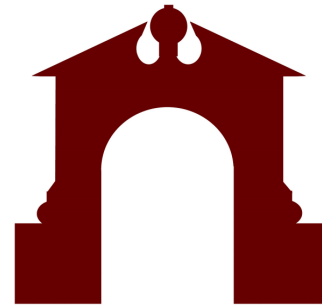
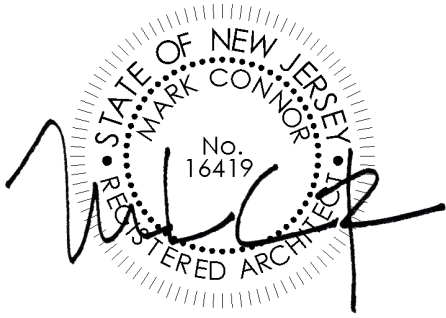




**RAMAPO
COLLEGE**
OF NEW JERSEY

505 RAMAPO VALLEY ROAD
MAHWAH, NEW JERSEY 07430

STUDENT CENTER

PHASE 2: ADDITIONS AND ALTERATIONS

RCNJ No. 2014-37-01C

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RAMAPO COLLEGE OF NEW JERSEY
STUDENT CENTER - PHASE 2: ADDITIONS AND ALTERATIONS
TABLE OF CONTENTS

DIVISION 02 – EXISTING CONDITIONS

02 4100 DEMOLITION

DIVISION 03 – CONCRETE

03 3000 CAST-IN-PLACE CONCRETE

DIVISION 04 – MASONRY

04 2000 UNIT MASONRY

DIVISION 05 - METALS

05 1200 STRUCTURAL STEEL

05 3100 STEEL DECKING

DIVISION 05 - METALS

05 5213 PIPE AND TUBE RAILINGS

05 7000 ORNAMENTAL METAL

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 1000 ROUGH CARPENTRY

06 2000 FINISH CARPENTRY

06 4100 ARCHITECTURAL MILLWORK

06 4216 WOOD-VENEER PANELING

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 0533 FIRE AND SMOKE ASSEMBLY IDENTIFICATION

07 2100 THERMAL INSULATION

07 2129 SPRAYED INSULATION

07 2500 WEATHER BARRIERS

07 4214 INSULATED METAL WALL PANELS

07 5323 ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING (EPDM)

07 6200 SHEET METAL FLASHING AND TRIM

07 9200 JOINT SEALANTS

07 9513 EXPANSION JOINT COVER ASSEMBLIES

DIVISION 08 – OPENINGS

08 1113	HOLLOW METAL DOORS AND FRAMES
08 1116	ALUMINUM DOORS AND FRAMES
08 3513.13	FOLDING SECURITY GRILLES
08 4313	ALUMINUM-FRAMED STOREFRONTS
08 6300	METAL-FRAMED SKYLIGHTS
08 7100	DOOR HARDWARE
08 8000	GLAZING
08 8100	POINT SUPPORTED GLAZING SYSTEMS

DIVISION 09 – FINISHES

09 0561	COMMON WORK RESULTS FOR FLOORING PREPARATION
09 2116	GYPSUM BOARD ASSEMBLIES
09 2216	NON-STRUCTURAL METAL FRAMING
09 3000	TILING
09 5100	CEILINGS
09 6813	TILE CARPETING
09 7200	WALL COVERINGS
09 9113	EXTERIOR PAINTING
09 9123	INTERIOR PAINTING

DIVISION 10 – SPECIALTIES

10 1400	SIGNAGE
10 2113.19	PLASTIC TOILET COMPARTMENTS
10 2800	TOILET, BATH, AND LAUNDRY ACCESSORIES
10 4400	FIRE PROTECTION SPECIALTIES

DIVISION 11 - EQUIPMENT

11 4000	FOODSERVICE EQUIPMENT
---------	-----------------------

DIVISION 12 - FURNISHINGS

12 3600	COUNTERTOPS
---------	-------------

DIVISION 21 - FIRE SUPPRESSION

21 0500	COMMON WORK RESULTS FOR FIRE SUPPRESSION
21 0553	IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT
21 1300	FIRE SUPPRESSION SPRINKLERS

DIVISION 22 - PLUMBING

22 0553	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
22 0719	PLUMBING PIPING INSULATION
22 1005	PLUMBING PIPING
22 1006	PLUMBING PIPING SPECIALTIES
22 4000	PLUMBING FIXTURES

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

23 0513	COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT
23 0548	VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT
23 0553	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
23 0593	TESTING, ADJUSTING, AND BALANCING FOR HVAC
23 0713	DUCT INSULATION
23 0719	HVAC PIPING INSULATION
23 0913	INSTRUMENTATION AND CONTROL DEVICES FOR HVAC
23 2113	HYDRONIC PIPING
23 2114	HYDRONIC SPECIALTIES
23 3100	HVAC DUCTS AND CASINGS
23 3300	AIR DUCT ACCESSORIES
23 3423	POWER VENTILATORS
23 3700	AIR OUTLETS AND INLETS
23 8200	CONVECTION HEATING AND COOLING UNITS

DIVISION 26 - ELECTRICAL

26 0501	MINOR ELECTRICAL DEMOLITION
26 0519	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 0526	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 0529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
26 0534	CONDUIT
26 0537	BOXES
26 0553	IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 0923	LIGHTING CONTROL DEVICES
26 2416	PANELBOARDS
26 2726	WIRING DEVICES
26 2813	FUSES
26 2818	ENCLOSED SWITCHES
26 2913	ENCLOSED CONTROLLERS
26 5100	INTERIOR LIGHTING

26 5600 EXTERIOR LIGHTING

DIVISION 27 - COMMUNICATIONS

27 1005 STRUCTURED CABLING FOR VOICE AND DATA - INSIDE-PLANT

DIVISION 31 - EARTHWORK

31 2316 EXCAVATION

31 2323 FILL

SECTION 02 4100
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements.
- B. Selective demolition of building elements for alteration purposes.
- C. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 1000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
- C. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- D. Section 01 5713 - Temporary Erosion and Sediment Control.
- E. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- F. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- G. Section 01 7419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.
- H. Section 31 2200 - Grading: Topsoil removal.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
 - 1. Vegetation to be protected.
 - 2. Areas for temporary construction and field offices.
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
 - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
 - 2. Identify demolition firm and submit qualifications.
 - 3. Include a summary of safety procedures.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
 - 1. Minimum of ___ years of documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fill Material: As specified in Section 31 2323 - Fill.

PART 3 EXECUTION

3.01 SCOPE

- A. Remove concrete slabs on grade as indicated on drawings.
- B. Remove manholes and manhole covers, curb inlets and catch basins.
- C. Remove fences and gates.
- D. Remove other items indicated, for salvage, relocation, and recycling.
- E. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with other requirements specified in Section 01 7000.
- B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Comply with applicable requirements of NFPA 241.
 - 3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 4. Provide, erect, and maintain temporary barriers and security devices.
 - 5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 7. Do not close or obstruct roadways or sidewalks without permit.
 - 8. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
 - 9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- C. Do not begin removal until receipt of notification to proceed from Owner.
- D. Protect existing structures and other elements that are not to be removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- E. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- F. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- G. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Dismantle existing construction and separate materials.

2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 1. Verify that construction and utility arrangements are as shown.
 2. Report discrepancies to Architect before disturbing existing installation.
 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove existing work as indicated and as required to accomplish new work.
 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 2. Remove items indicated on drawings.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 3. See Section 01 1000 for other limitations on outages and required notifications.
 4. Verify that abandoned services serve only abandoned facilities before removal.

5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- F. Protect existing work to remain.
 1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
 4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 03 3511 - Concrete Floor Finishes: Densifiers, hardeners, applied coatings, and polishing.
- B. Section 07 9200 - Joint Sealants: Products and installation for sealants for saw cut joints and isolation joints in slabs.

1.02 REFERENCE STANDARDS

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; American Concrete Institute International; 2010.
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2009).
- C. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International; 2010 (Errata 2012).
- D. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (Errata 2007).
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
- F. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 2010.
- G. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 2010.
- H. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).
- I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.
- J. ACI 347R - Guide to Formwork for Concrete; American Concrete Institute International; 2014.
- K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Billet-Steel Bars for Concrete Reinforcement; 2015.
- L. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2014.
- M. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.
- N. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.
- O. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.
- P. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- Q. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.
- R. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.
- S. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

- T. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes; 2001 (Reapproved 2012).
- U. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
- V. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures; 2010.
- W. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2014.
- X. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
- Y. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2014.
- Z. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2011.
- AA. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
- AB. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting; 2015.
- AC. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.
- AD. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
 - 1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
- C. Mix Design: Submit proposed concrete mix design.
 - 1. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
- D. Samples: Submit samples of underslab vapor retarder to be used.
- E. Sustainable Design Submittal: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete cast in place, mix design(s) used showing the quantity of portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used; use LEED New Product Content Form.

1.04 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
 - 2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
 - 3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
 - 2. Finish: Unfinished, unless otherwise indicated.
- B. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - 3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150, type I/II Portland type.
- B. Fine and Coarse Aggregates: ASTM C 33.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Calcined Pozzolan: ASTM C618, Class N.
- E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.
- F. Water: Clean and not detrimental to concrete.

2.04 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Air Entrainment Admixture: ASTM C260/C260M.
- C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
- D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.
- F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- G. Accelerating Admixture: ASTM C494/C494M Type C.
- H. Retarding Admixture: ASTM C494/C494M Type B.
- I. Water Reducing Admixture: ASTM C494/C494M Type A.
- J. Shrinkage Reducing Admixture:

2.05 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.
 - 1. Installation: Comply with ASTM E1643.
 - 2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations in vapor retarder.
- B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. ASTM C1107/C1107M; Grade A, B, or C.
 - 2. Minimum Compressive Strength at 48 Hours, ASTM C109/C109M: 2,000 pounds per square inch.
 - 3. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.
- C. Non-Shrink Epoxy Grout: Moisture-insensitive, two-part; consisting of epoxy resin, non-metallic aggregate, and activator.
 - 1. Composition: High solids content material exhibiting positive expansion when tested in accordance with ASTM C827/C827M.
 - 2. Minimum Compressive Strength at 7 days, ASTM C579: 12,000 pounds per square inch.

2.06 BONDING AND JOINTING PRODUCTS

- A. Epoxy Bonding System:
 - 1. Complying with ASTM C881/C881M and of Type required for specific application.
- B. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
 - 1. Material: ASTM D1751, cellulose fiber.
- C. Slab Contraction Joint Device: Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.
- D. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with minimum 1 inch diameter holes for conduit or rebars to pass through at 6 inches on center; ribbed steel stakes for setting.

2.07 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
- B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.
- C. Curing and Anti-Spalling Compound: Boiled linseed oil compound.
- D. Curing and Sealing Compound, Moisture Emission Reducing: Liquid, membrane-forming, clear sealer, for application to newly placed concrete; capable of providing adequate bond for flooring adhesives, initially and over the long term; with sufficient moisture vapor impermeability to prevent deterioration of flooring adhesives due to moisture emission.
 - 1. Use this product to cure and seal all slabs to receive adhesively applied flooring or roofing.

2. Comply with ASTM C309 and ASTM C1315 Type I Class A.
3. VOC Content: Less than 100 g/L.
4. Solids Content: 25 percent, minimum.
- E. Curing Compound, Non-dissipating: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C309.
- F. Curing and Sealing Compound, Low Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type I Class A.
- G. Moisture-Retaining Sheet: ASTM C171.
 1. Curing paper, regular.
 2. Polyethylene film, clear, minimum nominal thickness of 0.0040 inch.
 3. White-burlap-polyethylene sheet, weighing not less than 10 ounces per linear yard, 40 inches wide.
- H. Polyethylene Film: ASTM D2103, 4 mil thick, clear.
- I. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
 1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- D. Normal Weight Concrete:
 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: As indicated on drawings.

2.09 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
 1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.

- E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- F. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
 - 1. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as shown on the drawings. Do not use sand.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Notify Architect not less than 24 hours prior to commencement of placement operations.
- C. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- D. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- E. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Locate joints as indicated on the drawings and no further than 20 feet on-center.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.
- E. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Maximum Variation of Surface Flatness:
 - 1. Exposed Concrete Floors: 1/4 inch in 10 feet.
 - 2. Under Seamless Resilient Flooring: 1/4 inch in 10 feet.
 - 3. Under Carpeting: 1/4 inch in 10 feet.
- B. Correct the slab surface if tolerances are less than specified.

- C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile, ceramic tile, and terrazzo with full bed setting system.
 - 2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, thin set quarry tile, and thin set ceramic tile.
 - 3. Decorative Exposed Surfaces: Trowel as described in ACI 302.1R; use steel-reinforced plastic trowel blades instead of steel blades to avoid black-burnish marks; decorative exposed surfaces include surfaces to be stained or dyed, pigmented concrete, surfaces to receive liquid hardeners, surfaces to receive dry-shake hardeners, surfaces to be polished, and all other exposed slab surfaces.

3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 - 1. Normal concrete: Not less than 7 days.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. Surfaces Not in Contact with Forms:
 - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 - a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.
 - b. Spraying: Spray water over floor slab areas and maintain wet.
 - c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 - 2. Final Curing: Begin after initial curing but before surface is dry.
 - a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.

3.09 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.

- C. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- D. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.
- E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.11 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete Block.
- B. Clay Facing Brick.
- C. Mortar and Grout.
- D. Reinforcement and Anchorage.
- E. Flashings.
- F. Lintels.
- G. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 2000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.
- B. Section 06 1000 - Rough Carpentry: Nailing strips built into masonry.
- C. Section 07 2100 - Thermal Insulation: Insulation for cavity spaces.
- D. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- D. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2015.
- E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- F. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a.
- G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- H. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- I. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2012.
- J. ASTM C55 - Standard Specification for Concrete Building Brick; 2011.
- K. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2014.
- L. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.
- M. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
- N. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2011.
- O. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.

- P. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- Q. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- R. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- S. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.
- T. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- U. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2011b.
- V. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- W. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
- X. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.
- Y. ASTM C1634 - Standard Specification for Concrete Facing Brick; 2011.
- Z. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.
- AA. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- C. Samples: Submit four samples of decorative block units to illustrate color, texture, and extremes of color range.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
 - 1. Maintain one copy of each document on project site.

1.07 MOCK-UP

- A. Construct a masonry wall as a mock-up panel sized 8 feet (2.4 m) long by 6 feet (1.8 m) high; include mortar, accessories, structural backup, and flashings (with lap joint, corner, and end dam) in mock-up.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 x 8 inches (400 x 200 mm) and nominal depth of 4 inches (100 mm).
 - 2. Non-Loadbearing Units: ASTM C129.
 - a. Solid block, as indicated.

2.02 BRICK UNITS

- A. Manufacturers:
 - 1. Belden Brick; Belcrest: www.beldenbrick.com.
 - 2. Boral Bricks, Inc: www.boralbricks.com.
 - 3. Endicott Clay Products Co: www.endicott.com.
 - 4. General Shale Brick: www.generalshale.com.
 - 5. Substitutions: See section 01 6000 - Product Requirements.
- B. Facing Brick: ASTM C216, Type FBS, Grade SW.
 - 1. Color and texture: To match existing building brick..
 - 2. Nominal size: To match existing building brick.
 - 3. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M, Type N.
 - 1. Colored Mortar: Premixed cement as required to match existing building mortar.
- B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
 - 1. Not more than 0.60 percent alkali.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Mortar Aggregate: ASTM C144.
- E. Grout Aggregate: ASTM C404.
- F. Water: Clean and potable.
- G. Accelerating Admixture: Nonchloride type for use in cold weather.
- H. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.
- I. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Type S.
 - 2. Color: Mineral pigments added as required to produce approved color sample.
 - 3. Use Type "S" mortar in construction of concrete unit masonry; in all exterior building walls, all walls noted on Drawings as bearing walls or shear walls, and all masonry in contact with earth.
 - 4. Limit cementitious materials in mortar to portland cement-lime.
 - a. Mixes containing masonry cement are not acceptable.

- b. Do not add admixtures including colored pigments, air entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds, or other admixtures, unless otherwise indicated.
 - c. Do not use calcium chloride in mortar.
- J. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, hydrated lime, and graded sand; capable of producing Type N mortar in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Type N.
 - a. Use type "N" mortar, portland-lime mix or masonry cement complying with ASTM C91 for all masonry except as noted in "Mortar - Type "S" above.
 - b. Pre-blending: Pre-blend Type "N" mortar materials as required for type "S" mortar above.
- K. New Mortar for Old Brick: Proportioned by volume only; not more than 20 percent of the total volume of Portland cement and lime combined shall be Portland cement.
 - 1. Sand: match original mortar as closely as possible in color, size, and texture, without use of other activities.
 - 2. Do not use modern additives unless permitted in writing by Architect.
 - 3. Repointing Mortar: Use proportions from 1 part lime to 20 parts sand with no Portland cement, up to 2 parts Portland cement to 3 parts lime to 6 parts sand.
 - 4. White Portland Cement: Use for repointing mortar where Portland cement is permitted.
 - 5. Use mortar within 30 minutes after final mixing; do not add more water after the initial mix is prepared.
- L. Mixing: Use mechanical batch mixer and comply with referenced standards.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers of Joint Reinforcement and Anchors:
 - 1. Blok-Lok Limited; _____: www.blok-lok.com.
 - 2. Hohmann & Barnard, Inc (including Dur-O-Wal brand); _____: www.h-b.com.
 - 3. WIRE-BOND: www.wirebond.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- C. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M, Class 3; 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage on each exposure.
- D. Strap Anchors: Bent steel shapes configured as required for specific situations, 1-1/4 in (32 mm) width, 0.105 in (2.7 mm) thick, lengths as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage from masonry face, corrugated for embedment in masonry joint, hot dip galvanized to ASTM A 153/A 153M, Class B.
- E. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage from masonry face.
- F. Wall Ties: Corrugated formed sheet metal, 7/8 inch (22 mm) wide by 0.05 inch (1.22 mm) thick, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not more than 1 inch (25 mm) and not less than 1 inch (25 mm) of mortar coverage from masonry face.

- G. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch (4.8 mm) thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in (32 mm).
- H. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
 - 1. Anchor plates: Not less than 0.075 inch (1.91 mm) thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
 - 2. Wire ties: Manufacturer's standard shape, 0.1875 inch (4.75 mm) thick.
 - 3. Vertical adjustment: Not less than 3-1/2 inches (89 mm).
- I. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A 153/A 153M.
 - 1. Products:
 - a. ITW Commercial Construction North America; Teks Select Series; _____: www.ITWBuildex.com.

2.05 FLASHINGS

- A. Copper/Fiberglass Fabric Flashing: 3 oz/sq ft (0.915 kg/sq m) copper sheet bonded with a rubber based adhesive laminated between two sheets of heavy fiberglass fabric, weighing not less than .3 oz/sf/layer (10 x 20 threads per inch). Provide Multi-Flash 500 manufactured by York Manufacturing, or equivalent.
 - 1. Manufacturers:
 - a. Advanced Building Products, Inc.; Copper Sealtite 2000: www.advancedbuildingproducts.com.
- B. Rubberized Asphalt Flashing: Self-adhering polymer modified asphalt sheet; 40 mils (0.040 inch) (1.0 mm) minimum total thickness; with cross laminated polyethylene top and bottom surfaces.
 - 1. Manufacturers:
 - a. Advanced Building Products, Inc.; Strip-N-Flash: www.advancedbuildingproducts.com.
 - b. York Manufacturing, Inc; York Seal: www.yorkmfg.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- C. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gage, 0.0187 inch (0.48 mm) thick; finish 2B to 2D.
- D. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.
- E. Adhesives, Primers and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by the flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.06 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
 - 1. Manufacturers:
 - a. Blok-Lok Limited; _____: www.blok-lok.com.

- b. Hohmann & Barnard, Inc (including Dur-O-Wal brand); _____: www.h-b.com.
 - c. WIRE-BOND: www.wirebond.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; 3/8 inch (____ mm) wide x by maximum lengths available.
 - 1. Manufacturers:
 - a. Hohmann & Barnard, Inc (including Dur -O-Wal brand); _____: www.h-b.com.
 - b. WIRE-BOND: www.wirebond.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
 - 1. Full-Height Airspace Maintenance and Drainage Material: Mesh panels, attached to rigid insulation of type indicated and fitted between masonry ties.
 - a. Manufacturers:
 - 1) CavClear/Archovations, Inc; CavClear Masonry Mat: www.cavclear.com.
 - 2) Substitutions: See Section 01 6000 - Product Requirements.
- D. Nailing Strips: Softwood lumber, preservative treated; as specified in Section 06 1000.
- E. Termination Bars: Stainless steel; compatible with membrane and adhesives.
- F. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.
- G. Cavity Vents:
 - 1. Type: Molded PVC grilles, insect resistant.
 - 2. Manufacturers:
 - a. Blok-Lok Limited; Cell Vent: www.blok-lok.com.
 - b. Hohmann & Barnard, Inc; QV Quadro-Vent: www.h-b.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- H. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials. Job mixed detergent solution: Solution of 1/2 dry cup tetrasodium polyphosphate and 1/2 dry cup measure laundry detergent dissolved in 1 gallon of water.
- I. Acidic Cleaner: Manufacturer's standard strength cleaner designed for removing mortar/grout stains, efflorescence and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.07 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Exterior, non-loadbearing masonry: Type N.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. New Mortar for Old Brick: Proportioned by volume only; not more than 20 percent of the total volume of Portland cement and lime combined shall be Portland cement.

1. Sand: Match original mortar as closely as possible in color, size, and texture, without use of other additives.
- D. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches (50 mm) or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches (50 mm).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

3.04 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 1. Bond: Running.
 2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
 3. Mortar Joints: Concave.
- D. Brick Units:
 1. Bond: As indicated for different locations.
 2. Coursing: Three units and three mortar joints to equal 8 inches (200 mm).
 3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Interlock intersections and external corners, except for units laid in stack bond.
 1. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to opening.

2. Cut masonry units with motor-drive saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
 1. Match coursing, bonding, color, and texture of new masonry with existing masonry, unless otherwise specified or shown on Drawings.
 - G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
 - H. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond; do not "tooth". Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.
 - I. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

3.06 WEEPS/CAVITY VENTS

- A. Install weeps in veneer walls at 24 inches (600 mm) on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.
- B. Install cavity vents in veneer walls at 24 inches (600 mm) on center horizontally near top of walls and below window sills.

3.07 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions. Verify that airspace width is no more than 3/8 inch (9 mm) greater than panel thickness. Install horizontally between joint reinforcement. Stagger end joints in adjacent rows. Fit to perimeter construction and penetrations without voids.
- D. Mortar Net Installation: Comply with mortar net manufacturer's installation instructions. Install continuous throughout full height of exterior wall and over wall openings directly on flashing to prevent mortar droppings from blocking weep/cavity vents.

3.08 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches (400 mm) on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches (900 mm) horizontally and 24 inches (600 mm) vertically.

3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Install horizontal joint reinforcement 16 inches (400 mm) on center.

- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches (150 mm).
- E. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 1.77 sq ft (0.16 sq m) of wall surface per anchor. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches (200 mm) on center.
- F. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.
- G. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches (400 mm) on center.

3.10 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 4 inches into adjacent masonry or turn up at least 8 inches (___ mm) to form watertight pan at non-masonry construction.
 - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
 - 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Extend metal flashings through exterior face of masonry and turn down to form drip. Install joint sealer below drip edge to prevent moisture migration under flashing.
- C. Lap end joints of flashings at least 6 inches (152 mm) and seal watertight with flashing sealant/adhesive.

3.11 LINTELS

- A. Install loose steel lintels over openings.
 - 1. Provide open space not less than 1-inch wide between masonry and structural member, unless otherwise indicate. Keep open space free of mortar or other rigid materials.

3.12 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joint in accordance with proposed sealant manufacturer's performance requirements.
- E. Form expansion joint as detailed on drawings.
- F. Provide vertical and horizontal expansion, control, and isolation joints in masonry where shown and as specified below; install related items such as metal expansion joint covers as masonry construction progresses.
 - 1. Space joints as shown on Drawings; however, not more than 30 feet o.c. for expansion joints in brick or clay masonry and 25 feet for control joints in concrete block walls.

2. Do not form continuous span through movement joints.
 3. Fill joints in fire-rated walls with joint filler materials suitable to maintain required fire rating of wall.
- G. Expansion Joints in Brick:
1. Form open joint of width shown on Drawings, but not less than 3/8-inch. Maintain joint free and clear of mortar. Install compressible joint filler, backer rod, and sealant in accordance with manufacturer's recommendations and other articles in this manual.
 2. Construct horizontal pressure relieving joints where shown on Drawings. Insert compressible joint filler, backer rod, and sealant below lintel in accordance with manufacturer's recommendations and other articles in this manual.

3.13 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch (1.6 mm).
 1. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft (6 mm/3 m) and 1/2 inch in 20 ft (13 mm/6 m) or more.
- C. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft (3 mm/m) and 1/4 inch in 10 ft (6 mm/3 m); 1/2 inch in 30 ft (13 mm/9 m).
- E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch (minus 6.4 mm, plus 9.5 mm).
- F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch (6 mm).

3.14 CUTTING AND FITTING

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.
 1. Provide vertical and horizontal expansion, control, and isolation joints in masonry where shown and as specified below; install related items such as metal expansion joint covers as masonry construction progresses.

3.15 FIELD QUALITY CONTROL

- A. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for conformance to requirements of this specification.
- B. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.
- C. Contractor Requirements
 1. Provide access to site for designated representatives of Owner to conduct testing during construction, and provide unit samples, mortar cubes, and prisms required for testing upon Owner's request.
 2. Notify Owner's Representative at least 2 days in advance of commencement of laying to allow notification of Owner's Testing Agency. Do not grout or otherwise conceal reinforcing bars prior to inspection by the testing agency.

3.16 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.17 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 05 1200
STRUCTURAL STEEL

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; American Institute of Steel Construction, Inc.; 2011.
- B. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2010.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- E. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2014.
- F. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric); 2014.
- G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- H. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2007a (Reapproved 2014).
- I. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts [Metric]; 2007.
- J. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2015.
- K. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011 (Reapproved 2015).
- L. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability and Ultra-High Strength; 2014.
- M. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
- N. ASTM E94 - Standard Guide for Radiographic Examination; 2004 (Reapproved 2010).
- O. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2013.
- P. ASTM E165/E165M - Standard Test Method for Liquid Penetrant Examination for General Industry; 2012.
- Q. ASTM E709 - Standard Guide for Magnetic Particle Testing; 2014.
- R. ASTM F436 - Standard Specification for Hardened Steel Washers; 2011.
- S. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2007a.
- T. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
- U. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2011 w/Errata.
- V. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.

- W. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2009.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - 2. Connections not detailed.
 - 3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.
- E. Fabricator Test Reports: Comply with ASTM A1011/A1011M.
- F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.
- G. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.03 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC "Steel Construction Manual."
- B. Comply with Section 10 of AISC "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.
- C. Fabricator: Company specializing in performing the work of this section with minimum 5 years of documented experience.
- D. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).
- E. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience.
- F. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Steel W Shapes and Tees: ASTM A992/A992M.
- C. Rolled Steel Structural Shapes: ASTM A992/A992M.
- D. Steel Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.
- E. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.
- F. Pipe: ASTM A53/A53M, Grade B, Finish black.

- G. High-Strength Structural Bolts, Nuts, and Washers: ASTM A325 or ASTM A325M, Type 1, medium carbon, plain, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436 washers.
- H. Headed Anchor Rods: ASTM F1554, Grade 36, zinc-coated.
- I. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- J. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C1107/C1107M and capable of developing a minimum compressive strength of 7,000 psi at 28 days.
- K. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- C. Fabricate connections for bolt, nut, and washer connectors.

2.03 FINISH

- A. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

2.04 SOURCE QUALITY CONTROL

- A. Welded Connections: Visually inspect all shop-welded connections and test at least 15 percent of welds using one of the following:
 - 1. Radiographic testing performed in accordance with ASTM E94.
 - 2. Ultrasonic testing performed in accordance with ASTM E164.
 - 3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
 - 4. Magnetic particle inspection performed in accordance with ASTM E709.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".
- B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Field weld components and shear studs indicated on shop drawings.
- D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC "Specification for Structural Joints Using High-Strength Bolts".
- E. Do not field cut or alter structural members without approval of Architect.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.03 FIELD QUALITY CONTROL

- A. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC "Specification for Structural Joints Using High-Strength Bolts", testing at least 15 percent of bolts at each connection.
- B. Welded Connections: Visually inspect all field-welded connections and test at least 15 percent of welds using one of the following:
 - 1. Radiographic testing performed in accordance with ASTM E94.
 - 2. Ultrasonic testing performed in accordance with ASTM E164.
 - 3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
 - 4. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION

SECTION 05 3100
STEEL DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof deck.

1.02 REFERENCE STANDARDS

- A. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- B. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2011 w/Errata.
- C. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; American Welding Society; 2008.
- D. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.
- E. ICC-ES AC43 - Acceptance Criteria for Steel Deck Roof and Floor Systems; ICC Evaluation Service, Inc.; 2010 (R2013).
- F. ICC-ES AC70 - Acceptance Criteria for Fasteners Power Driven into Concrete, Steel and Masonry Elements; ICC Evaluation Service, Inc.; 2013.
- G. SDI (DM) - Publication No.31, Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute; 2007.
- H. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; Society for Protective Coatings; 1999 (Ed. 2004).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
- C. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.
- D. Submit manufacturer's installation instructions.
- E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.
- F. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.04 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).
- B. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.
- B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.01 STEEL DECK

- A. Roof Deck: Non-composite type, fluted steel sheet:
 - 1. Ungalvanized Steel Sheet: ASTM A1008/A1008M, Designation SS, Grade 40, Type 1.
 - 2. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.

2.02 ACCESSORY MATERIALS

- A. Welding Materials: AWS D1.1/D1.1M.
- B. Powder Actuated Mechanical Fasteners: Steel; with knurled shank and forged ballistic point. Comply with applicable requirements of ICC-ES AC70.
 - 1. Design Requirements: Provide number and type of fasteners that comply with the applicable requirements of SDI design method for roof deck and floor deck applications and ICC-ES AC43.
- C. Mechanical Fasteners: Steel; hex washer head, self-drilling, self-tapping.
 - 1. Design Requirements for Sidelap Connections: Provide number and type of fasteners that comply with the applicable requirements of SDI design method for roof deck and floor deck applications and ICC-ES AC43.
- D. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- F. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the deck.

2.03 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gage, 0.0299 inch thick sheet steel; of profile and size as indicated; finished same as deck.
- B. Cant Strips: Formed sheet steel, ___ gage, ___ inch minimum thickness, 45 degree slope, 3-1/2 inch nominal width and height, flange for attachment.
- C. Roof Sump Pans: Formed sheet steel, 14 gage, 0.0747 inch minimum thickness, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.

3.02 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On steel supports provide minimum 1-1/2 inch bearing.
- C. Drive mechanical sidelap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.
- D. Weld deck in accordance with AWS D1.3/D1.3M.
- E. At deck openings from 6 inches to 18 inches in size, provide 2 by 2 by 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.

- F. Where deck (other than cellular deck electrical raceway) changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.
- G. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.
- H. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.
- I. Place metal cant strips in position and fusion weld.
- J. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- K. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stair railings and guardrails.
- B. Free-standing railings at steps.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- D. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Handrails and Railings:
 - 1. Alumi-Guard, Inc.; ____: www.alumi-guard.com.
 - 2. C.R. Laurence Co., Inc; CRL Welded Post Railing Systems (WRS): www.crl-arch.com.
 - 3. Kee Safety, Inc; Kee Klamp (steel): www.keesafety.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Non-Weld Pipe Fittings:
 - 1. Kee Safety, Inc; Kee Klamp (steel): www.keesafety.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- C. Metal Rail Infill:
 - 1. The Western Group; Woven Wire: www.architecturalwire.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.
- B. Allow for expansion and contraction of members and building movement without damage to connections or members.
- C. Dimensions: See drawings for configurations and heights.

- D. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
- E. Provide slip-on non-weld mechanical fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.03 STEEL RAILING SYSTEM

- A. Steel Tube: ASTM A500/A500M, Grade B cold-formed structural tubing.
- B. Steel Pipe: ASTM A53/A53M, Grade B Schedule 80, black finish.
- C. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.
- D. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- E. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- F. Straight Splice Connectors: Steel concealed spigots.

2.04 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
 - 1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 - 2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
 - 3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.
- C. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

- C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- D. Anchor railings securely to structure.
- E. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.
- F. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

END OF SECTION

SECTION 05 7000
ORNAMENTAL METAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This section includes the following:
 - 1. Metal trims, edges, and accessories related to architectural millwork. Refer to the documents for information on size, shape, and finish.

1.03 PERFORMANCE REQUIREMENTS

- A. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.04 SUBMITTALS

- A. Product Data: For each product used in ornamental metal, including finishing materials and methods.
- B. Shop Drawings: Show fabrication and installation of ornamental metal. Include plans, elevations, component details, and attachments to other Work. Indicate materials and profiles of each ornamental metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
 - 1. Include setting drawings, templates, and directions for installing anchor bolts and other anchorages.
- C. Samples for Verification: For each profile and pattern of fabricated metal and for each type of metal finish required, prepared on metal of same thickness and alloy indicated for the Work. If finishes involve normal color and texture variations, include sample sets, consisting of two or more units, showing the full range of variations expected.
 - 1. Include 6-inch- (150-mm-) long samples of linear shapes.
- D. Welding Certificates: Copies of certificates for welding procedures and personnel.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Arrange for installation of ornamental metal specified in this Section by the same firm that fabricated it.
- B. Single source fabrication of Ornamental Metal and Architectural Millwork.
- C. Fabricator Qualifications: A firm experienced in producing ornamental metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store ornamental metal inside a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Where ornamental metal is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.08 COORDINATION

- A. Coordinate installation of anchorages for ornamental metal items. Furnish Setting Drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements of this specification.

2.02 METALS

- A. General: Provide metals free from surface blemishes where exposed to view in finished unit.
- B. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.
- C. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required:
 - 1. Extruded Bars and Shapes: ASTM B 221 (ASTM B 221M), alloy 6063-T6.
- D. Fasteners: Use fasteners of same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
 - 1. Provide concealed fasteners for interconnecting ornamental metal components and for attaching them to other work, unless otherwise indicated.

2.03 FABRICATION, GENERAL

- A. Form ornamental metal to required shapes and sizes, with true curves, lines, and angles. Provide components in sizes and profiles indicated, but not less than that needed to comply with requirements indicated for structural performance.
- B. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Drill and tap for required fasteners, unless otherwise indicated. Use concealed fasteners where possible.
- C. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.
- D. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.
- E. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

2.04 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.05 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Baked-Enamel Finish: AA-C12C42Rlx (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's specifications for cleaning, conversion coating, and painting.
- C. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 603.8 except with a minimum dry film thickness of 1.5 mils (0.04 mm), medium gloss.
 - 1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of ornamental metal, restore finishes to eliminate any evidence of such corrective work.
- B. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- C. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.
- D. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.
- E. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with wood, or dissimilar metals with a heavy coat of bituminous paint.

3.02 CLEANING

- A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."
- C. PROTECTION
 - 1. Protect finishes of ornamental metal from damage during construction period with temporary protective coverings approved by ornamental metal fabricator. Remove protective covering at the time of Substantial Completion.
 - 2. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

**SECTION 06 1000
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof-mounted curbs.
- B. Preservative treated wood materials.
- C. Fire retardant treated wood materials.
- D. Miscellaneous framing and sheathing.
- E. Communications and electrical room mounting boards.
- F. Concealed wood blocking, nailers, and supports.
- G. Miscellaneous wood nailers, furring, and grounds.

1.02 REFERENCE STANDARDS

- A. AFPA (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; American Forest and Paper Association; 2012.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- E. AWP A U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association; 2012.
- F. PS 1 - Structural Plywood; 2009.
- G. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; National Institute of Standards and Technology, U.S. Department of Commerce; 2010.
- H. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology, Department of Commerce; 2010.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.
- C. Lumber fabricated from recovered timber (abandoned in transit) is permitted in lieu of sustainably harvested lumber, unless otherwise noted, provided it meets the specified requirements for new lumber and is free of contamination; identify source.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.
 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Subfloor/Underlayment Combination: Any PS 2 type, rated Single Floor.
1. Bond Classification: Exterior.
 2. Span Rating: 48.
 3. Performance Category: 1-1/8 PERF CAT.
- B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
 3. Anchors: Toggle bolt type for anchorage to hollow masonry.
- B. Subfloor Glue: Waterproof, air cure type, cartridge dispensed.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Fire Retardant Treatment:
1. Exterior Type: AWWA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence

of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.

- a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat exposed exterior rough carpentry items, including stairways, balconies, and covered walkways
 - c. Do not use treated wood in direct contact with the ground.
- C. Preservative Treatment:
1. Preservative Pressure Treatment of Plywood Above Grade: AWP A U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft (4.0 kg/cu m) retention.
 - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - b. Treat plywood in contact with roofing, flashing, or waterproofing.
 - c. Treat plywood in contact with masonry or concrete.
 - d. Treat plywood less than 18 inches (450 mm) above grade.
 2. Preservative Pressure Treatment of Lumber in Contact with Soil: AWP A U1, Use Category UC4A, Commodity Specification A using waterborne preservative to 0.4 lb/cu ft (6.4 kg/cu m) retention.
 - a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
 - b. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AFPA Wood Frame Construction Manual.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

- F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.03 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Provide the following specific non-structural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Towel and bath accessories.
 - 6. Wall-mounted door stops.
 - 7. Wall paneling and trim.

3.04 INSTALLATION OF CONSTRUCTION PANELS

- A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.
 - 4. Size and Location: As indicated on drawings.

3.05 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

3.06 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from true position, maximum.
- B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

3.07 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Hardware and attachment accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 06 4100 - Architectural Millwork: Shop fabricated custom cabinet work.
- C. Section 06 4216 - Wood-Veneer Paneling: Shop fabricated custom paneling.
- D. Section 08 8000 - Glazing: Glass and glazing of wood partitions and screens.
- E. Section 09 9113 - Exterior Painting: Painting and finishing of finish carpentry items.
- F. Section 09 9123 - Interior Painting: Painting and finishing of finish carpentry items.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- E. AWMAC (GIS) - Guarantee and Inspection Services Program; current edition at www.awmac.com/gis.php.
- F. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association; 2012.
- G. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).
- H. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2009.
- I. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.
- J. PS 1 - Structural Plywood; 2009.
- K. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2010.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide data on fire retardant treatment materials and application instructions.
 - 2. Provide instructions for attachment hardware and finish hardware.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Provide the information required by AWI/AWMAC/WI (AWS).

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI (AWS) for Premium Grade.
- B. Interior Woodwork Items:
 - 1. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.
 - 2. Window Sills: Solid Surface.
 - 3. Suspended Wood Ceiling System: "FR-S" treated.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

2.03 LUMBER MATERIALS

- A. Softwood Lumber: pine or spruce species, _____ sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
- B. Hardwood Lumber: maple species, _____ sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

2.04 SHEET MATERIALS

- A. Softwood Plywood Not Exposed to View: Any face species, veneer core; PS 1 Grade A-B; glue type as recommended for application.
- B. Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1; glue type as recommended for application.

2.05 PLASTIC LAMINATE MATERIALS

- A. Plastic Laminate: NEMA LD 3, HGS; color as selected; textured, low gloss finish.
- B. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

2.06 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- B. Fasteners: Of size and type to suit application; stainless finish in concealed locations and stainless finish in exposed locations.
- C. Concealed Joint Fasteners: Threaded steel.

2.07 ACCESSORIES

- A. Lumber for Shimming, Blocking, and etc.: Softwood lumber of pine or spruce species.
- B. Glass: Type ____ as specified in Section 08 8000.
- C. Primer: Alkyd primer sealer.
- D. Wood Filler: Solvent base, tinted to match surface finish color.

2.08 HARDWARE

- A. Hardware: Comply with BHMA A156.9.

2.09 WOOD TREATMENT

- A. Factory-Treated Lumber: Comply with requirements of AWPA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.
- B. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
- C. Wood Preservative (Surface Application): Clear, _____ type, _____ manufactured by _____.
- D. Provide identification on fire retardant treated material.
- E. Redry wood after pressure treatment to maximum 6 percent moisture content.

2.10 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Fit exposed sheet material edges with 3/8 inch (9 mm) matching hardwood edging. Use one piece for full length only.
- C. Cap exposed plastic laminate finish edges with as indicated.
- D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- E. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet (600 mm) from sink cut-outs.

2.11 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. Prime paint surfaces in contact with cementitious materials.
- D. Back prime woodwork items to be field finished, prior to installation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

3.03 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply one coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

3.04 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 9113 and 09 9123.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.05 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

END OF SECTION

SECTION 06 4100
ARCHITECTURAL MILLWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Cabinet hardware.
- C. Factory finishing.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 05 7000 - Ornamental Metal.
- B. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- C. Section 12 3600 - Countertops.
- D. Section 06 6000 - High Pressure Decorative Laminates.
- E. Section 06 6100 - Simulated Stone Fabrications: Cast plastic countertops.
- F. Section 08 8000 - Glazing: Glass for casework.
- G. Section 09 9123 - Interior Painting: Site finishing of cabinet exterior.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).
- C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2009 (ANSI/HPVA HP-1).
- D. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.
- E. PS 1 - Structural Plywood; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Provide the information required by AWI/AWMAC/WI (AWS).

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

1.08 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. MYSTIC MILLWORK, JIM FITZGERALD - (781) 440-0914.
- B. ATLANTIC EQUIPMENT SPECIALISTS, (570) 271-1401.
- C. LYNCH EXHIBITS, (609) 239-1669.
- D. Substitutions: See Section 01 6000 - Product Requirements.
- E. Single Source Responsibility: Provide and install this work from single fabricator.

2.02 CABINETS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI (AWS) for Premium Grade.
- B. Wood Veneer Faced Cabinet:
 - 1. Exposed Surfaces: HPVA Grade A, Ash, plain sliced, random-matched.
- C. Plastic Laminate Faced Cabinets: Custom grade.

2.03 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

2.04 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. Refer to Section 06 6000 High Pressure Decorative Laminate.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- C. Provide specific types as scheduled.
 - 1. Horizontal Surfaces: HGS, 0.048 inch (1.22 mm) nominal thickness, colors as scheduled, finish as scheduled.
 - 2. Vertical Surfaces: VGS, 0.028 inch (0.71 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 3. Post-Formed Horizontal Surfaces: HGP, 0.039 inch (1.0 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 4. Flame Retardant Surfaces: HGF, 0.048 inch (1.22 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 5. Cabinet Liner: CLS, 0.020 inch (0.51 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 6. Laminate Backer: BKL, 0.020 inch (0.51 mm) nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

2.05 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Glass: Type A as specified in Section 08 8000.
- C. Fasteners: Size and type to suit application.

- D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- E. Concealed Joint Fasteners: Threaded steel.
- F. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.06 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch (25 mm) spacing adjustments.
- C. Adjustable Shelf Supports: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, satin chrome finish, for nominal 1 inch (25 mm) spacing adjustments.
- D. Hinges: Full surface (decorative) type, steel with polished finish.

2.07 SHOP TREATMENT OF WOOD MATERIALS

- A. Provide UL approved identification on fire retardant treated material.
- B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.08 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet (600 mm) from sink cut-outs.
 - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
 - 2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- E. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
 - 1. Provide sequence matching across each elevation.
- F. Provide cutouts for plumbing fixtures and kitchen equipment. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.
 - 1. All cutouts to have rounded corners to minimize cracking and be compliant with manufacturer's recommended methods.

2.09 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.

- C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (1 mm). Do not use additional overlay trim for this purpose.
- E. Secure cabinets to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- G. Site glaze glass materials using the Interior Dry method specified in Section 08 8000.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 06 4216
WOOD-VENEER PANELING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Custom wood veneer paneling.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Grounds and concealed blocking.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fire retardant treatment materials and application instructions.
- C. Samples: Submit two samples of finished plywood, ____x____ inch (____x____ mm) in size, illustrating wood grain and specified finish.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire retardant requirements.

1.06 MOCK-UP

- A. Construct mock-up, 2 feet (____ m) long by 2 feet (____ m) wide, illustrating full panel sheet, edge trim, joint trim, applied finish, and ____.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 FABRICATORS

- A. Stikwood: 866-226-8354, www.stikwood.com
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PANELING

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI (AWS) for Premium Grade.
- B. Flat Paneling:
 - 1. Species: Reclaimed Collection.
 - 2. Color: To be selected from manufacturers full range.
 - 3. Panels: Veneer of full width .
 - 4. Visible Edges and Reveals: As indicated on the Drawings.
 - 5. Outside Corners: As indicated on the Drawings.

2.03 WOOD-BASED MATERIALS - GENERAL

- A. Wood fabricated from old growth timber is not permitted.

2.04 ADHESIVES AND FASTENERS

- A. Adhesives: Self Adhesive.

2.05 WOOD TREATMENT PROCESSES

- A. Fire Retardant Treatment (FR-S Type) for Lumber: Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.

2.06 SHOP TREATMENT OF WOOD MATERIALS

- A. Provide UL approved identification on fire retardant treated material.

2.07 FABRICATION

- A. Prepare panels for delivery to site, permitting passage through building openings.
- B. Finish exposed edges of panels as specified by grade requirements.
- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting and scribing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- B. Do not begin installation until wood materials have been fully acclimated to interior conditions.
- C. Set and secure materials and components in place, plumb and level, using concealed fasteners wherever possible.
- D. Where necessary to cut and fit on site, scribe work abutting other components. Do not use additional overlay trim to conceal gaps.
- E. Touch up damaged finish to match original, using materials provided by fabricator; replace components that cannot be refinished like new.

END OF SECTION

SECTION 07 0533
FIRE AND SMOKE ASSEMBLY IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cash allowance for fire and smoke assembly identification.
- B. Identification markings for fire and smoke rated partitions, and fire rated walls.

1.02 REFERENCE STANDARDS

- A. ICC (IBC) - International Building Code; 2015.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of marking, indicating font, foreground and background colors, wording, and overall dimensions.
- C. Schedule: Completely define scope of proposed marking. Indicate location of affected walls and partitions, and number of markings.
- D. Samples: Submit two samples of each type of marking proposed for use, of size similar to that required for project, illustrating font, wording, and method of application.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Partition Identification Labels:
 - 1. Fire Wall Signs, Inc; _____: www.firewallsigns.com.
 - 2. Safety Supply Warehouse, Inc; _____: www.safetysupplywarehouse.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE AND SMOKE ASSEMBLY IDENTIFICATION

- A. Regulatory Requirements: Comply with "Marking and Identification" requirements of "Fire-Resistance Ratings and Fire Tests" chapter of the IBC.
- B. Adhered Fire and Smoke Assembly Identification Signs: Printed vinyl or paper sign with factory applied adhesive backing.
- C. Languages: Provide all markings in English.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Locate markings as required by the IBC.
- B. Install adhered markings in accordance with manufacturer's instructions.
- C. Install neatly, with horizontal edges level.
- D. Protect from damage until Substantial Completion; repair or replace damaged markings.

END OF SECTION

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at cavity wall construction, perimeter foundation wall, underside of floor slabs, over roof deck, over roof sheathing, and exterior wall behind brick and metal panel wall finish.
- B. Batt insulation in exterior wall, ceiling, and roof construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

- A. Section 04 2723 - Cavity Wall Unit Masonry: Masonry walls enclosing insulation.
- B. Section 05 4000 - Cold-Formed Metal Framing: Board insulation as wall sheathing.
- C. Section 06 1000 - Rough Carpentry: Supporting construction for batt insulation.
- D. Section 06 1000 - Rough Carpentry: Installation requirements for board insulation over steep slope roof sheathing or roof structure.
- E. Section 07 2119 - Foamed-In-Place Insulation: Plastic foam insulation other than boards.

1.03 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- E. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
- F. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies; 2011.
- G. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.05 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Under Concrete Slabs: Extruded polystyrene board.
- B. Insulation at Perimeter of Foundation: Expanded polystyrene board.
- C. Insulation Inside Masonry Cavity Walls: Extruded polystyrene board.
- D. Insulation Inside Prefabricated Wall Panels: Extruded polystyrene board.
- E. Insulation Over Metal Stud Framed Walls, Continuous: Extruded polystyrene board.
- F. Insulation Over Roof Deck: Polyisocyanurate board.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Expanded Polystyrene (EPS) Board Insulation: ASTM C578, Type XI; with the following characteristics:
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - 3. Board Size: 48 by 96 inch (1220 by 2440 mm).
 - 4. Board Thickness: 2 inches (50 mm).
 - 5. Thermal Resistance: R-value (RSI-value) of 3.1 (0.55) per 1 inch (25.4 mm) at 75 degrees F (24 degrees C) mean temperature.
 - 6. Manufacturers:
 - a. AFM Corp: www.r-control.com.
 - b. Diversifoam Products: www.diversifoam.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Extruded Polystyrene Board Insulation: Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - 3. R-value (RSI-value); 1 inch (25 mm) of material at 72 degrees F (22 C): 5 (0.88), minimum.
 - 4. Complies with fire resistance requirements shown on the drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 - 5. Manufacturers:
 - a. Dow Chemical Co: www.dow.com.
 - b. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com.
 - c. Kingspan Insulation LLC; GreenGuard XPS TYPE IV 25 PSI: www.trustgreenguard.com.

2.03 BATT INSULATION MATERIALS

- A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.
- B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.

1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 2. Formaldehyde Content: Zero.
 3. Manufacturers:
 - a. CertainTeed Corporation: www.certainteed.com.
 - b. Johns Manville: www.jm.com.
 - c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 2. Manufacturers:
 - a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com.
 - b. Thermafiber, Inc.; SAFB: www.thermafiber.com.
 - c. ROXUL, Inc; ComfortBatt: www.roxul.com.
 - d. ROXUL, Inc; Roxul AFB: www.roxul.com.

2.04 ACCESSORIES

- A. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Install boards horizontally on foundation perimeter.
 1. Install in running bond pattern.
 2. Butt edges and ends tightly to adjacent boards and to protrusions.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Immediately following application of board insulation, place protective boards over exposed insulation surfaces.
 1. Install boards horizontally from base of foundation to top of insulation.
 2. Butt boards tightly, with joints staggered from insulation joints.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Install rigid insulation directly to steel studs or exterior grade sheathing at 16 inches (406 mm) on center with manufacturer recommended mechanical fasteners. Tape all joints with manufacturer's minimum 4 inch (102 mm) wide sealant tape; comply with ASTM E2357.
- B. Install boards horizontally on walls.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- D. Place 6 inch (150 mm) wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames. Tape seal in place to ensure continuity of vapor retarder and air seal.

- E. Tape insulation board joints.

3.04 BOARD INSTALLATION AT CAVITY WALLS

- A. Install boards to fit snugly between wall ties.
- B. Install boards horizontally on walls.
 - 1. Install in running bond pattern.
 - 2. Butt edges and ends tightly to adjacent boards and to protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- D. Place 6 inch (150 mm) wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames. Tape seal in place to ensure continuity of vapor retarder and air seal.

3.05 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.06 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK

- A. Board Installation Over Roof Deck, General:
 - 1. See applicable roofing specification section for specific board installation requirements.
 - 2. Fasten insulation to deck in accordance with roofing manufacturer's written instructions and applicable Factory Mutual requirements.
 - 3. Do not apply more insulation than can be covered with roofing in same day.

3.07 BOARD INSTALLATION OVER STEEP SLOPE ROOF SHEATHING OR ROOF STRUCTURE

- A. Installation of board insulation over steep slope roof structure or roof sheathing is specified in Section 06 1000.

3.08 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

3.09 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 2119
FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Foamed-in-place insulation.
 - 1. In exterior framed walls.
 - 2. In exterior wall crevices.
 - 3. At junctions of dissimilar wall and roof materials.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- E. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- F. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.
- C. Certificates: Certify that products of this section meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience.

1.05 FIELD CONDITIONS

- A. Do not install insulation when ambient temperature is lower than 70 degrees F (21 degrees C).
- B. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.
- C. Do not apply foam when temperature is within 5 F (-15 C) of dew point.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Foamed-In-Place Insulation:
 - 1. BASF Corporation; WALLTITE US Series Closed Cell: www.spf.basf.com.

2. Demilec LLC; DEMILEC APX: www.demilec.com.
3. Icynene Inc; Icynene Classic LD-C-50: www.icynene.com.
4. NCFI Polyurethanes; ____: www.ncfi.com.
5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
 1. Regulatory Requirements: Conform to applicable code for flame and smoke limitations.
 2. Aged Thermal Resistance: R-value (RSI-value) of 5 (deg F hr sq ft)/Btu (0.9 (K sqm)/W), minimum, when tested at 1 inch (25.4 mm) thickness in accordance with ASTM C518 after aging for 180 days at 41 degrees F (23 degrees C).
 3. Water Vapor Permeance: Vapor retarder; 2 perm (115 ng/(Pa s sqm)), maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
 4. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
 5. Air Permeance: 0.004 cfm/sq ft (0.2 L/second sq meter), maximum, when tested at intended thickness in accordance with ASTM E2178 or ASTM E283 at 1.5 psf (75 Pa).
 6. Closed Cell Content: At least 90 percent.
 7. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
 8. Products:
 - a. BASF Corporation; WALLTITE US: www.spf.basf.com.
 - b. Bayer MaterialScience; EcoBay CC: www.spf.bayermaterialscience.com.
 - c. Demilec LLC; HEATLOK SOY 200: www.demilec.com.
 - d. Icynene Inc; Icynene ProSeal Eco MD-R-210: www.icynene.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify work within construction spaces or crevices is complete prior to insulation application.
- B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

3.02 PREPARATION

- A. Mask and protect adjacent surfaces from over spray or dusting.
- B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

- A. Apply insulation in accordance with manufacturer's instructions.
- B. Apply insulation by spray method, to a uniform monolithic density without voids.
- C. Apply to a minimum cured thickness of 4 inch (____ mm).
- D. Patch damaged areas.
- E. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
- F. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.04 FIELD QUALITY CONTROL

- A. Field inspections and tests will be performed by an independent testing agency under provisions of Section 01 4000 - Quality Requirements.
- B. Inspection will include verification of insulation and overcoat thickness and density.

3.05 PROTECTION

- A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

SECTION 07 2500
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vapor Retarders: Materials to make exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls water vapor resistant and air tight.
- B. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Vapor retarder under concrete slabs on grade.
- B. Section 05 4000 - Cold-Formed Metal Framing: Water-resistive barrier under exterior cladding.
- C. Section 06 1000 - Rough Carpentry: Water-resistive barrier under exterior cladding.
- D. Section 07 2100 - Thermal Insulation: Vapor retarder installed in conjunction with batt insulation.
- E. Section 07 5300 - Elastomeric Membrane Roofing: Vapor retarder installed as part of roofing system.
- F. Section 07 6200 - SHEET METAL FLASHING AND TRIM: Metal flashings installed in conjunction with weather barriers.
- G. Section 07 9200 - Joint Sealants: Sealing building expansion joints.
- H. Section 09 2116 - Gypsum Board Assemblies: Water-resistive barrier under exterior cladding.

1.03 DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.

1.04 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. AATCC Test Method 30 - Antifungal Activity, Assessment on Textile Materials: Mildew and Rot Resistance of Textile Materials; 2013.
- C. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test; 2014.
- D. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

- F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- G. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- H. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials; ICC Evaluation Service, Inc.; 2011.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics.
- C. Shop Drawings: Provide drawings of special joint conditions.
- D. Manufacturer's Installation Instructions: Indicate preparation.
- E. Installer's Qualification Statement: Submit ABAA QAP accreditation documents.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company accredited and certified under the Air Barrier Association of America (ABAA) Quality Assurance Program (QAP).
- B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.07 MOCK-UP

- A. Install air barrier and vapor retarder materials in mock-up specified in Section 07 4214 and 04 2000.

1.08 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

- A. Air Barrier:
 - 1. On outside surface of sheathing of exterior walls use air barrier sheet, self-adhesive type.

2.02 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

- A. Air Barrier Sheet, Self-Adhered:
 - 1. Air Permeance: 0.004 cubic feet per minute per square foot (0.02 L/s/sq m), maximum, when tested in accordance with ASTM E2178.
 - 2. Water Vapor Permeance: 10 perms (572 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant procedure).
 - 3. Water Penetration Resistance Around Nails: Pass, when tested in accordance with ASTM D1970/D1970M (modified).
 - 4. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for maximum of 150 days weather exposure.
 - 5. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.
 - 6. Seam and Perimeter Tape: As recommended by sheet manufacturer.
 - 7. Products:
 - a. Carlisle Coatings and Waterproofing, Inc.; Fire Resist 705 VP: www.carlisle-ccw.com.

- b. Henry Company; Blueskin VP160: www.henry.com.
- c. Henry Company; Blueskin VP100: www.henry.com.
- d. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
- B. Flexible Flashing: Sheathing fabric saturated with air barrier coating and complying with the applicable requirements of ICC-ES AC148.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Openings and Penetrations in Exterior Weather Barriers:
 - 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches (125 mm) onto weather barrier and at least 6 inches (150 mm) up jambs; mechanically fasten stretched edges.
 - 2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches (100 mm) wide; do not seal sill flange.
 - 3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches (230 mm) wide, covering entire depth of framing.
 - 4. At head of openings, install flashing under weather barrier extending at least 2 inches (50 mm) beyond face of jambs; seal weather barrier to flashing.
 - 5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
 - 6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

- A. Do not cover installed weather barriers until required inspections have been completed.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 4214
INSULATED METAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Factory-assembled metal panel system for walls, with trim, related flashings and accessory components.
- B. Secondary sub-girt framing system, attached to building structural frame.

1.02 RELATED REQUIREMENTS

- A. Section 05 1200 - Structural Steel: Structural steel building frame.
- B. Section 05 4000 - Cold-Formed Metal Framing: Stud wall framing system.
- C. Section 07 2100 - Thermal Insulation.
- D. Section 07 2500 - Weather Barriers: Separate air barrier and vapor retarder materials.
- E. Section 07 6200 - SHEET METAL FLASHING AND TRIM.
- F. Section 07 9200 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.
- G. Section 08 5113 - Aluminum Windows.

1.03 REFERENCE STANDARDS

- A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); American Architectural Manufacturers Association; 2015.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- D. ASTM D1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics; 2010.
- E. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- H. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- I. AAMA 508-07 - Voluntary Test Method and Specifications for Pressure Equalized Rain Screen Wall Cladding Systems.
- J. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- K. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.
- L. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtainwalls and Sloped Glazing Systems.

1.04 PRE-INSTALLATION MEETING

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer documentation on tested structural, thermal, and fire resistance capabilities of assembled panel.
- C. Shop Drawings: Indicate dimensions.
- D. Samples: Submit two samples of panel, 12 by 12 inch (____by____ mm) in size illustrating finish color, sheen, and texture.
- E. Design and Performance Data: Indicate panel profile and dimensions and structural properties.
- F. Manufacturer's Installation Instructions: Indicate special handling criteria and installation sequence.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this Section with minimum 3 years experience.

1.07 MOCK-UP

- A. Construct mock-up, 4 feet (____ m) long by 4 feet (____ m) wide, including panels, sub-girts, attachments to building frame, associated vapor retarder and air seal materials, sealants and seals, and related insulation.
- B. Demonstrate component assembly including panel materials, weep drainage system, attachments, anchors, and perimeter sealant.
- C. Locate where directed.
- D. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store pre-finished material off ground with weather protection to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials that could cause discoloration or staining.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion, including:
 - 1. Degradation of panel finish including color fading caused by exposure to weather.
 - 2. Failure of water tightness, loss of integrity of seals, and _____.
 - 3. Special Panel Finish Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace wall panels that display evidence of deterioration of finish within 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: CENTRIA, Formawall Dimension Series Insulated Core Metal Wall Panels.
 - .
- B. Other Acceptable Manufacturers:
 - 1. All Weather Insulated Panels, a Vicwest company: www.awipanel.com.
 - 2. Centria: www.centria.com.
 - 3. Industrial Building Panels: www.ibpcustompanels.com.
 - 4. Metl-Span, a Division of NCI Group, Inc: www.metlspan.com.
 - 5. MBCI: www.mbc.com.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PANEL SYSTEM

- A. Insulated Core Metal Wall Panel System: Factory-foamed-in-place horizontal and vertical wall panel system consisting of exterior metal face sheet with interior metal liner panel, bonded to factory foamed-in-place core in thermally-separated profile, utilizing no glues or adhesives, with factory sealed tongue-and-groove and pressure-equalized rainscreen-designed horizontal joint, attached to supports using concealed fasteners.
 - 1. Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
 - 2. Accommodate tolerances of building structural framing.
 - 3. Horizontal Panel - Side Joint: Side joints with positive drip edge, sloped drain shelf and integral venting to the exterior along the panel length to permit moisture drainage and to allow air to enter the pressure equalization chamber. Side joints shall have a 2-3/8-inch baffle interlock and shall provide effective pressure equalization as demonstrated by testing specified in 1.4.F.
 - 4. Horizontal Panel - End Joint: End joints for insulated metal panels shall be designed to allow moisture to be drained from the panel's side joint. No end dam sealant is to be applied to the ends of the side joint at the end joint location.
 - a. Backer Flash - A continuous back-up flash behind the end joint is required with two beads of field applied non-curing butyl sealant between the panel and back up flashing for each panel. The field applied non-curing butyl sealant shall be married to the panel's shop applied non-curing butyl sealant within the panel's side joint.
 - 1) Insulated Metal Vertical Joint (IMV) - End joint shall include an integrated, Insulated Metal Vertical Joint. The Insulated Metal Vertical Joint shall be recessed 1-3/16" deep and be 5/8" wide. The Insulated Metal Vertical Joint should not add exterior sightlines, contain exposed metal edges or exposed wet seals. The Insulated Metal Vertical Joint shall be constructed of an EPDM Foam Block adhered to a metal face of the same material, gage and color custom color as specified as the face of the panel.
 - 5. Panel Ends: Flat Panels - Factory formed trimless ends, tabbed under panel horizontal shelf.
 - 6. Panel Width: 24 inches.
 - 7. Panel Profile: Flat in locations and sizes indicated.
 - 8. Panel Reveals:
 - a. Horizontal panels: Flat Panels: 0.5" reveal.
 - 9. Panel Thickness: 2.0 inch (51 mm), flat.
 - 10. Thermal-Resistance (R) Value: 2" flat - R-14.

B. Performance Requirements:

1. Thermal Performance: Provide thermal resistance through entire system; R-value (RSI-value) of 14 deg F hr sq ft/Btu (____ K sq m/W), minimum.
2. Structural Performance: Design and size to withstand all dead loads and wind loads caused by positive and negative wind pressure acting normal to plane of panel.
 - a. Verify structural performance in accordance with ASTM E330/E330M, using test pressure 1.5 times design wind pressure, with 10 seconds duration of maximum load.
3. Movement: Accommodate the movement caused by the following without damage to system, components, or deterioration of seals:
 - a. Normal movement between system components.
 - b. Seasonal temperature cycling.
 - c. Deflection of structural support framing,

2.03 PANELS AND TRIM

- A. Wall Panels: Exterior and interior metal sheet skin, factory-assembled, with foamed in place insulation; exterior and interior sheet interlocking at edges, fitted with continuous gaskets.
 1. Panel Width: 24 inch (____ mm).
 2. Profile: smooth and flat; vertical panels.
 3. Panel Thickness: 2 inch (____ mm).
 4. Exterior Sheet: Pre-finished aluminum, 20 gage, 0.032 inch (0.81 mm) minimum thickness.
 5. Interior Sheet: Galvanized steel, pre-finished, 22 gage, 0.0299 inch (0.76 mm) minimum base metal thickness.
 6. Panel Edge Profile: Tongue and groove, for flush seam.
 7. Exterior Finish: Anodized, Class I, natural.
 8. Interior Finish: zinc coating; _____ color.
- B. Soffit Panels: Exterior and interior metal sheet skin, factory-assembled, with no insulation; exterior and interior sheet interlocking at edges, fitted with continuous gaskets.
 1. Panel Width: ____ inch (____ mm). Refer to drawings.
 2. Profile: flat and square to match profile of metal wall panel; horizontal panels.
 3. Panel Thickness: 16 gage, .063 inch (____ mm).
 4. Exterior Sheet: Pre-finished aluminum, 16 gage, 0.0508 inch (1.29 mm) minimum thickness; smooth, flat.
 5. Exterior Finish: Anodized, Class I, natural.
- C. Trim, Closure Pieces, Expansion Joints, Caps, Flashings, Fascias, and Infills: Same material, thickness and finish as exterior sheets; factory-fabricated to required profiles; fabricated in longest practicable lengths.
 1. Thickness: .030 gage, ____ inch (____ mm).
 2. Exposed Fasteners: Not permitted.
 3. Profiles: To suit system.

2.04 PANEL MATERIALS

- A. Metallic-Coated Steel Face Sheet: Coil-coated, ASTM A 755/A 755M.
 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90, structural quality.
 2. Face Sheet Thickness: Minimum 0.030 inch/22 gage (0.76 mm) thick.
 3. Surface: Smooth, flat. Panels shall be curved as required.

- B. Exposed Coil-Coated Finish:
 - 1. Fluoropolymer Two-Coat Mica System: 0.25 mil primer with 0.8 mil 70 percent PVDF fluoropolymer color coat providing a pearlescent appearance, AAMA 621.
 - a. Basis of Design: CENTRIA Sundance Mica.
- C. Metallic-Coated Steel Liner Sheet: Coil-coated, ASTM A 755/A 755M, 0.030 inch/22 gage (0.76 mm) thick.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90, structural quality.
 - 2. Surface: Embossed planked.
 - 3. Interior Liner Panel Finish: 0.2 mil primer with 0.6 mil acrylic color coat.
- D. Exposed Trim and Fasteners: Match panel finish.
- E. Foamed-in-Place Insulation: Polyisocyanurate type.
 - 1. Density: Minimum 2.7 lb/cu. ft. (43.4 kg/cu. m)
- F. Gaskets: Manufacturer's standard type suitable for use with panel system, permanently resilient; ultraviolet and ozone resistant; standard color.
- G. Panel Sealants: Manufacturer's standard type suitable for use with installation of panel system; non-staining, skinning, non-shrinking, non-sagging, ultra-violet and ozone resistant; standard color.

2.05 ACCESSORIES

- A. Subgirts: As required for system design. C- or Z- shaped sections, 0.054-inch (1.37-mm) minimum.
- B. Sill Channels: 0.054-inch (1.37-mm) minimum.
- C. Hat Channels: 0.054 (1.37mm) minimum.
- D. Anchors: Stainless steel. Or as recommended by manufacturer.
- E. Fasteners: Manufacturer's standard type to suit application; stainless steel with soft neoprene washers. Fastener cap same color as exterior panel.
- F. Powder Actuated Fasteners: Steel, hot dip galvanized; with soft neoprene washers, fastener cap same color as exterior panel.
- G. Field Touch-up Paint: As recommended by panel manufacturer.
- H. Bituminous Paint: Asphalt base.
- I. Formed Flashing and Trim: Match material, thickness, and color of metal wall panel face sheets.
- J. Extrusion Trim: Provide manufacturer-provided extruded trim for the following locations and as indicated on Drawings:
 - 1. Base trim.
 - 2. Coping.
 - 3. Panel installation perimeter.
 - 4. Opening perimeters.
- K. Sealants: Type recommended by metal wall panel system manufacturer for application, meeting requirements of Division 07 Section "Joint Sealants."
- L. Flashing Tape: 4-inch wide self-adhering butyl flashing tape.
- M. Panel Attachment Clips: Concealed G-90 galvanized steel clip configured to prevent overdriving of fastener and crushing of foam core, with panel fasteners engaging both face and liner elements and mechanically attaching to panel supports. Clip

configured also to be utilized without removing significant portions of the foam at each clip location.

- N. Fasteners: Self-tapping screws, bolts, nuts, and other acceptable fasteners recommended by panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal wall panels by means factory-applied coating.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that structural framing is ready to receive panel system.

3.02 INSTALLATION

- A. Install panel system on walls and soffits in accordance with manufacturer's instructions.
- B. Permanently fasten panel system to structural supports; aligned, level, and plumb, within specified tolerances.
- C. Locate panel joints over supports.
- D. Use concealed fasteners unless otherwise approved by Architect.
- E. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.03 TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch (1.6 mm).
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch (6 mm).

3.04 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.
- C. Upon completion of installation, thoroughly clean prefinished aluminum surfaces in accordance with AAMA 609 & 610.

END OF SECTION

SECTION 07 5323
ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING (EPDM)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. EPDM membrane roofing system, including all components specified.
- B. Comply with the published recommendations and instructions of the roofing membrane manufacturer, at <http://manual.fsbp.com>.
- C. Commencement of work by Contractor shall constitute acknowledgement by Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. No modification of the Contract Sum will be made for failure to adequately examine the Contract Documents or the project conditions.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood nailers associated with roofing and roof insulation.
- B. Section 07 6200 - SHEET METAL FLASHING AND TRIM: Formed metal flashing and trim items associated with roofing.
- C. Section 07 7100 - Roof Specialties: Manufactured copings, fascias, gravel stops, and other flashing-related items.
- D. Section 07 7200 - Roof Accessories: Roof hatches, vents, and manufactured curbs.
- E. Section 08 6300 - Metal-Framed Skylights.
- F. Section 22 1006 - Plumbing Piping Specialties: Roof drains.

1.03 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- B. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- C. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- D. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- E. ASTM D1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics; 2010.
- F. ASTM D1622/D1622M - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2014.
- G. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- H. ASTM D4601/D4601M - Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing; 2004 (Reapproved 2012)e1.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- J. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.

- K. FM DS 1-28 - Wind Design; Factory Mutual System; 2007.
- L. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components; Factory Mutual System; 2006.
- M. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; 2011. (ANSI/SPRI/FM 4435/ES-1)

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference: Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.
 - 1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
 - 2. Notify Architect well in advance of meeting.
- B. Post-Roofing Inspection: At the completion of the installation of the roofing membrane and associated work, a representative of the roofing membrane manufacturer shall inspect the work as required to provide the manufacturer's guarantee as specified below. The representative shall either approve the work or shall order changes in the work required in which case he shall reinspect the work after the changes have been made.
 - 1. Notify Architect or Owner 48 hours in advance of the date and time of inspection.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Before materials are delivered to site, submit manufacturer's printed product data and specifications for all materials and components of roofing and flashing system. Provide membrane manufacturer's printed data sufficient to show that all components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.
 - 2. Provide characteristic and safety data sheets on membrane materials. Flashing materials, sheathing insulation and sealants.
 - 3. Where UL or FM requirements are specified, provide documentation that shows that the roofing system to be installed is UL-Classified or FM-approved, as applicable; include data itemizing the components of the classified or approved system.
 - 4. Installation Instructions: Provide manufacturer's instructions to installer, marked up to show exactly how all components will be installed; where instructions allow installation options, clearly indicate which option will be used. Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- C. Samples: Submit samples of each product to be used. Submit 6 x 6 inch size finish roofing sheet, including T-shaped side/end-lap seam, rigid insulation and fasteners.
- D. Shop Drawings: Provide:
 - 1. The roof membrane manufacturer's standard details customized for this project for all relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.

2. For tapered insulation, provide project-specific layout and dimensions for each board. The shop drawing of the tapered insulation plan shall be provided by insulation manufacturer.
 3. Shop drawing submittals shall be approved in writing by membrane manufacturer. Letter of approval by membrane manufacturer shall be included with shop drawings prior to submission.
- E. Installer Qualifications: Letter from manufacturer attesting that the roofing installer meets the specified qualifications.
 - F. Sample copy of roofing system manufacturer's warranty stating obligations, remedies, limitations, and exclusions of warranty as stated in "Warranty" Article.
 - G. Executed Warranty. Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
 - H. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation, specified in the "Quality Assurance" Article.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Prior to commencing of work, and as a condition for approval by the Architect to allow work of this section to proceed, submit to the Architect a letter from the roofing membrane manufacturer stating that the roofer is approved and authorized by said manufacturer to install the specified roofing system for this particular project and that he intends to warrant the work in accordance with the Drawings and Specifications.
- B. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Manufacturer: Company specializing in manufacturing the products specified in this section with ten (10) years documented experience. Obtain primary single-ply membrane roofing from a single manufacturer. Provide secondary materials as produced by or accepted by manufacturer or primary materials.
- D. Applicator: Company specializing in performing the work of this section with seven (7) years documented experience and approved by system manufacturer. All workmen shall be competent and skilled roofers completely familiar with the products and the manufacturer's currently recommended methods of installation.
- E. Work of this section to conform to NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
- F. Drawings and Specifications: Where Drawings and Specifications require flashing terminations that are higher than required by elastomeric membrane manufacturer and other conditions that are more restrictive than required by membrane manufacturer for guarantee as specified, the work shall be performed as shown on the Drawings and specified herein. Where there is no detail drawing for an existing condition, provide manufacturer's recommended detail for specific condition.
- G. Pre-Roofing Inspection and Certification: Prior to start of installation of the work of this section, secure a visit to the job site by a representative of the manufacturer of the roofing membrane used who shall inspect the job conditions and shall certify in writing to the Architect that:
 1. Each of the surfaces to which the roofing materials will be applied is in a condition suitable for this application.

2. The materials to be installed comply in all respects with the requirements of this section of these specifications.
 3. The materials to be installed are in complete accordance with the manufacturer's current recommendations.
- H. UL Listing: Provide labeled materials that have been tested and listed by UL in "Building Materials Directory" for application indicated, with "Class A" rated materials/system for roof slopes shown.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.
- B. Store materials clear of ground and moisture with weather protective covering.
- C. Keep combustible materials away from ignition sources.
- D. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Comply with all warranty procedures required by manufacturer, including notifications, scheduling, and inspections.
- C. Warranty: Firestone Limited Warranty covering membrane, roof insulation, and other indicated components of the system, for the term indicated.
 1. Limit of Liability: No dollar limitation.
 2. Scope of Coverage: Repair leaks in the roofing system caused by:
 - a. Ordinary wear and tear of the elements.
 - b. Manufacturing defect in Firestone brand materials.
 - c. Defective workmanship used to install these materials.
 - d. Damage due to winds up to 90 mph (145 km/h).

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer - Roofing System: Firestone Building Products LLC, Carmel, IN: www.firestonebpco.com.
 1. Roofing systems manufactured by others are acceptable provided the roofing system is completely equivalent in materials and warranty conditions and the manufacturer meets the following qualifications:
 - a. Specializing in manufacturing the roofing system to be provided.
 - b. Roofing systems manufactured by the companies listed below are acceptable provided they are completely equivalent in materials and warranty conditions:
 - 1) Carlisle Snytec Systems..
 - 2) GenFlex Roofing Systems..
- B. Manufacturer of Insulation and Cover Boards: Same manufacturer as roof membrane.
- C. Manufacturer of Metal Roof Edging: Same manufacturer as roof membrane.
 1. Metal roof edging products by other manufacturers are not acceptable.
- D. Substitutions: See Section 01 6000 - Product Requirements.
 1. Submit evidence that the proposed substitution complies with the specified requirements.

- E. Compatibility: Provide products that are recommended by manufacturers to be fully compatible with indicated substrates or provide separation materials as required to eliminate contact between incompatible materials.
- F. Single Source: Primary roofing and flashing membrane and all associated components shall be products of one manufacturer or products accepted by manufacturer of primary roofing membranes.

2.02 ROOFING SYSTEM DESCRIPTION

- A. Roofing System: Ethylene-propylene-diene-monomer (EPDM) single-ply membrane.
 - 1. .060 mil white non reinforced FR (Fire Retardant), UL Class A, fully adhered EPDM membrane on multiple layers of polyisocyanurate insulation with the top and bottom layer of 1/2" gypsum based board, mechanically fastened.
 - 2. On the new metal decks the base layer of insulation will be mechanically attached and all additional layers set in asphalt. System will be in compliance with manufacturers 20 year warranty requirements and with 6" seams. Perimeters will receive new metal fascia and wood blocking as required. Assembly to conform to UL Requirements for a Class A rated assembly, and windstorm resistance of I-90, in accordance with FM DS 1-28.
 - a. Membrane Attachment: Fully adhered.
- B. Warranty: Full system warranty; Firestone 20 year Red Shield Limited Warranty covering membrane, roof insulation, and membrane accessories.
- C. Comply with applicable local building code requirements.
- D. Provide assembly having Underwriters Laboratories, Inc. (UL) Class A Fire Hazard Classification.
- E. Provide assembly complying with Factory Mutual Corporation (FM) Roof Assembly Classification, FM DS 1-28 and 1-29, and meeting minimum requirements of FM 1-90 wind uplift rating.
- F. System Design:
 - 1. The project documents describe the intended work required to provide a new installation and acquire the intended warranty as described in this section. The project documents depict most of the roofing installation details that will be required using the membrane manufacturer specified. If the details described in these contract documents are different or are missing items required in order to meet the membrane manufacturer's requirements for the specified warranty, the contractor is responsible to provide an install all components required by the membrane manufacturer at no additional cost to Owner.

2.03 EPDM MEMBRANE MATERIALS

- A. Roofing and Flashing Membrane: White, cured synthetic single-ply membrane composed of ethylene propylene diene terpolymer (EPDM) with the following properties:
 - 1. Reinforcement: None; membrane complying with ASTM D4637 Type I.
 - 2. Thickness: 0.060 inch (1.5 mm).
 - 3. Nominal Thickness Tolerance: Plus/minus 10 percent.
- B. Membrane Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.
- C. Self-Adhesive Flashing Membrane: Semi-cured 45 mil EPDM membrane laminated to 35 mil (0.9 mm) EPDM tape adhesive; QuickSeam Flashing by Firestone.

- D. Pre-Molded Pipe Flashings: EPDM, molded for quick adaptation to different sized pipes; Firestone EPDM Pipe Flashing.
- E. Self-Adhesive Lap Splice Tape: 35 mil (0.9 mm) EPDM-based, formulated for compatibility with EPDM membrane and high-solids primer; QuickSeam Splice Tape by Firestone.
- F. Splice Adhesive: Synthetic polymer-based, formulated for compatibility with EPDM membrane and metal surfaces; SA-1065 Splice Adhesive by Firestone.
- G. Adhesive Primer: Synthetic rubber based primer formulated for compatibility with EPDM membrane and tape adhesive; QuickPrime Plus by Firestone.
- H. Seam Edge Treatment: EPDM rubber-based sealant, formulated for sealing exposed edges of membrane at seams; Lap Sealant HS by Firestone.
- I. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer by Firestone.
- J. Water Block Seal: Butyl rubber sealant for use between two surfaces, not exposed; Water Block Seal by Firestone.
- K. Metal Plates and Strips Used for Fastening Membrane and Insulation: Steel with Galvalume coating; corrosion-resistance meeting FM 4470 criteria.
- L. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches (33 mm) wide by 0.10 inch (2.5 mm) thick; Firestone Termination Bar by Firestone.

2.04 VAPOR RETARDER MATERIALS

- A. Base Sheet: Firestone MB Base Sheet; high-performance, asphalt coated, fiberglass reinforced, roofing base sheet complying with ASTM D4601 Type II.
- B. Adhesive: As recommended by roofing membrane manufacturer.

2.05 ROOF INSULATION AND COVER BOARDS

- A. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C1289 Type II Class 1, with the following additional characteristics:
 - 1. Thickness: As indicated elsewhere.
 - 2. Size: 48 inches (1220 mm) by 96 inches (2440 mm), nominal.
 - a. Exception: Insulation to be attached using adhesive or asphalt may be no larger than 48 inches (1220 mm) by 48 inches (1220 mm), nominal.
 - 3. R-value (RSI-value) (LTTR):
 - a. 2.0 inch (51 mm) Thickness: 12.1 (2.13), minimum.
 - b. 3.0 inch (76 mm) Thickness: 18.5 (3.26), minimum.
 - 4. Compressive Strength: 20 psi (138 kPa) when tested in accordance with ASTM C1289.
 - 5. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
 - 6. Recycled Content: 19 percent post-consumer and 15 percent post-industrial, average.
- B. Gypsum-Based Cover Board: Non-combustible, water resistant gypsum core with embedded glass mat facers, complying with ASTM C1177/C1177M, and with the following additional characteristics:
 - 1. Size: 48 inches (1220 mm) by 96 inches (2440 mm), nominal.
 - 2. Thickness: As indicated elsewhere.
 - 3. Surface Water Absorption: 2.5 g, maximum, when tested in accordance with ASTM C473.

4. Spanning Capability: Recommended by manufacturer for following minimum flute spans:
 - a. 1/2 inch (12 mm) Thickness: 5 inches (127 mm), minimum.
 5. Surface Burning Characteristics: Flame spread index of 0 (zero), smoke developed index of 0 (zero), when tested in accordance with ASTM E84.
 6. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
 7. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
 8. Mold Growth Resistance: Zero growth, when tested in accordance with ASTM D3273 for minimum of 4 weeks.
- C. Insulation Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.
- D. Adhesive for Insulation Attachment: Type as required by roof membrane manufacturer for roofing system and warranty to be provided; use only adhesives furnished by roof membrane manufacturer.
- E. Asphalt for Insulation Attachments: Type as required by roof membrane manufacturer.

2.06 METAL ACCESSORIES

- A. Metal Roof Edging and Fascia: Continuous metal edge member serving as termination of roof membrane and retainer for metal fascia; watertight with no exposed fasteners; mounted to roof edge nailer.
1. Wind Performance:
 - a. Membrane Pull-Off Resistance: 100 lbs/ft (1460 N/m), minimum, when tested in accordance with ANSI/SPRI/FM 4435/ES-1 Test Method RE-1, current edition.
 - b. Fascia Pull-Off Resistance: At least the minimum required when tested in accordance with ANSI/SPRI/FM 4435/ES-1 Test Method RE-2, current edition.
 - c. Provide product listed in current Factory Mutual Research Corporation Approval Guide with at least FM 1-270 rating.
 2. Description: Two-piece; extruded aluminum T-shaped edge member securing top and bottom edges of flat-faced formed metal fascia; Firestone AnchorGard.
 3. Refer to drawings for fascia sizes.
 4. Edge Member Height Above Nailer: 1-1/4 inches (31 mm).
 5. Fascia Material and Finish: 0.063 inch (1.6 mm) thick formed aluminum, clear anodized finish; matching concealed joint splice plates; factory-installed protective plastic film.
 6. Length: 144 inches (3650 mm).
 7. Functional Characteristics: Fascia retainer supports while allowing for free thermal cycling of fascia.
 8. Aluminum Bar: Continuous 6063-T6 alloy aluminum extrusion with pre-punched slotted holes; miters welded; injection molded EPDM splices to allow thermal expansion.
 9. Anchor Bar Cleat: 20 gage, 0.036 inch (0.9 mm) G90 coated commercial type galvanized steel with pre-punched holes.
 10. Curved Applications: Factory modified.
 11. Fasteners: Factory-provided corrosion resistant fasteners, with drivers; no exposed fasteners permitted.
 12. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, scuppers, and end caps; minimum 14 inch (355 mm) long legs on corner pieces.
 13. Scuppers: Welded watertight.

14. Accessories: Provide matching brick wall cap, downspout, extenders, and other special fabrications as shown on the drawings.

PART 3 INSTALLATION

3.01 GENERAL

- A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.
- B. Obtain all relevant instructions and maintain copies at project site for duration of installation period.
- C. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.
- D. Perform work using competent and properly equipped personnel.
- E. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.
- F. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F (15 to 25 degrees C).
- G. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
 1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
 2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
 3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.
- H. Until ready for use, keep materials in their original containers as labeled by the manufacturer.
- I. Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

3.02 EXAMINATION

- A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.
- B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.
- C. Examine roof substrate to verify that it is properly sloped to drains.
- D. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptable of project conditions and requirements.

3.03 PREPARATION

- A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.
- B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.
- C. Fill all surface voids in the immediate substrate that are greater than 1/4 inch (6 mm) wide with fill material acceptable insulation to membrane manufacturer.
- D. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.
- E. Wood Nailers: Provide wood nailers at all perimeters and other locations where indicated on the drawings, of total height matching the total thickness of insulation being used.

3.04 VAPOR RETARDER

- A. Before installing insulation install vapor retarder directly over the base exterior sheathing layer.
- B. Install polyethylene sheet with all joints, edges, and penetrations taped.
- C. Ensure that all penetrations and edge conditions are sealed to prevent moisture and air drive into the roofing system.

3.05 INSULATION AND COVER BOARD INSTALLATION

- A. Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.
- B. Install insulation in a manner that will not compromise the vapor retarder integrity.
- C. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.
- D. Lay roof insulation in courses parallel to roof edges.
- E. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch (6 mm). Fill gaps greater than 1/4 inch (6 mm) with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch (6 mm).
- F. Mechanical Fastening: Using specified fasteners and insulation plates engage fasteners through insulation into deck to depth and in pattern required by Factory Mutual for FM Class specified in PART 2 and membrane manufacturer, whichever is more stringent.

3.06 SINGLE-PLY MEMBRANE INSTALLATION

- A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.
- B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.
- C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.
- D. Install membrane adhered to the substrate, with edge securement as specified.

- E. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.
- F. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches (1:6) using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
 - 1. Exceptions: Round pipe penetrations less than 18 inches (460 mm) in diameter and square penetrations less than 4 inches (200 mm) square.
 - 2. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.

3.07 FLASHING AND ACCESSORIES INSTALLATION

- A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.
- B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.
 - 1. Follow roofing manufacturer's instructions.
 - 2. Remove protective plastic surface film immediately before installation.
 - 3. Install water block sealant under the membrane anchorage leg.
 - 4. Flash with manufacturer's recommended flashing sheet unless otherwise indicated.
 - 5. Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
 - 6. If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, install an additional piece of self-adhesive flashing membrane over the metal lap to the top of the gravel stop; apply seam edge treatment at the intersections of the two flashing sections.
 - 7. When the roof slope is greater than 1:12, apply seam edge treatment along the back edge of the flashing.
- C. Scuppers: Set in sealant and secure to structure; flash as recommended by manufacturer.
- D. Roofing Expansion Joints: Install as shown on drawings and as recommended by roofing manufacturer.
- E. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing at least 8 inches (200 mm) high above membrane surface.
 - 1. Use the longest practical flashing pieces.
 - 2. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
 - 3. Complete the splice between flashing and the main roof sheet with specified splice adhesive before adhering flashing to the vertical surface.
 - 4. Provide termination directly to the vertical substrate as shown on roof drawings.
- F. Roof Drains:
 - 1. Taper insulation around drain to provide smooth transition from roof surface to drain. Use specified pre-manufactured tapered insulation with facer or suitable bonding surface to achieve slope; slope not to exceed manufacturer's recommendations.

2. Position membrane, then cut a hole for roof drain to allow 1/2 to 3/4 inch (12 to 19 mm) of membrane to extend inside clamping ring past drain bolts.
 3. Make round holes in membrane to align with clamping bolts; do not cut membrane back to bolt holes.
 4. Apply sealant on top of drain bowl where clamping ring seats below the membrane
 5. Install roof drain clamping ring and clamping bolts; tighten clamping bolts to achieve constant compression.
- G. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.
1. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical; otherwise use specified self-curing elastomeric flashing.
 2. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches (50 mm) deep, with at least 1 inch (25 mm) clearance from penetration, sloped to shed water.
 3. Structural Steel Tubing: If corner radii are greater than 1/4 inch (6 mm) and longest side of tube does not exceed 12 inches (305 mm), flash as for pipes; otherwise, provide a standard curb with flashing.
 4. Flexible and Moving Penetrations: Provide weathertight gooseneck set in sealant and secured to deck, flashed as recommended by manufacturer.
 5. High Temperature Surfaces: Where the in-service temperature is, or is expected to be, in excess of 180 degrees F (82 degrees C), protect the elastomeric components from direct contact with the hot surfaces using an intermediate insulated sleeve as flashing substrate as recommended by membrane manufacturer.

3.08 FIELD QUALITY CONTROL

- A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a sales person).
- B. Perform all corrections necessary for issuance of warranty.

3.09 CLEANING

- A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.
- B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.
- C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.10 PROTECTION

- A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.
- B. Sealants for joints within sheet metal fabrications.
- C. Precast concrete splash pads.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.
- C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.
- D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- F. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- G. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.
- H. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012)e1.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples 6 x 6 inch (____ mm) in size illustrating metal finish color.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 3 years years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Aluminum: ASTM B209 (ASTM B209M);.063 inch (____ mm) thick; anodized finish of color as selected.
 - 1. Clear Anodized Finish: AAMA 611 AA-M12C22A41 Class I clear anodic coating not less than 0.7 mils (0.018 mm) thick. Primary use two (2) piece counter flashing as detailed.
- B. Pre-Finished Aluminum: ASTM B209 (ASTM B209M);.063 inch (____ mm) thick; plain finish shop pre-coated with Class 1 color, standard Kynar finish with 20 year finish warranty coating. Primary use edge fascia with continuous hook strip and blind joint splices, and copings as detailed.
 - 1. Color: As selected by Architect from manufacturer's standard colors.

2.02 ACCESSORIES

- A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.
- B. Protective Backing Paint: Zinc molybdate alkyd.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, seal with sealant.
- F. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing gravel. Return and brake edges.

2.04 GUTTER AND DOWNSPOUT FABRICATION

- A. Downspouts: Rectangular profile.
- B. Downspouts: Size indicated on plumbing drawings.
- C. Accessories: Profiled to suit downspouts.
 - 1. Anchorage Devices: In accordance with SMACNA requirements.
 - 2. Downspout Supports: Brackets.
 - 3. Finish to be clear anodized to match Aluminum Storefront System.
 - 4. Submit brack shape and finish for approval.
- D. Splash Pads: Precast concrete type, of 24 x 24 inches and profiles indicated; minimum 3000 psi (21 MPa) at 28 days, with minimum 5 percent air entrainment.
- E. Seal metal joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.
- E. Secure downspouts in place using concealed fasteners.
- F. Set splash pads under downspouts. Set in place with slip sheet.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (Reapproved 2011).
- B. ASTM C834 - Standard Specification for Latex Sealants; 2010.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- F. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2010.
- G. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).
- H. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).
- I. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
 - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

- F. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation as specified in Section 01 6116.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Nonsag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
1. Adhesives Technology Corporation: www.atcepoxy.com.
 2. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 3. Bostik Inc: www.bostik-us.com.
 4. Dow Corning Corporation: www.dowcorning.com/construction.
 5. Fortifiber Building Systems Group: www.fortifiber.com.
 6. Franklin International, Inc.: www.titebond.com.
 7. Hilti, Inc: www.us.hilti.com.
 8. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
 9. Pecora Corporation: www.pecora.com.
 10. The QUIKRETE Companies: www.quikrete.com.
 11. Tremco Global Sealants: www.tremcosealants.com.
 12. Sherwin-Williams Company: www.sherwin-williams.com.
 13. Sika Corporation: www.usa-sika.com.
 14. W.R. Meadows, Inc: www.wrmeadows.com.
 15. Substitutions: See Section 01 6000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Other joints indicated below.
 3. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.

- B. Exterior Joints: Use nonsag non-staining silicone sealant, unless otherwise indicated.
- C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
 - 1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
 - 2. Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant.
 - 3. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in South Coast Air Quality Management District (SCAQMD); Rule 1168.

2.04 NONSAG JOINT SEALANTS

- A. Type A - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 - 4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 - 5. Color: Match adjacent finished surfaces.
- B. Type B - Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 - 3. Color: Match adjacent finished surfaces.
 - 4. Service Temperature Range: Minus 65 to 180 degrees F (Minus 54 to 82 degrees C).
- C. Type C - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
 - 3. Color: Match adjacent finished surfaces.
 - 4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
- D. Type D - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
 - 1. Color: Standard colors matching finished surfaces, Type OP (opaque).
 - 2. Grade: ASTM C834; Grade - Minus 18 Degrees C.
- E. Type E - Butyl Sealant: Solvent-based; ASTM C1311; single component, nonsag; not expected to withstand continuous water immersion or traffic.
 - 1. Hardness Range: 10 to 30, Shore A, when tested in accordance with ASTM C661.
 - 2. Color: Match adjacent finished surfaces.
 - 3. Service Temperature Range: Minus 13 to 180 degrees F (Minus 25 to 82 degrees C).

2.05 SELF-LEVELING SEALANTS

- A. Type F - Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.

- B. Type G - Self-Leveling Polysulfide Sealant: ASTM C920, Grade P, Uses M and A; multicomponent; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
 - 1. Movement Capability: Plus and minus 25 percent.
- C. Type H - Rigid Self-Leveling Polyurethane Joint Filler: Two part, low viscosity, fast setting; intended for cracks and control joints not subject to significant movement.
 - 1. Hardness Range: Greater than 100, Shore A, and 50 to 80, Shore D, when tested in accordance with ASTM C661.
- D. Type I - Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
 - 1. Composition: Multicomponent, 100 percent solids by weight.
 - 2. Hardness: Minimum of 85 (Shore A) or 35 (Shore D), when tested in accordance with ASTM D2240 after 7 days.
 - 3. Color: Concrete gray.
 - 4. Joint Width, Minimum: 1/8 inch (3 mm).

2.06 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
 - 2. Open Cell: 40 to 50 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.

- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- H. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

3.05 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at the low temperature in the thermal cycle. Report failures immediately and repair.

END OF SECTION

SECTION 07 9513
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Expansion joint cover assemblies for wall surfaces.

1.02 RELATED REQUIREMENTS

- A. Section 04 2000 - Unit Masonry: Placement of joint cover assembly frames in masonry.
- B. Section 07 6200 - SHEET METAL FLASHING AND TRIM: Roof expansion and control joint covers.
- C. Section 07 7100 - Roof Specialties: Roof expansion and control joint covers.
- D. Section 07 9200 - Joint Sealants: Sealing expansion and control joints using gunnable and pourable sealants.
- E. Section 09 2116 - Gypsum Board Assemblies: Gypsum board control joint trim.
- F. Section 09 2116 - Gypsum Board Assemblies: Placement of expansion joint assemblies in gypsum board walls and ceilings.

1.03 REFERENCE STANDARDS

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- C. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2010.
- D. ASTM B455 - Standard Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes; 2010.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.
- C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, effected adjacent construction and anchorage locations.
- D. Samples: Submit two samples 4 inch (___ mm) long, illustrating profile, dimension, color, and finish selected.
- E. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 for additional provisions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Expansion Joint Cover Assemblies:
 - 1. Architectural Art Mfg., Inc: www.archart.com.
 - 2. Construction Specialties, Inc: www.c-sgroup.com.
 - 3. Inpro: www.inprocorp.com.

4. MM Systems Corp: www.mmsystemscorp.com.
5. Nystrom, Inc: www.nystrom.com.
6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

- A. Exterior Wall Joints Subject to Seismic Movement:
 1. Products:
 - a. Inpro; 615 Series (flush, compression gasket): www.inprocorp.com.
 - b. C/S Expansion Joint Covers; SF Series. www.c-sgroup.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.03 EXPANSION JOINT COVER ASSEMBLIES

- A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
 1. Joint Dimensions and Configurations: As indicated on drawings.
 2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
 3. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
 4. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
 1. Color to be selected by architect.
- B. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.
- B. Verify that frames and anchors installed by others are in correct locations and suitable for installation of remainder of assembly.

3.02 INSTALLATION

- A. Install components and accessories in accordance with manufacturer's instructions.
- B. Align work plumb and level, flush with adjacent surfaces.
- C. Rigidly anchor to substrate to prevent misalignment.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Accessories, including glazing, louvers, and matching panels.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware.
- B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.
- C. Section 09 9123 - Interior Painting: Field painting.

1.03 ABBREVIATIONS AND ACRONYMS

- A. ANSI - American National Standards Institute.
- B. ASCE - American Society of Civil Engineers.
- C. HMMA - Hollow Metal Manufacturers Association.
- D. NAAMM - National Association of Architectural Metal Manufacturers.
- E. NFPA - National Fire Protection Association.
- F. SDI - Steel Door Institute.
- G. UL - Underwriters Laboratories.

1.04 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- I. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014 (ANSI/BHMA A156.115).
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities; International Code Council; 2009 (ANSI).
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

- M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes installation requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door; _____, an Assa Abloy Group company: www.assaabloydss.com.
 - 2. Steelcraft; _____, an Allegion brand: www.allegion.com/us.

2.02 DESIGN CRITERIA

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Door Edge Profile: Hinged edge square, and lock edge beveled.
 - 4. Typical Door Face Sheets: Flush.
 - 5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
 - 6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 - 7. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
- B. Hollow Metal Panels: Same construction, performance, and finish as doors.
- C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated

must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Type D-1, D-2, Interior Doors, Non-Fire Rated:
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 1 - Standard-duty.
 - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 20 gage, 0.032 inch (0.8 mm), minimum.
 - 2. Door Thickness: 1-3/4 inch (44.5 mm), nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 - 1. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch (150 mm), maximum, above floor at 45 degree angle.
 - 2. Frame Metal Thickness: 18 gage, 0.042 inch (1.0 mm), minimum.
 - 3. Frame Finish: Factory finished.

2.05 ACCESSORIES

- A. Glazing: As specified in Section 08 8000, factory installed.
- B. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

2.06 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Coordinate installation of hardware.
- D. Coordinate installation of glazing.
- E. Coordinate installation of electrical connections to electrical hardware items.

- F. Touch up damaged factory finishes.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified door and frame standards or custom guidelines indicated.
- B. Maximum Diagonal Distortion: 1/16 in (1.5 mm) measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08 1116
ALUMINUM DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glazed interior aluminum doors.
- B. Glazing.

1.02 RELATED REQUIREMENTS

- A. Section 07 2500 - Weather Barriers: Sealing door frame to weather barrier installed on adjacent construction.
- B. Section 07 9200 - Joint Sealants: Sealing joints between door frames and adjacent construction.
- C. Section 08 7100 - Door Hardware: Hardware for aluminum doors.
- D. Section 08 8000 - Glazing: Glazing materials for aluminum doors and frames.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's descriptive literature for each type of door; include information on fabrication methods.
- C. Shop Drawings: Include elevations of each opening type.
 - 1. Verify dimensions by field measurements before fabrication and indicate on shop drawings.
- D. Selection Samples: Complete set of glazing, color and finish options, using actual materials, for Architect's selection.
- E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Not less than 5 years of experience in manufacturing components of the types specified.
- B. Installer Qualifications: Firm with documented experience in installing components of the types specified.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver aluminum components in manufacturer's standard protective packaging, palletted, crated, or banded together.
- B. Inspect delivered components for damage and replace. Repaired components will not be accepted.
- C. Store components under cover in manufacturer's packaging until installation.

1.06 FIELD CONDITIONS

- A. Do not begin installation of interior aluminum components until space has been enclosed and ambient thermal conditions are being maintained at levels consistent with final project requirements.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

- C. Provide ten year manufacturer warranty for defects in workmanship and materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Glazed Interior Aluminum Doors:
 - 1. Kawneer Company, Inc:
 - a. AA 425 Thermal Entrance: www.kawneer.com
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS AND FRAMES

- A. Glazed Aluminum Doors: Thermally broken extruded aluminum tube frame, full glazed, without middle rail; factory glazed.
 - 1. Thickness: 2 1/4" inches (___ mm), nominal.
 - 2. Facing: Seamless aluminum sheet, 0.090 inch (2.2 mm), smooth texture.
 - 3. Weatherstripping: Replaceable pile type; at jambs and head of exterior doors.
 - 4. Stile Width: 4 1/4 inch (___ mm), nominal.
 - 5. Bottom Rail: 6 1/2 inches, nominal.
 - 6. Finish: Natural anodized.
 - 7. Glazing: Sealed insulating units, 1 inch (25 mm) thick, made of clear 1/4 inch (6 mm) fully tempered glass.
- B. Dimensions and Shapes: As indicated on drawings; dimensions shown are nominal.
 - 1. Provide clearances as follows:
 - a. Hinge and Lock Stiles: 0.125 inch (3.2 mm).
 - b. Between Meeting Stiles: 0.25 inch (6.3 mm).
 - c. At Top Rail and Bottom Rail: 0.125 inch (3.2 mm).

2.03 COMPONENTS

- A. Tubular Doors: Extruded aluminum tubing, 0.125 inch (3.17 mm) minimum thickness, with heavy-duty plated steel through bolts in rails, glazing stops, and glazing gaskets.

2.04 MATERIALS

- A. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy 5005-H14, stretcher leveled.
- B. Extruded Aluminum: ASTM B221 (ASTM B221M), alloy 6063-T5 or alloy 6463-T5.
- C. Natural Anodized Finish: Clear anodic coating; AAMA 611 AA-M12C22A31 Class II, minimum thickness 0.4 mil (0.010 mm).

2.05 ACCESSORIES

- A. Replaceable Weatherstripping: AAMA 701/702 wool pile.
- B. Fasteners: Aluminum, non-magnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.
- C. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, non-magnetic stainless steel or steel hot-dip galvanized in compliance with ASTM A123/A123M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.

- B. Verify that frames installed by other trades for installation of doors of this section are in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer's instructions.

3.02 PREPARATION

- A. Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions.
- B. Replace components with damage to exposed finishes.
- C. Separate dissimilar metals to prevent electrolytic action between metals.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings.
- B. Install exterior doors and frames in accordance with ASTM E2112.
- C. Set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with manufacturer's recommendations and within specified tolerances.
- D. Where aluminum surfaces contact metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by painting dissimilar metal with heavy coating of bituminous paint.
- E. Hang doors and adjust hardware to achieve specified clearances and proper door operation.
- F. Install door hardware as specified in Section 08 7100.

3.04 CLEANING

- A. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609 & 610.
- B. Do not use abrasive, caustic, or acid cleaning agents.

3.05 PROTECTION

- A. Protect products of this section from damage caused by subsequent construction until Date of Substantial Completion.
- B. Replace damaged or defective components that cannot be repaired to a condition indistinguishable from undamaged components.

END OF SECTION

SECTION 08 3513.13
FOLDING SECURITY GRILLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Accordion folding doors.
- B. Track, ceiling guards, and operating hardware.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood supports and blocking for track support.
- B. Section 06 2000 - Finish Carpentry: Wood perimeter trim.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on door operation, hardware and accessories, electric operating components, track switching components, colors and finishes available.
- C. Shop Drawings: Indicate opening sizes, details of track and required supports, static and dynamic loads, adjacent construction and finish trim, and stacking sizes.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and installation sequence.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Supply and install where indicated folding aluminum closure model "SYSTEM S-12" as manufactured by MobilFlex Inc.
 - 1. Phone: 418-831-6652 (1-800-501-FLEX-3539)
- B. Manufacturers:
 - 1. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCORDION FOLDING DOORS

- A. Accordion Door, Type ____: Non-acoustical.
 - 1. Curtain:
 - a. The top and bottom of each section is fitted with an aluminum panel 4" (102mm) high. This panel consists of an aluminum extrusion 1/16" (1,6mm) thick and composed of modules with a 15° angle between them to facilitate the operation of the closure. The curtain is made of vertical rods of 5/16" (8mm). Each rod is contained in an aluminum tube that measures 1/2" (13mm) in diameter. Spaced every 3" (76mm), these rods are linked by two series of horizontal modules of 2" (51mm) high. These module series are spaced vertically every 12" (305mm).

2. Track: Extruded aluminum; []thickness and profile designed to support loads.
 - a. Curtain shall be hung from an overhead track
 - 1) 1-5/16" (33mm) wide by 1-9/16" (40mm) high. Track shall be tempered aluminum alloy 6351-T6.
 - b. Design track and anchors to support imposed loads with maximum deflection of 1/360 of span, attached to structural members indicated.
3. Locking:
 - a. Lead post shall be equipped with a hook bolt lock with MobilFlex cylinders each side.
 - b. Lead post shall engage a full height wall jamb.
 - c. Trailing post shall be self-locking at the top and bottom inside the storage pocket.
4. Stacking:
 - a. Stacking shall not exceed a depth of 1.15" per foot of closure width plus 3" for each post (lead, end or intermediate). (95mm/lin. m + 76mm per post). Full egress doors add 7" (178mm).
5. Finish:
 - a. Finish shall be standard clear anodized or acrylic paint in white, black, medium bronze #40, light bronze #26.

2.03 COMPONENTS

- A. Trim: Aluminum moldings, clear anodized.
- B. Hardware: Latching door handles of cast steel, satin chrome finish; lock cylinder keyed to building keying system, with jamb lock and pull bars.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that field measurements are as indicated.

3.02 INSTALLATION

- A. Fit and align door assembly level and plumb.
- B. Lubricate moving components.

3.03 ADJUSTING

- A. Adjust door to provide smooth operation from stacked to full open position.
- B. Visually inspect door in fully closed position for light leaks to identify a potential acoustical leak, and adjust to achieve light tight seal.

3.04 CLOSEOUT ACTIVITIES

- A. Demonstrate operation of door and identify potential operational problems.

END OF SECTION

SECTION 08 4313
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Infill panels of metal and glass.
- C. Aluminum doors and frames.
- D. Weatherstripping.
- E. Door hardware.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 08 4229 - Automatic Entrances.
- C. Section 08 7100 - Door Hardware: Hardware items other than specified in this section.
- D. Section 08 8000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- H. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details .
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit two samples 12 x 12 inches (____x____ mm) in size illustrating finished aluminum surface, glass, infill panels, glazing materials.
- E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- G. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- H. Report of field testing for water leakage.
- I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the State in which the Project is located.
- B. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after the Date of Substantial Completion.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

- A. Front-Set Style, Thermally-Broken:
 - 1. Basis of Design: Kawneer EnCORE Framing System..
 - 2. Vertical Mullion Dimensions: 1 3/4 x 6 inches (____).
- B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:
 - 1. EFCO, a Pella Company: www.efcocorp.com.
 - 2. Trulite Glass and Aluminum Solutions, LLC: www.trulite.com.
- C. Substitution Procedures: See Section 01 6000 - Product Requirements.
 - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.02 BASIS OF DESIGN -- FRAMING FOR MONOLITHIC GLAZING

2.03 BASIS OF DESIGN -- SWINGING DOORS

- A. Narrow Stile, Insulating Glazing, Thermally-Broken:
 - 1. Basis of Design: Kawneer AA 425 Thermal Entrance.
 - 2. Thickness: 2-1/4 inches (57.1 mm).
- B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:
 - 1. EFCO, a Pella Company: www.efcocorp.com.
 - 2. Trulite Glass and Aluminum Solutions, LLC: www.trulite.com.
- C. Substitutions: See Section 01 6000 - Product Requirements.
 - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.04 STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Rabbet: For 1 inch (25 mm) insulating glazing.
 - 2. Finish: Class II natural anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - 3. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 4. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 - 6. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
 - 7. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 - 8. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements:

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Positive Design Wind Load: 60 lbf/sq ft (___ Pa).
 - b. Negative Design Wind Load: 60 lbf/sq ft (___ Pa).
 - c. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
2. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf (390 Pa).
3. Air Leakage: Maximum of 0.06 cu ft/min sq ft (0.3 L/sec sq m) of wall area, when tested in accordance with ASTM E283 at 6.27 psf (300 Pa) pressure differential across assembly.
4. Condensation Resistance Factor of Framing: 60, minimum, measured in accordance with AAMA 1503.

2.05 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
1. Framing members for interior applications need not be thermally broken.
 2. Glazing Stops: Flush.
 3. Cross-Section: As indicated on drawings.
 4. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.
- B. Glazing: As specified in Section 08 8000.
- C. Infill Panels: Insulated, aluminum sheet face and back, with edges formed to fit glazing channel and sealed.
1. Finish: Same as storefront.
- D. Swing Doors: Glazed aluminum.
1. Thickness: 2 1/4 inches (___ mm).
 2. Top Rail: 4 1/4 inches (___ mm) wide.
 3. Vertical Stiles: 4 1/4 inches (___ mm) wide.
 4. Bottom Rail: 6 1/2 inches (___ mm) wide.
 5. Glazing Stops: Square.
 6. Finish: Same as storefront.

2.06 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Sheet Aluminum: ASTM B209 (ASTM B209M).
- C. Fasteners: Stainless steel.
- D. Concealed Flashings: Stainless steel, 26 gage, 0.0187 inch (0.48 mm) minimum thickness.
- E. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
- F. Sealant for Setting Thresholds: Non-curing butyl type.
- G. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

H. Glazing Accessories: As specified in Section 08 8000.

2.07 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Color: Clear.

2.08 HARDWARE

- A. For each door, include weatherstripping, sill sweep strip, and threshold.
- B. Other Door Hardware: Storefront manufacturer's standard type to suit application.
 - 1. Finish on Hand-Contacted Items: Polished stainless steel.
 - 2. For each door, include butt hinges, pivots, push handle, pull handle, exit device, narrow stile handle latch, and closer.
- C. Automatic Door Operators and Actuators: As specified in Section 08 4229.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Install hardware using templates provided.
 - 1. See Section 08 4229 for operator and actuator installation requirements.
- K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.04 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.

3.05 PROTECTION

- A. Protect installed products from damage during subsequent construction.

END OF SECTION

SECTION 08 6300
METAL-FRAMED SKYLIGHTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum skylight framing system.
- B. Skylight glazing.
- C. Fasteners, anchors, reinforcement, and flashings.

1.02 RELATED REQUIREMENTS

- A. Section 05 1200 - Structural Steel: Structural support framing for system.
- B. Section 06 1000 - Rough Carpentry: Wood support curbs.
- C. Section 07 6200 - SHEET METAL FLASHING AND TRIM: Skylight counterflashing.
- D. Section 07 9200 - Joint Sealants: Sealing joints between skylight frames and adjacent construction.
- E. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

- A. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2009.
- B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); American Architectural Manufacturers Association; 2015.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 2012.
- D. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.
- E. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- H. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- J. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- K. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2015.
- L. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007 (Reapproved 2012)e1.
- M. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

- N. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- O. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's specifications, standard details, and installation requirements.
- C. Shop Drawings: Indicate framed opening requirements and tolerances, spacing of all members, anticipated deflection under load, affected related work, expansion and contraction joint locations and details, and sizes and locations for field welding.
 - 1. Show field measurements on shop drawings.
- D. Shop Drawings: Provide details of proposed structural sealant glazing (SSG) and weather sealant joints indicating dimensions, materials, bite, thicknesses, profile, and support framing.
- E. Selection Samples: Submit full range of aluminum finish samples for Architect's color selection.
- F. Samples: Submit two samples, not less than 12 by 12 inch (300 by 300 mm) in size illustrating appearance of prefinished aluminum and specified glazing system, including glazed edge and corner.
- G. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- H. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations.
- I. Structural Glazing Adhesive: Submit product data and calculations showing compliance with performance requirements.
- J. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.
- K. Manufacturer's Installation Instructions: Indicate special procedures, safety precautions, and perimeter conditions requiring special attention.
- L. Field Quality Control Submittals: Report of field testing for water leakage.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Design skylight system under direct supervision of a professional structural engineer experienced in design of work of the type specified in this section and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not fewer than three years of documented experience.
- C. Verify that each component is appropriate for use in structural sealant glazing (SSG) application in regards to at least the following properties; size, shape, dimensions, material, self-life, storage conditions, and color.
- D. Installer Qualifications: Company specializing in performing the type of work specified in this section.
 - 1. Minimum 10 years of documented experience.
 - 2. Approved by skylight manufacturer.

1.06 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-ups.
- B. Construct mock-up that includes examples of materials and conditions required in finished skylight installation. Size mock-up ___ by ___ feet (___ by ___ m).
- C. Locate where directed by Architect.
- D. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide wrapping to protect prefinished aluminum surfaces. Do not use adhesive papers or spray coatings that bond when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work, including leaks, discoloration, failure of seal at insulated glazing units, and excessive thermal or structural movement, within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal-Framed Skylights:
 - 1. Bristolite Daylighting Systems. Inc; Custom Metal Framed Skylights: www.bristolite.com.
 - 2. Oldcastle Building Envelope: www.obe.com.
 - 3. Super Sky Products Enterprises, LLC: www.supersky.com.
 - 4. United Skys, Inc.: www.unitedskys.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 METAL-FRAMED SKYLIGHTS

- A. Metal Framed Skylights: Factory-fabricated, glazed.
 - 1. Frame: Extruded aluminum structural members with integral condensation collection and guttering system thermally separated from exterior pressure bar.
 - 2. Glazing System: Pressure glazing bar system for sloped joints and two (2)-sided structural sealant glazing (SSG) for horizontal joints.
 - 3. Glazing: Insulating glass.
 - 4. Aluminum Finish: High performance organic coatings.
 - 5. Fabricate to prevent harmonic vibration, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.
- B. Performance Requirements: Provide products that comply with the following:
 - 1. Structural Design: Design and size components to withstand dead loads and specified live loads without damage or permanent set.
 - 2. Wind Loads: Test in accordance with ASTM E330/E330M, using loads 1.5 times the specified design pressures and 10 second duration of maximum load.
 - 3. Design Pressure (DP): In accordance with applicable codes.
 - 4. Concentrated Load: Design to withstand 250 lb (114 kg) concentrated load at any location on framing members without permanent set.

5. Glazing Support Member Deflection Under Wind Load: 1/180 of span, maximum.
6. Structural Glazing Adhesive: Design system to limit stress on structural glazing adhesive to 20 percent of tested tensile adhesion and maximum compression or elongation to 25 percent of neutral dimension.
7. Thermal Movement: Design system to accommodate thermal expansion and contraction over ambient temperature range of 100 degrees F (38 degrees C), dynamic loading and release of loads, creep of concrete structural members, and deflection of structural support framing without damage to skylight system components or loss of weathertightness.
8. Air Leakage: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft (0.3 L/s/sq m) for glazed area, measured at a reference differential pressure across assembly of 1.57 psf (75 Pa) in accordance with ASTM E283.

2.03 MATERIALS

- A. Aluminum Extrusions: Alloy 6063-T5, 6063-T6, or 6061-T6 members complying with ASTM B221 (ASTM B221M), with minimum thickness 1/8 inch (3.2 mm) for structural members and 1/16 inch (1.6 mm) for non-structural members.
- B. Formed Aluminum: Sheet material of alloy 5052, 5005, or 6061-T651 members complying with ASTM B209 (ASTM B209M), with minimum thickness 1/8 inch (3.2 mm) for structural members and 1/16 inch (1.6 mm) for non-structural members.
- C. Internal Reinforcement: ASTM A36/A36M; steel shapes as required for strength and mullion size limitations, hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
- D. Glass: Type I-1 specified in Section 08 8000.
- E. Glazing Accessories: As recommended by manufacturer of skylight system.
- F. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories.
- G. Touch-Up Primer for Galvanized Steel Surfaces: Zinc rich type.
- H. Protective Back Coating: Asphaltic mastic, ASTM D4479/D4479M Type I.

2.04 FABRICATION

- A. Rigidly fit and secure joints and corners with screw and spline. Make joints rigid, with connections that are flush, hairline, and weatherproof.
- B. Fabricate components to allow for expansion and contraction with minimum clearance and shim spacing around perimeter of assembly.
- C. Drain to exterior any water entering exterior joints, condensation occurring in glazing channels, or migrating moisture occurring within system.
- D. Prepare components to receive concealed anchorage devices. Ensure that fasteners and anchorage devices will be concealed upon completion of installation.

2.05 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick; exterior surfaces only.
- B. High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system; interior surfaces only.
- C. Color: As shown on the drawings. Clear anodized.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that structural curb is ready to receive skylight system. Coordinate installation of roofing and other adjacent work to ensure weathertight construction.

3.02 PREPARATION

- A. Apply 1 coat of protective coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

3.03 INSTALLATION

- A. Install metal-framed skylights in accordance with manufacturer's instructions.
- B. Install metal-framed skylights in accordance with ASTM E2112.
- C. Set skylight structure plumb, level, and true to line, without warp or rack of frames or glazing panels. Anchor securely in place in accordance with approved shop drawings.
- D. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Install base flashings in accordance with Section 07 6200.
- F. Install glazing in accordance with Section 08 8000.
- G. Touch up damaged finishes so repair is imperceptible from 6 feet (2 meters). Remove and replace components that cannot be satisfactorily touched up.

3.04 TOLERANCES

- A. Maximum Variation from Plumb, Level, or Line: 1/8 inch per 10 feet (1 mm per 1 m), or 3/8 inch (9.5 mm) total in overall dimension.
- B. Alignment of Two Adjoining Members Abutting in Plane: Within 1/16 inches (1.6 mm).

3.05 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for testing and inspection.
- B. Test installed skylight for water leakage in accordance with AAMA 501.2.

3.06 CLEANING

- A. Upon completion of installation, thoroughly clean skylight aluminum surfaces in accordance with AAMA 609 & 610.
- B. Remove protective material from prefinished aluminum surfaces.
- C. Wash down exposed surfaces; wipe surfaces clean.
- D. Remove excess sealant by methods recommended by skylight manufacturer.

END OF SECTION

SECTION 08 7100
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for aluminum doors.
- B. Electrically operated and controlled hardware.
- C. Thresholds.
- D. Weatherstripping, seals and door gaskets.

1.02 RELATED REQUIREMENTS

- A. Section 08 4313 - Aluminum-Framed Storefronts: Hardware for same except cylinders; installation of cylinders.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2100 - Allowances, for allowances affecting this section.

1.04 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; International Code Council; 2009 (ANSI).
- D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- E. NFPA 101 - Life Safety Code; National Fire Protection Association; 2015.
- F. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware will be installed upon.
- B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- C. Convey Owner's keying requirements to manufacturers.
- D. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; require attendance by all affected installers.
- E. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project.
- C. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.
- D. Keying Schedule: Submit for approval of Owner.
- E. Samples: Prior to preparation of hardware schedule:

1. Submit one (1) sample of hinge, latchset, lockset, and closer illustrating style, color, and finish.
 2. Samples will be returned to supplier.
- F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- G. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.
- H. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Extra Lock Cylinders: Ten for each master keyed group.
 3. Tools: One set of all special wrenches or tools applicable to each different or special hardware component, whether supplied by the hardware component manufacturer or not.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 DOOR HARDWARE SUPPLIERS

2.02 MANUFACTURERS

- A. Assa Abloy Brands; Corbin Russwin, Curries, McKinney, Norton, Sargent, or Yale: www.assaabloydss.com.
- B. Best Access Systems, division of Stanley Security Solutions: www.bestaccess.com.
- C. C. R. Laurence Co., Inc: www.crl-arch.com.
- D. Confirm preferred hardware manufacturer with owner..
- E. Substitutions: See Section 01 6000 - Product Requirements.

2.03 DOOR HARDWARE - GENERAL

- A. Provide hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.
- B. Provide items of a single type of the same model by the same manufacturer.
- C. Provide products that comply with the following:
1. Applicable provisions of federal, state, and local codes.
 2. Accessibility: ADA Standards and ICC A117.1.
 3. Applicable provisions of NFPA 101, Life Safety Code.
 4. Fire-Rated Doors: NFPA 80.
 5. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

- D. Function: Lock and latch function numbers and descriptions of manufactures series as listed in hardware schedule.
- E. Electrically Operated and/or Controlled Hardware: Provide all power supplies, power transfer hinges, relays, and interfaces required for proper operation; provide wiring between hardware and control components and to building power connection.

2.04 LOCKS AND LATCHES

- A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
 - 1. Hardware Sets indicate locking functions required for each door.
 - 2. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
 - 3. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.
- B. Electrically Operated Locks: Fail secure unless otherwise indicated.
- C. Lock Cylinders: Manufacturer's standard tumbler type, six-pin standard core.
 - 1. Provide cams and/or tailpieces as required for locking devices required.
- D. Keying: Grand master keyed.
 - 1. Include construction keying.
 - 2. Key to existing keying system. Quantities to be determined.
 - 3. When providing keying information, comply with DHI Handbook "Keying systems and nomenclature".
- E. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.05 KEY CONTROLS

- A. Key Management System: For each keyed lock on project, provide one set of consecutively numbered duplicate key tags with hanging hole and snap catch.
 - 1. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to number of keys to be managed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available to power operated devices and of the correct characteristics.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.
- D. Mounting heights for hardware from finished floor to center line of hardware item.

3.03 ADJUSTING

- A. Adjust work under provisions of Section 01 7000.
- B. Adjust hardware for smooth operation.

3.04 SCHEDULE - ATTACHED

HARDWARE SETS

4.01 HARDWARE SETS - GENERAL

4.02 SWING DOORS -- NOT REQUIRING KEY LOCKING

- A. HW-1: Push/Pull, Non-Fire-Rated:
 - 1. Closer.
 - 2. Push/Pull.
- B. HW-2: Latchset, Non-Fire-Rated.
 - 1. Latchset, Passage.

4.03 SWING DOORS -- LOCKABLE, MAY BE LEFT UNLOCKED, KEY NOT REQUIRED TO LOCK

- A. HW-13: Public Entrance, Exit Device, Lockable, Non-Fire-Rated:
 - 1. Closer.
 - 2. Exit Device, Rim, Entry/Exit, Free Swing, pull outside trim.
 - 3. Pair: Concealed vertical rod type devices.
- B. HW-13-Auto: Public Entrance, Automatic, Exit Device, Lockable, Non-Fire-Rated:
 - 1. Power Operator.
 - 2. Exit Device, Rim, Entry/Exit, Free Swing, pull outside trim.
 - 3. Actuators, Wall-Mounted, quantity and location as indicated on drawings.
 - 4. Pair: Concealed vertical rod type devices.

4.04 SWING DOORS -- EXIT ONLY, MAY NOT BE LEFT UNLOCKED

- A. HW-41: Exit Only, Exit Device, Self-Closing, Fire-Rated and Non-Fire-Rated:
 - 1. Closer.
 - 2. Exit Device, Exit Only Secure.
 - 3. Pair: Both leaves active; Removable Mullion, removal by key only.

END OF SECTION

SECTION 08 8000

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Plastic sheet glazing units.

1.02 RELATED REQUIREMENTS

- A. Section 07 2500 - Weather Barriers.
- B. Section 07 9200 - Joint Sealants: Sealants for other than glazing purposes.
- C. Section 08 4313 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.
- D. Section 08 5113 - Aluminum Windows: Glazing furnished by window manufacturer.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.
- C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- F. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- H. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.
- J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.
- K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- L. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2009.
- M. GANA (SM) - GANA Sealant Manual; Glass Association of North America; 2008.
- N. GANA (LGRM) - GANA Laminated Glazing Reference Manual; Glass Association of North America; 2009.
- O. IGMA TB-3001 - Guidelines for Sloped Glazing; Insulating Glass Manufacturers Alliance; 2001.
- P. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; Insulating Glass Manufacturers Alliance; 1990 (2004).
- Q. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.

- R. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.
- S. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2014.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- C. Samples: Submit two samples ___ by ___ inch (___ by ___ mm) in size of glass units.
- D. Manufacturer's Certificate: Certify that glass and glazing products meets or exceeds specified requirements.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.07 MOCK-UPS

- A. See Section 01 4000 - Quality Requirements, for additional mock-up requirements.
- B. Provide on-site glazing mock-up with the specified glazing components.
- C. Locate where directed.
- D. Mock-ups may remain as part of the Work.

1.08 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
- C. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for delamination, including replacement of failed units.
- D. Polycarbonate Sheet Glazing: Provide a five (5) year manufacturer warranty to include coverage for breakage, coating failure, abrasion resistance, including replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Laminated Glass Manufacturers:
 - 1. Cardinal Glass Industries: www.cardinalcorp.com.
 - 2. Viracon, Architectural Glass segment of Apogee Enterprises, Inc: www.viracon.com.
 - 3. Substitutions: Refer to Section 01 6000 - Product Requirements.
- B. Plastic Sheet Glazing Manufacturers:
 - 1. Altuglas International: www.altuglasint.com.
 - 2. American Acrylic Corp: www.americanacrylic.com.
 - 3. Bayer MaterialScience LLC; Makrolon UV: www.sheffieldplastics.com.
 - 4. Evonik Industries: www.acrylite.net.
 - 5. Plazit Polygal, the Plastic Sheets Group; ____: www.plazit-polygal.com.
 - 6. SABIC Innovative Plastics: www.sabic-ip.com.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Select type and thickness of exterior glazing assemblies to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Design Pressure: Calculated in accordance with ASCE 7.
 - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 3. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7.
 - 4. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 5. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
 - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
- C. Thermal and Optical Performance: Provide glass products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 5.2/6.3 computer program.
 - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 5.2/6.3 computer program.
 - 3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless noted otherwise.
 - 1. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and FT.
 - 2. Fully Tempered Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria.
 - 3. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

2.04 INSULATING GLASS UNITS

- A. Insulating Glass Units Manufacturers:

- B. Basis of Design: PPG Solarban 60 Solar Control, Low-E Glass.
 - 1. Any of the manufacturers specified for float glass.
 - 2. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
 - 3. Cardinal Glass Industries: www.cardinalcorp.com.
 - 4. Guardian Industries Corp: www.sunguardglass.com.
 - 5. PPG Industries, Inc: www.ppgideascales.com.
 - 6. Substitutions: Refer to Section 01 6000 - Product Requirements.
- C. Insulating Glass Units: Types as indicated.
 - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 - 3. Metal Edge Spacers: Aluminum, bent and soldered corners.
 - 4. Spacer Color: Aluminum.
 - 5. Edge Seal:
 - 6. Color: Grey.
 - 7. Purge interpane space with dry air, hermetically sealed.
- D. Type I-1 - Insulating Glass Units: Vision glass, double glazed.
 - 1. Applications: Exterior glazing unless otherwise indicated.
 - 2. Space between lites filled with argon.
 - 3. Outboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Low-E (passive type), on #2 surface.
 - 4. Inboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
 - 5. Total Thickness: 1 inch (25.4 mm).
 - 6. Thermal Transmittance (U-Value), Summer - Center of Glass:.27, nominal.
 - 7. Visible Light Transmittance (VLT): 70 percent, nominal.
 - 8. Solar Heat Gain Coefficient (SHGC):.39 percent, nominal.
 - 9. Visible Light Reflectance, Outside: 11 percent, nominal.
- E. Type I-4 - Insulating Glass Units: Spandrel glazing.
 - 1. Applications: Exterior spandrel glazing unless otherwise indicated.
 - 2. Space between lites filled with argon.
 - 3. Outboard Lite: Heat-strengthened float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Blue.
 - b. Coating: Same as on vision units, on #2 surface.
 - 4. Inboard Lite: Heat-strengthened float glass, 1/4 inch (6.4 mm) thick.
 - a. Tint: Blue.
 - b. Opacifier: Ceramic frit, on #4 surface.
 - c. Opacifier Color: To be selected from manufacturer's full range.
 - 5. Total Thickness: 1 inch (25.4 mm).
 - 6. Thermal Transmittance (U-Value), Summer - Center of Glass:.27, nominal.
- F. I-5 Insulating Glass Units: Sloped glazing, laminated; IGMA TB-3001.
 - 1. Applications: Exterior sloped glazing at 15 degrees or more from vertical, unless otherwise indicated.

2. Space between lites filled with air.
3. Outboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Low-E (passive type), on #2 surface.
4. Laminated Inboard Lite, Outer Pane: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
5. Laminated Inboard Lite, Inner Pane: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
6. Total Thickness: 1 inch (25.4 mm).
7. Thermal Transmittance (U-Value), Summer - Center of Glass: .27, nominal.
8. Visible Light Transmittance (VLT): 70 percent, nominal.
9. Solar Heat Gain Coefficient (SHGC): .39 percent, nominal.
10. Visible Light Reflectance, Outside: 11 percent, nominal.

2.05 GLAZING UNITS

- A. Type GL-1 - Monolithic Interior Vision Glazing:
 1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 3/8 inch (____ mm), nominal.

2.06 PLASTIC SHEET GLAZING UNITS

- A. Type P-2 - Acrylic Sheet:
 1. Application: Locations indicated on the drawings.
 2. Type: Cellular (multi-wall, "structured") sheet, corrugated.
 3. Ultraviolet stabilized.
 4. Tint: Clear.
 5. Thickness: 1/4 inch (6 mm).

2.07 GLAZING COMPOUNDS

- A. Manufacturers:
 1. Bostik Inc: www.bostik-us.com.
 2. Pecora Corporation: www.pecora.com.
 3. BASF Corporation: www.basf.com/us/en.html.
 4. Substitutions: Refer to Section 01 6000 - Product Requirements.
- B. Type GC-2 - Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- C. Type GC-5 - Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; ____ color.

2.08 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) x width of glazing rabbet space minus 1/16 inch (1.5 mm) x height to suit glazing method and pane weight and area.

- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch (75 mm) long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
- D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA Sealant Manual, and manufacturer's instructions.
- C. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

3.04 INSTALLATION - DRY GLAZING METHOD (TAPE AND GASKET SPLINE GLAZING)

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- F. Carefully trim protruding tape with knife.

3.05 INSTALLATION - WET/DRY GLAZING METHOD (PREFORMED TAPE AND SEALANT)

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Cut glazing tape to length and set against permanent stops, 3/16 inch (5 mm) below sight line. Seal corners by butting tape and dabbing with butyl sealant.

- C. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
- D. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- E. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
- F. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch (6.4 mm) below sight lines.
 - 1. Place glazing tape on glazing pane of unit with tape flush with sight line.
- G. Fill gap between glazing and stop with manufacturer approved sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch (9 mm) below sight line.
- H. Apply cap bead of manufacturer approved sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.06 INSTALLATION - BUTT JOINT GLAZING METHOD (SEALANT ONLY)

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Temporarily brace glass in position for duration of glazing process. Mask edges of glass at adjoining glass edges and between glass edges and framing members.
- C. Temporarily secure a small diameter non-adhering foamed rod on back side of joint.
- D. Apply sealant to open side of joint in continuous operation; thoroughly fill the joint without displacing the foam rod. Tool the sealant surface smooth to concave profile.
- E. Permit sealant to cure then remove foam backer rod. Apply sealant to opposite side, tool smooth to concave profile.
- F. Remove masking tape.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- C. Monitor and report installation procedures and unacceptable conditions.

3.08 CLEANING

- A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- C. Remove non-permanent labels immediately after glazing installation is complete.
- D. Clean glass and adjacent surfaces after sealants are fully cured.
- E. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.09 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 08 8100
POINT SUPPORTED GLAZING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Engineering and drafting of production documents, including structural calculations of the entire point supported skylight system.
- B. Fabrication and erection of point supported skylight materials.
- C. Applied finish of aluminum sheet, if required.
- D. Skylight glass and glazing.

1.02 RELATED SECTIONS

- A. Structural Steel: Division 05
- B. Space Frames: Division 05
- C. Metal Fabrications: Division 05
- D. Flashing and Sheet Metal: Division 07
- E. Glazing: Division 08
- F. Glazed Curtain Walls: Division 08
- G. Roofing: Division 07
- H. Sealants: Division 07

1.03 REFERENCES

- A. American National Standards Institute (ANSI): Z 97.1 -2004 Safety Glazing Materials Used in Buildings -Safety Performance Specifications and Methods of Test.
- B. American Society for Testing and Materials (ASTM):
- C. C1036: Specification for Flat Glass.
- D. C1048: Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
- E. C1172: Standard Specification for Laminated Architectural Flat Glass
- F. Consumer Product Safety Commission (CPSC): 16CFR 1201 - Architectural Glazing Standards and Related Material.

1.04 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Point-supported structural glass system: Laminated butt glazed joints with field applied silicone, supported by ball and joint rotules with 10 degree rotation capacity to anchor perpendicular to the plane of the glass.
 - 2. Glass fittings, rotules are available with button or countersunk (flush) heads. Note under hung systems are not available with countersunk (flush) rotules.
 - 3. Spider fittings shall be fabricated from 316 series stainless steel and have a smooth, machined finish.
 - 4. Spider arms are designed to resist all stipulated design loads.
 - 5. Glass joints consist of silicone sealant with an inner extruded silicone compression seal.
 - 6. The support structure, for connecting spider fittings, must be held to within (+/-) 1/4-in. of all theoretical locations and must be capable of withstanding loads imposed by the glass system. The deflection of the support structure should not

exceed (+/-) 1/4-in. The point supported glass system does not provide lateral bracing for support structure.

1.05 SUBMITTALS

- A. Submit 3 copies of shop drawings showing plans, elevations and sections as required to fully describe the skylight construction for the Architect's approval prior to starting fabrication.
- B. Submit structural calculations prepared by a structural engineer qualified in the design of point-supported sloped glazed systems licensed in New Jersey.
- C. With regard to structural silicone joinery, submit:
 - 1. Certification that adhesion of sealant to samples of glass is adequate when tested in accordance with ASTM C794.
 - 2. Certification that materials in contact with sealant are compatible with sealant after being exposed to 2,000-4,000 micro watt ultra-violet radiation for twenty-one (21) days.
- D. Submit 2 - 12-in. x 12-in. samples of each type of glass.
- E. Submit manufacturer's samples of each type of sealant.
- F. Submit sets of as-built drawings and cleaning and maintenance manuals upon completion of skylight installation.

1.06 QUALITY ASSURANCE

- A. Work of this Section, including design, engineering, fabrication, finishing, preparation at the job site, erection and glazing of the skylight system shall be the responsibility of the skylight manufacturer. The manufacturer shall be regularly engaged in the preceding phases of construction of skylights and able to demonstrate that he has performed successfully on comparably sized projects and of comparable design complexity over at least the previous ten (10) years.

1.07 WARRANTY

- A. Submit manufacturer's warranty certifying that skylight work was furnished and installed in accordance with the Contract Documents.
- B. Certify that the system is free of defects in design, material, and construction for a period of five (5) years from the Date of Skylight Completion.
- C. Warrant glass against defective materials, delamination, and defects in manufacture per the glass manufacturer's standard five (5) year warranty. Glass breakage is not warranted.
- D. Warrant sealant for a period of five (5) years per sealant manufacturer's standard warranty of merchantable quality. Warranty shall certify that cured sealant:
 - 1. Will not become brittle or crack due to weathering or normal expansion and contraction of adjacent surfaces.
 - 2. Will not harden beyond a Shore A, Durometer of 50, nor soften below a minimum of 10 points.
 - 3. Will not change color significantly when used with compatible back-up materials.
 - 4. Will not bleed significantly.
- E. Warrant finish per the manufacturer's standard warranties.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Super Sky Products Enterprises, LLC, www.supersky.com.

- B. DeaMor, <http://www.deamor.com>
- C. C.R. Laurence Company Co, Inc., <http://www.crl-arch.com/>
- D. Complete details are submitted for review by the Architect showing compliance to the drawings and Contract Documents.
 - 1. Structural calculations, showing loads applied to the support structure, based on the design loads of this specification are submitted for review.
 - 2. Prospective manufacturers submit notarized certification that they have successfully performed in the phases of design, manufacture and installation of skylight projects comparable in nature over at least the previous ten (10) years.

2.02 MATERIALS

- A. Point Supported Structural Glass Fittings:
 - 1. Spiders and rotules manufactured from 316 series stainless steel with machined finish.
 - 2. Aluminum rain gutters, if required.
- B. Fasteners:
 - 1. For Anchoring Spiders to Support Structure: ASTM F593, 316 series stainless steel fasteners.
- C. Exposed metal finish exterior to comply with the following:
 - 1. Anodized Coatings:
 - a. AAMA 611-98 Architectural Class I clear anodized Type AA-M10C22A41: 215-R1.
- D. Glass:
 - 1. Standard Certification Requirements:
 - a. Tempered Glass: ASTM C1048, with a minimum surface compression of 10,000 psi. Tempered glass should be heat-soaked for 2 hours at 536 °F in accordance with EN14179.
 - b. Exposed edges are polished.
 - 2. Performance Requirements:
 - a. Probability of breakage not to exceed 8/1000 for vertical glass and 1/1000 for sloped glass upon first application of design wind and live load pressures. For glass selection, design wind pressure for a one minute duration. For loads of longer duration use standard engineering practices for glass selection.
 - b. Probability of breakage due to anticipated thermal stress not to exceed 8/1000 for vertical glass and 1/1000 for sloped glass.
 - c. Probability of breakage due to anticipated spontaneous breakage from nickel sulfide inclusions not to exceed 5/1000.
- E. Sealants:
 - 1. Weather Seal Joints: Silicone sealants applied in accordance with manufacturer's recommendations.
 - 2. Silicone sealant performance requirements:
 - a. Hardness: ASTM D2240, Type A, Durometer 30.
 - b. Ultimate Tensile Strength: ASTM D412, 170 psi.
 - c. Tensile at 150% Elongation: ASTM D412, 80 psi.
 - d. Joint Movement Capability after fourteen (14) Day Cure: ASTM C719, (+/-) 50%.
 - e. Peel Strength (aluminum, glass, concrete) after twenty-one (21) Day Cure: ASTM C794, 50 ppi.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Upon arrival to the jobsite for installation of the specified work, the manufacturer's erector is to examine the structure and substrate to determine that they are properly prepared, dimensionally accurate, and ready to receive the skylight work included herein. Report any discrepancies to the General Contractor. Correction of faulty work to be at the expense of the responsible party/s. The skylight manufacturer is not responsible for faulty structure or substrate.

3.02 PREPARATION

- A. Skylight manufacturer and manufacturer's erector excludes all field measuring, demolition, removal, replacement, or re-work of any existing material.

3.03 INSTALLATION

- A. Installation of materials in strict accordance with the approved shop drawings and requirements.
- B. Install skylight system under the direction of the skylight manufacturer's designated erector.
- C. Stainless steel fittings to be mounted to the support steel. Design of device per contract documents for aesthetic and all structural criteria.
- D. Erect system plumb and true, in proper alignment and relation to established lines and grades as shown on approved shop drawings.
- E. Use high performance silicone sealants to seal joints between glass panels in conjunction with an extruded silicone compression seal on the underside.
- F. Apply sealing materials in strict accordance with sealant manufacturer's instructions. Before application, remove mortar dirt, dust, moisture and other foreign matter from surfaces it will contact. Mask adjoining surfaces to maintain a clean and neat appearance. Tool sealing compounds to fill the joint and provide a smooth finish.
- G. Furnishing of temporary covering and weather-proofing of the skylight openings, if required by the General Contractor, and removal of the protective measures during and after the skylight installation is excluded by the manufacturer and the manufacturer's erector. ANY TEMPORARY COVERINGS THAT MAY BE REQUIRED ARE NOT TO OBSTRUCT OR INTERFERE WITH THE SKYLIGHT INSTALLATION IN ANYWAY.

3.04 TOLERANCES

- A. All parts of the work, when completed, shall be within the following tolerances:
 - 1. Maximum variation from plane or location shown on approved shop drawings: 1/8-in. per 12-ft. length, or 1/2-in. in total length.
 - 2. Maximum offset from true alignment between two members abutting end-to-end, edge-to-edge in line or separated by less than 3-in.: 1/32-in.

3.05 FIELD QUALITY CONTROL

- A. Water Leakage: Field check in accordance with AAMA 501.2 in proportionate areas. There shall be no uncontrolled water leakage as defined in AAMA 501.2. Water supply to the skylights, with adequate water pressure, is to be furnished by the General Contractor. Tests are to be conducted upon completion of the installation with no remobilization or down time included to accommodate either water supply availability or witness personnel schedules. Testing is to be performed by the manufacturer's authorized personnel with a maximum of five (5) man-hours for set-up, testing and

clean-up. Independent laboratory testing and reports, if required, are to be ordered and directed by the Owner and/or General Contractor.

3.06 CLEANING

- A. Install glass and associated metal to avoid soiling or smudging the finish.
- B. Clean glass and hardware at time of installation. Final cleaning, if required, subsequent to completion of project, is not to be performed by the manufacturer.

3.07 PROTECTION

- A. Protection of the skylight from ongoing work by other trades shall be the responsibility of the General Contractor.

END OF SECTION

SECTION 09 0561
COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to all floors identified in the contract documents as to receive the following types of floor coverings:
 - 1. Carpet tile.
 - 2. Thin-set ceramic tile and stone tile.
- B. Removal of existing floor coverings.
- C. Preparation of new and existing concrete floor slabs for installation of floor coverings.
- D. Preparation of new and existing wood-based floors and subfloors for installation of new floor coverings.

1.02 REFERENCES

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.
- E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.
- F. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

1.03 SUBMITTALS

- A. Visual Observation Report: For existing floor coverings to be removed.
- B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- C. Adhesive Bond and Compatibility Test Report.
- D. Copy of RFCI (RWP).

1.04 QUALITY ASSURANCE

- A. Contractor may perform adhesive and bond test with his own personnel or hire a testing agency.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:

1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
1. Thickness: As required for application and in accordance with manufacturer's installation instruction.
 2. If testing agency recommends any particular products, use one of those.
 3. Products:
 - a. ARDEX Engineered Cements; ARDEX MC ULTRA with ARDEX FEATHERFINISH: www.ardexamericas.com.
 - b. LATICRETE International, Inc.; LATICRETE DRYTEK Moisture Vapor Barrier with LATICRETE DRYTEK Premium Skimcoat Patch Underlayment: www.laticrete.com.
 - c. LATICRETE International, Inc.; LATICRETE NXT Vapor Reduction Coating with LATICRETE NXT Level Plus: www.laticrete.com.
 - d. Sika Corporation; Sikafloor Moisture Tolerance Epoxy Primer and Sikafloor Self-Leveling Moisture Tolerant Resurfacer: www.sikafloorusa.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Perform following operations in the order indicated:
1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
 - a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
 - b. Removal of existing floor covering.
 2. Preliminary cleaning.
 3. Moisture vapor emission tests; 3 tests in the first 1000 square feet (100 square meters) and one test in each additional 1000 square feet (100 square meters), unless otherwise indicated or required by flooring manufacturer.
 4. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 5. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 6. Specified remediation, if required.
 7. Patching, smoothing, and leveling, as required.
 8. Other preparation specified.
 9. Adhesive bond and compatibility test.
 10. Protection.

- B. Remediations:

1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating over entire suspect floor area.
3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 REMOVAL OF EXISTING FLOOR COVERINGS

- A. Comply with local, State, and federal regulations and recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to floor covering being removed.
- B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.03 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.04 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet (1.4 kg per 93 square meters) per 24 hours.
- F. Report: Report the information required by the test method.

3.05 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.

- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

3.06 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
- C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
- D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch (25 mm) in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.07 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

3.08 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.09 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.10 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Gypsum sheathing.
- E. Gypsum wallboard.
- F. Joint treatment and accessories.
- G. Water-resistive barrier over exterior wall sheathing.

1.02 RELATED REQUIREMENTS

- A. Section 05 4000 - Cold-Formed Metal Framing: Exterior wind-load-bearing metal stud framing.
- B. Section 06 1000 - Rough Carpentry: Building framing and sheathing.
- C. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
- D. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.
- E. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- F. Section 09 2216 - Non-Structural Metal Framing.

1.03 REFERENCE STANDARDS

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- C. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board; 2004 (Reapproved 2014).
- D. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2009)e1.
- E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- H. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

- J. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- K. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- L. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel; 2007a (Reapproved 2011).
- M. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing; 2013.
- N. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- O. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2013.
- P. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- Q. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.
- R. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 2008.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Phillips Manufacturing Company: www.phillipsmfg.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf (L/240 at 240 Pa).
 - 1. Studs: "C" shaped with flat or formed webs with knurled faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Hand Bendable Curved Framing Track: ASTM A653; galvanized steel 20 gauge.
 - a. Product: Radius Track, Ready Track
 - 4. Ceiling Channels: C-shaped.
- C. Exterior Non-Loadbearing Studs and Furring for Application of Gypsum Board: As specified in Section 09 2216.
- D. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05 4000.
- E. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- F. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and braced with continuous bridging both sides.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. CertainTeed Corporation; ____: www.certainteed.com.
 - 2. Georgia-Pacific Gypsum; ____: www.gpgypsum.com.
 - 3. National Gypsum Company; ____: www.nationalgypsum.com.
 - 4. USG Corporation; ____: www.usg.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
 - 3. Unfaced fiber-reinforced gypsum panels as defined in ASTM C1278/C1278M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
 - 4. Thickness:
 - a. Vertical Surfaces: 5/8 inch (16 mm).
 - 5. Glass Mat Faced Products:
 - a. Georgia-Pacific Gypsum; DensArmor Plus.
 - b. USG Corporation; USG Sheetrock Brand Glass-Mat Panels Mold Tough.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- C. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
 - 1. Application: Exterior sheathing, unless otherwise indicated.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 - 4. Core Type: Regular.
 - 5. Regular Board Thickness: 1/2 inch (13 mm).
 - 6. Edges: Square.
 - 7. Glass Mat Faced Products:
 - a. American Gypsum Company; M-Glass Exterior Sheathing.
 - b. Continental Building Products; Weather Defense Platinum Exterior Sheathing.
 - c. Georgia-Pacific Gypsum; DensGlass Fireguard Sheathing.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Water-Resistive Barrier: As specified in Section 07 2500.
- B. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
 - 3. Products:
 - a. Same manufacturer as framing materials.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.

1. Tape: 2 inch (50 mm) wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 2. Ready-mixed vinyl-based joint compound.
 3. Powder-type vinyl-based joint compound.
- D. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- E. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch (0.84 to 2.84 mm) in Thickness: ASTM C954; steel drill screws, corrosion resistant.
- F. Nails for Attachment to Wood Members: ASTM C514.
- G. Adhesive for Attachment to Wood, ASTM C557 and Metal:
- H. Exterior Soffit Vents: One piece, perforated, ASTM B221 6063 T5 alloy aluminum, with edge suitable for direct application to gypsum board and manufactured especially for soffit application. Provide continuous vent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
- C. Studs: Space studs at 16 inches on center (at 406 mm on center).
1. Extend partition framing to structure where indicated and to ceiling in other locations.
 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
 3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
1. Seal joints, cut edges, and holes with water-resistant sealant.
 2. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.
- C. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.
- D. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For non-rated assemblies, install as follows:
1. Single-Layer Applications: Adhesive application.
- E. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- D. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations shown on the drawings. Provide vent area specified.

3.05 JOINT TREATMENT

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).

3.06 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

END OF SECTION

SECTION 09 2216
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal partition, ceiling, and soffit framing.
- B. Framing accessories.

1.02 RELATED REQUIREMENTS

- A. Section 05 2100 - Steel Joists: Execution requirements for anchors for attaching work of this section.
- B. Section 05 4000 - Cold-Formed Metal Framing: Structural load bearing metal stud framing and Exterior wall stud framing.
- C. Section 05 4000 - Cold-Formed Metal Framing: Execution requirements for anchors for attaching work of this section.
- D. Section 06 1000 - Rough Carpentry: Wood blocking within stud framing.
- E. Section 06 1000 - Rough Carpentry: Wall sheathing.
- F. Section 07 6200 - SHEET METAL FLASHING AND TRIM: Head and sill flashings
- G. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- H. Section 08 5113 - Aluminum Windows: Product requirements for window anchors.
- I. Section 09 2116 - Gypsum Board Assemblies: Metal studs for gypsum board partition framing.
- J. Section 09 2116 - Gypsum Board Assemblies: Execution requirements for anchors for attaching work of this section.

1.03 REFERENCE STANDARDS

- A. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2013.
- B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- C. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007 (Reapproved 2013).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
 - 2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.
- C. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC; ____: www.clarkdeitrich.com.
 - 2. Marino; ____: www.marinoware.com.
 - 3. Simpson Strong Tie; ____: www.strongtie.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf (L/240 at 240 Pa).
 - 1. Studs: C shaped with flat or formed webs with knurled faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Steel Stud Framing Connectors:
 - 4. Products:
 - a. Simpson Strong Tie, Bridging Connectors; DBC Bridging Connector: www.strongtie.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Loadbearing Studs: As specified in Section 05 4000.
- C. Partition Head to Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and braced with continuous bridging both sides.
- D. Tracks and Runners: Same material and thickness as studs, bent leg retainer notched to receive studs with provision for crimp locking to stud.
- E. Fasteners: ASTM C1002 self-piercing tapping screws.

2.03 FABRICATION

- A. Fabricate assemblies of framed sections to sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that rough-in utilities are in proper location.

3.02 INSTALLATION OF STUD FRAMING

- A. Comply with requirements of ASTM C754.
- B. Extend partition framing to structure where indicated and to ceiling in other locations.
- C. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
- D. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs as indicated.

- E. Align and secure top and bottom runners at 24 inches (600 mm) on center.
- F. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
- G. Align stud web openings horizontally.
- H. Secure studs to tracks using crimping method. Do not weld.
- I. Fabricate corners using a minimum of three studs.
- J. Double stud at wall openings, door and window jambs, not more than 2 inches (50 mm) from each side of openings.
- K. Brace stud framing system rigid.
- L. Coordinate erection of studs with requirements of door frames; install supports and attachments.
- M. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.
- N. Blocking: Use wood blocking secured to studs. Provide blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and opening frames.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation From Plumb: 1/8 inch in 10 feet (3 mm in 3 m).

END OF SECTION

SECTION 09 3000

TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Cementitious backer board as tile substrate.
- D. Ceramic accessories.
- E. Ceramic trim.
- F. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies: Tile backer board.

1.03 REFERENCE STANDARDS

- A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile - Version; 2014.
- B. ANSI A108.1A - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2014.
- C. ANSI A108.1B - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- D. ANSI A108.1C - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
- F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).
- H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).
- I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reapproved 2010).
- J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reapproved 2010).
- K. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Revised).
- L. ANSI A108.12 - American National Standard Specifications for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).

- M. ANSI A108.13 - American National Standard Specifications for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2010).
- N. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
- O. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2010 (Revised).
- P. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2010).
- Q. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014.
- R. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014.
- S. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2012.
- T. ANSI A137.1 - American National Standard Specifications for Ceramic Tile - Version; 2013.1.
- U. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.

1.07 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
- B. Construct tile mock-up where indicated on the drawings, incorporating all components specified for the location.
 - 1. Approved mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 WALL TILE

- A. Manufacturers: All products by the same manufacturer.
 - 1. Seneca Tile: www.senecatile.com.
 - 2. Susan Jablon: www.susanjablon.com.
 - 3. Johnson Tile: www.johnsontile.com.
 - 4. Walker Zanger: www.walkerzanger.com.

5. Crossville Tile: www.crossvilletile.com.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Glazed Brick Tile, Type WT-1: ANSI A137.1, and as follows:
1. Moisture Absorption: 3.0 to 7.0 percent.
 2. Size and Shape: 2" x 8" (_____).
 3. Surface Finish: High gloss.
 4. Color(s): As scheduled.
 5. Pattern: Running Bond.
 6. Products:
 - a. Seneca Tile, Seneca Thin Brick Tile, Glacier Blend.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Glazed Wall Tile, Type WT-2: ANSI A137.1, and as follows:
1. Moisture Absorption: 3.0 to 7.0 percent.
 2. Size and Shape: 4 x 8 inch (_____).
 3. Edges: Cushioned.
 4. Surface Finish: High gloss.
 5. Color(s): To be selected.
 6. Pattern: Stacked Bond.
 7. Products:
 - a. Fireclay Tile - Kite.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- D. Glass Tile, Type WT-3:
1. Composition: Opaque tinted glass.
 2. Front Paper-Mounted Tiles:
 - a. Size and Shape: 3/4" x 3/4" square inch (_____ mm) tiles on 12 by 12 inch (300 by 300 mm) nominal paper facing.
 - b. Thickness: 1/8 inch (3.2 mm).
 3. Face: Smooth.
 4. Edges: Square.
 5. Color(s): As scheduled.
 6. Products:
 - a. Susan Jablon, Recycled Mosaics, White.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- E. Metal Mosaic Tile, Type WT-4: ANSI A137.1, and as follows:
1. Moisture Absorption: 0 to 0.5 percent.
 2. Size and Shape: 3/4" x 4".
 3. Edges: Square.
 4. Surface Finish: Matte Stainless.
 5. Color(s): As shown on drawings.
 6. Products:
 - a. Nemo Tile, Razor.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- F. Porcelain Tile, Type WT-5: ANSI A137.1, and as follows:
1. Moisture Absorption: 3.0 to 7.0 percent.
 2. Size and Shape: 3 x 12 inch (_____).
 3. Edges: Cushioned.
 4. Surface Finish: Textured.
 5. Color(s): As scheduled.

6. Pattern: Vertical Stacked Bond.
 7. Products:
 - a. Crossville, NOW, Lead.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- G. Porcelain Tile, Type WT-6: ANSI A137.1, and as follows:
1. Moisture Absorption: 3.0 to 7.0 percent.
 2. Size and Shape: 3 x 12 inch (_____).
 3. Edges: Cushioned.
 4. Surface Finish: Textured.
 5. Color(s): As scheduled.
 6. Pattern: Vertical Stacked Bond.
 7. Products:
 - a. Crossville, NOW, Moss.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- H. Glazed Wall Tile, Type WT-7: ANSI A137.1, and as follows:
1. Moisture Absorption: 3.0 to 7.0 percent.
 2. Size and Shape: 10-1/4" x 3-3/4" (_____).
 3. Edges: Cushioned.
 4. Surface Finish: High gloss.
 5. Color(s): As scheduled.
 6. Pattern: Stacked Bond.
 7. Products:
 - a. Fireclay Tile - Picket.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- I. Glazed Wall Tile, Type WT-8: ANSI A137.1, and as follows:
1. Moisture Absorption: 3.0 to 7.0 percent.
 2. Size and Shape: 20 x 20 inch (_____).
 3. Edges: Cushioned.
 4. Surface Finish: High gloss.
 5. Color(s): To be selected by Architect from manufacturer's standard range.
 6. Pattern: Stacked Bond.
 7. Products:
 - a. Nemo Tile - Vogue Shades, Cut 2 Pattern.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- J. Glass Tile, Type WT-9:
1. Composition: Frosted tinted glass.
 2. Front Paper-Mounted Tiles:
 - a. Size and Shape: 1" x 6" subway inch (_____ mm) tiles on 12 by 12 inch (300 by 300 mm) nominal paper facing.
 - b. Thickness: 1/8 inch (3.2 mm).
 3. Face: Smooth.
 4. Edges: Square.
 5. Color(s): As scheduled.
 6. Products:
 - a. Susan Jablon, 1x6 frosted, subway, running brick layout.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- K. Glass Tile, Type WT-10:
1. Composition: Frosted tinted glass.

2. Front Paper-Mounted Tiles:
 - a. Size and Shape: 1" x 6" subway inch (____ mm) tiles on 12 by 12 inch (300 by 300 mm) nominal paper facing.
 - b. Thickness: 1/8 inch (3.2 mm).
3. Face: Smooth.
4. Edges: Square.
5. Color(s): As scheduled.
6. Products:
 - a. Susan Jablon, 1x6 frosted, subway, running brick layout.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FLOOR TILE

- A. Manufacturers: Refer to drawings..
 1. Seneca Tile: www.senecatile.com.
 2. Stonepeak Tile: www.stonepeak.com.
 3. Crossville Tile: www.crossvilletile.com.
- B. Porcelain Tile, Type PT-1: ANSI A137.1, and as follows:
 1. Moisture Absorption: 0 to 0.5 percent.
 2. Size and Shape: _____(_____).
 3. Thickness: 1/2 inch (13 mm)
 4. Face: Depressed pattern.
 5. Edges: Square.
 6. Surface Finish: Unpolished.
 7. Color(s): As scheduled.
 8. Products:
 - a. Crossville, Reclamation, AV274 Steel City.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Porcelain Tile, Type PT-2: ANSI A137.1, and as follows:
 1. Moisture Absorption: 0 to 0.5 percent.
 2. Size and Shape: 6 x 24 inch.
 3. Thickness: 1/2 inch (13 mm)
 4. Face: Plain.
 5. Edges: Square.
 6. Surface Finish: Unpolished.
 7. Color(s): As scheduled.
 8. Products:
 - a. Stonepeak, Quartzite, Iron.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- D. Porcelain Tile, Type PT-3: ANSI A137.1, and as follows:
 1. Moisture Absorption: 0 to 0.5 percent.
 2. Size and Shape: 6 x 24 inch.
 3. Thickness: 1/2 inch (13 mm)
 4. Face: Depressed pattern.
 5. Edges: Square.
 6. Surface Finish: Unpolished.
 7. Color(s): As scheduled.
 8. Products:
 - a. Crossville, Reclamation, Steel City Etching.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 TRIM AND ACCESSORIES

- A. Ceramic Accessories: Glazed or unglazed finish, same color and finish as adjacent field tile; same manufacturer as tile.
- B. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
 - 1. Applications:
 - a. Open Edges: Bullnose.
 - b. Inside Corners: Jointed.
 - c. Floor to Wall Joints: Cove base.
 - 2. Manufacturers: Same as for tile.
- C. Non-Ceramic Trim: Satin brass anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
 - 1. Applications:
 - a. Open edges of wall tile.
 - b. Open edges of floor tile.
 - c. Wall corners, outside and inside.
 - d. Transition between floor finishes of different heights.
 - e. Thresholds at door openings.
 - f. Expansion and control joints, floor and wall.
 - g. Borders and other trim as indicated on drawings.
 - 2. Manufacturers:
 - a. Schluter-Systems: www.schluter.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.04 SETTING MATERIALS

- A. Provide setting materials made by the same manufacturer as grout.
- B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4 or ANSI A118.15.
 - 1. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
 - 2. Products:
 - a. ARDEX Engineered Cements; ARDEX X 77 MICROTEC: www.ardexamericas.com.
 - b. LATICRETE International, Inc; LATICRETE 254 Platinum: www.laticrete.com.
 - c. ProSpec, an Oldcastle brand; Permalastic System: www.prospec.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

2.05 GROUTS

- A. Manufacturers:
 - 1. ARDEX Engineered Cements; ____: www.ardexamericas.com.
 - 2. ProSpec, an Oldcastle brand; ProColor Sanded Tile Grout: www.prospec.com.
 - 3. Bostik Inc; ____: www.bostik-us.com.
 - 4. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: www.laticrete.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
 - 1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
 - 2. Use sanded grout for joints 1/8 inch (3.2 mm) wide and larger; use unsanded grout for joints less than 1/8 inch (3.2 mm) wide.
 - 3. Color(s): As selected by Architect from manufacturer's full line.

4. Products:
 - a. ARDEX Engineered Cements; ARDEX FG-C MICROTEC:
www.ardexamericas.com.
 - b. Bostik Inc; ____: www.bostik-us.com.
 - c. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout:
www.laticrete.com.
 - d. ProSpec, an Oldcastle brand; ProColor Sanded Tile Grout:
www.prospec.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORY MATERIALS

- A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
 1. Type: Fluid-applied.
 2. Thickness: 20 mils (0.5 mm), maximum.
 3. Crack Resistance: No failure at 1/16 inch (1.6 mm) gap, minimum.
- B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
 1. Fluid or Trowel Applied Type:
 2. Bonded Sheet Membrane Type:
 - a. Material: PVC sheet membrane with polyester fleece laminated to both sides, 40 mils (1 mm) thick, nominal.
 - b. Material: Polyethylene sheet membrane with non-woven fabric laminated to both sides, 20 to 30 mils (0.5 to 0.8 mm) thick, nominal.
- C. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch (12.7 mm) thick; 2 inch (51 mm) wide coated glass fiber tape for joints and corners.
- D. Mesh Tape: 2 inch (50 mm) wide self-adhesive fiberglass mesh tape.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

- E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.
- F. For tile over tile installations, to insure a good bond to the existing tile, certain procedures need to be followed; these are described in the TCNA Handbook in detail TR712 and TR713.
 - 1. Note: Not all thin-sets (nor polymer modified thinsets) are capable of bonding directly to tile. Please consult the grout and mortar manufacturers specified for their recommended thinsets. Also, depending on the tile already installed, in some cases the tile must be mechanically abraded to insure a good bond - this is usually best determined with a "bond test."
 - 2. Caution: Mechanical or chemical abrasion to tile can release fine particles which could cause harm if inhaled or ingested. Mineral analysis of the tile and glaze should be performed before performing any operation. Appropriate safety equipment should be worn at all times.

3.03 INSTALLATION - GENERAL

- A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed.
- F. Install ceramic accessories rigidly in prepared openings.
- G. Install non-ceramic trim in accordance with manufacturer's instructions.
- H. Install thresholds where indicated.
- I. Sound tile after setting. Replace hollow sounding units.
- J. Keep control and expansion joints free of mortar, grout, and adhesive.
- K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- L. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
 - 1. Use uncoupling membrane under all tile unless other underlayment is indicated.
- B. Install tile-to-tile floor movement joints in accordance with TCNA (HB) Method EJ171F.

3.05 INSTALLATION - WALL TILE

- A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at kitchens.

- B. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.
- C. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.06 CLEANING

- A. Clean tile and grout surfaces.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

3.08 SCHEDULE

- A. Refer to drawings.

END OF SECTION

SECTION 09 5100
CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 RELATED REQUIREMENTS

- A. Section 08 3100 - Access Doors and Panels: Access panels.
- B. Section 21 1300 - Fire Suppression Sprinklers: Sprinkler heads in ceiling system.
- C. Section 26 5100 - Interior Lighting: Light fixtures in ceiling system.
- D. Section 28 3100 - Fire Detection and Alarm: Fire alarm components in ceiling system.

1.03 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2013.
- C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.
- E. GEI (SCH) - GREENGUARD "Children and Schools" Certified Products; GREENGUARD Environmental Institute; current listings at www.greenguard.org.
- F. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.
- G. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components.
- C. Samples: Submit two samples 12 by 12 inch (____by____ mm) in size illustrating material and finish of acoustical units.
- D. Samples: Submit two samples each, 12 inches (____ mm) long, of suspension system main runner.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.06 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Ceiling Panels:
 - 1. Armstrong World Industries, Inc; ____: www.armstrong.com.
 - 2. Hunter Douglas Contract; ____: www.hunterdouglascontract.com.
 - 3. USG; ____: www.usg.com.
- B. Suspension Systems:
 - 1. Same as for acoustical units.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CEILING TILE

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. Acoustical Tile Type 2: Painted mineral fiber, ASTM E1264 Type III, with the following characteristics:
 - 1. Size: 24 by 24 inches (____ by ____ mm).
 - 2. Thickness: 5/8 inches (15.9 mm).
 - 3. Joint: Kerfed and rabbeted.
 - 4. Edge: Square.
 - 5. Surface Color: To be selected by Architect from manufacturer's standard line.
 - 6. Suspension System: Concealed grid.
 - 7. Products:
 - a. ARMSTRONG CERAMAGUARD LAY IN.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Acoustical Tile Type 3: Painted mineral fiber, ASTM E1264 Type III, with the following characteristics:
 - 1. Size: 24 by 24 inches (____ by ____ mm).
 - 2. Thickness: 5/8 inches (15.9 mm).
 - 3. Joint: Kerfed and rabbeted.
 - 4. Edge: Square.
 - 5. Surface Color: To be selected by Architect from manufacturer's standard line.
 - 6. Suspension System: Concealed grid Type ARMSTRONG 15/16" STANDARD PRELUDE XL.
 - 7. Products:
 - a. ARMSTRONG ULTIMA LAY IN.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- D. EXPANDED METAL Panels Type 3: Galvanized steel/Aluminum flat formed sheet, with NO acoustical media backing; with the following characteristics:
 - 1. Size: 24 by 24 inches (600 by 600 mm).
 - 2. Panel Edge: Square.
 - 3. Surface Pattern: WOVEN WIRE 6129AM.

4. Surface Color: To be selected by Architect from manufacturer's standard line.
5. Suspension System: Concealed grid Type ARMSTRONG 15/16" STANDARD PRELUDE XL.
6. Products:
 - a. Armstrong, METALWORKS LINEAR - 5490 UNPERFORATED.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 SUSPENSION SYSTEM(S)

- A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- B. Concealed Suspension System: Formed steel, commercial quality cold rolled; light-duty.
 1. Products:
 - a. Refer to reflected ceiling plan.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Acoustical Insulation: ASTM C665, friction fit type, unfaced batts.
 1. Thickness: Thickness as required by individual ceiling types inch (____ mm).
 2. Size: To fit acoustical suspension system.
- C. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches (150 mm) of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
- G. Where round obstructions occur, provide preformed closures to match perimeter molding.
- H. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.
- I. Install hold-down clips on panels within 20 ft (6 m) of an exterior door.

3.04 SCHEDULE

- A. Refer to reflected ceiling plan.

END OF SECTION

SECTION 09 6813

TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, loose laid with edges and control grid adhered.

1.02 RELATED REQUIREMENTS

- A. Section 09 0561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006 (Reapproved 2011).
- B. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2011.
- C. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Manufacturer's Installation Instructions: Indicate special procedures.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Tile Carpeting:
 - 1. Interface, Inc; ____: www.interfaceinc.com.
 - 2. Lees Carpets; ____: www.leescarpets.com.
 - 3. Milliken & Company; ____: www.milliken.com.

4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Tile Carpeting, Type CPT-1: Tufted, manufactured in one color dye lot.
 1. Product: NET EFFECT manufactured by INTERFACE.
 2. Tile Size: 18 by 18 inch (450 by 450 mm), nominal.
 3. Color: CASPIAN.
 4. Pattern: NON-DIRECTIONAL.
 5. Yarn System: 100% Recycled Content Type 6 Nylon.
 6. Color System: 100% Solution Dyed.
 7. Stain Protection: Protekt2.
 8. Primary Backing Material: GlasBac.
- B. Tile Carpeting, Type CPT-2: Tufted, manufactured in one color dye lot.
 1. Product: ON LINE manufactured by INTERFACE.
 2. Tile Size: 10 X 40 inch (____x____ mm), nominal.
 3. Color: POPPY.
 4. Pattern: AS INDICATED.
 5. Yarn System: 100% Recycled Content Type 6 Nylon.
 6. Color System: 100% Solution Dyed.
 7. Stain Protection: Protekt2.
 8. Primary Backing Material: GlasBac.
- C. Tile Carpeting, Type CPT-3: Tufted, manufactured in one color dye lot.
 1. Product: RECLAIM manufactured by INTERFACE.
 2. Tile Size: 10 X 40 inch (____x____ mm), nominal.
 3. Color: BARN RUST.
 4. Pattern: AS INDICATED.
 5. Yarn System: 100% Recycled Content Type 6 Nylon.
 6. Color System: 100% Solution Dyed.
 7. Stain Protection: Protekt2.
 8. Primary Backing Material: GlasBac.
- D. Tile Carpeting, Type CPT-4: Tufted, manufactured in one color dye lot.
 1. Product: ONLINE manufactured by INTERFACE.
 2. Tile Size: 10 X 40 inch (____x____ mm), nominal.
 3. Color: LIME.
 4. Pattern: AS INDICATED.
 5. Yarn System: 100% Recycled Content Type 6 Nylon.
 6. Color System: 100% Solution Dyed.
 7. Stain Protection: Protekt2.
 8. Primary Backing Material: GlasBac.
- E. Tile Carpeting, Type CPT-5: Tufted, manufactured in one color dye lot.
 1. Product: RECLAIM manufactured by INTERFACE.
 2. Tile Size: 10 X 40 inch (____x____ mm), nominal.
 3. Color: WORN OLIVE.
 4. Pattern: AS INDICATED.
 5. Yarn System: 100% Recycled Content Type 6 Nylon.
 6. Color System: 100% Solution Dyed.
 7. Stain Protection: Protekt2.
 8. Primary Backing Material: GlasBac.

- F. Tile Carpeting, Type CPT-6: Tufted, manufactured in one color dye lot.
 - 1. Product: STEP RETREAT manufactured by INTERFACE.
 - 2. Tile Size: 20 X 20 inch (____x____ mm), nominal.
 - 3. Color: IRON.
 - 4. Pattern: AS INDICATED.
 - 5. Yarn System: 100% Recycled Content Type 6 Nylon.
 - 6. Color System: 100% Solution Dyed.
 - 7. Stain Protection: Protekt2.
- G. Tile Carpeting, Type CPT-7: Tufted, manufactured in one color dye lot.
 - 1. Product: A PEELING manufactured by INTERFACE.
 - 2. Tile Size: 20 X 20 inch (____x____ mm), nominal.
 - 3. Color: RUSTED.
 - 4. Pattern: AS INDICATED.
 - 5. Yarn System: 100% Recycled Content Type 6 Nylon.
 - 6. Color System: 100% Solution Dyed.
 - 7. Stain Protection: Protekt2.
- H. Tile Carpeting, Type CPT-8: Tufted, manufactured in one color dye lot.
 - 1. Product: A PEELING manufactured by INTERFACE.
 - 2. Tile Size: 20 X 20 inch (____x____ mm), nominal.
 - 3. Color: GRUNGE.
 - 4. Pattern: AS INDICATED.
 - 5. Yarn System: 100% Recycled Content Type 6 Nylon.
 - 6. Color System: 100% Solution Dyed.
 - 7. Stain Protection: Protekt2.
- I. Tile Carpeting, Type CPT-9: Tufted, manufactured in one color dye lot.
 - 1. Product: ONLINE manufactured by INTERFACE.
 - 2. Tile Size: 10 X 40 inch (____x____ mm), nominal.
 - 3. Color: RUST.
 - 4. Pattern: AS INDICATED.
 - 5. Yarn System: 100% Recycled Content Type 6 Nylon.
 - 6. Color System: 100% Solution Dyed.
 - 7. Stain Protection: Protekt2.

2.03 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Edge Strips: Embossed aluminum, color as selected by Architect.
- C. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove existing carpet tile.
- B. Prepare floor substrates for installation of flooring in accordance with Section 09 0561.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in indicated pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Adhere carpet tile to substrate along centerline of rooms, at perimeter of rooms, where tiles are cut, and at 15 foot (4.5 m) intervals throughout rooms. Lay remainder of tile dry over substrate.
- G. Trim carpet tile neatly at walls and around interruptions.
- H. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 7200
WALL COVERINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation and prime painting.
- B. Wall covering and borders.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

- A. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; 2002 (Reapproved 2013).
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. ASTM F793 - Standard Classification of Wallcovering by Use Characteristics; 2010a.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on wall covering and adhesive.
- C. Shop Drawings: Indicate wall elevations with seaming layout.
- D. Samples: Submit two samples of wall covering, 12 by 12 inch (____by____ mm) in size illustrating color, finish, and texture.
- E. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.
- F. Manufacturer's Installation Instructions: Indicate special procedures.
- G. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

1.06 MOCK-UP

- A. Provide panel, 1 panel drops wide, full height, illustrating installed wall covering and joint seaming technique.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Inspect roll materials at arrival on site, to verify acceptability.
- B. Protect packaged adhesive from temperature cycling and cold temperatures.

- C. Do not store roll goods on end.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.
- B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

PART 2 PRODUCTS

2.01 BASE BID MANUFACTURER

- A. Custom Printed Vinyl; Product Wolf Gordon.
- B. Other Acceptable Manufacturers:
 - 1. MDC Wallcoverings; ____: www.mdcwall.com.
 - 2. DL Couch; www.DLCOUCH.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Requirements for Wall Coverings:
 - 1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
 - 2. Chemical and Stain Resistance: No visible staining or discoloration and no damage to surface texture when tested in accordance with ASTM D1308.
- B. Wall Covering: Vinyl coated fabric roll stock, conforming to the following:
 - 1. Pattern: Custom Images to be Selected by Architect.
- C. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
- D. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
- E. Substrate Primer and Sealer: Alkyd enamel type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are prime painted and ready to receive work, and conform to requirements of the wall covering manufacturer.

3.02 PREPARATION

- A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.
- B. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.
- C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces that affect work of this section. Remove existing coatings that exhibit loose surface defects.
- E. Marks: Seal with shellac those that may bleed through surface finishes.
- F. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.
- G. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.

3.04 CLEANING

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.
- B. Reinstall wall plates and accessories removed prior to work of this section.

3.05 PROTECTION

- A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION

SECTION 09 9113
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, and varnishes.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Exposed surfaces of steel lintels and ledge angles.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

- A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; current edition, www.paintinfo.com.
- B. SSPC-SP 1 - Solvent Cleaning; 2015.
- C. SSPC-SP 6 - Commercial Blast Cleaning; Society for Protective Coatings; 2007.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
 - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit two paper chip samples, 8 by 8 inch (____by____ mm) in size illustrating range of colors and textures available for each surface finishing product scheduled.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience and approved by manufacturer.

1.05 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, 2 feet (____ m) long by 2 feet (____ m) wide, illustrating paint color, texture, and finish.
- C. Locate where directed by Architect.
- D. Mock-up may remain as part of the work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
 - 1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
 - 2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
- B. Paints:
 - 1. Benjamin Moore & Co: www.benjaminmoore.com.
 - 2. PPG Paints: www.ppgpaints.com.
 - 3. Sherwin-Williams Company: www.sherwin-williams.com.

- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Colors: To be selected from manufacturer's full range of available colors.
 - 1. Selection to be made by Architect after award of contract.
 - 2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
 - 3. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint GE-OP-3L - Exterior Gypsum Board and Exterior Plaster, Opaque, Latex, 3 Coat:
 - 1. One coat of latex primer sealer.
 - 2. Flat: Two coats of latex; color to be selected.
- B. Paint ME-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
 - 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 - 2. Gloss: Two coats of alkyd enamel; color to be specified.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 - 1. Rust-Inhibitive Water Based Primer; MPI #107.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.

- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Exterior Gypsum Board: Fill minor defects with exterior filler compound. Spot prime defects after repair.
- H. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance.
- D. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- E. Sand wood and metal surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, and varnishes.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. Paint dampers exposed behind louvers, grilles, and convactor and baseboard cabinets to match face panels.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; current edition, www.paintinfo.com.
- D. SSPC-SP 1 - Solvent Cleaning; 2015.
- E. SSPC-SP 6 - Commercial Blast Cleaning; Society for Protective Coatings; 2007.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.

5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit two paper chip samples, 8 by 8 inch (____by____ mm) in size illustrating range of colors and textures available for each surface finishing product scheduled.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
 3. Label each container with color in addition to the manufacturer's label.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience and approved by manufacturer.

1.05 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, 2 feet (____ m) long by 2 feet (____ m) wide, illustrating paint color, texture, and finish.
- C. Locate where directed by Architect.
- D. Mock-up may remain as part of the work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
 - 1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
 - 2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
- B. Paints:
 - 1. Benjamin Moore & Co: www.benjaminmoore.com.
 - 2. PPG Paints: www.ppgpaints.com.
 - 3. Sherwin-Williams Company: www.sherwin-williams.com.
- C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Architectural coatings VOC limits of the State in which the Project is located.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry units, brick, wood, plaster, uncoated steel, shop primed steel, galvanized steel, and aluminum.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
 - 3. Top Coat Sheen:
 - a. Eggshell: MPI gloss level 3; use this sheen at all locations.
 - b. Satin: MPI gloss level 4; use this sheen for items subject to frequent touching by occupants, including door frames and railings.
- B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): High Performance Architectural Interior Latex; MPI #139, 140, or 141.

3. Top Coat Sheen:
 - a. Satin: MPI gloss level 4; use this sheen at all locations.
4. Primer: As recommended by top coat manufacturer for specific substrate.
- C. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services in utilitarian spaces, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.
 1. Shop primer by others.
 2. One top coat.
 3. Top Coat: Latex Dry Fall; MPI #118, 155, or 226.
 4. Top Coat Sheen:
 - a. Flat: MPI gloss level 1; use this sheen at all locations.
- D. Paint I-TR-C - Transparent Finish on Concrete Floors.
 1. 1 coat stain.
 2. Stain: Semi-Transparent Stain for Concrete Floors; MPI #58.
 - a. Products:
 - 1) Behr Premium Semi-Transparent Concrete Stain [No. 850]. (MPI #58)
 - 2) Substitutions: Section 01 6000 - Product Requirements.
 3. Sealer Sheen:
 - a. Eggshell: MPI gloss level 3; use this sheen at all locations.
- E. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
 1. Touch-up with latex primer.
 2. Semi-gloss: Two coats of latex enamel.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 1. Interior Institutional Low Odor/VOC Primer Sealer; MPI #149.
 2. Interior Drywall Primer Sealer.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Gypsum Wallboard: 12 percent.
 2. Plaster and Stucco: 12 percent.
 3. Masonry, Concrete, and Concrete Masonry Units : 12 percent.
 4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 5. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Masonry:
- F. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- G. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- I. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- J. Galvanized Surfaces:
- K. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 10 1400
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.
- B. Interior directional and informational signs.
- C. Emergency evacuation maps.
- D. Building identification signs.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- D. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- E. Verification Samples: Submit samples showing colors specified.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.05 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flat Signs:
- B. Dimensional Letter Signs:
 - 1. Cosco Industries; Cast Aluminum: www.coscoarchitecturalsigns.com.
 - 2. Inpro; S600-060: www.inprocorp.com.
- C. Other Signs:
 - 1. Location: Lavatories: "Employees Must Wash Hands Before Returning to Work" Locate where directed..

2.02 SIGNAGE APPLICATIONS

- A. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
 - 1. Sign Type: Flat signs with engraved panel media as specified.
 - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch (0.8 mm) and Grade II braille.
 - 3. Character Height: 1 inch (25 mm).
 - 4. Sign Height: 2 inches (50 mm), unless otherwise indicated.
 - 5. Office Doors: Identify with room numbers to be determined later, not the numbers shown on the drawings; in addition, provide "window" section for replaceable occupant name.
 - 6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers shown on the drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.
 - 7. Service Rooms: Identify with room names and numbers to be determined later, not those shown on the drawings.
 - 8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.
- B. Interior Directional and Informational Signs:
 - 1. Sign Type: Same as room and door signs.
 - 2. Sizes: As indicated on the drawings.
 - 3. Allow for 4 signs 4 inches high by 6 inches long.
 - 4. Wording of signs is scheduled on the drawings.
- C. Emergency Evacuation Maps:
 - 1. Allow for one map per elevator lobby.
 - 2. Map content to be provided by Owner.
 - 3. Use clear plastic panel silk-screened on reverse, in brushed aluminum frame, screw-mounted.
- D. Building Identification Signs:
 - 1. Use individual metal letters.
 - 2. Mount on outside wall in location shown on drawings.
- E. Other Dimensional Letter Signs: Wall-mounted.
 - 1. Exterior: Allow for total of 50 letters, 16 inches (____ mm) high, metal.

2.03 SIGN TYPES

- A. Flat Signs: Signage media without frame.
 - 1. Edges: Square.
 - 2. Corners: Square.
 - 3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
 - 1. Character Font: Helvetica, Arial, or other sans serif font.
 - 2. Character Case: Upper case only.
 - 3. Character Color: _____ Color to be selected.

2.04 NON-TACTILE SIGNAGE MEDIA

- A. Silk Screened Plastic Panels: Letters and graphics silk screened onto reverse side of plastic surface:
 - 1. Sign Color: Clear.
 - 2. Total Thickness: 1/8 inch (3 mm).

2.05 DIMENSIONAL LETTERS

- A. Metal Letters:
 - 1. Metal: Aluminum casting.
 - 2. Finish: Brushed, satin.
 - 3. Mounting: Concealed screws.

2.06 ACCESSORIES

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
- B. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs where indicated on drawings. Coordinate with owner and architect.
 - 1. Room and Door Signs: Locate on wall at latch side of door with centerline of sign at 60 inches (1525 mm) above finished floor.
 - 2. If no location is indicated obtain Owner's instructions.
- D. Protect from damage until Substantial Completion; repair or replace damage items.

END OF SECTION

SECTION 10 2113.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic (solid surface) toilet compartments.
- B. Urinal and vestibule screens.

1.02 REFERENCE STANDARDS

- A. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Solid Plastic Toilet Compartments:
 - 1. Corian; www.dupontcorian.com
 - 2. Substitutions: Section 01 6000 - Product Requirements.

2.02 SOLID PLASTIC TOILET COMPARTMENTS

- A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), tested in accordance with NFPA 286, floor-mounted unbraced.
 - 1. Color: to be selected.
- B. Doors:
 - 1. Thickness: 1 inch (25 mm).
 - 2. Width: 24 inch (610 mm).
 - 3. Width for Handicapped Use: 36 inch (915 mm), out-swinging.
 - 4. Height: 55 inch (1397 mm).
- C. Panels:
 - 1. Thickness: 1 inch (25 mm).
 - 2. Height: 55 inch (1397 mm).
 - 3. Depth: As indicated on drawings.
- D. Pilasters:
 - 1. Thickness: 1 inch (25 mm).
 - 2. Width: As required to fit space; minimum 3 inch (76 mm).
- E. Screens: Without doors; to match compartments; mounted to wall with two panel brackets.

2.03 ACCESSORIES

- A. Pilaster Shoes: Formed chromed steel with polished finish, 3 in (75 mm) high, concealing floor fastenings.
- B. Pilaster Brackets: Polished stainless steel.
- C. Wall Brackets: Continuous type, polished stainless steel.
- D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
- E. Hardware: Polished stainless steel:
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 - 2. Door Latch: Slide type with exterior emergency access feature.
 - 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.

4. Coat hook with rubber bumper; one per compartment, mounted on door.
5. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch (9 to 13 mm) space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch (6 mm).
- B. Maximum Variation From Plumb: 1/8 inch (3 mm).

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch (5 mm).
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Accessories for toilet rooms, showers, and utility rooms.
- B. Electric hand/hair dryers.
- C. Grab bars.

1.02 RELATED REQUIREMENTS

- A. Section 09 3000 - Tiling: Ceramic washroom accessories.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- C. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Bobrick.
- B. Other Acceptable Manufacturers:
 - 1. Substitutions: Section 01 6000 - Product Requirements.
- C. Electric Hand/Hair Dryers:
 - 1. World Dryer Corporation; ____: www.worlddryer.com.
 - 2. Substitutions: Section 01 6000 - Product Requirements.
- D. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Keys: Provide 6 keys for each accessory to Owner; master key lockable accessories.
- C. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

2.03 FINISHES

- A. Stainless Steel: No. 4 Brushed finish, unless otherwise noted.

2.04 TOILET ROOM ACCESSORIES

- A. Toilet Paper Dispenser: Four roll, surface mounted bracket type, chrome-plated zinc alloy brackets, spindleless type for tension spring delivery designed to prevent theft of tissue roll.
- B. Electric Hand Dryers: Traditional fan-in-case type, with downward nozzle.

1. Operation: Automatic, sensor-operated on and off.
 2. Style: Traditional horizontal, rectangular case, fixed nozzle.
 3. Mounting: Surface mounted.
 4. Cover: Stainless steel with brushed finish.
 - a. Tamper-resistant screw attachment of cover to mounting plate.
 5. Warranty: 3 years.
- C. Waste Receptacle: Recessed, stainless steel, seamless lower door for access to container, with tumbler lock, reinforced panel full height of door, push-in self-closing top door, continuously welded bottom pan and seamless exposed flanges.
1. Liner: Removable, heavy-duty vinyl liner, attached at a minimum of 4 points with stainless steel grommets and hooks.
- D. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gage refill indicator, tumbler lock.
- E. Mirrors: Stainless steel framed, 1/4 inch (6 mm) thick annealed float glass; ASTM C1036.
1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
- F. Grab Bars: Stainless steel, nonslip grasping surface finish.
1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force (1112 N), minimum.
 - b. Dimensions: 1-1/4 inch (32 mm) outside diameter, minimum 0.05 inch (1.3 mm) wall thickness, exposed flange mounting, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
 - c. Length and Configuration: As indicated on drawings.
 - d. Products:
 - 1) Bobrick B-5806.
- G. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
1. Product: B-254 manufactured by Bobrick.

2.05 SHOWER AND TUB ACCESSORIES

- A. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.
1. Product: B-2116 manufactured by Bobrick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 09 9123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
- B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. Ansul, a Tyco Business: www.ansul.com.
 - 2. Nystrom, Inc; ____: www.nystrom.com.
 - 3. Pyro-Chem, a Tyco Business; ____: www.pyrochem.com.
 - 4. Strike First Corporation of America; Water Fire Extinguisher: www.strikefirstusa.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fire Extinguisher Cabinets and Accessories:
 - 1. Ansul, a Tyco Business; ____: www.ansul.com.
 - 2. JL Industries, Inc; ____: www.jlindustries.com.
 - 3. Pyro-Chem, a Tyco Business; ____: www.pyrochem.com.
 - 4. Strike First Corporation of America; EL-Elite Architectural Series Fire Extinguisher Cabinet, Non-Fire Rated: www.strikefirstusa.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL for the purpose specified and indicated.

- B. Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
 - 1. Cartridge Operated: Spun shell.
 - 2. Class: A:B:C.
 - 3. Size: 5 pound (2.27 kg).
 - 4. Size and classification as scheduled.
 - 5. Finish: Baked polyester powder coat, red color.

2.03 WHEELED FIRE EXTINGUISHERS

- A. Wet Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gage.
 - 1. Class: K.
 - 2. Size: 1.6 gallons (6 L).
 - 3. Size and classification as scheduled.
 - 4. Finish: Polished stainless steel.
 - 5. Temperature range: Minus 20 degrees F (Minus 29 degrees C) to 120 degrees F (49 degrees C).

2.04 FIRE EXTINGUISHER CABINETS

- A. Metal: Formed primed steel sheet; 0.036 inch (0.9 mm) thick base metal.
- B. Cabinet Configuration: Semi-recessed type.
 - 1. Sized to accommodate accessories.
- C. Door: 0.036 inch (0.9 mm) thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with two butt hinge. Provide nylon catch.
- D. Door Glazing: Plastic, clear, 1/8 inch (3 mm) thick acrylic. Set in resilient channel gasket glazing.
- E. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.
- F. Weld, fill, and grind components smooth.
- G. Finish of Cabinet Exterior Trim and Door: Satin chrome.
- H. Finish of Cabinet Interior: White enamel.

2.05 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Graphic Identification: _____.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Place extinguishers in cabinets.
- D. Position cabinet signage at manufacturer's instructed location.

END OF SECTION

SECTION 11 4000
FOODSERVICE EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Food service equipment.
- B. Connections to utilities.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing joints between equipment and adjacent walls, floors, and ceilings.
- B. Section 23 3813 - Commercial-Kitchen Hoods: Range and dishwasher hoods for commercial kitchens.
- C. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- E. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.
- F. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2014.
- G. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; National Fire Protection Association; 2014.
- I. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication & Installation Guidelines; 2001
- J. UL (EAUED) - Electrical Appliance and Utilization Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on appliances; indicate configuration, sizes, materials, finishes, locations, and utility service connection locations, service characteristics, and wiring diagrams.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- D. Operation Data: Provide operating data for the specified equipment .

- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture of standard products of the type specified.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for utility requirements.
- B. Products Requiring Electrical Connection: Listed and classified by UL (EAUED) as suitable for the purpose specified and indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store products clear of floor in a manner to prevent damage.
- B. Coordinate size of access and route to place of installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work of this section within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty for replacement or repair of scheduled equipment, refrigerant and compressors, including disconnection and removal of defective unit, and connection of replacement unit.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Equipment Schedule: Refer to schedule at end of this section.
- B. Installation Accessories: Provide all rough-in hardware, supports and connections, attachment devices, closure trim, and accessories required for complete installation.

2.02 FABRICATION

- A. Install rubber button feet on bearing surface of any item positioned on a finished surface.
- B. Isolate rotating or reciprocating machinery to prevent noise and vibration.
- C. Provide indirect drain piping from equipment to terminate over nearest waste receptor.
- D. Accommodate site installation of other services or equipment.

2.03 FINISHES

- A. All Components: Shop finish.
- B. Stainless Steel: No. 4 finish.
- C. Plastic Laminate: to be selected by architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify ventilation outlets, service connections, and supports are correct and in required location.
- B. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install items in accordance with manufacturers' instructions.

- B. Insulate to prevent electrolysis between dissimilar metals.
- C. Use anchoring devices appropriate for equipment and expected usage.

3.03 EXISTING EQUIPMENT

- A. Obtain, move, store, and re-install equipment, ready for utility connection.
- B. Do work in cooperation with Owner so that normal function of services is minimally interrupted.
- C. Clean and re-furbish existing equipment to be re-used to original condition.
- D. Where required, remove existing equipment from site for repairs or alterations; handle carefully and return in "like new" condition.
- E. Re-used Equipment: Refer to schedule on drawings for re-used equipment.

3.04 ADJUSTING

- A. Adjust equipment and apparatus to ensure proper working order and conditions.
- B. Remove and replace equipment creating excessive noise or vibration.

3.05 CLEANING

- A. Remove masking or protective covering from stainless steel and other finished surfaces.
- B. Wash and clean equipment.
- C. Polish glass, plastic, hardware, accessories, fixtures, and fittings.

3.06 CLOSEOUT ACTIVITIES

- A. At completion of work, provide qualified and trained personnel to demonstrate operation of each item of equipment and instruct Owner in operating procedures and maintenance.
 - 1. Test equipment prior to demonstration.
 - 2. Individual Performing Demonstration: Fully knowledgeable of all operating and service aspects of equipment.

3.07 PROTECTION

- A. Remove protective coverings from prefinished work.
- B. Protect finished work from damage.

END OF SECTION

03/17/2016

RAMAPO COLEGE PHASE 2

ITEM # 1 **SANDWICH / SALAD PREPARATION REFRIGERATOR**
Dimensions: **40.88(h) x 72(w) x 35(d)**
Quantity: **One (1)**
Manufacturer: **Continental Refrigerator**
Model: **SW72-30M-FB**



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	115	60	1	Cord & Plug		5-15P	7.6				

One (1) Model SW72-30M-FB Mighty Top Sandwich Unit, Front Breather, 72" wide, three-section, (30) 1/6 size x 4" deep pans with 10" cutting board, (3) field rehingable doors, stainless steel top & front, aluminum sides & interior, 3-5/8" casters, rear mounted self-contained refrigeration, 1/4 hp
One (1) Standard warranty (for the United States & Canada Only): 3 year parts and labor; 5 year compressor
One (1) 115v/60/1, 7.6 amps, NEMA 5-15P, standard

ITEM # 2 **RANGE, 36", 6 OPEN BURNERS**
Dimensions: **58(h) x 36(w) x 34(d)**
Quantity: **One (1)**
Manufacturer: **Vulcan**
Model: **36S-6B**



GAS

	SIZE	MBTU	KW
1	3/4"	215.0	

STEAM

	INLET SIZE	RETURN SIZE	LB/HR	PSIG (MIN)	PSIG (MAX)
1					

One (1) Model 36S-6B Endurance™ Restaurant Range, gas, 36", (6) 30,000 BTU burners, lift-off burner heads, standard oven, stainless steel front, sides, backriser, & lift-off high shelf, fully MIG welded chassis, 6" adjustable legs, 215,000 BTU, CSA, NSF
One (1) 1 year limited parts & labor warranty, standard
One (1) Gas type to be specified
One (1) Stainless steel backriser and lift-off high shelf, standard
One (1) Model 3/4QDH-4FT 3/4" x 4' flex hose & quick disconnect, with restraining device

ITEM # 3 **CHARBROILER**
Dimensions: **15.5(h) x 36(w) x 31(d)**
Quantity: **One (1)**
Manufacturer: **Vulcan**
Model: **VACB36**



GAS

	SIZE	MBTU	KW
1	3/4"	102.0	

STEAM

	INLET SIZE	RETURN SIZE	LB/HR	PSIG (MIN)	PSIG (MAX)
1					

One (1) Model VACB36 Achiever Charbroiler, countertop, 36", (6) 17,000 BTU cast iron burners, infinite heat control valves, fully welded chassis, (1) drip tray, stainless steel front, sides & top trim, backsplash & grease trough, 4"

adjustable legs, 102,000 BTU, CSA, NSF

One (1) 1 year limited parts & labor warranty, standard

One (1) Natural gas (add -1 suffix) (specify elevation if over 2,000 ft.)

One (1) Model 3/4QDH-4FT 3/4" x 4' flex hose & quick disconnect, with restraining device

ITEM # 4 **COUNTERTOP GRIDDLE**
Dimensions: **15.25(h) x 48(w) x 31.5(d)**
Quantity: **One (1)**
Manufacturer: **Vulcan**
Model: **948RX**



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1	Cord & Plug		5-15P	1.0				

GAS

	SIZE	MBTU	KW
1	3/4"	108.0	

STEAM

	INLET SIZE	RETURN SIZE	LB/HR	PSIG (MIN)	PSIG (MAX)
1					

One (1) Model 948RX Heavy Duty Griddle, countertop, gas, 48" W x 24" D cooking surface, 1" thick polished steel griddle plate, embedded mechanical snap action thermostat every 12", millivolt pilot safety, electric spark or manual ignition, front manifold gas shut-off valve, low profile, stainless steel front, sides, front grease trough, 4" back & tapered side splashes, 4" adjustable legs, 108,000 BTU, CSA, NSF

One (1) 1 year limited parts & labor warranty, standard

One (1) Natural gas (add -1 suffix) (specify elevation if over 2,000 ft.)

One (1) 120v/50/60/1-ph, 1.0 amp, NEMA 5-15P, standard

One (1) Model 3/4QDH-4FT 3/4" x 4' flex hose & quick disconnect, with restraining device

ITEM # 5 **EQUIPMENT STAND, REFRIGERATED BASE**
Dimensions: **26(h) x 84(w) x 34(d)**
Quantity: **One (1)**
Manufacturer: **Vulcan**
Model: **ARS84**



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	115	60	1	Cord & Plug		5-15P	12.0		1/2		

One (1) Model ARS84 Achiever Refrigerated Base, 84", self-contained, two-section, (4) drawers, marine top, stainless base, top, front, sides, interior, galvanized back, 3" heavy duty casters, magnetic drawer gasket, 1/2 hp, 115v/60/1, 12.0 amps

One (1) 1 year limited parts & labor warranty, standard

One (1) Compressor on left, standard

One (1) 3" casters, set of (4) standard

ITEM # 6 **CARVING STATION / SHELF**

Dimensions: 36(w) x 24(d)
Quantity: One (1)
Manufacturer: Hatco
Model: DCSB400-3624-2



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1	Cord & Plug		5-15P	10.83	1.3		15	

One (1) Model DCSB400-3624-2 Decorative Carving Station with Two Heat Lamps (clear bulbs included), telescoping clearance (bottom of shade to top of cutting board) 14" - 26", 30° shade pivot, heated Swanstone® base with thermostatic control, includes one 36"x24" cutting board with meat juice containment, specify finish

One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details

One (1) NOTE: Includes 24/7 parts & service assistance, call 800-558-0607

One (1) One year parts and labor warranty (excludes sneeze guard and light bulbs), standard

One (1) One year warranty for burnouts on all ceramic heating elements

One (1) 120v/60/1-ph, 1300 watt, NEMA 5-15P, standard

One (1) Model ABRONZE1 Antique Bronze plated finish (Not for retrofit)

One (1) The color selected is considered custom and is NOT returnable

One (1) Model NSKY Night Sky Swanstone® base and cutting board color (one included) (Not for retrofit)

ITEM # 7 **FRYER**
Dimensions: 36.25(h) x 21(w) x 30.25(d)
Quantity: One (1)
Manufacturer: Vulcan
Model: LG500



GAS

	SIZE	MBTU	KW
1	3/4"	150.0	

STEAM

	INLET SIZE	RETURN SIZE	LB/HR	PSIG (MIN)	PSIG (MAX)
1					

One (1) Model LG500 Fryer, gas, 21" W, free-standing, 65-70 lb capacity, millivolt thermostat controls, twin baskets, legs, stainless steel front top, door and fry tank, 150,000 BTU, CSA, NSF

One (1) 1 year limited parts & labor warranty, standard

One (1) 5 year limited fry tank warranty (NOTE: If tank fails within the first year and verified by an authorized service agency, then the entire LG fryer will be replaced), standard

One (1) Natural gas (add -1 suffix) (specify elevation if over 2,000 ft.)

One (1) Model 3/4QD HOSE-4 3/4" x 4' long gas flex hose & quick disconnect

ITEM # 8 **WORK TABLE**
Dimensions: 40.5(h) x 60(w) x 30(d)
Quantity: One (1)
Manufacturer: Advance Tabco
Model: KSS-305



One (1) Model KSS-305 Work Table, 60"W x 30"D, 14 gauge 304 series stainless steel top with 5"H backsplash, 18 gauge stainless steel adjustable undershelf, stainless steel legs with stainless steel bullet feet, NSF

ITEM # 9 **DUAL TEMP FOOD WELL, DROP-IN**
Dimensions: **26.13(h) x 46.5(w) x 27.13(d)**
Quantity: **One (1)**
Manufacturer: **Wells**
Model: **HRCF-7300**



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	115	60	1	Direct			5.6		1/3		
2	208/240	60	1	Direct			14.4/16.7	3.8/5.0			

ELECTRICAL 1 REMARKS

Refrigeration operation

ELECTRICAL 2 REMARKS

Hot operation

One (1) Model HRCF-7300 Hot/Cold Drop In Unit, 3-pan size, single tank with switch for hot or cold operation with self-contained refig., automatic water fill, (COLD) 1/3 hp, 115v/60/1-ph, 5.6 amps, (HOT) 208-240v/60/1-ph, 14.4/16.7 amps, direct, NSF 7, UL, cULus

One (1) Warranty; 1 year parts and labor, standard

ITEM # 10 **DROP-IN SINK**
Dimensions: **12(h) x 23(w) x 21(d)**
Quantity: **One (1)**
Manufacturer: **Advance Tabco**
Model: **DI-1-2012**



WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1									

WASTE

	INDIRECT SIZE	DIRECT SIZE
1	1-1/2"	

PLUMBING 1 REMARKS

(1) set of 1/2" faucet holes, 4" OC

One (1) Model DI-1-2012 Drop-In Sink, 1-compartment, 20" wide x 16" front-to-back x 12" deep bowl, 18 gauge 304 series stainless steel, with deck mounted 8" swing spout faucet, basket drain, NSF

One (1) Model K-614F Removable 3-sided splash for counter-mounted drop in sink, 8" tall, includes posts to be installed in countertop, for DI-1-208 & DI-1-2012 (drop in sink-for sinks welded into stainless counters use TA-56)

ITEM # 11 **MICROWAVE OVEN**
Dimensions: **13.75(h) x 22(w) x 19(d)**
Quantity: **One (1)**
Manufacturer: **ACP**
Model: **RCS10TS**



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1	Cord & Plug		5-15P	15	1			15.0

One (1) Model RCS10TS Amana® Commercial Microwave Oven, 1000 watts, 1.2 cu. ft. capacity, medium volume, capacity to program 100 menus, 5 power levels, 4-stage cooking, braille touch pads, non-removable air filter, side hinged door with tempered glass, accommodates 14" plate, stainless steel interior & exterior, 120v/60/1-ph, 15 amps, 5 ft. cord & NEMA 5-15P, cETLus

One (1) 3-year limited warranty (Year 1: parts, labor and travel are covered; Year 2 and 3: Magnetron tube (part only) are covered)

ITEM # 12 **CONVEYOR TOASTER**
Dimensions: **13.5(h) x 14.5(w) x 19.5(d)**
Quantity: **One (1)**
Manufacturer: **Admiral Craft**
Model: **CVYT-120**



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1			5-15P		1.7			

One (1) Model CVYT-120 Conveyor Toaster, countertop design, 280-300 pieces/hour, 10" wide stainless steel conveyor belt, adjustable speed, single or dual side toasting option, pull out crumb tray, heavy duty stainless steel construction, 1700W, 120v/60/1-ph, NEMA 5-15P, CE, NSF

One (1) 1 year warranty on parts & labor, standard

ITEM # 13 **REACH-IN FREEZER**
Dimensions: **77.75(h) x 27.5(w) x 33.75(d)**
Quantity: **One (1)**
Manufacturer: **True Food Service Equipment**
Model: **STG1F-1S**



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	115	60	1	Cord & Plug		5-15P	6.8		1/2		15.0

One (1) Model STG1F-1S SPEC SERIES® Freezer, Reach-in, -10°F, one-section, stainless steel front, aluminum sides, (1) stainless steel door with lock, cam-lift hinges, digital temperature control, aluminum interior, (3) gray shelves, LED interior lights, 5" castors, 1/2 HP, 115v/60/1, 6.8 amps, 9' cord, NEMA 5-15P, MADE IN USA

One (1) Warranty - 3 year parts and labor, please visit www.Truefmfg.com for specifics

One (1) Warranty - 5 year compressor (self-contained only), please visit www.Truefmfg.com for specifics

One (1) Door hinged right standard

One (1) (3) vinyl shelves and shelf supports standard per section

Three (3) Vinyl coated shelf (includes shelf clip supports) (specify for left, center or right section, if applicable), each

One (1) 5" castors, set of 4, standard

ITEM # 14 **REACH-IN REFRIGERATOR**

Dimensions: 77.75(h) x 27.5(w) x 33.75(d)
Quantity: One (1)
Manufacturer: True Food Service Equipment
Model: STG1R-1S



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	115	60	1	Cord & Plug		5-15P	4.8		1/3		15.0

One (1) Model STG1R-1S SPEC SERIES® Refrigerator, Reach-in, one-section, stainless steel front, aluminum sides, (1) stainless steel door with lock, cam-lift hinges, digital temperature control, aluminum interior, (3) gray shelves, LED interior lights, 5" castors, 1/3 HP, 115v/60/1, 4.8 amps, 9' cord, NEMA 5-15P, ENERGY STAR®, cULus, NSF, MADE IN USA (THIS MODEL ALSO AVAILABLE IN HYDROCARBON REFRIGERANT)

One (1) Warranty - 3 year parts and labor, please visit www.Truefmfg.com for specifics

One (1) Warranty - 5 year compressor (self-contained only), please visit www.Truefmfg.com for specifics

One (1) Left door hinging

One (1) (3) vinyl shelves and shelf supports standard per section

Three (3) Vinyl coated shelf (includes shelf clip supports) (specify for left, center or right section, if applicable), each

One (1) 5" castors, set of 4, standard

ITEM # 15 HEATED SHELF FOOD WARMER

Dimensions: 5.25(h) x 72(w) x 25.5(d)
Quantity: One (1)
Manufacturer: Hatco
Model: GRS-72-L



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1	Cord & Plug		5-15P		1.45			

One (1) Model GRS-72-L Glo-Ray® Heated Shelf, Free-standing, 72" W, 25-1/2" D, with adjustable thermostat, aluminum base, stainless steel top, 1450 watts, 4" legs

One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details

One (1) NOTE: Includes 24/7 parts & service assistance, call 800-558-0607

One (1) 120v/60/1-ph, 1450W, NEMA 5-15P

ITEM # 16 SPARE NO. <Spare No.>

ITEM # 17 DROP-IN HOT WELL
Dimensions: 8.75(h) x 12(w) x 12(d)
Quantity: Two (2)
Manufacturer: Wells



Model: SS-10



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1	Direct			3.75	0.45			

Two (2) Model SS-10 Food Warmer, top-mount, built-in, electric, for 11-quart round inserts, wet/dry operation, non-insulated, infinite control, stainless steel interior, Wellslok, cRUus, cULus, NSF

Two (2) Limited 2 year parts & 1 year labor warranty, standard

Two (2) NOTE: CSA models available

Two (2) Model 20130 120v/60/1-ph, 450w, 3.75 amps, direct

ITEM # 18 **DISPLAY FREEZER**
Dimensions: **35.24(h) x 40.94(w) x 25.2(d)**
Quantity: **One (1)**
Manufacturer: **Entree**
Model: **OFL-40**



ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	115	60	1	Cord & Plug		5-15P	1.0		1/8		

One (1) Model OFL-40 Oblique Display Freezer, 7.1 cu ft, sliding flat lid, white aluminum interior & exterior, 3" foam insulation, digital temperature display, inside light, 1/8 HP, 1 amp, 115v-60/1-ph, NEMA 5-15P, 8" cord

One (1) 2 years parts and labor, additional 3 years compressor parts warranty, standard

ITEM # 19 **DIPPER WELL**
Dimensions: **7(h) x 7(w)**
Quantity: **One (1)**
Manufacturer: **AllPoints Foodservice Parts & Supplies**
Model: **56-1462**



One (1) Model 56-1462 Dipperwell, 6" faucet, round, drop-in, 1-1/2" pipe size drain, 2" spout & 1-1/2" pipe, stainless steel

ITEM # 20 **L-SHAPED WORK TABLE**
Dimensions: **41.5(h) x 84(w) x 30(d)**
Quantity: **One (1)**
Manufacturer: **Advance Tabco**
Model: **KTMS-307**



WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1									

WASTE

	INDIRECT SIZE	DIRECT SIZE
1	(2) 1-1/2"	

One (1) Model KTMS-307 Work Table, 30" wide top, L-shaped, 5" splash at rear only, 84" x 60" (specify which side is which), with crossrails, stainless steel construction, 14 gauge 304 series stainless steel top
 One (1) Model KT-101 Additional Length for KTMS table, in excess of 5 ft. (per linear foot) (use wall dimension)
 One (1) Model KT-103 Undershelf for KTMS table, per linear foot (use wall dimension), stainless steel
 One (1) Model TA-48 12" x 12" cut out for plumbing in back panel or undershelf
 One (1) Model TA-11A-2 Double Sink Welded Into Table Top, 16"W x 20"D x 8" deep bowls, includes faucet (must specify sink location)

ITEM # 21 DECORATIVE LAMP**Dimensions:****Quantity: Four (4)****Manufacturer: Hatco****Model: DL-775-CL****ELECTRICAL**

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1	Direct			2.08	.25		15	
2							16.0				

Four (4) Model DL-775-CL Decorative Lamp, (1) bulb type, 8-1/2" H x 10-1/2" Dia. shade, cord mount to canopy (overall length from 17" to any length), lower switch location, No bulb included (specify finish)

One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details

One (1) NOTE: Includes 24/7 parts & service assistance, call 800-558-0607

One (1) NOTE: The decorative lamp and Luminaires are NOT returnable

Four (4) 120v/60/1-ph, 250 watt (Decorative lamp only) standard

Four (4) No bulb is included, 250 watt max.

Four (4) Model DL-SWITCH-16AMP Lamp Toggle Switch, 16 amp (shipped separately)

Four (4) Model DL-CORD-BK Black Cord, (CL, CU, CT, RL mounts only), (black is standard) (Not for retrofit)

Four (4) Model SPECIFY Designer color selected from list of standard colors and indicated on order (Not for retrofit)

Four (4) Color to match unit finish

Four (4) Model UP TO 72" Overall Length - Up to 72" (specify to the nearest inch) (Not for retrofit)

ITEM # 22 REACH-IN UNDERCOUNTER REFRIGERATOR**Dimensions: 34.5(h) x 60(w) x 29.25(d)****Quantity: One (1)****Manufacturer: Beverage Air****Model: UCR60A****ELECTRICAL**

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1									1/4		
2	115	60	1				8.2				

One (1) Model UCR60A Undercounter Refrigerator, two-section, 60" W, 17.1 cu. ft., (2) doors, (4) shelves, stainless steel exterior & top, aluminum interior, rear-mounted self-contained refrigeration, 6" casters, 1/4 hp, UL, cUL, UL-EPH, MADE IN USA

One (1) 3 years parts & labor warranty (excludes maintenance items)

One (1) Additional 2 yr compressor warranty, standard

One (1) 115v/60/1-ph, 8.2 amps, standard

03/17/2016

RAMAPO COLLEGE PHASE 2

One (1) Left door hinged left, right door hinged on right, standard

One (1) 6" Heavy duty casters, standard

One (1) 16 gauge top for 60" wide units

SANDWICH UNIT REFRIGERATOR

Model: SW72-30M-FB

72" Mighty Top Sandwich Unit Refrigerator with Solid Doors - 30 Pans Front Breathing

Stainless steel front and top, aluminum end panels, case back and interior.
Certified under NSF-7 to maintain temperatures in 86°F ambient and designed to maintain NSF-7 temperatures in 100°F ambient.



Options and Accessories

(upcharge and lead times may apply)

Stainless steel exterior and interior - SS models	Expansion valve system
Stainless steel end panels - SA models	Rear-mounted cutting board
Glass doors in lieu of solid doors - GD models	Flat insulated night covers
Stainless steel finished back in lieu of aluminum	Remote models
Drawers in lieu of doors	Door locks
Overshelves (single or double)	Adjustable legs
Stainless steel shelves	Digital thermometer
Additional epoxy-coated steel shelves	Crumb catcher
Automatic, electric condensate evaporator	

Consult factory for other model configurations, options and accessories.

Continental
 Refrigerator

Toll-Free: 800-523-7138
 Phone: 215-244-1400
 Fax: 215-244-9579

539 Dunksferry Road
 Bensalem, PA 19020
www.continentalrefrigerator.com

Project Name:

Model Specified:

Location:

Item No:

Quantity:

AIA #:

SIS #:

Standard Model Features

REFRIGERATION SYSTEM

Performance-rated refrigeration system
 Environmentally-safe R-134a refrigerant
 Unique air flow distribution allows pan product to maintain 33° - 41°F
 Automatic, energy saving, non-electric condensate evaporator
 Non-corrosive, plasticized fin evaporator coil
 Easily serviceable, back mounted compressor

CABINET ARCHITECTURE

2" non-CFC polyurethane foam insulation
 Spring loaded, self closing doors
 Magnetic snap-in door gaskets
 Heavy-duty, epoxy-coated steel shelves
 10" deep, full length nylon cutting board
 Insulated lids
 3 5/8" casters
 Completely enclosed, vented and removable case back

MODEL FEATURES

(30) 1/6 size non-recessed pans, 4" deep
 Interior hanging thermometer
 Field rehingeable doors

Front breathers are a unique, field assembled, bottom mounted ventilation system designed to allow cabinets to be flush against a wall or built into a counter to conserve space.

APPROVAL:

Model Specifications

DIMENSIONAL DATA

Net Capacity (cu. ft.)	20.6 (583 cu l)
1/6 Size Pans (4" deep)	30
Width, Overall (in.)	72 (1829 mm)
Depth, Overall (in.) (incl. handles & bumpers)	35 (889 mm)
Depth, Body Only (less doors) (in.)	27 1/2 (699 mm)
Depth, Cutting Board (in.)	10 (254 mm)
Height, Overall (in.) (incl. 3 5/8" casters)	40 7/8 (1038 mm)
Shelf Area (sq. ft.)	10.2 (.9 sq m)
No. of Shelves	3
No. of Doors	3
Interior Depth (in.)	19 3/8 (492 mm)
Interior Height (in.)	26 1/4 (667 mm)
Interior Width (in.)	68 (1727 mm)

REFRIGERANT DATA

Condensing Unit Size (H.P.)	1/4
Capacity (BTU/Hr)*	1940

ELECTRICAL DATA

Voltage (int'l)	115/60/1 (220/50/1)
Fans	4
Total Amps (int'l)	7.6 (4.7)
10 ft. Cord/Plug [attached] (int'l)	Yes (No)

SHIPPING DATA

Weight (lbs.)	420 (191 kg)
Height - Crated (in.)	43 1/4 (1099 mm)
Width - Crated (in.)	80 1/4 (2038 mm)
Depth - Crated (in.)	46 (1168 mm)

* Rating @ +25°F evaporator, 90°F ambient

Figures in parentheses reflect metric equivalents rounded to the nearest whole unit.



Equipped with one NEMA-5-15P Plug
(varies by country)

Continental
Refrigerator

Toll-Free: 800-523-7138
Phone: 215-244-1400
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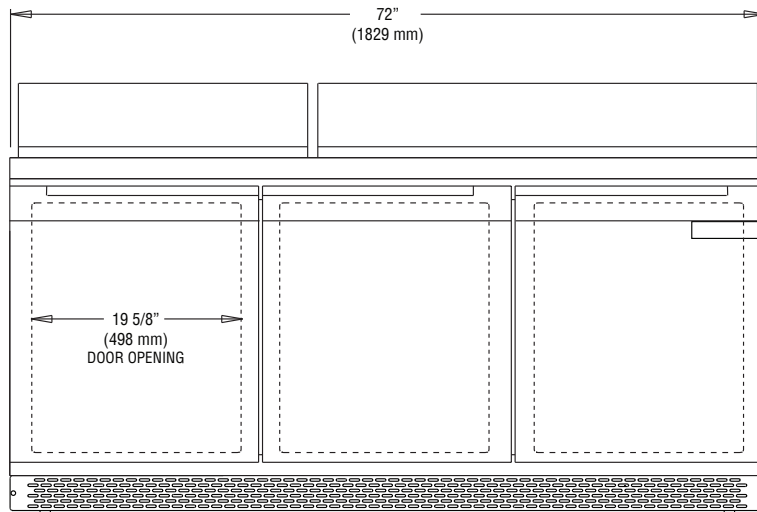
Due to our continued efforts in developing innovative products, specifications subject to change without notice.



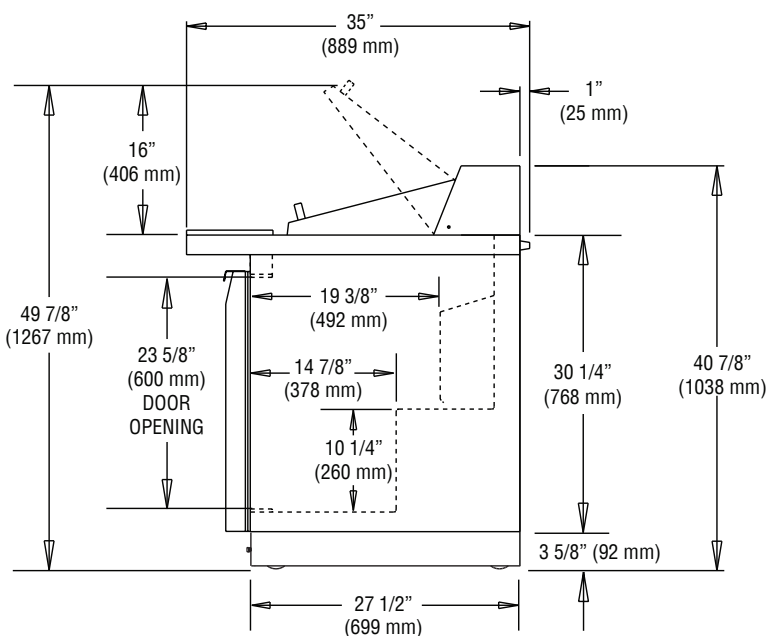
MADE IN THE U.S.A.

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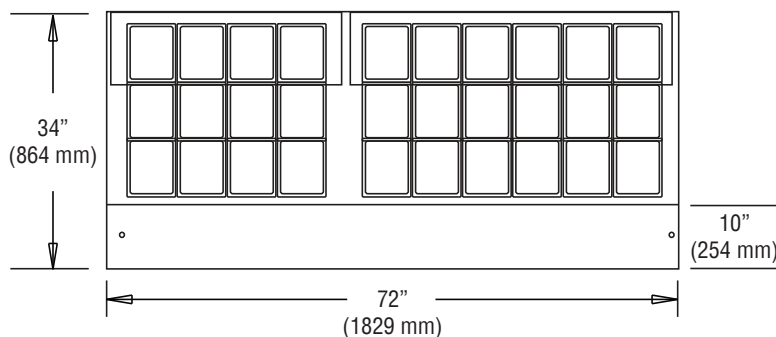
Model Plan Views



FRONT VIEW



SIDE VIEW



PAN TOP CONFIGURATION

RESTAURANT RANGES

VULCAN**ENDURANCE GAS RESTAURANT RANGE**
6 OPEN BURNERS
36" WIDE GAS RANGE

Model 36S-6BN
(shown with optional casters)

**SPECIFICATIONS**

36" wide gas restaurant range, Vulcan Model No. 36S-6BN. Fully MIG welded aluminized steel frame for added durability. Stainless steel front, sides, backriser, highshelf and 6" adjustable legs. Extra deep crumb tray with welded corners. Six 30,000 BTU/hr. open top burners with lift-off burner heads. Energy saving flashtube open burner ignition system (one pilot for every two burners) shrouded for reliability. Heavy duty cast grates, easy lift-off 12" x 12½" in the front and 12" x 14½" in the back to better accommodate stock pots or large pans. Grates have a built in aeration bowl for greater efficiency. Burner knobs are cool to the touch, high temperature material. One oven: 35,000 BTU/hr. standard bakers depth ovens with porcelain oven bottom and door panel, measures 27"d x 26⅜"w x 14"h. Oven thermostat adjusts from 250°F to 500°F with a low setting. Oven is supplied with two racks, two rack guide sets, and four rack positions. Oven door is heavy duty with an integrated door hinge/spring mechanism requiring no adjustment. ¾" rear gas connection and pressure regulator. Total input 215,000 BTU/hr.

Exterior Dimensions:

34"d x 36"w x 58"h on 6" adjustable legs

- ☐ **36S-6BN** 1 Standard Oven / Natural Gas
- ☐ **36S-6BP** 1 Standard Oven / Propane
- ☐ **36C-6BN** 1 Convection Oven / Natural Gas
- ☐ **36C-6BP** 1 Convection Oven / Propane

STANDARD FEATURES

- Fully MIG welded frame
- Stainless steel front, sides, backriser, lift-off high shelf
- 6" stainless steel adjustable legs
- Six open top burners, each burner is 30,000 BTU/hr. with lift-off burner heads
- Shrouded flash tube pilot system (one pilot per two burners)
- Heavy duty cast grates, easy lift-off 12" x 12½" in front and 12" x 14½" in the rear
- Extra deep pull out crumb tray with welded corners
- 35,000 BTU/hr. baker's depth standard oven cavity. Full size sheet pans fit side-to-side or front-to-back.
- Oven thermostat adjusts from 250°F to 500°F
- Two oven racks and four rack positions
- 35,000 BTU/hr. convection oven in place of standard oven, 24"d x 26⅜"w x 13⅞"h (115v - 1 phase blower motor 4 amp, 6' cord and plug), includes three oven racks. Full size sheet pans only fit side-to-side in convection oven. Convection oven motor requires field attachment.
- One year limited parts and labor warranty

ACCESSORIES (Packaged & Sold Separately)

- ☐ Extra oven rack with rack guides
- ☐ Casters (set of four)
- ☐ Leveling casters (set of four)
- ☐ Flanged feet (set of four)
- ☐ 10" stainless steel stub back
- ☐ Reinforced high shelf for mounting salamander broiler

OPTIONS (Factory Installed)

- ☐ Flame Safety device with manual spark ignition for all open top burners, thermostatic griddles and oven pilots

VULCAN

a division of ITW Food Equipment Group LLC

P.O. Box 696 ■ Louisville, KY 40201 ■ Toll-free: 1-800-814-2028 ■ Local: 502-778-2791 ■ Quote & Order Fax: 1-800-444-0602

RESTAURANT RANGES



ENDURANCE GAS RESTAURANT RANGE

6 OPEN BURNERS

36" WIDE GAS RANGE

INSTALLATION INSTRUCTIONS

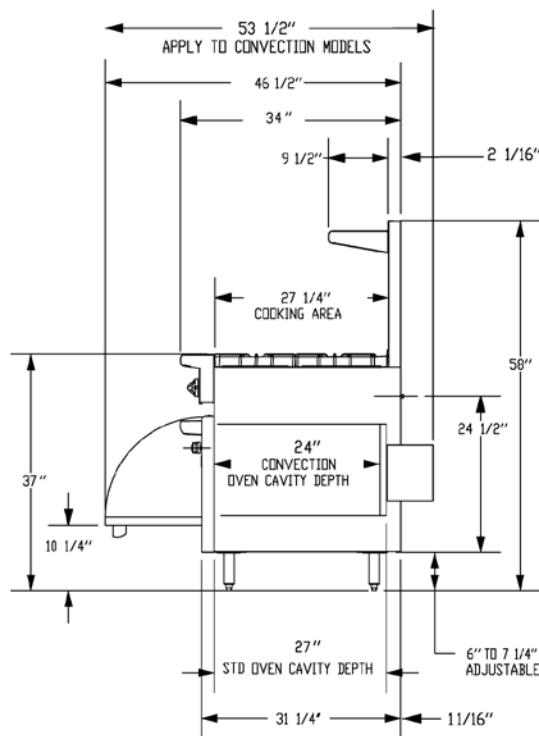
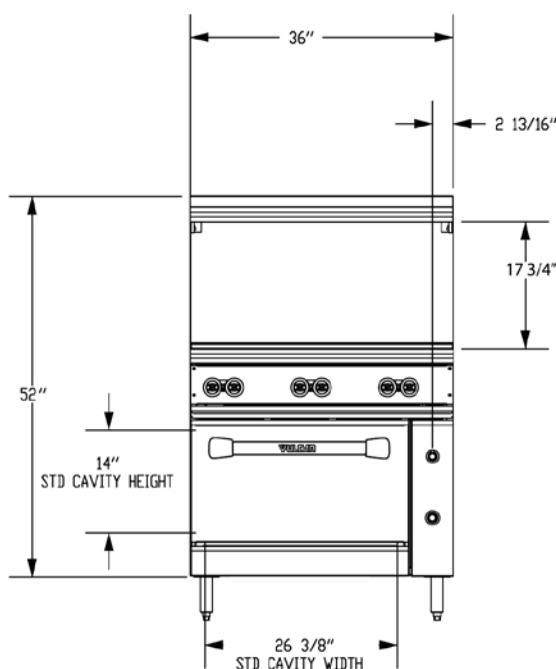
1. A pressure regulator sized for this unit is included. Natural gas 5.0" W.C., propane gas 10.0" W.C.
2. Gas line connecting to range must be $\frac{3}{4}$ " or larger. If flexible connectors are used, the inside diameter must be $\frac{3}{4}$ " or larger.
3. An adequate ventilation system is required for commercial cooking equipment. Information may be obtained by writing to the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269, www.NFPA.org. When writing, refer to NFPA No. 96.
4. These units are manufactured for installation in accordance with ANSI Z223.1A (latest edition), National Fuel Gas Code. Copies may be obtained from The American Gas Association, 400 N Capitol St. NW, Washington, DC 20001, www.AGA.org.

5. Clearances	Rear	Sides
Combustible	6"	10"
Standard Oven Non-combustible	0"	0"
Convection Oven Non-combustible	Min. 4"	0"

6. For proper combustion, install equipment on adjustable legs or casters provided with unit.

NOTE: In line with its policy to continually improve its product, Vulcan reserves the right to change materials and specifications without notice.

Specify type of gas when ordering.
Specify altitude when above 2,000 feet.



TOP CONFIGURATION	MODEL NUMBER	DESCRIPTION	TOTAL INPUT BTU / HR	SHIPPING WEIGHT LBS / KG
	36S-6BN	1 Standard Oven / 6 Burners / Natural Gas	215,000	520 / 236
	36S-6BP	1 Standard Oven / 6 Burners / Propane	215,000	520 / 236
	36C-6BN	1 Convection Oven / 6 Burners / Natural Gas	215,000	580 / 263
	36C-6BP	1 Convection Oven / 6 Burners / Propane	215,000	580 / 263

This appliance is manufactured for commercial use only and is not intended for home use.



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GRIDDLES & BROILERS

VULCAN**VACB SERIES**
HEAVY DUTY COUNTER MODEL GAS CHARBROILER

Model VACB36

**SPECIFICATIONS**

Low profile, high volume gas charbroiler, Vulcan-Hart Model No. _____. All welded chassis with stainless steel front, sides, top trim and grease trough. Heavy cast iron char-radiants. 5¼" wide cast iron diamond grates. Supercharger burner dividers. One 17,000 BTU/hr. burner for each broiling grate. Underburner deflector system reflects heat upwards. Standing pilot ignition system. One high range infinite heat control valve for each burner. 4" adjustable legs. ¾" rear gas connection and gas pressure regulator.

Exterior dimensions:

_____ " wide x 31" deep x 12" working height

CSA design certified. NSF Certified.

SPECIFY TYPE OF GAS WHEN ORDERING.
SPECIFY ALTITUDE WHEN ABOVE 3,999 FT.

- ☐ **VACB25** 25⅛" wide
- ☐ **VACB36** 36" wide
- ☐ **VACB47** 46⅞" wide
- ☐ **VACB60** 62⅛" wide
- ☐ **VACB72** 72½" wide

STANDARD FEATURES

- All welded chassis with stainless steel sides, control panel, top trim, backsplash and grease trough
- Heavy duty cast iron char-radiants
- 5¼" wide cast iron diamond grates
- One 17,000 BTU/hr burner for each broiler grate
- Easy lighting standing pilot ignition system
- One high range infinite heat control valve for each burner. Valve adjustment marks engraved into front panel for easy set-up.
- Heat deflector tray system reflects heat upwards creating a "Cool Zone" in the grease drawer and facilitates easier cleaning.
- 4" adjustable legs
- ¾" rear gas connection and gas pressure regulator
- Supercharger burner dividers minimize heat transfer to enhance multi-zone cooking capability
- One year limited parts and labor warranty

ACCESSORIES

- ☐ 6" legs
- ☐ Cutting board
- ☐ Deep plate rail
- ☐ Condiment rail
- ☐ Back and side splash kit
- ☐ Griddle plate
- ☐ Welded steel diamond and round rod grates.
- ☐ 10½" wide griddle plate inserts
- ☐ Stainless steel stand with undershelf and casters
- ☐ Fajita pan rack
- ☐ Upper warming shelf

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GRIDDLES & BROILERS



VACB SERIES

HEAVY DUTY COUNTER MODEL GAS CHARBROILER

INSTALLATION REQUIREMENTS:

1. A gas pressure regulator supplied with the unit must be installed:
Natural Gas 5.0" (127 mm) W.C.
Propane Gas 10.0" (254 mm) W.C.
2. An adequate ventilation system is required for commercial cooking equipment. Information may be obtained by writing to the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269. When writing refer to NFPA No. 96.
3. These units are manufactured for installation in accordance with National Fuel Gas Code, ANSI-Z223.1/NFPA #54 (latest edition). Copies may be obtained from The American Gas Association, Accredited Standards Committee Z223 @ 400 N. Capital St. NW, Washington, DC 20001, or the Secretary Standards Council, NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471.

NOTE: In The Commonwealth of Massachusetts

All gas appliances vented through a ventilation hood or exhaust system equipped with a damper or with a power means of exhaust shall comply with 248 CMR.

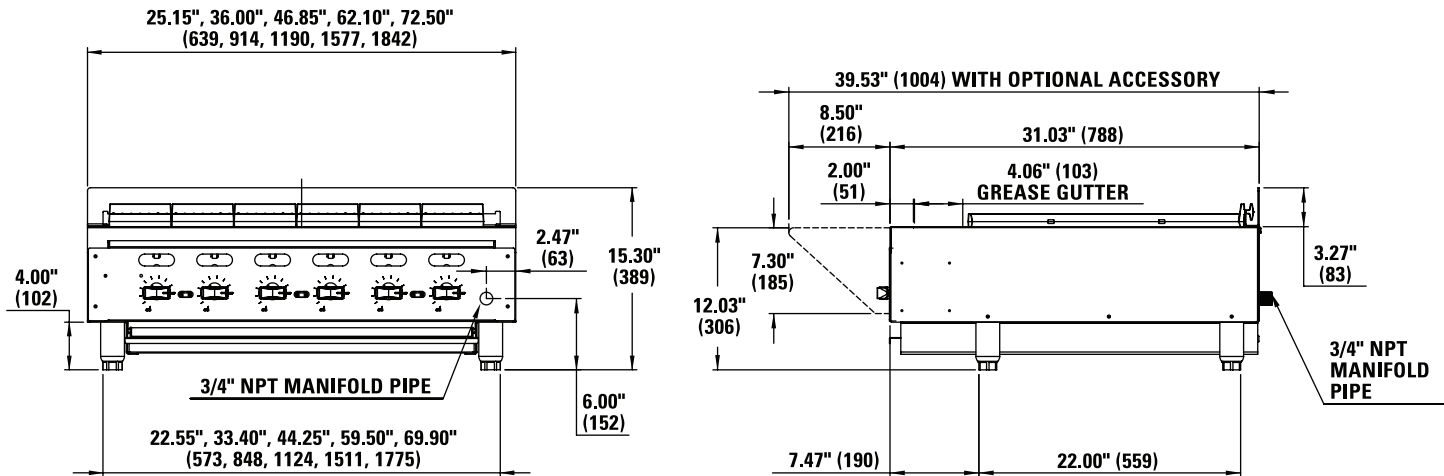
4. CLEARANCES

Non-Combustible

Rear 3"
Sides 0"

All models require a 4" bottom clearance from a non-combustible counter and must be installed with minimum 4" legs.

5. This appliance is manufactured for commercial installation only and is not intended for home use.



MODEL	WIDTH	DEPTH	OVERALL HEIGHT	WORKING HEIGHT*	BROILING AREA
VACB25	25.15" (639)	31" (788)	15.30" (389)	12" (306)	21.50" (546) x 22.31" (567)
VACB36	36.00" (914)				32.25" (819) x 22.31" (567)
VACB47	46.85" (1190)				43.00" (1092) x 22.31" (567)
VACB60	62.10" (1577)				57.00" (1448) x 22.31" (567)
VACB72	72.50" (1842)				68.75" (1746) x 22.31" (567)

*These are nominal dimensions and can vary by +1.75" with adjustable legs. Dimensions in "() " are in millimeters.

MODEL	# BURNERS	# DRIP TRAYS	TOTAL BTU/HR NATURAL GAS	TOTAL BTU/HR LP GAS	APPROX SHIP WT (LB/KG)
VACB25	4	1	68,000	64,000	290/131
VACB36	6	1	102,000	96,000	370/167
VACB47	8	2	136,000	128,000	450/203
VACB60	11	2	187,000	176,000	500/225
VACB72	13	2	221,000	208,000	580/263



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NOTE: In line with its policy to continually improve its products, Vulcan reserves the right to change materials and specifications without notice.

GRIDDLES & BROILERS

VULCAN**900RX SERIES
HEAVY DUTY GAS GRIDDLES**

Model 948RX

**SPECIFICATIONS**

Low profile heavy duty gas griddle, Vulcan Model No. _____. Stainless steel front, sides and front top ledge. Fully welded stainless and aluminized steel body frame. 11" low profile cooking height on 4" legs. 1" thick polished steel griddle plate with 12 gage, 4" stainless steel back and tapered side splashes. Grease chute is fully welded to stop grease migration. One 27,000 BTU/hr. "U" shaped aluminized steel burner and mechanical snap action thermostat for each 12" of griddle width. Chrome thermostat knob guards. Temperature adjusts from 200° to 550° F. One pilot safety for every two burners. Manual shut-off valve. 3½" wide stainless steel grease trough. 120V 50/60Hz 1 Amp single phase electric ignition circuit. Plug type is NEMA 5-15 USA. ¾" rear gas connection and gas pressure regulator.

Exterior Dimensions:

_____ "w x 33" d x 15½" h on 4" legs.

CSA design certified. NSF listed.

SPECIFY TYPE OF GAS WHEN ORDERING.
SPECIFY ALTITUDE WHEN ABOVE 3,999 FT.

- ☐ **924RX** 24" w x 24" d griddle plate
- ☐ **936RX** 36" w x 24" d griddle plate
- ☐ **948RX** 48" w x 24" d griddle plate
- ☐ **960RX** 60" w x 24" d griddle plate
- ☐ **972RX** 72" w x 24" d griddle plate

STANDARD FEATURES

- Stainless steel front, sides and front top ledge with "Cool Bullnose" design.
- Fully welded stainless and aluminized steel chassis frame.
- 11" low profile cooking height on 4" adjustable legs.
- 1" thick polished steel griddle plate with 12 gage, 4" stainless steel back and tapered side splashes.
- Spatula wide 3½" grease gutter and chute is fully welded for easier cleaning and to stop grease migration.
- One 27,000 BTU/hr. "U" shaped aluminized steel burner for every 12" of griddle width.
- One embedded snap action thermostat per burner with temperature adjust from 200°F to 550°F.
- Large 6 quart stainless steel grease drawer (2 drawers on 60" and 72" models).
- Heavy duty chromed thermostat knob guards.
- One pilot safety valve for every two burners. Safety will completely shut off gas to pilot and burners if pilot extinguishes.
- Manual shut-off valve for gas inlet.
- Dual (manual/electric) ignition.
- Bottom heat shields
- ¾" rear gas connection and gas pressure regulator.
- 120V 50/60Hz 1 Amp single phase with NEMA 5-15 USA plug.
- One year limited parts and labor warranty.

OPTIONAL FEATURES

- ☐ Hexavalent chrome plated cooking surface.
- ☐ 30" deep plate.
- ☐ Stainless steel stand with marine edges and casters.
- ☐ Cutting board, condiment rail, plate rail and banking strip accessories.
- ☐ Full or partially grooved griddle plate.

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GRIDDLES & BROILERS

VULCAN

900RX SERIES HEAVY DUTY GAS GRIDDLES

INSTALLATION INSTRUCTIONS

1. A gas pressure regulator supplied with the unit must be installed;
Natural Gas 4.0" (102 mm) W.C.
Propane Gas 10.0" (254 mm) W.C.
2. All models require a 6" (152 mm) clearance at both sides and rear adjacent to combustible and 0" from non-combustible constructions. All models require a 4" (102mm) bottom clearance and must be installed with minimum 4" legs.
3. These units are manufactured for installation in accordance with ANSI/NFPA-70, National Electrical code.

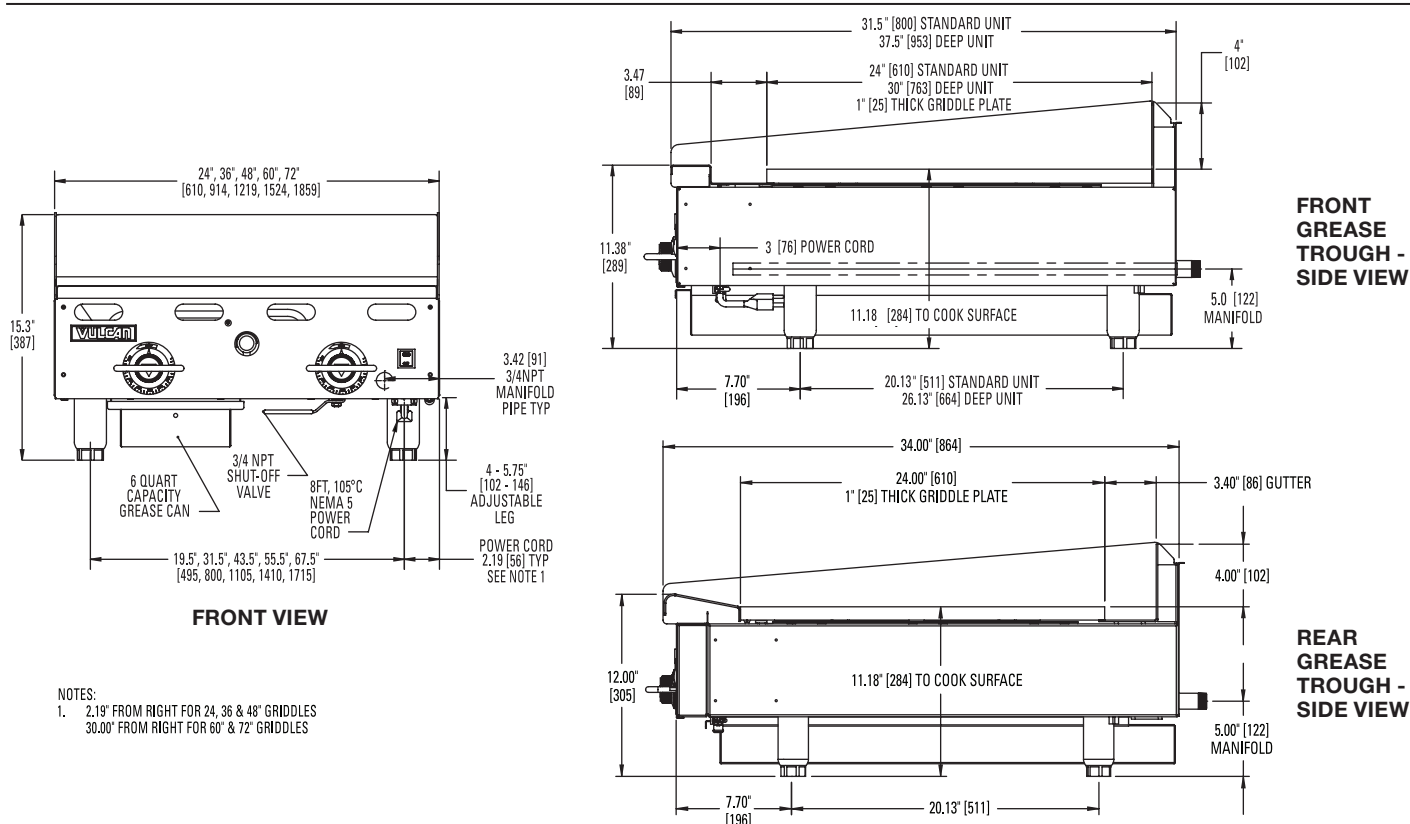
An adequate ventilation system is required for Commercial Cooking Equipment (NFPA No. 96). Information may be obtained by writing to the National Fire Protection Association, Batterymarch Park, Quincy, MA 02169.

4. These units are manufactured for installation in accordance with National Fuel Gas Code, ANSI-Z223.1/NFPA #54 (latest edition). Copies may be obtained from The American Gas Association, Accredited Standards Committee Z223 @ 400 N. Capital St. NW, Washington, DC 20001, or the Secretary Standards Council, NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471.

NOTE: In The Commonwealth of Massachusetts

All gas appliances vented through ventilation hood or exhaust system equipped with a damper or with a power means of exhaust shall comply with 248 CMR.

5. This appliance is manufactured for commercial installation only and is not intended for home use.



MODEL	WIDTH	DEPTH	OVERALL HEIGHT*	WORKING HEIGHT*	NO. OF BURNERS	TOTAL BTU/HR.	NO. OF DRAWERS	APPROX. SHIP. WT.
924RX	24"	31½"	15¼"	11⅞"	2	54,000	1	285 lbs. /129 kg.
936RX	36"	31½"	15¼"	11⅞"	3	81,000	1	400 lbs. /181 kg.
948RX	48"	31½"	15¼"	11⅞"	4	108,000	1	480 lbs. /218 kg.
960RX	60"	31½"	15¼"	11⅞"	5	135,000	2	650 lbs. /295 kg.
972RX	72"	31½"	15¼"	11⅞"	6	162,000	2	790 lbs. /358 kg.

*These are nominal dimensions and can vary by +1.75" with adjustable legs.

VULCAN

a division of ITW Food Equipment Group LLC

P.O. Box 696 ■ Louisville, KY 40201 ■ Toll-free: 1-800-814-2028 ■ Local: 502-778-2791 ■ Quote & Order Fax: 1-800-444-0602

NOTE: In line with its policy to continually improve its products, Vulcan reserves the right to change materials and specifications without notice.

HEAVY DUTY COOKING

VULCAN**ARS SERIES**
SELF-CONTAINED REFRIGERATED BASES**Model ARS72**(Shown with optional right-located compressor with
ASA griddle, ACB charbroiler and AHP hotplate)

UL listed to U.S. and Canadian safety standards. NSF listed.

SPECIFICATIONS

Heliarc welded, fully insulated, stainless steel double pan Cabinet exterior front, sides, louver assembly and drawers are constructed of 20-gauge 430 stainless steel, exterior back and bottom are constructed of heavy gauge galvanized steel. Cabinet interior sides are constructed of 22-gauge 400 series stainless steel, top and bottom are constructed of 22-gauge 300 series stainless steel. A set of 4" high casters are included standard. Vinyl magnetic snap-in drawer gasket assures tight drawer seal. Both the cabinet and drawers are insulated with an average of 2" thick high density, non-CFC, foamed in place polyurethane. The easy to use water resistant INTELA-TRAUL® microprocessor control system is supplied standard. Unit is NAFEM Data Protocol communication (NDP) ready. Optional hardware required to be NDP compliant (3rd party software required for network connection). It includes a 3-Digit LED Display, °F or °C Temperature Scale Display Capability, and an RS485 data port. In addition it includes audio/visual alarms for: Hi/Lo Cabinet Temperature, Clean Condenser, Evaporator Coil and Discharge Line Sensor Failures, and Power Supply Interruption. The left side mounted, self-contained, balanced refrigeration system using R-404A refrigerant features an off-cycle defrost, capillary tube, air-cooled hermetic compressor, automatic condensate evaporator, and a dedicated rear-mounted evaporator design which distributes cold air through

- ☐ **ARS36** 36" wide
- ☐ **ARS48** 48" wide
- ☐ **ARS60** 60" wide
- ☐ **ARS72** 72" wide
- ☐ **ARS84** 84" wide
- ☐ **ARS96** 96" wide
- ☐ **ARS110** 110" wide

STANDARD FEATURES

- Stainless steel top, front, sides and interior
- Marine edge top
- Compressor on left
- 4" casters in adjustable channels
- INTELA-TRAUL microprocessor control system
- Balanced, self-contained refrigeration system that utilizes R-404A
- Front-breathing design allows for zero clearance installation
- Controllable anti-condensate drawer perimeter heaters
- Automatic non-electric condensate filter
- Condenser filter
- Off-cycle evaporator defrost
- Magnetic snap-in drawer gaskets
- Self-closing drawers with stay open feature
- Side, front and rear access panels provide for ease of service and maintenance
- 14-gauge stainless steel drawer slides
- NEMA 5-15 plug with 9' cord and cord retainer
- One year limited parts and labor warranty

OPTIONS

- ☐ 6" stainless steel legs
- ☐ Compressor on right
- ☐ 6" cabinet length extension
- ☐ Export 220/50/1 voltage
- ☐ NAFEM data protocol gateway package

each drawer section. A 9' cord and retainer is provided. Standard operating temperature is 34 to 38°F. Each heavy-duty drawer is designed to accommodate 12" x 20" x 6" deep pans. They are constructed using 14-gauge stainless steel drawer slides and 2" diameter stainless steel rollers. Drawers include both a self-closing and stay-open feature.

Exterior Dimensions:

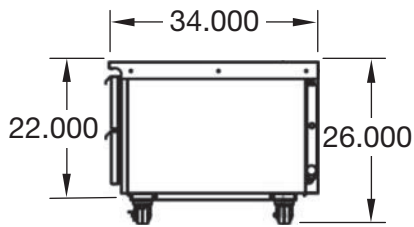
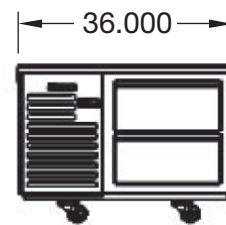
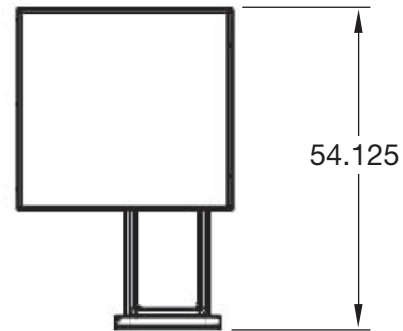
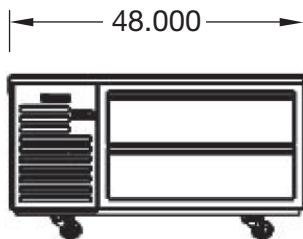
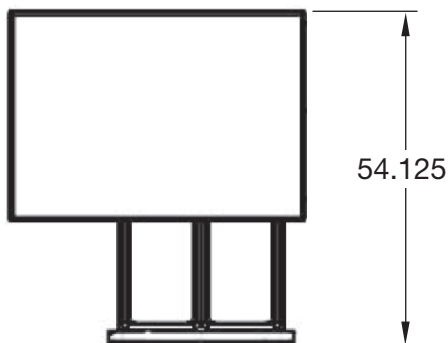
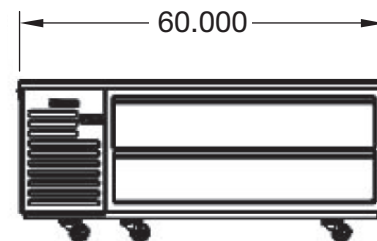
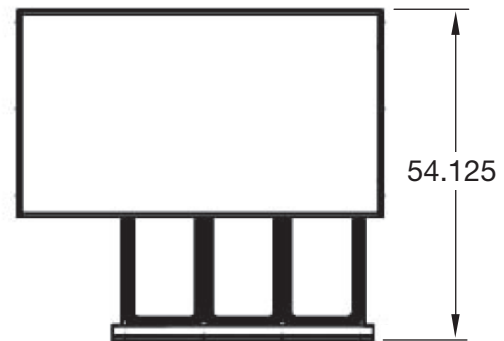
____ "w x 34"d x 26"h on 4" casters

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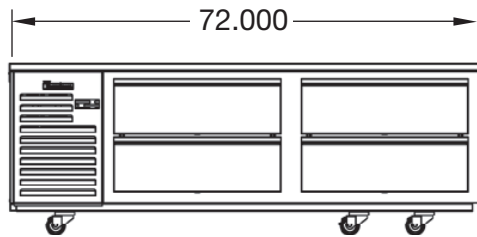
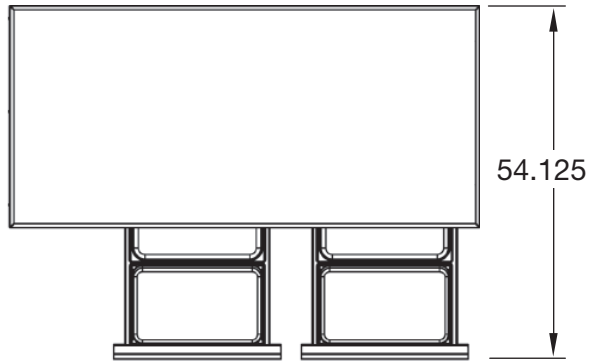
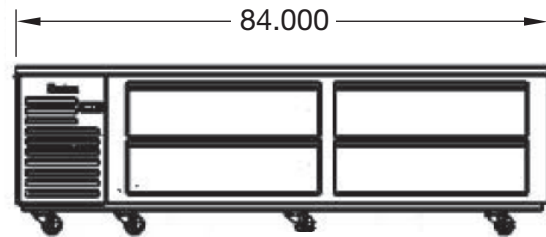
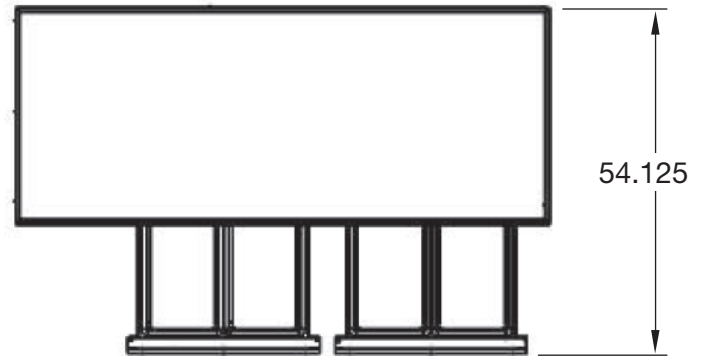
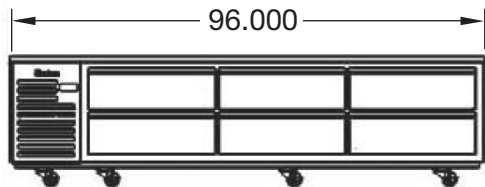
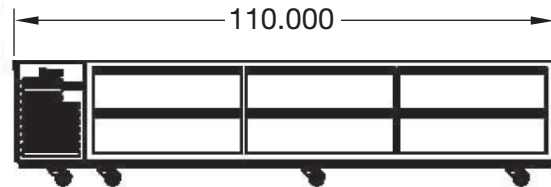
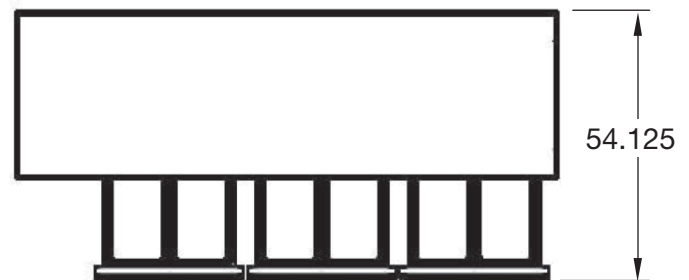
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HEAVY DUTY COOKING

VULCAN**ARS SERIES**
SELF-CONTAINED REFRIGERATED BASES**SIDE VIEW ALL MODELS****ARS36****ARS48****ARS60****VULCAN**

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HEAVY DUTY COOKING**VULCAN****ARS SERIES
SELF-CONTAINED REFRIGERATED BASES****ARS72****ARS84****ARS96****ARS110****VULCAN**

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HEAVY DUTY COOKING



ARS SERIES

SELF-CONTAINED REFRIGERATED BASES

MODEL	BTU/HR-HP ²	REFRIG.	VOLT/HZ/PH	FULL LOAD AMPS	NEMA PLUG TYPE	MAX. TOP LOAD	PAN ORIENTATION
ARS36	2,440 (1/3 HP)	R-404A	115/60/1	6.7	5-15P	625 lbs.	N/A
ARS48	2,440 (1/3 HP)			6.7		625 lbs.	Side by Side
ARS60	2,440 (1/3 HP)			6.7		625 lbs.	Side by Side
ARS72	2,440 (1/3 HP)			6.7		1,200 lbs.	Front to Back
ARS84	2,440 (1/3 HP)			6.7		1,500 lbs.	Side by Side
ARS96	4,090 (1/2 HP)			12		1,500 lbs.	Front to Back
ARS110	4,090 (1/2 HP)			12		1,500 lbs.	Side by Side

MODEL	COUNTER DEPTH	COUNTER HEIGHT	COUNTER WIDTH	DEPTH W/OPEN DRAWER	NO. OF DRAWERS	PAN CAPACITY 12" x 20" x 6"	APPROX. SHIP WEIGHT	
							LBS	KG
ARS36	34" (914)	26" (660)	36" (914)	54 1/8" (1,375)	2	2	410	186
ARS48			48" (1,219)		2	4	430	195
ARS60			60" (1,524)		2	6	475	216
ARS72			72" (1,829)		4	8	555	252
ARS84			84" (2,134)		4	8	655	297
ARS96			96" (2,438)		6	12	760	345
ARS110			110" (2,794)		6	12	845	383

Dimensions in () are in millimeters



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Project _____
 Item # _____
 Quantity _____

Decorative Carving Stations

Models: DCS400-1

DCS400-1CM

DCSB400-R24-1

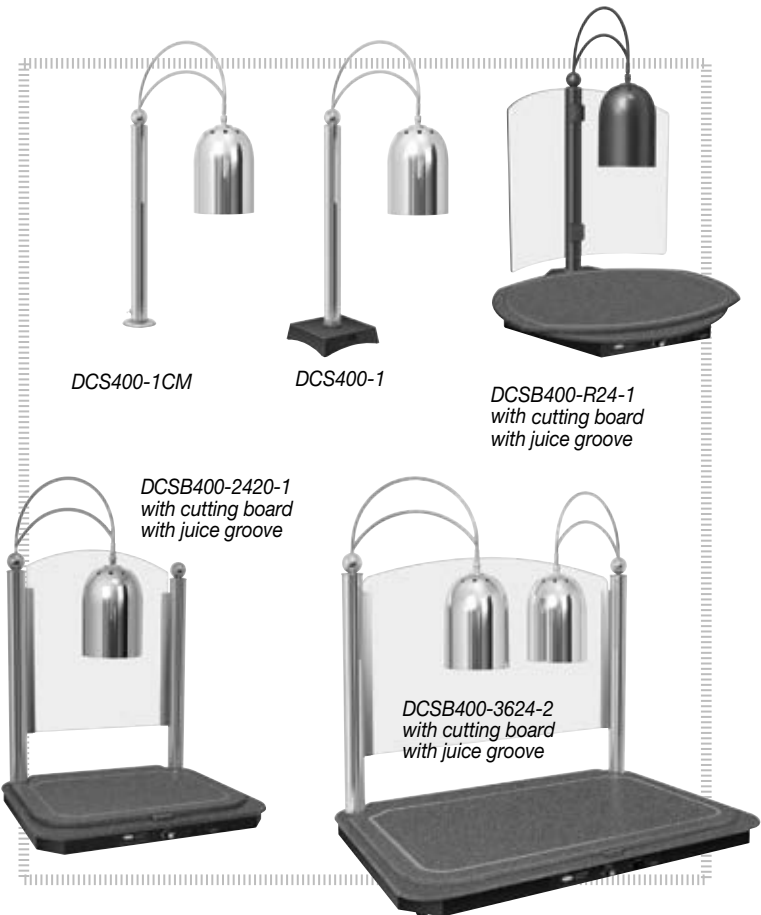
DCSB400-2420-1

DCSB400-3624-2

Providing proper food serving temperatures, the Decorative Carving Station combines the Hatco Decorative Heat Lamp with the Swanstone® Heated Base to create an attractive carving display. These warmers are perfect for chef stations in restaurants, hotels, country clubs, casinos and catered events.

Standard features

- Available as Post Mount, Counter Mount or Freestanding with a round or rectangular heated stone base
- Patented telescoping adjustable post pivots 30° to put the heat and light where it is needed
- Height can be adjusted from from the bottom of lamp to top of the cutting board:
 14" to 26" (356 to 660 mm) for DCSB400-R24-1, -2420-1, -3624-2
 15" to 27" (381 to 686 mm) for DCS400-1
 16" to 28" (406 to 711 mm) for DCS400-1CM
- DCS400-1 includes a 40 lbs. (18 kg) black base for stability and to minimize the risk of tipping
- DCS400-1CM is designed to be permanently mounted to a counter or stable shelf
- Heated base is controlled by an adjustable thermostat and power switch (excludes DCS400-1 and DCS400-1CM)
- Heated stone bases, post bases and cutting boards are made of foodsafe materials
- Sneeze guard is 5" (127 mm) above base for easy accessibility (excludes DCS400-1 and DCS400-1CM)
- Swanstone cutting board matches color of base (excludes DCS400-1 and DCS400-1CM)
- Clear coated, 250 watt bulb(s) included
- Comes with 6' (1829 mm) cord and plug attached



Options (available at time of purchase only)

Post and Lamp Shades Plated Finishes:

- ☐ Bright Brass ☐ Bright Nickel (standard) ☐ Antique Bronze

Heated Stone Base, Trim Ring (DCS400-1CM only) and Cutting Board

Swanstone® Decorative Stone Color:

- ☐ Gray Granite ☐ Bermuda Sand ☐ Night Sky (standard)

Accessories

- ☐ Coated Red Bulb, 250 Watt (clear coat is standard)

Swanstone® Cutting Boards with Juice Groove (Heated Base Units

include one Cutting Board) (excludes DCS400-1 and DCS400-1CM)

- ☐ Gray Granite ☐ Bermuda Sand ☐ Night Sky (standard)



HATCO CORPORATION | P.O. Box 340500 Milwaukee, WI 53234-0500 U.S.A. | (800) 558-0607 | (414) 671-6350

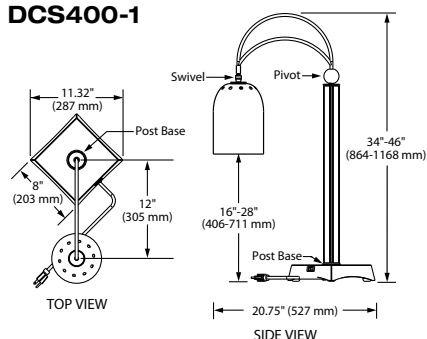
Fax: (800) 543-7521 | Int'l. Fax: (414) 671-3976 | www.hatcocorp.com | equipsales@hatcocorp.com | intl@hatcocorp.com



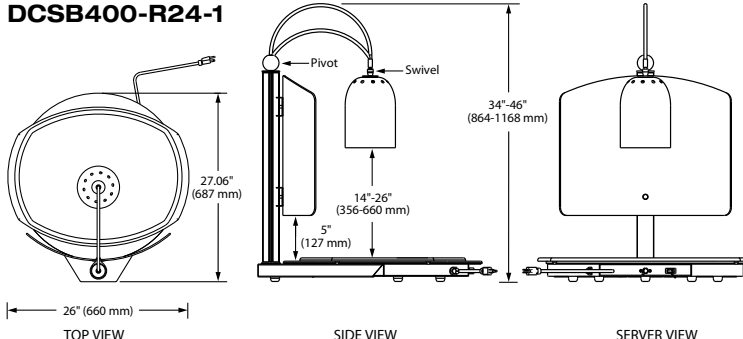
Decorative Carving Stations

Models: DCS400-1, DCS400-1CM, DCSB400-R24-1, DCSB400-2420-1, DCSB400-3624-2

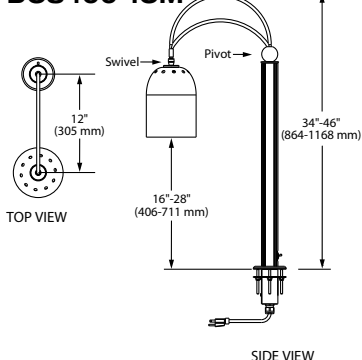
DCS400-1



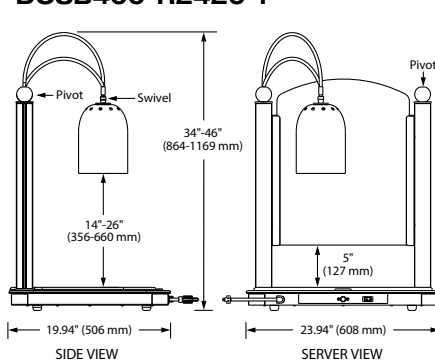
DCSB400-R24-1



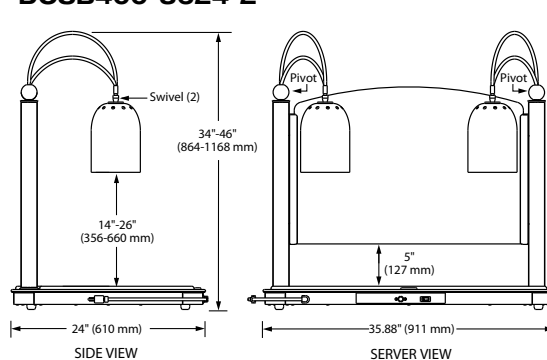
DCS400-1CM



DCSB400-R2420-1



DCSB400-3624-2



SPECIFICATIONS Decorative Carving Stations

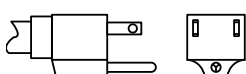
The shaded areas contain electrical information for International models only

Model	Dimensions (Width x Depth x Height)	Heated Base Surface (Width x Depth)	Voltage	Phase	Watts	Amps	Plug	Cord Location	Ship Weight*
DCS400-1	8" x 20.75" x 34"-46" (203 x 527 x 864-1168 mm)		120	Single	250	2.1	NEMA 5-15P	Server side center, base of unit	32 lbs. (15 kg)
			230 (CE)	Single	250	1.1	CEE 7/7 Schuko, AS 3112 or BS-1363		
DCS400-1CM	6.125" x 20.75" x 34"-46" (156 x 527 x 864-1168 mm)		120	Single	250	2.1	NEMA 5-15P	Bottom of unit	17 lbs. (8 kg)
			230 (CE)	Single	250	1.1	CEE 7/7 Schuko, AS 3112 or BS-1363		
DCSB400-R24-1	26"W x 27.06"D x 34"-46"H (660 x 687 x 864-1168 mm)	24" (609 mm) diameter	120	Single	600	5.0	NEMA 5-15P	Server side on left, base of unit	75 lbs. (35 kg)
			230 (CE)	Single	600	2.6	CEE 7/7 Schuko, AS 3112 or BS-1363		
DCSB400-2420-1	23.94" x 19.94" x 34"-46" (608 x 506 x 864-1168 mm)	24" x 20" (609 x 508 mm)	120	Single	750	6.3	NEMA 5-15P	Server side on left, base of unit	106 lbs. (48 kg)
			230 (CE)	Single	750	3.3	CEE 7/7 Schuko, AS3112 or BS-1363		
DCSB400-3624-2	35.88" x 24" x 34"-46" (911 x 610 x 864-1168 mm)	36" x 24" (914 x 609 mm)	120	Single	1300	10.8	NEMA 5-20P	Server side on left, base of unit	154 lbs. (70 kg)
			230 (CE)	Single	1300	5.7	CEE 7/7 Schuko, AS3112 or BS-1363		

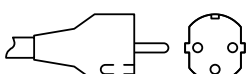
* Shipping weight includes packaging.

PLUG CONFIGURATIONS

NEMA 5-15P



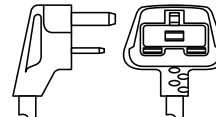
CEE 7/7 Schuko



AS3112



BS-1363



PRODUCT SPECS Decorative Carving Stations

The Foodwarmer shall be a Decorative Carving Station, manufactured by the Hatco Corporation, Milwaukee, WI 53234 U.S.A.

The Foodwarmer shall be a Decorative Carving Station Model ... , rated at ... watts, ... volts, single phase, and be ... inches (millimeters) in overall width.

The foodwarmer shall be factory-assembled ready for electrical installation with cutting board and 6' (1829 mm) cord and plug. Heated base units shall be thermostatically controlled.

Warranty consists of 24/7 parts and service assistance (U.S. and Canada only).

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F R Y E R S

VULCAN**LG SERIES**
FREE STANDING ENTRY LEVEL GAS FRYERS

Model LG300

**SPECIFICATIONS**

LG Series gas freestanding model fryers, Vulcan Model No. LG300, LG400, and LG500 available in 35-40, 45-50, and 65-70 lb. oil capacities with 90,000, 120,000, or 150,000 BTU's respectively. Stainless steel front top and reinforced door. Stainless steel fry tank with three, four or five heat exchanger tubes for maximum heat transfer. Large "V" shaped cold zone and 1¼" port ball valve. Includes twin fry baskets with plastic coated handles and drain extension. Behind the door snap action millivolt thermostat control adjust from 200° to 400°F

Overall Dimensions:

15½"w x 30¼"d x 36¼"h working height – LG300, LG400

21"w x 30⅞"d x 36¼"h working height – LG500

CSA design certified. NSF listed.

SPECIFY TYPE OF GAS WHEN ORDERING

- ☐ Natural Gas
☐ Propane Gas

SPECIFY ALTITUDE

- ☐ Natural Gas for above 2,000 ft.
☐ Propane Gas for above 3,500 ft.

- ☐ **LG300** 35-40 lb. Capacity
☐ **LG400** 45-50 lb. Capacity
☐ **LG500** 65-70 lb. Capacity

STANDARD FEATURES

- Stainless steel fry tank, 35-40, 45-50 and 65-70 lb. capacities.
- Large cold zone area.
- 1¼" full port ball type drain valve.
- Stainless steel reinforced door.
- G90 high grade galvanized non corrosive finish sides and back.
- Door liner for added stability.
- Set of four nickel plated adjustable legs.
- Twin fry baskets with plastic coated handles.
- 90,000, 120,000 and 150,000 BTU's/hr. input.
- Behind the door snap action millivolt thermostat control adjusts from 200° to 400°F with standing pilot.
- Millivolt System - Requires no electric hook-up.
- Hi-limit shut-off protector shuts off gas combination valve and standing pilot.
- Built in flue deflector.
- Nickel plated tube rack.
- Earth magnet to secure closed door.
- Easily removable stainless steel basket hanger for cleaning.
- Vulcan-Hart (Vulcan) warrants the LG Series gas fryer to be free of defects in materials and workmanship for a period of 1 year from the date of original installation.
- Stainless steel fry tank has a five (5) year limited tank warranty. If during the first year only, the tank is found to have a leak and is verified by an authorized service agency, the entire LG Series fryer will be replaced.

ACCESSORIES (Packaged & Sold Separately)

- ☐ Casters 6" adjustable – 2 locking, 2 non-locking.
- ☐ Stainless steel tank cover – doubles as a work surface top.
- ☐ Connecting kit(s) – connect two fryers together (banking strip, brackets, and hardware).
- ☐ Single large basket:
 13"w x 13¼"d x 5½"h – LG300, LG400
 18½"w x 13¼"d x 6"h – LG500
- ☐ Extra set of twin baskets:
 6½"w x 13¼"d x 6"h – LG300, LG400
 9½"w x 13¼"d x 6"h – LG500
- ☐ FRYMATE-VX15 add-on Frymate™ Dump Station.
- ☐ 10" high stainless steel removable splash guard.
- ☐ Flexible gas hose with quick disconnect.

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F R Y E R S

VULCAN

LG SERIES FREE STANDING ENTRY LEVEL GAS FRYERS

INSTALLATION INSTRUCTIONS

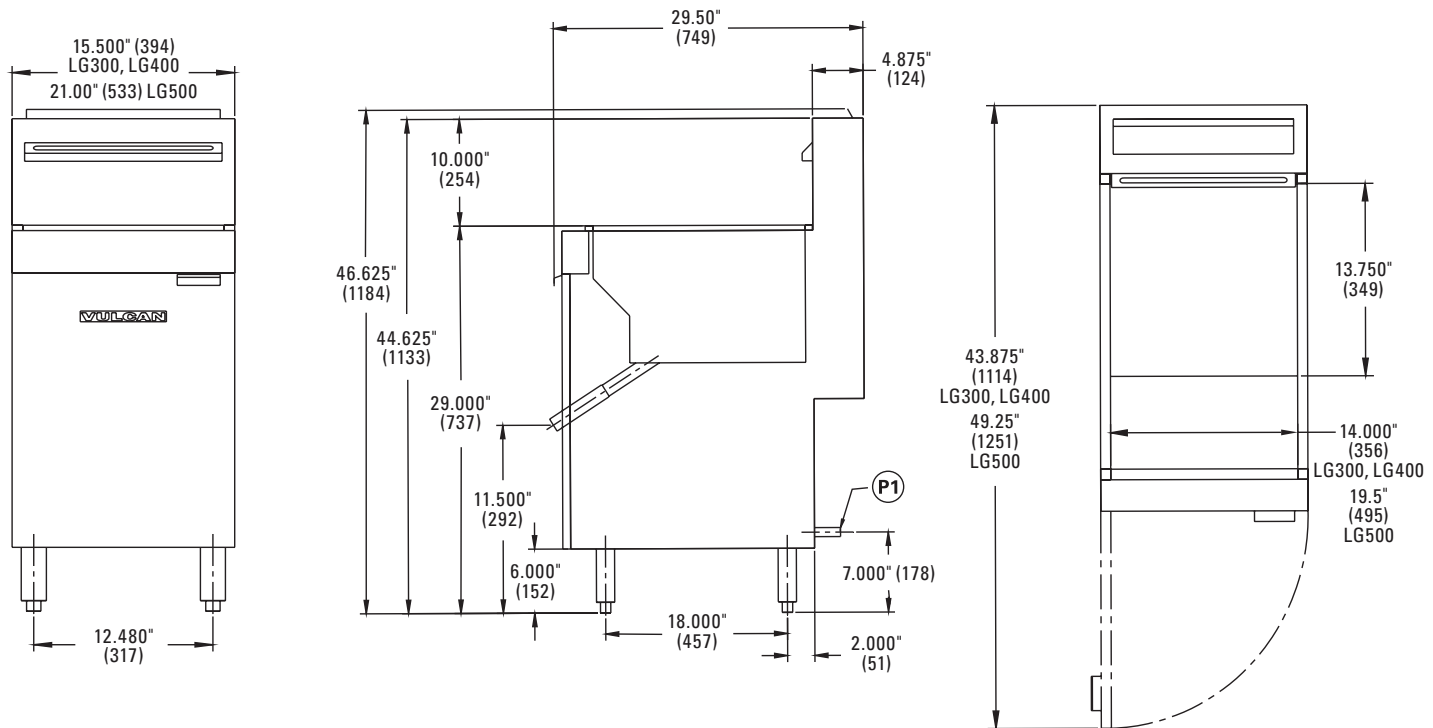
1. A combination valve with pressure regulator is provided with this unit. Natural Gas 4.0" (102 mm) W.C. Propane Gas 10.0" (279 mm) W.C.
2. An adequate ventilation system is required for Commercial Cooking Equipment. Information may be obtained by writing to the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269. When writing refer to NFPA No. 96.
3. All models require a 6" (152 mm) clearance at both sides and rear adjacent to combustible construction.
4. All models require a 16" (407 mm) minimum clearance to adjacent open top burner units.

5. This appliance is manufactured for commercial installation only and is not intended for home use.

SERVICE CONNECTIONS:

- Ⓟ ¾" (19 mm) OD rear gas connection and a ½" (13 mm) ID.

NOTE: In line with its policy to continually improve its product, Vulcan reserves the right to change materials and specifications without notice.



Model	Width	Depth	Overall Height	Working Height	Tank Size	BTU/HR	Fry Comp. Capacity	Approx. Shipping Weight
LG300	15½"	29½"	47⅝"	29"	14" x 14"	90,000	35 - 40 lbs.	210 lbs. (95 kg)
LG400	15½"	29½"	47⅝"	29"	14" x 14"	120,000	45 - 50 lbs.	210 lbs. (95 kg)
LG500	21"	29½"	47⅝"	29"	19½" x 14"	150,000	65 - 70 lbs.	270 lbs. (122 kg)

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STAINLESS STEEL WORK TABLES

PREMIUM Series - 5" Backsplash - Undershelf Style

Item #: _____ Qty #: _____

Model #: _____

Project #: _____

FEATURES:

Top is furnished with a 1 5/8" sanitary rolled rim edge on front, 1 5/8" square side edges, and a 5" splash with a 1" return on the rear side.

24" wide tables supplied with TWO hat channels stud welded to reinforce and maintain a level working surface. 30" and 36" wide tables supplied with THREE hat channels.

Pre-engineered welded angle adapters insure ease of future drawer installation.

Aluminum die cast "leg-to-shelf" clamp secures shelf to leg eliminating unsightly nuts and bolts. Undershelf is adjustable.

CONSTRUCTION:

All TIG welded. Exposed weld areas polished to match adjacent surfaces.

Entire top mechanically polished to a satin finish.

Top is sound deadened.

Roll formed embossed galvanized hat channels are secured to top by means of structural adhesive and weld studs.

Gussets welded to support hat sections.



NEW

Rolled Rim Edges on Front & Splash on Back and Square Side Edges



Featuring as Standard:
"THE PROVEN"

**ORIGINAL ADVANCE TABCO
Adjustable Undershelf
with Die Cast Leg Clamp**

MATERIAL:

KSS-SERIES: Stainless Steel Legs & Undershelf

TOP: 14 gauge stainless steel type "304" series.

SHELF: 18 gauge stainless steel.

LEGS: 1 5/8" diameter tubular stainless steel.
1" adjustable stainless steel bullet feet.
Stainless steel gussets.

KLG-SERIES: Galvanized Legs & Undershelf

TOP: 14 gauge stainless steel type "304" series.

SHELF: 18 gauge galvanized steel.

LEGS: 1 5/8" diameter tubular galvanized steel.
1" adjustable plastic bullet feet.
Galvanized steel gussets.

KSS-Series: Stainless Steel Legs & Undershelf

L	24" Wide	30" Wide	36" Wide
30"	KSS-240	KSS-300	
24"	KSS-242	KSS-302	
36"	KSS-243	KSS-303	KSS-363
48"	KSS-244	KSS-304	KSS-364
60"	KSS-245	KSS-305	KSS-365
72"	KSS-246	KSS-306	KSS-366
84"	KSS-247	KSS-307	KSS-367
96"	KSS-248	KSS-308	KSS-368
108"	KSS-249	KSS-309	KSS-369
120"	KSS-2410	KSS-3010	KSS-3610
132"	KSS-2411	KSS-3011	KSS-3611
144"	KSS-2412	KSS-3012	KSS-3612



KLG-Series: Galvanized Steel Legs & Undershelf

L	24" Wide	30" Wide	36" Wide
30"	KLG-240	KLG-300	
24"	KLG-242	KLG-302	
36"	KLG-243	KLG-303	KLG-363
48"	KLG-244	KLG-304	KLG-364
60"	KLG-245	KLG-305	KLG-365
72"	KLG-246	KLG-306	KLG-366
84"	KLG-247	KLG-307	KLG-367
96"	KLG-248	KLG-308	KLG-368
108"	KLG-249	KLG-309	KLG-369
120"	KLG-2410	KLG-3010	KLG-3610
132"	KLG-2411	KLG-3011	KLG-3611
144"	KLG-2412	KLG-3012	KLG-3612

Create Your Own Efficient Workstation with the Available Standard Accessories (Visit Section K)



Customer Service Available To Assist You **1-800-645-3166** 8:30 am - 8:00 pm E.S.T.

Email Orders To: customer@advancetabco.com. For Smart Fabrication™ Quotes, Email To: smartfab@advancetabco.com or Fax To: 631-586-2933

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TEXAS

Fax: (972) 932-4795

NEVADA

Fax: (775) 972-1578

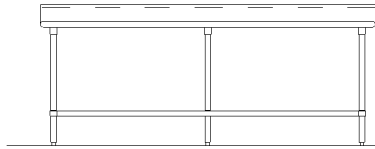
DETAILS and SPECIFICATIONS

ALL DIMENSIONS ARE TYPICAL TOL $\pm .500"$

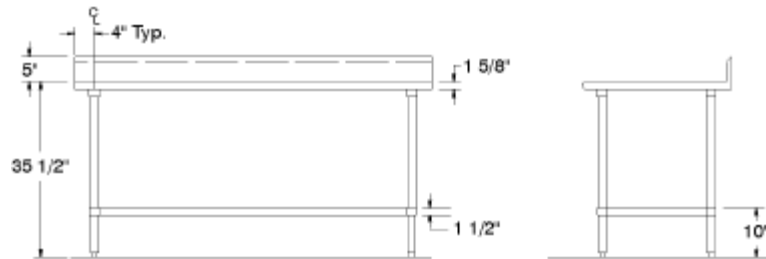
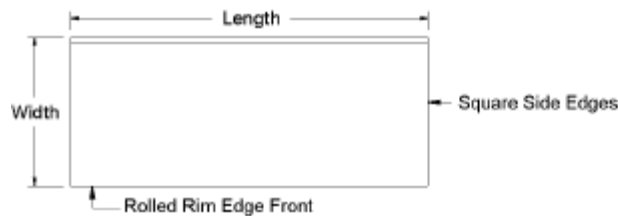
All Units Shipped Unassembled (KD) for Reduced Shipping Costs.

KSS & KLG Series Undershelf Style 5" Backsplash

Finished size of undershelf = Length minus 5 3/4"
Width minus 5 3/4"



Units 8ft. and larger are furnished with six (6) legs



KSS-Series: Stainless Steel Legs & Undershelf

L	24" Wide	Wt.	30" Wide	Wt.	36" Wide	Wt.
30"	KSS-240	55 lbs.	KSS-300	70 lbs.		
24"	KSS-242	50 lbs.	KSS-302	56 lbs.		
36"	KSS-243	66 lbs.	KSS-303	77 lbs.	KSS-363	92 lbs.
48"	KSS-244	81 lbs.	KSS-304	92 lbs.	KSS-364	101 lbs.
60"	KSS-245	95 lbs.	KSS-305	111 lbs.	KSS-365	121 lbs.
72"	KSS-246	113 lbs.	KSS-306	129 lbs.	KSS-366	142 lbs.
84"	KSS-247	135 lbs.	KSS-307	153 lbs.	KSS-367	169 lbs.
96"	KSS-248	150 lbs.	KSS-308	171 lbs.	KSS-368	189 lbs.
108"	KSS-249	165 lbs.	KSS-309	195 lbs.	KSS-369	260 lbs.
120"	KSS-2410	268 lbs.	KSS-3010	294 lbs.	KSS-3610	315 lbs.
132"	KSS-2411	301 lbs.	KSS-3011	331 lbs.	KSS-3611	358 lbs.
144"	KSS-2412	316 lbs.	KSS-3012	346 lbs.	KSS-3612	373 lbs.

KLK-Series: Galvanized Steel Legs & Undershelf

L	24" Wide	Wt.	30" Wide	Wt.	36" Wide	Wt.
30"	KLK-240	55 lbs.	KLK-300	70 lbs.		
24"	KLK-242	50 lbs.	KLK-302	56 lbs.		
36"	KLK-243	66 lbs.	KLK-303	77 lbs.	KLK-363	92 lbs.
48"	KLK-244	81 lbs.	KLK-304	92 lbs.	KLK-364	101 lbs.
60"	KLK-245	95 lbs.	KLK-305	111 lbs.	KLK-365	121 lbs.
72"	KLK-246	113 lbs.	KLK-306	129 lbs.	KLK-366	142 lbs.
84"	KLK-247	135 lbs.	KLK-307	153 lbs.	KLK-367	169 lbs.
96"	KLK-248	150 lbs.	KLK-308	171 lbs.	KLK-368	189 lbs.
108"	KLK-249	165 lbs.	KLK-309	195 lbs.	KLK-369	260 lbs.
120"	KLK-2410	268 lbs.	KLK-3010	294 lbs.	KLK-3610	315 lbs.
132"	KLK-2411	301 lbs.	KLK-3011	331 lbs.	KLK-3611	358 lbs.
144"	KLK-2412	316 lbs.	KLK-3012	346 lbs.	KLK-3612	373 lbs.





Over 90 Years Of Quality Foodservice
Products And Service

Job _____ Item No. _____

Dual Temperature NSF-7 Hot & Refrigerated Cold Pans

☐ HRCP-7100 ☐ HRCP-7200 ☐ HRCP-7300
☐ HRCP-7400 ☐ HRCP-7500 ☐ HRCP-7600



Model HRCP-7200

DESCRIPTION

Wells Dual Temperature Hot & Refrigerated Drop-In Cold Pans are two units in one; from a heated Bain Marie to a refrigerated cold pan with the flip of a switch. All models are completely self-contained in one to six-well models are CFC free and are recessed 3" to comply with NSF-7 performance requirements.

SPECIFICATIONS

Exterior – One-piece top flange and coved-corner interiors constructed of 18 gauge stainless steel. Exterior body constructed of heavy gauge, corrosion resistant steel. Condensing unit mounted on corrosion resistant frame below the cold pan.

Interior – CFC free foamed-in-place insulation through-out, 1" drain located in the center for easy cleaning. Ledge is recessed 3" to comply with NSF-7 requirements, allowing a layer of air to insulate food and for pan support.

Refrigeration – Air cooled, type 134A or 404A CFC free refrigerant systems featuring wrapped coil construction on both sides and bottom. Refrigeration system features sight glass, easy service valves, dryer/filter and receiver. Condensing unit may be easily removed for service. Larger compressors speed refrigeration.

Heating - Automatic water-fill with high-limit protection featuring a water sensor and solenoid valve to maintain proper water levels. And efficient electric immersion heating system transfers heat directly to the water while a positive-off thermostat controls provides adjustable and consistent temperatures. Designed for wet operation only.

STANDARD FEATURES

- ☐ NSF-7 compliant with 3" recessed top edge
- ☐ Self contained drop-in design
- ☐ Hold standard 12" by 20" food pans and fractional sized pans
- ☐ Stainless steel top and liner for maximum strength and durability
- ☐ 1" drains for ease of cleaning
- ☐ Single control for changing from hot to cold operation.
- ☐ Easy access temperature & function control panel attached to a 24" long flexible conduit for optional counter mounting
- ☐ Type 134A or 404A CFC free refrigerant
- ☐ Fully insulated, CFC free, foamed-in place insulation keeps food cold while saving energy
- ☐ Recessed ledge for pan support and colder, fresher products
- ☐ Quick & easy service with sight glass, service valves, filter/dryer and receiver
- ☐ Adaptor bars provided for food pans
- ☐ Limited 1 year parts & labor warranty

OPTIONS & ACCESSORIES

- ☐ 5-year compressor warranty
- ☐ Perforated bottom strainer plate conveniently holds ice above drain to prevent clogging
- ☐ Adaptor bars for fractional sized pans
- ☐ Remote on/off switch
- ☐ Condenser orientation and/or compressor rack location
- ☐ 220/230/240V
- ☐ 50 cycle
- ☐ Remote models (Includes compressor and condensing units and up to 20' leads)
- ☐ Remote models without compressors or condensing units
- ☐ 2nd year parts & labor warranty

CERTIFICATIONS



Sheet No. WELLHRCP1-07/13



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NOTE: Specifications are subject to change without notice and are not intended for installation purposes. See installation instructions prior to installing the unit.

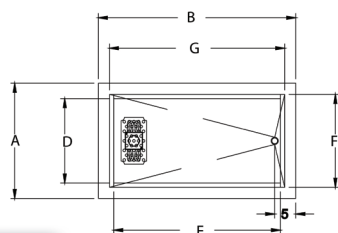


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Products And Service

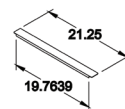
Dual Temperature NSF-7 Hot & Refrigerated Cold Pans

□ HRCP-7100 □ HRCP-7200 □ HRCP-7300
□ HRCP-7400 □ HRCP-7500 □ HRCP-7600

INCHES
MM

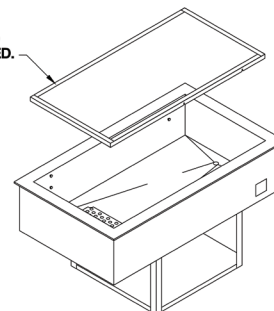


PLAN VIEW



PAN DIVIDER
(TWO INCLUDED)

NOTE: RAILS ARE IN (4)
INDIVIDUAL PIECES, NOT WELDED.

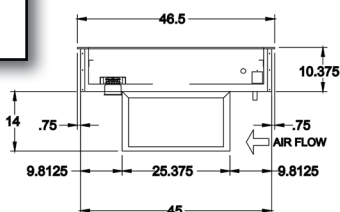


ISOMETRIC VIEW

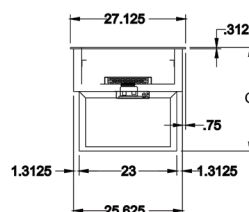
NOTE:
Specifications
are subject to change
without notice and
are not intended for
installation purposes.
See installation
instructions prior to
installing the unit.

COUNTER CUTOOUT:
45 1/4" X 25 7/8"

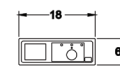
HRCP-7300 Shown



FRONT ELEVATION
(OPERATOR SIDE)



SIDE ELEVATION



CONTROL PANEL
REFER TO INSTALLATION
INSTRUCTIONS FOR
REMOTE MOUNTING.

SPECIFICATIONS

Model Number	OVERALL DIMENSIONS			INTERIOR DIMENSIONS		CUT OUT DIMENSIONS	
	A Front to Back Inches (MM)	B Left to Right Inches (MM)	C Height Inches (MM)	D Front to Back Inches (MM)	E Left to Right Inches (MM)	F Front to Back Inches (MM)	G Left to Right Inches (MM)
HRCP-7100	27-1/8 (689)	19-1/8 (468)	26-1/8" (664)	21-7/8 (555)	13-7/8 (352)	25-7/8 (657)	17-7/8 (451)
HRCP-7200	27-1/8 (689)	32-3/4 (832)	26-1/8" (664)	21-7/8 (555)	27-1/2 (699)	25-7/8 (657)	31-1/2 (800)
HRCP-7300	27-1/8 (689)	46-1/2 (1181)	26-1/8" (664)	21-7/8 (555)	41-1/4 (1048)	25-7/8 (657)	45-1/4 (1149)
HRCP-7400	27-1/8 (689)	60-1/4 (1530)	26-1/8" (664)	21-7/8 (555)	55 (1397)	25-7/8 (657)	59 (1499)
HRCP-7500	27-1/8 (689)	74 (1880)	26-1/8" (664)	21-7/8 (555)	68-3/4 (1747)	25-7/8 (657)	72-3/4 (1847)
HRCP-7600	27-1/8 (689)	87-3/4 (2229)	26-1/8" (664)	21-7/8 (555)	82-1/2 (2096)	25-7/8 (657)	86-1/2 (2197)

SHIPPING INFORMATION

Model Number	WEIGHTS		CARTON DIMENSIONS			CRATE SIZE	
	SHIPPING WEIGHT POUNDS (KG)	INSTALLED WEIGHT POUNDS (KG)	WIDTH Inches (MM)	DEPTH Inches (MM)	HEIGHT Inches (MM)	CUBIC FEET	CUBIC METERS
HRCP-7100	175 (80)	150 (69)	21 (533)	29 (737)	32 (813)	11.3	0.31
HRCP-7200	220 (100)	190 (87)	29 (737)	34 (864)	32 (813)	18.3	0.52
HRCP-7300	240 (109)	210 (96)	29 (737)	48 (1219)	32 (813)	25.8	0.73
HRCP-7400	275 (125)	240 (109)	29 (737)	62 (1575)	32 (813)	33.3	0.94
HRCP-7500	298 (136)	255 (116)	29 (737)	76 (1930)	32 (813)	41.0	1.16
HRCP-7600	320 (146)	275 (125)	29 (737)	89 (2261)	32 (813)	47.8	1.35

POWER SUPPLY- HOT OPERATION

Model Number	VOLTS	KW	AMPS	PHASE	POWER SUPPLY
HRCP-7100	208/240	1.9/2.5	9.0/10.4	SINGLE	*
HRCP-7200	208/240	1.9/2.5	9.0/10.4	SINGLE	*
HRCP-7300	208/240	3.0/4.0	14.4/16.7	SINGLE	*
HRCP-7400	208/240	3.8/5.0	18.1/20.8	SINGLE	*
HRCP-7500	208/240	6.0/8.0	28.9/33.3	SINGLE	*
HRCP-7600	208/240	6.0/8.0	28.9/33.3	SINGLE	*

POWER SUPPLY- REFRIGERATION OPERATION

Model Number	VOLTS	HP	AMPS	PHASE	POWER SUPPLY	REFRIGERANT
HRCP-7100	115	1/4	4.9	SINGLE	*	134A
HRCP-7200	115	1/4	4.9	SINGLE	*	134A
HRCP-7300	115	1/3	5.6	SINGLE	*	404A
HRCP-7400	115	1/2	6.4	SINGLE	*	404A
HRCP-7500	115	3/4	15.2	SINGLE	*	404A
HRCP-7600	115	3/4	15.2	SINGLE	*	404A

* All model permanently field wired connected. Power supply single phase, 3-wire, 120/208-240V, L2-N 120VAC

All HRCP models feature automatic water fill systems and require a water supply connection. Please refer to the operator's manual and installation instructions for details.

Due to periodic changes in designs, methods, procedures, policies and regulations, the specifications contained in this sheet are subject to change without notice. While Wells exercises good faith efforts to provide information that is accurate, we are not responsible for errors or omissions in information provided or conclusions reached as a result of using the specifications. By using the information provided, the user assumes all risks in connection with such use.



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NOTE: Specifications are subject to change without notice and are not intended for installation purposes. See installation instructions prior to installing the unit.



STAINLESS STEEL
DROP-IN SINKS
 One Compartment - FOR GENERAL PURPOSE USE



Sinks Include Faucet & Drain

Item #: _____ Qty #: _____

Model #: _____

Project #: _____



DI-1-168
18 Gauge



DI-1-208
18 Gauge

DROP-IN FILLER STATION

DI-1-9
20 Gauge



DI-1-2012
18 Gauge



DI-1-30
20 Gauge

LARGEST ONE COMPARTMENT DROP-IN SINK IN THE INDUSTRY!

Supplied with
K-53 Faucet

DI-1-2812
16 Gauge



FEATURES:

One piece seamless **Deep Drawn** sink bowl design.

All sink bowls have a large liberal radii with a minimum dimension of 2" and are rectangular in design for increased capacity.

Self-Rim Design. Mounting clips provided accommodates all thicknesses of counter. (Quantity supplied varies based on drop in sink ordered).

DI-1-30 & DI-1-168: includes 4" O.C. **K-52** faucet.

DI-1-208 & DI-1-2012: includes 4" O.C. **K-50** faucet.

DI-1-2812: includes 4" O.C. **K-53** faucet.

DI-1-9: includes single hole **K-54** filler faucet.

DI-1-9 has Removable Electro-Polished stainless steel grill.

CONSTRUCTION:

Unit fabricated from one sheet of stainless steel.

All bowls are Sound Deadened.

Units feature Advance Tabco's **Smart Finish™**.

MECHANICAL:

Faucet supply is 1/2" IPS male thread.

Deck mounted faucet is furnished with aerator.

DI-1-9 includes deck mounted faucet furnished with "Push-Back" actuator.

MATERIAL:

Type 304 series stainless steel.

Faucets are brass-nickel plated.

Stainless Steel 1-1/2" IPS basket drain.

Available Faucets & Accessories

Model #	Qty
Deck Mounted 8" Swing Spout. 4" O.C.	K-50
Deck Mounted Gooseneck. 4" O.C.	K-52
Deck Mounted. 12" Swing Spout. 4" O.C.	K-53
Water Filler Faucet (Single Hole)*	K-54
Deck Mounted 8 1/2" Gooseneck. 4" O.C.	K-55
Deck Mounted Swing w/Spray. 8" O.C.*	K-58
Deck Mtd. X.H.D. 3 1/2" Gooseneck. 4" O.C.	K-62
Mounting Clips (Bag of 4).	K-28

*REQUIRES **K-472** FAUCET HOLE REVISION



STANDARD MOUNTING CLIPS

For countertops over 7/8" and up to 2" thick.

Replacement # **K-28** (Per Sink)

Standard Faucet conforms to NSF 61 Standard 9.
Faucets Are AB1953 Lead Free Compliant.

For Replacement Faucets & Upgrades, Drains & Accessories
visit our website at www.advancetabco.com



Customer Service Available To Assist You **1-800-645-3166** 8:30 am - 8:00 pm E.S.T.

For Orders & Customer Service:

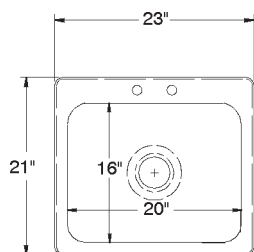
Email: customer@advancetabco.com or Fax: 631-242-6900

For Smart Fabrication™ Quotes:

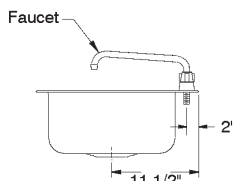
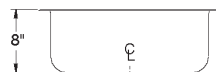
Email: smartfab@advancetabco.com or Fax: 631-586-2933

DIMENSIONS and SPECIFICATIONSTOL $\pm .125"$

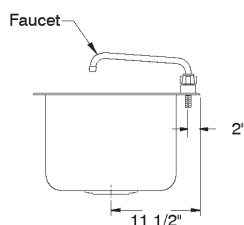
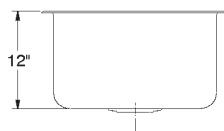
ALL DIMENSIONS ARE TYPICAL

DI-1-208 & DI-1-2012

Cut-Out Size
22 1/4" x 20 1/4"
 1 1/4" radius corners

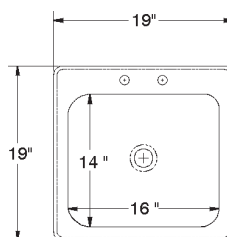
DI-1-208

Approx. Wt. 18 lbs.

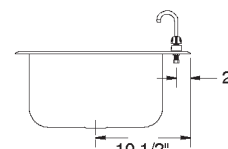
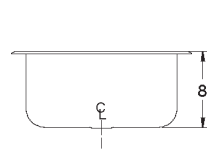
DI-1-2012

Approx. Wt. 20 lbs.

Supplied with K-50 Faucet

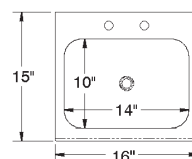
DI-1-168

Cut-out Size
18 1/4" x 18 1/4"
 1 1/4" radius corners

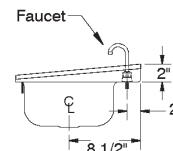


Approx. Wt. 15 lbs.

Supplied with K-52 Faucet

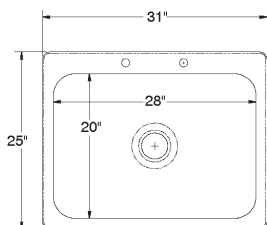
DI-1-30

Cut-Out Size
15" x 14 1/4"
 1 1/4" radius corners

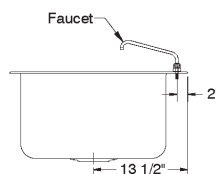
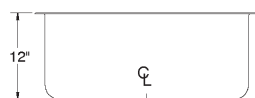


Approx. Wt. 11 lbs.

Supplied with K-52 Faucet

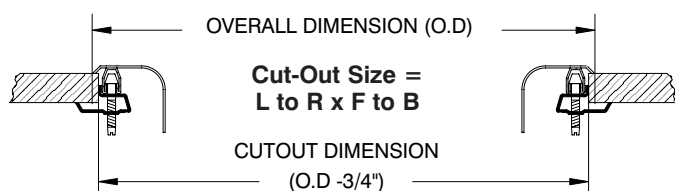
DI-1-2812

Cut-out Size
30 1/4" x 24 1/4"
 1 1/4" radius corners

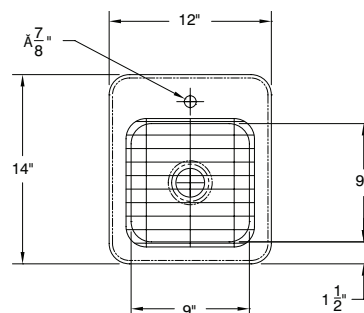


Approx. Wt. 42 lbs.

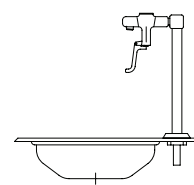
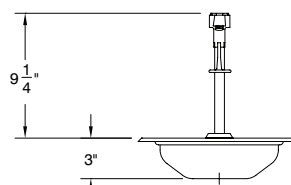
Supplied with K-53 Faucet

TYPICAL INSTALLATION

Standard Mounting Clips Fit Countertops
 Over 7/8" & Up To 2" Thick.

DI-1-9

Cut-Out Size
11 1/4" x 13 1/4"
 1 1/4" radius corners



Approx. Wt. 15 lbs.

Supplied with K-54 Faucet



REMOVABLE 8" SPLASH WRAP FOR EXISTING DROP-IN SINKS



Item #: _____ **Qty #:** _____

Model #: _____

Project #: _____

FEATURES:

Adapts easily to any existing Drop-In Sink (Must specify Drop-In Sink Model).
Mounting hardware provided.

MATERIALS:

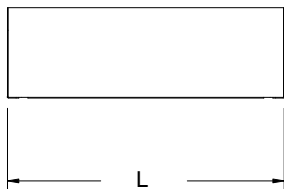
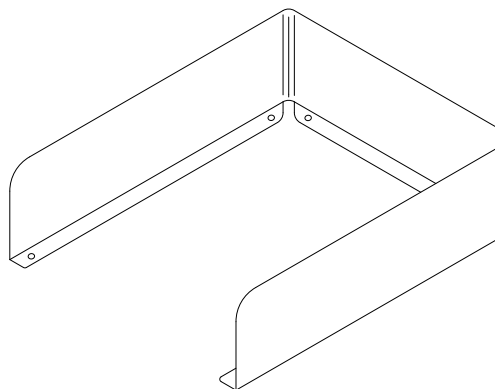
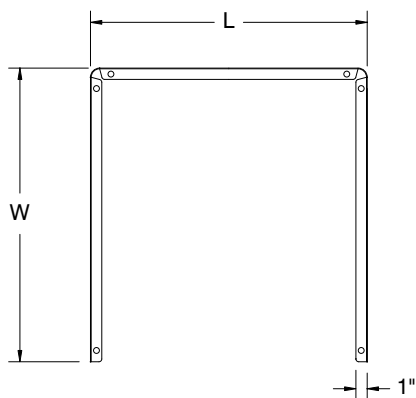
16 Gauge, Type 304 Series Stainless steel.
Plastic hardware included.

DIMENSIONS and SPECIFICATIONS

TOL ± .125"

ALL DIMENSIONS ARE TYPICAL

K-614



MUST SPECIFY BOWL SIZE

Amana®

Commercial

Project #: _____

Item #: _____



Model RCS10TS shown

Medium Volume

This category of microwave is ideal for...

Applications:

- Pizza restaurants
- Casual dining
- Clubs
- Deli

Defrost:

- Defrosts most frozen food products

All ACP, Inc. commercial ovens are backed by our Culinary Center. Call us with any question regarding food preparation, menu development and cooking times. 866-426-2621.



Medium Volume

Amana Commercial Microwave Model RCS10TS

Power Output

- 1000 watts of power.
- Five power levels for consistent, delicious results for frozen, refrigerated and fresh foods - from the freezer to table in minutes.

Easy to Use

- Up to 100 programmable menu items simplifies cooking and ensures consistent results.
- Four stage cooking option for easy one-touch cooking.
- Multiple quantity pad calculates the proper cooking times for multiple portions.
- User friendly touch controls are easy to use.
- Time entry option for added flexibility.
- Digital display with countdown timer for simple operation and "at-a-glance" monitoring.
- Braille touch pads are ADA compliant.
- See-through door and lighted interior for monitoring without opening the door.
- 1.2 cubic ft. (34 liter) capacity accommodates a 14" (356 mm) platter, prepackaged foods and single servings.
- Stackable to save valuable counter space.

Easy to Maintain

- Stainless steel exterior and interior for easy cleaning and a professional look.
- Non-removable air filter protects oven components.
- Constructed to withstand the foodservice environment.
- Backed by the ACP, Inc. 24/7 ComServ Support Center, 866-426-2621.
- ETL Listed.



Part No. 20154711
Updated 8/8/14
Original Instructions



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Cedar Rapids, Iowa 52404

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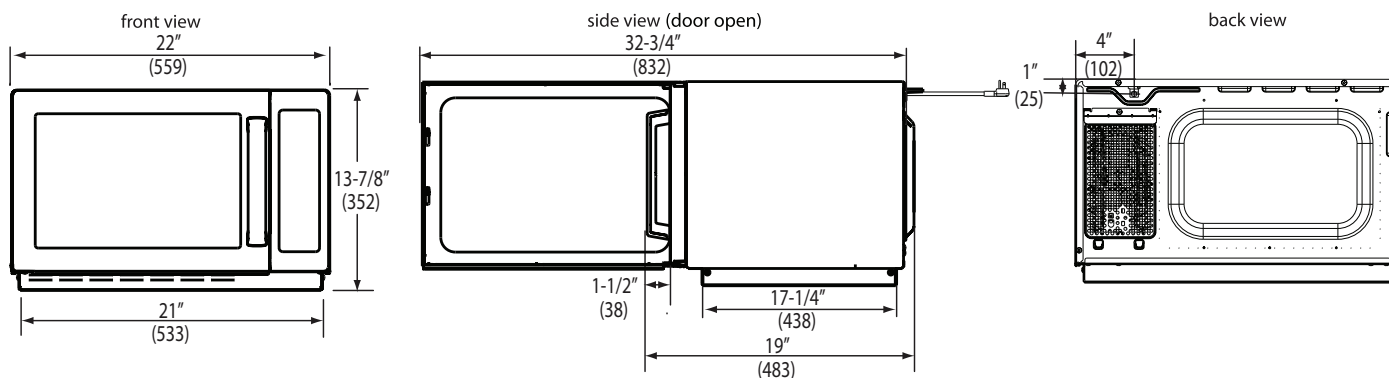
800-233-2366

319-368-8120

Fax: 319-368-8198

www.acpsolutions.com

Amana Commercial Microwave Model RCS10TS | Medium Volume



Installation clearance: 2" all sides

Drawings available from KCL CADlog - techs@kclcad.com

Specification #:

Specifications			
Model	RCS10TS	UPC Code 728028020724	
Configuration	Countertop		
Control System	Touch		
Programmable Control	10		
Settings Programmable	100		
Braille			
Max. Cooking Time	60:00		
Power Levels	5		
Defrost	Yes		
Time Entry Option	Yes		
Microwave Distribution	Rotating antenna, top		
Magnetron(s)	1		
Display	VFD		
Stackable	Yes		
Stage Cooking	Yes, 4		
Interior Light	Yes		
Door Handle	Grab & Go		
Signal	End of cycle, adjustable		
Air Filter	Non-removable with cleaning reminder		
Multiple Portion Setting	Yes, X2		
Exterior Dimensions	H 13 7⁄8" (352)	W 22" (559)	D*19" (483)
Cavity Dimensions	H 8 1⁄2" (216)	W 14 1⁄2" (368)	D 15" (381)
Door Depth	32 3⁄4" (832), 90°+ door open		
Usable Cavity Space	1.2 cubic ft. (34 liter)		
Exterior Finish	Stainless steel		
Interior Finish	Stainless steel		
Power Consumption	1550 W, 13 A		
Power Output**	1000 W** Microwave		
Power Source	120V, 60 Hz, 15 A single phase		
Plug Configuration / Cord	NEMA 5-15	5 ft. (1.5m)	
Frequency	2450 MHz		
Product Weight	41 lbs. (19 kg.)		
Ship weight (approx.)	48 lbs. (22 kg.)		
Shipping Carton Size	H 17" (431)	W 26" (660)	D 20" (508)
UPS Shippable	Yes		

AIA File #:

Measurements in () are millimeters

* Includes handle

** IEC 60705 Tested

Specifications

Commercial microwave 10 touch pad control panel shall be programmable with the ability to program up to 100 menu items with two multiple portions. Touch pad shall include Braille for ADA compliance. Cooking timer shall be 60 minute, countdown style with a time entry option and an adjustable end of cycle audible signal. There shall be 5 power levels, including defrost and 4 cooking stages. Microwave output shall be 1000 watts distributed by one magnetron with a rotating top antenna to provide superior even heating throughout the cavity. Durable door shall have a tempered glass window and a grab and go handle with a 90°+ opening for easy access. An interior light shall facilitate monitoring without opening the door. The large 1.2 cubic ft. (34 liter) cavity shall accommodate a 14" (356 mm) platter. Interior ceramic shelf shall be sealed and recessed on oven bottom to reduce plate-to-shelf edge impact. Oven shall have a stainless steel interior and exterior and be stackable to save counter and shelf space. Front air filter shall be permanently affixed to the front of the oven and have a clean filter reminder. Microwave oven shall comply with standards set by the U.S Department of Health and Human Services, UL923 for safety and NSF4 for sanitation.

Warranty

Warranty Certificate can be found on at:

www.acpsolutions.com/warranty



ite for this product
the ACP, Inc. website at:



Service

All products are backed by the ACP, Inc. 24/7 ComServ Support Center.

Conveyor Toaster

Tostadora de Banda Transportadora

CVYT-120

- Constructed of heavy duty stainless steel
Hecho en acero inoxidable de alta resistencia
- 10" wide stainless steel conveyor belt
Banda transportadora de acero inoxidable de 10"
- Adjustable speed conveyor
Banda con velocidad ajustable
- 280-300 Slices per hour
280-300 rebanadas por hora
- Pull out crumb tray for easy cleaning
Bandeja de migajas removible para facilitar la limpieza
- Single or dual side toasting option
De un solo lado o doble opción de tostato
- Overall dimensions: 13-1/2"H x 14-1/2"W x 19-1/2"D
- 120V/1700W
- CE, NSF



ADCRAFT®

NEMA 5-15 PLUG
120V/15 Amps

Protected by Admiral Craft Equipment Corporation's one year limited warranty. Should your product fail under normal use, it will be repaired or replaced up to one year from date of purchase.



The more you look, the better we look.



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PROJECT NAME	LOCATION		AIA #
ITEM #	QTY	MODEL #	SIS #

SPEC SERIES®

REACH-IN SOLID SWING DOOR FREEZERS

models	STR1F-1S	STA1F-1S	STG1F-1S
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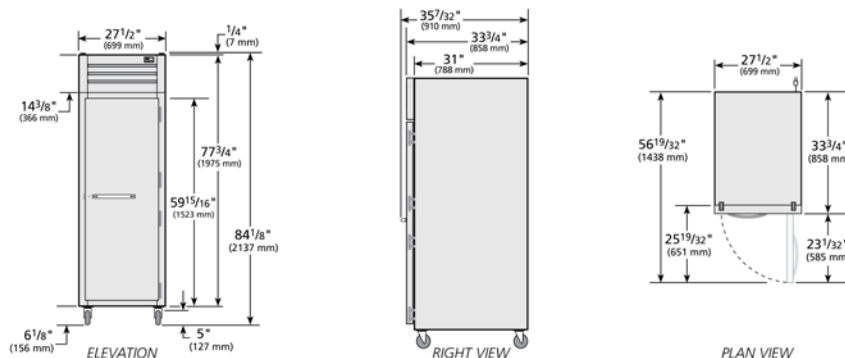
STR1F-1S	
Exterior	Stainless steel door, front & sides.
Interior	Stainless steel side walls, back, floor, door liner, & ceiling.
Shelving	(1) Interior kit option included per full section, factory installed.

STA1F-1S	
Exterior	Stainless steel door, front & sides.
Interior	Aluminum side walls & back. Stainless steel floor & ceiling.
Shelving	(3) Heavy duty, chrome plated, wire shelves per section.

STG1F-1S	
Exterior	Stainless steel door & front, with matching aluminum sides.
Interior	Aluminum side walls & back. Stainless steel floor & ceiling.
Shelving	(3) Heavy duty, PVC coated, wire shelves per section.

SPECIFICATIONS		
Dimensions	in.	mm.
Length	27½	699
Depth	33¾	858
Height	77¾	1975
Electrical	U.S.	International
Horsepower	½	N/A
Amps	6.8	N/A
Voltage	115/60/1	
NEMA	5-15P	
Cord Length	9 ft.	2.74 M.
115/60/1 NEMA-5-15R		
* Height does not include 6⅞" (156 mm) for castors or 6" (153 mm) for optional legs. Height does not include ¼" (7mm) for system mechanical components. † Depth does not include 1½ for door handle.		

plan view



Specifications subject to change without notice.
Chart dimensions are rounded up to the nearest ⅛" (millimeters rounded up to the next whole number).

	APPROVALS	AVAILABLE AT
4/15	Printed in U.S.A.	



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PROJECT NAME	LOCATION	AIA #
ITEM #	QTY	MODEL #
		SIS #

SPEC SERIES®

REACH-IN SOLID SWING DOOR FREEZERS

models	STR1F-1S	STA1F-1S	STG1F-1S
--------	----------	----------	----------



standard features

REFRIGERATION SYSTEM

- Factory engineered, self-contained, capillary tube system using environmentally friendly (CFC free) R404A refrigerant.
- High capacity, factory balanced refrigeration system that maintains -10°F (-23.3°C) temperatures. Ideal for both frozen foods and ice cream.
- State of the art, electronically commutated evaporator and condenser fan motors. ECM motors operate at higher peak efficiencies and move a more consistent volume of air which produces less heat, reduces energy consumption and provides greater motor reliability.
- Top mounted refrigeration system with evaporator positioned out of food zone to maximize capacity.
- Automatic defrost system time-initiated, temperature-terminated. Saves energy consumption and provides shortest possible defrost cycle.
- Automatic evaporator fan motor delay during defrost cycle.

CABINET CONSTRUCTION

- Insulation - entire cabinet structure and solid door are foamed-in-place using Ecomate. A high density, polyurethane insulation that has zero ozone depletion potential (ODP) and zero global warming potential (GWP).
- 5" (127 mm) diameter plate castors - locks provided on front set.

DOOR

- Lifetime guaranteed bolt style door lock standard.
- Lifetime guaranteed heavy duty all metal working door handle.
- Positive seal self-closing door with 120° stay open feature. Lifetime guaranteed external cam lift door hinges, four (4) per door section.
- Magnetic door gaskets of one piece construction, removable without tools for ease of cleaning.

LIGHTING

- LED interior lighting, safety shielded.

MODEL FEATURES

- Exterior digital temperature display, available with either °F or °C.
- Evaporator epoxy coated to eliminate the potential of corrosion
- Curb mounting ready.
- NSF-7 compliant for open food product.

ELECTRICAL

- Unit completely pre-wired at factory and ready for final connection to a 115/60/1 phase, 15 amp dedicated outlet. Cord and plug set included.

OPTIONAL FEATURES/ ACCESSORIES

(upcharge & lead times may apply)

- 6" (153 mm) standard legs.
- 6" (153 mm) seismic/flanged legs.
- 6" (153 mm) stainless steel legs.
- Field reversible hinge.
- Additional shelves.
- Stainless back. (STR, STA, STG)

SHELVING KIT OPTIONS

- STR series kits factory installed at no charge. STA & STG series kits field installed, upcharge applies, lead times may apply.
- Kit #1: Nine (9) sets of #1 type tray slides and pilasters (field installed), bottom support of one (1) 18"L x 26"D (458 mm x 661 mm) pan or two (2) 14"L x 18"D (356 mm x 458 mm) pans.
- Kit #2: One (1) set half-section #2 steel rod tray slides and pilasters (field installed), rim support of one (1) 18"L x 26"D (458 mm x 661 mm) pan.
- Kit #3: Six (6) sets of universal type tray slides and pilasters (field installed), bottom support of one (1) 18"L x 26"D (458 mm x 661 mm) pan, two (2) 14"L x 18"D (356 mm x 458 mm) pans or two (2) 12"L x 20"D (305 mm x 508 mm) pans.
- Kit #4: Three (3) chrome shelves 25"L x 27 3/4"D (635 mm x 705 mm). Optional wall mounted shelf support pilasters (field installed) with four (4) shelf clips per shelf available; adjustable on 1/2" (13 mm) increments (must order at time of cabinet order).
- Additional kit option components available individually.

WARRANTY*

Three year warranty on all parts and labor and an additional 2 year warranty on compressor. (U.S.A. only)

*RESIDENTIAL APPLICATIONS: TRUE assumes no liability for parts or labor coverage for component failure or other damages resulting from installation in non-commercial or residential applications.

METRIC DIMENSIONS ROUNDED UP TO THE NEAREST WHOLE MILLIMETER

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



Model	Elevation	Right	Plan	3D	Back
ST()1F-1S					



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PROJECT NAME	LOCATION	AIA #
ITEM #	QTY	MODEL #
		SIS #

SPEC SERIES®

REACH-IN SOLID SWING DOOR REFRIGERATORS

models	STR1R-1S	STA1R-1S	STG1R-1S
--------	----------	----------	----------

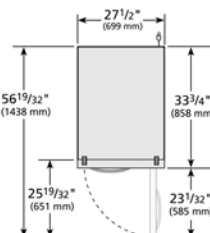
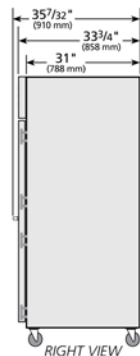
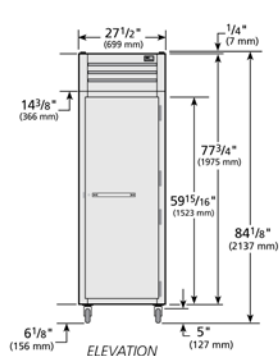
THIS MODEL ALSO
AVAILABLE IN R290
HYDROCARBON
REFRIGERANT



plan view



Scan code
for video



PLAN VIEW

STR1R-1S	
Exterior	Stainless steel door, front & sides.
Interior	Stainless steel side walls, back, floor, door liner, & ceiling.
Shelving	(1) Interior kit option included per full section, factory installed.

STA1R-1S	
Exterior	Stainless steel door, front & sides.
Interior	Aluminum side walls & back. Stainless steel floor & ceiling.
Shelving	(3) Heavy duty, chrome plated, wire shelves per section.

STG1R-1S	
Exterior	Stainless steel door & front, with matching aluminum sides.
Interior	Aluminum side walls & back. Stainless steel floor & ceiling.
Shelving	(3) Heavy duty, PVC coated, wire shelves per section.

SPECIFICATIONS		
Dimensions	in.	mm.
Length	27 1/2	699
Depth	33 3/4	858
Height	77 3/4	1975
Electrical	U.S.	International
Horsepower	1/3	N/A
Amps	4.8	N/A
Voltage	115/60/1	
NEMA	5-15P	
Cord Length	9 ft.	2.74 M.
115/60/1 NEMA-5-15R		
* Height does not include 6 1/8" (156 mm) for castors or 6" (153 mm) for optional legs. Height does not include 1/4" (7 mm) for system mechanical components. † Depth does not include 1 1/2" for door handle.		

Specifications subject to change without notice.
Chart dimensions are rounded up to the nearest 1/8" (millimeters rounded up to the next whole number).

	APPROVALS	AVAILABLE AT
4/15	Printed in U.S.A.	



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PROJECT NAME	LOCATION	AIA #
ITEM #	QTY	MODEL #
		SIS #

SPEC SERIES®

REACH-IN SOLID SWING DOOR REFRIGERATOR

models	STR1R-1S	STA1R-1S	STG1R-1S
--------	----------	----------	----------



standard features

REFRIGERATION SYSTEM

- Factory engineered, self-contained, capillary tube system using environmentally friendly (CFC free) 134A refrigerant.
- High capacity, factory balanced refrigeration system that maintains cabinet temperatures of 33°F to 38°F (.5°C to 3.3°C) for the best in food preservation.
- State of the art, electronically commutated evaporator and condenser fan motors. ECM motors operate at higher peak efficiencies and move a more consistent volume of air which produces less heat, reduces energy consumption and provides greater motor reliability.
- Top mounted refrigeration system with evaporator positioned out of food zone to maximize capacity.
- Electronic control.

CABINET CONSTRUCTION

- Insulation - entire cabinet structure and solid door are foamed-in-place using Ecomate. A high density, polyurethane insulation that has zero ozone depletion potential (ODP) and zero global warming potential (GWP).
- 5" (127 mm) diameter plate castors - locks provided on front set.

DOOR

- Lifetime guaranteed bolt style door lock standard.
- Lifetime guaranteed heavy duty all metal working door handle.

- Positive seal self-closing door with 120° stay open feature. Lifetime guaranteed external cam lift door hinges, four (4) per door section.
- Magnetic door gaskets of one piece construction, removable without tools for ease of cleaning.

LIGHTING

- LED interior lighting, safety shielded.

MODEL FEATURES

- Exterior digital temperature display, available with either °F or °C.
- Evaporator epoxy coated to eliminate the potential of corrosion
- Curb mounting ready.
- NSF-7 compliant for open food product.

ELECTRICAL

- Unit completely pre-wired at factory and ready for final connection to a 115/60/1 phase, 15 amp dedicated outlet. Cord and plug set included.

OPTIONAL FEATURES/ ACCESSORIES

(upcharge & lead times may apply)

- 6" (153 mm) standard legs.
- 6" (153 mm) seismic/flanged legs.
- 6" (153 mm) stainless steel legs.
- Field reversible hinge.
- Additional shelves.
- Stainless back. (STR, STA, STG)
- Available in R290 hydrocarbon refrigerant.

SHELVING KIT OPTIONS

- STR series kits factory installed at no charge. STA & STG series kits field installed, upcharge applies, lead times may apply.
- Kit #1: Nine (9) sets of #1 type tray slides and pilasters (field installed), bottom support of one (1) 18"L x 26"D (458 mm x 661 mm) pan or two (2) 14"L x 18"D (356 mm x 458 mm) pans.
- Kit #2: One (1) set half-section #2 steel rod tray slides and pilasters (field installed), rim support of one (1) 18"L x 26"D (458 mm x 661 mm) pan.
- Kit #3: Six (6) sets of universal type tray slides and pilasters (field installed), bottom support of one (1) 18"L x 26"D (458 mm x 661 mm) pan, two (2) 14"L x 18"D (356 mm x 458 mm) pans or two (2) 12"L x 20"D (305 mm x 508 mm) pans.
- Kit #4: Three (3) chrome shelves 25"L x 27 3/4"D (635 mm x 705 mm). Optional wall mounted shelf support pilasters (field installed) with four (4) shelf clips per shelf available; adjustable on 1/2" (13 mm) increments (must order at time of cabinet order).
- Additional kit option components available individually.

WARRANTY*

Three year warranty on all parts and labor and an additional 2 year warranty on compressor. (U.S.A. only)

*RESIDENTIAL APPLICATIONS: TRUE assumes no liability for parts or labor coverage for component failure or other damages resulting from installation in non-commercial or residential applications.

METRIC DIMENSIONS ROUNDED UP TO THE NEAREST WHOLE MILLIMETER

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



Model	Elevation	Right	Plan	3D	Back
ST()1R-1S					



GLO-RAY® HEATED SHELVES

Models GRS-18, -24, -30, -36, -42, -48, -54, -60, -66, -72

The Hatco Glo-Ray® Heated Shelf has an extruded aluminum base with non-slip rubber feet, stainless steel top, and blanket-type element for uniform heat distribution. Fiberglass insulation keeps heat at the holding surface while a built-in adjustable thermostat controls surface temperature.

FLEXIBILITY

Ideal for pass-through areas, buffet lines, or as a heated work shelf.

Model GRS features a rocker switch with indicator light and an adjustable thermostat ranging from 80° to 200°F (27° to 93°C). Surface-mounted blanket-type elements distribute heat under the entire stainless steel surface. All models are shipped factory assembled and include a 6' (1829 mm) cord and plug attached, ready to use.

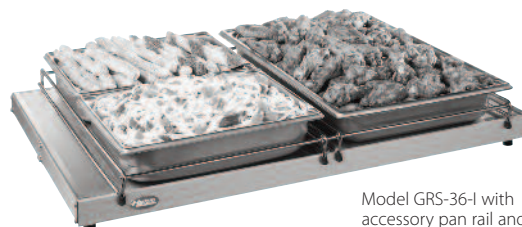
QUALITY

The following features assure the finest performance for years to come:

- Models feature a thermostatically-controlled heated base to extend the holding times of most food.
- Available in widths from 18" to 72" (457-1829 mm) and depths from 6" to 25.5" (152-648 mm).
- Extruded aluminum base with stainless steel top – hardcoated aluminum surface is optional for the 19.5" (495 mm), 15.5" (394 mm), 21.5" (546 mm), and 23.5" (597mm) deep models
- Optional *Designer* colors: Warm Red, Black, Gray Granite, White Granite, Navy Blue, Hunter Green, Antique Copper



Model GRS-60-I



Model GRS-36-I with accessory pan rail and food pans



Model GRS-36-I with optional hardcoated aluminum surface (standard 19.5" (495 mm) deep models only)



Model GRS-30-I with optional *Designer* color and accessory food pans

BLANKET ELEMENTS GUARANTEED AGAINST BURNOUT AND BREAKAGE FOR ONE YEAR.



ANSI/NSF 4

HATCO CORPORATION P.O. Box 340500 Milwaukee, WI 53234-0500 U.S.A.
(800) 558-0607 • (414) 671-6350 • Fax (800) 543-7521 • Int'l. Fax (414) 671-3976
www.hatcocorp.com • E-mail: equipsales@hatcocorp.com

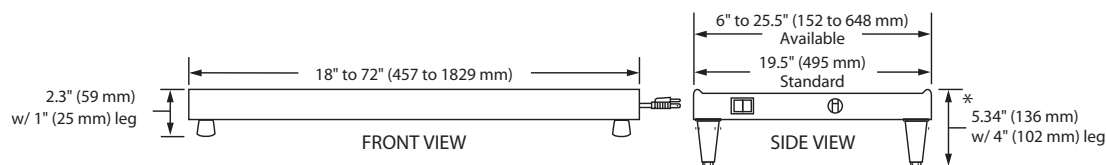
Form No. GRS Spec Sheet

Printed in U.S.A.
January 2012



GLO-RAY® HEATED SHELVES

Models GRS-18, -24, -30, -36, -42, -48, -54, -60, -66, -72



SPECIFICATIONS FOR STANDARD 19.5 (495 mm) DEPTH

Model	Watts	Width	Shipping Weight
GRS-18-I	250	18" (457 mm)	16 lbs. (7 kg)
GRS-24-I	350	24" (610 mm)	20 lbs. (9 kg)
GRS-30-I*	450	30" (762 mm)	25 lbs. (11 kg)
GRS-36-I	550	36" (914 mm)	28 lbs. (13 kg)
GRS-42-I†	600	42" (1067 mm)	32 lbs. (15 kg)
GRS-48-I†	700	48" (1219 mm)	36 lbs. (16 kg)
GRS-54-I†	800	54" (1372 mm)	42 lbs. (19 kg)
GRS-60-I†	900	60" (1524 mm)	44 lbs. (20 kg)
GRS-66-I†	1000	66" (1676 mm)	50 lbs. (23 kg)
GRS-72-I†	1100	72" (1829 mm)	56 lbs. (25 kg)

* Indicates models that accommodate multiple food pans: 30" (762 mm) = 2 pans, 42" (1067 mm) = 3 pans, 54" (1372 mm) = 4 pans, and 66" (1676 mm) = 5 pans.

† NSF requires units over 36" (914 mm) in width or weighing more than 80 lbs. (36 kg) to be either sealed, or raised on the installation surface with the 4" (102 mm) legs included.

DIMENSIONS

GRS (Standard Depth): Model shown is 18"-72"W x 19.5"D x 2.3"H* (457-1829 x 495 x 59 mm).

* Add 3" (76 mm) to height when using 4" (102 mm) legs.

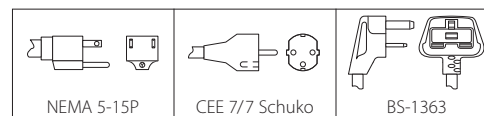
VOLTAGE

120 volts, single phase only, (uses NEMA 5-15P).
Export voltages available.

CORD LOCATION

Is on the same end as the switch

PLUG CONFIGURATIONS



GRS Models are available in depths of:

Model	Depths	Model	Depths
A	6" (152 mm)	G	15.75" (400 mm)
B	7.75" (197 mm)	H	17.5" (445 mm)
C	9.75" (248 mm)	I	19.5" (495 mm)
D	12" (305 mm)	J	21.5" (546 mm)
E	13.75" (349 mm)	K	23.5" (597 mm)
F	15.5" (394 mm)	L	25.5" (648 mm)

WATTS

Model	A	B	C	D	E	F	G	H	I	J	K	L
GRS-18-(X)	100	100	125	200	200	200	225	225	250	300	325	350
GRS-24-(X)	125	125	175	250	250	250	300	300	350	375	425	475
GRS-30-(X)	150	150	225	300	300	300	375	375	450	450	525	600
GRS-36-(X)	175	175	275	350	350	350	450	450	550	525	625	725
GRS-42-(X)	225	225	300	450	450	450	525	525	600	675	750	825
GRS-48-(X)	250	250	350	500	500	500	600	600	700	750	850	950
GRS-54-(X)	275	275	400	550	550	550	675	675	800	825	950	1075
GRS-60-(X)	300	300	450	600	600	600	750	750	900	900	1050	1200
GRS-66-(X)	325	325	500	650	650	650	825	825	1000	975	1150	1325
GRS-72-(X)	350	350	550	700	700	700	900	900	1100	1050	1250	1450

OPTIONS (NOT FOR RETROFIT)

- ☐ Designer Colors: Warm Red, Black, Gray Granite, White Granite, Navy Blue, Hunter Green, and Antique Copper
- ☐ Hardcoated Surface for 15.5" (394 mm), 19.5" (495 mm), 21.5" (546 mm), or 23.5" (597mm) depth models only

ACCESSORIES

- ☐ 4" (102 mm) Adjustable Legs (Standard on units over 36" (914 mm) in width)
- ☐ Slant Leg Kit (Models 12" (305 mm) deep or deeper)
- ☐ Pan Rail (19.5" (495 mm) deep models only)

PRODUCT SPECS

Heated Shelf

The Heated Shelf shall be a Glo-Ray® Model ... as manufactured by the Hatco Corporation, Milwaukee, WI 53234 U.S.A.

With 24/7 parts and service assistance (U.S. and Canada only), the Shelf shall be rated at ... watts, ... volts, and be ... inches (millimeters) in overall

width. It shall consist of a thermostatically-controlled heated base and a cord with plug attached.

Accessories shall include 4" (102 mm) adjustable legs, slant leg kit, and pan rail.



Over 90 Years of Quality Foodservice
Products and Service

Job _____ Item No. _____

SS10 SERIES-11 QUART TOP-MOUNT, ROUND DROP-IN WARMERS



SS10TDU

DESCRIPTION

The heavy-duty, top-mount, drop-in round food warmers are designed to hold heated foods at safe and fresh serving temperatures. Wells SS10 Series accommodates standard 11 quart round inset pans and are designed for wet or dry operations.

STANDARD FEATURES

- ☐ Accommodates standard 11-quart Insets
- ☐ 26 Models to choose from
- ☐ One-piece stainless steel top flange and heavy-gauge, deep-drawn stainless steel warming pans.
- ☐ Suitable for wet or dry operation
- ☐ Energy-saving, fully insulated models or standard non-insulated models
- ☐ Fully insulated models are perfect for non-metal counters (with adapter kit)
- ☐ Thermostatic or Infinite Controls
- ☐ High limits prevent overheating
- ☐ Infinite controls provided w/guard ring to prevent temperature change
- ☐ Thermostatic controls are recessed in a one-piece, front-mounted panel
- ☐ Wellslock is standard for easy installation
- ☐ Powerful tubular heating elements
- ☐ 1/4" drains available
- ☐ 2-Year Limited Parts & 1-Year Limited Labor Warranty

SPECIFICATIONS

Construction – One-piece stainless steel top flange and heavy-gauge, deep-drawn stainless steel warming pans are standard features on all models. Wellslocks are standard for quick and easy installation.

Insulation – Choose between models that are fully insulated around the sides and bottom or standard non-insulated models. Fully Insulated models save energy and may be installed in non-metal counters.

Controls & Heating – Models with thermostatic or infinite controls are available. High-limits prevent overheating. Temperature-ready indicator lights are standard on all control types. Powerful tubular heating elements are located under the warming pans for quick and efficient heating and for even heat distribution.

OPTIONS & ACCESSORIES

- ☐ Inset with lid
- ☐ 8 oz. soup ladle
- ☐ Drain value extension kit
- ☐ Adaptor top for 4-quart inset
- ☐ Adaptor top for 7-quart inset
- ☐ Non-metal counter adapter kit
- ☐ Optional 72" control wiring

ADDITIONAL FEATURES AVAILABLE

- ☐ 120V or 208/240V
- ☐ Drains
- ☐ Cord & plugs
- ☐ Fully insulated models or standard models
- ☐ Infinite or thermostatic controls

MINIMUM CLEARANCES	BACK (MM)	SIDE (MM)	BOTTOM (MM)	FRONT (MM)
STANDARD	1 (25)	1 (25)	8-1/2 (216)	4* (102)
FULLY INSULATED	1 (25)	1 (25)	8 (203)	4 (102)

* When control box is located below the warmer, front clearance may be reduced to 2" or 52mm

Sheet No. SS10 [06/15]



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NOTE: Specifications are subject to change without notice and are not intended for installation purposes. See installation instructions prior to installing the unit.



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SS10 SERIES-11 QUART TOP-MOUNT, ROUND DROP-IN WARMERS

PLEASE NOTE: SOME MODEL NUMBERS HAVE CHANGED

SPECIFICATIONS											
OLD MODEL	NEW MODEL	CONTROLS	INSULATION	INSTALL WT	SHIP WT	VOLTAGE	WATTS	PHASE	PLUG	DRAIN	APPROVAL
SS10-120	SS10-120	Infinite	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	120V	450	1Ø	N/A	No	NSF
SS10	SS10	Infinite	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	208V/240	338/450	1Ø	N/A	No	NSF
SS10D-120	SS10D-120	Infinite	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	120V	450	1Ø	N/A	Yes	NSF
SS10D	SS10D	Infinite	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	208V/240	620/825	1Ø	N/A	Yes	NSF
SS10T-120	SS10T-120	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	120V	825	1Ø	N/A	No	NSF
SS10T	SS10T	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	208V/240	620/825	1Ø	N/A	No	NSF
SS10T-230	SS10T-230	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	230V	825	1Ø	N/A	No	
SS10TD-120	SS10TD-120	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	120V	825	1Ø	N/A	Yes	NSF
SS10TD	SS10TD	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	208V/240	620/825	1Ø	N/A	Yes	NSF
SS10TD-230	SS10TD-230	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	230V	825	1Ø	N/A	Yes	
SS10ULT-120	SS10TU-120	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	120V	825	1Ø	N/A	No	NSF
SS10ULT	SS10TU	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	208V/240	620/825	1Ø	N/A	No	NSF
SS10ULTD-120	SS10TDU-120	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	120V	825	1Ø	N/A	Yes	NSF
SS10ULTD	SS10TDU	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	208V/240	620/825	1Ø	N/A	Yes	NSF
SS10TUC-120	SS10TUC-120	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	120V	825	1Ø	NEMA 5-15P	No	NSF
SS10TUC	SS10TUC	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	208V/240	620/825	1Ø	NEMA 6-15P	No	NSF
SS10TDUC-120	SS10TDUC-120	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	120V	825	1Ø	NEMA 5-15P	Yes	NSF
SS10TDUC	SS10TDUC	Thermostatic	Non-Insulated	6 lbs./2.8 kg	7 lbs./3.2 kg	208V/240	620/825	1Ø	NEMA 6-15P	Yes	NSF
SS10TUI-120	SS10TUI-120	Thermostatic	Fully Insulated	11.4 lbs./5.2 kg	12.4 lbs./5.6 kg	120V	825	1Ø	N/A	No	NSF
SS10TUI	SS10TUI	Thermostatic	Fully Insulated	11.4 lbs./5.2 kg	12.4 lbs./5.6 kg	208V/240	620/825	1Ø	N/A	No	NSF
SS10TDUI-120	SS10TDUI-120	Thermostatic	Fully Insulated	11.4 lbs./5.2 kg	12.4 lbs./5.6 kg	120V	825	1Ø	N/A	Yes	NSF
SS10TDUI	SS10TDUI	Thermostatic	Fully Insulated	11.4 lbs./5.2 kg	12.4 lbs./5.6 kg	208V/240	620/825	1Ø	N/A	Yes	NSF
SS10TUCI-120	SS10TUCI-120	Thermostatic	Fully Insulated	11.4 lbs./5.2 kg	12.4 lbs./5.6 kg	120V	825	1Ø	NEMA 5-15P	No	NSF
SS10TUCI	SS10TUCI	Thermostatic	Fully Insulated	11.4 lbs./5.2 kg	12.4 lbs./5.6 kg	208V/240	620/825	1Ø	NEMA 6-15P	No	NSF
SS10TDUCI-120	SS10TDUCI-120	Thermostatic	Fully Insulated	11.4 lbs./5.2 kg	12.4 lbs./5.6 kg	120V	825	1Ø	NEMA 5-15P	Yes	NSF
SS10TDUCI	SS10TDUCI	Thermostatic	Fully Insulated	11.4 lbs./5.2 kg	12.4 lbs./5.6 kg	208V/240	620/825	1Ø	NEMA 6-15P	Yes	NSF



Sheet No. SS10 [06/15]



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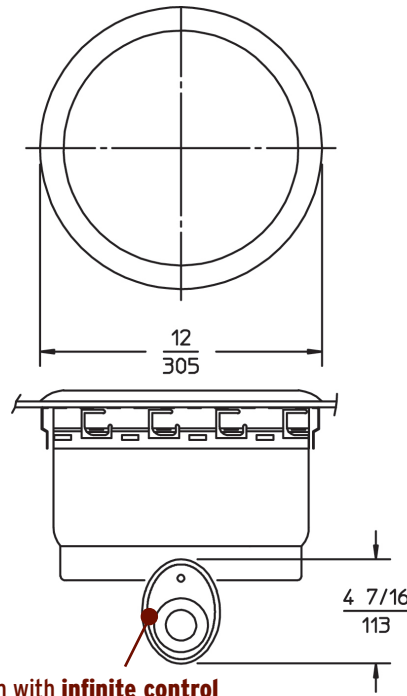


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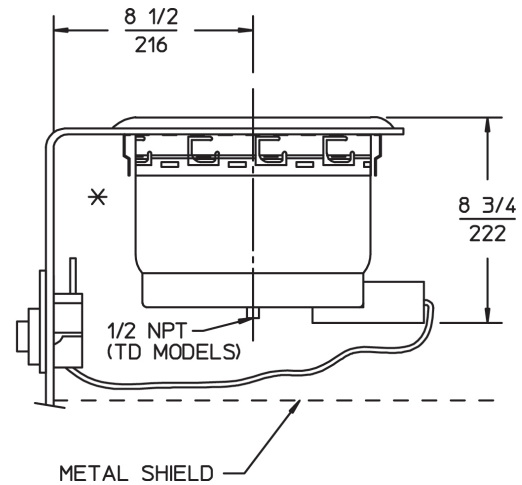
SS10 SERIES-11 QUART TOP-MOUNT, ROUND DROP-IN WARMERS

PRODUCT DIMENSIONS FOR STANDARD MODELS ONLY

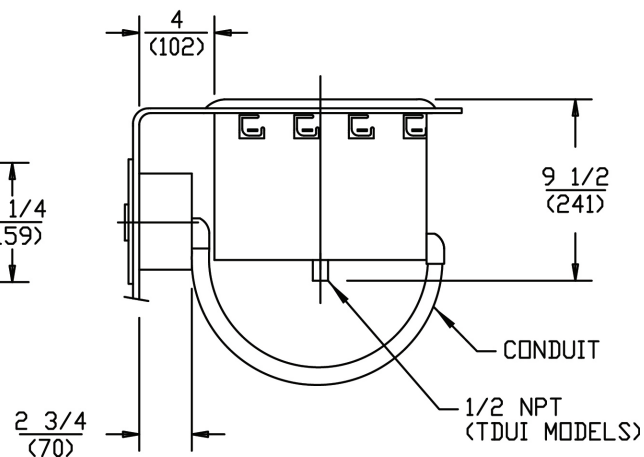
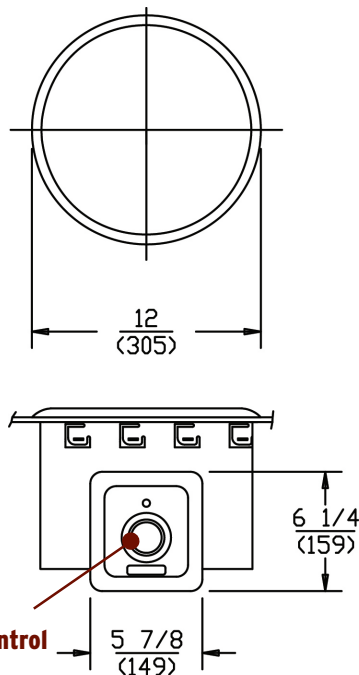
INCHES
MM



NOTE: * CONTROL MUST NOT BE MOUNTED
IN THIS HIGH TEMPERATURE AREA.



NOTE: Required with models without conduit



Sheet No. SS10 [06/15]



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STAINLESS STEEL KORNER TABLES

Item #: _____ Qty #: _____

Model #: _____

Project #: _____



24" WIDE

Length	Model #	Wt.
60"	KTMS-245	240 lbs.
72"	KTMS-246	260 lbs.
84"	KTMS-247	280 lbs.
96"	KTMS-248	305 lbs.
108"	KTMS-249	330 lbs.
120"	KTMS-2410	355 lbs.
132"	KTMS-2411	375 lbs.
144"	KTMS-2412	400 lbs.

30" WIDE

Length	Model #	Wt.
60"	KTMS-305	320 lbs.
72"	KTMS-306	360 lbs.
84"	KTMS-307	400 lbs.
96"	KTMS-308	440 lbs.
108"	KTMS-309	000 lbs.
120"	KTMS-3010	520 lbs.
132"	KTMS-3011	560 lbs.
144"	KTMS-3012	600 lbs.

FEATURES:

TOP furnished with 1 5/8" square bend edges on front and sides. 5" splash with a 1" return on rear.

Hat channels stud welded to reinforce and maintain a level working surface.

Front to Back Leg Stretchers bolted to legs and require assembly. Left to Right Stretchers welded to legs.

CONSTRUCTION:

All TIG welded. Exposed weld areas polished to match adjacent surfaces.

Entire top mechanically polished to a satin finish.

Top is sound deadened.

Roll formed embossed galvanized hat channels are secured to top by means of structural adhesive and weld studs.

Gussets welded to support hat sections.

5' length is standard on one side. Length can be modified, but not to exceed 7' on one wall dimension.

MATERIAL:

TOP: 14 gauge stainless steel type "304" series.

STRETCHERS: 1 5/8" dia. tubular stainless steel.

LEGS: 1 5/8" diameter tubular stainless steel.

Stainless steel gussets.

1" adjustable stainless steel bullet feet.

Optional Sinks: Fabricated sinks type "304" stainless steel.

Furnished with 1 1/2" IPS basket drain.

Faucets not included.

ACCESSORIES

	Model #	Qty.
36" Width	KT-100	
Additional Length in excess of 5"	KT-101	
Special Sizing Charge	KT-102	
Stainless Steel Undershelf	KT-103	
Stainless Steel Cabinet Base	KT-104	
14 Gauge Unit	KT-105	

SINKS

	Model #	Qty.
16" x 20" x 12"	TA-11B	
20" x 20" x 12"	TA-11D	
20" x 24" x 12"	TA-11E	



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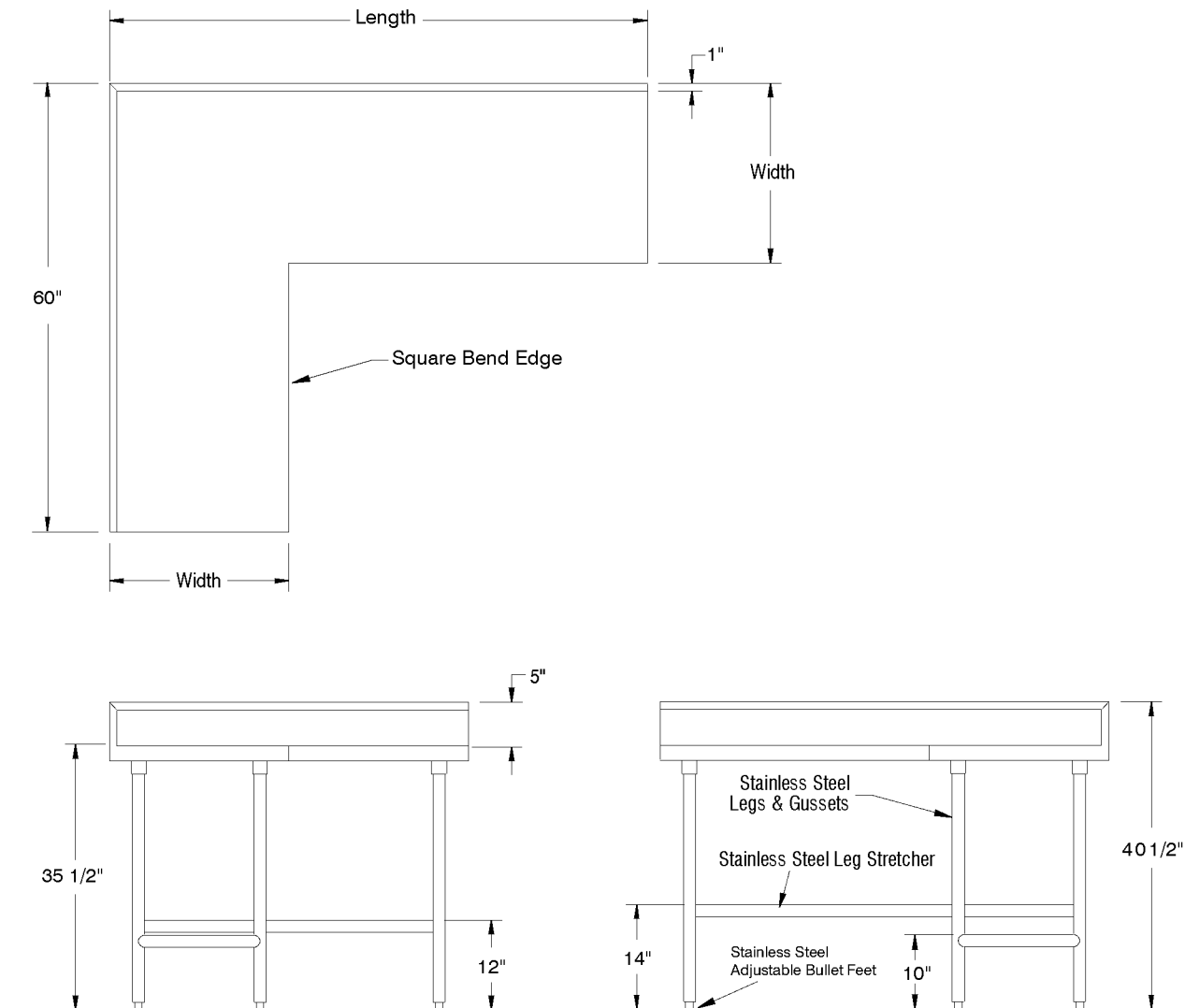
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Fax: (775) 972-1578

DETAILS and SPECIFICATIONS

TOL $\pm .500"$

ALL DIMENSIONS ARE TYPICAL





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Stainless Steel Undershelf	KT-103	
Stainless Steel Cabinet Base	KT-104	
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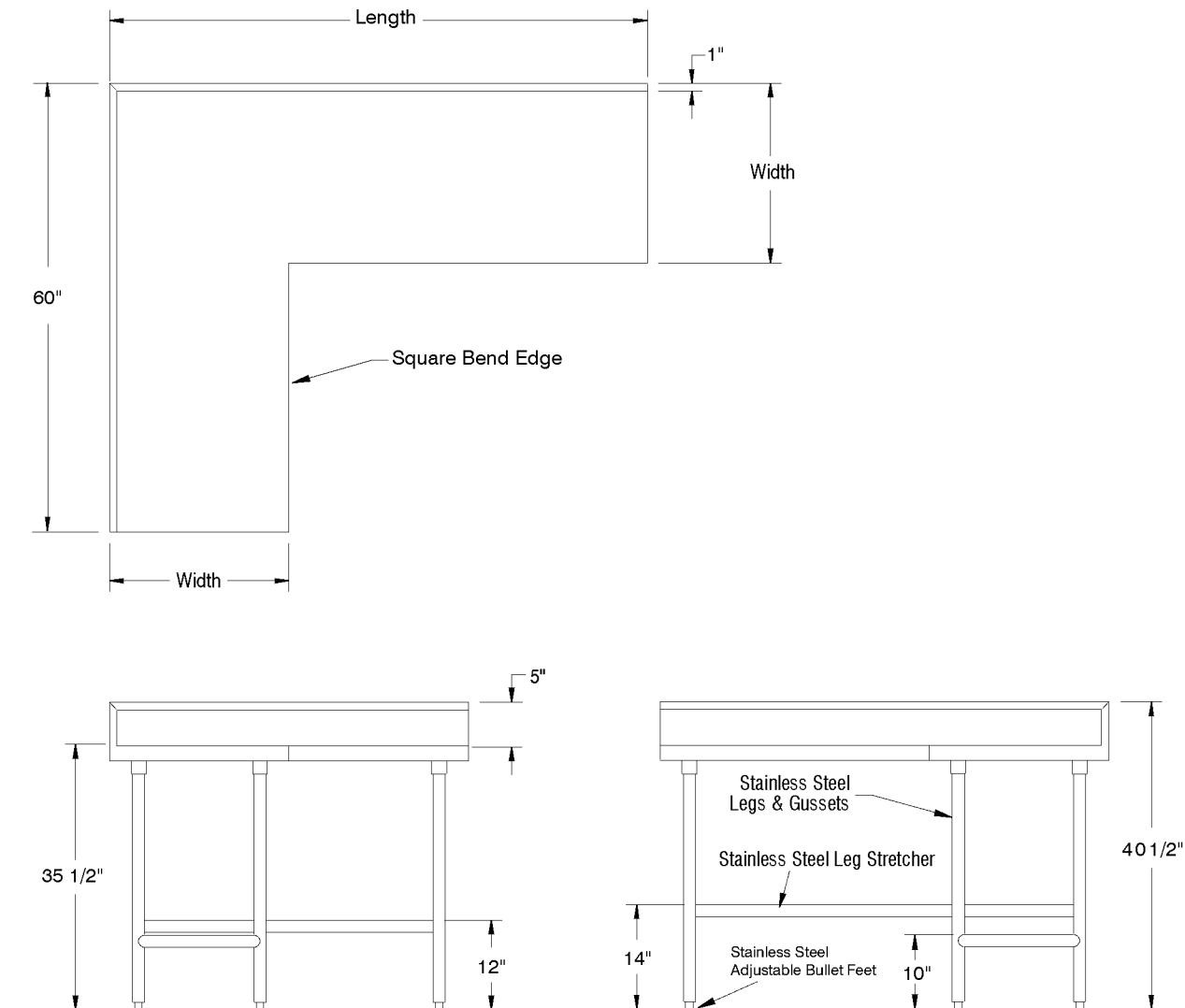
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Fax: (775) 972-1578

DETAILS and SPECIFICATIONS

TOL $\pm .500"$

ALL DIMENSIONS ARE TYPICAL





STAINLESS STEEL KORNER TABLES

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Model #: _____

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Stainless steel gussets.

1" adjustable stainless steel bullet feet.

Optional Sinks: Fabricated sinks type "304" stainless steel.

Furnished with 1 1/2" IPS basket drain.

Faucets not included.

ACCESSORIES

	Model #	Qty.
36" Width	KT-100	
Additional Length in excess of 5"	KT-101	
Special Sizing Charge	KT-102	
Stainless Steel Undershelf	KT-103	
Stainless Steel Cabinet Base	KT-104	
14 Gauge Unit	KT-105	

SINKS

	Model #	Qty.
16" x 20" x 12"	TA-11B	
20" x 20" x 12"	TA-11D	
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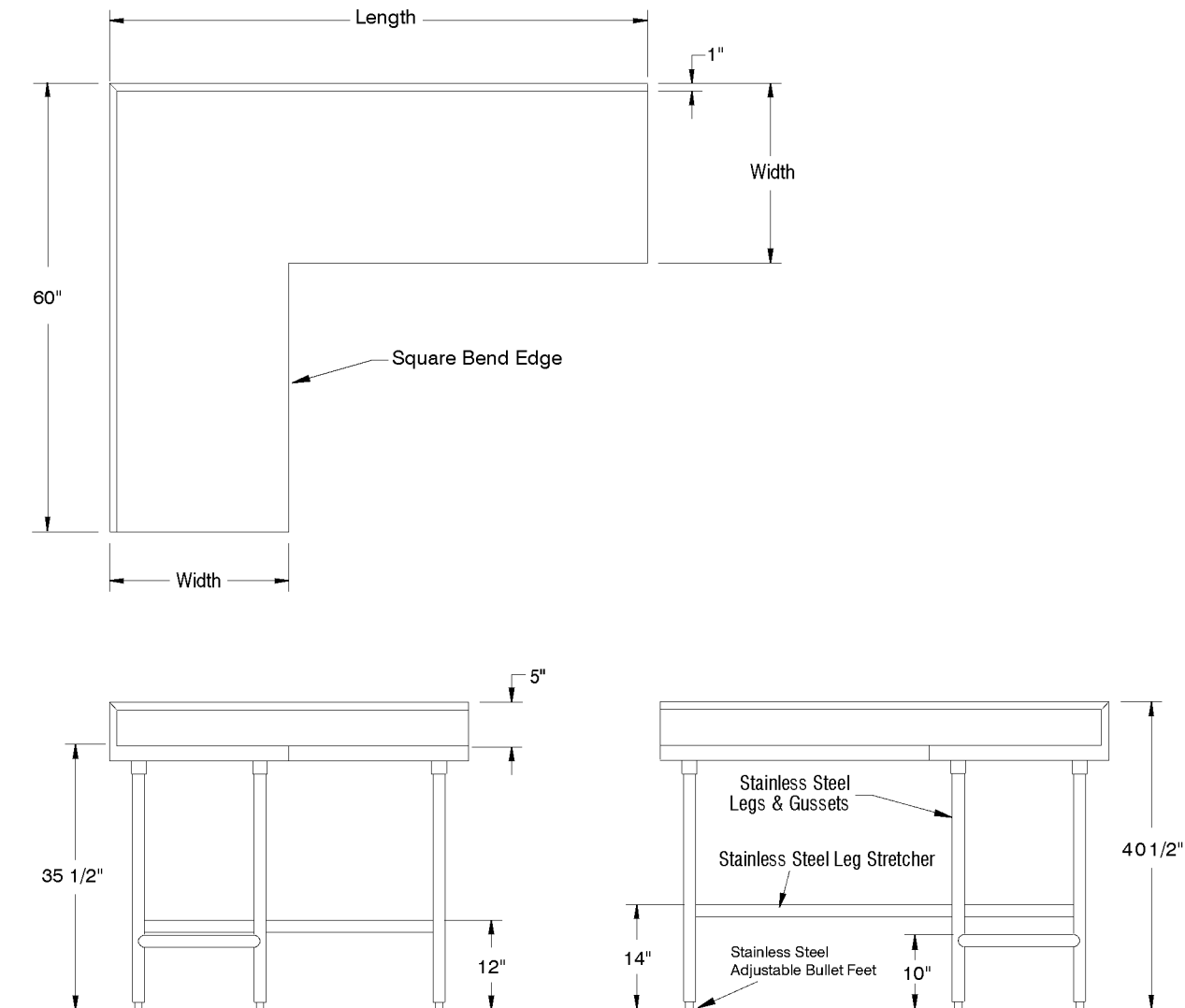
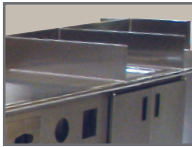


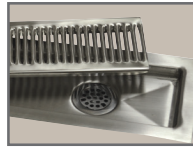


TABLE MODIFICATIONS & ACCESSORIES

TOP MODIFICATIONS



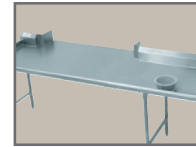
TA-56
5" NSF Partition



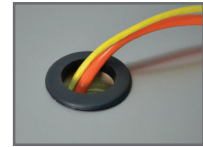
TA-523
Drop-In Urn Trough



CDR-5
Condiment Holder



TA-84
Pass-Thru



TA-108
Grommet For Cords

QTY.

CDR-5	Condiment Holder (Accommodates 5 Bins)
TA-1	Notch Backsplash For Roll Up Door w/ Pass-Thru
TA-3	Stainless Steel Hat Channel & Gusset Upgrade
TA-7	10" Partial Splash
TA-8	Column Notch in Rear Splash (Includes Splash)
TA-10	5" Partial Splash
TA-12	Countertop Edge
TA-22	Square Edge Table
TA-28	Cut-Out For Cold Well. Includes Louvered Doors
TA-29	16 Ga. 304 Rear Splash Capping Strip w/Adhesive Backing
TA-30	1-1/2" Side Splash
TA-30A	1-1/2" Turn Up For Table Tops
TA-31	5" Side Splash
TA-32	10" Side Splash
TA-34	Top Cut-Out
TA-34A	Top Cut-Out for Undermount Well
TA-35	Splash Cut-Out
TA-41	Poly-Vance 5/8" Cutting Board
TA-56	5" NSF Partition
TA-56A	18" NSF Partition
TA-57	Prepare Welded Field Joint (Welded in field by others)
TA-57A	Bolted Field Joint (Bolted in field by others)
TA-57B	Hairline Field Joint
TA-58	Stepdown to 24" Working Height
TA-64	Urn Trough (Factory installation only)
TA-75	Mitered Edge
TA-76	Paint on Sound Deadening
TA-79	Flour Trough (Factory installation only)
TA-82	Scrap Chute (6" dia. opening)
TA-84	Simple Pass-Thru
TA-87	Enclosed Rear Splash
TA-91	Poly Retaining Clips Includes TA-22 (S/S top table)

QTY.

TA-93	Wall Brackets (Includes 2. For 5" & 10 1/2" splash only)
TA-96A	Can Opener Provision for Openers with Bolt-on Base (Customer to provide location)
TA-96B	Can Opener Surface Mount Provision with 4" S/S Tube for Openers w/o Base (Customer to provide location)
TA-96C	Can Opener Spacer Plate Provision for Use on Tables With Countertop Edge & Can Opener Base (Customer to provide location)
TA-100	Bull Nose All Sides of Worktable
TA-101	Rear Tray Lock
TA-106	Mirror HI-LITE Edge
TA-107	Vacuum Breaker Holes on Tables (Includes Backsplash with 2" Return)
TA-108	2" Hole with Grommet for Appliance Cord
TA-112	Hubble Outlet
TA-113	Notch Top for Buyout Unit
TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
TA-135	Plate Shelf (Undercounter Mounted)
TA-366A	Heavy duty Understructure Top
TA-502	Install Advance Tabco Hot Food Unit In Work Table Top (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)
TA-521	Drop-In urn Trough 1'
TA-522	Drop-In urn Trough 2'
TA-523	Drop-In urn Trough 3'
TA-524	Drop-In urn Trough 4'
TA-525	Drop-In urn Trough 5'
TA-526	Drop-In urn Trough 6'
TA-527	Drop-In urn Trough 7'
TA-528	Drop-In urn Trough 8'
TA-529	Drop-In urn Trough 9'
TA-550	Install Customer Supplied Buyout Items (Does not include wiring. Consult factory)
TA-551	Installation of Hot Food Wells. (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)



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TABLE MODIFICATIONS & ACCESSORIES

BASE MODIFICATIONS



TA-39
Louvered Hinged Doors



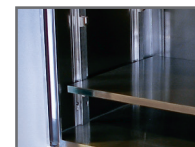
TA-73
Drop-Down Tray Slide



TA-74
Solid Tray Slide



TA-92A
Apron w/ Lever Handle Support



TA-116
Adj. Mid-Shelf

QTY.

___	TA-4	Removable Access Panel
___	TA-5	Curb Mounting Provision
___	TA-15	Provision for Built In Drawer Warmer
___	TA-23	Welded Set-Up Table/Crating
___	TA-24	Shell Crating
___	TA-27	Control Panel (Must add TA-34A or TA-34B)
___	TA-36A	Sliding/Hinge Stainless Steel Doors
___	TA-36B	1/2 Height Stainless Steel Hinge Doors
___	TA-36C	Hinged door with Trash Flap
___	TA-37	Stainless Enclosed Base
___	TA-39	24" Louvered Hinged Doors
___	TA-40	Remove Undershelf in Cabinet Base For Slide in Buyout
___	TA-42	Interior Partition (2.5"x30")
___	TA-43	Filler Panel (3"x30" with Flanged Feet)
___	TA-44	K.D. Aluminum Pan Rack Slides (6 slides. Table min. lgth. 30")
___	TA-45	K.D. Aluminum Glass Rack Slides (3 slides. Table min. lgth. 3 feet)
___	TA-46	Door Locks

QTY.

___	TA-48	12"x12" Cut-Out in Back Panel/Undershelf for Plumbing
___	TA-54	Removable Kick Plate
___	TA-55	Remove Back Panel (on Enclosed Base)
___	TA-63	Removable Shelving (In addition to standard shelf & table width)
___	TA-70	S/S Tubular Tray Divider (12" sections)
___	TA-73	Tubular Tray Slide w/Dropdown (Stationary Tray Slide Available. Factory installation only)
___	TA-74	Solid Tray Slide
___	TA-92	12" Apron (in front of sink)
___	TA-92A	17" Stainless Steel Apron to Cover Sink Bowls and Support Lever Drain Handles
___	TA-116	Adjustable Enclosed Base Cabinet Mid Shelf- Add to Price of Enclosed Base Table with Fixed Mid Shelf (M) on Page 42-43 . Shelves Over 36" In Length Require Multiple Sections With Center Partition. For Partial Shelves Add To Price Of Shelf On Page 60 .
___	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
___	TA-135	Plate Shelf (Undercounter Mounted)
___	TA-205	Connect Cafeteria Items (Per Joint Between 2 Tables. Requires Casters)

ELECTRICAL & DATA PORT OUTLETS



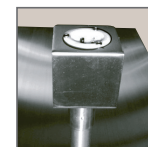
TA-62
Duplex
Outlet



TA-62A
GFI Duplex
Outlet



TA-62D
GFI
Doghouse
Outlet



TA-112
Hubble
Outlet

QTY.

___	TA-62	Standard Duplex Electrical Outlet & Cover Plate (Under Flat Top). NEMA 5-15R
___	TA-62A	GFI Duplex Outlet & Cover Plate in a VKS Splash. NEMA 5-20R
___	TA-62C	GFI Duplex Outlet & Cover Plate Below Shelf Top. NEMA 5-20R

QTY.

___	TA-62D	GFI Duplex Outlet & Cover Plate in a Doghouse. NEMA 5-20R
___	TA-62E	Upgrade Outlet to a NEMA 6-20R or Equiv.
___	TA-112	Hubble Outlet
___	TA-622	CAT-5 Data Port Outlet. Cable Not Included



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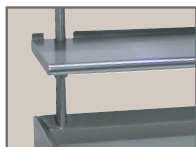
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TABLE MODIFICATIONS & ACCESSORIES

OVERSHELF & POT RACK MODIFICATIONS



TA-9A
1" Turn Up



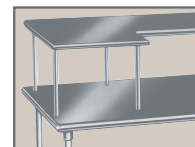
TA-22A
Square Edge



TA-71
Heat Lamp Mounting Provision



TA-100A
Bull Nose



TA-102
24" x 24" Extension

QTY.

_____	TA-9A	Partial 1" Turn-Up for all Table Mt. Shelves
_____	TA-22A	Square Edge on Oversheff
_____	TA-26-10	Welded Wall Shelf Brackets for 10" Wide Shelf
_____	TA-26-12	Welded Wall Shelf Brackets for 12" Wide Shelf
_____	TA-26-15	Welded Wall Shelf Brackets for 15" Wide Shelf
_____	TA-26-18	Welded Wall Shelf Brackets for 18" Wide Shelf
_____	TA-47	Shelf Mounting Bracket for Existing Table
_____	TA-49	Wall Shelf 2" Offset
_____	TA-60	Special Sizing Charge for Shelves (Must Order Larger Unit to be Cut Down to Smaller Size)
_____	TA-71	Heat Lamp Mounting Provision
_____	TA-78	Additional Lin. Ft. Past 12' For Table Mt. Shelf (For ODS, OTS, TS, DS & WS Shelving only)
_____	TA-77	Check Minder Shelf Provision (Factory install only)
_____	TA-83	Spice Bins
_____	TA-86	Stainless Steel Pot Hooks

QTY.

_____	TA-89	Double Sided Plated Pot Hooks (Package of 4)
_____	TA-89A	Single Sided Plated Pot Hooks (Package of 4)
_____	TA-99	16 Ga. S/S 304 Upgrade for Wall & Over Shelves
_____	TA-100A	Bull Nose All Sides of Shelf
_____	TA-100R	Bull Nose Three Sides of Shelf w/ Rear Turn Up
_____	TA-102	24" x 24" Extension for Microwave or Computer Shelf (Add to OTS and ODS Shelves. See page 65)
_____	TA-103	24" Wide PT Shelf (36" Min Length. Mid mount only. PT Series Shelf, See Pg. 73. Add to 18" Wide Shelf)
_____	TA-104	Additional Length Over 12' (Add to 18" Shelf. (PA & CU Shelving Only. Max. Length is 14' as Single Piece)
_____	TA-98	Stainless Steel Flat Bar in lieu of Chain
_____	TA-84A	Knife Rack for Rolled Rim Tables
_____	TA-84B	Knife Rack for Poly Top Tables
_____	TA-84C	Knife Rack for Square Edge Tables

UNDERSHELF MODIFICATIONS

QTY.

_____	TA-9	1-1/2" Turn-Up for Undershelves
_____	TA-17	Upgrade Undershelf to a Marine Edge (Must add TA-23)
_____	TA-48	12"x12" Cut-Out in Back Panel or Undershelf for Plumbing

QTY.

_____	TA-94	Upgrade 16 Ga. 304 S/S Undershelf
_____	TA-366	Reinforced Understructure For Undershelves

SIZE MODIFICATIONS

QTY.

_____	TA-33	Special Working Height
_____	TA-59	36" Wide Equipment Stand
_____	TA-6	Extra Length for Standard Tables Over 12' (Tables Over 14' Require Field Joint TA-57)
_____	TA-61	Special Sizing Charge (Larger Unit Cut Down to Smaller Size)
_____	TA-61A	Special Modification Charge

QTY.

_____	TA-65	Enclosed Base Units Over 12' (Open Base Table)
_____	TA-66	Enclosed Base Units Over 12' (Sliding Door Units)
_____	TA-67	Enclosed Base Units Over 12' (Hinged Door Units)
_____	TA-105	Modify Enclosed Base Table w/ Drawers to 24" Width
_____	TA-110	Modify Enclosed Base Table w/ Drawers to 36" Width



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TABLE MODIFICATIONS & ACCESSORIES

LEG MODIFICATIONS

QTY.

TA-16	Galvanized Leg with Plastic Bullet Foot (34 1/2" Total Length)
TA-19	Flanged Stainless Steel Bullet Feet (34 1/2" Total Length)
TA-20	Stainless Steel Leg with S/S Bullet Foot (34 1/2" Total Length)

QTY.

TA-21	Stainless Steel Bullet Foot
TA-72	Leg to Wall Brace (Set per table)
TA-95	Upgrade 16 Ga. 304 S/S Legs Only



WORK TABLE CASTERS

STANDARD CASTER FEATURES:

Maintains the standard 35-1/2" working height.
200 lbs. load capacity per caster

OPTIONAL:

TA-25B - Brakes on all casters

TA-25C - Upgrade caster with heavy duty urethane wheel.

	Model#	Description
When Used w/ Stainless Steel Legs	TA-25S-4	Set of 4 (2 w/ Brakes)
	TA-25S-6	Set of 6 (2 w/ Brakes)
When Used w/ Galvanized Legs	TA-25G-4	Set of 4 (2 w/ Brakes)
	TA-25G-6	Set of 6 (2 w/ Brakes)

REPLACEMENT CASTERS:



TA-25 series
200 lbs. load capacity
per caster



TA-255 series
300 lbs. load capacity
per caster

	Model#	Description
For Work Tables	TA-25	Set of 4 (2 w/ Brakes)
	TA-25A	Set of 6 (2 w/ Brakes)
For Enclosed Base Tables	TA-255P	Set of 4 (2 w/ Brakes)
	TA-255AP	Set of 6 (2 w/ Brakes)

EQUIPMENT STAND CASTERS



STANDARD CASTER FEATURES:

Maintains the standard 24" working height.
5" rubber tires.
200 lbs. load capacity per caster

	Model#	Description
When Used w/ Stainless Steel Legs	TA-25ES	Set of 4 (2 w/ Brakes)
When Used w/ Galvanized Legs	TA-25EG	Set of 4 (2 w/ Brakes)

HEAVY DUTY CASTER FEATURES:

5" urethane wheels.
1200 lbs. load capacity per caster



Model#	Description
TA-255	Set of 4 (2 w/ Brakes)
TA-256	Set of 6 (2 w/ Brakes)

Contact Our SMART FABRICATION™ Department for more information at 800-645-3166
or email in your specifications to smartfab@advancetabco.com



ADVANCE TABCO is constantly engaged in a program of improving our products. Therefore, we reserve the right to change specifications without prior notice.

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Welded Sinks Into Table Top

Multiple Sizes



Flat Top
w/ K-50
Deck Mount
Faucet Shown



10" Backsplash
w/ K-1
Splash Mount
Faucet Shown

Item #: _____ Qty #: _____
Model #: _____
Project #: _____

FEATURES:

Sinks welded into table top.

Includes K-6 basket drain(s)

All faucets included meet federal lead free standards.

Flat Top, 1", 1-1/2" & 5" backsplash tables include deck mounted faucet.

- Single Sink Bowls provided with K-50 swing spout faucet
- Double Sink Bowls provided with K-53 swing spout faucet

10" backsplash tables include splash mounted faucet

- Single and double sink bowls provided with K-1 swing spout faucet

OPTIONS:

TA-11Z - Allow 5" backsplash accommodate splash mounted faucet

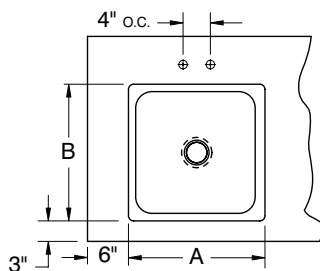
Single Bowl	Double Bowl	Size
Model#	Model#	A B
TA-11A**	TA-11A-2**	16" x 20" x 8"
TA-11B**	TA-11B-2**	16" x 20" x 12"
TA-11C	TA-11C-2	20" x 20" x 8"
TA-11D*	TA-11D-2*	20" x 20" x 12"
TA-11E*	TA-11E-2*	24" x 24" x 12"
TA-11F	TA-11F-2†	10" x 14" x 10"
TA-11G*	TA-11G-2*	28" x 20" x 12"
TA-11J	TA-11J-2	14" x 16" x 12"
TA-11L	TA-11L-2	18" x 24" x 12"
TA-11N	TA-11N-2	18" x 18" x 14"
TA-11P	TA-11P-2	20" x 24" x 14"

* Only Installed In Tables 30" Wide or Wider

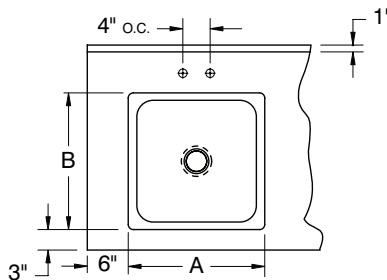
** Bowls Are Turned In 24" Wide Tables (20" X 16" X 8")

† K-50 Swing Spout Faucet (Double Bowl)

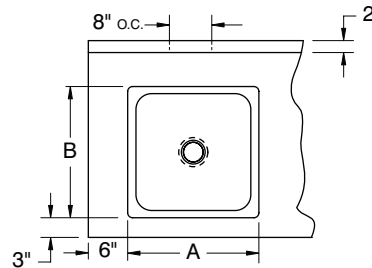
FLAT TOP, 1" or 1-1/2" REAR SPLASH



5" REAR SPLASH with 1" RETURN



10" REAR SPLASH with 2" RETURN



MODIFICATIONS & ACCESSORIES

K-2A	Poly-Vance Sink Cover 10"x14"
K-2B	Poly-Vance Sink Cover 14"x16"
K-2C	Poly-Vance Sink Cover 16"x20"
K-2D	Poly-Vance Sink Cover 18"x24"
K-2E	Poly-Vance Sink Cover 20"x20"
K-2F	Poly-Vance Sink Cover 24"x24"
K-4	Lever Drain Bracket
K-5	Lever Drain
K-12	Deck Mounted Soap Dispenser
K-15	Lever Drain with Overflow
K-50	Deck Mounted 4" O.C. 8" Swing Spout Faucet
K-500MIT	Omit Swing Spout Faucet
K-52	Deck Mounted 4" O.C. 3-1/2" Gooseneck Faucet
K-520MIT	Omit Swing Spout Faucet
K-53	Deck Mounted 4" O.C. 12" Gooseneck Faucet
K-54	8-1/4" High Water Filler Faucet

K-54A	12" High Water Filler Faucet
K-55	8 1/2" Spout 4" O.C. Deck Mt. Gooseneck Faucet
K-56	5" NSF Partition
K-60	4" O.C. Splash Mounted Gooseneck Faucet
K-62	X.H.D. 4" O.C. Deck Mounted Gooseneck Faucet
K-105	14" Splash Mounted 8" O.C. Faucet
K-112	Extra Heavy Duty 12" Splash Mounted Faucet
K-316-LU	Wrist Handles for 4" O.C. Faucets
K-452	6"x9" Control Bracket
K-453	14"x16" Control Bracket
K-455A	Stainless Steel Sink Cover 10"x14"
K-455B	Stainless Steel Sink Cover 14"x16"
K-455C	Stainless Steel Sink Cover 16"x20"
K-455D	Stainless Steel Sink Cover 18"x24"
K-455E	Stainless Steel Sink Cover 20"x20"
K-455F	Stainless Steel Sink Cover 24"x24"

K-455G	Stainless Steel Sink Cover 20"x28"
K-460	Installation of Disposal Cone with 6"x9" Control Bracket
K-461	Installation of Collar with 6"x9" Control Bracket
K-470	14" deep Bowls
K-472	Faucet Hole Revision
TA-11Z	Return Only (5" Splash Tables Require 2" Return For Splash Mounted Faucet
TA-31	5" Side Splash
TA-32	10" Side Splash
TA-34	Top Cut-Out

For More Faucet Options & Faucet Specs, See Faucet Specifications in Section G



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Decorative Lamps/ Luminaires

Models: DL or DLH-400, -500, -600, -700, -725, -750,
-760, -775, -800, -1100, -1200, -1300,
-1400, -1500

Hatco Decorative Lamps provide radiant heat to briefly hold food warm at kitchen work areas, waitress pickup stations, or customer serving points, while enhancing your décor. Versatile enough for almost any location, the range of lights are available with a selection of unlimited personalizing choices. In addition to food warming, configurations for lighting (Luminaire) is offered as well.

Standard features

- Luminaire, Standard and High Watt bulbs available (bulb not included in unit price)
- Models available in fourteen lamp shade styles
- Eight different mounting arrangements to choose from
- Four switch options
- Available for food holding and display or lighting only applications

NOTE:
Decorative Lamps (DL and DLH Series)
are non-returnable.

Build Your Decorative/Luminaire Lamp in Six Easy Steps

(not for retrofit-bulb not included) –

Step 1	Wattage
Step 2	Shade Style
Step 3	Shade and Canopy Colors
Step 4	Mounting Style
Step 5	Switch Location
Step 6	Overall Length



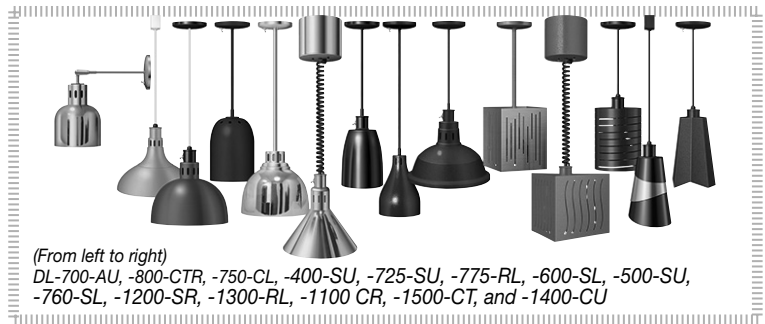
You can develop your own Hatco Decorative Lamp solutions with our online lamp configurator.

Visit "www.hatcocorp.com" and click on "Build a Lamp"

Project _____

Item # _____

Quantity _____



(From left to right)

DL-700-AU, -800-CTR, -750-CL, -400-SU, -725-SU, -775-RL, -600-SL, -500-SU, -760-SL, -1200-SR, -1300-RL, -1100 CR, -1500-CT, and -1400-CU

Options (available at time of purchase only)

Designer Colors (Exception: DL-1500)

- ☐ Warm Red ☐ Black ☐ Gray Granite ☐ White Granite
☐ Navy Blue ☐ Hunter Green ☐ Antique Copper

Gloss Finishes (Exception: DL-1500)

- ☐ Smooth White ☐ Gleaming Gold ☐ Glossy Gray ☐ Bold Black

Gloss Finishes* for Shade Only (Exception: DL-1500)

- ☐ Radiant Red ☐ Brilliant Blue ☐ Clear Brushed Metal

Plated Finishes* (Exception: DL-1500)

- ☐ Bright Brass ☐ Bright Nickel ☐ Bright Copper
☐ Antique Nickel ☐ Antique Brass ☐ Antique Bronze

DL-1500 Color Combinations only

- ☐ **Designer Finishes** Black/Antique Copper/Black
☐ **Gloss Finishes** Bold Black/Radiant Red/Bold Black*
☐ **Gloss Bold Black/Plated** Bright Nickel/Gloss Bold Black*
☐ **Gloss Bold Black/Plated** Antique Nickel/Gloss Bold Black*
☐ **Gloss Bold Black/Plated** Bright Copper/Gloss Bold Black*

*Special process required and extended lead times

Cord Color (C=Cord, R=Retractable Mounts only)

- ☐ Black (Standard) ☐ White

☐ Luminaire Lighting, (200W bulb maximum, not included)

Extended Electrical Leads – For any SU, SL, or SR mount unit, must specify lead length)

- ☐ 1'-5' (305-1524 mm) ☐ 6'-10' (1829-3048 mm)
☐ 11'-15' (3353-4572 mm) ☐ 16'-20' (4877-6096 mm)

Accessories

Track Mount Bar - (120V only)

- ☐ 4' (1219 mm) Black ☐ 4' (1219 mm) White
☐ 8' (2438 mm) Black ☐ 8' (2438 mm) White
☐ 12' (3658 mm) Black ☐ 12' (3658 mm) White

Additional Track Installation and Modification Kit

- ☐ Black ☐ White

☐ 16 Amp Lamp Toggle Switch

Coated Bulbs for Luminaire models only

- ☐ 120V, 60W Clear ☐ 240V, 60W Clear

Coated Bulbs

- ☐ 120V, 250W Clear ☐ 240V, 250W Clear ☐ 120V, 250W Red

Coated Bulbs for DLH models only

- ☐ 120V, 375W Clear ☐ 120V, 375W Red

Uncoated Bulbs

- ☐ 120V, 250W Clear ☐ 240V, 250W Clear ☐ 120V, 250W Red

Uncoated Bulbs for DLH models only

- ☐ 120V, 375W Clear ☐ 120V, 375W Red



ANSI/NSF 4



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Fax: (800) 543-7521 | Int'l. Fax: (414) 671-3976 | www.hatcocorp.com | equipsales@hatcocorp.com | intlsales@hatcocorp.com



Decorative Lamps/Luminaires

Models: DL or DLH-400, -500, -600, -700, -725, -750, -760, -775, -800, -1100, -1200, -1300, -1400, -1500

ORDERING INSTRUCTIONS

Please refer to the six steps in the Hatco Foodservice Equipment Price List, go online at www.hatcocorp.com and click on "Build A Lamp", or click on

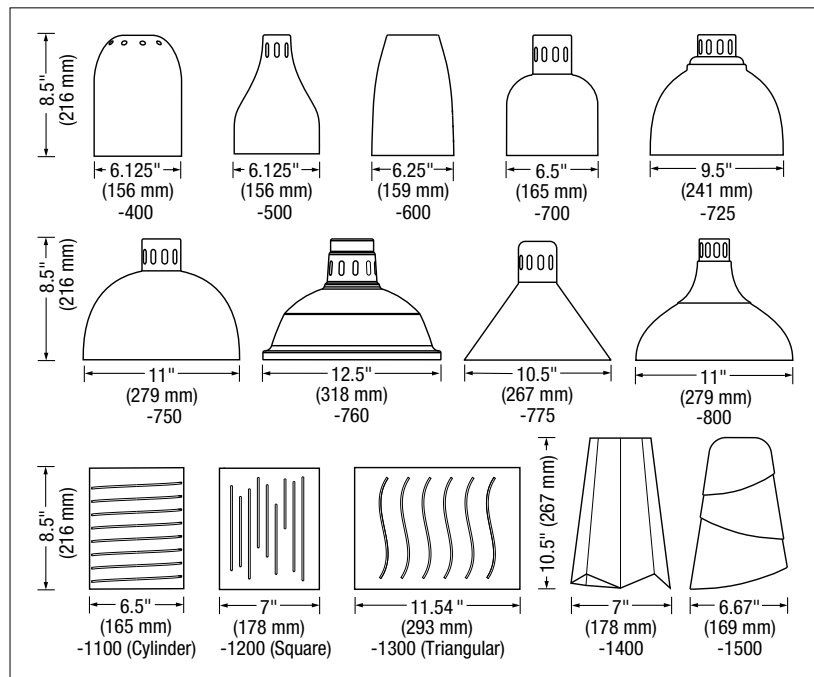
"Video Library" and watch "Decorator Lamp Configurator". This will help you in choosing the correct configuration for your specific needs.

Step 1-Wattages

Model [▲]	Maximum Watt Bulb (Not included)	Voltage (Single Phase)	Ship Weight [▼]
DL- (Luminaire)	200	120, 240	6-10 lbs. (3-5 kg)
DL- (Standard)	250	120, 240	6-10 lbs. (3-5 kg)
DLH- (High Watt)	375	120, 240	6-10 lbs. (3-5 kg)

▲ Not field convertible ▼ Depending on components

Step 2-Shade Styles -



Step 3-Colors -

Click on www.hatcocorp.com (Order Literature/Sales Literature/Color Chip Chart) or see the Hatco Price List for color representations.

Designer colors: Warm Red, Black, Gray Granite, White Granite, Navy Blue, Hunter Green, Antique Copper

Gloss Finishes: Smooth White, Gleaming Gold, Glossy Gray, Bold Black

Gloss Finishes* for Shade Only: Radiant Red, Brilliant Blue, Clear Brushed Metal Finish

Plated Finishes*: Bright Brass, Bright Nickel, Bright Copper, Antique Nickel, Antique Brass and Antique Bronze

Exception: DL-1500 in these color options only

Designer Black/Antique Copper/Black

Gloss Bold Black/**Plated** Bright Nickel/**Gloss** Bold Black* (shown)

Gloss Bold Black/**Plated** Antique Nickel/**Gloss** Bold Black*

Gloss Bold Black/**Plated** Bright Copper/**Gloss** Bold Black*

Gloss Bold Black/Radiant Red/Bold Black*

*Special Process Required and Extended Lead Times



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Decorative Lamps/Luminaires

Models: DL or DLH-400, -500, -600, -700, -725, -750, -760, -775, -800, -1100, -1200, -1300, -1400, -1500

Step 4-Mounting Styles

MOUNTING STYLES		SPECIFY the:	Shade Height	
			8.5" H (216 mm)	10.5" H (267 mm)
ARM	A Mount Rigid Mount to canopy with pivot. 	Horizontal Stem Length	7 to 20" (178 to 508 mm)	
			Overall Length: 17" to 30" (432 to 762 mm)	Overall Length: 19" to 32" (483 to 813 mm)
PIVOT	P Mount Rigid Mount to canopy with pivot. 	Overall Length (from pivot to bottom of shade)	17" to 71" (432 to 1803 mm)	19" to 73" (483 to 1854 mm)
CORD	C Mount Cord Mount to canopy. 	Overall Length	17" (432 mm) to any length	19" (483 mm) to any length
	CT Mount* Cord Mount to track adapter. 			

MOUNTING STYLES		SPECIFY the:	Shade Height	
			8.5" H (216 mm)	10.5" H (267 mm)
RETRACTABLE CORD	R Mount Retractable Cord Mount. 	Adjusts to a maximum and minimum according to shade height	31" to 69 1/2" (787 to 1765 mm)	33" to 71 1/2" (838 to 1816 mm)
	RT Mount* Retractable Cord Mount to track adapter. 		33 3/8" to 71 7/8" (848 to 1826 mm)	35 3/8" to 73 7/8" (899 to 1876 mm)
STEM	S Mount Rigid Stem Mount to canopy. 	Overall Length	14" to 71" (356 to 1803 mm)	16" to 73" (483 to 1854 mm)
	ST Mount* Rigid Stem Mount to track adapter. 			

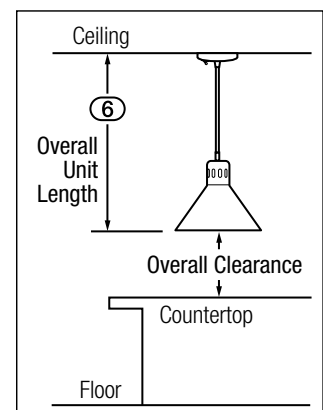
* NOTE: Lamp shade diameter and wattage may limit number of lamps per track. To assure warranty coverage, do not install track systems in damp or wet locations (including above steam tables).

Step 5-Switch Locations

(N)-None Supplied by installer	(U)-Upper Switch Not available on: • DLH-(high watt models) • R Mount • Track Mounts: (CT, RT, ST)	
(L)-Lower Switch Not available on: • DLH-(high watt models) • A Mount	(R)-Remote Switch • Accommodates 16 amps • Up to seven 250W lamps, or five 375W lamps maximum per remote switch	

Step 6-Overall Unit Length

- For C, CT, S or ST Mounts: From ceiling to bottom of warmer lamp shade (#6 in drawing).
- For A or P Mounts: From center of shade to wall plus vertical shade length (see line art in mounting styles).
- For Clearance: See "Clearance Requirements" in the Hatco Price List Ordering Instructions.



PRODUCT SPECS Decorative Lamp

The Decorative Lamp shall be a Hatco Model ... as distributed by the Hatco Corporation, Milwaukee, WI 53234 U.S.A.

With 24/7 parts and service assistance (US and Canada only), the Decorative Lamp shall be rated at ... watts, ... volts, and ... inches (millimeters) in overall width. It shall consist of a vented lamp shade and mounting. Switch locations can be upper, lower,

remote or supplied by installer. Bulb options are uncoated or coated, clear or red, 60W clear, 250W (DL models) or 375W (DLH models).

Warranty consists of 24/7 parts and service assistance (US and Canada only).



BEVERAGE-AIR

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1-888-845-9800 Fax# 1-336-245-6453
<http://www.Beverage-Air.com>

CUSTOMER'S CHOICE FOR A HOT KITCHEN
Tested & Certified to Ambient Class of 100°F

3 Year Parts/Labor Warranty Additional 2 Year Compressor Warranty

UCR-SERIES UNDERCOUNTER UNITS

Versatile, compact (29" deep) models for undercounter and worktop applications for refrigerated storage of food product. Height is 34-1/2".

CABINET CONSTRUCTION

Heavy duty construction includes exterior stainless steel on front, sides, door(s) and grille. Cabinet back and bottom are galvanized steel. Interior liner is made of corrosion resistant aluminum. Interior thermometer is standard.

Cabinets are insulated with 2" thick foamed-in-place polyurethane insulation. Sub-top insulated with 1-1/2" foamed-in-place polyurethane insulation. Doors are mounted to cabinet on self-closing, cartridge style hinges with 120° stay open feature. Doors are equipped with a snap-in-place vinyl magnetic gasket for positive seal. Convenient, double pull style door handle is made of black anodized aluminum. 6" high casters are standard, 2 include brakes. An 8' cord set is provided with 115 volt models. Cabinet interior standard with 2 steel wire epoxy coated shelves per section. Interior light with manual switch is provided with glass door models.

REFRIGERATION

Refrigeration system utilizes R134a refrigerant governed by a capillary tube system. Automatic (non-electric) condensate evaporator is provided. Interior forced-air system with high humidity evaporator coils, provides the ideal environment for food preservation.

ELECTRICAL

Units wired at factory and ready for connection to a 115/60/1 phase, 15 amp dedicated outlet. 8' long cord and plug set included.

SPECIAL FEATURES

- Cartridge style door hinges provides positive seal & eliminates door sagging issues (excludes glass door and some special units).
- Optional 6" legs or 3" casters available

Item No. _____
Quantity _____

29" DEPTH UNDERCOUNTER REFRIGERATOR FOOD PREPARATION SERIES

MODELS:
UCR27A
UCR48A
UCR60A
UCR72A



UCR27



UCR48

ELECTRICAL CONNECTION

Units pre-wired at factory and include 8' long cord and plug set.



115/60/1
NEMA-5-15P

Available From:



Model Specified _____

Store# _____

Location _____

Quantity _____

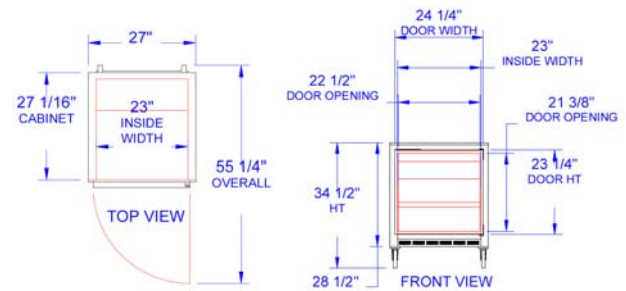
**BEVERAGE-AIR**

Standard Undercounter Refrigerator Cabinet

Models: UCR27A / UCR48A / UCR60A / UCR72A

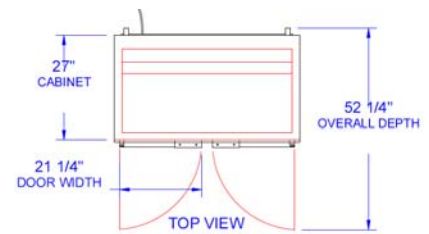
MODEL	UCR27A	UCR48A	UCR60A	UCR72A
EXTERNAL DIMENSIONAL DATA				
Length Overall (inches)	27"	48"	60"	72"
Length Overall (mm)	686	1219	1524	1829
Depth Overall (inches) - Less handle	29 1/4"	29 1/4"	29 1/4"	29 1/4"
Depth Overall (mm) - Less handle	743	743	743	743
Height Overall—on 6" casters (inches)	34 1/2"	34 1/2"	34 1/2"	34 1/2"
Height Overall—on 6" casters (mm)	876	876	876	876
Depth with Door Open 90 °	51 5/8"	50 5/8"	55 1/4"	52
Clear Door Opening (inches)	22 1/2" x 21 1/2"	19 1/2" x 21 1/2"	22 1/2" x 21 1/2"	19 1/2" x 21 1/2"
Number of doors	1	2	2	3
INTERNAL DIMENSIONAL DATA				
NET Capacity (cubic ft.)	7.3	13.9	17.1	21.5
NET Capacity (Liters)	207	394	484	609
Internal Length Overall (inches)	23"	44"	56"	68"
Internal Length Overall (mm)	584	1118	1422	1727
Internal Depth Overall (inches)	18"	17"	19 3/4"	19 3/4"
Internal Depth Overall (mm)	457	432	502	502
Internal Height Overall (inches)	23"	23"	23"	22 3/4"
Internal Height Overall (mm)	584	584	584	578
Number of shelves	2	4	4	6
ELECTRICAL DATA				
Full Load Amperes 115/60/1	4.0	3.3	8.2	8.2
ENERGY CONSUMPTION (KWH)	2.23	2.62	3.5	4.1
REFRIGERATION DATA				
Horsepower	1/6	1/5	1/4	1/4
WEIGHT DATA				
Gross Weight (Crated lbs)	158	225	266	305
Gross Weight (Crated kg)	72	102	121	138

PLAN VIEWS

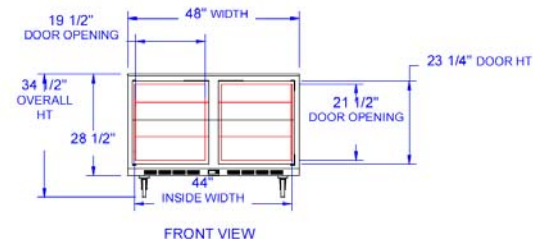


UCR27 TOP

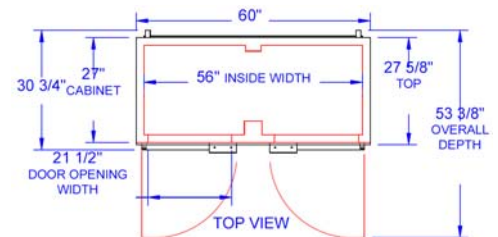
UCR27 FRONT



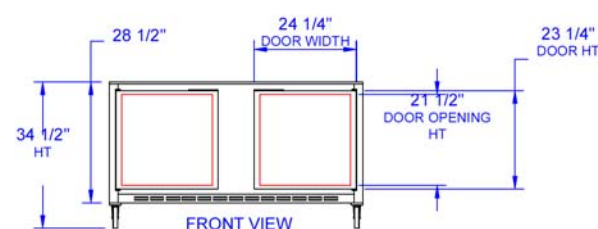
UCR48 TOP



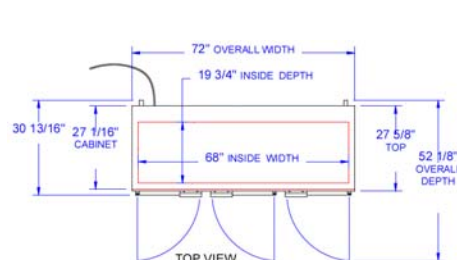
UCR48 FRONT



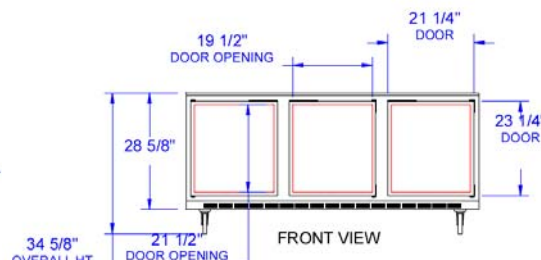
UCR60 TOP



UCR60 FRONT



UCR72 TOP



UCR72 FRONT



BEVERAGE-AIR® CORPORATION

3779 Champion Blvd. • Winston-Salem, NC 27105 USA • (336) 245-6400 • Fax (336) 245-6453 • (888) 845-9800 • www.beverage-air.com

Specifications are subject to change without prior notice. 04/14

SECTION 12 3600 COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid surfacing window sills.
- B. Adhesives and sealants.

1.02 REFERENCE STANDARDS

- A. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- E. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; International Surface Fabricators Association; 2013.
- F. ISFA 3-01 - Classification and Standards for Solid Surfacing Material; International Surface Fabricators Association; 2013.
- G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- H. PS 1 - Structural Plywood; 2009.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- G. Installation Instructions: Manufacturer's installation instructions and recommendations.
- H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.04 QUALITY ASSURANCE

- A. Fabricator Qualifications: Minimum of three years documented experience in fabricating solid surfacing countertops similar in scope and complexity to this Project. Currently certified by the manufacturer as an acceptable fabricator.
- B. Installer Qualifications: Fabricator. Installer Qualifications: Minimum of three years documented installation experience for projects similar in scope and complexity to this

Project, and currently certified by the manufacturer as an acceptable installer.
[Installer shall be the fabricator].

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOP ASSEMBLIES

- A. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: 1/2 inch (12 mm), minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - b. NSF approved for food contact.
 - c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - d. Color and Pattern: As selected by Architect from manufacturer's full line.
 - e. Manufacturers:
 - 1) Dupont; Corian: www.corian.com.
 - 2) Formica Corporation; ____: www.formica.com.
 - 3) Wilsonart, LLC; ____: www.wilsonart.com.
 - 4) Substitutions: See Section 01 6000 - Product Requirements.
 - 3. Other Components Thickness: 1/2 inch (12 mm), minimum.
 - 4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch (32 mm) thick; square edge.

2.02 ACCESSORY MATERIALS

- A. Wood-Based Components:
 - 1. Wood fabricated from old growth timber is not permitted.
- B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.
- C. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- D. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using best method recommended by manufacturer.

2. Fabricate to overhang fronts and ends of cabinets 1 inch (25 mm) except where top butts against cabinet or wall.
 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Solid Surfacing: Fabricate tops up to 144 inches (3657 mm) long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.
- B. Offset From Wall, Countertops: 1/8 inch (3 mm) maximum; 1/16 inch (1.5 mm) minimum.

3.04 CLEANING

- A. Clean countertops surfaces thoroughly.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 21 0500
COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler, standpipe and fire hose, and combination sprinkler and standpipe systems.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Preparation and painting of interior fire protection piping systems.
- B. Section 21 0553 - Identification for Fire Suppression Piping and Equipment: Piping identification.
- C. Section 21 1300 - FIRE SUPPRESSION SPRINKLERS: Sprinkler systems design.

1.03 REFERENCE STANDARDS

- A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; The American Society of Mechanical Engineers; 2015.
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; The American Society of Mechanical Engineers; 2011.
- C. ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings; The American Society of Mechanical Engineers; 2012.
- D. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).
- E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- F. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2009).
- G. AWWA C606 - Grooved and Shouldered Joints; American Water Works Association; 2011 (ANSI/AWWA C606).
- H. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2016.
- I. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems; National Fire Protection Association; 2013.
- J. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.
- C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
- D. Project Record Documents: Record actual locations of components and tag numbering.
- E. Operation and Maintenance Data: Include installation instructions and spare parts lists.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified this section.
 1. Minimum three years experience.
 2. Approved by manufacturer.
- C. Conform to UL, FM, and Warnock Hersey requirements.
- D. Valves: Bear UL, FM, and Warnock Hersey label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- E. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 PRODUCTS

2.01 FIRE PROTECTION SYSTEMS

- A. Sprinkler Systems: Conform to NFPA 13.
- B. Standpipe and Hose Systems: Conform to NFPA 14.
- C. Welding Materials and Procedures: Conform to ASME BPVC-IX.

2.02 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A53 Schedule 40, black.
 1. Steel Fittings: ASME B16.9, wrought steel, butt welded.
 2. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
 3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

2.03 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- D. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
- E. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
- F. Vertical Support: Steel riser clamp.

2.04 MECHANICAL COUPLINGS

- A. Rigid Mechanical Couplings for Grooved Joints:
 1. Dimensions and Testing: Comply with AWWA C606.
 2. Minimum Working Pressure: 300 psig.
 3. Housing Material: Fabricate of ductile iron conforming to ASTM A536.
 4. Housing Coating: Factory applied orange enamel.

5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
6. Bolts and Nuts: Hot dipped galvanized or zinc electroplated steel
7. Product:
 - a. Victaulic Company; FireLock Style 009H: www.victaulic.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.05 BUTTERFLY VALVES

- A. Bronze Body:
 1. Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, handwheel and gear drive and integral indicating device, and built-in tamper proof switch rated 10 amp at 115 volt AC.

2.06 DRAIN VALVES

- A. Ball Valve:
 1. Brass with cap and chain, 3/4 inch hose thread.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Install standpipe piping, hangers, and supports in accordance with NFPA 14.
- C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- D. Install piping to conserve building space, to not interfere with use of space and other work.
- E. Group piping whenever practical at common elevations.
- F. Sleeve pipes passing through partitions, walls, and floors.
- G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- H. Inserts:
 1. Provide inserts for placement in concrete formwork.
 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- I. Pipe Hangers and Supports:
 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 2. Place hangers within 12 inches of each horizontal elbow.
 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- J. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
 - K. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
 - L. Do not penetrate building structural members unless indicated.
 - M. Provide sleeves when penetrating footings, floors, walls, and partitions and seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 - N. Escutcheons:
 1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
 2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
 3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
 - O. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
 - P. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.
 - Q. Provide drain valves at main shut-off valves, low points of piping and apparatus.

END OF SECTION

SECTION 21 0553

IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tags.
- B. Pipe markers.
- C. Ceiling tacks.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007 (ANSI/ASME A13.1).
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Piping: Tags.
- B. Valves: Nameplates and ceiling tacks where above lay-in ceilings.

2.02 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.

2.03 TAGS

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

- A. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

2.05 CEILING TACKS

- A. Description: Steel with 3/4 inch diameter color coded head.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install tags with corrosion resistant chain.

- B. Install plastic pipe markers in accordance with manufacturer's instructions.
- C. Use tags on piping 3/4 inch diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.

END OF SECTION

SECTION 21 1300
FIRE SUPPRESSION SPRINKLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wet-pipe sprinkler system.
- B. System design, installation, and certification.

1.02 RELATED REQUIREMENTS

- A. Section 28 3100 - Fire Detection and Alarm.
- B. Section 21 0500 - Common Work Results for Fire Suppression: Pipe, fittings, and valves.
- C. Section 21 0553 - Identification for Fire Suppression Piping and Equipment.
- D. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- B. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2016.
- C. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Shop Drawings:
 - 1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
 - 2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
 - 3. Submit shop drawings to Authority Having Jurisdiction for approval. Submit proof of approval to Architect.
- D. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Sprinklers: Type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
 - 3. Sprinkler Wrenches: For each sprinkler type.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of referenced design and installation standard on site.
- B. Conform to UL requirements.

- C. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- D. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- E. Installer Qualifications: Company specializing in performing the work of this section documented experience approved by manufacturer.
- F. Equipment and Components: Provide products that bear UL label or marking.
- G. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 SPRINKLER SYSTEM

- A. Sprinkler System: Provide coverage for building areas noted.
- B. Occupancy: Light hazard & Ordinary hazard, Group 1; comply with NFPA 13.
- C. Water Supply: Determine volume and pressure from water flow test data.
- D. Storage Cabinet for Spare Sprinklers and Tools: Steel, in existing sprinkler room.

2.02 SPRINKLERS

- A. Suspended Ceiling Type: Concealed pendant type with matching push on escutcheon plate.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.
 - 3. Cover Plate Finish: Enamel, color selection by architect.
 - 4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- B. Exposed Area Type: Upright type.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.
 - 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with referenced NFPA design and installation standard.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Place pipe runs to minimize obstruction to other work.
- D. Place piping in concealed spaces above finished ceilings.
- E. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- F. Flush entire piping system of foreign matter.
- G. Hydrostatically test entire system.
- H. Require test be witnessed by Fire Marshal.

END OF SECTION

SECTION 22 0553
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tags.
- B. Stencils.
- C. Pipe markers.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007 (ANSI/ASME A13.1).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 TAGS

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.02 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
 - 1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
 - 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
 - 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
 - 4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.

2.03 PIPE MARKERS

- A. Comply with ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install tags with corrosion resistant chain.
- B. Install plastic pipe markers in accordance with manufacturer's instructions.
- C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- D. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- E. Use tags on piping 3/4 inch diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 22 0719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 22 1005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus; 2013.
- B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- D. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- G. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 650 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- B. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- D. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- F. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- G. Inserts and Shields:

1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert Location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.

3.03 SCHEDULES

- A. Plumbing Systems:
1. Domestic Cold Water Supply:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 1/2 - 2 inch.
 - 2) Thickness: 1 inch.
 - b. Cellular Foam Insulation:
 - 1) Pipe Size Range: 1/2 - 2 inch.
 - 2) Thickness: 1 inch.
 2. Roof Drain Bodies:
 - a. Cellular Foam Insulation:
 - 1) Pipe Size Range: All sizes.
 - 2) Thickness: 1 inch.
 3. Roof Drainage Above Grade:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: All sizes.
 - 2) Thickness: 1 inch.
 - b. Cellular Foam Insulation:
 - 1) Pipe Size Range: All sizes.
 - 2) Thickness: 1 inch.

END OF SECTION

SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Storm water.
 - 4. Gas.
 - 5. Flanges, unions, and couplings.
 - 6. Pipe hangers and supports.
 - 7. Valves.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 08 3100 - Access Doors and Panels.
- C. Section 22 0553 - Identification for Plumbing Piping and Equipment.
- D. Section 22 0719 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

- A. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV; The American Society of Mechanical Engineers; 2012.
- B. ASME B31.1 - Power Piping; The American Society of Mechanical Engineers; 2014 (ANSI/ASME B31.1).
- C. ASME B31.2 - Fuel Gas Piping; The American Society of Mechanical Engineers; 1968.
- D. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2014 (ANSI/ASME B31.9).
- E. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; The American Society of Mechanical Engineers; 2015.
- F. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2015.
- G. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
- H. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- I. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- J. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2013.
- K. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.
- L. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014.
- M. AWWA C651 - Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651).
- N. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; Cast Iron Soil Pipe Institute; 2009.
- O. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; Cast Iron Soil Pipe Institute; 2011

- P. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.
- Q. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2010.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: ASTM A74 extra heavy weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
- B. Cast Iron Pipe: CISPI 301, hubless.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.

2.02 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. Copper Tube: ASTM B306, DWV.
 - 1. Fittings: ASME B16.29, wrought copper, or ASME B16.23, sovent.
 - 2. Joints: ASTM B32, alloy Sn50 solder.

2.03 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
- B. CPVC Pipe: ASTM D2846/D2846M, ASTM F441/F441M, or ASTM F442/F442M.
 - 1. Fittings: CPVC; ASTM D2846/D2846M, ASTM F437, ASTM F438, or ASTM F439.
 - 2. Joints: ASTM D2846/D2846M, solvent weld with ASTM F493 solvent cement.
 - 3. Design basis for pipe and fittings: FlowGuard Gold.

2.04 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.05 STORM WATER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.06 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
 - 2. Joints: Threaded or welded to ASME B31.1.

2.07 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping - Drain, Waste, and Vent:
 - 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
- C. Plumbing Piping - Water:
 - 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

2.08 BALL VALVES

- A. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze body, 304 stainless steel ball, full port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder or threaded ends.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not exposed.
 - 1. Coordinate size and location of access doors with Section 08 3100.
- H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- I. Install bell and spigot pipe with bell end upstream.
- J. Install valves with stems upright or horizontal, not inverted.
- K. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- L. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- M. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

7. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
8. Support cast iron drainage piping at every joint.

3.04 APPLICATION

- A. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- B. Provide plug valves in natural gas systems for shut-off service.

3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.07 SCHEDULES

- A. Pipe Hanger Spacing: Refer to schedule on drawing P000.
 1. Metal Piping:
 - a. Pipe size: 1/2 inches to 1-1/4 inches:
 - 1) Maximum hanger spacing: 6.5 ft.
 - 2) Hanger rod diameter: 3/8 inches.
 - b. Pipe size: 1-1/2 inches to 2 inches:
 - 1) Maximum hanger spacing: 10 ft.
 - 2) Hanger rod diameter: 3/8 inch.
 - c. Pipe size: 2-1/2 inches to 3 inches:
 - 1) Maximum hanger spacing: 10 ft.
 - 2) Hanger rod diameter: 1/2 inch.
 - d. Pipe size: 4 inches to 6 inches:
 - 1) Maximum hanger spacing: 10 ft.
 - 2) Hanger rod diameter: 5/8 inch.
 - e. Pipe size: 8 inches to 12 inches:
 - 1) Maximum hanger spacing: 14 ft.
 - 2) Hanger rod diameter: 7/8 inch.
 2. Plastic Piping:
 - a. All Sizes:

- 1) Maximum hanger spacing: 6 ft.
- 2) Hanger rod diameter: 3/8 inch.

END OF SECTION

SECTION 22 1006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Roof and floor drains.
- C. Cleanouts.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Product requirements for Owner furnished kitchen equipment.
- B. Section 01 6000 - Product Requirements: Procedures for Owner-supplied products.
- C. Section 22 1005 - Plumbing Piping.

1.03 REFERENCE STANDARDS

- A. ASME A112.6.4 - Roof, Deck, and Balcony Drains; The American Society of Mechanical Engineers; 2003.
- B. ASSE 1011 - Hose Connection Vacuum Breakers; American Society of Sanitary Engineering; 2004 (ANSI/ASSE 1011).
- C. PDI-WH 201 - Water Hammer Arresters; Plumbing and Drainage Institute; 2010.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors.
- D. Operation Data: Indicate frequency of treatment required for interceptors.
- E. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

- A. Roof Drains:
 - 1. Assembly: ASME A112.6.4.
 - 2. Body: Lacquered cast iron with sump.
 - 3. Strainer: Removable polyethylene dome with vandal proof screws.
 - 4. Accessories: Coordinate with roofing type, refer to Section ____:
 - a. Membrane flange and membrane clamp with integral gravel stop.

- b. Adjustable under deck clamp.
 - c. Roof sump receiver.
 - d. Waterproofing flange.
 - e. Controlled flow weir.
- 5. Design based on Watts, Model RD-100 (size per plans), or approved equal.
- B. Floor Drain (FD-1):
 - 1. ASME A112.6.3; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer, vandal-proof screws. Design based on Watts Drainage, Model FD-100-T-A5-6. Size shown on plans.
- C. Floor Sink (FS-1):
 - 1. 8" square, 6" deep floor sink with white, porcelain enamel coated interior, loose set nickel-bronze grate, aluminum dome strainer, sediment bucket, 3/4 grate, and no-hub outlet. Design based on Watts Drainage, Model FS-710-1-5-175.

2.03 CLEANOUTS

- A. Cleanouts at Interior Finished Floor Areas (FCO-1):
 - 1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas. Design based on Watts Drainage, Model CO-200-R.
- B. Cleanouts at Interior Finished Wall Areas (WCO-1):
 - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
- C. Cleanouts at Interior Unfinished Accessible Areas (CO-1): Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.04 HOSE BIBBS

- A. Interior Hose Bibbs:
 - 1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with lockshield and removable key, integral vacuum breaker in conformance with ASSE 1011.

2.05 WATER HAMMER ARRESTORS

- A. Water Hammer Arrestors:
 - 1. Copper construction, piston type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 250 psi working pressure.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Install floor cleanouts at elevation to accommodate finished floor.
- D. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping in locations as indicated on riser diagrams..

END OF SECTION

SECTION 22 4000
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water closets.
- B. Urinals.
- C. Lavatories.
- D. Electric water coolers.
- E. Drinking fountains.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing joints between fixtures and walls and floors.
- B. Section 22 1005 - Plumbing Piping.
- C. Section 22 1006 - Plumbing Piping Specialties.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008.
- C. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use; The American Society of Mechanical Engineers; 1997 (Reaffirmed 2002).
- D. ASME A112.18.1 - Plumbing Supply Fittings; The American Society of Mechanical Engineers; 2012.
- E. ASME A112.19.2 - Ceramic Plumbing Fixtures; The American Society of Mechanical Engineers; 2013.
- F. ASME A112.19.5 - Flush Valves and Spuds for Water-Closet Bowls, Urinals, and Tanks; The American Society of Mechanical Engineers; 2011.
- G. NSF 61 - Drinking Water System Components - Health Effects; 2014.
- H. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Manufacturer's Instructions: Indicate installation methods and procedures.
- D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 FLUSH VALVE WATER CLOSETS

- A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
 - 1. ADA Bowl (WC-1): ASME A112.19.2; 16.5 inches high with elongated rim.
 - 2. Non-ADA Bowl (WC-2): ASME A112.19.2; 15 inches high with elongated rim.
 - 3. Flush Valve: Exposed (top spud).
 - 4. Flush Operation: Sensor operated.
 - 5. Handle Height: 44 inches or less.
 - 6. Supply Size: 1 inches.
 - 7. Outlet Size: 3 inches.
 - 8. Color: White.
- B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
 - 1. Sensor-Operated Type: Solenoid operator, low voltage hard-wired, infrared sensor and over-ride push button.
 - 2. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
- C. Seats:
 - 1. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, without cover.

2.03 WALL HUNG URINALS

- A. Urinals: Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
 - 1. Flush Volume: 1.0 gallons, maximum.
 - 2. Flush Style: Washout.
 - 3. Flush Valve: Exposed (top spud).
 - 4. Flush Operation: Sensor operated.
 - 5. Trap: Integral.
 - 6. Removable stainless steel strainer.
 - 7. Supply Size: 3/4 inch.
 - 8. Outlet Size: 2 inches.
- B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.

1. Sensor-Operated Type: Solenoid operator, low voltage hard-wired, infrared sensor and over-ride push button.
 2. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
- C. Carriers:
1. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.04 LAVATORIES

- A. Vitreous China Under-Mount Basin: ASME A112.19.2; vitreous china under-mount lavatory, front overflow, mounting kit and template by manufacturer.
- B. Sensor Operated Faucet: Cast brass, chrome plated, deck mounted with sensor located on neck of spout.
1. Spout Style: Standard.
 2. Power Supply: 24 VAC.
 - a. For 24V applications, provide transformer.
 3. Mixing Valve: None, single line for tempered water.
 4. Water Supply: 3/8 inch compression connections.
 5. Aerator: Vandal resistant, 0.5 GPM, laminar flow device.
 6. Automatic Shut-off: 30 seconds.
 7. Sensor range: Factory set at a minimum of 3 inch adjustable up to 24 inch.
 8. Sensor range: Automatically adjusts.
 9. Finish: Polished chrome.
 10. Accessory: 4 inch deck plate.
- C. Accessories:
1. Chrome plated 17 gage, 0.0538 inch brass P-trap _____ and arm with escutcheon.
 2. Screwdriver stops.
 3. Flexible supplies.

2.05 ELECTRIC WATER COOLERS

- A. Water Cooler and Bottle Filling Station: Electric, mechanically refrigerated; surfacehandicapped mounted; stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser and stainless steel grille.
1. Capacity: 8 gallons per minute of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.
 2. Electrical: 115 V, 60 Hertz compressor, 6 foot cord and plug for connection to electric wiring system including grounding connector.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.
- E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

- A. Clean plumbing fixtures and equipment.
- B. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.07 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

3.08 SCHEDULES

- A. Fixture Heights: Install fixtures to heights above finished floor as indicated.
 - 1. Water Closet:
 - a. Standard: 15 inches to top of bowl rim.
 - b. Accessible: 18 inches to top of seat.
 - 2. Urinal:
 - a. Standard: 22 inches to top of bowl rim.
 - b. Accessible: 17 inches to top of bowl rim.
 - 3. Lavatory:
 - a. Accessible: 34 inches to top of basin rim.
 - 4. Drinking Fountain:
 - a. Accessible: 36 inches to top of spout.

END OF SECTION

SECTION 23 0513
COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single phase electric motors.
- B. Three phase electric motors.

1.02 RELATED REQUIREMENTS

- A. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; American Bearing Manufacturers Association, Inc.; 2015.
- B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; Institute of Electrical and Electronic Engineers; 2004.
- C. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2014.
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 QUALITY ASSURANCE

- A. Conform to NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 PRODUCTS

2.01 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service:
 - 1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
 - 2. Motors Larger than 1/2 Horsepower: 460 volts, three phase, 60 Hz.
- B. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Design for continuous operation in 40 degrees C environment.
 - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- D. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.02 APPLICATIONS

- A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not conform to these specifications.
- B. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- C. Motors located in exterior locations: Totally enclosed type.
- D. Motors located in outdoors: Totally enclosed weatherproof epoxy-treated type.

2.03 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.04 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between 1 and 1-1/2 times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 26 2913.
- I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- J. Sound Power Levels: To NEMA MG 1.
- K. Part Winding Start Where Indicated: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.
- L. Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.
- M. Nominal Efficiency: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.
- N. Nominal Power Factor: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION

SECTION 23 0548

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Equipment support bases.
- B. Vibration isolators.
- C. Roof curbs.

1.02 REFERENCE STANDARDS

- A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2011.
- B. SMACNA (SRM) - Seismic Duct Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association; 2008.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.

1.04 QUALITY ASSURANCE

- A. Perform design and installation in accordance with applicable codes.
- B. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and registered and licensed in the State in which the Project is located.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General:
 - 1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
 - 2. Steel springs to function without undue stress or overloading.
 - 3. Steel springs to operate in the linear portion of the load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
 - 4. Lateral to vertical stiffness ratio to not exceed 0.08 with spring deflection at minimum 75 percent of specified deflection.
 - 5. All equipment mounted on vibration isolated bases to have minimum operating clearance of 2 inches between the base and floor or support beneath unless noted otherwise.

2.02 EQUIPMENT SUPPORT BASES

2.03 VIBRATION ISOLATORS

- A. Non-Seismic Type:
 - 1. All Elastomeric-Fiber Glass Pads:
 - a. Configuration: Flat or molded.
 - b. Thickness: 0.25 inch minimum.
 - c. Assembly: Single or multiple layers using bonded, galvanized sheet metal separation plate between each layer with load plate providing evenly distributed load over pad surface.

2. Elastomeric Mounts:
 - a. Material: Oil, ozone, and oxidant resistant compounds.
 - b. Assembly: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.
3. Steel Springs:
 - a. Assembly: Freestanding, laterally stable without housing.
 - b. Leveling Device: Rigidly connected to equipment or frame.
4. Restrained Steel Springs:
 - a. Housing: Rigid blocking during rigging prevents equipment installed and operating height from changing during temporary weight reduction.
 - b. Equipment Wind Loading: Adequate means for fastening isolator top to equipment and isolator base plate to supporting structure.
5. Elastomeric Hangers:
 - a. Housing: Steel construction containing elastomeric isolation element to prevent rod contact with housing and short-circuiting of isolating function.
 - b. Incorporate steel load distribution plate sandwiching elastomeric element to housing.
6. Spring Hanger:
 - a. Housing: Steel construction containing stable steel spring and integral elastomeric element preventing metal to metal contact.
 - b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.
7. Combination Elastomeric-Spring Hanger:
 - a. Housing: Steel construction containing stable steel spring with elastomeric element in series isolating upper connection of hanger box to building structure.
 - b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.
8. Thrust Restraints:
 - a. Housing: Steel construction containing stable steel spring and integral elastomeric element installed in pairs to resist air pressure thrusts.
 - b. Bottom Openings: Sized to allow plus/minus 15 degrees rod misalignment.

2.04 ROOF CURBS

- A. Vibration Isolation Curbs:
 1. Non-Seismic Curb Rail:
 - a. Location: Between existing roof curb and rooftop equipment.
 - b. Construction: Aluminum.
 - c. Integral vibration isolation to conform to requirements of this section.
 - d. Weather exposed components consist of corrosion resistant materials.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.
- C. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.
- D. Provide pairs of horizontal limit springs on fans with more than 6.0 inches WC static pressure, and on hanger supported, horizontally mounted axial fans.

- E. Support piping connections to equipment mounted on isolators using isolators or resilient hangers for scheduled distance.
 - 1. Up to 4 Inches Pipe Size: First three points of support.

3.02 FIELD QUALITY CONTROL

- A. Inspect isolated equipment after installation and submit report. Include static deflections.

END OF SECTION

SECTION 23 0553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.04 SUBMITTALS

- A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Air Terminal Units: Tags.
- B. Automatic Controls: Tags. Key to control schematic.
- C. Control Panels: Nameplates.
- D. Dampers: Ceiling tacks, where located above lay-in ceiling.
- E. Ductwork: Nameplates.
- F. Instrumentation: Tags.
- G. Major Control Components: Nameplates.
- H. Thermostats: Nameplates.

2.02 NAMEPLATES

- A. Letter Color: White.
- B. Letter Height: 1/4 inch.
- C. Background Color: Black.
- D. Plastic: Conform to ASTM D709.

2.03 TAGS

2.04 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
 - 1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
 - 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
 - 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.

2.05 CEILING TACKS

- A. Description: Steel with 3/4 inch diameter color coded head.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 9123 for stencil painting.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Apply stencil painting in accordance with Section 09 9123.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- G. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of hydronic systems.

1.02 REFERENCE STANDARDS

- A. AABC MN-1 - AABC National Standards for Total System Balance; Associated Air Balance Council; 2002.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2008.
- C. NEBB (TAB) - Procedural Standard for Testing Adjusting and Balancing of Environmental Systems; National Environmental Balancing Bureau; 2005, Seventh Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting, and Balancing; Sheet Metal and Air Conditioning Contractors' National Association; 2002.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - d. Final test report forms to be used.
 - e. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 5. Units of Measure: Report data in I-P (inch-pound) units only.
 - 6. Include the following on the title page of each report:

- a. Name of Testing, Adjusting, and Balancing Agency.
- b. Address of Testing, Adjusting, and Balancing Agency.
- c. Telephone number of Testing, Adjusting, and Balancing Agency.
- d. Project name.
- e. Project location.
- f. Project Architect.
- g. Project Engineer.
- h. Project Contractor.
- i. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 1. AABC MN-1, AABC National Standards for Total System Balance.
 2. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
 3. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. TAB Agency Qualifications:
 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 2. Having minimum of three years documented experience.
 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabchq.com; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org.
 - c. TABBB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org.
- D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 1. Systems are started and operating in a safe and normal condition.
 2. Temperature control systems are installed complete and operable.
 3. Proper thermal overload protection is in place for electrical equipment.
 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 5. Duct systems are clean of debris.
 6. Fans are rotating correctly.
 7. Fire and volume dampers are in place and open.
 8. Air coil fins are cleaned and combed.
 9. Access doors are closed and duct end caps are in place.
 10. Air outlets are installed and connected.
 11. Duct system leakage is minimized.
 12. Hydronic systems are flushed, filled, and vented.
 13. Service and balance valves are open.

- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.

3.03 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.04 RECORDING AND ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

3.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- E. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- F. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- G. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- H. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

3.06 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

- C. Effect system balance with automatic control valves fully open to heat transfer elements.
- D. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

3.07 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Terminal Heat Transfer Units
 - 2. Fans
 - 3. Air Inlets and Outlets

3.08 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer
 - 2. Model/Frame
 - 3. HP/BHP
 - 4. Phase, voltage, amperage; nameplate, actual, no load
 - 5. RPM
 - 6. Service factor
- B. V-Belt Drives:
 - 1. Identification/location
 - 2. Required driven RPM
 - 3. Driven sheave, diameter and RPM
 - 4. Belt, size and quantity
 - 5. Motor sheave diameter and RPM
- C. Exhaust Fans:
 - 1. Location
 - 2. Manufacturer
 - 3. Model number
 - 4. Air flow, specified and actual
 - 5. Total static pressure (total external), specified and actual
 - 6. Inlet pressure
 - 7. Discharge pressure
 - 8. Sheave Make/Size/Bore
 - 9. Number of Belts/Make/Size
 - 10. Fan RPM
- D. Duct Traverses:
 - 1. System zone/branch
 - 2. Duct size
 - 3. Area
 - 4. Design velocity
 - 5. Design air flow
 - 6. Test velocity
 - 7. Test air flow
 - 8. Duct static pressure
- E. Terminal Unit Data:
 - 1. Manufacturer
 - 2. Type, constant, variable, single, dual duct
 - 3. Identification/number

4. Location
5. Size
6. Minimum static pressure
7. Minimum design air flow
8. Maximum design air flow
9. Inlet static pressure

END OF SECTION

SECTION 23 0713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- C. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2014.
- D. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts; 2011.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- G. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.
- I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.05 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
 - 1. Knauf Insulation: www.knaufinsulation.com.

2. Johns Manville: www.jm.com.
 3. Owens Corning Corporation: www.ocbuildingspec.com.
 4. CertainTeed Corporation: www.certainteed.com.
- B. Vapor Barrier Jacket:
1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 3. Secure with pressure sensitive tape.
- C. Vapor Barrier Tape:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Insulated ducts conveying air below ambient temperature:
1. Provide insulation with vapor barrier jackets.
 2. Finish with tape and vapor barrier jacket.
 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- C. Insulated ducts conveying air above ambient temperature:
1. Provide with or without standard vapor barrier jacket.
 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- D. Fire-Rated Duct Insulation Application:
1. Adhere insulation with adhesive for 90 percent coverage.
 2. Install per manufacturer's installation instructions.
 3. Seal and smooth joints. Seal and coat transverse joints.
 4. Seal liner surface penetrations with adhesive.
 5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

- A. Supply Air Duct:
1. Flexible Glass Fiber Duct Insulation: 2 inches thick.
- B. Kitchen Hood Exhaust Ducts: Two-layer fire rated duct insulation

END OF SECTION

SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 23 2113 - Hydronic Piping: Placement of hangers and hanger inserts.
- C. Section 23 2300 - Refrigerant Piping: Placement of inserts.

1.03 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus; 2013.
- B. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
- C. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- D. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- E. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2015.
- F. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2013.
- G. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- J. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.

- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. Knauf Insulation: www.knaufinsulation.com.
 - 2. Johns Manville Corporation: www.jm.com.
 - 3. Owens Corning Corporation: www.ocbuildingspec.com.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E. Vapor Barrier Lap Adhesive: Compatible with insulation.
 - 1. Compatible with insulation.
- F. Insulating Cement: ASTM C449.
 - 1. ASTM C449/C449M.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
 - 1. Aeroflex USA, Inc: www.aeroflexusa.com.
 - 2. Armacell LLC: www.armacell.us.
 - 3. K-Flex USA LLC: www.kflexusa.com.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.04 JACKETS

- A. ABS Plastic:
 - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: Minus 40 degrees F.
 - b. Maximum Service Temperature: 180 degrees F.
 - c. Moisture Vapor Permeability: 0.012 perm inch, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 30 mil.
 - e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.

- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- D. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- F. Inserts and Shields:
 - 1. Application: Piping 1-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under the finish jacket.
 - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
- G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.

3.03 SCHEDULE

- A. Heating Systems:
 - 1. Heating Water Supply and Return: 1 1/2" thick, glass fiber.

END OF SECTION

SECTION 23 0913
INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Thermostats.

1.02 REFERENCE STANDARDS

- A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2014.
- B. NEMA DC 3 - Residential Controls - Electrical Wall-Mounted Room Thermostats; National Electrical Manufacturers Association; 2013.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilation Systems; National Fire Protection Association; 2015.

1.03 SUBMITTALS

- A. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

1.04 QUALITY ASSURANCE

- A. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this work and licensed at the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years experience approved by manufacturer.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 EQUIPMENT - GENERAL

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.02 THERMOSTATS

- A. Airstream Thermostats:
 - 1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint in middle of range and adjustable throttling range.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that systems are ready to receive work.
- C. Beginning of installation means installer accepts existing conditions.
- D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
- E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

- F. Ensure installation of components is complementary to installation of similar components.
- G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of thermostats with plans and room details before installation. Locate in return air grille. Refer to Section 26 2726.
- C. Provide conduit and electrical wiring in accordance with Section 26 2717. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

END OF SECTION

SECTION 23 2113 HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Heating water piping, above grade.
- C. Pipe hangers and supports.
- D. Unions, flanges, mechanical couplings, and dielectric connections.
- E. Valves:
 - 1. Ball valves.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 08 3100 - Access Doors and Panels.
- C. Section 22 0553 - Identification for Plumbing Piping and Equipment.
- D. Section 22 0719 - Plumbing Piping Insulation.
- E. Section 23 0719 - HVAC Piping Insulation.
- F. Section 23 2114 - Hydronic Specialties.
- G. Section 23 2500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- C. ASME B31.9 - Building Services Piping; 2014 (ANSI/ASME B31.9).
- D. ASTM B32 - Standard Specification for Solder Metal; 2008.
- E. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- F. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
- G. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2011 and errata.
- H. MSS SP-58 - Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Include data on pipe materials, pipe fittings, valves, and accessories.
 - 2. Provide manufacturers catalogue information.
 - 3. Indicate valve data and ratings.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with minimum three years of experience.

- C. Provide all grooved joint couplings, fittings, valves, specialties, and grooving tools from a single manufacturer.
- D. Date stamp all castings used for coupling housings, fittings, valve bodies, etc. for quality assurance and traceability.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:
 - 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
 - 2. Use non-conducting dielectric connections whenever joining dissimilar metals.
 - 3. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
- C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
- D. Valves: Provide valves where indicated:
 - 1. Provide drain valves where indicated, and if not indicated provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
 - 2. For shut-off and to isolate parts of systems or vertical risers, use ball valves.

2.02 HEATING WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:
 - 1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
 - a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
 - b. Braze: AWS A5.8/A5.8M BCuP copper/silver alloy.
 - 2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

2.03 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
 - 3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 4. Vertical Support: Steel riser clamp.

5. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
7. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe 2 Inches and Under:
 1. Ferrous Piping: 150 psig malleable iron, threaded.
 2. Copper Pipe: Bronze, soldered joints.
- B. Dielectric Connections:
 1. Waterways:
 - a. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
 - b. Dry insulation barrier able to withstand 600 volt breakdown test.
 - c. Construct of galvanized steel with threaded end connections to match connecting piping.
 - d. Suitable for the required operating pressures and temperatures.

2.05 BALL VALVES

- A. Manufacturers:
 1. Conbraco Industries: www.apollovalves.com.
 2. Grinnell Products, a Tyco Business: www.grinnell.com.
 3. Milwaukee Valve Company: www.milwaukeevalve.com.
 4. Nibco, Inc: www.nibco.com.
- B. Up To and Including 2 Inches:
 1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment using jointing system specified.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems. Refer to Section 23 2500 for additional requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and to avoid interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Slope piping and arrange to drain at low points.
- F. Pipe Hangers and Supports:
 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

2. Place hangers within 12 inches of each horizontal elbow.
 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 0719.
- H. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 0719.
- I. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 3100.
- J. Use eccentric reducers to maintain top of pipe level.
- K. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
1. 1/2 inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 2. 1 inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 3. 1-1/2 inch and 2 inch: Maximum span, 8 feet; minimum rod size, 3/8 inch.

END OF SECTION

SECTION 23 2114
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air vents.
- B. Automatic flow control valves.

1.02 RELATED REQUIREMENTS

- A. Section 23 2113 - Hydronic Piping.
- B. Section 23 2500 - HVAC Water Treatment: Pipe Cleaning .

1.03 REFERENCE STANDARDS

- A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model and dimensions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 AIR VENTS

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Taco, Inc: www.taco-hvac.com.
- B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

2.02 AUTOMATIC FLOW CONTROL VALVE

- A. Manufacturers:
 - 1. Griswold Controls: www.griswoldcontrols.com
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Flow Design: www.flowdesign.com.
- B. Construction: Brass or bronze body with union on inlet, temperature and pressure test plug on inlet and outlet.

- C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.
- D. Control Mechanism: Stainless steel or nickel plated brass piston or regulator cup, operating against stainless steel helical or wave formed spring.
 - 1. Accessories: ball valve on outlet.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.
- B. Provide manual air vents at system high points and as indicated.
- C. Provide valved drain and hose connection on strainer blow down connection.

END OF SECTION

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ductwork.
- B. Kitchen hood ductwork.

1.02 RELATED REQUIREMENTS

- A. Section 11 4000 - Foodservice Equipment: Supply of kitchen range hoods for placement by this Section.
- B. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.
- C. Section 23 0713 - Duct Insulation: External insulation and duct liner.
- D. Section 23 3300 - Air Duct Accessories.
- E. Section 23 3700 - Air Outlets and Inlets.
- F. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low-Alloy With Improved Formability, and Ultra-High Strength; 2014.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- F. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.
- G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2015.
- H. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; National Fire Protection Association; 2014.
- I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.
- J. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication & Installation Guidelines; Sheet Metal and Air Conditioning Contractors' National Association; 2001.
- K. UL 1978 - Grease Ducts; Current Edition, Including All Revisions.
- L. UL 2221 - Tests of Fire Resistive Grease Duct Enclosure Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Provide data for duct materials.

- B. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for kitchen hood exhaust systems.
- C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

1.06 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. Low Pressure Supply (Heating Systems): 1/2 inch w.g. pressure class, galvanized steel.
- D. Low Pressure Supply (System with Cooling Coils): 1/2 inch w.g. pressure class, galvanized steel.
- E. Kitchen Cooking Hood Exhaust: 1/2 inch w.g. pressure class, galvanized steel.
 - 1. Construct of 16 gage, 0.0598 inch sheet steel using continuous external welded joints in rectangular sections.
 - 2. Construct of 18 gage, 0.0500 inch stainless steel using continuous external welded joints in rectangular sections.
- F. Grease Exhaust: 1/2 inch w.g. pressure class, stainless steel.
 - 1. Construct of ASTM A1011/A1011M 16 gage carbon steel.
 - 2. Construct of 18 gage, 0.0500 inch stainless steel.
 - 3. Construction:
 - a. Liquid tight with continuous external weld for all seams and joints.
 - b. Where ducts are not self draining back to equipment, provide low point drain pocket with copper drain pipe to sanitary sewer.
 - 4. Fire Barrier Greas Duct Access Doors:
 - a. Provide for duct cleaning inside horizontal duct at drain pockets, every 12 foot intervals and at each change of direction.
 - b. Use same material and thickness as duct with gaskets and sealants rated 1500 degrees F for grease tight construction.
 - c. UL 1978 listed for greas leakage and meets NFPA 96 requirements.
 - d. Inretek/OPL Listed System when combined with fre barrier duct wrap.
 - e. Provide extension kit for installation with duct wrap.
 - f. Basis of Design: 3M.

2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Un-Galvanized Steel for Ducts: ASTM A1008/A1008M, Designation CS (commercial steel), cold-rolled.

- C. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
- D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- E. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Other Types: As required.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- E. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.04 MANUFACTURED DUCTWORK AND FITTINGS

- A. Flexible Ducts: Black polymer film supported by helically wound spring steel wire.
 - 1. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
 - 2. Maximum Velocity: 4000 fpm.
 - 3. Temperature Range: Minus 20 degrees F to 175 degrees F.
- B. Kitchen Cooking Hood and Grease Exhaust: Nominal 3 inches thick ceramic fiber insulation between 20 gage, 0.0375 inch, Type 304 stainless steel liner and 24 gage, 0.0239 inch aluminized steel sheet outer jacket.
 - 1. Tested and UL listed for use with commercial cooking equipment in accordance with NFPA 96.
 - 2. Certified for zero clearance to combustible material in accordance with:
 - a. UL 2221 with a 2 hour rating.
 - 3. Materials and construction of the modular sections and accessories to be in accordance with the terms of the following listings:
 - a. UL 1978.
 - b. UL 2221.
- C. Grease Exhaust: Nominal 3 inches thick ceramic fiber insulation between 20 gage, 0.0375 inch, Type 304 stainless steel liner and 24 gage, 0.0239 inch, aluminized steel sheet outer jacket.
 - 1. Manufacturers:
 - a. AMPCO: www.ampcostacks.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.05 KITCHEN HOOD EXHAUST DUCTWORK

- A. Fabricate in accordance with ductwork manufacturer's installation instructions, SMACNA (DCS), SMACNA (KVS), and NFPA 96.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Kitchen Hood Exhaust: Provide residue traps at base of vertical risers with provisions for clean out.
- E. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- G. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

3.02 DUCTWORK SCHEDULE

- A. Supply and Return Air Ductwork:
 - 1. Galvanized steel.
- B. Kitchen Hood/Grease Exhaust Ductwork:
 - 1. Exposed Below Ceiling: Stainless steel, uninsulated.
 - 2. Concealed Above Ceiling: Un-galvanized steel, insulated with fire wrap.

END OF SECTION

SECTION 23 3300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air turning devices.
- B. Duct test holes.
- C. Flexible duct connections.
- D. Volume control dampers.

1.02 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2015.
- B. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2014.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES

- A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.03 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
 - a. Net Fabric Width: Approximately 2 inches wide.
- C. Maximum Installed Length: 14 inch.

2.04 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Single Blade Dampers: Fabricate for duct sizes up to 68" x 20" inch.
 - 1. Blade: 24 gage, 0.0239 inch, minimum.
- C. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single dampers.
 - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

3. Where rod lengths exceed 30 inches provide regulator at both ends.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.
- B. Provide duct test holes where indicated and required for testing and balancing purposes.
- C. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- D. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.
- E. Provide air turing devices on all 90 degree mitered elbows in supply and return air ductwork.

END OF SECTION

SECTION 23 3423
POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Kitchen hood upblast centrifugal utility set.

1.02 RELATED REQUIREMENTS

- A. Section 23 0513 - Common Motor Requirements for HVAC Equipment.
- B. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AMCA (DIR) - [Directory of] Products Licensed Under AMCA International Certified Ratings Program; Air Movement and Control Association International, Inc.; <http://www.amca.org/certified/search/company.aspx>.
- B. AMCA 99 - Standards Handbook; Air Movement and Control Association International, Inc.; 2010.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans; Air Movement and Control Association International, Inc.; 2005.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; Air Movement and Control Association International, Inc.; 2007 (ANSI/AMCA 210, same as ANSI/ASHRAE 51).
- E. AMCA (DIR) - [Directory of] Products Licensed Under AMCA International Certified Ratings Program; Air Movement and Control Association International, Inc.; <http://www.amca.org/certified/search/company.aspx>.
- F. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; Air Movement and Control Association International, Inc.; 2014.
- G. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; Air Movement and Control Association International, Inc.; 2014.
- H. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; National Fire Protection Association; 2014.
- I. UL 705 - Power Ventilators; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- J. UL 762 - Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's Instructions: Indicate installation instructions.
- D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Fan Belts: One set for each individual fan.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Greenheck: www.greenheck.com.

2.02 POWER VENTILATORS - GENERAL

- A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
- D. Fabrication: Conform to AMCA 99.
- E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- G. Kitchen Hood Exhaust Fans: Comply with requirements of NFPA 96 and UL 762.

2.03 KITCHEN HOOD UTILITY SETS

- A. Description: Fan shall be aluminized and or galvanized steel, roof mounted, belt and or direct driven, centrifugal up blast restaurant utility exhaust ventilator.
- B. Application: CASRE centrifugal up blast restaurant utility exhaust ventilators are engineered to discharge grease laden vapors, fumes and other contaminants vertically away from the building. Model CASRE is specifically intended for high temperature and heavy grease applications.
- C. Certifications: All models shall be ETL Listed and comply with UL705 (electrical) and UL762 Standards and CSA Std C22.2, No 113. Fan shall bear the AMCA certified ratings seal for sound and air performance.
- D. Construction Housing: The fan shall be constructed of aluminized steel. Fan scroll shall be continuously sealed with a list intumescent to prevent grease leakage. The fan discharge scoop shall be fully weld and have a 2" fully welded drain to prevent grease leakage and blockage of the drain. Fan shall include integral hinge at the base of the fan power pack to allow the wheel to tilt out of the fan housing for easy cleaning of the duct in compliance with NFPA-96. Hinge shall be designed to limit the amount of travel and be self-locking with manual release. The hinged section of the fan shall be provided with heavy gauge, oversized handle in place to allow safe, fast and easy opening.
- E. Base: The base shall be constructed of heavy gauge galvanized steel with pre-punched mounting holes for fasteners. Base corners shall be welded and painted to provide strength and support for hinging and cleaning and to prevent leakage into the building.
- F. Fan Wheel: The fan wheel shall be centrifugal backward inclined and non-overloading. Wheels shall be balanced in two planes and done in accordance with AMCA standard 204-96, Balance Quality and Vibration Levels for Fans. The wheel blades shall be aerodynamically designed to minimize turbulence, increase efficiency and reduce noise. The wheel shall be heavy gauge welded aluminum. In the event that balancing weights are required they shall be riveted or welded to the blades or wheel. The wheel inlet shall overlap the fan base inlet for maximum performance and efficiency. The wheel shall be firmly attached to the motor shaft with set screws.

- G. Motor & Motor Compartment: Motors shall be heavy duty ball bearing type, mounted out of the airstream and furnished at the specified voltage, phase and enclosure. Motor mounting plate shall be constructed of heavy gauge steel and isolated from the fan structure with vibration isolators or gasket material. The motor compartment shall be cooled by outside air drawn through louvers in the motor cover. The motor compartment shall be completely removable to provide unobstructed access to the motor and drives. The fan shall have a tilt open top cover assembly that allows the wheel to be tilted back for easy access during cleaning and maintenance. The motor cover assembly shall have wing bolts to secure the assembly to the housing.
- H. Shaft and Bearings: Shafts shall be precision ground and polished. Heavy duty, per-lubricated bearings shall be selected for a minimum life (L10) life in excess of 200,000 hours of operation at cataloged operating speed. They shall be designed and individually tested specifically for use in air handling applications.
- I. Belts & Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be cast type, precision machined and keyed and secured attached to the fan and motor shafts. Drives shall be sized for a minimum of 150% of the installed motor horsepower. Fan operating speed shall be factory set using adjustable pitch motor pulleys; motors over 2 HP will come standard with double groove pulleys.
- J. Grease Spout: The 2" grease drain is fully welded in the discharge scoop, a removable grease trough is attached to the scoop to collect grease.
- K. Safety Disconnect Switch: A safety disconnect switch shall be standard on all units with open drip proof motors. Switches shall be installed in a NEMA3R enclosure and mounted to exterior of the fan for easy access. The safety disconnect switch shall be interlocked with the fan. The fan motor cover and (or) wheel compartment shall not be accessible unless the safety disconnect is in the off position.
- L. Description: Fan shall be aluminized and or galvanized steel, roof mounted, belt driven, centrifugal up blast restaurant utility exhaust ventilator.
- M. Application: CASRE centrifugal up blast restaurant utility exhaust ventilators are engineered to discharge grease laden vapors, fumes and other contaminants vertically away from the building. Model CASRE is specifically intended for high temperature and heavy grease applications.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.
- C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.

END OF SECTION

SECTION 23 3700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers.
- B. Registers

1.02 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; Air Movement and Control Association International, Inc.; 2012.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Titus: www.titus-hvac.com.

2.02 SQUARE CEILING DIFFUSERS (D-A & D-D)

- A. Type: Provide square, stamped, multi-core diffuser to discharge air in four way pattern.
- B. Connections: Round.
- C. Frame: Provide inverted T-bar type.
- D. Fabrication: Aluminum with baked enamel finish.
- E. Color: As selected by Architect from manufacturer's standard range.

2.03 SPIRAL DUCT MOUNTED SUPPLY GRILLES (D-B)

- A. Type: Aluminum supply grilles shall be direct spiral duct-mounted supply grilles double deflection for the sizes and mounting types as shown on the plans and outlet schedule. The deflection blades shall be available parallel to the long dimension of the grille. All supply grilles shall be constructed with radius end caps and foam gaskets for a tight seal to the duct diameter. All supply grilles shall be constructed with a 1 3/8-inch wide border.
- B. Blades shall be constructed of heavy duty extruded aluminum and shall be spaced 3/4-inch apart. Blades shall extend completely through the side frame on each side to ensure stability throughout the complete cfm operating range of the grille. Blades shall be individually adjustable without loosening or rattling and shall be securely held in place with tension wire.
- C. Color: As selected by Architect from manufacturer's standard range.

2.04 LINEAR AND MODULAR SLOT DIFFUSERS (D-F)

- A. Provide all materials and equipment required for a complete installation of all linear and modular slot air distribution systems as shown on the architectural and mechanical drawings and/or indicated in the architectural or mechanical specifications. The systems shall be complete in every respect and shall include all required appurtenances. Mechanical contractor shall furnish and install all plenums, hoods, blank-offs and associated sheet metal components including all duct connections thereto.

- B. The linear slot diffusers shall have a single 1" slot unless shown otherwise and shall be capable of being used for supply air, return air, exhaust air or any combination thereof.
- C. Provide all continuous linear slot and modular slot diffusers as shown on the drawings. The slot diffusers shall integrate into the ceiling system.
- D. The linear slot diffusers shall be capable of supporting the ceiling system. Linear diffusers supported by screws in the flanges or from air plenums are unacceptable.
- E. Provide ends and corners as required. Ends shall be butt type, field installed, or mitered picture frame type factory installed, as indicated herein or shown on the drawings. Corners shall be mitered one piece unit.
- F. Pattern controllers shall be one piece extruded aluminum, 24 inches long maximum, positioned between spring loaded spacers. Pattern controllers shall allow the airstream to be directed flat against the ceiling in either direction or downward as well as allowing throw reduction every two feet along the entire length of the linear slot diffusers. The airstream shall be maintained at the ceiling plane and shall not dump when volume is reduced. Only extruded aluminum pattern controllers are acceptable. Where shown or noted pattern controllers shall be designed to allow the airstream to be jetted into the occupied space and be adjustable to vector the airstream as required.
- G. Material shall be minimum wall thickness 0.062 inches extruded aluminum. Spring steel retainers shall be used under the spacers to hold the slot diffusers assembly tightly together and allow the slot diffusers to be disassembled easily for field trimming. Materials other than extruded aluminum and spring steel will not be accepted.
- H. provide a friction type volume damper located in the entry collar of the supply air plenum, accessible through the slot diffuser.
- I. Color: As selected by Architect from manufacturer's standard range.

2.05 CEILING EXHAUST REGISTERS (R-A)

- A. Type: Steel supply grilles shall be single deflection for the sizes and mounting types as shown on the plans and outlet schedule. The deflection blades shall be available parallel to the long dimension of the grille. Corners shall be assembled with full penetration resistance welds with a reinforcing steel patch for extra strength.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.
- C. Blades: Blades shall be constructed of heavy duty aluminum and shall be contoured to a specifically designed airfoil cross-section to meet published performance data. Hollow blades are not acceptable. Blades must be solid
- D. Color: As selected by Architect from manufacturer's standard range.
- E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.06 WALL SUPPLY REGISTERS/GRILLES (D-C & D-E)

- A. Type: Streamlined and individually adjustable blades, 3/4 inch minimum depth, 3/4 inch maximum spacing with spring or other device to set blades, vertical face, single deflection.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.
- C. Fabrication: Steel with 20 gage, 0.0359 inch minimum frames and 22 gage, 0.0299 inch minimum blades, steel and aluminum with 20 gage, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
- D. Color: To be selected by Architect from manufacturer's standard range.

- E. Damper: Integral, gang-operated opposed blade type with removable key operator, operable from face.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- C. Install registers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

END OF SECTION

SECTION 23 8200
CONVECTION HEATING AND COOLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electric cabinet unit heaters.

1.02 RELATED REQUIREMENTS

- A. Section 23 0513 - Common Motor Requirements for HVAC Equipment.
- B. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections. Installation of room thermostats. Electrical supply to units.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.
- D. UL 674 - Electrical Motors and Generators for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Provide typical catalog of information including arrangements.
- B. Shop Drawings:
 - 1. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided. Indicate the ability to create the curved sections as required.
- C. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 ELECTRIC CABINET UNIT HEATERS

- A. Manufacturers:
 - 1. Trane, a brand of Ingersoll Rand: www.trane.com.
- B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
- C. Heating Elements: Provide open-wire, finned tubular, or resistance wire enclosed in steel sheath.
- D. Cabinet: Minimum 18 gage, 0.0478 inch thick steel front panel with exposed corners and edges rounded, easily removed panels, glass fiber insulation and integral air outlet, and inlet grilles.
- E. Finish:

1. Factory applied, painted finish.
 2. Color: As selected from color chart.
- F. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.
- G. Motor: Tap wound multiple speed permanent split capacitor with sleeve bearings, resiliently mounted.
- H. Controls:
1. Thermostat in return air grille.
- I. Filter: Easily removed, 1 inch thick glass fiber throw-away type, located to filter air before coil.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are suitable for installation.
- B. Verify that field measurements are as shown on the drawings.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Install equipment exposed to finished areas after walls and ceilings are finished and painted.
- C. Do not damage equipment or finishes.
- D. Cabinet Unit Heaters:
 1. Install per manufacturer's instructions.
 2. Coordinate to ensure correct recess size for recessed units.

3.03 CLEANING

- A. After construction and painting is completed, clean exposed surfaces of units.
- B. Vacuum clean coils and inside of units.
- C. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.

3.04 PROTECTION

- A. Provide finished cabinet units with protective covers during the balance of construction.

END OF SECTION

SECTION 26 0501
MINOR ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

1.02 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution and Closeout Requirements: Additional requirements for alterations work.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that abandoned wiring and equipment serve only abandoned facilities.
- B. Demolition drawings are based on casual field observation and existing record documents.
- C. Report discrepancies to Architect before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- C. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
 - 1. PCB- and DEHP-containing lighting ballasts.
 - 2. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- H. Repair adjacent construction and finishes damaged during demolition and extension work.
- I. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

- A. See Section 01 7419 - Construction Waste Management and Disposal for additional requirements.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.
- C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Wire pulling lubricant.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0501 - Minor Electrical Demolition: Disconnection, removal, and/or extension of existing electrical conductors and cables.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 28 3100 - Fire Detection and Alarm: Fire alarm system conductors and cables.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.
- F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- H. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); National Electrical Contractors Association; 2012 (NECA/NACMA 102).
- I. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; National Electrical Manufacturers Association; 2009 (ANSI/NEMA WC 70/ICEA S-95-658).
- J. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
- K. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- L. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- M. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- N. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- O. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- P. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- Q. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- R. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions.

When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Metal-clad cable is permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
 - 1) Maximum Length: 6 feet.
 - b. Where concealed in hollow stud walls and above accessible ceilings for branch circuits up to 20 A.
 - 1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.
 - 2. In addition to other applicable restrictions, may not be used:
 - a. Where not approved for use by the authority having jurisdiction.
 - b. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Provide new conductors and cables manufactured not more than one year prior to installation.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- E. Comply with NEMA WC 70.
- F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- H. Conductors for Grounding and Bonding: Also comply with Section 26 0526.
- I. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.
- J. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- K. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.

- a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
 - 3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
 - 2. Control Circuits: 14 AWG.
- L. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- M. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
 - 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
 - 1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com.
 - b. Encore Wire Corporation: www.encorewire.com.
 - c. Southwire Company: www.southwire.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
 - a. Size 4 AWG and Larger: Type XHHW-2.
 - b. Installed Underground: Type XHHW-2.
 - c. Fixture Wiring Within Luminaires: Type TFFN/TFN for luminaires with labeled maximum temperature of 90 degrees C; Approved suitable type for luminaires with labeled maximum temperature greater than 90 degrees C.

2.04 METAL-CLAD CABLE

- A. Manufacturers:

1. AFC Cable Systems Inc: www.afcweb.com.
 2. Encore Wire Corporation: www.encorewire.com.
 3. Southwire Company: www.southwire.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- C. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
 2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- F. Grounding: Full-size integral equipment grounding conductor.
- G. Armor: Steel, interlocked tape.
- H. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.05 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 0526.
- C. Wiring Connectors for Splices and Taps:
1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- D. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
 5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
 6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
 7. Conductors for Control Circuits: Use crimped terminals for all connections.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

1. Manufacturers:
 - a. 3M: www.3m.com.
 - b. Ideal Industries, Inc: www.idealindustries.com.
 - c. NSI Industries LLC: www.nsiindustries.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- H. Mechanical Connectors: Provide bolted type or set-screw type.
 1. Manufacturers:
 - a. Burndy: www.burndy.com.
 - b. IlSCO: www.ilsco.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
 1. Manufacturers:
 - a. Burndy: www.burndy.com.
 - b. IlSCO: www.ilsco.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
 1. Manufacturers:
 - a. Burndy: www.burndy.com.
 - b. IlSCO: www.ilsco.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

2.06 WIRING ACCESSORIES

- A. Electrical Tape:
 1. Manufacturers:
 - a. 3M: www.3m.com.
 - b. Plymouth Rubber Europa: www.plymouthrubber.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
 4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
 5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
 6. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil; suitable for continuous temperature environment up to 221 degrees F.
 7. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.

- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
 - 1. Manufacturers:
 - a. 3M: www.3m.com.
 - b. Burndy: www.burndy.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
 - 1. Manufacturers:
 - a. 3M: www.3m.com.
 - b. American Polywater Corporation: www.polywater.com.
 - c. Ideal Industries, Inc: www.idealindustries.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as shown on the drawings.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated and routing is not shown, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Include circuit lengths required to install connected devices within 10 ft of location shown.
 - 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
 - 7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are shown as separate, combining them together in a single raceway is not permitted.
 - 8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
 - 9. Provide oversized neutral/grounded conductors where indicated and as specified below.
- B. Install products in accordance with manufacturer's instructions.
- C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

- D. Install metal-clad cable (Type MC) in accordance with NECA 120.
- E. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- H. Terminate cables using suitable fittings.
 - 1. Metal-Clad Cable (Type MC):
 - a. Use listed fittings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- I. Install conductors with a minimum of 12 inches of slack at each outlet.
- J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- L. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
 - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of

- rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 3. Wet Locations: Use heat shrink tubing.
- N. Insulate ends of spare conductors using vinyl insulating electrical tape.
- O. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- P. Identify conductors and cables in accordance with Section 26 0553.
- Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- R. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Perform inspection, testing, and adjusting in accordance with Section 01 4000.
- C. Inspect and test in accordance with NETA ATS, except Section 4.
- D. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
- E. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 5600 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

1.03 REFERENCE STANDARDS

- A. IEEE 81 - Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System; Institute of Electrical and Electronic Engineers; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; National Electrical Manufacturers Association; 2007.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 - 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
- F. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Metal Building or Structure Frame:
 - a. Provide connection to metal building or structure frame effectively grounded in accordance with NFPA 70 at nearest accessible location.
 - 3. Ground Rod Electrode(s):
 - a. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 - 4. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
- G. Bonding and Equipment Grounding:
 - 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.

2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

H. Pole-Mounted Luminaires: Also comply with Section 26 5600.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Rod Electrodes:
 1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.
 4. Manufacturers:
 - a. Advanced Lightning Technology (ALT): www.altfab.com.
 - b. Erico International Corporation: www.erico.com.
 - c. Galvan Industries, Inc: www.galvanelectrical.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as shown on the drawings.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
- D. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Perform inspection, testing, and adjusting in accordance with Section 01 4000.
- C. Inspect and test in accordance with NETA ATS except Section 4.
- D. Perform inspections and tests listed in NETA ATS, Section 7.13.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 0534 - Conduit: Additional support and attachment requirements for conduits.
- C. Section 26 0536 - Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.
- D. Section 26 0537 - Boxes: Additional support and attachment requirements for boxes.
- E. Section 26 5100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.
- F. Section 26 5113 - Luminaires, Ballasts, and Drivers - Lutron: Additional support and attachment requirements for luminaires.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.
- D. MFMA-4 - Metal Framing Standards Publication; Metal Framing Manufacturers Association; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:

1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.
- C. Installer's Qualifications: Include evidence of compliance with specified requirements.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.
- C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of _____. Include consideration for vibration, equipment operation, and shock loads where applicable.
 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
 3. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com.
 - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
 1. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com.

- b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 1. Comply with MFMA-4.
 - 2. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 - 3. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com.
 - b. Thomas & Betts Corporation: www.tnb.com.
 - c. Unistrut, a brand of Atkore International Inc: www.unistrut.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Single Conduit up to 1 inch (27mm) trade size: 1/4 inch diameter.
 - c. Single Conduit larger than 1 inch (27mm) trade size: 3/8 inch diameter.
 - d. Outlet Boxes: 1/4 inch diameter.
 - e. Luminaires: 1/4 inch diameter.
- F. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 - 4. Hollow Masonry: Use toggle bolts.
 - 5. Hollow Stud Walls: Use toggle bolts.
 - 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 - 7. Sheet Metal: Use sheet metal screws.
 - 8. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
 - 9. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.
 - 10. Manufacturers - Mechanical Anchors:
 - a. Hilti, Inc: www.us.hilti.com.
 - b. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com.
 - c. Simpson Strong-Tie Company Inc: www.strongtie.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 11. Manufacturers - Powder-Actuated Fastening Systems:
 - a. Hilti, Inc: www.us.hilti.com.
 - b. ITW Ramset, a division of Illinois Tool Works, Inc: www.ramset.com.
 - c. Simpson Strong-Tie Company Inc: www.strongtie.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I. Conduit Support and Attachment: Also comply with Section 26 0534.
- J. Box Support and Attachment: Also comply with Section 26 0537.
- K. Interior Luminaire Support and Attachment: Also comply with Section 26 5100.
- L. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- M. Secure fasteners according to manufacturer's recommended torque settings.
- N. Remove temporary supports.
- O. Identify independent electrical component support wires above accessible ceilings (only where specifically indicated or permitted) with color distinguishable from ceiling support wires in accordance with NFPA 70.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

- D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 0534

CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Electrical metallic tubing (EMT).
- C. Liquidtight flexible nonmetallic conduit (LFNC).
- D. Conduit fittings.
- E. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Metal clad cable (Type MC), armored cable (Type AC), and manufactured wiring systems, including uses permitted.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- D. Section 26 0529 - Hangers and Supports for Electrical Systems.
- E. Section 26 0537 - Boxes.
- F. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 27 1005 - Structured Cabling for Voice and Data - Inside-Plant: Additional requirements for communications systems conduits.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); National Electrical Contractors Association; 2013.
- E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); National Electrical Contractors Association; 2003.
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).
- G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; National Electrical Manufacturers Association; 2005.
- H. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- J. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- K. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.
- L. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

- M. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- N. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- C. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:

1. Under Slab on Grade: Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.
 2. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.
- D. Embedded Within Concrete:
1. Within Slab Above Ground (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- F. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).
- G. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).
- H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- I. Interior, Within Kitchen Casework: Use PVC Coated MC cable
- J. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
1. Maximum Length: 6 feet.
- K. Connections to Vibrating Equipment:
1. Dry Locations: Use flexible metal conduit.
 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 3. Maximum Length: 6 feet unless otherwise indicated.
- L. Fished in Existing Walls, Where Necessary: Use flexible metal conduit or MC Cable.

2.02 CONDUIT REQUIREMENTS

- A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.
- B. Communications Systems Conduits: Also comply with Section 27 1005.
- C. Fittings for Grounding and Bonding: Also comply with Section 26 0526.
- D. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- E. Provide products listed, classified, and labeled as suitable for the purpose intended.
- F. Minimum Conduit Size, Unless Otherwise Indicated:
1. Branch Circuits: 1/2 inch (16 mm) trade size.
 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
 3. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.
 4. Underground, Interior: 1 inch (27 mm) trade size.
- G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
1. Allied Tube & Conduit: www.alliedeg.com.
 2. Republic Conduit: www.republic-conduit.com.
 3. Wheatland Tube Company: www.wheatland.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.

- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com.
 - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
 - 4. Material: Use steel or malleable iron.
 - 5. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Thomas & Betts Corporation; _____: www.tnb.com.
 - 2. Robroy Industries; _____: www.robroy.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.
- D. Interior Coating: Urethane, minimum thickness of 2 mil.
- E. PVC-Coated Fittings:
 - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
 - 2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.
 - 5. Interior Coating: Urethane, minimum thickness of 2 mil.
- F. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

2.05 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc; _____: www.afcweb.com.
 - 2. Electri-Flex Company; _____: www.electriflex.com.
 - 3. International Metal Hose; _____: www.metalhose.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com.

- b. O-Z/Gedney, a brand of Emerson Industrial Automation:
www.emersonindustrial.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 3. Material: Use steel or malleable iron.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc; ____: www.afcweb.com.
 - 2. Electri-Flex Company; ____: www.electriflex.com.
 - 3. International Metal Hose; ____: www.metalhose.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com.
 - b. O-Z/Gedney, a brand of Emerson Industrial Automation:
www.emersonindustrial.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.

2.07 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Allied Tube & Conduit; ____: www.alliedeg.com.
 - 2. Republic Conduit: www.republic-conduit.com.
 - 3. Wheatland Tube Company; ____: www.wheatland.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com.
 - b. O-Z/Gedney, a brand of Emerson Industrial Automation:
www.emersonindustrial.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.
 - 5. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

2.08 LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc: www.afcweb.com.
 - 2. Electri-Flex Company: www.electriflex.com.
 - 3. International Metal Hose: www.metalhose.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type LFNC liquidtight flexible nonmetallic conduit listed and labeled as complying with UL 1660.
- C. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; suitable for the type of conduit to be connected.

2.09 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.
- D. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on drawings.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.
- E. Install electrical nonmetallic tubing (ENT) in accordance with NECA 111.
- F. Install liquidtight flexible nonmetallic conduit (LFNC) in accordance with NECA 111.
- G. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated and routing is not shown, determine exact routing required.
 - 3. Conceal all conduits unless specifically indicated to be exposed.
 - 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Within joists in areas with no ceiling (Painted Black).
 - 5. Unless otherwise approved, do not route conduits exposed:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.

- d. _____.
- 6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
- 7. Arrange conduit to maintain adequate headroom, clearances, and access.
- 8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
- 9. Arrange conduit to provide no more than 150 feet between pull points.
- 10. Route conduits above water and drain piping where possible.
- 11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
- 12. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
- 13. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 - d. Kitchen Equipment.
- 14. Group parallel conduits in the same area together on a common rack.
- H. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 - 4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 - 5. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
 - 6. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.
- I. Connections and Terminations:
 - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.
 - 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 - 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 - 6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 - 7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

- J. Penetrations:
 - 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 - 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 - 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 - 4. Conceal bends for conduit risers emerging above ground.
 - 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 - 6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 - 7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
 - 8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- K. Embedment Within Structural Concrete Slabs (only where approved by Structural Engineer):
 - 1. Secure conduits to prevent floating or movement during pouring of concrete.
- L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
 - 1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 - 2. Where conduits are subject to earth movement by settlement or frost.
- M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
 - 1. Where conduits pass from outdoors into conditioned interior spaces.
 - 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- N. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- O. Provide grounding and bonding in accordance with Section 26 0526.
- P. Identify conduits in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
- D. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 0537

BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Floor boxes.

1.02 RELATED REQUIREMENTS

- A. Section 08 3100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0534 - Conduit:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 2726 - Wiring Devices:
 - 1. Wall plates.
 - 2. Additional requirements for locating boxes for wiring devices.
- F. Section 27 1005 - Structured Cabling for Voice and Data - Inside-Plant: Additional requirements for communications systems outlet boxes.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2013 (ANSI/NEMA OS 1).
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2014.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.
- C. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.

2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 3. Use suitable concrete type boxes where flush-mounted in concrete.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
 12. Minimum Box Size, Unless Otherwise Indicated:
 - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
 - b. Communications Systems Outlets: Comply with Section 27 1005.
 13. Wall Plates: Comply with Section 26 2726.
 14. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com.
 - b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 4. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com.
 - b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com.

- c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com.
- d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on drawings.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
 - 2. Unless dimensioned, box locations indicated are approximate.
 - 3. Locate boxes as required for devices installed under other sections or by others.
 - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 2726.
 - b. Communications Systems Outlets: Comply with Section 27 1005.
 - 4. Locate boxes so that wall plates do not span different building finishes.
 - 5. Locate boxes so that wall plates do not cross masonry joints.
 - 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 - 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
 - 8. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
 - 9. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 0534.
 - 10. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
 - a. Concealed above accessible suspended ceilings.

- I. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
 - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
 - 4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.
- J. Install boxes plumb and level.
- K. Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- L. Install boxes as required to preserve insulation integrity.
- M. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- N. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- O. Close unused box openings.
- P. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- Q. Provide grounding and bonding in accordance with Section 26 0526.
- R. Identify boxes in accordance with Section 26 0553.

3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- B. Section 26 2300 - Low-Voltage Switchgear: Factory-installed mimic bus.
- C. Section 26 2726 - Wiring Devices: Device and wallplate finishes; factory pre-marked wallplates.
- D. Section 27 1005 - Structured Cabling for Voice and Data - Inside-Plant: Identification for communications cabling and devices.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.07 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location.
 - 3) Identify load(s) served. Include location.
- B. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
 - 2. Identification for Communications Conductors and Cables: Comply with Section 27 1005.
 - 3. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
 - 4. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
 - a. At each source and load connection.
 - b. Within boxes when more than one circuit is present.
 - c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
- C. Identification for Raceways:
 - 1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet.
 - 2. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, and at equipment terminations when source is not within sight.
- D. Identification for Boxes:
 - 1. Use voltage markers to identify highest voltage present.
 - 2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
 - a. For exposed boxes in public areas, use only identification labels.
- E. Identification for Devices:
 - 1. Identification for Communications Devices: Comply with Section 27 1005.
 - 2. Wiring Device and Wallplate Finishes: Comply with Section 26 2726.
 - 3. Use identification label to identify fire alarm system devices.
 - 4. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
 - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
 - 5. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

F. Identification for Luminaires:

1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Manufacturers:
 - a. Brimar Industries, Inc: www.brimar.com.
 - b. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
2. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Kitchen Locations: Use plastic, stainless steel, or aluminum nameplates suitable for wet location use.
3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
6. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:

1. Manufacturers:
 - a. Brady Corporation: www.bradyid.com.
 - b. Brother International Corporation: www.brother-usa.com.
 - c. Panduit Corp: www.panduit.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:

1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
 - a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
 - a. Equipment Designation: 1/2 inch.
 - b. Other Information: 1/4 inch.
5. Color:
 - a. Normal Power System: White text on black background.
 - b. Fire Alarm System: White text on red background.

D. Format for General Information and Operating Instructions:

1. Minimum Size: 1 inch by 2.5 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch.

5. Color: Black text on white background unless otherwise indicated.
- E. Format for Caution and Warning Messages:
 1. Minimum Size: 2 inches by 4 inches.
 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 1/2 inch.
 5. Color: Black text on yellow background unless otherwise indicated.
- F. Format for Receptacle Identification:
 1. Minimum Size: 3/8 inch by 1.5 inches.
 2. Legend: Power source and circuit number or other designation indicated.
 - a. Include voltage and phase for other than 120 V, single phase circuits.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch.
 5. Color: Black text on clear background.
- G. Format for Control Device Identification:
 1. Minimum Size: 3/8 inch by 1.5 inches.
 2. Legend: Load controlled or other designation indicated.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch.
 5. Color: Black text on clear background.
- H. Format for Fire Alarm Device Identification:
 1. Minimum Size: 3/8 inch by 1.5 inches.
 2. Legend: Designation indicated and device zone or address.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch.
 5. Color: Red text on white background.

2.03 WIRE AND CABLE MARKERS

- A. Manufacturers:
 1. Brady Corporation: www.bradyid.com.
 2. HellermannTyton: www.hellermanntyton.com.
 3. Panduit Corp: www.panduit.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- D. Legend: Power source and circuit number or other designation indicated.
- E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
 1. Do not use handwritten text.
- F. Minimum Text Height: 1/8 inch.
- G. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

- A. Manufacturers:

1. Brady Corporation: www.bradyid.com.
 2. Brimar Industries, Inc: www.brimar.com.
 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- C. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- D. Minimum Size:
1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
 2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
 3. Markers for Junction Boxes: 1/2 by 2 1/4 inches.
- E. Legend:
1. Markers for Voltage Identification: Highest voltage present.
- F. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

- A. Manufacturers:
1. Brady Corporation: www.bradyid.com.
 2. Brimar Industries, Inc: www.brimar.com.
 3. Seton Identification Products: www.seton.com.
- B. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- C. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.
- D. Legend: Type of service, continuously repeated over full length of tape.
- E. Color:
1. Tape for Buried Power Lines: Black text on red background.

2.06 WARNING SIGNS AND LABELS

- A. Manufacturers:
1. Brimar Industries, Inc: www.brimar.com.
 2. Clarion Safety Systems, LLC: www.clarionsafety.com.
 3. Seton Identification Products: www.seton.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- C. Warning Signs:
1. Materials:
 - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
 - b. Kitchen Locations: Use factory pre-printed rigid aluminum signs.
 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
 3. Minimum Size: 7 by 10 inches unless otherwise indicated.
- D. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.

2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 1. Surface-Mounted Equipment: Enclosure front.
 2. Flush-Mounted Equipment: Inside of equipment door.
 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 4. Elevated Equipment: Legible from the floor or working platform.
 5. Interior Components: Legible from the point of access.
 6. Conduits: Legible from the floor.
 7. Boxes: Outside face of cover.
 8. Conductors and Cables: Legible from the point of access.
 9. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Secure rigid signs using stainless steel screws.
- H. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 26 0923
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Occupancy sensors.
- B. Time switches.
- C. Outdoor photo controls.

1.02 RELATED REQUIREMENTS

- A. Section 26 0537 - Boxes.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. 47 CFR 15 - Radio Frequency Devices; Code of Federal Regulations; current edition.
- B. ANSI C136.24 - American National Standard for Roadway and Area Lighting Equipment - Nonlocking (Button) Type Photocontrols; 2004 (R2010).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2014.
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control; Current Edition, Including All Revisions.
- G. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.
- H. UL 917 - Clock-Operated Switches; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
 - 3. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
- C. Field Quality Control Reports.
- D. Operation and Maintenance Data: Include detailed information on device programming and setup.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional provisions.
- F. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for all occupancy sensors.
- C. Provide five year manufacturer warranty for outdoor photo controls.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

- A. Manufacturers:
 1. Hubbell Building Automation, Inc: www.hubbellautomation.com
 2. Lutron Electronics Company, Inc: www.lutron.com.
 3. WattStopper: www.wattstopper.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
 5. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.
- B. All Occupancy Sensors:
 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
 2. Sensor Technology:
 - a. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.

3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
 5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
 6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
 7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
 8. Sensitivity: Field adjustable.
 9. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
 10. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on the drawings.
 11. Where wired sensors are indicated, wireless sensors are acceptable provided that all components and wiring modifications necessary for proper operation are included.
 12. Wireless Sensors:
 - a. RF Range: 30 feet through typical construction materials.
 - b. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B application.
 - c. Power: Battery-operated with minimum ten-year battery life.
- C. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
- D. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
 - a. Description: Low profile occupancy sensors designed for ceiling installation.
 - b. Unless otherwise indicated or required to control the load indicated on the drawings, provide low voltage units, for use with separate compatible accessory power packs.
 - c. Finish: White unless otherwise indicated.
 2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
 - a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
 - b. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
- E. Directional Occupancy Sensors:

1. All Directional Occupancy Sensors: Designed for wall or ceiling mounting, with integral swivel for field adjustment of motion detection coverage.
 - a. Unless otherwise indicated or required to control the load indicated on the drawings, provide low voltage units, for use with separate compatible accessory power packs.
 2. Passive Infrared/Ultrasonic Dual Technology Directional Occupancy Sensors: Capable of detecting motion within a distance of 40 feet at a mounting height of 10 feet.
- F. Power Packs for Low Voltage Occupancy Sensors:
1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
 2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on the drawings.
 3. Input Supply Voltage: Dual rated for 120/277 V ac.
 4. Load Rating: As required to control the load indicated on the drawings.
- G. Power Packs for Wireless Occupancy Sensors:
1. Description: Plenum rated, self-contained relay compatible with specified wireless occupancy sensors for switching of line voltage loads.
 2. Input Supply Voltage: Dual rated for 120/277 V ac.
 3. Load Rating: As required to control the load indicated on the drawings.

2.03 TIME SWITCHES

- A. Manufacturers:
1. Intermatic, Inc: www.intermatic.com.
 2. Tork, a division of NSI Industries LLC: www.tork.com.
 3. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.
- B. Digital Electronic Time Switches:
1. Description: Factory-assembled solid state programmable controller with LCD display, listed and labeled as complying with UL 916 or UL 917.
 2. Program Capability:
 - a. 365 Day Astronomic Time Switches: Two channel, capable of different schedule for each day of the week with additional holiday schedule available to override normal schedule for selected days and field-configurable astronomic feature to automatically adjust for seasonal changes in sunrise and sunset times.
 3. Schedule Capacity: Not less than 16 programmable on/off operations.
 4. Provide automatic daylight savings time and leap year compensation.
 5. Provide power outage backup to retain programming and maintain clock.
 6. Manual override: Capable of overriding current schedule both permanently and temporarily until next scheduled event.
 7. Input Supply Voltage: Multiple voltage input for 120, 208, 240 or 277 V ac.
 8. Output Switch Configuration: As required to control the load indicated on the drawings.
 9. Output Switch Contact Ratings:
 - a. Resistive Load: Not less than 30 A at 120-277 V ac.
 10. Provide lockable enclosure; environmental type per NEMA 250 as specified for the following installation locations:
 - a. Indoor clean, dry locations: Type 1.

2.04 OUTDOOR PHOTO CONTROLS

- A. Manufacturers:
 - 1. Intermatic, Inc: www.intermatic.com.
 - 2. Tork, a division of NSI Industries LLC: www.tork.com.
 - 3. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.
- B. Button Type Outdoor Photo Controls
 - 1. Description: Direct-wired photo control unit complying with ANSI C136.24 with weatherproof gasketed wall plate where required or indicated, listed and labeled as complying with UL 773A.
 - 2. Housing: Weather resistant polycarbonate.
 - 3. Photo Sensor: Cadmium sulfide.
 - 4. Light Level Activation: 1 to 3 footcandles turn-on and 3 to 1 turn-off to turn-on ratio with delayed turn-off.
 - 5. Voltage: As required to control the load indicated on the drawings.
 - 6. Failure Mode: Fails to the on position.
 - 7. Load Rating: As required to control the load indicated on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- E. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of lighting control devices provided under this section.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.

- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 2726.
- G. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- H. Identify lighting control devices in accordance with Section 26 0553.
- I. Outdoor Photo Control Locations:
 - 1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.
 - 2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.
- J. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.
- K. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.
- L. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.
- M. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.
- N. Where indicated or required, provide cabinet or enclosure in accordance with Section 26 0537 for mounting of lighting control device system components.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each lighting control device for damage and defects.
- C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
- D. Test outdoor photo controls to verify proper operation, including time delays where applicable.
- E. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

- A. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.
- B. Adjust position of directional occupancy sensors and outdoor motion sensors to achieve optimal coverage as required.
- C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

- D. Adjust time switch settings to achieve desired operation schedule as indicated or as directed by Architect. Record settings in written report to be included with submittals.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. See Section 01 7900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.
- D. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

END OF SECTION

SECTION 26 2416

PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 407 - Standard for Installing and Maintaining Panelboards; National Electrical Contractors Association; 2009.
- B. NEMA PB 1 - Panelboards; National Electrical Manufacturers Association; 2011.
- C. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 2. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature within the following limits during and after installation of panelboards:
 - 1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.01 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 2) 14,000 rms symmetrical amperes at 480 VAC.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 3. Conductor Terminations:
 - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 4. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

2.02 SOURCE QUALITY CONTROL

- A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide required supports in accordance with Section 26 0529.
- C. Provide grounding and bonding in accordance with Section 26 0526.
- D. Install all field-installed branch devices, components, and accessories.
- E. Provide filler plates to cover unused spaces in panelboards.

3.02 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1. Tests listed as optional are not required.
- D. Correct deficiencies and replace damaged or defective panelboards or associated components.

END OF SECTION

SECTION 26 2726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables :
Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors .
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0537 - Boxes.
- D. Section 26 0537 - Boxes.
- E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 0923 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors, in-wall time switches, and in-wall interval timers.
- G. Section 26 2717 - Equipment Wiring: Cords and plugs for equipment.
- H. Section 27 1005 - Structured Cabling for Voice and Data - Inside-Plant: Voice and data jacks.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- D. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2010).
- E. NEMA WD 6 - Wiring Device -- Dimensional Specifications; National Electrical Manufacturers Association; 2012.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- B. Sequencing:
1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- C. Operation and Maintenance Data:
1. GFCI Receptacles: Include information on status indicators.
- D. Project Record Documents: Record actual installed locations of wiring devices.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Screwdrivers for Tamper-Resistant Screws: Two for each type of screw.
 3. Extra Wall Plates: Two of each style, size, and finish.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hubbell Incorporated: www.hubbell-wiring.com.
- B. Lutron Electronics Company, Inc: www.lutron.com.
- C. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
- D. Substitutions: See Section 01 6000 - Product Requirements.
- E. Source Limitations: Where possible, provide products for each type of wiring device produced by a single manufacturer and obtained from a single supplier.

2.02 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

- C. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- D. Provide GFCI protection for receptacles installed in kitchens.

2.03 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices Installed in Dining: White with white nylon wall plate.
- C. Wiring Devices Installed in Servery: Black with stainless steel wall plate.

2.04 WALL SWITCHES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell-wiring.com.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com.
 - 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.05 RECEPTACLES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell-wiring.com.
 - 2. Lutron Electronics Company, Inc; Designer Style: www.lutron.com.
 - 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
 - 1. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 - 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
- E. Combinatin USB Receptacles: Commercial Decorator Style with (2) USB Chargers and a Duplex Receptacle.

2.06 WALL PLATES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell-wiring.com.
 - 2. Lutron Electronics Company, Inc: www.lutron.com.
 - 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Wall Plates: Comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.
- D. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor.
 - b. Receptacles: 18 inches above finished floor or 6 inches above counter.
 - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - 3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 - 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
- C. Install wiring devices in accordance with manufacturer's instructions.

- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- N. Identify wiring devices in accordance with Section 26 0553.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.
- C. Inspect each wiring device for damage and defects.
- D. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- E. Test each receptacle to verify operation and proper polarity.
- F. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 26 2813

FUSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fuses.

1.02 RELATED REQUIREMENTS

- A. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- B. Section 26 2818 - Enclosed Switches: Fusible switches.
- C. Section 26 2913 - Enclosed Controllers: Fusible switches.

1.03 REFERENCE STANDARDS

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2012.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.
- D. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
 - a. Fusible Enclosed Switches: See Section 26 2818.
 - b. Fusible Switches for Enclosed Motor Controllers: See Section 26 2913.
 - 2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
 - 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Bussmann, a division of Eaton Corporation: www.cooperindustries.com.
- B. Mersen (formerly Ferraz Shawmut): ferrazshawmut.mersen.com.
- C. Littelfuse, Inc: www.littelfuse.com.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 APPLICATIONS

- A. Feeders:
 - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
- B. General Purpose Branch Circuits: Class RK1, time-delay.
- C. Individual Motor Branch Circuits: Class RK1, time-delay.

2.03 FUSES

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.
- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F. Voltage Rating: Suitable for circuit voltage.
- G. Class R Fuses: Comply with UL 248-12.
 - 1. Class RK1, Time-Delay Fuses:
- H. Provide the following accessories where indicated or where required to complete installation:
 - 1. Fuseholders: Compatible with indicated fuses.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Do not install fuses until circuits are ready to be energized.
- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION

SECTION 26 2818
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 2813 - Fuses.
- E. Section 26 2913 - Enclosed Controllers: Manual motor controllers.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2014.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2013.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- C. Field Quality Control Test Reports.
- D. Project Record Documents: Record actual locations of enclosed switches.
- E. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Corporation: www.eaton.com.
- B. General Electric Company: www.geindustrial.com.
- C. Schneider Electric; Square D Products: www.schneider-electric.us.

2.02 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
 - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
 - 2. Minimum Ratings:
 - a. Switches Protected by Class H Fuses: 10,000 rms symmetrical amperes.
 - b. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.
- G. Provide with switch blade contact position that is visible when the cover is open.
- H. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
- I. Conductor Terminations: Suitable for use with the conductors to be installed.
- J. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
- K. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- L. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
- M. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- N. Heavy Duty Switches:
 - 1. Comply with NEMA KS 1.
 - 2. Conductor Terminations:
 - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed safety switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install enclosed switches in accordance with manufacturer's instructions.
- B. Install enclosed switches securely, in a neat and workmanlike manner in accordance with NECA 1.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required supports in accordance with Section 26 0529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Provide fuses complying with Section 26 2813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2913
ENCLOSED CONTROLLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manual motor controllers.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 2813 - Fuses.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; National Electrical Manufacturers Association; 2000 (R2005), with errata, 2008.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2013.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
- B. Maintenance Data: Replacement parts list for controllers.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Corporation; Cutler-Hammer Product: www.eaton.com.
- B. General Electric Company: www.geindustrial.com.
- C. Schneider Electric; Square D Products: www.schneider-electric.us.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MANUAL CONTROLLERS

- A. Manual Motor Controllers: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller with overload element, red pilot light, NO auxiliary contact, and push button operator.
- B. Fractional Horsepower Manual Controllers: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, red pilot light, and toggle operator.
- C. Motor Starting Switches: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, without thermal overload unit, with red pilot light and key operator.

2.03 DISCONNECTS

- A. Fusible Switch Assemblies: NEMA KS 1, enclosed knife switch with externally operable handle. Fuse clips: Designed to accommodate Class R fuses.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install enclosed controllers where indicated, in accordance with manufacturer's instructions.
- B. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- C. Provide supports in accordance with Section 26 0529.
- D. Height: 5 ft to operating handle.
- E. Provide fuses for fusible switches; refer to Section 26 2813 for product requirements.
- F. Select and install overload heater elements in motor controllers to match installed motor characteristics.
- G. Identify enclosed controllers in accordance with Section 26 0553.

3.02 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 4000.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.16.1.

END OF SECTION

SECTION 26 5100
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Ballasts and drivers.
- D. Lamps.
- E. Luminaire accessories.

1.02 RELATED REQUIREMENTS

- A. Section 26 0537 - Boxes.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 0923 - Lighting Control Devices: Automatic controls for lighting including occupancy sensors, outdoor motion sensors, time switches, outdoor photo controls, and daylighting controls.
- D. Section 26 2726 - Wiring Devices: Manual wall switches and wall dimmers.
- E. Section 26 5600 - Exterior Lighting.

1.03 REFERENCE STANDARDS

- A. 47 CFR 15 - Radio Frequency Devices; Code of Federal Regulations; current edition.
- B. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; 2011.
- C. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; Institute of Electrical and Electronic Engineers; 2002 (Cor 1, 2012).
- D. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; Illuminating Engineering Society; 2002 (Reaffirmed 2008).
- E. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; Illuminating Engineering Society; 2008.
- F. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; Illuminating Engineering Society; 2015.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- H. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; 2006.
- I. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; National Electrical Contractors Association; 2006.
- J. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; National Electrical Manufacturers Association; 2012.
- K. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. NFPA 101 - Life Safety Code; National Fire Protection Association; 2015.

- M. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- N. UL 935 - Fluorescent-Lamp Ballasts; Current Edition, Including All Revisions.
- O. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- P. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - 2. Provide photometric calculations where luminaires are proposed for substitution upon request.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - b. Include IES LM-79 test report upon request.
 - 2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IESNA LM-63 standard format upon request.
 - 3. Ballasts: Include wiring diagrams and list of compatible lamp configurations.
 - 4. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
 - 5. Fluorescent Emergency Power Supply Unit: Include list of compatible lamp configurations and associated lumen output.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

- F. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide three year manufacturer warranty for all LED luminaires, including drivers.
- C. Provide two year manufacturer warranty for all linear fluorescent ballasts.
- D. Provide five year pro-rata warranty for batteries for emergency lighting units.

PART 2 PRODUCTS

2.01 MANUFACTURERS - LUMINAIRES

- A. Acuity Brands, Inc: www.acuitybrands.com.
- B. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com.
- C. Hubbell Lighting, Inc: www.hubbellighting.com.
- D. Substitutions: See Section 01 6000 - Product Requirements, except where individual luminaire types are designated with substitutions not permitted.

2.02 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 01 6000 - Product Requirements, except where individual luminaire types are designated with substitutions not permitted.

2.03 LUMINAIRES

- A. Manufacturers:
 - 1. Acuity Brands, Inc: www.acuitybrands.com.
 - 2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com.
 - 3. Hubbell Lighting, Inc: www.hubbellighting.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Provide products that comply with requirements of NFPA 70.

- C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- H. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
- I. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- J. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.04 EMERGENCY LIGHTING UNITS

- A. Manufacturers:
 - 1. Bodine: www.bodine.com.
 - 2. Wattstopper www.wattstopper.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- C. Operation: Upon interruption of normal power source, solid-state control automatically switches connected fixtures to an emergency generator power source. Unit shall have a local switch input to allow emergency fixtures to be controlled in conjunction with normal power lighting in the same area.
- D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

2.05 EXIT SIGNS

- A. Manufacturers - Powered and Self-Luminous Signs:
 - 1. Acuity Brands, Inc: www.acuitybrands.com.
 - 2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com.
 - 3. Hubbell Lighting, Inc: www.hubbellighting.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
 - 1. Number of Faces: Single or double as indicated or as required for the installed location.
 - 2. Directional Arrows: As indicated or as required for the installed location.
- C. Self-Powered Exit Signs:

1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
2. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.
3. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
4. Provide low-voltage disconnect to prevent battery damage from deep discharge.
5. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

2.06 BALLASTS AND DRIVERS

- A. Ballasts - General Requirements:
 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. Fluorescent Ballasts:
 1. All Fluorescent Ballasts: Unless otherwise indicated, provide high frequency electronic ballasts complying with ANSI C82.11 and listed and labeled as complying with UL 935.
 - a. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
 - b. Total Harmonic Distortion: Not greater than 20 percent.
 - c. Power Factor: Not less than 0.95.
 - d. Ballast Factor: Normal ballast factor between 0.85 and 1.15, unless otherwise indicated.
 - e. Thermal Protection: Listed and labeled as UL Class P, with automatic reset for integral thermal protectors.
 - f. Sound Rating: Class A, suitable for average ambient noise level of 20 to 24 decibels.
 - g. Lamp Compatibility: Specifically designed for use with the specified lamp, with no visible flicker.
 - h. Lamp Operating Frequency: Greater than 20 kHz, except as specified below.
 - i. Lamp Current Crest Factor: Not greater than 1.7.
 - j. Provide automatic restart capability to restart replaced lamp(s) without requiring resetting of power.
 - k. Provide end of lamp life automatic shut down circuitry for T5 and smaller diameter lamp ballasts.
 - l. Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category A.
 - m. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class A, non-consumer application.
 - n. Ballast Marking: Include wiring diagrams with lamp connections.
- C. Dimmable LED Drivers:
 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 2. Control Compatibility: Fully compatible with the dimming controls to be installed.
 - a. Wall Dimmers: See Section 26 2726.

- b. Daylighting Controls: See Section 26 0923.

2.07 LAMPS

- A. Lamps - General Requirements:
 - 1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
 - 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
 - 3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
 - 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect to be inconsistent in perceived color temperature.
- B. Compact Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
 - 1. Low Mercury Content: Provide lamps that pass the EPA Toxicity Characteristic Leaching Procedure (TCLP) test for characteristic hazardous waste.
 - 2. Correlated Color Temperature (CCT): 3,000 K unless otherwise indicated.
 - 3. Color Rendering Index (CRI): Not less than 80.
 - 4. Average Rated Life: Not less than 10,000 hours for an operating cycle of three hours per start.

2.08 ACCESSORIES

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.
- B. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).

- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
 - 4. Secure pendant-mounted luminaires to building structure.
 - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
 - 7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- F. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
- G. Suspended Luminaires:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 - 3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet in length, with no more than 4 feet between supports.
 - 4. Install canopies tight to mounting surface.
- H. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- I. Install accessories furnished with each luminaire.
- J. Bond products and metal accessories to branch circuit equipment grounding conductor.
- K. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to switched power from same circuit feeding normal lighting in same room or area for control in conjunction with normal power light fixtures.
- L. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from circuit indicated. Bypass local switches, contactors, or other lighting controls.
 - 2. Install lock-on device on branch circuit breaker serving units.
- M. Install lamps in each luminaire.
- N. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.

- D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
- C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.06 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. See Section 01 7900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.
- D. Just prior to Substantial Completion, replace all lamps that have failed .

3.08 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 26 5600
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.
- B. Poles and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0537 - Boxes.
- D. Section 26 0923 - Lighting Control Devices26 0923: Automatic controls for lighting including time switches and outdoor photo controls.
- E. Section 26 5100 - Interior Lighting.

1.03 REFERENCE STANDARDS

- A. AASHTO LTS - Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals; American Association of State Highway and Transportation Officials; 6th Edition, with 2015 Interim Revisions
- B. IEEE C2 - National Electrical Safety Code; Institute of Electrical and Electronic Engineers; 2012.
- C. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; Illuminating Engineering Society; 2015.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- E. NECA/IESNA 501 - Recommended Practice for Installing Exterior Lighting Systems; National Electrical Contractors Association; 2006.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
 - 2. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
- C. Certificates for Poles and Accessories: Manufacturer's documentation that products are suitable for the luminaires to be installed and comply with designated structural design criteria.
- D. Field Quality Control Reports.
- E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
- G. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide three year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acuity Brands, Inc: www.acuitybrands.com.
- B. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com.
- C. Hubbell Lighting, Inc: www.hubbelllighting.com.

2.02 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.03 LUMINAIRES

- A. Manufacturers:
 1. Acuity Brands, Inc: www.acuitybrands.com.
 2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com.
 3. Hubbell Lighting, Inc: www.hubbelllighting.com.
- B. Provide products that comply with requirements of NFPA 70.
- C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

2.04 POLES

- A. All Poles:
 - 1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
 - 2. Structural Design Criteria:
 - a. Comply with AASHTO LTS.
 - b. Wind Load: Include effective projected area (EPA) of luminaire(s) and associated supports and accessories to be installed.
 - c. Dead Load: Include weight of proposed luminaire(s) and associated supports and accessories.
 - 3. Shape: Square straight, unless otherwise indicated.
 - 4. Finish: Match luminaire finish, unless otherwise indicated.
 - 5. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).
- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- F. Pole-Mounted Luminaires:
 - 1. Maintain the following minimum clearances:
 - a. Comply with IEEE C2.

- b. Comply with utility company requirements.
- 2. Foundation-Mounted Poles:
 - a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 03 3000.
 - 1) Install anchor bolts plumb per template furnished by pole manufacturer.
 - 2) Position conduits to enter pole shaft.
 - b. Install foundations plumb.
 - c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
 - d. Tighten anchor bolt nuts to manufacturer's recommended torque.
- 3. Grounding:
 - a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
 - b. Provide supplementary ground rod electrode as specified in Section 26 0526 at each pole bonded to grounding system as indicated.
- 4. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
- G. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.
- I. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 CLEANING

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.
- B. Just prior to Substantial Completion, replace all lamps that have failed.

3.07 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 27 1005
STRUCTURED CABLING FOR VOICE AND DATA - INSIDE-PLANT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Communications system design requirements.
- B. Communications pathways.
- C. Copper cable and terminations.
- D. Communications outlets.
- E. Communications identification.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0534 - Conduit.
- C. Section 26 0537 - Boxes.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products.
- E. Section 26 2726 - Wiring Devices.

1.03 REFERENCE STANDARDS

- A. ICEA S-90-661 - Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cables (With or Without An Overall Shield) For Use in General Purpose and LAN Communications Wiring Systems Technical Requirements; Insulated Cable Engineers Association; 2012. (ANSI/ICEA S-90-661)
- B. NECA/BICSI 568 - Standard for Installing Building Telecommunications Cabling; National Electrical Contractors Association; 2006. (ANSI/NECA/BICSI 568)
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. TIA-568-C.1 - Commercial Building Telecommunications Cabling Standard; Telecommunications Industry Association; Rev C, 2009 (with Addenda; 2012).
- E. TIA-568-C.2 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components; Telecommunications Industry Association; Rev C, 2009.
- F. TIA-569-C - Telecommunications Pathways and Spaces; Telecommunications Industry Association; Rev C, 2012 (with Addenda; 2013).
- G. TIA-606-B - Administration Standard for the Telecommunications Infrastructure; Telecommunications Industry Association; Rev B, 2012.
- H. TIA-607-B - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; Telecommunications Industry Association; Rev B, 2012 (with Addenda; 2013).
- I. UL 444 - Communications Cables; Current Edition, Including All Revisions.
- J. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.
- K. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
2. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- C. Field Test Reports.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified. Installer must be a Panduit PCI in good standing. Must be able to submit a Panduit/General Cable (Pan/Gen) 20 year warranty.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements. Must submit and return to Ramapo College a 20 year Pan/Gen warranty.
- B. Correct defective Work within a 2 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cabling and Equipment:
 1. Panduit: www.panduit.com
 2. General Cable: www.generalcable.com
 3. Technologies (fire stopping): www.specifiedtechnologies.com
 4. Substitutions: See Section 01 6000 - Product Requirements.
 5. Substitutions: No product substitutions without prior written consent from Ramapo College.

2.02 SYSTEM DESIGN

- A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
 1. Comply with TIA-568 (cabling) and TIA-569 (pathways), latest editions (commercial standards).
 2. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
 3. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
 4. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.

- B. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
 - 1. Locate main distribution frame as indicated on the drawings.
- C. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.03 PATHWAYS

- A. Conduit: As specified in Section 26 0534; provide pull cords in all conduit.

2.04 COPPER CABLE AND TERMINATIONS

- A. Copper Backbone Cable:
 - 1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568, ICEA S-90-661, and listed and labeled as complying with UL 444; arranged in 25-pair binder groups.
 - 2. Cable Type: TIA-568 Category 3 UTP (unshielded twisted pair); 24 AWG.
 - 3. Cable Capacity: Quantity of pairs as indicated on drawings.
 - 4. Cable Applications:
 - a. Plenum Applications: Use listed NFPA 70 Type CMP plenum cable.
 - b. Riser Applications: Use listed NFPA 70 Type CMR riser cable or Type CMP plenum cable.
- B. Copper Horizontal Cable:
 - 1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568 and listed and labeled as complying with UL 444.
 - 2. Cable Type - Voice and Data: TIA-568 Category 6A UTP (unshielded twisted pair); 23 AWG.
 - 3. Cable Capacity: 4-pair.
 - 4. Cable Applications: Use listed NFPA 70 Type CMP plenum cable unless otherwise indicated.
 - 5. Cable Jacket Color - Voice and Data Cable: Blue.
 - 6. Product(s):
 - a. General Cable: www.generalcable.com
 - 1) Category 6 UTP Cable:
 - (a) GenSpeed 6000e Part# 7131900
- C. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.
- D. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
 - 1. Performance: 500 mating cycles.
 - 2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.
 - 3. Product(s):
 - a. General Cable: www.generalcable.com
 - 1) Category 6 UTP Cable:
 - (a) Part# CJ688TH(xx)

2.05 COMMUNICATIONS OUTLETS AND PATCHING

- A. Outlet Boxes: Comply with Section 26 0537.
 - 1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.

2. Minimum Size, Unless Otherwise Indicated:
 - a. Voice Only Outlets: 4 inch by 2 inch by 2-1/8 inch deep (100 by 50 by 54 mm) trade size.
 - b. Data or Combination Voice/Data Outlets: 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
- B. Wall Plates:
 1. Comply with system design standards and UL 514C.
 2. Accepts modular jacks/inserts.
 3. Capacity:
 4. Wall Plate Material/Finish - Flush-Mounted Outlets: Match wiring device and wall plate finishes specified in Section 26 2726.
 5. Product(s):
 - a. Panduit: www.panduit.com
- C. Patch Panels:
 1. Patch panel must be Panduit Category 6 Panel. DPA48688TGY.

2.06 GROUNDING AND BONDING COMPONENTS

- A. Comply with TIA-607.

2.07 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606.

2.08 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Factory test cables according to TIA-568. Fluke or JDSU meter acceptable. Tester must have latest testing software downloaded. Launchcords must be either new or within limits of Manufacturers recommendations (i.e. if cords are only supposed to do a maximum of 1,000 tests, Cords need to have been used for testing less than 1,000 times).

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Comply with latest editions and addenda of TIA-568 (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2. Must comply with all aspects of Panduit (Pan/Gen) warranty.
- B. Comply with Communication Service Provider requirements.
- C. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.
- D. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400. Recommended Fire stopping product is Specified Technologies (STI) EZ Path. Please visit STI website for proper product sizing.

3.02 INSTALLATION OF PATHWAYS

- A. Install pathways with the following minimum clearances:
 1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
 2. 12 inches from power conduits and cables and panelboards.
 3. 5 inches from fluorescent and high frequency lighting fixtures.
 4. 6 inches from flues, hot water pipes, and steam pipes.
- B. Conduit, in Addition to Requirements of Section 26 0534:

1. Arrange conduit to provide no more than the equivalent of two 90 degree bend(s) between pull points.
 2. Conduit Bends: Inside radius not less than 10 times conduit internal diameter.
 3. Arrange conduit to provide no more than 100 feet between pull points.
- C. Outlet Boxes:
1. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of telecommunications outlets provided under this section.
 - a. Mounting Heights: Unless otherwise indicated, as follows:
 - 1) Telephone and Data Outlets: 18 inches above finished floor.
 - b. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - c. Locate outlet boxes so that wall plate does not span different building finishes.
 - d. Locate outlet boxes so that wall plate does not cross masonry joints.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

- A. Cabling:
1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
 2. Do not over-cinch or crush cables.
 3. Do not exceed manufacturer's recommended cable pull tension.
 4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
1. At Distribution Frames: 120 inches.
 2. At Outlets - Copper: 12 inches.
- C. Copper Cabling:
1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
 2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
 3. Use T568B wiring configuration.
- D. Identification:
1. Use wire and cable markers to identify cables at each end.
 2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Comply with inspection and testing requirements of specified installation standards.
- C. Visual Inspection:
1. Inspect cable jackets for certification markings.
 2. Inspect cable terminations for color coded labels of proper type.
 3. Inspect outlet plates and patch panels for complete labels.
- D. Testing - Copper Cabling and Associated Equipment:
1. Test backbone cables after termination but before cross-connection.
 2. Test backbone cables for DC loop resistance, shorts, opens, intermittent faults, and polarity between connectors and between conductors and shield, if cable has overall shield.
 3. Category 3 Backbone: Perform attenuation test.

4. Category 3 Links: Test each pair for short circuit continuity, short to ground, crosses, reversed polarity, operational and ring-back, and dial tone.
 5. Category 5e and Above Backbone: Perform near end cross talk (NEXT) and attenuation tests.
 6. Category 5e and Above Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.
- E. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

END OF SECTION

SECTION 31 2316
EXCAVATION

PART 1 GENERAL

1.01 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for excavation.

1.02 PROJECT CONDITIONS

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.

PART 3 EXECUTION

2.01 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the work are as indicated.

2.02 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Notify utility company to remove and relocate utilities.
- D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Protect plants, lawns, rock outcroppings, and other features to remain.

2.03 EXCAVATING

- A. Underpin adjacent structures that could be damaged by excavating work.
- B. Excavate to accommodate new structures and construction operations.
- C. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- D. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- E. Do not interfere with 45 degree bearing splay of foundations.
- F. Cut utility trenches wide enough to allow inspection of installed utilities.
- G. Hand trim excavations. Remove loose matter.
- H. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323.
- I. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- J. Remove excavated material that is unsuitable for re-use from site.
- K. Remove excess excavated material from site.

2.04 FIELD QUALITY CONTROL

- A. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

2.05 PROTECTION

- A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

SECTION 31 2323

FILL

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2010
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2012.
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)); 2012.
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.
- F. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Materials Sources: Submit name of imported materials source.
- C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- D. Compaction Density Test Reports.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where indicated.
 - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
 - 2. Prevent contamination.
 - 3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. All Fill: Conforming to types as indicated on the drawings _____.

2.02 ACCESSORIES

- A. Geotextile Fabric: Mirafi 600X or equivalent. Place over completed subgrade per geotechnical report.

2.03 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey bench marks and intended elevations for the Work are as indicated.
- B. Identify required lines, levels, contours, and datum locations.
- C. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- D. Verify structural ability of unsupported walls to support imposed loads by the fill.

3.02 PREPARATION

- A. Scarify subgrade surface to a depth of 6 inches to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

- A. Fill to contours and elevations indicated using unfrozen materials.
- B. Fill up to subgrade elevations unless otherwise indicated.
- C. Employ a placement method that does not disturb or damage other work.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
- G. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- H. Correct areas that are over-excavated.
 - 1. Other areas: Use structural fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- I. Compaction Density Unless Otherwise Specified or Indicated:
 - 1. At other locations: 95 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.

3.04 TOLERANCES

- A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D3017, or ASTM D6938.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.

- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.06 CLEANING

- A. Remove unused stockpiled materials, leave area in a clean and neat condition.
Grade stockpile area to prevent standing surface water.

END OF SECTION