DIVISION 15 - MECHANICAL
SECTION 15000
MECHANICAL GENERAL PROVISIONS

A. GENERAL CONDITIONS

1. DRAWINGS AND GENERAL PROVISIONS OF CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND ALL OTHER SPECIFICATION SECTIONS ARE A PART OF THIS CONTRACT AND APPLY TO THIS AND THE OTHER SECTIONS OF DIVISION 15.

2. THE CONTRACTOR FOR THIS WORK IS REQUIRED TO READ THE ENTIRE SPECIFICATIONS AND REVIEW DRAWINGS FOR ALL OTHER TRADES.

3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING HIS SUBCONTRACTORS WITH A FULL SET OF BID SET DOCUMENTS (INCLUDING SPECIFICATIONS) AND THE COORDINATION OF HIS WORK AND INSPECTIONS AND THE WORK AND INSPECTIONS OF HIS SUBCONTRACTORS WITH ALL OTHER TRADES ON SITE CONFORMING TO THE GENERAL CONTRACTOR'S TIME SCHEDULE.

4. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING HIS BID TO DETERMINE CONDITIONS AFFECTING THE WORK. BIDS SHALL SERVE AS EVIDENCE OF KNOWLEDGE OF EXISTING CONDITIONS AND ANY MODIFICATIONS WHICH ARE REQUIRED TO MEET THE INTENT OF THE DRAWINGS AND SPECIFICATIONS. FAILURE TO VISIT THE SITE DOES NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY IN PERFORMANCE OF WORK.

5. WHEN USED, THE TERM "PROVIDED BY CONTRACTOR" SHALL BE INTERPRETED AS MEANING "FURNISHED AND INSTALLED" WITH THE EXCEPTION WHERE ITEMS ARE "PROVIDED BY TENANT" WHICH MEANS "FURNISHED ONLY" (INSTALLED BY CONTRACTOR), EXCEPT AS SPECIFICALLY NOTED OTHERWISE.

B. GENERAL REQUIREMENTS

1. THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, SERVICES, TOOLS, TRANSPORTATION, INCIDENTALS AND DETAILS NECESSARY TO PROVIDE A COMPLETE AND FULLY FUNCTIONAL MECHANICAL SYSTEM AS SHOWN ON THE DRAWINGS, CALLED FOR IN THE SPECIFICATIONS, AND AS REQUIRED BY JOB CONDITIONS. ALL WORK NOT SPECIFICALLY NOTED AS BEING BY THE LANDLORD SHALL BE PROVIDED BY THE MECHANICAL CONTRACTOR. CLOSELY COORDINATE THE ENTIRE INSTALLATION WITH THE LANDLORD, AS REQUIRED. FIELD VERIFY THE EXACT TYPE, SIZE AND LOCATION, ETC. OF EXISTING PIPE AND DUCTS IN THE TENANT SPACE PRIOR TO BID.

2. THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO SUPPLEMENT EACH OTHER AND ANY MATERIAL OR LABOR CALLED FOR IN ONE SHALL BE PROVIDED EVEN THOUGH NOT SPECIFICALLY MENTIONED IN BOTH. ANY MATERIAL OR LABOR WHICH IS NEITHER SHOWN ON THE DRAWINGS NOR CALLED FOR IN THE SPECIFICATIONS, BUT WHICH IS OBVIOUSLY NECESSARY TO COMPLETE THE WORK, AND WHICH IS USUALLY INCLUDED IN WORK OF SIMILAR CHARACTER, SHALL BE PROVIDED AS PART OF CONTRACT.

3. WHERE THE DRAWINGS OR SPECIFICATIONS CALL FOR ITEMS WHICH EXCEED CODES OR THE LANDLORD'S TENANT CRITERIA, THE CONTRACTOR IS STILL RESPONSIBLE FOR PROVIDING THE SYSTEM AS DESIGNED AND DESCRIBED ON THESE DRAWINGS, UNLESS SPECIFICALLY NOTED OTHERWISE.

4. ALL MECHANICAL WORK SHALL BE INSTALLED SO AS TO BE READILY ACCESSIBLE FOR OPERATING, SERVICING, MAINTAINING, AND REPAIRING. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SUFFICIENT ACCESS TO ALL EQUIPMENT FOR SERVICE.

5. THE CONTRACTOR SHALL DO ALL CUTTING, CORE DRILLING, CHASING OR CHANNELING AND PATCHING REQUIRED FOR ANY WORK UNDER THIS DIVISION. CUTTING SHALL HAVE PRIOR APPROVAL BY THE TENANT'S CONSTRUCTION MANAGER AND THE LANDLORD. PATCHING SHALL MATCH, FINISH OF SURROUNDING AREA.

C. CODES

1. ALL WORK SHALL BE PERFORMED IN A NEAT PROFESSIONAL MANNER USING GOOD ENGINEERING PRACTICES. ALL WORK SHALL CONFORM TO THE LANDLORD'S CRITERIA, THE STATE'S, COUNTY'S, CITY'S AND LOCAL CODES AND ORDINANCES, SAFETY AND HEALTH CODES, NFPA CODES, ENERGY CODES AND ALL OTHER APPLICABLE CODES AND REQUIREMENTS. THE CONTRACTOR SHALL INQUIRE INTO AND COMPLY WITH ALL APPLICABLE CODES, ORDINANCES, AND REGULATIONS. AFTER CONTRACT IS ISSUED, NO ADDITIONAL COST DUE TO CODE ISSUES SHALL BE REIMBURSED BY THE TENANT TO THE CONTRACTOR.

D. LICENSES, PERMITS, INSPECTIONS & FEES

1. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL LICENSES, PERMITS, INSPECTIONS, AND FEES REQUIRED OR RELATED TO HIS WORK.

2. FURNISH TO THE TENANT'S CONSTRUCTION MANAGER ALL CERTIFICATES OF INSPECTION AND FINAL INSPECTION APPROVAL AT SUBSTANTIAL COMPLETION DATE OF PROJECT.

E. DRAWINGS

1. DRAWINGS (PLANS, SPECIFICATIONS, AND DETAILS) ARE DIAGRAMMATIC AND INDICATE THE GENERAL LOCATION AND INTENT OF THE MECHANICAL SYSTEMS. BECAUSE OF THE SMALL SCALE OF THE DRAWINGS, IT IS NOT POSSIBLE TO INDICATE ALL DUCT AND PIPING OFFSETS, FITTINGS AND ACCESSORIES THAT MAY BE REQUIRED.

2. THE LAYOUT SHOWN ON THE DRAWINGS IS BASED ON A PARTICULAR MAKE OF EQUIPMENT. IF ANOTHER MAKE OF EQUIPMENT IS USED WHICH REQUIRES MODIFICATION OR CHANGE OF ANY DESCRIPTION FROM THE DRAWINGS OR SPECIFICATIONS, THE CONTRACTOR SHALL BE RESPONSIBLE AS PART OF THIS WORK, FOR MAKING ALL SUCH MODIFICATIONS AND CHANGES, INCLUDING THOSE INVOLVING OTHER TRADES WITH THE COST THEREOF INCLUDED IN HIS BID. IN SUCH CASE, CONTRACTOR SHALL SUBMIT DRAWINGS AND SPECIFICATIONS PRIOR TO STARTING WORK SHOWING ALL SUCH MODIFICATIONS AND CHANGES. HIS PROPOSAL SHALL BE SUBJECT TO THE APPROVAL OF THE TENANT'S CONSTRUCTION MANAGER.

F. EXISTING SHELL SPACE CONDITONS

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF THE DEMOLITION OF EXISTING MECHANCIAL WORK SHOWN ON THE MECHANCIAL DRAWINGS AND THE MECHANCIAL DEMOLITION SHOWN ON THE ARCHITECTURAL DRAWINGS.

2. THE CONTRACTOR SHALL INCLUDE, AND WILL BE HELD RESPONSIBLE FOR, THE REMOVAL OF ALL EXISTING FIRE PROTECTION, PLUMBING FIXTURES, PIPING, HVAC UNITS, REFRIGERANT RECAPTURE, EXHAUST FANS, ETC. AND ASSOCIATED ROOF CURBS NOT TO BE REUSED ON THIS PROJECT, UNLESS SPECIFICALLY NOTED OTHERWISE. CONTRACTOR MUST VERIFY WITH THE LANDLORD ALL PRESUMED ABANDONED EQUIPMENT, PIPES, DUCTWORK, AND EQUIPMENT PRIOR TO REMOVAL. ROOF CURBS SHALL BE REMOVED AND THE ROOF PATCHED UNLESS NOTED FOR REUSE OR RECONFIGURATION ON PLANS. ROOF PATCHING SHALL BE PERFORMED AT THE CONTRACTOR'S EXPENSE BY A ROOFING CONTRACTOR APPROVED BY THE LANDLORD. ALL EXTRANEOUS ITEMS IN THE SPACE OR ON THE ROOF (ABOVE THIS SPACE) NOT APPLICABLE TO THE NEW WORK OR PART OF THE LANDLORD'S OR ANOTHER TENANT'S ACTIVE SYSTEM MUST BE REMOVED AND ROOF/WALL/FLOOR PATCHED/REPAIRED TO MATCH EXISTING STRUCTURE. EXISTING ABANDONED PIPES, DUCTS, OR EQUIPMENT IN THE FLOOR, EMBEDDED IN CONCRETE, OR OTHERWISE INACCESSIBLE ARE TO BE CUT OFF AND SEALED BELOW OR WITHIN FLOOR OR WALL LEVEL WHEN THEY ARE NOT TO BE REUSED IN THIS PROJECT. IF REQUIRED BY LANDLORD OR CODES, ABANDONED PIPING AND/OR DUCTWORK MUST BE REMOVED TO POINT OF ORIGIN. CONFIRM THE EXTENT OF DEMOLITION PRIOR TO BID AND INCLUDE IN BID PROPOSAL.

3. ACTIVE LANDLORD OR OTHER TENANT SERVICES ENCOUNTERED IN WORK SHALL BE PROTECTED AND SUPPORTED. IF EXISTING SERVICES NOT ANTICIPATED REQUIRE RELOCATION, CONTACT THE TENANT'S CONSTRUCTION MANAGER IMMEDIATELY. ALL COSTS FOR REPAIR OF DAMAGES TO ACTIVE LANDLORD OR OTHER TENANT SERVICES DURING CONSTRUCTION SHALL BE PAID FOR BY THE CONTRACTOR CAUSING THE DAMAGE.

4. TIE-INS AND MODIFICATIONS TO EXISTING LANDLORD SERVICES MUST BE DONE WITH MINIMUM INTERRUPTION OF LANDLORD OPERATION AND DURING HOURS SPECIFIED BY THE LANDLORD. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING EXACT WORKING HOURS OF THIS WORK WITH THE LANDLORD PRIOR TO SUBMITTING HIS BID. THE CONTRACTOR SHALL INCLUDE IN HIS BID, ALL PREMIUM TIME REQUIRED TO PERFORM MODIFICATIONS DURING OTHER THAN NORMAL WORKING HOURS. ALL SUCH WORK MUST BE COORDINATED WITH THE LANDLORD.

G. DISCREPANCIES IN DOCUMENTS

1. DRAWINGS (PLANS, SPECIFICATIONS, AND DETAILS) ARE DIAGRAMMATIC AND INDICATE THE GENERAL LOCATION AND INTENT OF THE MECHANICAL SYSTEMS. WHERE DRAWINGS, EXISTING SITE CONDITIONS, SPECIFICATIONS OR OTHER TRADES CONFLICT OR ARE UNCLEAR, ADVISE THE GENERAL CONTRACTOR IN WRITING, PRIOR TO SUBMITTAL OF BID. THE GENERAL CONTRACTOR IS RESPONSIBLE TO ADVISE THE TENANT'S CONSTRUCTION MANAGER, IN WRITING, OF VARIATIONS TO CONTRACT DOCUMENTS PRIOR TO SUBMISSION OF BID. OTHERWISE, TENANT'S CONSTRUCTION MANAGER'S INTERPRETATION OF CONTRACT DOCUMENTS OR CONDITIONS SHALL BE FINAL WITH NO ADDITIONAL COMPENSATION PERMITTED.

H. TRADE NAMES AND MANUFACTURERS

1. WHERE TRADE NAMES AND MANUFACTURERS ARE USED ON THE DRAWINGS OR IN THE SPECIFICATIONS, THE EXACT EQUIPMENT SHALL BE USED AS A MINIMUM STANDARD FOR THE BID. MANUFACTURERS CONSIDERED AS AN EQUAL OR BETTER IN ALL ASPECTS TO THAT SPECIFIED WILL BE SUBJECT TO APPROVAL IN WRITING BY THE TENANT'S CONSTRUCTION MANAGER PRIOR TO ACCEPTANCE. THE USE OF ANY UNAUTHORIZED EQUIPMENT SHALL BE SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.

I. SHOP DRAWINGS

1. SUBMIT SIX COPIES OF MATERIAL LISTS AND SHOP DRAWINGS FOR ALL EQUIPMENT AND DUCT FABRICATION DRAWINGS TO THE TENANT'S CONSTRUCTION MANAGER FOR APPROVAL PRIOR TO ORDERING EQUIPMENT. SUBMISSIONS MUST BE EARLY ENOUGH TO ALLOW THE TENANT'S CONSTRUCTION MANAGER EIGHT WORKING DAYS FOR REVIEW WITHOUT CAUSING DELAYS OR CONFLICTS TO THE JOB'S PROGRESS. SUBMITTALS SHALL BE IN ACCORDANCE WITH THE GENERAL CONDITIONS USING THE MANUFACTURER'S LISTED ON THE DRAWINGS. SHOP DRAWINGS SHALL INCLUDE ALL DATA THAT PERTAINS TO THE REQUIREMENTS SET FORTH ON THE DRAWINGS AND IN THE SPECIFICATIONS. THE SUBMITTAL SHALL INCLUDE BUT NOT LIMITED TO CUTS OR CATALOGS INCLUDING DESCRIPTIVE LITERATURE AND CHARACTERISTICS OF EQUIPMENT SHALL SHOW MAJOR DIMENSIONS, ROUGHING-IN DATA, CAPACITY, CURVES, PRESSURE DROP, CODE COMPLIANCE, MOTOR AND DRIVE DATA AND ELECTRICAL DATA. OBSERVE SPECIAL INSTRUCTIONS WHEN REQUIRED. SUBMITTALS SHALL BEAR THE STAMP OF THE GENERAL AND SUB-CONTRACTOR SHOWING THAT HE HAS REVIEWED AND CONFIRMED THAT THEY ARE IN CONFORMANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS OR INDICATE WHERE EXCEPTIONS TAKE PLACE. LACK OF SUCH CONTRACTOR'S REVIEW AND APPROVAL WILL BE CAUSE FOR REJECTION WITHOUT REVIEW BY TENANT'S CONSTRUCTION MANAGER. ALL SHOP DRAWINGS MUST APPEAR IN THE OPERATION AND MAINTENANCE MANUALS LEFT ON SITE AT JOB COMPLETION.

2. TENANT'S CONSTRUCTION MANAGER'S REVIEW OF SHOP DRAWINGS OR SCHEDULES SHALL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS, OMISSIONS OR OTHER DEFICIENCIES OR DEVIATIONS IN THE SHOP DRAWING FROM THE CONTRACT DRAWINGS AND SPECIFICATIONS.

J. RECORD DRAWINGS

1. THE CONTRACTOR SHALL MAINTAIN ONE COPY OF DRAWINGS AND SPECIFICATIONS ON THE JOB SITE TO RECORD DEVIATIONS FROM CONTRACT DRAWINGS, SUCH AS:

A. LOCATION OF CONCEALED PIPING VALVES AND DUCTS.
B. REVISIONS, ADDENDUMS, AND CHANGE ORDERS.
C. SIGNIFICANT DEVIATIONS MADE NECESSARY BY FIELD CONDITIONS, APPROVED EQUIPMENT SUBSTITUTIONS, AND CONTRACTOR'S COORDINATION WITH OTHER TRADES.
D. EXACT ROUTING OF ALL SANITARY AND DOMESTIC WATER PIPING UNDER FLOOR.

2. AT COMPLETION OF THE PROJECT AND BEFORE FINAL APPROVAL, THE CONTRACTOR SHALL MAKE ANY FINAL CORRECTIONS TO DRAWINGS AND CERTIFY THE ACCURACY OF EACH PRINT BY SIGNATURE THEREON. THE DRAWINGS ARE TO BE TURNED OVER TO THE TENANT.

K. GUARANTEE

1. THE CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORK UNDER HIS CONTRACT AND SHALL MAKE GOOD, REPAIR OR REPLACE AT HIS OWN EXPENSE, ANY DEFECTIVE WORK, MATERIAL, OR EQUIPMENT WHICH MAY BE DISCOVERED WITHIN A PERIOD OF 12 MONTHS FROM THE DATE OF ACCEPTANCE (IN WRITING) OF THE INSTALLATION BY THE TENANT'S CONSTRUCTION MANAGER. PROVIDE EXTENDED WARRANTIES AS SPECIFIED WITH INDIVIDUAL EQUIPMENT. IN CASE OF REPLACEMENT OR REPAIR OR EQUIPMENT DUE TO FAILURE WITHIN GUARANTEE PERIOD, GUARANTEE ON THAT PORTION OF WORK SHALL BE EXTENDED FOR A PERIOD OF ONE (1) YEAR FROM DATE OF SUCH REPLACEMETN OR REPAIR.

L. OPERATIONS MANUALS

1. ONE COPY OF EACH OPERATION AND MAINTENANCE MANUAL FOR ALL EQUIPMENT FURNISHED ON JOB SHALL BE COLLECTED AND INSERTED IN A 3" THREE RING BINDER AND TURNED OVER TO THE TENANT. EACH NOTEBOOK SHALL INCLUDE BUT NOT BE LIMITED TO INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS, PAMPHLETS OR BROCHURES APPROVED SHOP DRAWINGS AND WARRANTIES OBTAINED FROM EACH MANUFACTURER OF PRINCIPAL ITEMS OF EQUIPMENT.

M. SLEEVES

1. THE CONTRACTOR SHALL PROVIDE SLEEVES TO PROTECT EQUIPMENT OR FACILITIES IN THE INSTALLATION. EACH SLEEVE SHALL EXTEND THROUGH IT'S RESPECTIVE FLOOR, WALL OR PARTITION AND SHALL BE CUT FLUSH WITH EACH SURFACE EXCEPT SLEEVES THAT PENETRATE THE FLOOR, WHICH SHALL EXTEND 2" ABOVE THE FLOOR.

2. ALL SLEEVES AND OPENINGS THROUGH FIRE RATED WALLS AND/OR FLOORS SHALL BE FIRE SEALED WITH CALCIUM SILICATE, SILICONE "RTV" FOAM, "3M" FIRE RATED SEALANTS OR EQUAL, SO AS TO RETAIN THE FIRE RATING OF THE FLOOR OR WALL. CONFORM TO U.L. ASSEMBLY RATING OF FLOOR OR WALL.

3. SLEEVES IN BEARING AND MASONRY WALLS, FLOORS, AND PARTITIONS SHALL BE STANDARD WEIGHT STEEL PIPE FINISHED WITH SMOOTH EDGES. FOR OTHER THAN MASONRY PARTITIONS, THROUGH SUSPENDED CEILINGS, OR FOR CONCEALED VERTICAL PIPING, SLEEVES SHALL BE NO. 22 U.S.G. GALVANIZED STEEL MINIMUM.

4. DUCT SLEEVES TO BE MINIMUM 14 GAUGE STEEL.

N. HANGERS

1. HANGERS SHALL INCLUDE ALL MISCELLANEOUS STEEL SUCH AS ANGLE IRON, BANDS, C-CLAMPS WITH RETAINING CLIPS, CHANNELS, HANGER RODS, ETC., NECESSARY FOR THE INSTALLATION OF WORK.

2. HANGERS SHALL BE FASTENED TO BUILDING STEEL, CONCRETE, OR MASONRY, BUT NOT TO PIPING OR DUCTWORK. HANGING FROM METAL DECK IS NOT PERMITTED. HANGERS MUST BE ATTACHED TO UPPER CHORD OF BAR JOIST. WHERE INTERFERENCES OCCUR, IN ORDER TO SUPPORT DUCTWORK OR PIPING, THE CONTRACTOR MUST INSTALL TRAPEZE TYPE HANGERS OR SUPPORTS WHICH SHALL BE LOCATED WHERE THEY DO NOT INTERFERE WITH ACCESS TO FIRE DAMPERS, VALVES, ACCESS DOORS AND OTHER EQUIPMENT SERVICE REQUIREMENTS AND/OR OTHER TRADES. HANGER TYPES AND INSTALLATION METHODS ARE SUBJECT TO LANDLORD CRITERIA.

3. HANGERS FOR ALL INSULATED PIPING SHALL BE SIZED AND INSTALLED FOR THE OUTER DIAMETER OF INSULATION. INSTALL 6" LONG SPLIT CIRCLE GALVANIZED SADDLE BETWEEN THE HANGER AND THE PIPE INSULATION.

4. HANGERS AND PIPING OF DISSIMILAR METALS SHALL BE DI-ELECTRICALLY SEPARATED FROM ONE ANOTHER.

O. ACCESS DOORS

1. FURNISH STEEL ACCESS DOORS AND FRAMES, MIN. 16" X 20" OR AS SHOWN ON DRAWINGS, TO GENERAL CONTRACTOR FOR ALL LOCATIONS WHERE NECESSARY TO PROVIDE ACCESS TO CONCEALED VALVES, AND OTHER EQUIPMENT REQUIRING SERVICE OR INSPECTION. LOCATION, TYPE, SIZE AND NUMBER AS DETERMINED BY CONTRACTOR AND APPROVED BY TENANT CONSTRUCTION MANAGER TO SUIT EQUIPMENT REQUIREMENTS. GENERAL CONTRACTOR WILL INSTALL ACCESS DOORS AND FRAMES.

2. ACCESS DOORS LOCATED IN FIRE-RATED WALLS, FLOORS, CEILING-FLOOR OR CEILING-ROOF ASSEMBLIES SHALL BE FIRE RATED, UNDERWRITER'S LABORATORIES, INC., LISTED AND LABELED.

3. ACCESS DOORS SHALL BE FLUSH TYPE, MANUFACTURED FROM NO. 14 GAUGE STEEL, COMPLETE WITH FLUSH FLANGE TYPE FRAMES MANUFACTURED FROM NO. 16 GAUGE STEEL, PROVIDED WITH ANCHORS. ACCESS DOORS SHALL BE SUITABLE FOR INSTALLATION IN WALL OR CEILING MATERIALS SHOWN IN ROOM FINISH SCHEDULES.

P. ELECTRICAL MOTORS

1. FURNISH, INSTALL AND ALIGN ALL MOTORS REQUIRED FOR THIS EQUIPMENT. UNLESS THEY ARE FACTORY INSTALLED IN THE UNIT, ALL STARTERS AND ASSOCIATED WIRING AND SAFETY SWITCHES FOR SUCH MOTORS SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. STARTERS SHALL MEET ALL REQUIREMENTS AS DEFINED IN THE ELECTRICAL DIVISION OF THE SPECIFICATIONS.

2. DESIGN, CONSTRUCTION AND PERFORMANCE CHARACTERISTICS OF MOTORS SHALL CONFORM TO ALL APPLICABLE PROVISIONS OF LATEST NEMA, ANSI, ISEE STANDARDS FOR ELECTRICAL EQUIPMENT. ALL MOTORS SHALL BE SUITABLE FOR OPERATION ON VOLTAGE VARIATIONS OF PLUS OR MINUS 10%, 40 DEGREES C AMBIENT TEMPERATURE; HAVE A SERVICE FACTOR OF NOT LESS THAN 1.15.

Q. LOW VOLTAGE (24 VOLT) WIRING

1. THE CONTRACTOR IS TO INSTALL ALL LOW VOLTAGE WIRING REQUIRED FOR HIS EQUIPMENT. THIS WORK INCLUDES ALL TRANSFORMERS AND DEVICES TO MAKE THIS A COMPLETE FUNCTIONAL SYSTEM.

2. ALL WORK IS TO CONFORM TO THE LATEST ADDITION N.E.C AND TO DIVISION 16 ELECTRICAL SPECIFICATIONS.

3. ANY CONDUIT REQUIRED BY CODE OR THE LANDLORD WILL BE INSTALLED BY THE ELECTRICAL SUBCONTRACTOR.

DIVISION 15 - MECHANICAL
SECTION 15200
PLUMBING

A. SCOPE OF WORK

1. THIS CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, EQUIPMENT, SERVICES, TOOLS, TRANSPORTATION AND FACILITIES NECESSARY FOR, REASONABLY IMPLIED AND INCIDENTAL TO, THE FURNISHING, INSTALLATION, COMPLETION AND TESTING OF ALL THE WORK FOR THE PLUMBING SYSTEMS AS SHOWN ON THE DRAWINGS, CALLED FOR IN THE SPECIFICATIONS, AND AS REQUIRED BY JOB CONDITIONS, TO INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING: (REFER TO RESPONSIBILITY SCHEDULE FOR EXACT RESPONSIBILITIES)

A. COMPLETE SANITARY PIPING SYSTEMS OF WASTE, DRAINS, AND VENTS.
B. COMPLETE COLD AND HOT WATER PIPING SYSTEMS, APPURTENANCES AND INSULATION.
C. PLUMBING FIXTURES AND EQUIPMENT AS SCHEDULED.
D. COMPLETE NATURAL GAS PIPING SYSTEMS (AS APPLICABLE, REFER TO PLANS).
E. TESTS AND ADJUSTMENTS.

2. BEFORE STARTING WORK, THIS CONTRACTOR SHALL EXAMINE THE ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL PLANS AND SPECIFICATIONS TO SEQUENCE, COORDINATE, AND INTEGRATE THE VARIOUS ELEMENTS OF THE PLUMBING SYSTEM, MATERIALS, AND EQUIPMENT WITH OTHER CONTRACTORS TO AVOID INTERFERENCES AND CONFRONTATIONS.

3. RELOCATION OF EXISTING WATER, GAS, WASTE, VENT, OR DRAINAGE LINES TO FACILITATE STORE DESIGN CRITERIA MUST BE INCLUDED IN BID PROPOSAL.

B. PLUMBING EQUIPMENT

C. GENERAL PIPING REQUIREMENTS

1. GENERALLY, SANITARY AND POTABLE WATER TAPS WILL BE PROVIDED BY THE LANDLORD. FIELD VERIFY EXACT CONNECTION POINTS PRIOR TO SUBMITTING BID AND NOTIFY THE TENANT'S CONSTRUCTION MANAGER IF CONDITIONS ARE NOT AS SHOWN ON THE PLANS OR AS STATED IN THE SPECIFICATIONS. CONTRACTOR MUST VERIFY THE OPERABILITY OF ENTIRE SYSTEM PRIOR TO TIE IN AS FOLLOWS:

A. SNAKE SANITARY FOR A DISTANCE OF 100 FEET AND REPORT ANY BLOCKAGE.
B. TEST WATER PRESSURE TO INSURE MINIMUM OF 50 PSI.

2. INSTALL ALL NECESSARY PIPE HANGERS, SADDLES, AND CARRIERS TO PROPERLY SUPPORT ALL PIPING AND FIXTURES. HANGERS SHALL SUIT TYPE OF PIPING PROVIDED AND BE SPACED AT A MAXIMUM SPAN OF 5 FEET. PROVIDE SWAY AND SEISMIC BRACING WHERE REQUIRED BY CODES.

3. ESCUTCHEONS SHALL BE CHROME PLATED, SIZE AS REQUIRED AND PLACED AT ALL PIPE PENETRATIONS AT WALLS, FLOORS, AND CEILINGS IN FINISHED AREAS.

4. FLASHING SHALL BE SEALED WATERTIGHT AND PERFORMED IN ACCORDANCE TO THE LANDLORD'S CRITERIA. USE A LANDLORD APPROVED ROOFING CONTRACTOR WHERE APPLICABLE.

D. PIPING

1. SANITARY PIPING - NO PVC ALLOWED (STORM PIPING AS REQUIRED)

A. WASTE, DRAIN AND VENT PIPING SHALL BE SERVICE WEIGHT, CAST IRON SOIL PIPE. VENT PIPING ABOVE FLOOR 2" OR SMALLER MAY BE GALVANIZED STEEL.
B. JOINTS: BELOW FLOOR SLAB - BELL AND SPIGOT WITH CAULKED JOINTS PER CODE.
C. PITCH WASTE LINES 2" AND SMALLER NOT LESS THAN 1/4" PER FOOT. PITCH LARGER MAINS NOT LESS THAN 1/8" PER FOOT.
D. INSTALL A CLEANOUT AT BASE OF EACH SOIL STACK, AT EACH CHANGE IN DIRECTION, AT INTERVALS NOT OVER 50 FEET, AND ELSEWHERE AS SHOWN ON DRAWINGS OR REQUIRED BY LOCAL CODE. CLEANOUTS SHALL NOT BE INSTALLED IN PUBLIC AREAS WITHOUT SPECIFIC PERMISSION BY TENANT'S CONSTRUCTION MANAGER; BUT WHERE NECESSARY, THE WALL COVERS ARE TO BE STAINLESS STEEL AND THE FLOOR COVERS ARE TO BE BRASS (FLUSH WITH FINISHED FLOOR). PROVIDE COVERS WITH INSET AREA FOR CARPETED FLOOR LOCATIONS. ALL CLEAN-OUT LOCATIONS SHALL BE APPROVED BY THE TENANT'S CONSTRUCTION MANAGER.
E. INSULATE ALL HORIZONAL RUNS OF PIPING LOCATED IN CEILING SPACES WHEN APPLICABLE. INSULATION TO BE AS SPECIFIED FOR WATER PIPING.
F. INSULATE THE TRAP, SANITARY AND SUPPLY PIPES UNDER LAVATORY WITH 1/2" ARMSTRONG "ARMAFLEX" PIPING INSULATION OR TRUEBRO MODEL 102W "HANDI LAV GUARD" INSULATION KIT.

2. CONDENSATE PIPING SHALL BE TYPE "L" DRAWN COPPER TUBE WITH 95-5 TIN-ANTIMONY SOLDERED JOINTS AND WROUGHT COPPER FITTINGS WITH DIELECTRIC SEPARATION BETWEEN DISSIMILAR METALS.

3. POTABLE WATER PIPING:

A. BELOW GRADE: TYPE 'K', ANNEALED TEMPERED COPPER TUBE FOR PIPE SIZES 2 INCHES AND SMALLER. BRAZE ALL JOINTS.
B. ABOVE GRADE: TYPE 'L' DRAWN COPPER TUBE WITH WROUGHT COPPER FITTINGS AND 95-5 TIN-ANTIMONY SOLDER.
C. INSTALL AIR CHAMBER SHOCK ABSORBERS IN PIPING SYSTEM TO PREVENT NOISE AND DAMAGE DUE TO WATER HAMMER.
D. ALL BRANCH PIPING SYSTEM SHALL HAVE ACCESSIBLE SERVICE VALVE. PROVIDE SHUT OFF VALVES IN THE SUPPLY PIPING TO EVERY FIXTURE. PROVIDE ACCESS DOORS WHERE NECESSARY.
E. PROVIDE WATER METER AND REMOTE READER PER LANDLORD'S CRITERIA OR LOCAL UTILITIES REQUIREMENTS IF APPLICABLE. REFER TO PLANS TO DETERMINED IF WATER METER IS REQUIRED.
F. SECURE PIPE AT ANGLE STOPS.
G. PROVIDE FLEXIBLE INSERTS AT ALL PIPE PENETRATIONS THROUGH FRAMING TO KEEP PIPES FROM HITTING FRAME WHEN IN OPERATION.

4. GAS PIPING

A. PROVIDE A COMPLETE GAS PIPING SYSTEM IF APPLICABLE. REFER TO PLANS TO DETERMINE IF A GAS SYSTEM IS REQUIRED.
B. LOW PRESSURE (14" W.C. AND BELOW) GAS LINES SHALL BE BLACK STEEL, SCHEDULE 40, ASTM A-120, WITH MALLEABLE THREADED FITTINGS FOR 2" AND SMALLER, AND WITH WELDED JOINTS FOR 2-1/2" AND LARGER. MEDIUM PRESSURE (ABOVE 14" W.C.) SHALL HAVE WELDED JOINTS.
C. PROVIDE A GAS COCK, DIRT LEG, AND UNION CONNECTION AT EACH PIECE OF EQUIPMENT. PROVIDE GAS METER AND/OR REGULATOR AS REQUIRED. REGULATOR TO BE VENTED TO THE EXTERIOR.
D. PITCH PIPING AT A UNIFORM GRADE OF 1/4" IN 15 FEET UPWARD IN DIRECTION OF FLOW. SUPPORT PIPING EVERY 5 FEET. SUPPORTS AS REQUIRED BY LANDLORD CRITERIA, AS DETAILED ON DRAWINGS, OR BY STANDARD INDUSTRY PRACTICE, WHICHEVER IS MORE STRINGENT.
E. GAS PIPING EXPOSED ON ROOF MUST BE PAINTED WITH RUST-INHIBITING PAINT.
F. INSTALLATION, TESTING AND PURGING OF GAS PIPING SHALL BE DONE PER THE REQUIREMENTS OF THE LOCAL GAS COMPANY, LOCAL CODES, AND APPLICABLE NFPA 54 CODES.
G. CONTACT AND COORDINATE GAS SERVICE AND METER REQUIREMENTS WITH THE LOCAL GAS COMPANY AND THE MALL'S MANAGER PRIOR TO BID.

5. INSULATION

A. INSULATE ALL [illegible] INTERIOR CONDENSATE PIPING WITH 1" THICK (K=[illegible] @ 75 F) SNAP-ON FIBERGLASS PIPE INSULATION WITH AN ALL SERVICE JACKET TO MEET LOCAL CODES AND UL FLAME SPREAD RATING OF 25 AND SMOKE DEVELOPED RATINGS OF 50. APPROVED MANUFACTURER: MANVILLE MICRO-LOK.

6. TEST & STERILIZATION

A. LEAKAGE TESTS SHALL BE PER LOCAL CODES, MINIMUM AS FOLLOWS:

1. TEST POTABLE WATER PIPING AND CONDENSATE PIPING AT 125 PSIG FOR SIX HOURS.
2. TEST DRAIN, WASTE, VENT PIPING BY A 10' WATER COLUMN FOR TWO HOURS. ALL JOINTS SHALL BE GAS AND WATER TIGHT.
3. TEST GAS PIPING WITH PER NFPA 54 CODES.
4. STERILIZE POTABLE HOT & COLD WATER LINES UPON COMPLETION OF SYSTEM. STERILIZE WATER SYSTEM IN ACCORDANCE WITH LOCAL CODES.

DIVISION 15 - MECHANICAL
SECTION 15300
FIRE PROTECTION

A. SCOPE OF WORK

1. THE F.P. CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, EQUIPMENT, SERVICES, TOOLS, TRANSPORTATION AND FACILITIES NECESSARY FOR, REASONABLY IMPLIED AND INCIDENTAL TO, THE FURNISHING, INSTALLATION, COMPLETION AND TESTING OF ALL THE WORK FOR THE SPRINKLER SYSTEMS AS SHOWN ON THE DRAWINGS, CALLED FOR IN THE SPECIFICATIONS, AND AS REQUIRED BY JOB CONDITIONS, TO INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING: (REFER TO RESPONSIBILITY SCHEDULE FOR EXACT RESPONSIBILITIES)

A. INSTALLATION OF NEW WET SPRINKLER SYSTEM AS REQUIRED TO PROVIDE COVERAGE IN ACCORDANCE WITH NFPA-13, LOCAL CODES, LANDLORD'S CRITERIA, AND INSURANCE CARRIERS FOR THE MALL AND TENANT.
B. TAPS, RISERS, LATERALS, BRANCHES, VALVES, ALARMS, SPRINKLER HEADS AND ALL COMPONENTS REQUIRED FOR A COMPLETE SYSTEM.
C. DESIGN DRAWINGS, CALCULATIONS, SUBMITTALS AND APPROVALS.
D. PERMITS, FEES, AND CHARGES.
E. TESTS AND TEST CERTIFICATES.
F. COST FOR SHUT DOWN FEES.

2. THE CONTRACTOR THAT DOES THE ACTUAL SPRINKLER WORK IS REQUIRED TO BE A LANDLORD APPROVED SPRINKLER CONTRACTOR.

3. BEFORE STARTING WORK, THE CONTRACTOR SHALL EXAMINE THE ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL PLANS AND SPECIFICATIONS TO SEQUENCE, COORDINATE, AND INTEGRATE THE VARIOUS ELEMENTS OF THE FIRE PROTECTION SYSTEM, MATERIALS, AND EQUIPMENT WITH OTHER CONTRACTORS TO AVOID INTERFERENCES AND CONFRONTATIONS.

4. RELOCATION OF EXISTING MAINS, LATERALS, BRANCHES AND RISERS TO FACILITATE STORE DESIGN CRITERIA MUST BE INCLUDED IN BID PROPOSAL.

B. SHOP DRAWINGS

1. THE FIRE PROTECTION CONTRACTOR SHALL PREPARE DETAILED SHOP DRAWINGS AND CALCULATIONS FOR HIS WORK. SUBMIT SIX (6) COPIES TO GENERAL CONTRACTOR FOR APPROVAL. NO WORK SHALL BEGIN UNTIL TENANT'S CONSTRUCTION MANAGER APPROVES HEAD AND PIPING LOCATIONS.

2. THE FIRE PROTECTION CONTRACTOR IS RESPONSIBLE FOR SUBMITTING COORDINATED DRAWINGS, CALCULATIONS, HEAD TYPES AND COLORS TO ALL AUTHORITIES HAVING JURISDICTION FOR APPROVAL. NO WORK SHALL BEGIN UNTIL ALL APPROVALS HAVE BEEN RECEIVED.

3. A COPY OF THE LETTER OF APPROVAL FROM THE LANDLORD'S INSURANCE RATING BUREAU SHALL BE FORWARDED TO THE LANDLORD'S AGENT AND TO THE TENANT'S CONSTRUCTION MANAGER.

C. EQUIPMENT

1. SPRINKLER HEADS:

A. ALL SPRINKLER HEADS SHALL BE NEW (EXISTING HEADS SHALL BE REPLACED AS NECESSARY), U.L., F.M. LISTED AND APPROVED AUTOMATIC SPRAY TYPE AS MANUFACTURED BY CENTRAL SPRINKLER CO., GLOBE, GRINNELL, RELIABLE, STAR, OR VIKING.
B. ALL SPRINKLER HEADS SHALL BE RATED FOR 165°F UNLESS INDICATED OTHERWISE ON DRAWINGS OR REQUIRED BY LOCAL CODES.
C. ALL SALES FLOORS HEADS ARE TO HAVE BE FACTORY APPLIED COLOR FINISH TO MATCH ARCHITECTURAL CEILING FINISH. VERIFY HEAD TYPES AND COLORS WITH TENANT'S CONSTRUCTION MANAGER AND SUBMIT WITH SPRINKLER DRAWINGS FOR PERMIT.
D. SPRINKLER HEAD TYPES SHALL BE AS FOLLOWS:

1. FINISHED CEILING (SALES AREA) - FULLY RECESSED/CONCEALED TYPE
2. FINISHED CEILING (NON-SALES AREA) - SEMI-RECESSED TYPE
3. NO-CEILING - CHROME UPRIGHT TYPE.

NOTE:SEMI-RECESSED HEADS SHALL PROTRUDE NO MORE THAN 1" BELOW LEVEL OF CEILING OF SOFFIT. ALL HORIZONTAL SPRINKLER RUNS AT SIDEWALL SOFFITS SHALL BE CONCEALED WITHIN SOFFIT FRAMING.

D. GENERAL PIPING

1 A FIRE PROTECTION SYSTEM STUB IN SHALL BE FURNISHED BY THE LANDLORD. SPRINKLER SPACING SHALL NOT EXCEED 130 SQ. FT. IN "SALES" AREAS AND 100 SQ. FT. IN "STOCK" AREAS. COMPLY WITH LANDLORD'S DESIGN CRITERIA. PIPE SIZING SHALL BE BASED ON NFPA ORDINARY HAZARD.

2. ALL SPRINKLER LINES SHALL BE INSTALLED CONCEALED, AVOIDING INTERFERENCE WITH LIGHTS, DUCTS, PIPES, STORAGE DECK, ETC. FIRE PROTECTION CONTRACTOR SHALL PREPARE COORDINATED SHOP DRAWINGS INDICATING THE LOCATIONS OF ALL SPRINKLER HEADS, SPRINKLER LINES, LIGHTS, DIFFUSERS, GRILLES AND REGISTERS PRIOR TO INSTALLATION. HORIZONTAL SPRINKLER RUNS AT MERCHANDISE SOFFITS SHALL BE PLACED INSIDE SOFFIT STRUCTURE. VERTICAL DROPS FROM CEILING TO MERCHANDISE SOFFIT SHALL BE LOCATED FLUSH AGAINST DEMISING WALL.

3. WHERE POSSIBLE, REWORK THE EXISTING SPRINKLER SYSTEM TO MEET THE NEW REQUIREMENTS OF THIS DESIGN. RELOCATE ALL MAINS AND BRANCHES INTERFERING WITH CEILING HEIGHTS, EQUIPMENT, AND MAJOR COMPONENTS INCLUSIVE OF ADJACENT TENANTS AND MALL COMMON AREAS. REMOVE ALL UNUSED PIPING.

4. LOCATION OF ALL HEADS SHOULD BE APPROVED BY THE LOCAL FIRE PROTECTION OFFICIAL AND THE TENANT'S CONSTRUCTION MANAGER BEFORE INSTALLATION. HEADS MUST BE CENTERED IN THE CENTER OF CEILING TILES AND IN A SYMMETRICAL PATTERN WITH OTHER CEILING FIXTURES. ADDITIONAL MONIES WILL NOT BE ALLOCATED FOR ADDITIONAL HEADS REQUIRED BY FIELD FIRE INSPECTOR AFTER BIDS ARE ACCEPTED. HEADS IN MERCHANDISE BAYS SHALL BE CENTERED SIDE TO SIDE AND FRONT TO BACK.

5 PROVIDE AND INSTALL A VALVED TEST CONNECTION FOR THE SPRINKLER SYSTEM AS REQUIRED OR REQUESTED BY THE MALL, LOCAL INSPECTOR, OR INSURANCE CARRIER. COORDINATE LOCATION WITH TENANT'S CONSTRUCTION MANAGER AND LOCAL FIRE PROTECTION OFFICIAL PRIOR TO ROUGH-IN.

6. SPRINKLER HEADS LOCATED IN STOCK, CORRIDOR ON TOILET ROOM CEILINGS OR WALLS BELOW 8'-0" ABOVE THE FINISHED FLOOR ARE TO BE PROTECTED WITH APPROVED GUARDS.

E. PIPING:

1. SCHEDULE 40, BLACK STEEL PIPE, ASTM A-53 FOR FERROUS PIPING, WELDED AND SEAMLESS, ANSI B-36-10-70 FOR WROUGHT STEEL PIPE.
2. CAST IRON OR MALLEABLE IRON SCREWED FITTINGS FOR PIPES 2 INCHES AND SMALLER. SCREWED OR CAST IRON FLANGED JOINTS FOR PIPES LARGER THAN 2 INCHES.
3. GALVANIZED OR BLACK MALLEABLE IRON WITH BRASS SEAT SCREWED UNIONS FOR PIPES 2 INCHES AND SMALLER.
4. VICTAULIC TYPE COUPLINGS ARE ACCEPTABLE, WHERE APPROVED BY CODE AND THE LANDLORD.

F. TESTS

1. WHEN COMPLETED, THE ENTIRE FIRE PROTECTION PIPING SYSTEM SHALL BE HYDROSTATICALLY TESTED AS REQUIRED BY THE RULES AND REGULATIONS OF THE AUTHORITIES HAVING JURISDICTION. SYSTEM SHALL SHOW NO SIGNS OF LEAKAGE OR OTHER DEFECTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO THE WORK OF THE OTHER CONTRACTORS OR TO THE BUILDING, OR TO ITS CONTENTS, PEOPLE, ETC., CAUSED BY LEAKS IN ANY OF THE EQUIPMENT INSTALLED BY HIM. ALL REPAIRS OR REPLACEMENT OF DAMAGES SHALL BE AT THIS CONTRACTOR'S EXPENSE.

2. PROPERLY COMPLETED AND SIGNED "SPRINKLER CONTRACTOR'S MATERIAL AND TEST CERTIFICATES" SHALL BE FURNISHED TO THE LANDLORD, AUTHORITIES HAVING JURISDICTION, AND TENANT'S CONSTRUCTION MANAGER.

DIVISION 15 - MECHANICAL
SECTION 15500
HEATING, VENTILATION, AND AIR CONDITIONING

A. SCOPE OF WORK

1. THE HVAC CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, EQUIPMENT, SERVICES, TOOLS, TRANSPORTATION AND FACILITIES NECESSARY FOR, REASONABLY IMPLIED AND INCIDENTAL TO, THE FURNISHING, INSTALLATION, COMPLETION AND TESTING OF ALL THE WORK FOR THE MECHANICAL SYSTEMS AS SHOWN ON THE DRAWINGS, CALLED FOR IN THE SPECIFICATIONS, AND AS REQUIRED BY JOB CONDITIONS, TO INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING:(REFER TO RESPONSIBILITY SCHEDULE FOR EXACT RESPONSIBILITIES)

A. ROOFTOP UNITS, EQUIPMENT, AND APPURTENANCES.
B. DUCTWORK, FITTINGS, DAMPERS, AND INSULATION.
C. HYDRONIC PIPING AND INSULATION (AS APPLICABLE, REFER TO PLANS).
D. REFRIGERANT PIPING (AS APPLICABLE, REFER TO PLANS).
E. DIFFUSERS, GRILLES, AND REGISTERS.
F. CURBS AND STEEL FRAMING FOR SUPPORT (AS APPLICABLE, REFER TO PLANS).
G. TESTING, ADJUSTING, AND BALANCING.
H. OPERATIONS MANUALS.
I. TEMPERATURE CONTROLS AND RELATED DIAGRAMS.
J. SEQUENCES OF OPERATION.
K. CONNECTION TO ANY LANDLORD ENERGY MANAGEMENT SYSTEM.

3. BEFORE STARTING WORK, THIS CONTRACTOR SHALL EXAMINE THE ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL PLANS AND SPECIFICATIONS TO SEQUENCE, COORDINATE, AND INTEGRATE THE VARIOUS ELEMENTS OF THE HVAC SYSTEM, MATERIALS, AND EQUIPMENT WITH OTHER CONTRACTORS TO AVOID INTERFERENCES AND CONFRONTATIONS.

B. HVAC EQUIPMENT
1. PRIMARY HEATING, VENTILATION AND AIR CONDITIONING UNITS.

A. PRIMARY HEATING, VENTILATION, AND AIR CONDITIONING UNITS ARE TO BE BY CARRIER AS SCHEDULED. ALL COMPRESSORS ARE TO INCLUDE A 5-YEAR EXTENDED WARRANTY.
B. EQUALS EQUIPMENT AS MANUFACTURED BY TRANE OR YORK ARE ACCEPTABLE.
C. ALL EQUIPMENT SHALL BE COMPLETE IN EVERY RESPECT WITH ALL DEVICES, APPURTENANCES, AND ACCESSORIES PROVIDED TO MEET THE DESIGN INTENT AND OPERATION OF THE SYSTEMS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN.
D. EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. ALL AIR CONDITIONING EQUIPMENT MUST HAVE A CONDENSATE DRAIN AND BE TRAPPED IN ACCORDANCE WITH MANUFACTURERS DATA. SEE DRAWINGS FOR ADDITIONAL DETAILS.
E. SECONDARY DRAIN PANS ARE REQUIRED TO BE INSTALLED BENEATH ALL INDOOR AIR CONDITIONING EQUIPMENT WITH THE EXCEPTION OF VAV BOXES. SECONDARY PANS ARE TO PROTECT ENTIRE UNIT. PROVIDE CONDENSATE PUMPS, AS REQUIRED. CONDENSATE SHALL BE DIRECTED TO MOP SINK OR AS SPECIFIED ON PLANS.

2. VARIABLE AIR VOLUME BOXES (VAV)

A. WHERE SHOWN ON DRAWINGS, PROVIDE VAV BOXES COMPLETE WITH CONTROLS, HEATING COILS (FANS AS REQUIRED). ALL DUCT CONNECTIONS FLEXIBLE DUCT/PIPE CONNECTIONS SHALL BE PROVIDED BY THE CONTRACTOR.

3. TOILET EXHAUST FANS

A. WHERE SHOWN ON DRAWINGS, PROVIDE A TOILET EXHAUST FAN UNIT COMPLETE WITH GRAVITY BACK DRAFT DAMPERS. ALL DUCTWORK, ROOF OPENINGS AND CAPS NECESSARY TO PROVIDE A COMPLETE EXHAUST SYSTEM SHALL BE PROVIDED BY THE CONTRACTOR. REFER TO PLANS FOR APPLICABILITY.

4. BASEBOARD, CABINET, AND UNIT HEATERS

A. WHERE SHOWN ON DRAWINGS, PROVIDE ELECTRIC HEATERS COMPLETE WITH ELECTRIC HEATING COIL, CONTROLS, AND INTEGRAL THERMOSTAT.

5. [illegible] PUMPS

A. WHERE SHOWN ON DRAWINGS PROVIDE AN INLINE CLOSE COUPLED PUMP(S), BRONZE FITTED, PUMPS SHALL BE FURNISHED WITH BRONZE CASE WEARING RINGS, [illegible] SHAFT SLEEVE AND MECHANICAL SHAFT SEAL RATED FOR. PUMPS TO BE CONSTRUCTED THAT THEY MAY BE MOUNTED IN A HORIZONTAL OR VERTICAL PIPE LINE. MOTOR TO BE 1750 RPM UNLESS NOTED OTHERWISE.

6. VIBRATION ISOLATION DEVICES

A. VIBRATION ISOLATION DEVICES SHALL BE PROVIDED IN ALL SUPPORTS BETWEEN VIBRATING EQUIPMENT (FANS, ROOFTOP UNITS, AIR HANDLERS, FAN POWERED VAV BOXES, ETC.) AND STRUCTURE.
B. VIBRATING EQUIPMENT HUNG FROM STRUCTURE SHALL BE ISOLATED WITH RUBBER AND SPRING DEVICES. VIBRATING EQUIPMENT SUPPORTED FROM FLOOR OR DECK SHALL BE ISOLATED WITH HOUSED SPRING MOUNT DEVICES.
C. EXAMINE DEAD LOAD AND OPERATING LOAD CONDITIONS WHEN SELECTING DEVICES. ADJUST FOR PROPER ALIGNMENT AND LOADING. AVOID "GROUNDING" THE ISOLATOR.
D. CHECK HANGER ROD SIZE FOR ALLOWABLE LOADS AT THE ISOLATING DEVICE AND AT THE UPPER AND LOWER ATTACHMENTS TO STRUCTURES, DUCTS, EQUIPMENT, ETC.
E. CONSULT MANUFACTURER FOR APPLICATION DATA.

7. CURBS AND STEEL FRAMING FOR SUPPORT

A. THIS CONTRACTOR WILL PROVIDE ALL NECESSARY CURBS AND STEEL FRAMING REQUIRED TO INSTALL ALL HVAC EQUIPMENT AS DESCRIBED OR IMPLIED ON THE DRAWINGS. CURBS SHALL BE A MINIMUM OF 14" HIGH, OF THE SAME MANUFACTURER OF THE EQUIPMENT SUPPORTED. INSULATE UNDER THE COMPRESSOR SECTION TO PREVENT CONDENSATION. ALL CURBS MUST BE INSTALLED SO THAT TOP OF CURBS ARE "DEAD" LEVEL. ALL PENETRATIONS OF EXISTING STRUCTURE SHALL BE DONE IN ACCORDANCE TO THE LANDLORD'S GUIDELINES AT THIS CONTRACTOR'S EXPENSE.

C. METAL DUCTWORK - NO FIBERGLASS DUCT ALLOWED

1. NO DUCTWORK SHALL BE FABRICATED PRIOR TO APPROVAL BY THE TENANT'S CONSTRUCTION MANAGER. SIGNIFICANT DEVIATIONS FROM DESIGN MUST BE APPROVED BY TENANT'S CONSTRUCTION MANAGER PRIOR TO FABRICATION OR INSTALLATION. ALL DUCT MAINS ARE TO BE RECTANGULAR UNLESS NOTES OTHERWISE. ALL DUCT BRANCHES TO DIFFUSERS ARE TO BE ROUND RIGID DUCT.

2. EXCEPT AS OTHERWISE INDICATED, FABRICATE AND INSTALL RECTANGULAR DUCTS WITH GALVANIZED SHEET STEEL, IN ACCORDANCE WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS" OF THE LATEST EDITION. CONFORM TO THE REQUIREMENTS IN THE REFERENCED STANDARD FOR METAL THICKNESS, REINFORCING TYPES AND INTERVALS, TIE ROD APPLICATIONS, AND JOINT TYPES AND INTERVALS.

3. EXCEPT WHERE OTHERWISE INDICATED, CONSTRUCT DUCT SYSTEMS TO THE FOLLOWING PRESSURE CLASSIFICATIONS: (VERIFY WHETHER RETURN OR EXHAUST DUCT IS POSITIVE OR NEGATIVE PRESSURE).

A. SUPPLY DUCTS: 2 INCHES WATER GAUGE, POSITIVE PRESSURE
B. RETURN AND EXHAUST DUCTS: 2 INCHES WATER GAUGE, NEGATIVE PRESSURE.
PRESSURE TEST DUCTS FOR LEAKAGE. REMAKE LEAKING JOINTS AND APPLY SEALANTS AS REQUIRED TO FABRICATE A SYSTEM THAT DOES NOT EXCEED 5% LEAKAGE OR LESS AS STATED BY PRESSURE CLASS RATINGS IN SMACNA STANDARDS.

4. AS A MINIMUM, CROSSBREAK ALL FLAT SURFACES OR REINFORCE WITH A BEAD APPROXIMATELY 3/8" WIDE X 3/16" DEEP ON 12" CENTERS TO PREVENT VIBRATIONS.

5. INSTALL DOUBLE THICKNESS TURNING VANES IN ALL RIGHT ANGLE ELBOWS.

6. INSTALL RIGID ROUND AND RECTANGULAR METAL DUCT WITH SUPPORT SYSTEMS INDICATED IN SMACNA STANDARDS. SUPPORT HORIZONTAL DUCTS WITHIN 2 FEET OF EACH ELBOW AND WITHIN 4 FEET OF EACH BRANCH INTERSECTION USING DOUBLE STRAP HANGERS ON EACH SIDE OF FITTING. SUPPORT VERTICAL DUCTS AT A MAXIMUM INTERVAL OF 16 FEET AND AT EACH FLOOR. NO WOOD SHALL BE USED TO SUPPORT OR BRACE DUCTS. PROVIDE SWAY AND SEISMIC BRACING AS REQUIRED BY STATE AND LOCAL CODES OR BY LANDLORD.

7. WHERE DUCTS PASS THROUGH ROOFS AND FLOORS, PROVIDE AS MINIMUM 1-1/2"X1-1/2" X1/8" STEEL ANGLE FRAMES AT EACH SIDE OF OPENING. THE ANNULAR SPACE BETWEEN DUCT AND ANGLE FRAMES SHALL BE CAULKED WITH SILICONE SEALANT OR FIREPROOFED AS REQUIRED BY ASSEMBLY FIRE RATING.

8. ALL TRAVERSE JOINTS AND SEAMS IN SUPPLY AIR DUCT SHALL BE SEALED AIR TIGHT WITH DAP CMC DUCT SEALER. JOINTS ALSO SHALL BE RIVETED OR CONNECTED WITH SHEET METAL SCREWS.

9. SOFT ELASTOMER BUTYL GASKET WITH ADHESIVE BACKING SHALL BE USED TO SEAL FLANGED JOINTS.

10. DUCT TRANSITIONS SHALL NOT EXCEED 30 DEGREES SLOPE EXCEPT AS SPECIFICALLY NOTED OTHERWISE.

11. PROVIDE ACCESS TO ALL MOTORIZED DAMPERS, FIRE DAMPERS, CONTROLS, AND OTHER ITEMS IN DUCTWORK THAT REQUIRE SERVICE OR INSPECTION. IF THE ACCESS PANEL LOCATION IS EXPOSED TO THE SALES AREA, IT MUST BE APPROVED BY THE TENANT'S CONSTRUCTION MANAGER PRIOR TO INSTALLATION. LAY-IN SUPPLY AND RETURN AIR DIFFUSERS, GRILLES AND REGISTERS WITH PLASTER FRAMES MAY BE USED AS ACCESS LOCATIONS.

12. FLEXIBLE CONNECTIONS

A. FLEXIBLE COLLARS SHALL BE PROVIDED IN ALL CONNECTIONS BETWEEN VIBRATING EQUIPMENT (FANS, ROOFTOP UNITS, AIR HANDLERS, FAN POWERED VAV BOXES, ETC.) AND DUCTS OR CASINGS. ALSO, PROVIDE FLEXIBLE CONNECTIONS WHERE DUCTS CROSS BUILDING EXPANSION JOINTS.
B. FLEXIBLE CONNECTIONS SHALL CONSTRUCTED OF NEOPRENE-COATED FLAMEPROOF FABRIC. PROVIDE ADEQUATE JOINT FLEXIBILITY TO ALLOW FOR MOVEMENT AND PREVENT THE TRANSMISSION OF VIBRATION.
C. FLEXIBLE CONNECTION IS TO BE RATED FOR THE OPERATING PRESSURE OF THE SYSTEM.

13. FIRE DAMPERS

A. PROVIDE PRIMARY FIRE DAMPERS WHERE INDICATED OR REQUIRED BY CODES. DAMPERS SHALL BE DESIGNED FOR HORIZONTAL OR VERTICAL FLOW OF AIR AS REQUIRED. FIRE DAMPERS SHALL BE UL LABELED.
B. FIRE DAMPERS SHALL HAVE THE BLADES OUT OF THE AIRSTREAM AND A 165°F FUSIBLE LINK, TYPE A, AS MINIMUM.
C. PROVIDE ALL NECESSARY FRAMING AND SLEEVES FOR DAMPER MOUNTING PER UL AND CODE REQUIREMENTS.
D. PROVIDE DUCT ACCESS DOORS IN AN ACCESSABLE LOCATION FOR ALL FIRE DAMPERS. DOOR IS TO BE 20 GA GALVANIZED DOOR WITH QUICK-OPENING LATCH AND PIANO HINGE.

14. FLEXIBLE AIR DUCT

A. FLEXIBLE AIR DUCT SHALL BE 1" INSULATED CLASS 1 AND RATED FOR THE OPERATING PRESSURE OF THE SYSTEM. DUCT CONSTRUCTION MATERIAL (PLASTIC, CLOTH, ALUMINUM) MUST ADHERE TO LOCAL CODES AND LANDLORD'S REQUIREMENTS AND BE INCLUDED AS SUCH IN THE BID.
B. FLEXIBLE AIR DUCT MAY ONLY BE USED IN VERTICAL APPLICATIONS WITH PRIOR APPROVAL FROM TENANT'S CONSTRUCTION MANAGER.
C. FLEXIBLE DUCT SHALL NOT EXTEND OVER 5'-0" IN LENGTH AT ANY ONE LOCATION.

15. SUPPLY AIR TAKE-OFF FITTINGS

A. PROVIDE CONICAL OR "BELL-MOUTH" TAKE-OFFS FROM MAIN DUCTWORK TO ROUND BRANCHES. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
B. PROVIDE 45° RECTANGULAR TAKE-OFFS FROM MAIN DUCTWORK TO RECTANGULAR BRANCHES.

16. DAMPERS

A. PROVIDE MANUAL LOCKING QUADRANT VOLUME CONTROL DAMPERS WITH HANDLE OPERATORS IN EACH BRANCH DUCT AND AS SHOWN ON PLANS TO FACILITATE AIR BALANCING.
B. WHERE ACCESS TO BALANCING DAMPER IS RESTRICTED, YOUNG'S REGULATORS SHALL BE USED.
C. ALL RECTANGULAR DAMPERS IN OUTSIDE AIR, RELIEF AIR, OR RETURN AIR DUCTS ARE TO BE OF OPPOSED BLADE TYPE. ALL OUTSIDE AIR DUCT DAMPERS MUST ALSO BE OF THE LOW LEAKAGE TYPE.
D. ALL MOTORIZED DAMPERS NOT FURNISHED WITH EQUIPMENT ARE TO BE HONEYWELL DAMPERS.

17. DIFFUSERS, GRILLES, AND REGISTERS

A. PROVIDE DIFFUSERS GRILLES AND REGISTERS AS SCHEDULED. DEVICES TO BE COMPLETE WITH DAMPERS FRAMES AND ALL ACCESSORIES. FINISH AS INDICATED.
B. INSTALL ALL AIR DEVICES AS LOCATED ON THE ARCHITECTURAL REFLECTED CEILING PLAN.
C. APPROVED MANUFACTURERS: TITUS IS SPECIFIED, EQUALS BY METALAIRE OR KRUEGER IS ACCEPTABLE.

18. MEDIUM PRESSURE DUCT

A. WHERE DUCTWORK IS SPECIFICALLY NOTED AS MEDIUM PRESSURE, IT SHALL BE CONSTRUCTED IN ACCORDANCE WITH SMACNA STANDARDS FOR A PRESSURE RATING OF 3 INCHES WATER COLUMN MINIMUM OR LARGER AS REQUIRED B LANDLORD.
B. ALL GAUGES AND REINFORCEMENT MUST MEET WITH THE LATEST EDITION OF SMACNA STANDARDS FOR MEDIUM PRESSURE DUCT AND WITH THE LANDLORD'S CRITERIA.
C. ALL OTHER ITEMS FROM METAL DUCTWORK SPECIFICATION SECTION APPLY TO THIS SECTION

19. DUCTWORK INSULATION

A. INSTALL INSULATION PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS, AND IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES. INSULATION MUST COMPLY WITH NFPA 90A.

B. DUCT SIZES SHOWN ON DRAWINGS ARE INSIDE CLEAR DIMENSIONS. INSULATE SUPPLY AND RETURN AIR RECTANGULAR DUCTWORK. DUCTWORK SHALL BE INTERNALLY LINED WITH 1" THICK ACCOUSTICAL LINER. IF REQUIRED, DUCTWORK SHALL BE EXTERNALLY WRAPPED WITH 1 1/2" THICK, FOIL FACED FIBERGLASS INSULATION IN PLACE OF ACCOUSTICAL LINER.

C. ALL ROUND AND OUTSIDE AIR DUCTWORK ABOVE THE CEILING SHALL BE EXTERNALLY INSULATED WITH A MINIMUM OF 1" THICK, 1-1/2 LB. DENSITY (R=5.6) DUCT WRAP WITH VAPOR BARRIER. VAPOR BARRIER IS TO BE MAINTAINED THROUGHOUT DUCT SYSTEM. ALL JOINTS MUST BE TAPED SO THAT NO INSULATION FIBER IS VISIBLE. EXTEND DUCTWORK INSULATION WITHOUT INTERRUPTION THROUGH WALLS, FLOORS, AND SIMILAR PENETRATIONS.

D. DUCKWORK LOCATED IN THE CONDITIONED SPACE SHALL NOT BE INSULATED UNLESS OTHERWISE NOTED ON PLANS. INSULATE ALL DUCT DROPS OR THE FIRST 20 FEET OF DUCT AT THE HVAC UNITS IN ALL CASES.

E. ALL INSULATION SHALL HAVE A FLAME SPREAD RATING OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING OF NO HIGHER THAT 50 WHEN TESTED IN ACCORDANCE WITH ASTM C 411, OR AS REQUIRED BY LOCAL CODES.

20. SYSTEM CLEANOUT

A. DUCTWORK AND AIR HANDLING EQUIPMENT IS TO BE CLEANED OUT AND BLOWN OUT BEFORE PAINTING IS STARTED BY THE GENERAL CONTRACTOR.
B. FILTERS MUST BE IN UNITS AT ANY TIME FANS ARE OPERATED.

D. HYDRONIC PIPING

1. PROVIDE A COMPLETE HYDRONIC PIPING SYSTEM IF APPLICABLE. REFER TO PLANS TO DETERMINE IF A HYDRONIC SYSTEM IS REQUIRED.

2. PIPING

A. HYDRONIC PIPING FOR CHILLED WATER AND/OR HEATING WATER AND/OR CONDENSER WATER SHALL BE ASTM A-120, SCHEDULE 40, ERW, BLACK STEEL PIPE WITH PLAIN ENDS. INSTALL STEEL PIPE WITH WELDED JOINTS WHERE PIPE IS 2-1/2 INCH AND LARGER. INSTALL STEEL PIPE WITH THREADED JOINTS AND FITTINGS OR INSTALL TYPE "K" ANNEALED TEMPERED COPPER TUBE WITH SILFOS JOINTS FOR 2 INCH AND SMALLER PIPE. PROVIDE DIELECTRIC UNIONS BETWEEN DISSIMILAR METALS. ALL PIPING SHALL BE IN STRICT CONFORMANCE WITH ASTM, ASA, AND LANDLORD'S REQUIREMENTS, WHICHEVER IS MOST STRINGENT. UNIONS OR FLANGES MUST BE USED AT EQUIPMENT CONNECTIONS WHERE SERVICE OR REMOVAL MAY BE REQUIRED.
B. ALL PIPING AND EQUIPMENT SHALL BE PRESSURE TESTED WITHOUT LEAKAGE AT A MINIMUM PRESSURE OF 125 PSI.
C. ALL HYDRONIC PIPING AND EQUIPMENT CONNECTED TO THE HVAC PIPING SYSTEM SHALL BE CLEANED AND FLUSHED. REMOVE, CLEAN, AND REPLACE STRAINER SCREENS. FILL TENANT'S SYSTEM WITH DOMESTIC WATER AND VENT ALL PIPING AND EQUIPMENT PRIOR TO CONNECTION TO THE LANDLORD'S SYSTEM. CONTRACTOR SHALL NOT FILL TENANT'S SYSTEM WITH WATER FROM THE LANDLORD'S SYSTEM UNLESS SPECIFICALLY INSTRUCTED TO DO SO FROM THE LANDLORD'S FIELD REPRESENTATIVE.
D. PRIOR TO CONNECTION TO THE LANDLORD'S SYSTEM, CONTRACTOR SHALL OBTAIN WRITTEN CONFIRMATION FROM THE LANDLORD'S FIELD REPRESENTATIVE, THAT ALL TESTING, FLUSHING, AND PROPER FILLING OF THE TENANT'S SYSTEM HAS BEEN COMPLETED IN ACCORDANCE TO THE LANDLORD'S REQUIREMENTS AND THAT THE TENANT'S SYSTEM IS READY TO BE CONNECTED TO THE LANDLORD'S SYSTEM.

3. VALVES

A. GATE VALVES, 2-INCH AND SMALLER: CLASS 150, BODY AND UNION BONNET OF ASTM B 62 CAST BRONZE WITH THREADED OR SOLDER ENDS, INTEGRAL SEAT, RENEWABLE SOLID BRONZE WEDGE DISC, RISING STEM, SCREWED BONNET AND RE-PACKABLE UNDER PRESSURE. BALL VALVES ARE ACCEPTED AS AN EQUAL SUBSTITUTION.
B. GATE VALVES, 2-1/2 INCH AND LARGER: CLASS 125 CAST IRON BODY, RENEWABLE BRONZE SEATS AND SOLID WEDGE DISC, RISING STEM, FLANGED ENDS, AND RE-PACKABLE UNDER PRESSURE.
C. SWING CHECK VALVES, 2-INCH AND SMALLER: CLASS 150, CAST BRONZE BODY AND CAP CONFORMING TO ASTM B 62 WITH HORIZONTAL SWING, Y-PATTERN, RENEWABLE BRONZE DISC, AND HAVING THREADED OR SOLDERED ENDS.
D. SWING CHECK VALVE, 2-1/2 INCH AND LARGER: CLASS 125 CAST IRON BODY AND BOLTED CAP, HORIZONTAL SWING, RENEWABLE BRONZE DISC, FLANGED ENDS AND CAPABLE OF BEING REFITTED WHILE THE VALVE REMAINS IN THE LINE.
E. COMBINATION BALANCING AND SHUT-OFF VALVES: BELL & GOSSETT CIRCUIT SETTER WITH LOCKING SETPOINT. A CIRCUIT SETTER BALANCE WHEEL MUST BE INCLUDED WITH O & M MANUAL.
F. FLOW METER: BELL AND GOSSETT THERMOFLO INDICATOR MODEL TFI.

4. PIPING SPECIALTIES

A. PRESSURE/TEMPERATURE TEST PLUGS (PETE'S PLUG) - 1/4 INCH NPT FITTINGS TO RECEIVE EITHER A TEMPERATURE OR PRESSURE PROBE, 1/8 INCH O.D. FITTING AND CAPS SHALL BE BRASS WITH VALVE CORE OF NORDEL, RATED AT 400 PSIG, 0°F TO 200°F.
B. STRAINERS - "Y" PATTERN STRAINERS, 125 PSIG, CAST IRON BODY WITH PERFORATED STAINLESS STEEL SCREEN, THREADED FOR 2 INCHES AND SMALLER, FLANGED FOR 2-1/2 INCHES AND LARGER. SCREEN OPENING SIZE AT 0.033 INCH FOR HEATING AND 1/8 INCH FOR CHILLED OR CONDENSER WATER. PROVIDE WITH BLOWDOWN VALVE WITH HOSE END FITTING.
C. THERMOMETERS - DIE CAST ALUMINUM, 9" INDUSTRIAL MERCURY THERMOMETER, FULLY ADJUSTABLE WITH CLEAR ACRYLIC WINDOW AND BRASS SEPARABLE SOCKET.
D. MANUAL AIR VENTS - 1/8" COIN-OPERATED VENT. PROVIDE AIR CHAMBER CONSISTING OF A 3/4" NIPPLE AND BUSHINGS.

5. GENERAL INSTALLATION

A. INSTALL WATER MAINS WITHOUT PITCH. USE ECCENTRIC REDUCING COUPLINGS AT CHANGES IN SIZE WITH THE TOP OF PIPES AT SAME ELEVATION. MAKE CHANGES IN DIRECTION WITH FITTINGS.
B. BRANCHES TO UNITS BELOW MAINS TO BE TAKEN FROM BOTTOM OF MAINS AT A 45 DEGREE ANGLE. PITCH DOWNWARD TOWARD UNITS. BRANCHES TO UNITS ABOVE MAINS TO BE TAKEN FROM TOP OF MAINS AT A 45 DEGREE ANGLE PITCH [illegible] TOWARDS UNITS. PITCH NOT LESS THAN 1" TO 10 FEET.
C. HANGERS SHALL BE SIZED AND INSTALLED FOR THE OUTSIDE DIAMETER OF THE INSULATED PIPE. INSTALL 6" LONG SPLIT CIRCLE GALVANIZED SADDLE BETWEEN THE HANGER AND PIPE INSULATION.
D. HANGERS AND PIPING OF DISSIMILAR METALS SHALL BE DIELECTRICALLY SEPARATED FROM ONE ANOTHER.
E. SEE PLANS FOR APPLICABLE DETAILS.
F. ALL [illegible] PIPING SYSTEMS INSTALLED SHALL CONFORM TO THE REQUIREMENTS OF THE STATE PIPING AND WELDING CODES.
G. INSTALL VALVES AT LOW POINTS FOR DRAINING EACH SYSTEM AND INSTALL MANUAL VENTS AT ALL HIGH POINTS OF EQUIPMENT AND PIPING IN THE SYSTEM TO PROPERLY REMOVE ENTRAPPED AIR.

6. INSULATION

A. ALL HYDRONIC PIPING FOR CHILLED WATER AND/OR HEATING WATER, VALVES, FITTINGS, AND ACCESSORIES SHALL BE INSULATED. FOR PIPE SIZES UP TO 2 INCHES, INSULATE WITH 1 INCH THICK (K=0.23 @ 75°F FIBERGLASS INSULATION WITH ALL SERVICE JACKET AND VAPOR BARRIER. FOR PIPE SIZES 2-1/2 INCHES AND LARGER, INSULATE WITH 1-1/2 INCH THICK (K=0.23 @ 75°F) FIBERGLASS INSULATION WITH ALL SERVICE JACKET AND VAPOR BARRIER.
B. INSULATION AT ALL HANGERS FOR PIPING 2-1/2 INCHES AND LARGER SHALL BE HARD AND NON-COMPRESSIBLE.
C. ALL INSULATION SHALL HAVE A FLAME SPREAD RATING OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING OF NO HIGHER THAT 50 TO CONFORM WITH THE REQUIREMENTS OF THE NFPA.

E. REFRIGERANT PIPING

1. PROVIDE A COMPLETE REFRIGERANT PIPING SYSTEM BETWEEN INDOOR FAN UNITS AND OUTDOOR CONDENSING UNITS, IF APPLICABLE. PROVIDE OIL, REFRIGERANT CHARGE AND TEST SYSTEM. REFER TO PLANS TO DETERMINE IF A REFRIGERANT PIPING SYSTEM IS REQUIRED.

2. MATERIALS

A. REFRIGERANT PIPING SHALL BE TYPE "L" DRAWN COPPER TUBING (ASTM B88), WROUGHT COPPER OR CAST BRONZE FITTINGS (ANSI B16.22), WITH SILFOS-5 SOLDERED JOINTS.
B. SERVICE VALVES, CHARGING PORTS, FILTER-DRIER, SIGHT GLASS, AND A THERMOSTATIC EXPANSION VALVE (TXV) SHALL BE INSTALLED FOR EACH SYSTEM AS A MINIMUM.

3. INSTALLATION

A. SIZE LINES WITH ADEQUATE LIFT TRAPS AND DOUBLE SUCTION RISERS AS NECESSARY TO MEET THE NEEDS OF EQUIPMENT SPECIFIED, FIELD CONDITIONS, AND EQUIPMENT MANUFACTURER'S RECOMMENDATIONS.
B. PRESSURE TEST FOR LEAKS WITH AN INERT GAS AT 250 PSIG. REDO LEAKING JOINTS AND RETEST UNTIL SYSTEM IS TIGHT. EVACUATE GAS AND CHARGE SYSTEM. RE-TEST SYSTEM AND CHECK FOR LEAKS WITH HALIDE LEAK DETECTOR. ALL LEAKING JOINTS MUST BE COMPLETELY RE- DONE UNTIL NO LEAKS EXIST.
C. UPON COMPLETION OF TESTING, BUT BEFORE INSULATION IS APPLIED, PIPING MUST BE INSPECTED BY A REPRESENTATIVE OF THE LOCAL GOVERNING AUTHORITY AS NECESSARY.
D. REFRIGERANT LINES SHALL BE INSULATED WITH 1 INCH THICK RUBATEX OR ARMSTRONG REFRIGERANT PIPE INSULATION IN ACCORDANCE WITH INDUSTRY STANDARDS.

F. SYSTEM TESTING, ADJUSTING, AND BALANCING

1. TESTING, ADJUSTING AND BALANCING OF ALL WORK SHALL BE MADE BY AN INDEPENDENT CONTRACTOR WHO IS CURRENTLY LICENSED ASSOCIATED AIR BALANCING COUNCIL (AABC) OR NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) BALANCING CONTRACTOR. NO OTHER BALANCE REPORTS WILL BE REVIEWED OR ACCEPTED. ALL BALANCING WORK MUST BE COMPLETE AND DONE IN ACCORDANCE WITH THE MOST RECENT STANDARDS OF THEIR SOCIETY. PAYMENT OF ALL COSTS FOR TESTING SHALL BE MADE BY THE HVAC CONTRACTOR.
2. THE HVAC CONTRACTOR SHALL INSTALL NEW FILTERS IN ALL UNITS PRIOR TO THE AIR BALANCE. THE COMPLETE AIR BALANCE SHALL TAKE PLACE WITH OUTSIDE AIR DAMPERS IN MINIMUM POSITION.
3. BALANCE AIR AND WATER QUANTITIES TO WITHIN + 5% OF THAT INDICATED ON THE DRAWINGS. ANY REQUIRED CHANGES IN SHEAVES, BELTS, PULLEYS, OR THE ADDITION OF DAMPERS REQUIRED TO ACHIEVE SPECIFIED FLOW RATES SHALL BE PERFORMED BY THE HVAC CONTRACTOR WITH NO ADDITIONAL COST TO THE TENANT.

4. THE BALANCE REPORT SHALL INCLUDE AS A MINIMUM THE FOLLOWING INFORMATION:
A. AABC OR NEBB CERTIFICATION NUMBER AND SIGNATURE OF BALANCING CONTRACTOR.
B. INSTRUMENTATION LIST WITH LAST CALIBRATION DATES.
C. MAKE AND MODEL NUMBERS OF ALL HVAC EQUIPMENT TESTED.
D. AIR CFM AND STATIC PRESSURE READINGS (DISCHARGE AND SUCTION) AS MEASURED BY PITOT TUBE DUCT TRAVERSE AT THE UNIT.
E. MOTOR NAMEPLATE DATA WITH ACTUAL FIELD VOLTAGE AND AMPERAGE READINGS FOR EACH LEG.
F. MOTOR AND FAN RPMS, SHEAVE SIZES AND BELT SIZES.
G. OUTSIDE, RETURN, MIXED AND SUPPLY AIR TEMPERATURES AT FULL COOLING.
H. WATER BALANCE DATA INCLUDING GPM WITH INLET AND OUTLET TEMPERATURE AND PRESSURE READINGS (WHERE APPLICABLE).
I. MAKE AND MODEL NUMBERS OF ALL AIR DISTRIBUTION EQUIPMENT.
J. FINAL BALANCED AIR VOLUMES AT ALL OUTLETS (INCLUDING RETURNS WHERE DUCTED).
K. INDEXED PLAN WITH DIFFUSER AND RETURN LOCATIONS.
L. REPORT SHALL INCLUDE VAV BOX AIRFLOW SENSOR DIFFERENTIAL PRESSURE READING AT MAX. AND MIN. COOLING.

5. ALL CONTROL SEQUENCES SHALL BE TESTED (INTERLOCKED EQUIPMENT, SMOKE DETECTORS, SMOKE EVACUATION, ECONOMIZER, ETC.) AND OPERATING STATUS RECORDED IN THE REPORT.

6. THREE COPIES OF THE BALANCE REPORT SHALL BE SUBMITTED THROUGH THE GENERAL CONTRACTOR TO THE TENANT'S CONSTRUCTION MANAGER FOR APPROVAL.

7. THE BALANCING CONTRACTOR SHALL PERFORM ALL APPLICABLE TESTING AND BALANCING FUNCTIONS REQUIRED FOR THE SYSTEM DESIGNED IN THESE DRAWINGS. THE BALANCING CONTRACTOR SHALL RECHECK ANY ITEMS THAT THE TENANT DEEMS NECESSARY AT NO ADDITIONAL COST TO THE TENANT.
8. FINAL BALANCE REPORT SHALL BE INCLUDED IN THE OPERATION & MAINTENANCE MANUALS.

G. FINAL HVAC INSPECTIONS

1. ASIDE FROM NORMAL INTERIM INSPECTIONS OF WORK IN PLACE, THE TENANT SHALL HAVE THE RIGHT TO AN INDEPENDENT HVAC CONTRACTOR INSPECT THE FINISHED HVAC INSTALLATION UPON COMPLETION FOR COMPLIANCE WITH THE PLANS, SPECIFICATIONS, AND CODES. THE INSTALLING CONTRACTOR WILL BE RESPONSIBLE TO BRING ALL ITEMS REPORTED BY THE INDEPENDENT HVAC CONTRACTOR UP TO PLANS AND SPECIFICATION REQUIREMENTS AT NO COST TO TENANT.

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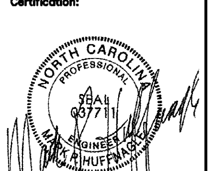
Certification:



04/06/2018

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4,740 SQUARE FEET

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- ☐ bidding
- ■ permits/LL review 04-06-18
- ☐ construction

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