

**MECHANICAL NOTES AND SPECIFICATIONS**

**I. GENERAL**

- A. CONTRACTOR SHALL PERFORM ALL WORK AS TO CONFORM TO LOCAL, STATE AND NATIONAL CODES AND THE REQUIREMENTS OF LOCAL AUTHORITIES HAVING JURISDICTION.
- B. CONTRACTOR TO EXAMINE THE SITE TO DETERMINE THE EXACT CONDITIONS EFFECTING THE MECHANICAL WORK. THE CONTRACTOR SHALL VERIFY ALL OVERSIGHTS NOTED ON THE PLANS.
- C. DRAWINGS INDICATE THE GENERAL SCHEME OF THE INSTALLATION AND ARE DIAGRAMMATIC IN SCOPE. THE ENGINEER RESERVES THE RIGHT TO CHANGE THE LOCATION OF DUCTWORK, PIPING, DIFFUSERS, APPARATUS, ETC. TO A REASONABLE EXTENT AS THE BUILDING CONDITIONS MAY DICTATE PRIOR TO THEIR INSTALLATION WITHOUT EXTRA COST TO THE OWNER. THE EXACT LOCATION AND ARRANGEMENT OF ALL EQUIPMENT AND PARTS SHALL BE DETERMINED AS THE WORK PROGRESSES.
- D. DETAILS OF CONSTRUCTION AND OF WORKMANSHIP WHERE NOT SPECIFICALLY DESCRIBED HEREIN OR INDICATED ON THE DRAWINGS SHALL BE SUBJECT TO THE ENGINEER'S APPROVAL. IT IS THE INTENT OF THESE SPECIFICATIONS TO PROVIDE COMPLETE SYSTEMS, CONSTRUCTED WITH NEW AND FIRST QUALITY MATERIALS AND EQUIPMENT LEFT IN GOOD WORKING ORDER, READY FOR OPERATION.
- E. SCRAP DEBRIS AND ABANDONED HVAC EQUIPMENT/DUCTWORK/SUPPORTS/CONTROLS AND ACCESSORIES SHALL, EXCEPT AS OTHERWISE SPECIFIED, BE REMOVED FROM THE SITE AND DISPOSED OF BY THIS CONTRACTOR.
- F. THE CONTRACTOR SHALL BE RESPONSIBLE FOR START-UP OF ALL SYSTEMS.
- G. ALL WORK SHALL BE DONE WITH A MINIMUM OF DUST AND DRIFT. PROVIDE SUFFICIENT FIBERGLASS TARPULINS AND COVER ALL EQUIPMENT IN WORK AREA WITH SAME DURING WORK OPERATIONS.
- H. CONTRACTOR SHALL FURNISH SHOP DRAWINGS AND EQUIPMENT CUTS TO THE ARCHITECT FOR APPROVAL (MINIMUM 10 COPIES). THE ENGINEER'S APPROVAL SHALL NOT RELIEVE THE CONTRACTOR FROM HIS OBLIGATION TO COMPLY WITH THE INFORMATION CONTAINED IN THE CONTRACT DOCUMENTS.
- I. CONTRACTOR SHALL COORDINATE CONNECTIONS TO STREET WITH LOCAL UTILITY COMPANIES.
- J. CONTRACTOR SHALL FILE, SECURE AND PAY FOR ANY NECESSARY APPROVALS, PERMITS AND INSPECTIONS.
- K. ALL WORK SHALL BE IN STRICT CONFORMANCE WITH THE STATE OF NEW JERSEY UNIFORM CONSTRUCTION CODE, THE STATE OF NEW JERSEY FIRE PREVENTION CODE (NJAC 17:28), THE STATE OF NEW JERSEY FIRE PREVENTION CODE, THE INTERNATIONAL BUILDING CODE, THE INTERNATIONAL MECHANICAL CODE AND THE ASHRAE 90.1-2001 ENERGY CONSERVATION CODE.
- L. PRIOR TO TESTING, CONTRACTOR SHALL MAKE ALL SYSTEM ADJUSTMENTS REQUIRED FOR PROPER OPERATION. ADJUSTMENTS SHALL INCLUDE AIR BALANCING, HYDRONIC BALANCING, ETC.
- M. ALL SYSTEMS SHALL BE TESTED IN ACCORDANCE WITH THE INTERNATIONAL MECHANICAL CODE AND THE STATE OF NEW JERSEY FIRE PREVENTION CODE. CONTRACTOR TO COORDINATE TESTS WITH LOCAL OFFICIALS.
- N. CONTRACTOR SHALL BE RESPONSIBLE FOR DISCONNECTING ALL FACILITIES IN AREAS INDICATED FOR DEMOLITION ON THE ARCHITECTURAL DRAWINGS.
- O. WHERE DEMOLITION OF EXISTING SERVICES RESULTS IN THE INTERRUPTION OF DUCTWORK, MECHANICAL PIPING, ETC. SERVING AREAS WHICH ARE TO REMAIN, INSTALL BYPASS CONNECTIONS AS REQUIRED TO RESTORE REMAINING SERVICES TO OPERATION. SIZING, MATERIAL, JOINTINGS AND INSULATION OF BYPASS CONNECTIONS SHALL MATCH EXISTING INSTALLATION.
- P. ALL WORK SHALL BE GUARANTEED TO BE FREE FROM DEFECT FOR ONE YEAR AFTER ACCEPTANCE OF WORK.
- Q. THE CONTRACTOR'S PROPOSAL AND BASE BID MUST COVER ALL ITEMS IN THE PLANS AND SPECIFICATIONS EXACTLY AS DRAWN, NOTED, SCHEDULED, DETAILED AND SPECIFIED. TO RECEIVE CONSIDERATION FOR A SUBSTITUTION OF MATERIALS AND/OR EQUIPMENT, THE CONTRACTOR MUST INCLUDE THE FOLLOWING INFORMATION WITH HIS BASE BID:
  - DOCUMENTATION OF EQUALITY. A SIDE-BY-SIDE COMPARISON OF PERFORMANCE AND CONSTRUCTION MATERIALS BETWEEN THE SPECIFIED ITEM AND THE PROPOSED SUBSTITUTION.
  - THE DOLLAR VALUE FOR CREDIT ASSOCIATED WITH THE SUBSTITUTED ITEM(S) SHALL BE ITEMIZED IN THE BASE BID.
- R. IN ACCORDANCE WITH IMC 2004 SECTION 602.1, THE FOLLOWING REQUIREMENTS SHALL APPLY TO ALL WIRING LOCATED IN A PLUMB CEILING:
  - a. MUST BE LOW VOLTAGE OR POWER LIMITED.
  - b. FLAME SPREAD NOT GREATER THAN FIVE FEET.
  - c. WIRE SHALL BEAR THE LABEL OF AN APPROVED AGENCY AND BE MARKED IN ACCORDANCE WITH NFPA 70.
  - d. THERMAL AND ACOUSTICAL MATERIALS AND PIPE INSULATION MUST HAVE A FLAME SPREAD RATING OF 25 OR LESS AND A SMOKE DEVELOPED RATING RATING OF 50 OR LESS WHEN TESTED IN ACCORDANCE WITH ASTM E84.

2. SCOPE OF WORK
  - A. THE WORK SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING:
    - B. FURNISH AND INSTALL ALL NEW EXHAUST AIR DUCTWORK.
    - C. FURNISH AND INSTALL INSULATION FOR ALL SUPPLY & RETURN AIR DUCTWORK.
    - D. FURNISH AND INSTALL ALL FAN COIL UNITS AS SHOWN ON DRAWINGS AND SPECIFIED IN SCHEDULES.
    - E. FURNISH AND INSTALL ALL CEILING MOUNTED CABINET EXHAUST FANS AS SHOWN ON DRAWINGS AND SPECIFIED IN SCHEDULES.
    - F. FURNISH AND INSTALL ALL HANGERS AND SUPPORTS.
    - G. FURNISH AND INSTALL ALL HOT/CILLED WATER PIPES FOR FAN COIL UNITS AS REQUIRED.
    - H. SHOP DRAWINGS.
    - I. ENGAGE THE SERVICES OF AN APPROVED INDEPENDENT AIR BALANCING COMPANY TO BALANCE THE SYSTEMS AND ISSUE AN AIR BALANCING REPORT. THE INDEPENDENT AIR BALANCING COMPANY SHALL BE SUBJECT TO THE ENGINEER'S APPROVAL. IF NECESSARY, PROVIDE MANUAL VOLUME DAMPERS AT BRANCH DUCTWORK TO ASSURE PROPER AIR BALANCE.
    - J. ALTERATIONS, REMOVALS, AND DISPOSAL.
    - K. CUTTING AND ROUGH PATCHING.
    - L. OBTAINING AND PAYING FOR ALL NECESSARY PERMITS, INSPECTIONS AND CERTIFICATES REQUIRED IN CONNECTION WITH THIS WORK.
    - M. REMOVE ALL WORK INDICATED ON THE DRAWINGS.
    - N. REMOVE ALL EXISTING HVAC EQUIPMENT AS SHOWN ON PLANS.
    - O. FURNISH AND INSTALL INSULATION FOR ALL HOT/CILLED WATER PIPING.
    - P. GUARANTEE ALL WORK FOR A PERIOD OF ONE YEAR FROM THE FINAL DATE OF ACCEPTANCE.

**3. WORK NOT INCLUDED**

- THE FOLLOWING ITEMS OF WORK SHALL BE PROVIDED UNDER OTHER CONTRACTS:
- A. FINISHED PATCHING AND PAINTING.
  4. NOISE CONTROL
    - A. ALL INSTALLATION SHALL BE IN A MANNER THAT THE NOISE CRITERIA LEVEL IN THE SPACE SHALL NOT EXCEED NC-35. NOISE LEVELS ABOVE THIS LIMIT WILL NOT BE ACCEPTABLE AND SHOULD BE CORRECTED BY THIS CONTRACTOR AT NO EXPENSE TO THE OWNER.
    - B. ALL SUPPLY AND RETURN DUCTWORK SHALL BE PROVIDED WITH 1" INTERNAL ACOUSTIC LINING AT LEAST 20" FROM EACH AIR HANDLING UNIT. ALL DUCTWORK DIMENSIONS NOTED ON THE PLANS ARE CLEAR INSIDE DIMENSIONS.
  5. VIBRATION CONTROL
    - A. ALL INSTALLATIONS SHALL BE IN SUCH A MANNER THAT VIBRATION FROM ROTATING EQUIPMENT IS ISOLATED FROM DUCTWORK, PIPING AND THE BUILDING STRUCTURE.
    - B. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT ALL LOCATIONS WHERE RIGID DUCTWORK CONNECTS TO FANS, AIR HANDLERS, OR OTHER EQUIPMENT CAPABLE OF PRODUCING OBJECTIONABLE VIBRATION. FLEXIBLE CONNECTIONS SHALL BE 30 OZ. NEOPRENE COATED FABRIC SECURED WITH HEAVY DUTY BANDS OR CORNERS.
    - C. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT ALL LOCATIONS WHERE PIPING CONNECTS TO PUMPS OR OTHER EQUIPMENT CAPABLE OF PRODUCING OBJECTIONABLE VIBRATION.
    - D. ALL EQUIPMENT SUPPORTED FROM THE BUILDING STRUCTURE SHALL BE PROVIDED WITH SPRING-TYPE VIBRATION ISOLATORS.

**6. SHEET METAL DUCTWORK**

- A. ALL RECTANGULAR DUCTWORK, UNLESS OTHERWISE NOTED, SHALL BE BUILT FROM GALVANIZED SHEET STEEL AND THOROUGHLY BRACKET 4 SUFFICIENT. ALL DUCTWORK DIMENSIONS NOTED ON THE PLANS ARE CLEAR INSIDE DIMENSIONS.
- B. FABRICATION OF SHEET METAL DUCTS SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF ASHRAE LATEST EDITION OR AS PER SHACMA DUCT CONSTRUCTION MANUAL(S). ALL BRANCH DUCTWORK AND TAKE-OFFS SHALL BE PROVIDED WITH VOLUME DAMPERS.
- C. CONTRACTOR SHALL SEAL ALL DUCTWORK JOINTS WITH 3M EC-800 OR APPROVED EQUAL.
- D. UNLESS OTHERWISE NOTED, ALL DUCTWORK SHALL BE CONCEALED WITHIN CEILINGS, HALLS, FLOORS AND SHAFTS.
- E. ALL DUCTWORK GAUGES, AND INSTALLATION SHALL CONFORM TO THE LATEST EDITION OF SHACMA STANDARDS.
- F. CHANGES IN SHAPE AND DIMENSION SHALL CONFORM TO THE FOLLOWING: EXCEPT WHERE OTHERWISE NOTED, FOR INCREASES IN CROSS-SECTIONAL AREA, THE SHAPE OF THE TRANSFORMATION SHALL NOT EXCEED 1" IN 12" SPACE. CONDITIONS PERMITTING, EXCEPT WHERE OTHERWISE NOTED, FOR REDUCTIONS IN AREA, THE SLOPE SHALL NOT BE LESS THAN 1" IN 12" SPACE CONDITIONS PERMITTING.
- G. THE CONSTRUCTION FOR LOW PRESSURE RECTANGULAR SHEET METAL DUCTS SHALL BE MADE IN ACCORDANCE WITH RECOMMENDATIONS OF ASHRAE GUIDE, LATEST EDITION, OR AS PER SHACMA MANUAL, BUT NOT LESS THAN THE FOLLOWING HEIGHTS AND CONSTRUCTION:
 

LOW PRESSURE RECTANGULAR/ROUND DUCTWORK STANDARDS			
DIMENSION OF LONGEST SIDE OF DUCT (INCHES)	MINIMUM GAUGE OF SHEET METAL FOR ALL FOUR SIDES OF DUCT		TRANSVERSE REINFORCING AT AND BETWEEN DUCT JOINTS
	ALUMINUM STEEL (GAUGE)	THICKNESS (INCHES)	
UP THRU 12	26	0.020	1" POCKET LOCK 24 GAUGE, STANDING SEAM JOINT 24 GAUGE, 1" STANDING S SLIP 24 GAUGE, JOINT MAX ON 8 FT. CENTERS.

- H. FLAT AREAS OF DUCT OVER 18 IN. INDE SHALL BE STIFFENED BY CROSS BRACING OR BEADING.
- I. ALL JOINTS SHALL HAVE CORNER CLOSURES.
  1. PROVIDE 3M GO S GASKET EC-1002 GASKET AT FLANGED JOINTS AND ALL SLIP JOINTS SHALL BE SEALED WITH 3M GO S EC-800. JOINTS SHALL BE MAXIMUM ON 8 FEET CENTERS.
- K. THIS CONTRACTOR MAY ELECT THE OPTION OF USING STANDARD PREFABRICATED SPIRAL CONSTRUCTION CONDUIT AND PREFABRICATED FITTINGS AS MADE BY UNITED SPIRAL CO. OR APPROVED EQUAL. ALL JOINTS SHALL BE SEALED WITH 3M GO S EC-800.
- L. ALL JOINTS IN A DUCT SYSTEM MUST BE TIGHT IN ORDER TO ENSURE PROPER AIR DISTRIBUTION AND STRUCTURAL INTEGRITY. DUCT SUPPORT SHALL NOT EXCEED 10 FEET.
7. FLEXIBLE DUCTWORK
  - A. FLEXIBLE DUCTWORK SHALL BE PERMITTED FOR USE BETWEEN BRANCH DUCTWORK AND CEILING DIFFUSERS IN LENGTHS NOT EXCEEDING 10'-0".
  - B. LOW PRESSURE FLEXIBLE DUCTWORK SHALL BE A FACTORY ASSEMBLY OF LOW FRICTION POLYMER INNER LINER APPLIED OVER A MECHANICALLY INTERLOCKED, GALVANIZED STEEL HELIX. INSULATION SHALL BE FIBERGLASS WITH A THERMAL CONDUCTANCE OF NOT MORE THAN 0.25. THE OVERALL ASSEMBLY SHALL BE JACKETED WITH A POLYETHYLENE VAPOR BARRIER HAVING A PERMEANCE OF NOT GREATER THAN 0.1 WHEN TESTED IN ACCORDANCE WITH ASTM METHOD PROCEDURE A. ASSEMBLY SHALL BE RATED FOR A MAXIMUM WORKING PRESSURE OF 6" WC. POSITIVE, 4" WC. NEGATIVE, 4,000 FPM MAXIMUM VELOCITY AND -20°F TO 200°F OPERATING TEMPERATURE. MINIMUM EXIST PRESSURE SHALL BE NOT LESS THAN 250% OF RATED WORKING PRESSURE. DUCT SHALL BE UL LISTED AS "CLASS 0" OR "CLASS 1" FLEXIBLE AIR DUCT UNDER UL 181 AND SHALL BE SO IDENTIFIED. FLAME SPREAD RATING SHALL BE LESS THAN 25. UL SMOKE DEVELOPED RATING SHALL BE LESS THAN 50. LOW PRESSURE FLEXIBLE DUCT SHALL BE "TYPE 4" INSULATED AS MANUFACTURED BY FLEXIMASTER USA, INC. OR ENGINEER APPROVED EQUAL.
  - C. ALL FLEXIBLE DUCTWORK SHALL BE SECURED USING HEAVY DUTY, STAINLESS STEEL CLAMPS.

**B. PIPING**

- A. ALL PIPE SHALL BE NEW, FREE FROM SCALE OR RUST, OF THE MATERIAL AND HEIGHT SPECIFIED UNDER THE VARIOUS SERVICES. EACH LENGTH OF PIPE SHALL BE PROPERLY MARKED AT THE MILL FOR PROPER IDENTIFICATION WITH NAME OR SYMBOL OF MANUFACTURER.
- B. ALL FITTINGS USED AT EXPANSION LOOPS OR BENDS SHALL BE EXTRA HEAVY.
- C. ALL HOT/CILLED WATER PIPING SHALL BE SCHEDULE 40 STEEL.
- D. PROVIDE NECESSARY STRUCTURAL MEMBERS, HANGERS AND SUPPORTS OF APPROVED DESIGN TO KEEP PIPING IN PROPER ALIGNMENT AND PREVENT TRANSMISSION OF NUISANCE THROTS AND VIBRATIONS. IN ALL CASES WHERE HANGERS, BRACKETS, ETC., ARE SUPPORTED FROM METAL DECKING AND/OR CONCRETE CONSTRUCTION, CARE SHALL BE TAKEN NOT TO WEAKEN DECKING AND/OR CONCRETE OR PENETRATE WATERPROOFING. ALL HANGERS AND SUPPORTS SHALL BE CAPABLE OF CARRYING WEIGHT AFTER PIPING IS INSTALLED. HANGERS SUPPORTING PIPING EXPANDING INTO LOOPS, BENDS AND OFFSETS SHALL BE SECURED TO THE BUILDING STRUCTURE IN SUCH A MANNER THAT HORIZONTAL ADJUSTMENT PERPENDICULAR TO THE RUN OF PIPING SUPPORTED MAY BE MADE TO ACCOMMODATE DISPLACEMENT DUE TO EXPANSION. ALL SUCH HANGERS SHALL BE FINALLY ADJUSTED, BOTH IN THE VERTICAL AND HORIZONTAL DIRECTION WHEN THE SUPPORTED PIPING IS HOT OR CHILLED, AS REQUIRED.
- E. ALL VERTICAL PIPING SHALL BE ANCHORED BY MEANS OF HEAVY STEEL CLAMPS SECURELY BOLTED OR WELDED TO THE PIPING AND WITH END EXTENSION BEARING ON THE BUILDING.
- F. ALL PIPING SHALL BE ERECTED SO AS TO ENSURE A PERFECT AND NOISELESS CIRCULATION THROUGHOUT THE SYSTEM.
- G. ALL VALVES AND SPECIALTIES SHALL BE SO PLACED AS TO PERMIT EASY OPERATION AND ACCESS.
- H. PROVIDE PROPER PROVISION FOR EXPANSION AND CONTRACTION IN ALL PORTIONS OF PIPEWORK TO PREVENT undue STRAINS ON PIPING OR APPARATUS CONNECTED THEREWITH. PROVIDE DOUBLE SHANGES AT RISER TRANSFERS AND OTHER OFFSETS WHEREVER POSSIBLE TO TAKE UP EXPANSION, ARRANGE RISER BRANCHES TO TAKE UP MOTION OF RISER.
- I. THE ENDS OF ALL PIPE AND NIPPLES SHALL BE THOROUGHLY BEAMED TO THE FULL INSIDE DIAMETER OF THE PIPE AND ALL BURS FORMED IN THE CUTTING OF THE PIPES SHALL BE REMOVED.
- J. PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE ASME CODE FOR PRESSURE PIPING.
- K. PIPING AT ALL EQUIPMENT AND CONTROL VALVES SHALL BE SUPPORTED TO PREVENT STRAINS OR DISTORTIONS IN THE CONNECTED EQUIPMENT AND CONTROL VALVES. PIPING SHALL BE SUPPORTED TO ALLOW FOR REMOVAL OF EQUIPMENT, VALVES AND ACCESSORIES WITH A MINIMUM OF DISMANTLING AND WITHOUT REQUIRING ADDITIONAL SUPPORTS AFTER THESE ITEMS ARE REMOVED.
- L. MISCELLANEOUS DRAINS, VENTS, RELIEFS, AND OVERFLOWS FROM TANKS, EQUIPMENT, PIPING, RELIEF VALVES, PUMPS, ETC., SHALL BE RUN TO THE NEAREST OPEN SIGHT DRAIN OR ROOF DRAIN. PROVIDE DRAIN VALVES WHENEVER REQUIRED FOR COMPLETE DRAINAGE OF PIPING, INCLUDING THE SYSTEM SIDE OF ALL PUMPS.
- M. INSTALL AIR VENTS IN CONDENSER, CHILLED AND HOT WATER PIPING AT ALL HIGH POINTS.

**9. INSULATION**

- A. PIPE INSULATION SHALL BE HEAVY DENSITY FIBERGLASS SECTIONAL PIPE INSULATION WITH A MAXIMUM K FACTOR OF 0.25 AT 75 DEGREES F MEAN TEMPERATURE WITH FACTORY APPLIED ALL SERVICE VAPOR BARRIER, JACKET, DENSITY SHALL BE NOT LESS THAN 3 LBS. PER CUBIC FEET.
- B. INSULATE ALL HOT/CILLED WATER PIPING WITH 1-1/2" FIBERGLASS INSULATION WITH VAPOR BARRIER.

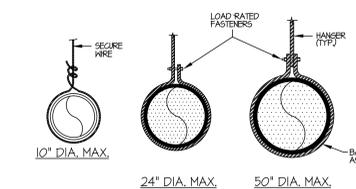
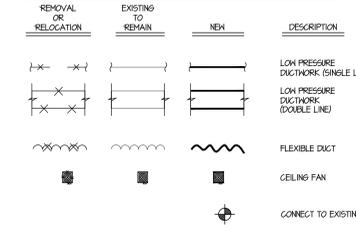
**10. SHOP DRAWINGS**

- A. PRIOR TO ISSUING SHOP DRAWING SUBMITTALS FOR THE ENGINEER'S REVIEW, THE CONTRACTOR SHALL BE RESPONSIBLE TO REVIEW ALL OF THE SUBMITTAL DATA. THE CONTRACTOR SHALL STAMP EACH SHOP DRAWING CERTIFYING THAT THE CONTRACTOR'S REVIEW HAS BEEN COMPLETED AND THAT COORDINATION HAS BEEN ESTABLISHED.
- B. THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE HIS WORK WITH THE WORK OF ALL OTHER TRADES. ALL SHOP DRAWINGS SHALL ILLUSTRATE THAT COORDINATION HAS BEEN ESTABLISHED. FOR SHEET METAL PIPING AND EQUIPMENT LAYOUTS COMPOSITE DRAWINGS SHALL BE SUBMITTED. FIELD RELATED CONFLICTS SHALL BE RESOLVED BY THIS CONTRACTOR.
  1. DUCTWORK.
  2. PIPING.
  3. PIPE HANGERS AND SUPPORTS.
  4. PIPE INSULATION.
  5. FAN COIL UNITS.
  6. FANS.
  7. CONTROLS.
  8. AIR/HYDRONIC BALANCING REPORT.
- C. SUBMIT SHOP DRAWINGS (PROVIDE A MINIMUM OF FIVE COPIES TO ARCHITECT FOR ENGINEER'S APPROVAL) COVERING THE FOLLOWING ITEMS:
  1. DUCTWORK.
  2. PIPING.
  3. PIPE HANGERS AND SUPPORTS.
  4. PIPE INSULATION.
  5. FAN COIL UNITS.
  6. FANS.
  7. CONTROLS.
  8. AIR/HYDRONIC BALANCING REPORT.
- D. THE ENGINEER'S SHOP DRAWING APPROVAL SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY TO COMPLY WITH ALL OF THE INFORMATION INDICATED IN THE CONTRACT DOCUMENTS (i.e. PLANS, SCHEDULES, DETAILS, NOTES AND SPECIFICATIONS, ETC.).
- E. TESTS AND BALANCING
  - II. TESTS AND BALANCING
    - A. THE WORK OF THIS CONTRACTOR SHALL INCLUDE THE FURNISHING OF ALL TESTING INSTRUMENTS, GAUGES, AND OTHER EQUIPMENT REQUIRED FOR NECESSARY TESTS REQUIRED BY LAW RULES AND REGULATIONS AND AS SPECIFIED.
    - B. NO VISIBLE LEAKS, LOSSES IN PRESSURE, OR INCREASE IN VACUUM SHALL OCCUR DURING TEST PERIOD.
    - C. PROVIDE ALL OTHER TESTS REQUIRED BY BUILDING DEPARTMENT, FIRE DEPARTMENT AND ALL OTHER PUBLIC AGENCIES HAVING JURISDICTION.
    - D. TESTS SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF THE ARCHITECT AND SUCH OTHER PARTIES AS MAY HAVE LEGAL JURISDICTION.
    - E. OPERATE THE INSTALLATION AFTER COMPLETION FOR PERIOD NECESSARY TO MAKE ALL REQUIRED ADJUSTMENTS FOR AUTOMATIC CONTROLS, AIR OUTLETS AND FANS, UNTIL ALL PERFORMANCE CHARACTERISTICS ARE MET.
    - F. ENGAGE THE SERVICES OF APPROVED INDEPENDENT AIR AND HYDRONIC BALANCING COMPANY TO BALANCE THE SYSTEM AND ISSUE AN AIR AND HYDRONIC BALANCING REPORT FOR ENGINEER'S APPROVAL. THE REPORTING BALANCING COMPANY SHALL BE SUBJECT TO THE ENGINEER'S APPROVAL. THE TEST SHALL BE PERFORMED BY A PERSON HAVING A MINIMUM OF 5 YEARS EXPERIENCE IN TESTING AND BALANCING AIR AND HYDRONIC SYSTEMS.
    - G. UPON COMPLETION OF THE INSTALLATION, THE AIR AND HYDRONIC BALANCE AND TESTING SUBCONTRACTOR SHALL MAKE THE NECESSARY ADJUSTMENTS TO BALANCE THE SYSTEM. PROVIDE ANY EXTRA MANUAL VOLUME DAMPERS REQUIRED FOR PROPER AIR BALANCE.
    - H. AT THE COMPLETION OF THE TEST, THE CONTRACTOR SHALL FURNISH THE ARCHITECT SEVEN (7) COPIES OF THE FINAL TEST REPORT.

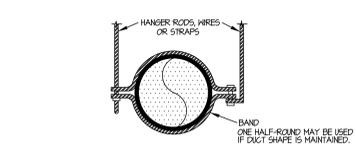
**12. GUARANTEE**

- A. THE CONTRACTOR GUARANTEES BY HIS ACCEPTANCE OF THE CONTRACT THAT ALL WORK INSTALLED WILL BE FREE FROM ANY AND ALL DEFECTS FOR A PERIOD OF ONE YEAR FROM DATE OF COMPLETION AND ACCEPTANCE OF WORK.

**HVAC SYMBOLS FOR ALTERATION WORK**



NOTE: HANGERS MUST NOT DEFORM DUCT SHAPE.



METHOD OF HANGING ROUND DUCTWORK (N.T.S.)

DUCT DIAMETER	ROD DIAMETER	STRAP	WIRE DIAMETER	MAXIMUM SPACING
10" TO 10"	1/4"	1" X 22 ga.	ONE (1) 12 ga.	12'-0" O.C.
11" TO 18"	1/4"	1" X 22 ga.	TWO (2) 12 ga. ONE (1) 8 ga.	12'-0" O.C.
19" TO 24"	1/4"	1" X 22 ga.	TWO (2) 10 ga.	12'-0" O.C.
25" TO 36"	3/8"	1" X 20 ga.	TWO (2) 8 ga.	12'-0" O.C.
37" TO 50"	(2) 3/8"	TWO (2) 1" X 20 ga.	-	12'-0" O.C.
51" TO 60"	(2) 3/8"	TWO (2) 1" X 18 ga.	-	12'-0" O.C.
61" TO 84"	(2) 3/8"	TWO (2) 1" X 18 ga.	-	12'-0" O.C.

**PIPING INSULATION NOTE:**  
CONTRACTOR SHALL INSPECT ALL EXISTING HOT/CILLED WATER PIPING INSULATION THROUGHOUT THE BUILDING, INCLUDING CRAWL SPACE AND REPAIR OR REPLACE INSULATION AS REQUIRED.

Revisions

Date	Issue	Description
03-06-15	1	ISSUED FOR DCA FILING
03-18-15	2	ISSUED FOR BIDDING

Consultants

**LINWOOD ENGINEERING ASSOCIATES, P.A.**

CONSULTING MECHANICAL & ELECTRICAL ENGINEERS

**LEA**

955 Lincoln Ave. Glen Rock, New Jersey 07452  
 201.857.3998  
 201.857.3994

301 Dupont Drive-Suite 150 Irvine, California 92612  
 714.424.0001  
 714.424.0004

www.linwoodengineering.com

**Michael T. Davina, P.E.**  
 NJ #48654  
 CT #0025779

**Robert J. Hatch, P.E.**  
 AR #13868  
 CA #E16118  
 CT #15318  
 FL #69560  
 MA #48516  
 NJ #30419  
 NY #019975  
 NY #56608  
 PA #03601-E

Project

INTERIOR RENOVATIONS  
AT THE  
**HOLLY - C RESIDENCE**

**RAMAPO COLLEGE**  
OF NEW JERSEY

505 Ramapo Valley Road  
Mahwah, New Jersey 07430-1680

Client

**RAMAPO COLLEGE**  
OF NEW JERSEY

505 Ramapo Valley Road  
Mahwah, New Jersey 07430-1680

**SNS** Architects & Engineers, PC

1 PARAGON DRIVE . MONTVALE . NEW JERSEY . 07645  
 tel: 201.573.1767 fax: 201.573.0808 www.sns-arch-eng.com

Fay W. Logan, AIA ○

John M. Lignos, AIA ○

Lorin J. Sonenshine, AIA ○

Steven Napolitano, PE ○

Cert./Lic. No. \_\_\_\_\_

Date 02-03-15 Scale AS NOTED

Drawn By PVL/edd Checked By HD

Dwg. Title  
**HVAC NOTES, DETAILS & SYMBOLS**

Work Order No. **4698C** Dwg. No. **M001**