B. Control Dampers

1. Control dampers shall be of the same construction as manual volume dampers, except that no manual operator and quadrant is required. The operating rod shall be suitable for operation by an automatic pneumatic or electric operator.

C. Fire Dampers

1. Fire dampers shall be UL-listed and labelled for 1 1/2 hours and shall be provided with 160 degrees F. links. Dampers installed within ducts shall be Type B or Type C with the blades out of the airstream. Areas indicated shall be net, clear, open areas.

D. Smoke Dampers

1. Smoke dampers shall be UL-listed as Class 1 low-leakage smoke dampers and shall be products of Prefco.

2.07 LOW-PRESSURE DUCT BRANCHES

A. Splitter dampers shall be provided at all low-pressure ductwork branches. All low-pressure ductwork branches shall be radiused or 45 degree take-offs; straight taps are unacceptable. The length of the damper blade shall be the same as the width of the widest duct section at the split, but in no case shall blade length be less than 12". Each operator rod shall have a locking swivel joint.

2.08 FLEXIBLE DUCT

A. Flexible ductwork shall be Class 1, UL 181 air duct and meet NFPA 90A and 90B Standards.

B. The internal duct surface shall be acoustically rated, black CPE bonded to a coated steel wire helix. The external jacket shall be a fiberglass, bi—directionally reinforced, metallized vapor barrier with a standing, triple ply seam. Fiberglass insulation shall be provided between the duct surface and the jacket to achieve a maximum thermal conductance of 0.23 BTU/Hr./sq. ft./degree F. at 75 degrees F. mean.

C. Flexible ductwork shall be suitable for 10" W.G. positive pressure and 1" W.G. negative pressure.

D. Flexible ductwork, insulation and insulation cover shall be suitable for ceiling return air plenum installation and shall comply with all applicable codes and standards regarding such ceiling plenum installations.

E. Flexible duct shall be Thermalfex M-KE or an approved equal.

return, exhaust and transfer ductwork.

F. The maximum allowable installed length of flexible ductwork shall be as

1. 8'-0'' on low-pressure supply air systems limited to short runouts and end of runs connected to round neck supply diffusers and registers.

2. 4'-0" on medium and high-pressure supply air systems limited to the

runouts from the sheetmetal ductwork to each terminal unit. 3. 2'-0" on connections from round neck grilles to sheetmetal ductwork on

G. Provide a spin—in fitting with integral scoop and volume damper at all flexible run—out connections in low—pressure supply air ductwork only.

2.09 TERMINAL UNIT RUNOUTS

A. Medium and high-pressure runouts to terminal units shall be connected to the trunk duct with factory—welded laterals, conical tees or belimouth fitting abrupt round to rectangular taps are strictly prohibited and shall be rejected.

2.10 FLEXIBLE CONNECTIONS

A. Provide flexible duct connections at the inlet and outlet of each belt-driven fan, indoor unit, fan coil unit, air handling unit, etc., and at all other locations indicated. Flexible connections shall be fabricated from a glass fabric coated on both sides with neoprene. Minimum weight shall be 30 oz.

2.11 DUCT HARDWARE

A. Duct hardware shall be as manufactured by Young Regulator or an approved

2.12 ACCESS DOORS

A. A duct access door shall be provided at each fire damper. Access doors shall be designed for 1.5 times the pressure of the duct in which they are mounted. Access doors shall be of sufficient size to provide access to the dampers for resetting the blades and replacing the links. Access doors in medium and high-pressure ductwork shall be installed downstream of fire dampers and shall be implosion type. Where access is provided through gypsum board walls or ceilings, furnish access door for installation under Division 9. Each door shall match the fire—rating of the wall or ceiling indicated.

2.13 DUCT LINER

A. Duct liner shall be one inch thick, 1 1/2 lb. density (3 lb. density on medium— and high—pressure supply air systems) fibrous glass with one face coated with a black fire retardant compound. The permanent composite fire and smoke hazard rating of the liner shall be stenciled on the liner face and

1. Maximum flame spread 25

2. Maximum smoke developed 50

2.14 DUCT INSULATION

A. Duct insulation shall be 2" thick, minimum 3/4 lb. density fiberglass with an FSKL 0.00035" thick aluminum foil jacket, reinforced with fiberglass scrim. Thermal conductivity shall be a maximum of K = 0.24 at 75 degrees F. mean temperature.

B. Insulation adhesive shall be Benjamin Foster 85-20. Tape shall be aluminum foil and shall be SMACNA listed and labeled.

C. The composite NFPA 90A and 90B, ASTM E84, UL rating of the installed insulation shall not exceed 25/50.

3.0 EXECUTION

3.01 INSTALLATION

A. Ductwork shall be installed in strict accordance with SMACNA, UL and NFPA

B. Duct liner shall be provided for the following minimum distances or through the first elbow(s) or as otherwise indicated on the drawings, whichever is greater, downstream of each unit indicated below:

3. Terminal unit

Duct liner shall also be provided throughout all return air, transfer and

C. Duct liner shall be cut to provide overlapped and compressed longitudinal corner joints. Liner shall be installed with the coated surface facing the air stream. Duct liner shall be adhered to the ductwork with a 100% coverage of the sheet metal surfaces using a fire retardant adhesive applied by spraying. Coat all exposed leading edges and all transverse joints with fire retardant adhesive. The liner shall be additionally secured using metal pins welded to the duct and speed washers. All leading edges shall be secured with sheet metal airfoils.

. All supply air ductwork which is not lined shall be insulated. All outside air ductwork shall be insulated. Insulation shall be cut slightly longer than circumference of duct to insure full thickness at corners. All insulation shall be applied with edges tightly banded. Insulation shall be adhered to duct with fire resistant adhesive. Adhesive shall be applied so that insulation conforms to duct surfaces uniformly and firmly. In addition to the adhesive, the insulation shall be additionally secured to the bottom of all ducts 18" or wider by means of welded pins and speed clips. The protruding end of the pins shall be cut off flush after the speed clips have been applied. The vapor-barrier facing shall be thoroughly sealed with tape where the pins have pierced through. All joints shall be sealed with 2" wide SMACNA tape. Any cuts or tears shall be sealed with SMACNA tape.

Flexible ducts utilized in the low-pressure ductwork systems shall be installed without kinks or bends which are less than a centerline radius equal to or greater than twice the diameter of the flexible duct being installed. Also, in the runouts from the medium or high—pressure ductwork to the terminal units, the flexible ducts shall be installed with a variance of no more than 1" per foot of installed length off a straight and level line from the centerline of the sheetmetal ductwork runout or tap to the centerline of the terminal unit inlet. The size of the flexible ductwork connected to each terminal unit shall be the equivalent size of the larger of the following:

1. The inlet size of the terminal unit.

2. The runout size indicated on the drawings.

Should the runout size indicated on the drawings differ from the inlet size of the terminal unit or where the inlet to the terminal unit is rectangular, the transition shall be made with sheetmetal and shall occur at the inlet to the terminal unit.

F. All intersections (crossing) of low—pressure and medium—pressure ductwork shall be made with offsets in the low-pressure ductwork only. The medium pressure ductwork shall be ran straight and level.

END OF SECTION

SECTION 23773 SPLIT SYSTEMS

1.0 GENERAL

.01 DESCRIPTION

A. All work specified in this Section is governed by the HVAC General Section

B. This Section 23773 and the accompanying drawings cover the provision of all labor, equipment, appliances and materials, and performing all operations in connection with the construction and installation of the split systems as specified herein and as shown. This work includes, but is not limited to, the

1. Split system fan coil, heating section and condensing units

2. Control system (interlocked to all split system components)

C. Split system units shall be self—contained, automatic, packaged units. These units shall be completely factory assembled as unitary packages complete with operating controls, internal wiring and piping and fully charged with R-410a refrigerant. Only one electrical power connection shall be required for each unit.

D. Units shall be UL listed and cooling capacities shall be certified in accordance with ARI 210.

A. It is the intent of this Section of the specifications to provide complete. operable, adjusted split systems, as shown and specified, which operate efficiently and automatically, and are free of excessive noise and vibration.

.03BASIS OF DESIGN

A. The basis of design is Trane. Any proposed substitutions shall be submitted in accordance with the prior approval requirements.

2.01 UNIT CASINGS

A. Unit casings shall be formed, galvanized steel construction with welded assembly. Galvanized steel surfaces shall be bonderized and painted with baked acrylic enamel for complete weather protection. Accessories and components shall match and interlock with all other split system components. Fan coil unit casings shall be fully internally insulated with liner which meets NFPA 25/50 flame spread/smoke developed ratings.

2.02 CONDENSING UNITS

A. Condensing unit refrigeration systems shall be factory charged and ready for operation. All units with capacities greater than five (5) tons shall be provided with minimum 2-stage (50% and 100%) cooling. Compressor(s) shall be direct drive, 3600 RPM, hermetic reciprocating type with centrifugal oil pump, crankcase heater and internal pressure relief valve. Compressor(s) shall have internal spring isolation and sound muffling and exhibit minimum vibration transmission and noise. Antirecycle timers shall be provided to prevent excessive cycling of compressors thru utilization of a minimum five (5) minute time shutdown of unit on interruption of power or controlled

B. Condensing unit condenser fans shall be direct—driven, propeller blade type. Condensing unit heat rejection shall be vertically upward. 2.03 COILS

A. Evaporator and condenser coils shall be copper tubing mechanically bonded to heavy duty aluminum fins. Aluminum tubes shall not be acceptable.

2.04 ELECTRIC HEATING SECTIONS

A. Electric heating sections shall be UL listed with nickel-chromium open coil resistance heating elements. Each heater shall be protected by an automatic reset high—limit thermostat and manual reset high—limit thermostat for the primary and secondary overcurrent/thermal protection. A proof of airflow/fan interlock shall also be provided. Controls shall provide for multiple stage start-up and operation.

2.07 CONTROLS AND ACCESSORIES

A. All operating and safety controls which are internal to each unit shall be factory installed and shall include, as a minimum, solid state compressor overload protection, magnetic contactors, thermostatic expansion valve(s), refriaerant line drier(s), outdoor fan and compressor cycling thermostats, high and low limit protection against excessive temperatures or pressures.

B. A 24 volt transformer shall be provided to accommodate an accessory 24 volt indoor thermostat complete with an electronic programmable night setback, separate automatic heat/cool settings, auto/manual fan control and seasonal selector. Thermostat shall provide staging of the cooling and heating to match the stages of each component.

C. Provide a locking cover for each indoor thermostat.

D. Controls on electric heat section shall meet NEMA specifications and requirements.

E. Controls on gas heating sections shall be AGA certified.

F. Automatic shutdown controls shall be provided to meet local codes (or NFPA 90A as a minimum) and shall consist of firestats and duct—mounted smoke detectors interlocked to the fan coil unit for shutdown on the detection of fire or smoke.

2.08 FILTERS

A. Units shall have minimum 1 inch thick, low velocity, glass fiber throwaway filters in commercially available sizes.

3.01 INSTALLATION

A. The split systems and associated controls shall be installed in strict accordance with the manufacturer's recommendations.

B. The control system shall be completely wired under this Division 15. Wiring shall be in accordance with the N.E.C. and shall meet all requirements for this installation.

3.02 STARTUP

A. Provide the services of a factory trained and gualified service technician employed by the unit manufacturer who shall inspect the installation including external interlock and power connections; supervise leak testing, initial operation, calibration of operating and safety controls and supervise electrical testing including insulation resistance of motors and voltage balance between phases during starting and running.

This service technician shall forward a report in four (4) copies to the Owner when the unit is in safe and proper operating condition. This report shall include all pressure and control settings, meg readings, voltage readings per phase during start and run, and shall list minor discrepancies to be corrected that affect safe and reliable operation. One additional copy of the report shall be left in the unit control panel. One copy of bound installation, operation, maintenance service and parts brochures, including applicable serial numbers, full unit description and parts ordering sources, shall be placed in the unit control panel at the time of startup; four (4) additional copies shall be forwarded to the Owner.

END OF SECTION

SECTION 23066 REFRIGERANT PIPING SYSTEMS

1.0 GENERAL

1.02INTENT

1.01 DESCRIPTION

A. All work specified in this Section is governed by the HVAC General Section

B. This Section 23066 and the accompanying drawings cover the provisions of all labor, equipment, appliances, and materials and performing all operations in connection with the construction of the piping systems as specified herein and as shown for the heating, ventilating and air conditioning (HVAC) systems. These piping systems include, but are not limited to, the following:

1. Refrigerant suction and liquid (RS&RL)

2. Condensate drains (DR)

A. It is the intent of this Section of the specifications to provide complete and operable piping systems as shown and specified which are free of leaks, properly vented, free of noise, vibration and sweating, and fabricated so as t fit the space allotted and to exhibit a minimum resistance to fluid flow. It is also the intent of this Section of the specifications to provide a complete piping insulation system which is free of gaps and tears, properly fitted and finished, free of sweating, and fabricated so as to fit the space allotted and to exhibit a negligible heat transfer.

B. The word "piping" is defined to mean all piping, fittings, joints, hangers, coatings, valves, test and sensor wells and accessories necessary for the refrigerant piping systems described, shown and specified.

1.03 GENERAL REQUIREMENTS

A. Provide all reducing fittings, flanges, couplings and unions of the size and type of material to match the piping to each piece of equipment, valve and accessory.

B. Union joints, couplings or flanges shall be provided in each pipe line connected to each piece of equipment and elsewhere as indicated and specified. Unions shall match the piping system in which they are installed.

1. Unions or flanges shall be provided between all copper to steel connections in water—carrying piping. These unions shall be dielectric, insulating type.

. All changes in direction and branches shall be made with manufactured

D. All pipe joints shall be cut square and all burrs shall be removed.

E. Fabrication of a bull—head tee connection is strictly prohibited.

F. Open ends of pipe lines not currently being handled shall be plugged during installation to keep dirt, water and foreign material out of the system.

. Horizontal refrigerant and drain piping shall slope down in the direction of flow at a minimum slope of 1/8" per foot of run.

H. All insulation products installed indoors shall meet NFPA 90A, 90B and 255 requirements for Flame Spread Rating 25 and Smoke Developed Rating 50.

1.04FIRE-STOPS A. Where pipes pass through fire partitions, fire walls and floors, install a fire—stop that shall provide an effective barrier against the spread of fire. smoke and gases. Fire-stop material shall be packed tight and completely fill clearances between pipes and openings. Fire—stop material shall conform to the following:

1. Fire—stopping material shall maintain its dimensions and integrity while preventing the passage of flame, smoke and gases under conditions of installation and use when exposed to the ASTM E119 time—temperature curve for a time period equivalent to the rating of the assembly penetrated. Fire-stopping material shall be noncombustible as defined by ASTM E136; and in addition for insulation materials melt point shall be a minimum of 1700 degrees F. for 1-hour protection and 1850 degrees F. for 2-hour protection. Fire-stopping material shall be Dow-Corning RTV

Foam or an approved equal. 1.05 ACCEPTABLE MANUFACTURERS

A. Insulation products shall be as manufactured by Rubatex or Armstrong. 2.0 PRODUCTS

2.01 PIPE AND FITTINGS

A. All pipe and fittings shall be products of a domestic manufacturer.

B. Pipe and fittings shall be as listed and outlined below:

MATERIAL TYPE <u>SIZES</u> 1. Refrigerant Suction and Liquid 2. Drains*

*Note: As an option, on cooling coil condensate drains (which are <u>not</u> installed in a plenum) the drain piping may be schedule 40 PVC with solvent joints; subject to advance approval by the Local Authorities. Fittings shall meet ASTM D2466 and solvent shall meet ASTM D2564.

C. The pipe, fittings and joints shall be as outlined below:

Material Type 1:

a. Pipe — Type L hard drawn copper tubing meeting ASTM B88 or ASTM

b. Fittings - Wrought copper meeting ANSI B16.22.

c. Joints — Silver brazed with sil—fos or silver solder.

2. Material Type 2: a. Pipe — Copper drainage tube DWV meeting ASTM B306.

b. Fittings — Wrought copper solder—joint drainage fittings meeting ANSI

c. Joints — Soldered with a solder meeting ASTM B32.

2.02 PIPE HANGERS AND SUPPORTS

A. Pipe hangers, trapeze hangers, upper attachments, rods and other supports shall be selected based on pipe size and material contained therein. Provide all hangers, rods, turnbuckles, angles, channels and other supports to securely support the piping systems from the building structure.

3. All materials utilized for the hanging and support of the piping systems shall be manufactured products which are specifically intended for the purpose of hanging piping systems. The use of wire, steel straps, plastic ties, etc. is strictly prohibited. C. Supports and hangers shall be selected to fit around the pipe (and insulation

unless otherwise specified herein) and provide adequate movement for

expansion of the piping systems. Anchors shall be provided to restrict and control such movement within offsets and expansion loops. . All hangers and supports shall be selected at a minimum factor of safety of

five based on the ultimate tensile strength of the material.

AFF

Intermediate pipe supports shall be provided between building structural

members so as not to exceed maximum support spacing specified and shall

construction, intermediate supports shall be securely clamped to steel beams

and to steel joists, and in no case shall supports be attached to roof decks.

NOMINAL PIPE SIZE

2 1/2" and larger

2" and smaller

H. Pipe hangers selected for supporting horizontal insulated piping shall be sized

I. Provide pipe saddles and shields on all insulated piping as outlined below:

1. All insulated piping shall be supported on galvanized shields.

1) Pipes 2" and smaller: 18 gauge x 12" long.

2) Pipes 2 1/2" and larger: 16 gauge x 18" long.

A. All valves shall have the manufacturer's name or trademark and the working

A. Closed—cell insulation shall be provided over all refrigerant suction piping and

1/2" thick 25/50 Armaflex or Rubatex. All glues and coatings shall be

B. Insulation shall be continuous over all valve bodies, fittings, and wall and floor

A. Piping shall follow the general layout, arrangement, schematics, and details.

Provide all offsets, vents, drains, charging ports and connections necessary to

accomplish the installation. Fabricate piping accurately to measurements

established at the project site to avoid interference with ductwork, other

suitable provision for expansion and contraction with expansion loops and

piping, equipment, openings, electrical conduits and light fixtures. Make

A. Pipe hangers or supports shall be provided within 18" of each horizontal

fitting, equipment connection, valve, etc. and at not more than 10 ft.

spacings along horizontal runs of straight, copper piping equal to or greater

305.4 in the 2009 NCSMC. Follow Midstory guide for maximum vertical spacing

than $1-\frac{1}{2}$ diameter, 6 ft. spacing for copper piping equal to or less than

 $1-\frac{1}{4}$ " diameter, and 4 ft. spacing for PVC piping in accordance with table

other services as specified or noted. Closed—cell piping insulation shall be

B. All valves shall be designed and constructed for refrigerant service.

products of the same manufacturer as the insulation.

b. Shields shall be 180 degrees around the lower half of the pipe at all

pipe hangers, except that on trapeze hangers, pipe racks and floor

supported horizontal pipes, shields shall be 360 degrees around the

be structural steel angles (minimum 2 1/2" x 2 1/2" x 1/4"). In steel

F. For suspending pipes from concrete beams, upper attachments shall be side

beam bracket utilizing bolts in sleeves set in top portions of the beams.

Where sleeves are not used, provide expansion shields or power—actuated

G. Hanger rods for pipe hangers shall be as follows:

to fit around the outside of the pipe insulation

a. Shields shall be as follows:

J. Provide riser clamps at all floor penetrations.

pressure cast or stamped on the valve body.

entire pipe.

2.03 VALVES

2.04 PIPING INSULATION

3.0 EXECUTION

3.01 ARRANGEMENT

3.02 MINIMUM HANGER SPACING

3.03 UNDERGROUND PIPING

3.04 REFRIGERANT PIPING INSTALLATION

nitrogen or other inert gases.

a lintless, dry cloth.

7/8" and larger.

END OF SECTION

TAG

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3.05 CLOSED-CELL PIPING INSULATION INSTALLATION

of PVC pipe 2 inches and smaller.

B. Riser clamps shall be provided at each floor penetration.

A. All underground piping shall have a minimum cover of 2'-0".

B. All underground copper lines shall be protected from corrosion with a

continuous plastic sheathing or coating and wrapping. This sheathing or

coating and wrapping shall be extended 6" to 12" above finished floor.

A. All refrigerant piping shall be sized in accordance with the air conditioning

equipment manufacturer's written instructions. Provide charging ports,

solenoid valves, service valves, dryers, etc. at each piece of equipment.

B. All brazing shall be done while the line is being flushed with carbon dioxide,

C. The inside of all tubing shall be thoroughly cleaned and internally wiped with

D. Suction lines shall drop below their coils before any horizontal run.

E. Provide oil traps at least every ten feet for extended vertical risers.

F. All oil traps shall be constructed from close—radius type fittings.

G. Dryer cores shall be installed to remove horizontally or downward.

H. Install external equalizer downstream of its expansion valve sensing bulb.

I. Install expansion sensing valve bulb on top centerline of piping up to 5/8"

A. Insulation shall be provided on all refrigerant suction and indoor condensate

drain lines. The insulation shall be installed by the slip—on method; slitting

of the insulation is <u>prohibited</u> and shall be cause for <u>rejection</u>. All elbows

B. All insulation installed outdoors shall be coated with a glossy white, ultraviolet

protective coating applied in two coats; Armacote or approved equal.

CAP. (BTUH) CAP. (BTUH)

(5) INTERLOCK MOD SO THAT MOD IS OPEN WHEN FAN IS ENERGIZED.

(3) THIS IS THE MINIMUM OUTPUT CAPACITY (IN BTUH FOR GAS AND IN KW FOR ELEC.)

shall be mitered and all such joints and butt joints shall be tightly made and

size; install 45 degrees down from the horizontal centerline on pipe sizes

<u>HANGER ROD SIZE</u>

INSIDE DIMENSION ABOVE CEILING INCHES ACCESS DOOR ADJ ADJUSTABI F ABOVE FINISHED FLOOR KW KILOWATTS AUTO AUTOMATIC AIR CONDITIONING AHU AIR HANDLING UNIT LEAVING AIR TEMPERATURE POUNDS LINEAR GRILLE LINEAR RETURN GRILLE BACKDRAFT DAMPER I WR LOOP WATER RETURN BELOW FLOOR LWS LOOP WATER SUPPLY BELOW GRADE BUTTERFLY BRAKE HORSEPOWER MINIMUM MIN BASE CLEANOUT MAXIMUM MAX MANUAL DAMPER MOTOR OPERATED DAMPER MOD MFR MANUFACTURER

NORMALLY CLOSED

NFWH NON-FREEZE WALL HYDRANT

OUTSIDE DIMENSION

OPPOSED BLADE DAMPER

POWERED INDUCTION UNIT

POUNDS PER SQUARE INCH

NATURAL GAS

OUTSIDE AIR

RETURN AIR

RETURN AIR GRILLE

REFRIGERANT LIQUID

ROOFTOP UNIT

STATIC PRESSURE

SUPPLY AIR

SMOKE DAMPER

SUPPLY REGISTER

SPLIT SYSTEM

TRANSFER GRILLE

UON UNLESS OTHERWISE NOTED

VENT THRU ROOF

WATER COLUMN

VARIABLE AIR VOLUME

WATER HAMMER ARRESTOR

SPLIT SYSTEM SCHEDULE

HEATING SECTION

TYPE CAPACITY (3) TEMP.(°F) PHASE

SANITARY

SENSIBLE

SQUARE

STORM

TEMP TEMPERATURE

VENT

VALVE

WET BULB

WEIGHT

WASTE

TYP TYPICAL

SAN

SEN

VTR

WT

REFRIGERANT SUCTION

RETURN AIR REGISTER

STATIC PRESSURE SENSOR

RADIUS

REDUCER

NO NORMALLY OPEN

NOM NOMINAL

ABBREVIATIONS

CUBIC FEET PER MINUTE CBCR CURVED BLADE CEILING REGISTER CEILING DIFFUSER CONDENSING UNIT CU COLD WATER (DOMESTIC) CW CHILLED WATER SUPPLY CHWS CHILLED WATER RETURN CHWR CONDENSER WATER SUPPLY CWS CONDENSER WATER RETURN CWR CONCENTRIC

CON CLEANOUT COND CONDENSATE DRY BULB DOWN DRAIN DITTO

DECIBELS DWG DRAWING ENTERING AIR TEMPERATURE ECC **ECCENTRIC** EXHAUST FAN EOD EMERGENCY OVERFLOW DRAIN **FXHAUST REGISTER** ESP EXTERNAL STATIC PRESSURE

EWT ENTERING WATER TEMPERATURE EXH EXHAUST EFF EFFICIENCY FAHRENHEIT FCO FLOOR CLEANOUT FAN COIL UNIT FCU FIRE/SMOKE DAMPER FSD FIRE DAMPER OR FLOOR DRAIN FL DR FLOOR DRAIN (only) FLR FLOOR

FLAT ON BOTTOM FOB FUEL OIL RETURN FOR FUEL OIL SUPPLY FOS FLAT ON TOP FOT FDM FFFT PFR MINITE FPS FEET PER SECOND

GALLONS PER MINUTE GLOBE GRADE CLEANOUT

HERTZ

Hz

1,000 N/A

(6) PRIMARY HEATING SHALL BE THROUGH THE HEAT PUMP SECTION. THE ELECTRIC HEAT SHOWN IS FOR EMERGENCY HEATING ONLY.

(4) PROVIDE WITH CONDENSATE PUMP WHERE GRAVITY FEEDING IS NOT POSSIBLE. COORDINATE WITH DIVISION 26.

(CFM) | AIR (CFM) | (IN. W.C.) U | H.P. of db of wb PHASÉ!

(1) THIS IS THE SP EXTERNAL TO THE ENTIRE FAN COIL UNIT ASSEMBLY (WET COIL, CASING, CLEAN FILTERS, AND FURNACE LOSSES ARE NOT INCLUDED IN THIS EXT. SP.)

(2) PROVIDE WITH 7 DAY PROGRAMMABLE WALL THERMOSTAT LOCATED AS SHOWN ON PLANS AND INTERLOCK WITH BMS. UNIT SHALL OPERATE AS STANDALONE IN THE EVENT THE BMS SYSTEM CONNECTION IS LOST.

GPM HORSEPOWER HTG HEATING HOT WATER (DOMESTIC) HW HOT WATER RETURN HWR HWRR HOT WATER REVERSE RETURN HWS HOT WATER SUPPLY

GENERAL NOTES

THESE DRAWINGS ARE SCHEMATIC IN NATURE AND ARE NOT INTENDED TO SHOW ALL POSSIBLE CONDITIONS. IT IS INTENDED THAT A COMPLETE TENANT MECHANICAL SYSTEM BE PROVIDED WITH ALL NECESSARY EQUIPMENT, ACCESSORIES, OPTIONS AND CONTROLS. COMPLETELY COORDINATED WITH ALL DISCIPLINES. ALL ITEMS AND LABOR REQUIRED FOR A COMPLETE TENANT MECHANICAL SYSTEM IN ACCORDANCE WITH ALL APPLICABLE CODES, STANDARDS AND THE BASE BUILDING CONTRACT DOCUMENTS SHALL BE FURNISHED WITHOUT INCURRING ADDITIONS TO THE CONTRACT.

REFER TO THE ARCHITECTURAL DRAWINGS FOR EXACT PARTITION LAYOUTS, REFLECTED CEILING PLANS, DIMENSIONS, ETC.

EXISTING MECHANICAL EQUIPMENT AND DUCTWORK ARE SHOWN BY DASHED LINES. NEW WORK AND RELOCATED WORK ARE SHOWN BY SOLID LINES. EXISTING WORK TO BE REMOVED IS SHOWN CROSSHATCHED. WHEN ANY DUCTWORK OR AIR DISTRIBUTION DEVICE IS REMOVED, THE ASSOCIATED TRUNK DUCT SHALL BE SEALED AIRTIGHT WITH A SHEET METAL PATCH OR CAP.

4. VISIT SITE AND CAREFULLY EXAMINE EXISTING CONDITIONS PRIOR TO SUBMITTING BID. THE EXISTING CONDITIONS SHOWN ARE BASED ON DOCUMENTS PROVIDED BY OTHERS AND HAVE NOT BEEN VERIFIED BY THE ENGINEER. IF EXISTING CONDITIONS DIFFER FROM DRAWINGS IN SUCH A MANNER THAT WILL AFFECT PRICING. (I.E. DUCTWORK, VAV OR PIU ARE NOT IN THE SHOWN LOCATION) CONTRACTOR WILL NOTIFY DWNER SO THAT A RESOLUTION CAN BE MADE PRIOR TO SUBMITTING BIDS. NO ALLOWANCE WILL BE MADE FOR LACK OF KNOWLEDGE OF EXISTING CONDITIONS.

REFER TO THE ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF ALL CEILING MOUNTED AIR DISTRIBUTION DEVICES. IF ANY ITEMS ARE NOT SHOWN ON THE REFLECTED CEILING PLANS, PREPARE A DRAWING OF THE PROPOSED LOCATION AND PRESENT IT TO THE ARCHITECT FOR APPROVAL PRIOR TO INSTALLATION.

ALL ROUND AND FLEXIBLE DUCTWORK EXTENDING TO DIFFUSERS SHALL BE SIZED FULL SIZE OF DISTRIBUTION DEVICE INLET, AND TAPS TO THE EXISTING LOW-PRESSURE DUCTWORK SHALL BE MADE WITH SPIN-IN FITTINGS HAVING INTEGRAL SCOOPS AND VOLUME DAMPERS. ALL NEW RECTANGULAR DUCTWORK TAPS SHALL BE MADE WITH SPLITTERS OR EXTRACTORS. ALL DUCTWORK SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH SMACNA DUCT STANDARDS.

FLEXIBLE DUCTS SHALL BE INSTALLED FREE OF SAGS AND KINKS; SUPPORTED AT NOT MORE THAN 48" O.C.

TEST AND BALANCE ALL DIFFUSERS, BOXES, FANS, ETC. TO THE AIRFLOWS AND CONDITIONS INDICATED. ALL EXISTING DIFFUSERS, BOXES, FANS, ETC. WHICH ARE NOT NOTED OTHERWISE SHALL BE BALANCED TO THEIR PRIOR DESIGN AIRFLOWS; REFERENCE THE EXISTING RECORD DRAWING AVAILABLE FROM THE OWNER. TESTING AND BALANCING OF HVAC SYSTEM SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS OF AABC OR NEBB AND SHALL BE PERFORMED UNDER THE DIRECT SUPERVISION OF A AABC OR NEBB CERTIFIED TEST AND BALANCE ENGINEER. SUBMIT 4 COPIES OF THE REPORT TO THE OWNER.

9. ALL CONTROL WIRING AND TUBING INSTALLED ABOVE THE CEILING SHALL BE LOCATED AS HIGH ABOVE THE CEILING AS POSSIBLE AND SHALL FOLLOW THE DESIGNATED GENERAL ROUTING OF THE DUCTWORK. DO NOT HANG WIRING OR TUBING FROM DUCTWORK; RATHER, SUSPEND FROM THE STRUCTURE.

THE WALL INDICATED SHALL BE AS DIRECTED BY THE ARCHITECT. NEW THERMOSTATS SHALL BE SELECTED TO MATCH EXISTING BASE BUILDING THERMOSTATS AND SHALL BE COMPATIBLE WITH EQUIPMENT SERVED. 11. ADJUST ALL DIFFUSERS IN CORRIDORS OR WITHIN 3 FEET OF A WALL TO PROVIDE 2-

10. THERMOSTATS SHALL BE LOCATED IN EACH ZONE AS SHOWN. THE EXACT LOCATION ON

WAY OR 3-WAY BLOW AWAY FROM OR PARALLEL TO WALLS. ALL LAY-IN DIFFUSERS

SHALL HAVE 4-WAY BLOW UNLESS NOTED OTHERWISE. 12. PORTIONS OF DUCTWORK VISIBLE THROUGH GRILLES AND REGISTERS IN FINISHED

AREA SHALL BE PAINTED FLAT BLACK.

CONCLUSION OF THE PROJECT.

CONDENSING UNIT DATA

208/3

STAGES

BASIS OF DESIGN

13 | TRANE GAM5B0B30/4TWA3030 | (2)(4)(5)

REMARKS

13. SHEET METAL SUPPLY DUCTWORK SHALL BE INSULATED WITH 2" THICK FIBERGLASS DUCT INSULATION WITH FOIL VAPOR BARRIER U/L LISTED. EXHAUST DUCTWORK SHALL NOT BE INSULATED UNLESS OTHERWISE NOTED

14. LOW PRESSURE DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH SMACNA DUCT CONSTRUCTION STANDARDS. 15. TEST AND BALANCE ALL AFFECTED ZONES AND PROVIDE REPORT TO OWNER/CUSHMAN.

18. ALL DAMPERS, MECHANICAL EQUIPMENT, SHUTOFF VALVES, WATER SOURCE HEAT

HEAT PUMPS, ETC, ARE TO BE MOUNTED IN ACCESIBLE LOCATIONS.

16. COORDINATE TSTAT LOCATIONS WITH ARCHITECT.

17. BAS GRAPHICS SHOULD BE UPDATED WITH EXISTING AND ALL NEW EQUIPMENT AT THE

LEGEND CEILING DIFFUSER CEILING RETURN AIR GRILLE or EXHAUST GRILLE SIDE-WALL or DUCT MOUNTED REGISTER SLOT DIFFUSER MANUAL VOLUME DAMPER **__** FIRE DAMPER THERMOSTAT HUMIDISTAT NIGHT SET-BACK MOTOR OPERATED DAMPER EXISTING WORK NEW WORK WORK TO BE REMOVED FLOOR DRAIN Ø HOSE BIBB FLOOR CLEAN-OUT

WALL CLEAN-OUT

DUCT ACCESS PANEL

FAN COIL UNIT DATA

RPM

1/3 80 67 208/3 BELT 1,750 HORIZONTAL FAN COIL ELEC 7.2 kW (6) 95

TYPE OF UNIT

 \triangle Date Description

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Charlotte, NC 28202

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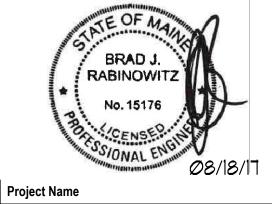
MEP JOB# 170358

Suite 2320

United States

08.18.2017 ISSUE FOR PERMIT AND CONSTRUCTION

| Seal / Signature



Unum Workplace Transformation- Phase 1 (HO2) Project Number

59.6481.000 Description SPECIFICATIONS, NOTES, AND SCHEDULES - HVAC

Scale

M1.003

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