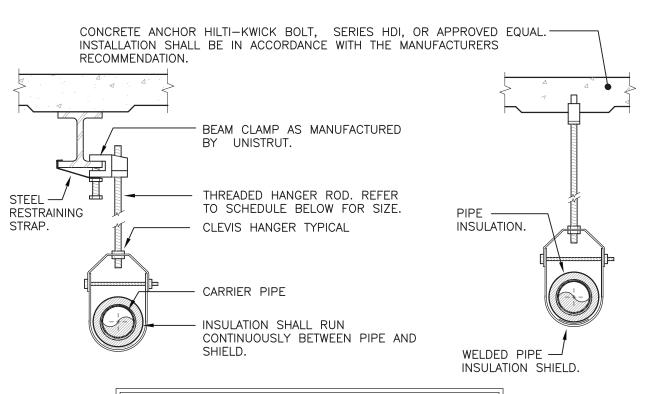


- ALL BRACKETS, HANGERS, AND FASTENERS SHALL BE GALVANIZED STEEL.
 CLAMP INSERT ASSEMBLY SHALL INCLUDE GALVANIZED STEEL PIPE CLAMP, ARMAFLEX INSULATION
- WITH PAINTED ALUMINUM JACKET, AND INTERIOR SUPPORTS 3. CEMENT RUBBER SUPPORT BLOCKS TO ROOF - USE ONLY MATERIALS COMPATIBLE WITH THE

ROOF PIPE SUPPORT DETAIL

NOT TO SCALE



PIPE HANGER SCHEDULE
 PIPE DIA.
 3/4"-2"
 2 1/2"-3"
 4"-5"
 6"
 8"-12"

 HANGER DIA.
 3/8"
 1/2"
 5/8"
 3/4"
 7/8"

NOTES:

- 1. CLEVIS HANGERS WITH WELDED INSULATION SHIELDS SIMILAR TO RAUCH FIG. 100SH ON ALL PIPES LARGER THAN 1". 2. FOR PIPES 1" OR SMALLER, A BAND HANGER WITH INSULATION SHIELD MAY BE USED SIMILAR TO RAUCH FIG. NO. 1ASH.
- . FOR NON-INSULATED PIPE, INSULATION SHIELDS MAY BE OMITTED. 4. ALL PIPE HANGERS SHALL BE GALVANIZED STEEL OR FACTORY PAINTED BLACK WITH ENAMEL.
- 5. FOR NON FERROUS PIPING WITHOUT INSULATION, ALL HANGERS SHALL BE COPPER PLATED OR FURNISHED WITH A DI-ELECTRIC BETWEEN PIPE AND HANGERS.

BRANCH DUCT RIGID STEEL

FLEXIBLE DUCT FOR FINAL

FLEXMASTER USA -TYPE 1 M

CONNECTION SHALL NOT EXCEED 4'

-- INSULATE BACK OF SUPPLY DIFFUSERS

- SUPPLY DIFFUSER SHALL BE

SUPPORTED INDEPENDENT OF THE

PROOF JACKET

WITH 1" THICK INSULATION WITH VAPOR

6. WHERE EXISTING BUILDING STRUCTURAL COMPONENTS HAVE FIREPROOF MATERIAL, ANY AREA THAT IS DISTURBED OR DAMAGED AS A RESULT OF HANGER INSTALLATION SHALL BE PATCHED WITH UL AND FM APPROVED FIREPROOFING TO MATCH EXISTING.

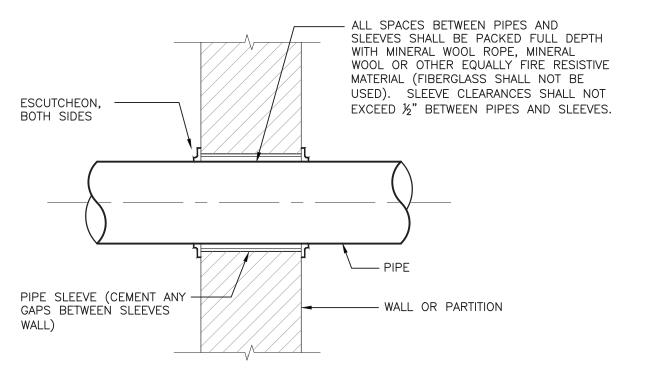
PIPE HANGER DETAIL

VOLUMETRIC

DUCT RIGID

DAMPER

NOT TO SCALE

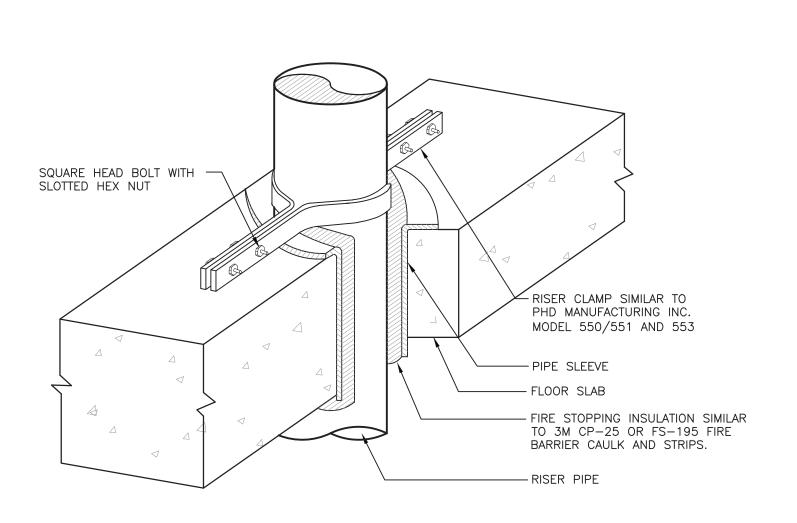


1. THIS DETAIL ALSO APPLICABLE TO INTERIOR NON-WATER PROOF FLOOR CONSTRUCTION. FOR WATER PROOF FLOOR CONSTRUCTION AND OTHER CONSTRUCTION - SEE SPECIFICATIONS.

2. PROVIDE FIRE STOP SEALANT ON ALL NEW AND EXISTING PIPING PENETRATING EXISTING FIRE RATED WALLS AND NEW FIRE RATED WALLS CONSTRUCTED AS PART OF THE PROJECT.

FIRE RATED PARTITION AND WALL PIPE

PENETRATION DETAIL

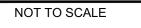


PIPE PENETRATION THROUGH FLOOR DETAIL

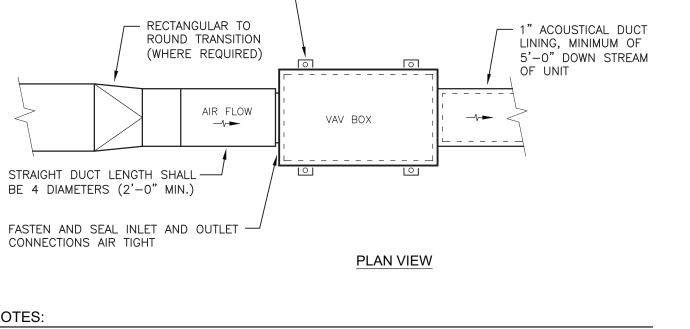
- BRANCH DUCT RIGID STEEL VOLUMETRIC -_\ FLEXMASTER USA -TYPE 1 M FLEXIBLE DUCT FOR FINAL CONNECTION SHALL NOT EXCEED 4' - ACOUSTICALLY LINE INTERIOR AND PAINT BLACK ALL METAL SURFACES MAIN RETURN DUCT CEILING RIGID STEEL - SUPPORT REGISTER AND PLENUM BOX INDEPENDENT OF CEILING.

1. FLEXIBLE AIR DUCT SHALL BE TESTED AND APPROVED IN ACCORDANCE WITH UL 181. ALL SUCH CONNECTORS AND FLEXIBLE AIR DUCTS SHALL BE LISTED AND LABELED AS CLASS O OR CLASS 1, IN ACCORDANCE WITH INTERNATIONAL MECHANICAL CODE.

SUPPLY DIFFUSER LAY-IN DETAIL



RETURN REGISTER DETAIL M6.01 NOT TO SCALE



NOTES:

3/8" THREADED SUPPORT RODS: — ATTACH TO BUILDING STRUCTURE.

SUPPORTING CHANNEL: FASTEN ROD

WITH LOCKING NUT AND LEVEL UNIT

- 1. THE OPERATION OF VARIABLE VOLUME TERMINAL UNITS ARE AFFECTED BY EXCESSIVE TURBULENCE ON THE ENTERING SIDE OF EACH TERMINAL UNIT. THEREFORE, TERMINAL UNITS MUST NOT BE INSTALLED
- TO CLOSE TO MAIN DUCTS, ELBOWS AND FITTINGS. 2. WHEN MINIMUM UPSTREAM STRAIGHT DUCT CONNECTION TO TERMINALS AS INDICATED ABOVE CANNOT BE MAINTAINED, PROVIDE ORIFICE PLATE, STRAIGHTENING VANES OR OTHER DEVICE AS RECOMMENDED BY TERMINAL UNIT MANUFACTURER AND SUBMIT TO ENGINEER FOR REVIEW PRIOR TO INSTALLATION.
- 3. TERMINAL UNITS SHALL BE PROVIDED WITH CONTROLS ON LEFT OR RIGHT SIDE AS REQUIRED BY FIELD CONDITIONS. FOR UNITS WITH ELECTRONIC CONTROLS FURNISH NEMA 1 RATED ENCLOSURE AND U.L. II TRANSFORMER AND DISCONNECT SWITCH.

4. ARRANGE ACCESS TO PERMIT EASY FIELD BALANCING AND MAINTENANCE.

NOT TO SCALE

VAV BOX INSTALLATION DETAIL

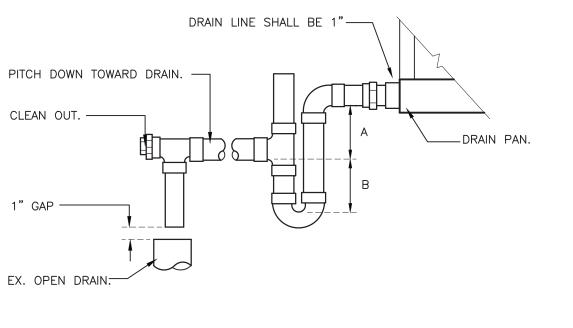
TYPICAL 3/4" HANGER ROD — TO STRUCTURE ABOVE MAX. SPAN 36" — INSULATION TYPICAL PIPE ROLLER AND ROLLER CHAIR. SEE NOTE # 3 PIPE - NO INSULATION - $-2" \times 1\%" \times 12 \text{ GA}.$ CHANNEL SEE NOTE # 2 TYPICAL LOCKING NUT AND -WASHER — PIPE SADDLE. SEE TYPICAL SUPPORT NUT ----AND WASHER NOTE # 1 BELOW - HIGH DENSITY INSULATION BOLT PIPE ROLLERS TO -12" LONG CHANNEL OR ANGLE (TYP.) INSULATION SHIELD, 12" LONG. SEE NOTE # 1

NOTES:

NOT TO SCALE

- 1. PROVIDE INSULATION SHIELD OR PIPE SADDLE BASED ON THE PIPING SYSTEM AND
- PIPE SIZE AS INDICATED IN THE SPECIFICATIONS.
- TRAPEZE TYPE HANGER SHALL BE USED FOR A MAXIMUM 1,000 LB UNIFORM LOAD. 3. ELIMINATE PIPE ROLLERS AND ROLLER CHAIRS AT ANCHOR POINTS

TRAPEZE TYPE HANGER INSTALLATION DETAIL



1. DRAW THRU UNITS; DIMENSION A (DEPTH OF SEAL) SHALL BE 2" MINIMUM AND DIMENSION B SHALL BE 1.2 x THE STATIC PRESSURE OF THE UNIT.

CONDENSATE DRAIN DETAIL

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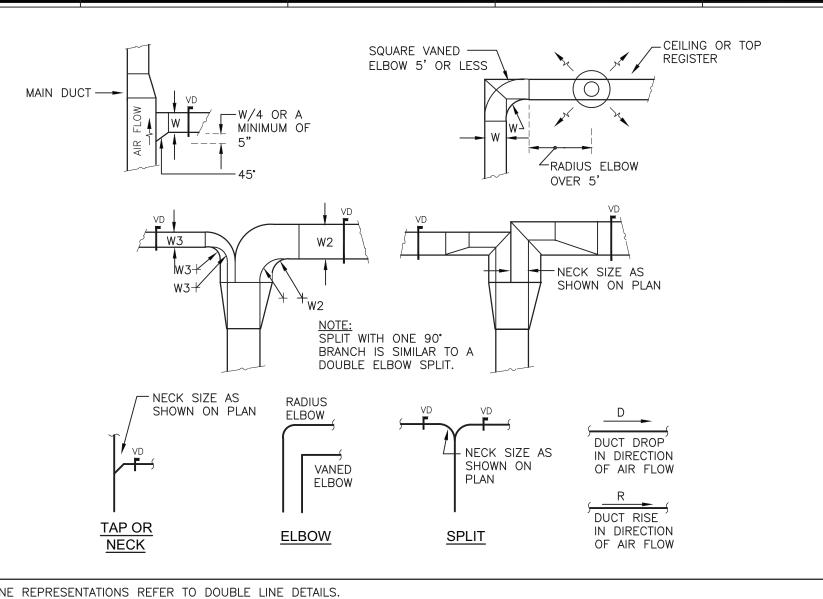
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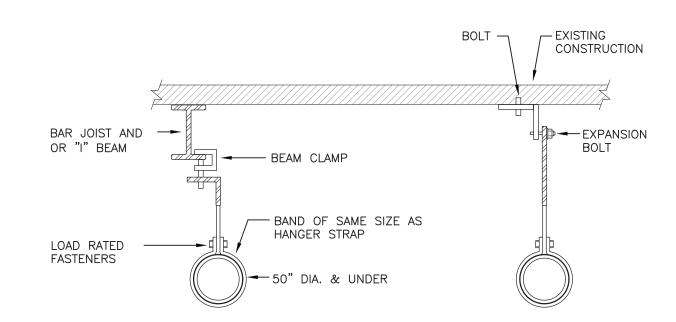


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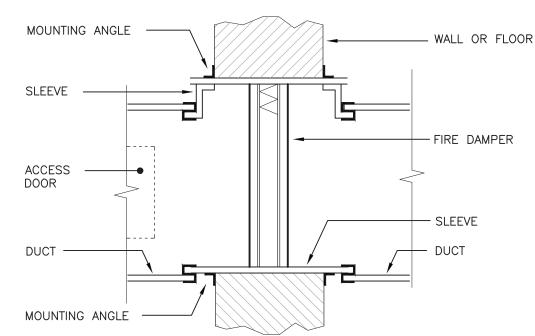
- SINGLE LINE REPRESENTATIONS REFER TO DOUBLE LINE DETAILS. USE RADIUS OR SQUARE VANED BENDS FOR BOTH ELBOWS AND SPLITS AS DETERMINED BY SPACE LIMITATIONS, AND THE DISTANCE FROM AIR OUTLETS. ALL SQUARE ELBOWS SHALL HAVE FACTORY TURNING VANES. AND MAINTAIN A CONSTANT WIDTH. 4. WHERE DUCTS SPLIT, THE SOLID LINE REPRESENTATION IS PREFERRED, UNLESS PRECLUDED BY SPACE, OR OTHERWISE INDICATED.
- 5. USE ELBOW SPLIT FOR BRANCH CONNECTIONS ONLY WHERE NECK SIZE IS GIVEN.

DUCT BRANCH TAKE-OFF DETAIL

NOT TO SCALE



ROUND DUCT HANGER DETAIL

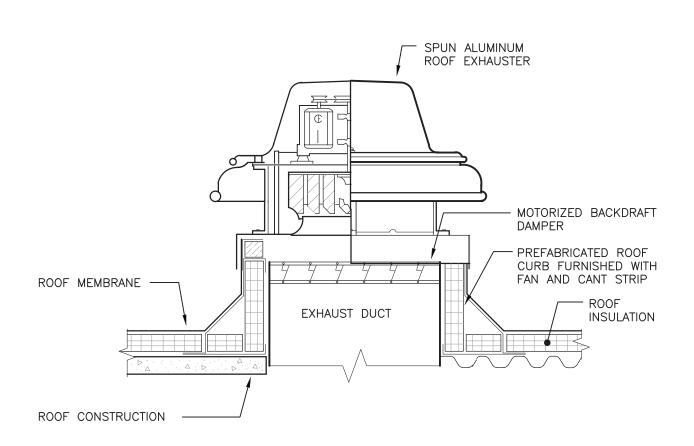


INSTALLATION REQUIREMENTS

- 1. REQUIREMENTS FOR AN APPROVED INSTALLATION INCLUDE THE FOLLOWING: OPENINGS IN THE FLOOR OR WALL SHALL BE ½" PER FOOT LARGER THAN DAMPER DIMENSIONS (¾6" LARGER PER FOOT FOR STAINLESS). MINIMUM CLEARANCE OF ¼" REQUIRED FOR ANY INSTALLATION.
- 2. SLEEVE GAGE SHALL BE AT LEAST EQUAL TO THE GAGE OF THE DUCT AS DEFINED BY THE APPROPRIATE SMACNA DUCT CONSTRUCTION STANDARD, AS DESCRIBED IN NFPA90A. WHEN ONE OR MORE OF THE FOLLOWING DUCT CONNECTIONS ARE USED, PLAIN S SLIP, HEMMED S SLIP, STANDING S SLIP, REINFORCED STANDING S SLIP, INSIDE SLIP JOINT, OR DOUBLE S
- 3. IF ANY OTHER DUCT SLEEVE CONNECTIONS ARE USED, THE SLEEVE SHALL BE MINIMUM 16 GAGE FOR DAMPERS UP TO 36" (W) x 24" (H) AND 14 GAGE IF WIDTH EXCEEDS 36" OR HEIGHT EXCEEDS 24".
- 4. MOUNTING ANGLES SHALL BE MINIMUM OF 1½" x 1½" x 14" GAGE AND BOLTED. TACK WELDED PR SCREWED TO SLEEVE AT MAXIMUM SPACING OF 12" AND WITH MINIMUM OF TWO CONNECTIONS IN EACH SIDE, TOP AND BOTTOM. MOUNTING ANGLES SHALL OVERLAP WALL A MINIMUM OF ONE INCH ON ALL FOUR SIDES.
- 5. DAMPER SHALL BE BOLTED, TACK WELDED, OR SCREWED TO SLEEVE ON SAME SPACING AS ANGLES. SLEEVES SHALL NOT EXTEND MORE THAN 6" OUTSIDE OF WALL.
- 6. IF GAP BETWEEN DUCT/SLEEVE AND CONSTRUCTION IS 1" OR LESS, PACK SPACE WITH FIREPROOF FIBROUS MATERIAL AND SEAL BOTH SIDES WITH NON-HARDENING FIREPROOF SEALER. IF GAP EXCEEDS 1", WRAP DUCT WITH 1" THICK FIREPROOF FIBROUS MATERIAL AND FILL REMAINING SPACE WITH GROUT.
- 7. ALL FIRE DAMPERS IN DUCTWORK SERVING AUDITORIUM SHALL HAVE BLADES OUT OF AIRSTREAM.

FIRE DAMPER DETAIL

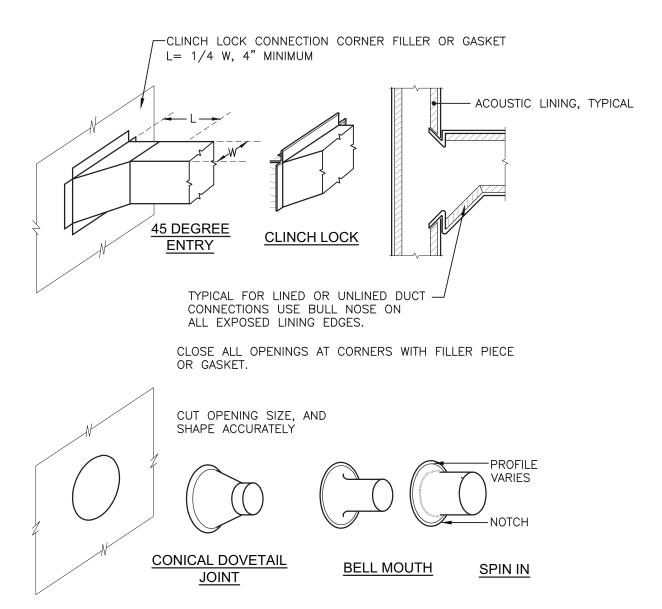
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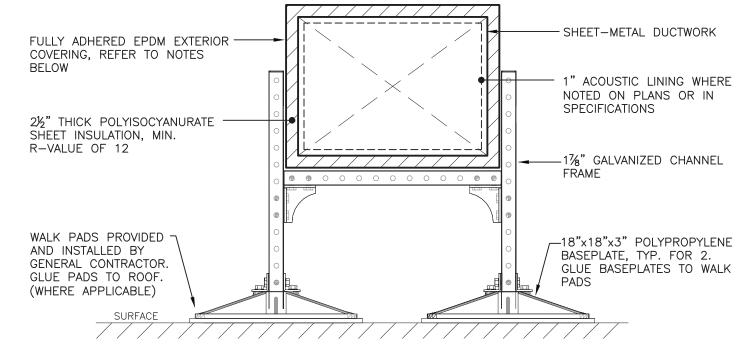
NOTES:

. ROOF CURB TO BE PROVIDED BY MECHANICAL CONTRACTOR AND INSTALLED BY GENERAL CONTRACTOR. REFER TO ARCHITECTURAL ROOF DETAILS FOR MORE INFORMATION. COORDINATE ROOF OPENINGS AS REQUIRED FOR MECHANICAL WORK WITH GENERAL CONTRACTOR. . DETAIL SIMILAR FOR UPBLAST TYPE EXHAUST FANS.

ROOFTOP EXHAUST FAN DETAIL



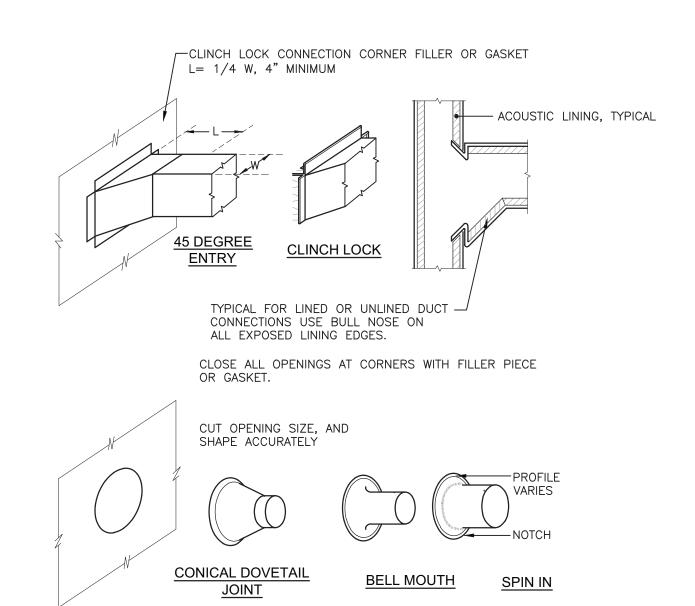
DUCT BRANCH CONNECTION DETAIL



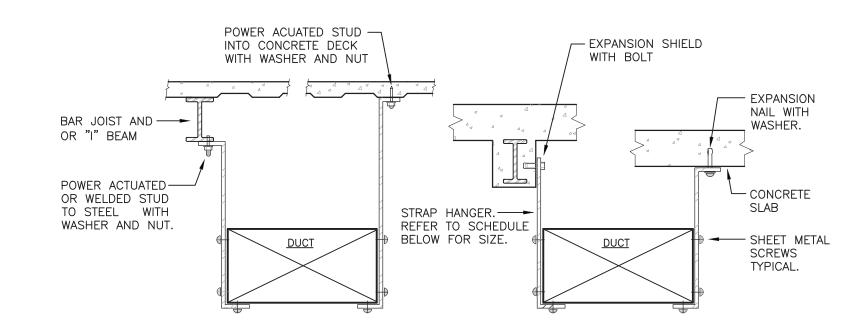
- 1. ROOF DUCT SUPPORT SHALL BE BASED ON PHP SYSTEMS/DESIGN MODEL NUMBER PHP-D. 2. ALL BRACKETS, HANGERS, FASTENERS AND SUPPORTS LOCATED OUTDOORS SHALL BE GALVANIZED OR NICKEL PLATED 5. USE ONLY THOSE MATERIALS COMPATIBLE WITH THE ROOFING SYSTEM, REFER TO ARCHITECTURAL DRAWINGS.
- 4. SEAL ALL EXTERIOR DUCTWORK IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS METAL AND FLEXIBLE-SEAL CLASS A. SEAL ALL DUCT JOINTS AND MAKE WATER-TIGHT.
- 5. DUCT SUPPORTS ON ROOF SHALL SIT ON WALK PADS PROVIDED AND INSTALLED BY GENERAL CONTRACTOR. 6. INSULATION INSTALLED ON THE TOP OF THE DUCTWORK SHALL BE SLOPED 1/2" PER FOOT.
- 7. INSULATION SHALL BE FASTENED TO THE DUCTWORK WITH SCREWS AND PLATES INSTALLED 12" ON CENTER IN ALL DIRECTIONS.
- 8. INSULATION SHALL BE COVERED WITH 60 MIL THICK, FIRE RATED, FULLY ADHERED EPDM BY THE GENERAL CONTRACTOR. THE GENERAL CONTRACTOR SHALL APPLY TWO ROLLER COATS OF WHITE ACRYLIC LATEX COATING TO EXTERIOR.

INSULATED EXTERIOR DUCT SUPPORT DETAIL

NOT TO SCALE



DUCT BRANCH CONNECTION DETAIL



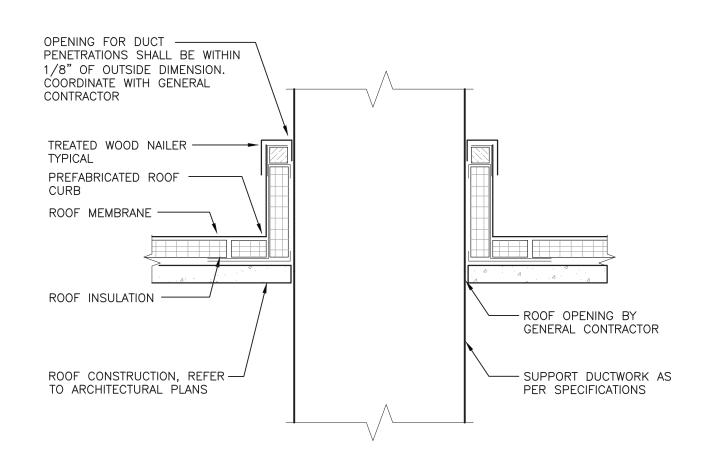
| HANGE | ER STRAP SCHE | DULE |
|-----------------------|---------------|-----------------|
| DUCT SIZE | HANGER SIZE | MAXIMUM SPACING |
| UP TO 2 SQ.FT. | 1" X 1/16" | 8'-0" |
| 2 SQ.FT. TO 4 SQ.FT. | 1" X 1/8" | 8'-0" |
| 4 SQ.FT. TO 10 SQ.FT. | 1" X 1/8" | 6'-0" |
| OVER 10 SQ.FT. | 1" X 1/8" | 4'-0" |

RESULT OF HANGER INSTALLATION SHALL BE PATCHED WITH UL AND FM APPROVED FIREPROOFING TO MATCH EXISTING.

NOTES:

1. FOR DUCTS OVER 49" WIDE, THE STRAP HANGER SHALL BE TURNED UNDER THE BOTTOM OF THE DUCT. WHERE BUILDING STRUCTURAL COMPONENTS HAVE FIREPROOF MATERIAL, ANY AREA THAT IS DISTURBED OR DAMAGED AS A

DUCT HANGER DETAIL



1. INSULATED PREFABRICATED ROOF CURB SHALL BE BASED ON THYCURB MODEL TC-3. ROOF CURB SHALL BE CONSTRUCTED OF 18 GAUGE GALVANIZED STEEL WITH FULLY WELDED CORNERS, FACTORY INSTALLED WOOD NAILERS, REINFORCED SIDES, GASKETING, AND 1½" THICK 3-POUND DENSITY RIGID INSULATION. CURB HEIGHT SHALL BE 24" MINIMUM. ROOF CURB SHALL BE PROVIDED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE GENERAL CONTRACTOR. . GENERAL CONTRACTOR SHALL MAKE PENETRATION WEATHER-TIGHT, REFER TO ARCHITECTURAL AND ROOFING DRAWINGS. 3. THIS DETAIL SHALL BE USED FOR ALL DUCT PENETRATIONS THROUGH ROOF.

ROOF DUCT PENETRATION DETAIL

NOT TO SCALE

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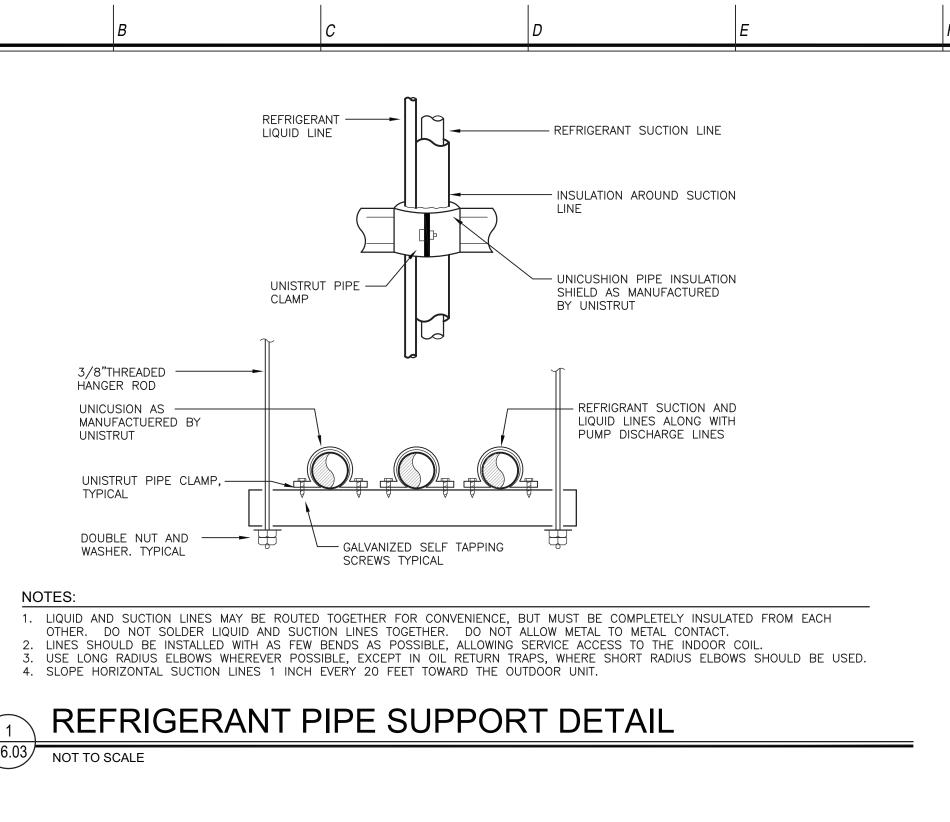
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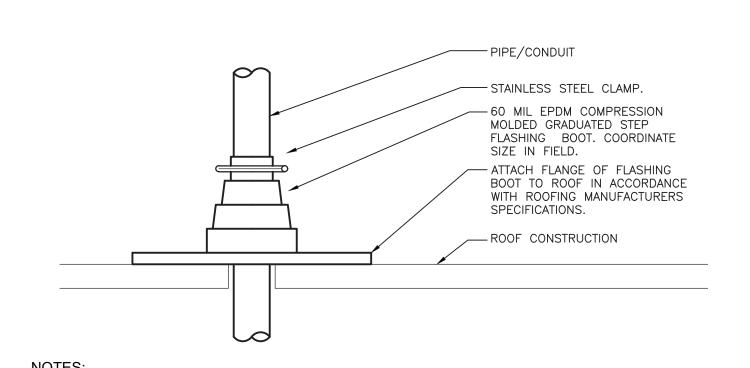
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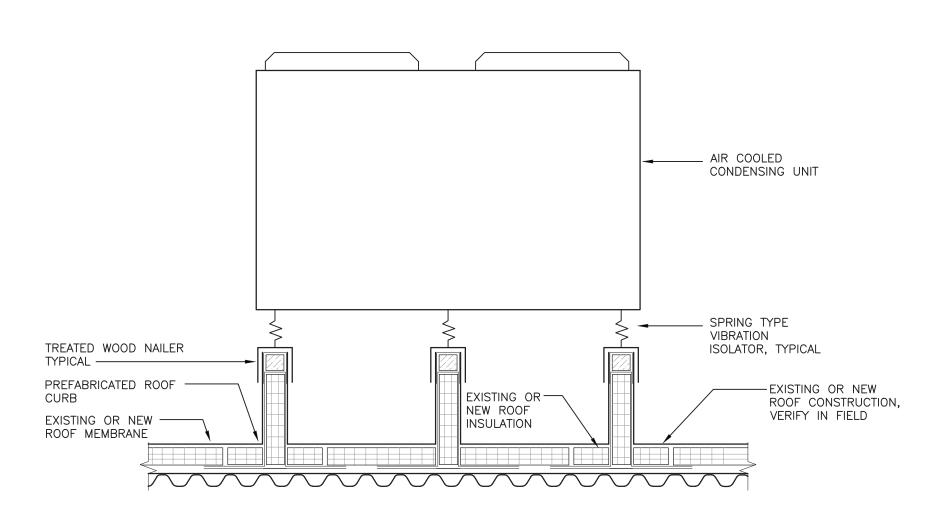




1. CONTRACTOR TO SELECT FLASHING BOOT BASED ON QUANTITY & SIZE OF PIPE PENETRATIONS. FLASHING BOOT SHALL PROVIDE A WATERTIGHT SEAL.

- CLEAN AND PREPARE ROOF SURFACE AS REQUIRED FOR INSTALLATION OF FLASHING BOOT AND IN ACCORDANCE WITH ANY SPECIAL REQUIREMENTS PER THE ROOFING MANUFACTURER.
- 3. COORDINATE QUANTITIES AND SIZES OF PIPE/CONDUIT PENETRATIONS IN THE FIELD WITH CAP AND BOOT REQUIREMENTS.
- 4. USE ONLY MATERIALS COMPATIBLE WITH THE ROOFING SYSTEM.

ROOF PIPE/CONDUIT PENETRATION DETAIL

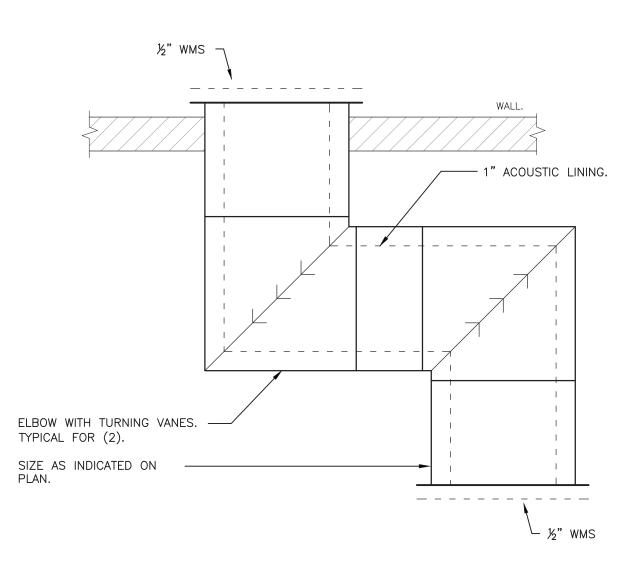


NOTES

NOT TO SCALE

- 1. GENERAL CONTRACTOR SHALL MAKE PENETRATION WEATHER-TIGHT, REFER TO ARCHITECTURAL AND ROOFING DRAWINGS.
- 2. THIS DETAIL SHALL BE USED FOR ACCU-A, ACCU-B, ACCU-C, ACCU-D, ACCU-4, ACCU-5, AND ACCU-6. PROVIDE (2) RAILS.

FQUIPMENT SUPPORT RAIL DETAIL NOT TO SCALE



TRANSFER DUCT DETAIL

SEAL WEATHER-TIGHT WITH
MASTIC OR ASPHALT.

CENTER PIPE IN SLEEVE.

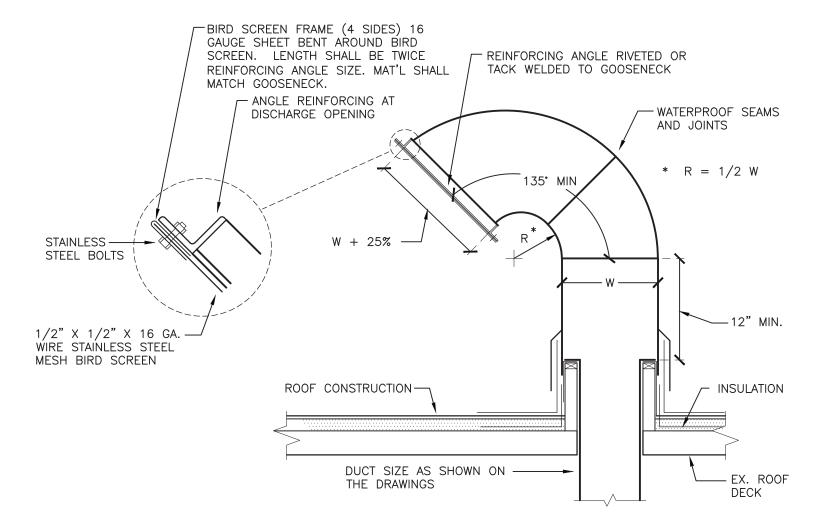
FINISHED WALL SURFACE.

SEAL SLEEVE WITH TIGHTLY PACKED OAKUM AND POURED LEAD.

COAT EXTERIOR SURFACES WITH TAR COMPOUND.

1. PIPE SLEEVE FOR EXTERIOR WALL ABOVE GRADE.

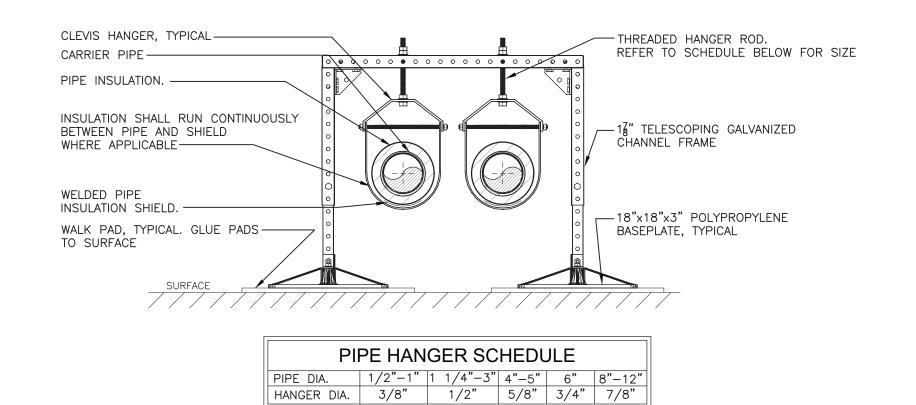
EXTERIOR WALL PIPE PENETRATION DETAIL



NOTES 1. REFER TO ROOF DUCT PENETRATION DETAIL FOR ROOF CURB INFORMATION.

GENERAL CONTRACTOR SHALL MAKE PENETRATION WEATHER—TIGHT, REFER TO ARCHITECTURAL AND ROOFING DRAWINGS. REFER TO
ARCHITECTURAL ROOF DETAILS FOR MORE INFORMATION.
 EXPOSED DUCTWORK SHALL BE PREPARED, PRIMED AND PAINTED BY GENERAL CONTRACTOR. COLOR SHALL BE AS SELECTED BY THE ARCHITECT.
 SEAL ALL EXTERIOR DUCTWORK IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS METAL AND FLEXIBLE SEAL CLASS A. SEAL
ALL DUCT JOINTS AND MAKE WATER—TIGHT.

GOOSENECK DETAIL



NOTES:

- 1. PIPE SUPPORT SYSTEM SHALL BE BASED ON PHP SYSTEMS/DESIGN MODEL NUMBER PSE-CUSTOM OR PSE-2-2 DEPENDING ON NUMBER
- 2. CLEVIS HANGERS WITH WELDED INSULATION SHIELDS SIMILAR TO RAUCH FIG. 100SH ON ALL PIPES R4 LARGER THAN 1".

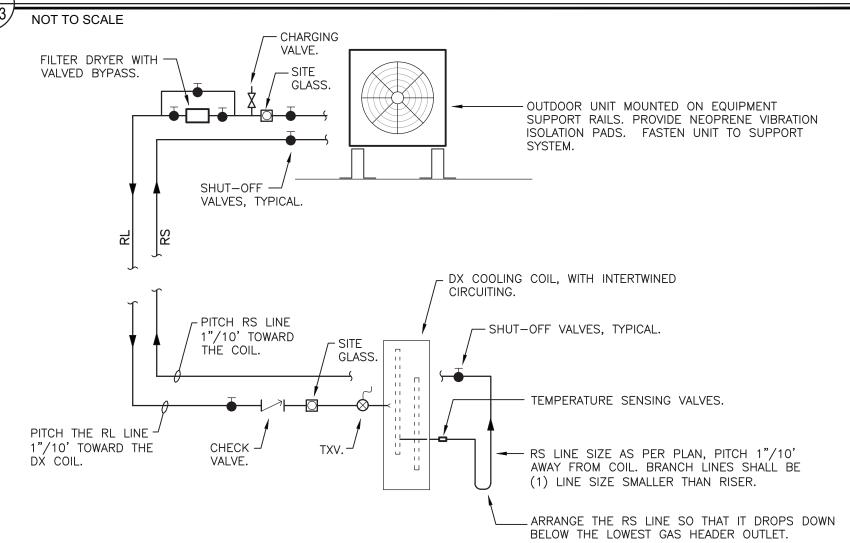
 3. BOTTOM OF PIPE ELEVATION SHALL BE MIN. OF 2'-0" ABOVE GRADE. PIPING SHALL BE INSTALLED AS TO ELIMINATE ANY UNNECESSARY
- OFFSETS UP OR DOWN.

 4. FOR PIPES 1" OR SMALLER, A BAND HANGER WITH INSULATION SHIELD MAY BE USED SIMILAR TO RAUCH FIG. NO. 1ASH.
- 5. FOR NON-INSULATED PIPE, INSULATION SHIELDS MAY BE OMITTED. FOR NON FERROUS PIPING WITHOUT INSULATION, ALL HANGERS SHALL BE COPPER PLATED OR FURNISHED WITH A DI-ELECTRIC BETWEEN PIPE AND HANGERS.

 6. ALL PIPE SUPPORT COMPONENTS SHALL BE GALVANIZED STEEL OR FACTORY PAINTED BLACK WITH ENAMEL.
- 7. THIS CONTRACTOR SHALL VERIFY SIZE AND NUMBER OF PIPES TO BE SUPPORTED BASED ON FINAL LAYOUT.

 8. THIS DETAIL TO BE USED FOR STANDARD PIPE SUPPORT LOCATIONS. FOR PIPE GUIDES AND ANCHORS USE DETAIL ON M-4.

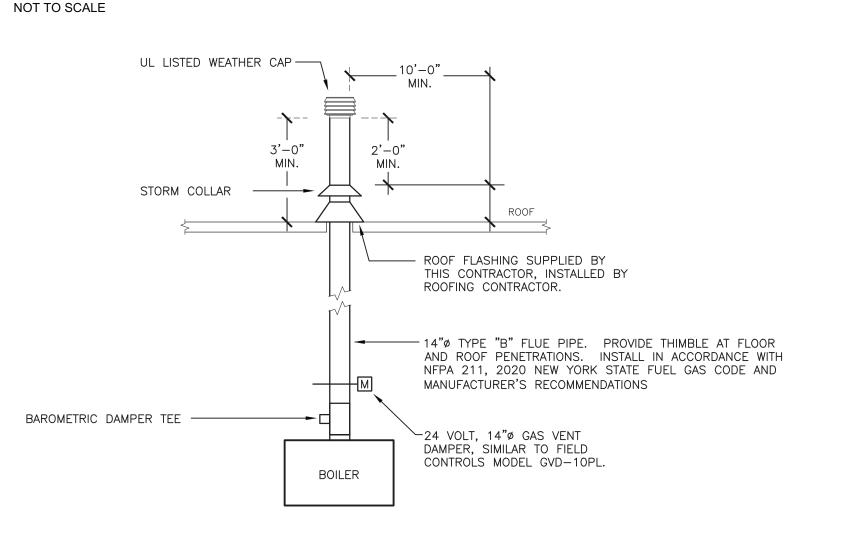
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NOTES:

- 1. PROVIDE (1) ONE TRAP AT THE BOTTOM OF SUCTION LINE FOR RISES UP TO 50'-0". FOR RISERS BETWEEN 50'-0" AND 100'-0" PROVIDE A SECOND RISER HALF WAY UP.
- PIPING SHALL BE INSTALLED SO NOT TO OBSTRUCT SERVICE ACCESS TO EITHER THE INDOOR OR OUTDOOR UNIT.
 ALL FASTENERS LOCATED OUTDOORS SHALL BE GALVANIZED.
- 4. SLOPE HORIZONTAL SUCTION LINES APPROXIMATELY 1" EVERY 20 FEET TOWARD OUTDOOR UNIT TO FACILITATE OIL RETURN.
 5. NUMBER OF REFRIGERANT LINE SETS VARY BASED ON SYSTEM, ONE SET SHOWN FOR CLARITY.

DX SPLIT-SYSTEM AC UNIT PIPING SCHEMATIC



NOTES:

NOT TO SCALE

1. BREECHING AND FLUE PIPING SHALL BE INSTALLED AND SUPPORTED IN ACCORDANCE WITH NFPA 211, 2020 NEW YORK STATE FUEL GAS CODE AND MANUFACTURER'S RECOMMENDATIONS. OBSERVE ALL CLEARANCES TO COMBUSTIBLES.

2. COMBUSTION AIR DAMPER AND COMPUSTION AIR DAMPER SHALL OPEN ONCE DAMPER HAS BEEN BROVEN TO BE IN FILL OPEN POSITION. THE HEATER

2. COMBUSTION AIR DAMPER AND GAS VENT DAMPER OPERATION SHALL BE TIED TO HEATER OPERATION. WHEN HEATER IS CALLED TO OPERATE THE GAS VENT DAMPER AND COMBUSTION AIR DAMPER SHALL OPEN. ONCE DAMPER HAS BEEN PROVEN TO BE IN FULL OPEN POSITION THE HEATER SHALL TURN ON. WHEN THE HEATER TURNS OFF THE COMBUSTION AIR DAMPER AND GAS VENT DAMPER SHALL CLOSE. PROVIDE ALL REQUIRED WIRING, RELAYS, SWITCHES, TRANSFORMERS, SENSORS, AND ETC. AS REQUIRED TO ACHIEVE SEQUENCE OF OPERATION SPECIFIED.



ZIEGLER

SCOTT P. ZIEGI

Revisions:

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10/15/21

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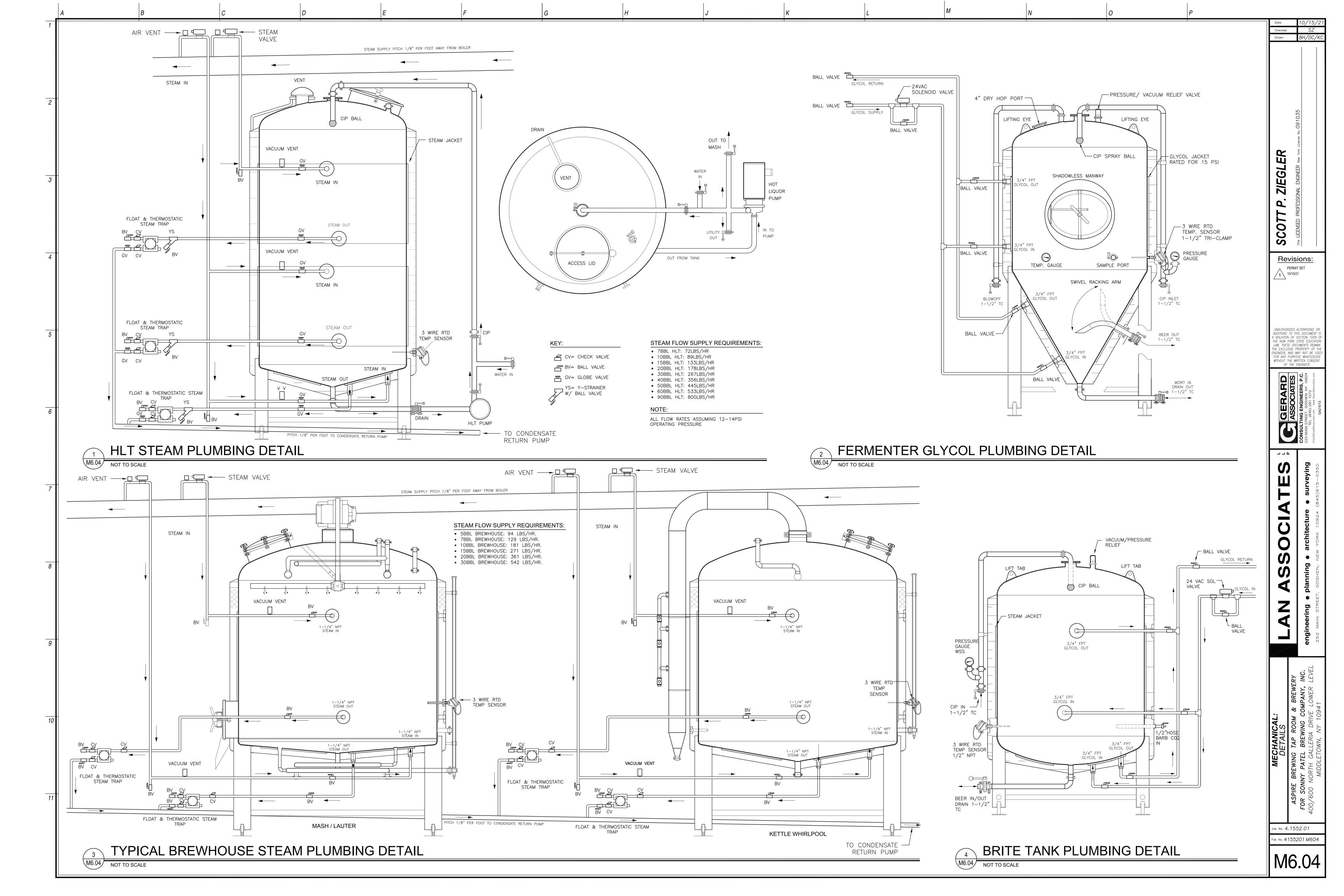
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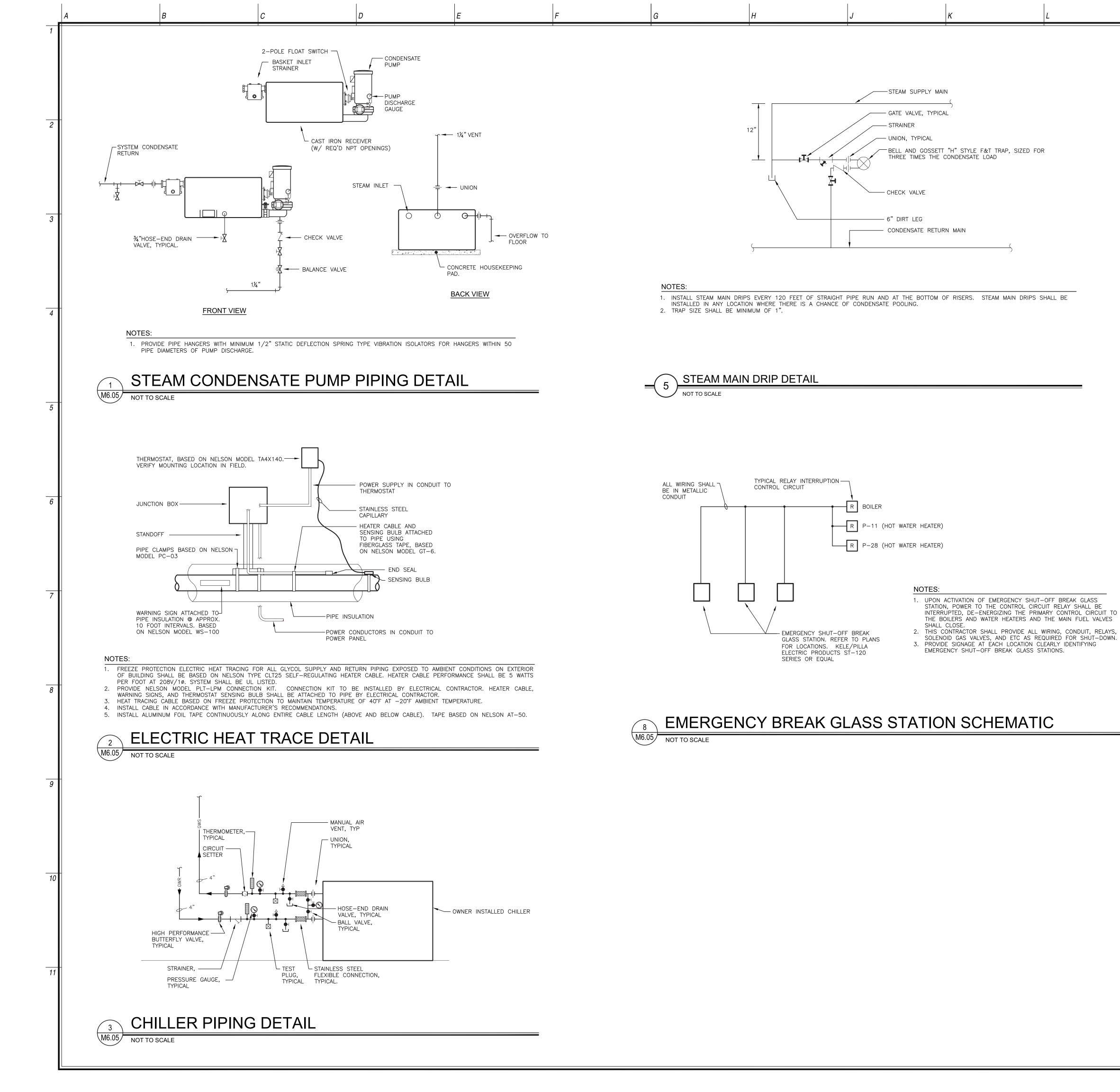
WING TAP ROOM & BREWERY
PATEL BREWING COMPANY, INC.
H GALLERIA DRIVE LOWER LEVEI

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SCOTT P. ZIEGLER

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Job No. 4.1552.01 File No. 4155201 M605

M6.05

GENERAL HVAC NOTES

- 1. ALL MECHANICAL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE 2020 MECHANICAL CODE, FIRE CODE, PLUMBING CODE, FUEL GAS CODE, BUILDING CODE, AND ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE, ALL LOCAL CODES AND GENERALLY ACCEPTED STANDARDS.
- 2. MECHANICAL CONTRACTOR SHALL PROVIDE ALL EQUIPMENT, PIPING, VALVES, ACCESS DOORS, HANGERS, FITTINGS AND MISCELLANEOUS COMPONENTS NOT NECESSARILY DETAILED ON THESE DRAWINGS TO RENDER THE MECHANICAL SYSTEMS COMPLETE, OPERABLE, AND IN ACCORDANCE WITH APPLICABLE CODES AND GENERALLY ACCEPTED INDUSTRY STANDARDS.
- 3. MECHANICAL CONTRACTOR SHALL SUBMIT SHOP DRAWINGS ON ALL EQUIPMENT TO OWNER'S REPRESENTATIVE FOR APPROVAL. DEMONSTRATE NEW MECHANICAL SYSTEMS TO OWNER'S REPRESENTATIVES AND REVIEW MAINTENANCE PROCEDURES.
- 4. MECHANICAL CONTRACTOR SHALL SEAL AROUND ALL PIPE AND DUCT PENETRATIONS THROUGH FIRE RATED WALLS, FLOORS AND CEILINGS WITH HILTI INTUMESCENT FIRE STOP MATERIALS TO MAINTAIN FIRE AND SMOKE RATINGS. DUCTS PENETRATING FIRE RATED WALLS, FLOORS AND CEILINGS SHALL BE INSTALLED WITH FIRE DAMPER AND ACCESS DOORS WHETHER SPECIFICALLY SHOWN ON THE DRAWINGS OR NOT.
- 5. MECHANICAL CONTRACTOR SHALL NOT DRILL OR CUT ANY STRUCTURAL MEMBERS WITHOUT PERMISSION OF ARCHITECT.
- 6. ALL EQUIPMENT SHALL BE INSTALLED PER MANUFACTURERS RECOMMENDATIONS.
- 7. MECHANICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL CONTROL WIRING (120V AND 24V) FOR SYSTEMS SHOWN ON MECHANICAL DRAWINGS AND DESCRIBED IN MECHANICAL SPECIFICATIONS, INCLUDING ALL RELAYS, TRANSFORMERS, CONDUIT, JUNCTION BOXES, CONDUCTORS, THERMOSTATS, APPURTENANCES AND ALL NECESSARY EQUIPMENT TO MAKE SYSTEMS COMPLETE
- 8. MECHANICAL CONTRACTOR SHALL PAY FOR ALL PERMITS AND INSPECTION FEES REQUIRED BY LOCAL AUTHORITY HAVING
- 9. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL CUTTING, PATCHING, AND PAINTING ASSOCIATED WITH PLUMBING WORK WITH THE GENERAL CONTRACTOR, WHO SHALL PERFORM THE WORK.
- 10. ALL DUCTWORK SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH SHEET METAL AND AIR CONDITIONING MECHANICAL CONTRACTORS NATIONAL ASSOCIATION (SMACNA) DUCT STANDARDS. PROVIDE RADIUS TURNS OR TURNING VANES ON ALL CHANGES IN DIRECTION IN ACCORDANCE WITH SMACNA STANDARDS.
- 11. ALL CONTROL WIRING SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (N.E.C.) AND ALL LOCAL CODES. ALL CONDUCTORS SHALL BE COPPER WITH THHN INSULATION IN EMT CONDUIT. 120V/1 - MINIMUM CONDUCTOR SIZE #12. 24V -MINIMUM CONDUCTOR SIZE #18. MINIMUM CONDUIT SIZE SHALL BE 3/4". CONDUIT INSTALLED OUTDOORS SHALL BE GALVANIZED.
- 12. ALL DUCTWORK SHALL BE FABRICATED WITH MINIMUM 26 GAGE GALVANIZED STEEL INCLUDING ROUND DUCTS. 13. FINAL LOCATIONS OF ALL THERMOSTATS AND SENSORS SHALL BE APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO
- INSTALLATION, COORDINATE IN FIELD. THERMOSTATS AND SENSORS SHALL BE LOCATED 4'-0" ABOVE FINISHED FLOOR. 14. MECHANICAL CONTRACTOR SHALL PROVIDE ACCESS DOORS FOR ALL VALVES AND DUCT ACCESSORIES CONCEALED IN WALLS/CEILINGS. ACCESS DOORS SHALL HAVE APPROPRIATE FIRE RATING TO MAINTAIN INTEGRITY OF WALL/CEILING. ACCESS DOORS TO BE INSTALLED BY GENERAL CONTRACTOR.
- 15. MECHANICAL CONTRACTOR SHALL COORDINATE FINAL LOCATIONS OF ALL PIPING IN FINISHED AREAS WITH GENERAL CONTRACTOR TO ENSURE CONCEALMENT OF ALL PIPING IN WALLS, FLOORS AND CEILINGS.
- 16. MECHANICAL CONTRACTOR SHALL PROVIDE ALL AIR BALANCING FOR ALL NEW MECHANICAL SYSTEMS. PROVIDE ALL NECESSARY MOTOR, DRIVE, BELT CHANGES AND ETC. SEE SPECIFICATIONS FOR BALANCE PROCEDURES AND ADDITIONAL REQUIREMENTS. CONTRACTOR SHALL COMFORT BALANCE ALL MECHANICAL SYSTEMS TO THE SATISFACTION OF ENGINEER/ARCHITECT.
- 17. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SUPPLEMENTAL STRUCTURAL STEEL SUPPORT ASSOCIATED WITH NEW MECHANICAL EQUIPMENT HUNG OR SUPPORTED FROM OR ON THE BUILDING STRUCTURE. MECHANICAL CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO OWNER'S REPRESENTATIVE FOR APPROVAL PRIOR TO STEEL FABRICATION AND INSTALLATION OF
- 18. MECHANICAL CONTRACTOR SHALL SUBMIT PIPING AND DUCTWORK FULLY COORDINATED SHOP DRAWINGS FOR OWNER'S REPRESENTATIVE REVIEW.
- 19. MECHANICAL CONTRACTOR SHALL INCLUDE IN BID ALL MATERIALS, RIGGING AND LABOR REQUIRED FOR THE COMPLETE AND PROPER INSTALLATION OF THE MECHANICAL SYSTEM.
- 20. MECHANICAL CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK, AND COORDINATE WORK WITH ALL OTHER TRADES.
- 21. PROVIDE ALL PIPE OPENINGS THROUGH PARTITIONS WITH PIPE SLEEVES.
- 22. PROVIDE VOLUME DAMPERS ON ALL EXHAUST, SUPPLY AND RETURN BRANCH DUCTWORK, WHETHER SPECIFICALLY INDICATED ON DRAWINGS OR NOT.
- 23. PROVIDE 1" ACOUSTIC LINING IN DUCTWORK A MINIMUM OF 25'-0" FROM INLET AND OUTLET OF ALL FANS. THE FIRST FIGURE OF DUCT SIZE INDICATE DIMENSION OF FACE SHOWN OR INDICATED. DUCT DIMENSIONS SHOWN ON DRAWINGS REFER TO INSIDE CLEAR DIMENSIONS. WHERE DUCTWORK IS LINED, THE CONTRACTOR SHALL INCREASE THE SIZE OF DUCT TO COMPENSATE FOR LINING.
- 24. ALL MOTOR STARTERS AND DISCONNECT SWITCHES FOR MECHANICAL EQUIPMENT SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE ELECTRICAL CONTRACTOR, UNLESS OTHERWISE NOTED. DISCONNECT SWITCHES FURNISHED BY THE MECHANICAL CONTRACTOR FOR MECHANICAL EQUIPMENT SHALL BE HEAVY DUTY TYPE AND SHALL BE NEMA 3R WHEN
- 25. MECHANICAL CONTRACTOR SHALL GUARANTEE ALL WORKMANSHIP AND MATERIAL INSTALLED UNDER THIS CONTRACT FREE FROM DEFECTS FOR A PERIOD OF ONE (1) YEAR FROM DATE OF SUBSTANTIAL COMPLETION AND ACCEPTANCE BY THE OWNER AND AGREES TO REPLACE DEFECTIVE WORK (INCLUDING ALL REQUIRED LABOR AND MATERIAL) AT NO ADDITIONAL COST TO OWNER DURING THE GUARANTEE PERIOD.
- 26. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING START-UP OF ALL NEW EQUIPMENT, CONTROLS, AND ETC. TO ENSURE CORRECT OPERATION OF INSTALLED DEVICES.
- 27. MECHANICAL CONTRACTOR SHALL PROVIDE OWNER WITH CATALOG DATA, OPERATING INSTRUCTIONS, MAINTENANCE INSTRUCTIONS, AND RECORD (AS-BUILT) DRAWINGS OF ALL COMPLETED WORK. MECHANICAL CONTRACTOR SHALL ENGAGE A FACTORY AUTHORIZED REPRESENTATIVE TO PERFORM START-UP PROCEDURES.
- 28. ALL PIPING SHALL BE TESTED AS HEREINAFTER SPECIFIED. TESTS SHALL BE MADE AFTER ERECTION AND BEFORE COVERING IS APPLIED OR PIPING PAINTED OR CONCEALED AND AS SECTIONS OF MAINS AND GROUPS OR RISERS ARE COMPLETED. WHERE CONTROLS AND ACCESSORIES ARE NOT DESIGNED TO WITHSTAND PIPE TEST PRESSURES, THEY SHALL BE PROPERLY PROTECTED
- AGAINST DAMAGE DURING SUCH TESTS. A. REFRIGERANT PIPING — TESTS SHALL INCLUDE BOTH HIGH AND LOW PRESSURE SIDES OF EACH SYSTEM AT NOT LESS THAN THE LOWER OF THE DESIGN PRESSURE OR THE SETTING OF THE PRESSURE RELIEF DEVICES. DESIGN PRESSURES FOR TESTING SHALL BE THOSE LISTED ON THE CONDENSING UNITS, COMPRESSORS OR COMPRESSOR UNIT NAMEPLATE, AS REQUIRED BY ASHRAE 15-1994. TESTS SHALL BE PERFORMED WITH AN INERT DRIED GAS. PROVIDE CERTIFICATE OF TEST INDICATING NAME OF REFRIGERANT AND FIELD TEST PRESSURE.
- 29. MECHANICAL CONTRACTOR SHALL TRAIN STAFF ON USE OF MECHANICAL SYSTEMS. THE MECHANICAL CONTRACTOR SHALL ENGAGE A FACTORY AUTHORIZED REPRESENTATIVE TO PERFORM THE TRAINING.
- 30. ALL MECHANICAL SYSTEMS INDICATED ON DRAWINGS SHALL BE COMMISSIONED. MECHANICAL CONTRACTOR SHALL PROVIDE ALL SERVICES REQUIRED BY THE OWNER'S COMMISSIONING AGENT AS REQUIRED.
- 31. INSTALL ALL STEAM SUPPLY, RETURN AND PUMP DISCHARGE PIPING TO PERMIT COMPLETE DRAINAGE.
- PITCH HORIZONTAL STEAM MAINS, RETURN MAINS, AND BRANCHES DOWNWARD, 1/2" PER 10 FEET IN DIRECTION OF FLOW.
- PITCH STEAM RUNOUTS UPWARD, $\frac{3}{16}$ " PER FOOT IN DIRECTION OF FLOW. PITCH RETURN BRANCHES AND RUNOUTS DOWNWARD, ¼" PER 10 FEET IN DIRECTION OF FLOW.

| MINIM | 1UM HAN | GER SIZE | S FOR RO | UND DUCT |
|--------------|--------------------|------------------|----------|-----------------|
| DIAMETER | MAXIMUM SPACING | WIRE DIAMETER | ROD | STRAP |
| <u>≤</u> 10" | 12' | | 1/4" | 1" X 22 ga. |
| 11" - 18" | 12' | | 1/4" | 1" X 22 ga. |
| 19" - 24" | 12' | | 1/4" | 1" X 22 ga. |
| 25" - 36" | 12' | | 3/8" | 1" X 20 ga. |
| 37" - 50" | 12' | | TWO 3/8" | TWO 1" X 20 ga. |
| 51" - 60" | 12' | | TWO 3/8" | TWO 1" X 18 ga. |
| 61" - 84" | 12' | | TWO 3/8" | TWO 1" X 16 ga. |

I. STRAPS AND RODS ARE GALVANIZED STEEL

2. TABLE ALLOWS FOR CONVENTIONAL WALL THICKNESS, AND JOINT SYSTEMS PLUS ONE Ib/sf OF INSULATION WEIGHT. IF HEAVIER DUCTS ARE TO BE INSTALLED, ADJUST HANGER SIZES TO BE WITHIN THEIR LOAD LIMITS.

| | MAXI | MUM HORIZO | NTAL | SINGLE S | TEEL ROD | | MA | XIMUM VERT | TCAL |
|--------------|----------------|---------------|-------------|----------------------|----------|---------------------|----------------|---------------|-------------|
| PIPE SIZE | S | PACING (FEE | T) | HANGER SIZE (INCHES) | | HANGER TYPE | | PACING (FE | |
| (INCHES) | COPPER TUBE | STEEL PIPE | PVC PIPE | TUBING | PIPING | STEEL | COPPER TUBE | STEEL PIPE | PVC PIPE |
| 1/2" | 6 | 8 | 4 | 1/4" | 3/8" | BAND | 10 | 15 | 10 |
| 3/4" | 6 | 8 | 4 | 1/4" | 3/8" | BAND | 10 | 15 | 10 |
| 1" | 6 | 8 | 4 | 1/4" | 3/8" | BAND | 10 | 15 | 10 |
| 11/4" | 6 | 9 | 4 | 1/4" | 3/8" | CLEVIS | 10 | 15 | 10 |
| 1½" | 6 | 9 | 4 | 1/4" | 3/8" | CLEVIS | 10 | 15 | 10 |
| 2" | 10 | 10 | 4 | 1/4" | 3/8" | CLEVIS | 10 | 15 | 10 |
| 2½" | 10 | 12 | 4 | 3/8" | 1/2" | CLEVIS | 10 | 15 | 10 |
| 3" | 10 | 12 | 4 | 3/8" | 1/2" | CLEVIS | 10 | 15 | 10 |
| 4" | | 12 | 4 | 1/2" | 5/8" | CLEVIS OR ROLLER | | 15 | 10 |
| 6" | | 12 | | | 3/4" | CLEVIS OR ROLLER | | 15 | |

- . INSTALL HANGER OR SUPPORT CLOSE TO THE POINT OF CHANGE OF DIRECTION IN ALL PIPE RUNS.
- 2. INSTALL ADDITIONAL HANGERS ON SUPPORTS AT CONCENTRATED LOADS.
- 3. SUPPORT ALL BRANCH PIPING OVER 5'-0" IN LENGTH.
- 4. USE ROLLER TYPE HANGERS (MSS TYPE 41) WHERE PIPING IS SUBJECT TO MOVEMENT CAUSED BY EXPANSION AND CONTRACTION.
- 5. HANGERS AND ANCHORS SHALL BE ATTACHED TO THE BUILDING CONSTRUCTION IN AN APPROVED
- 6. PIPING SHALL BE SUPPORTED AT DISTANCES NOT EXCEEDING THE SPACING SPECIFIED IN SCHEDULE OR IN ACCORDANCE WITH MSS SP-69.

| | | MII | _ | ANGER S NGULAR | SIZES FOR DUCT | ₹ | | |
|------------------------|-----------------|-------------------------|----------------|-------------------|-------------------|-----------|--------------------------------|---------------------------|
| MINIMUM HALF OF | PAIF 10Ft SP | | PAIF 8Ft SP | | PAIF 5Ft SP | | PAIR 4Ft SPA | |
| DUCT PERIMETER | STRAP | ROD | STRAP | ROD | STRAP | ROD | STRAP | ROD |
| P/2 = 30" | 1" x 22ga | <i>y</i> ₄ " | 1" x 22ga | 1/4" | 1" x 22ga | 1/4" | 1" x 22ga | <i>1</i> / ₄ " |
| P/2 = 72" | 1" x 18ga | 3∕ ₈ " | 1" x 20ga | 1/4" | 1" x 22ga | 1/4" | 1" x 22ga | 1/4" |
| P/2 = 96" | 1" x 16ga | 3∕8" | 1" x 18ga | 3%" | 1" x 20ga | 3/8" | 1" x 22ga | 3/8" |
| P/2 = 120" | 1½" x 16ga | 1/2" | 1" x 16ga | 3%" | 1" x 18ga | 3/8" | 1" x 20ga | 3/8" |
| P/2 = 168" | 1½" x 16ga | 1/2" | 1" x 16ga | 1/2" | 1" x 16ga | 3/8" | 1" x 18ga | 3/8" |
| P/2 = 192" | _ | _ | 1" x 16ga | 1/2" | 1" x 16ga | 3/8" | 1" x 18ga | 3/8" |
| | | | | ; | SINGLE HANG | ER MAXIMU | M ALLOWABLE | LOAD |
| WHEN STRAPS FASTENERS: | ARE LAP JO | INED USE TH | ESE MINIMUM | | STRAP | | ROD (D | ia.) |
| 1" × 18, 20, | 22aa - C | N ¼" BOLT | | 1" | x 22ga — 26 | OLbs. | <i>1</i> / ₄ " – 27 | OLbs. |
| 1 7 10, 20, | 2294 | 74 DOL1 | | 4 " | 00 70 | N. L | 3/" | 01.1 |

1" X 16ga

, 1" X 16ga

1. DIMENSIONS OTHER THAN GAUGE ARE IN INCHES.

PLACE FASTENERS IN SERIES, NOT SIDE BY SIDE.

− TWO ¼" Dia.

– TWO ¾" Dia.

2. TABLES ALLOW FOR DUCT WEIGHT, 1 LB./SF. INSULATION WEIGHT AND NORMAL REINFORCEMENT AND TRAPEZE WEIGHT, BUT NO EXTERNAL LOADS.

1" x 20ga — 32Lbs.

1" x 18ga — 420Lbs.

1" x 16ga — 700Lbs.

1½" x 16ga — 1100Lbs.

¾" − 680Lbs.

½" − 1250Lbs.

%" − 2000Lbs.

 $\frac{3}{4}$ " - 3000Lbs.

- 3. STRAPS ARE GALVANIZED STEEL.
- 4. ALLOWABLE LOADS FOR P/2 ASSUME THAT DUCTS ARE 16 GA. MAXIMUM, EXCEPT WHEN MAXIMUM DUCT DIMENSION (W) IS OVER 60" THEN P/2 MAXIMUM IS 1.25 W.

| | ING MINIMU OMMERCIA | NL | JLATION | |
|------------------|------------------------|------------------|--------------|--------|
| <u> </u> | | NOMINAL PIPE DIA | METER | |
| FLUID | < 1-1/2" | 1-1/2" < 4.0" | 4.0" to 8.0" | ≤ 8.0" |
| REFRIGERANT | 1.0 | 1.0 | 1.0 | 1.0 |
| CONDENSATE | 1.0 | 1.0 | 1.0 | 1.0 |
| GLYCOL WATER | 1.5 | 1.5 | 1.5 | 1.5 |
| STEAM | 2.5 | 2.5 | 3.0 | 3.0 |
| STEAM CONDENSATE | 2.5 | 2.5 | 3.0 | 3.0 |
| ES: | | • | | • |

1. PIPE COVERING SHALL BE FIBERGLASS PREFORMED PIPE AND PREMOLDED FITTING INSULATION WITH: FIRE RETARDANT VAPOR BARRIER JACKET, 0.23 K-FACTOR AT 75°F

MEAN TEMPERATURE, FLAME SPREAD = 25, SMOKE DEVELOPED = 50. ALL INTERIOR AND EXTERIOR PIPING, FITTINGS, AND VALVES SHALL BE INSTALLED WITH 20 MIL THICK, WHITE PVC JACKETING. PVC JACKETING SHALL BE HIGH IMPACT RESISTANT,

UV RESISTANT COMPLYING WITH ASTM D 1784, CLASS 16354-C. PROVIDE FACTORY FABRICATED FITTING AND VALVE COVERS WHERE AVAILABLE. REFRIGERANT AND CONDENSATE PIPE INSULATION SHALL BE FLEXIBLE ELASTOMERIC FOAM SIMILAR TO ARMAFLEX. EXTERIOR INSULATIONS TO BE COATED WITH ARMAFLEX WB OR BE INSTALLED WITH PVC JACKETING.

| | | SYMBOLS AND |) ABBREVI | ATIONS | |
|--------|---------------|---|---------------------|--------------|---|
| SYMBOL | ABBREVIATION | DESCRIPTION | SYMBOL | ABBREVIATION | DESCRIPTION |
| (CD) | — DESIGNATION | OFH NO DIFFLIORD | | MBH | 1000 BRITISH THERMAL UNITS PER HOUR |
| CFM | — AIRFLOW | CEILING DIFFUSER | | MCA | MINIMUM CIRCUIT AMPACITY |
| (RR) | DESIGNATION | RETURN/EXHAUST REGISTER | | MOCP | MAXIMUM OVERCURRENT PROTECTION |
| CFM - | — AIRFLOW | RETURNY EXHAUST REGISTER | | NC | NOISE CRITERIA |
| _ | AC | AIR CONDITIONING UNIT | | MIN. | MINIMUM |
| | ВНР | BRAKE HORSE POWER | | WB | WET BULB TEMPERATURE |
| _ | CFM | CUBIC FEET PER MINUTE | | V | VOLT |
| _ | DB | DRY BULB TEMPERATURE | | AHU | AIR HANDLING UNIT |
| _ | dBA | DECIBELS AMBIENT | RR/ER | RR/ER | RETURN/EXHAUST REGISTER |
| Ø | DIA | DIAMETER OR PHASE | ◯ CD | CD | CEILING DIFFUSER |
| _ | EAT | ENTERING AIR TEMPERATURE | | - | SUPPLY/OUTSIDE AIR INTAKE DUCT UP |
| | EER | ENERGY EFFICIENT RATING | [| - | SUPPLY/OUTSIDE AIR INTAKE DUCT DOWN |
| | HVAC | HEATING VENTILATING AND AIR CONDITIONING UNIT | | - | RETURN/EXHAUST AIR DUCT UP |
| _ | ESP | EXTERNAL STATIC PRESSURE | | - | RETURN/EXHAUST AIR DUCT DOWN |
| | °F | FAHRENHEIT | 6 × 8 | - | DUCT SIZE |
| | FLA | FULL LOAD AMPS | | - | ACOUSTIC LINING |
| | FPM | FEET PER MINUTE | V D T | VD | VOLUME DAMPER |
| | HP | HORSE POWER | (T) | _ | THERMOSTAT/TEMPERATURE SENSOR |
| | Hz | HERTZ | | - | SQUARE VANED ELBOW |
| | IEER | INTEGRATED ENERGY EFFICIENT RATIO | FD | FD | FIRE DAMPER WITH ACCESS DOOR |
| _ | LAT | LEAVING AIR TEMPERATURE | | NEW | NEW WORK |
| _ | TSP | TOTAL STATIC PRESSURE | ─ | - | DUCT TRANSITION FROM RECTANGLE TO ROUND |
| _ | RPM | REVOLUTIONS PER MINUTE | ~~~~ | - | FLEXIBLE DUCTWORK |
| _ | ACCU | AIR COOLED CONDENSING/ HEAT PUMP UNIT | _ | SEER | SEASONAL ENERGY EFFICIENT RATING |
| _ | MAX. | MAXIMUM | | A | AMPS |
| _ | BTUH | BRITISH THERMAL UNITS | | DX | DIRECT EXPANSION |
| _ | GS&R | GLYCOL WATER SUPPLY & RETURN | | LPS | LOW PRESSURE STEAM |

| MECHAN | NICAL PI | PING MATER | RIAL SCHEDULE | Ē |
|----------------------------------|--------------|-------------|------------------------------|-------------|
| SERVICE | SIZE (IN) | MATERIAL | TYPE/WEIGHT | STANDARD |
| CONDENSATE DRAIN | ALL | PVC | SCHEDULE 40 DWV | ASTM D 2665 |
| REFRIGERANT | ALL | COPPER | HARD OR ANNEALED TYPE ACR | ASTM B 280 |
| STEAM | ALL | BLACK STEEL | SCHEDULE 40 | ASTM A 53 |
| STEAM CONDENSATE & STEAM VENT | ALL | BLACK STEEL | SCHEDULE 80 | ASTM A 53 |
| GLYCOL WATER | 4" AND UP | BLACK STEEL | SCHED 40 | ASTM A 53 |
| GLYCOL WATER | 3" & DOWN | COPPER | HARD DRAWN TYPE L TUBING | ASTM B 88 |

| MECHA | NICAL F | PIPING FITTIN | NG SCHEDULE | | |
|----------------------------------|--------------|-------------------|------------------------------------|----------------------------|--|
| SERVICE | SIZE (IN) | MATERIAL | TYPE/WEIGHT | STANDARD | |
| CONDENSATE DRAIN | ALL | PVC | SCHEDULE 40 DWV SOLVENT CEMENT | ASTM D 3034 ASTM D 2855 | |
| REFRIGERANT | ALL | COPPER | SILVER SOLDER 300 PSI | ANSI B 16.22 | |
| STEAM | ALL | CARBON STEEL | STANDARD WEIGHT WELDING TYPE | ASME B 16.9 | |
| STEAM CONDENSATE & STEAM VENT | ALL | CAST IRON | EXTRA HEAVY WEIGHT SCREWED ENDS | ASME B 16.4 | |
| GLYCOL WATER | 4" & UP | CARBON STEEL | BUTT WELDED OR FLANGED | ASME ASME B 16.9 234 | |
| GLYCOL WATER | 3" & DOWN | WROUGHT COPPER | SOLDER | ASME B 16.22 | |

| | | | | SING | LE DU | ICT V | AV BO | OX SC | HEDU | JLE | | | | |
|-------|---------------------|-------|------|-------|-------|-------|-----------|-------|-----------------------|---------|----------------------|-------|-------|--------------------|
| TAO | ADEA 05DV5D | MODEL | SI | ZE | DESIG | N CFM | CFM RANGE | | ELECTRIC HEATING COIL | | | | | |
| TAG | AREA SERVED | MODEL | UNIT | INLET | MAX. | MIN. | MIN. | MAX. | KW | EAT/LAT | MAX. COIL AIR PD. | VOLTS | PHASE | NUMBER OF STEPS |
| VAV-1 | CONFERENCE ROOM 115 | DESV | 16 | 16 | 2400 | 1600 | 300 | 3000 | N/A | N/A | N/A | N/A | N/A | N/A |
| VAV-2 | REFER TO PLANS | DESV | 08 | 08 | 675 | 350 | 90 | 900 | N/A | N/A | N/A | N/A | N/A | N/A |
| VAV-3 | REFER TO PLANS | DESV | 08 | 08 | 600 | 300 | 90 | 900 | N/A | N/A | N/A | N/A | N/A | N/A |
| VAV-4 | REFER TO PLANS | DESV | 06 | 06 | 300 | 150 | 45 | 500 | N/A | N/A | N/A | N/A | N/A | N/A |
| VAV-5 | TAPROOM 103 | DESV | 14 | 14 | 1700 | 1700 | 300 | 3000 | N/A | N/A | N/A | N/A | N/A | N/A |
| VAV-6 | TAPROOM 103 | DESV | 12 | 12 | 1100 | 1100 | 190 | 2000 | N/A | N/A | N/A | N/A | N/A | N/A |
| VAV-7 | LOBBY 102 | DESV | 14 | 14 | 1450 | 950 | 300 | 3000 | 13 | 55/98 | 0.38" | 480 | 3 | 2 |
| VAV-8 | TAPROOM 103 | DESV | 14 | 14 | 1800 | 150 | 300 | 3000 | N/A | N/A | N/A | N/A | N/A | N/A |
| VAV-9 | MEN 127 & WOMEN 130 | DESV | 06 | 06 | 350 | 150 | 45 | 500 | N/A | N/A | N/A | N/A | N/A | N/A |

VAV BOXES BASED ON TITUS.

ALL VAV BOXES SHALL BE COMPLETE WITH FACTORY MOUNTED SHEET-METAL CONTROL ENCLOSURE, 24 VOLT CONTROL TRANSFORMER, DISCONNECT SWITCH, HANGER BRACKETS, AND FIBER-FREE CLOSED-CELL POLYMER FOAM INSULATION.

AUTOMATIC TEMPERATURE CONTROLS CONTRACTOR SHALL FURNISH AND INSTALL ALL VAV BOX CONTROLS WITHIN FACTORY CONTROL ENCLOSURE.

4. CONTRACTOR SHALL VERIFY LEFT OR RIGHT HAND CONTROL ENCLOSURE MOUNTING AND PIPING CONNECTIONS PRIOR TO ORDERING.

MAXIMUM ALLOWANCE STATIC PRESSURE DROP FOR BOX SHALL BE 0.5".

MAXIMUM DISCHARGE NC<28 AND MAXIMUM RATED NC<30.

VAV BOXES WITH ELECTRIC REHEAT COILS SHALL BE COMPLETE WITH: INTEGRAL CONTROL PANEL HOUSED IN NEMA 1 ENCLOSURE, PRIMARY AUTOMATIC RESET THERMAL CUT-OUT, SECONDARY MANUAL RESET THERMAL CUT-OUT, DIFFERENTIAL PRESSURE AIRFLOW SWITCH, LINE TERMINAL BLOCK, INTEGRAL DOOR INTERLOCK DISCONNECT SWITCH, AND MERCURY CONTACTORS.

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Revisions:

DDITIONS TO THIS DOCUMENT VIOLATION OF SECTION 7209 THE NEW YORK STATE EDUCAT. AW. THESE DOCUMENTS REMAII IGINEER, AND MAY NOT BE FOR ANY PURPOSE WHATSO. WITHOUT THE WRITTEN CONSEI OF THE ENGINEER.

b No. 4.1552.01 ile No. 4155201 M70

| SYMBOL | MANUFACTURER | CATALOG# | DESCRIPTION |
|-------------------------------|-------------------|--------------|---|
| CD-A | KRUEGER | 1400 | STEEL HIGH PERFORMANCE CEILING DIFFUSER. MAXIMUM CORE VELOCITY: 550 FPM. MAXIMUM NOISE CRITERIA: 30 NC. SURFACE MOUNTED WITH FRAMES AND BORDERS SUITABLE FOR THE CONSTRUCTION IN WHICH THEY WILL BE INSTALLED, CONTRACTOR TO COORDINATE. BAKED ENAMEL FINISH, COLOR SELECTED BY ARCHITECT. 4—WAY DEFLECTION UNLESS OTHERWISE NOTED ON PLANS. 24" x 24" MODULE SIZE. ALL DIFFUSERS SHALL BE EQUIPPED WITH OPPOSED BLADE VOLUME DAMPER. CFM RANGE: 0-100 |
| RR-A ER-A ER-B RG-A | KRUEGER | S80H/S580 | STEEL RETURN/EXHAUST REGISTER WITH ¾" FIXED BLADE SPACING. MAXIMUM CORE VELOCITY: 500 FPM. MAXIMUM NOISE CRITERIA: 25 NC. SURFACE MOUNTED 35° FIXED DEFLECTION BLADES. BLADES PARALLEL TO LONG DIMENSION UNLESS OTHERWISE NOTED. BAKED ENAMEL FINISH, COLOR SELECTED BY ARCHITECT. REGISTERS SHALL HAVE FRAMES AND BORDERS SUITABLE FOR THE CONSTRUCTION IN WHICH THEY WILL BE INSTALLED, CONTRACTOR TO COORDINATE. REGISTERS SHALL BE PROVIDED WITH OPPOSED BLADE VOLUME DAMPERS. UNLESS OTHERWISE NOTED ON PLANS REGISTERS AND GRILLES SHALL BE SIZED PER SCHEDULE. ER—B ONLY, SHALL BE S580 (ALUMINUM CONSTRUCTION). CFM RANGE: 0-150 → 8"x8" 151-250 → 10"x10" 251-350 → 12"x12" 351-725 → 18"x18" 726-1125 → 24"x24" |
| RG-B | KRUEGER | EGC5 | EGGCRATE RETURN GRILLE WITH ALUMINUM BORDER AND CORE. 24" x 24" MODULE SIZE. EXTRUDED ALUMINUM 1¼" WIDE BORDER WITH ½"x½"x½" ALUMINUM GRID. BAKED ENAMEL FINISH, COLOR SELECTED BY ARCHITECT. MAXIMUM NOISE CRITERIA = 20 NC. MAXIMUM CORE VELOCITY = 700 FPM. GRILLE SHALL HAVE FRAMES AND BORDERS SUITABLE FOR THE CONSTRUCTION IN WHICH THEY WILL BE INSTALLED, CONTRACTOR TO COORDINATE. |
| FD | RUSKIN | DIBD2 | 1-1/2 HOUR UL555 RATED, SUITABLE FOR INSTALLATION IN WALL AND FLOOR PARTITIONS WITH FIRE RATINGS OF LESS THAN 3 HOURS. DAMPER SHALL BE A COMPLETE FACTORY PACKAGE INCLUDING UL APPROVED ANGLES, WALL SLEEVE, AND BREAKAWAY CONNECTIONS. DAMPER SHALL BE RATED FOR DYNAMIC AIRFLOW CONDITIONS OF 2,000 FPM AND 4.0" ESP. 165°F FUSIBLE LINK. ALL FIRE DAMPERS IN DUCTWORK SERVING AUDITORIUM SHALL HAVE BLADES OUT OF AIRSTREAM. |
| CD-B | KRUEGER | RM1 | STEEL, ROUND CEILING DIFFUSER WITH (3) CONES AND 360° DISCHARGE PATTERN. DIFFUSERS SHALL HAVE ROUND NECK INLETS AND (2) HORIZONTAL DISCHARGE SETTINGS. BAKED ENAMEL FINISH, COLOR SELECTED BY ARCHITECT. MAXIMUM NECK VELOCITY: 600 FPM. MAXIMUM NOISE CRITERIA: 25 NC. PROVIDE NECK MOUNTED OPPOSED BLADE VOLUME DAMPER. CFM RANGE: 0-100 |
| DL-A DL-B DL-C | KRUEGER | DMD | ALUMINUM DIRECT SPIRAL DUCT MOUNTED ADJUSTABLE DOUBLE DEFLECTION DRUM LOUVER WITH ROTATING DRUM. MAXIMUM CORE VELOCITY: 550 MAXIMUM NOISE CRITERIA: 30 NC. SURFACE MOUNTED WITH FRAMES AND BORDERS SUITABLE FOR THE CONSTRUCTION IN WHICH THEY WILL BE INSTALLED, CONTRACTOR TO COORDINATE. COLOR SELECTED BY ARCHITECT. PROVIDE WITH FLOW EXTRACTOR. DL—A SHALL HAVE NOMINAL 24"X6" DUCT SIZE, DL—B SHALL HAVE 48"x6" DUCT SIZE AND DL—C SHALL HAVE 12"x6" NOMINAL DUCT SIZE. |
| VFD | ABB | _ | UNLESS PROVIDED AS PART OF EQUIPMENT BY MANUFACTURER, VARIABLE FREQUENCY DRIVES SHALL BE BASED ON ABB WITH BACNET IP-MS/TP COMMUNICATION FACTORY INSTALLED. THE VFD SHALL BE IN A NEMA 1 TYPE ENCLOSURE WITH A CIRCUIT BREAKER DISCONNNECT SWITCH, INDUSTRIAL RATED OPERATOR CONTROLS, USER TERMINAL STRIP CONNECTIONS AND BYPASS CONTROLS. POWER CIRCUIT CONFIGURATION SHALL BE "POWER Y CIRCUIT". VFD SHALL BE COMPLETE WITH: HAND-OFF-AUTO SWITCH AND MANUAL SPEED POTENTIOMETER, IEC-RATED ISOLATION AND BYPASS CONTACTORS WITH MECHANICAL AND ELECTRICAL INTERLOCKING AND A CLASS 20 OVERLOAD RELAY, 120 V FUSED CONTROL TRANSFORMER AND CIRCUIT BREAKER WITH LOCKOUT/TAG CAPABILITY, AFC-OFF-BYPASS SWITCH, TEST-NORMAL SWITCH, PILOT LIGHT CLUSTER "BO8" (POWER ON, AFC RUN, BYPASS RUN AND AFC FAULT), LINE ISOLATION CONTACTOR AND "HO9" ANALOG OUTPUT. PROVIDE AUXILIARY CONTACTS FOR "STATUS/RUN", "FAULT", AND ANALOG OUTPUT FOR "SPEED". |
| M | RUSKIN | CD40 | UNLESS PROVIDED WITH A SPECIFIC PIECE OF EQUIPMENT MOTORIZED DAMPERS SHALL BE CONSTRUCTED OF 4" DEEP EXTRUDED ALUMINUM AIRFOIL DAMPER BLADES. DAMPER SHALL HAVE OPPOSED BLADES, MOTOR AND LINKAGE. PROPORTIONAL DAMPER ACTUATORS SHALL BE 24VAC/60Hz., MAXIMUM 6 WATTS RUNNING AND 2 WATTS HOLDING POWER CONSUMPTION, COMPLETE WITH DISCONNECT SWITCH AND END SWITCH KITS, SIMILAR TO BELIMO NF24-SR. PROVIDE 120V TO 24V TRANSFORMER. MOTORIZED DAMPER FOR L-1 SHALL BE TIED TO OWNER PROVIDED BOILER TO ONLY ALLOW BOILER TO OPERATE ONCE DAMPER HAS BEEN PROVEN OPEN. |
| EQUIPMENT SUPPORT RAILS | THYBAR | TEMS-3 | 24" HIGH EQUIPMENT SUPPORT RAIL CONSTRUCTED OF WELDED 18 GAUGE GALVANIZED STEEL SHELL, BASE PLATE AND COUNTER FLASHING WITH FACTORY INSTALLED 2"x4" WOOD NAILERS AND INTERNAL BULKHEAD REINFORCEMENT. RAIL LENGTH TO EXTEND 6" ON BOTH ENDS OF EQUIPMENT. EQUIPMENT SUPPORT RAILS SHALL BE PROVIDED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE GENERAL CONTRACTOR. |
| TIME CLOCK | TORK | 7100 | 24 HOUR, SKIP—A—DAY, ELECTROMECHANICAL TIME CLOCK WITH MANUAL OVERRIDE. 120 VOLT, 40 AMP, SPST GENERAL PURPOSE CONTACTS. METAL, INDOOR, NEMA 1 ENCLOSURE. 3 WATTS POWER CONSUMPTION. |
| EH-1 | QMARK | MSPH154324L | PLENUM HEATER. CAPACITY: 5,000 WATTS, 17,060 BTUH, 1000 CFM. ELECTRICAL: 480V/3Ø, 6.51 AMPS. HEATER SHALL HAVE: DIRECT DRIVE MOTOR, ACOUSTICALLY INSULATED WITH FIBERGLASS, ACCESS PANELS ON FRONT OF UNIT, DISCONNECT SWITCH, FILTER RACK ON INLET, INLET AND OUTLET SCREENS, THERMAL SAFETY CUTOUTS, FAN DELAY CONTROL AND CONCEALED TAMPER—PROOF SINGLE STAGE THERMOSTAT. HEATER SHALL HAVE ZERO CLEARANCE TO COMBUSTIBLE MATERIALS. PROVIDE PERMANENT WASHABLE FILTER. |
| EH-2 | BROMIC HEATING | BH0420035 | TUNGSTEN SMART HEAT, CEILING HUNG ELECTRIC INFRARED HEATER. CAPACITY: 6,000 WATTS, 20,470 BTUH. ELECTRICAL: 277V/1ø, 21.7 AMPS. HEATER SHALL HAVE: DOUBLE HEATING ELEMENTS, STAINLESS STEEL CONSTRUCTION, SPECTRAL REFLECTOR, 36" LONG TUBE SUSPENSION KIT, WIRELESS ON/OFF CONTROLLER WITH BUILT—IN TIMER AND REMOTE. REMOTE SHALL BE PAIRED TO CONTROL (3) HEATERS FROM EACH REMOTE AND CREATE (4) ZONES OF HEATING. CONTRACTOR SHALL CONTACT BROMIC HEATING TECHNICAL SUPPORT TO COORDINATE THE SET—UP OF THE TIMER FUNCTION OF THE CONTROLLER. EACH ZONE OF HEATERS SHALL OPERATE FOR A SET AMOUNT OF TIME. CONTRACTOR SHALL COORDINATE DESIRED TIME WITH OWNER. REMOTES SHALL BE INSTALLED TO WALL WITH LOCKDOWN BRACKET. REFER TO ARCHITECTURAL PLANS FOR MOUNTING HEIGHT. |
| EH-3 | BERNER | ARD12-4144E | CEILING MOUNTED, ELECTRIC HEATED AIR CURTAIN. CURTAIN SHALL HAVE (4) 1/2 HP DIRECT-DRIVE, CONTINUOUS-DUTY, TEN SPEED MOTORS, ADJUSTABLE AIR DIRECTIONAL VANES, CUSTOM COLOR POWDER COATING FINISH AND BE 149" IN LENGTH. HEATER CAPACITY: 56,000 WATTS, 28* TEMPERATURE RISE AND 6,348 CFM. ELECTRICAL: DUAL CIRCUIT 480V/3ø, 44.2/33.7 AMPS. FINISH SHALL BE SELECTED BY OWNER. HEATER SHALL HAVE: INTELLISWITCH DIGITAL CONTROLLER, THERMAL CUT-OUT, POWER ON/OFF SWITCH, TEMPERATURE PROBE, HANDHELD REMOTE CONTROLLER WITH LOCKDOWN BRAKCET, DISCONNECT SWITCHES, AND (4) MAGNETIC REED DOOR SWITCHES. |
| EH-4 | BERKO | HUHAA324 | HORIZONTAL/VERTICAL UNIT HEATER. CAPACITY: 3,000 WATTS, 10,230 BTUH, 350 CFM. ELECTRICAL: 240V/1ø, 12.5 AMPS. HEATER SHALL HAVE: CONCEALED TAMPER-PROOF THERMOSTAT, MANUAL RESET, TWO-STAGE ELEMENT CONTROL, BIRD SCREEN, INDIVIDUAL ADJUSTABLE LOUVERS WITH 30° DOWNWARD STOPS, 18 GAUGE CABINET, WALL SWIVEL MOUNTING BRACKETS, AND DISCONNECT SWITCH. |
| EH-5 | BERKO | FRC4027FNW | ARCHITECTURAL, HEAVY-DUTY, FAN FORCED WALL HEATER. CAPACITY: 1500 WATTS, 5120 BTUH, 100 CFM. ELECTRICAL: 277V/1ø, 6.3 AMPS. FINISH SHALL BE NORTHERN WHITE. HEATER SHALL HAVE: CONCEALED TAMPER-PROOF THERMOSTAT, MANUAL RESET THERMAL CUT-OUT, CONCEALED POWER ON/OFF SWITCH, BACK BOX, SURFACE MOUNTING FRAME, DISCONNECT SWITCH, AND 14 GAUGE SECURITY FRONT COVER. |
| MUA-1 | CAPTIVE AIRE | A3-D.500-24D | DIRECT GAS FIRED MAKE-UP AIR UNIT WITH 24" DIRECT DRIVE FAN. MOTOR CHARACTERISTICS: 7.5HP, 460V/3\$\(\phi\)/60Hz, 9.6 FLA, PREMIUM EFFICIENCY. SUPPLY PERFORMANCE: MAXIMUM CFM 5250, MINIMUM CFM 3500, 1426 RPM, 1.2" ESP, 5.3 BHP, 9°F EAT, 66°F TEMPERATURE RISE, GAS INPUT 387.9 MBH, AND GAS OUTPUT 356.9 MBH. UNIT SHALL BE COMPLETE WITH: 0°-150°F DISCHARGE TEMPERATURE CONTROL, SLOPED FILTERED INTAKE WITH METAL MESH FILTERS, 24" HIGH INSULATED ROOF CURB, MOTORIZED BACKDRAFT DAMPER, LOW FIRE START, INLET AND MANIFOLD GAS PRESSURE GAUGES, AND SEPARATE 120V WIRING PACKAGE. |
| HVAC-1 | DAIKIN | FTQ24TAVJDU | HEAT PUMP AIR HANDLER UNIT. NOMINAL COOLING 2 TON (24,000 BTUH), HEATING 27,000 BTUH @ 5° OAT, HIGH EFFICIENT MULTI—SPEED BLOWER MOTOR, DISCONNECT SWITCH, DRAIN PAN LEVEL SENSOR, AND FILTER. 800 CFM @ .9" W.C. (10.3 EER). REFRIGERANT R-410A - 208V/1, 4.9 MCA, AND 15 MOCP. |
| HP-1 | DAIKIN | RZQ24TAVJUA | COMPRESSOR/CONDENSER HEAT PUMP UNIT WITH INVERTER COMPRESSOR. NOMINAL COOLING 2 TON, HEATING 27,000 BTUH @ 5° OAT. PROVIDE WITH NEMA 3-R DISCONNECT SWITCH AND EEV VALVE. (15.2 SEER)/(10.7 HSPF). REFRIGERANT R-410A - 208V/1, 16.5 MCA AND 20 MOCP. |
| L-1 | RUSKIN | ELF6375DX | EXTRUDED ALUMINUM, DRAINABLE STATIONARY LOUVER. FRAME: 6" DEEP, EXTRUDED ALUMINUM WITH 0.081" NOMINAL WALL THICKNESS. BLADES: EXTRUDED ALUMINUM, DRAINABLE, 0.081" NOMINAL WALL THICKNESS, AND 37.5° BLADE ANGLE. LOUVER SHALL HAVE 54% FREE AREA. LOUVER SHALL HAVE MILL FINISH, BIRD SCREEN, EXTENDED SILL AND INSTALLATION ANGLE. LOUVER SIZE: 36"x30" WITH 3.97 FT ² FREE AREA. LOUVER SHALL BEAR THE AMCA SEAL. |
| AC-1 | DAIKIN | FCQ24TAVJU | CEILING CASSETTE, 4-WAY AIRFLOW PATTERN, INDOOR UNIT WITH BUILT-IN CONDENSATE PUMP. UNIT SHALL BE COMPLETE WITH DISCONNECT SWITCH, AND BRC1E73 REMOTE CONTROLLER. PERFORMANCE: 777 CFM, 24,000 BTUH COOLING CAPACITY AT 80°F DB/67°F WB EAT AND 95°F AMBIENT, 27,000 BTUH HEATING CAPACITY AT 70°F DB/60°F WB EAT AND 47° AMBIENT. ELECTRICAL: 208V/1¢/60Hz. |
| CP-1 | BELL & GOSSETT | WC6-20B | SIMPLEX CONDENSATE PUMP SET. CAPACITY 6,000 EDR, PUMPING 9 GPM AT 22 PSI DISCHARGE PRESSURE. CAST IRON RECEIVER WITH 6 GALLON CAPACITY. MOTORS SHALL BE 1/3 HP, 3500 RPM, 120V/1ø/60Hz. SYSTEM SHALL BE COMPLETE WITH: BASKET INLET STRAINER, CLOSE COUPLED BRONZE FITTED PUMP, |

| | | | FAN SCH | HEDULE | | | | |
|---------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| DESIGNATION | EF-1 | EF-2 | EF-3 | EF-4 | EF-5 | EF-6 | EF-7 | EF-8 |
| LOCATION | ROOF |
| AREA SERVED | KITCHEN EXHAUST HOOD | DISHWASHER EXHAUST HOOD | REFER TO PLANS | REFER TO PLANS | KITCHEN 117 | LAB 105F00M | ELEC. 116 | IT ROOM |
| MODEL | DU240HFA | DU50HFA | G-100-VG | G-120-VG | G-100-VG | G-09-VG | G-095-VG | G-080-VG |
| CFM (MAX./MIN.) | 6,000/- | 1,000/- | 500/- | 1,350/- | 850/- | 150/- | 250/- | 150/- |
| ВНР | 2.85 | .13 | 0.15 | 0.37 | 0.23 | 0.05 | 0.1 | 0.03 |
| HP | 5 | 1/2 | 1/4 | 1/2 | 1/4 | 1/4 | 1/6 | 1/10 |
| RPM (MAX./MIN.) | 994/- | 1081- | 1535/- | 1595/- | 1574/- | 1404/- | 1671/- | 1319/- |
| ESP (IN H₂O) | 1.3" | .5" | 0.88" | 1.0" | 0.91" | 0.56" | 0.78" | 0.39 |
| VOLTS/Ø | 460/3 | 115/1 | 115/1 | 115/1 | 115/1 | 115/1 | 115/1 | 115/1 |
| STARTER TYPE | NEMA 3R DISCONNECT SWITCH |
| SOUND DATA (dBA/SONES) | -/21 | -/8.6 | 52/6.4 | 65/13.2 | 57/8.4 | 52/6.1 | 60/11.1 | 51/6.1 |

- FANS EXCEPT EF-1 AND EF-2 BASED ON GREENHECK. EXHAUST FANS EF-1 AND EF-2 BASED ON CAPTIVE AIRE. ALL MOTORS 1 HP AND LARGER SHALL BE PREMIUM EFFICIENCY. FANS PROVIDED WITH VARIABLE FREQUENCY DRIVES WITH DISCONNECT SWITCHES, SHALL HAVE INVERTER RATED PREMIUM EFFICIENCY MOTORS SUITABLE FOR VARIABLE SPEED AND TORQUE APPLICATIONS. VARIABLE FREQUENCY DRIVES SHALL BE CAPABLE OF BY-PASS OPERATION. TURN DOWN RATIO OF 10:1. VFD TO BE PURCHASED BY MECHANICAL CONTRACTOR AND INSTALLED BY ELECTRICAL CONTRACTOR.
- ALL MOTORS TO INCLUDE THERMAL OVERLOAD. PROVIDE ONE EXTRA SET OF BELTS FOR EACH BELT DRIVEN FAN. ALL BELT DRIVEN FANS SHALL HAVE VARIABLE PITCH
- ALL FANS SHALL BE PROVIDED WITH MOTORIZED BACKDRAFT DAMPERS CONSTRUCTED OF A GALVANIZED STEEL FRAME AND ALUMINUM BLADES WITH SEALS. MOTORIZED DAMPER VOLTAGE SHALL BE 120 VOLTS. NOT REQUIRED FOR EF-1.
- EXHAUST FANS 3,4,5,6,7 AND 8 SHALL BE PROVIDED WITH THE FOLLOWING: VARI-GREEN EC MOTOR WITH MOUNTED POTENTIOMETER DIAL, BIRDSCREEN, CURB SEAL AND 24" HIGH ROOF CURB WITH DAMPER TRAY.
- EXHAUST FAN EF-1 SHALL BE PROVIDED WITH THE FOLLOWING: GREASE CLASSIFICATION TESTING, UL 705 AND UL 762. 24" HIGH VENTED AND HINGED ROOF CURB, AND GREASE CUP. EXHAUST FAN EF-2 SHALL BE PROVIDED WITH THE FOLLOWING: BIRDSCREEN, 24" HIGH VENTED AND HINGED ROOF CURB WITH DAMPER TRAY, AND ECM EXHAUST WIRING PACKAGE.
- PROVIDE MANUAL ON/OFF LOCAL SWITCH FOR EF-6 CONTROL. ALL FANS SHALL BE PROVIDED WITH DISCONNECT SWITCH AT UNIT FOR SERVICE. OUTDOOR DISCONNECT SWITCHES SHALL BE
- EF-7 AND EF-8 SHALL BE CONTROLLED BY ROOM MOUNTED LINE VOLTAGE THERMOSTAT. ROOF CURBS AND EQUIPMENT SUPPORT RAILS SHALL BE PROVIDED BY MECHANICAL CONTRACTOR AND INSTALLED BY GENERAL CONTRACTOR.

MINIMUM DUCT INSULATION

COMMERCIAL

ALL SUPPLY AND RETURN AIR DUCTS AND PLENUMS SHALL BE INSULATED WITH A MINIMUM OF R-6 INSULATION WHEN LOCATED IN UNCONDITIONED SPACES AND WITH A MINIMUM OF R-12 INSULATION WHEN LOCATED OUTSIDE THE BUILDING ENVELOPE. WHEN LOCATED WITHIN A BUILDING ENVELOPE ASSEMBLY, THE DUCT OR PLENUM SHALL BE SEPARATED FROM THE BUILDING EXTERIOR OR UNCONDITIONED OR EXEMPT SPACES BY A MINIMUM OF R-12 INSULATION.

EXCEPTIONS:

1. WHEN LOCATED WITHIN EQUIPMENT. . WHEN THE DESIGN TEMPERATURE DIFFERENCE BETWEEN THE INTERIOR AND EXTERIOR OF THE DUCT OR PLENUM DOES NOT EXCEED 15°F

ALL JOINTS, LONGITUDINAL AND TRANSVERSE SEAMS, AND CONNECTIONS IN DUCTWORK, SHALL BE SECURELY FASTENED AND SEALED WITH WELDS, GASKETS, MASTICS (ADHESIVES), MASTIC-PLUS- EMBEDDED FABRIC SYSTEMS OR TAPES. TAPES AND MASTICS USED TO SEAL DUCTWORK SHALL BE LISTED AND LABELED IN ACCORDANCE WITH UL 181A OR UL 181B. DUCT CONNECTIONS TO FLANGES OF AIR DISTRIBUTION SYSTEM EQUIPMENT SHALL BE SEALED AND MECHANICALLY FASTENED. <u>UNLISTED</u> DUCT TAPE IS NOT PERMITTED AS A SEALANT ON ANY METAL DUCTS.

NOTE:

DUCT INSULATION, COVERINGS AND LINING MATERIALS AND ADHESIVES SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25, AND A SMOKE DEVELOPED INDEX OF NOT MORE THAN 50, IN ACCORDANCE WITH 2020 MECHANICAL CODE OF NEW YORK STATE SECTION 604.3.

NOTE:

1. ARCHITECT SHALL SELECT FINISH COLORS FOR ALL MECHANICAL EQUIPMENT VISIBLE WITHIN FINISHED SPACES OR ON EXTERIOR OF BUILDING. COLOR CHOICES FOR SELECTION SHALL BE MANUFACTURER'S FULL RANGE OF BOTH STANDARD AND CUSTOM COLOR/FINISHES UNLESS OTHERWISE NOTES.

| REA SERVED | RTU-1 | RTU-2 | RTU-3 | RTU-4 | RTU-5 | RTU-6 |
|---|---|--|--|---|---|---|
| | REFER TO PLANS | REFER TO PLANS | REFER TO PLANS | REFER TO PLANS | REFER TO PLANS | REFER TO PLANS |
| MODEL NUMBER | DPS020A | DPS015A | DPS016A | DPS015A | DPS012A | DPS020A |
| NOMINAL CAPACITY (TONS) | 20 | 15 | 16 | 15 | 12 | 20 |
| WEIGHT OF UNIT (POUNDS) | 4441 | 2951 | 4441 | 2711 | 2788 | 4524 |
| ER/IEER | 11.0/19.6 | 10.8/17.5 | 11.9/20.1 | 10.8/17.5 | 11.2/17.6 | 11.0/19.6 |
| DESIGN DATA: | | | | | | |
| SUPPLY AIR (CFM) | 6,400 | 4,350 | 6,400 | 4,800 | 4,000 | 8,000 |
| DUTDOOR AIR (CFM) | 3,510 | 2,400 | 3,040 | 1,800 | 2,400 | 3,000 |
| CONDENSER DATA: | | | | | | |
| COMPRESSOR No./TYPE | 1/SCROLL | 2/SCROLL | 1/SCROLL | 2/SCROLL | 2/SCROLL | 1/SCROLL |
| CAPACITY CONTROL | MODULATING | MODULATING | MODULATING | MODULATING | MODULATING | MODULATING |
| REFRIGERANT TYPE | R-410A | R-410A | R-410A | R-410A | R-410A | R-410A |
| COMPRESSOR (AMPS) EACH | 30.1 | 7.9/12.8 | 22.9 | 7.9/12.8 | 6.8/7.9 | 30.1 |
| No. OF FANS/No. OF MOTORS | 1/1 | 2/2 | 1/1 | 2/2 | 2/2 | 1/1 |
| AN FLA (AMPS) EACH | 3.5 | 1.8 | 3.5 | 1.8 | 1.8 | 3.5 |
| No. OF ROWS/FPI | 1/23 | 1/21 | 1/23 | 1/21 | 1/23 | 1/23 |
| AMBIENT TEMPERATURE (°F) | 95 | 95 | 95 | 95 | 95 | 95 |
| FILTER DATA: | | | | | | |
| | 2" MERV 8 & | 2" MERV 8 & | 2" MERV 8 & | 2" MERV 8 & | 2" MERV 8 & | 2" MERV 8 & |
| TACE AREA (SQ.FT.) | 4" MERV 14 | 4" MERV 14 | 4" MERV 14 | 4" MERV 14 | 4" MERV 14 | 4" MERV 14 |
| QUANTITY/SIZE (In.) | 27.0 9/18x24x2 | 18.0 6/18x24x2 | 27.0 9/18x24x2 | 18.0 6/18x24x2 | 18.0 6/18x24x2 | 27.0 9/18x24x2 |
| . , , | 9/18x24x4 | 6/18x24x4 | 9/18x24x4 | 6/18x24x4 | 6/18x24x4 | 9/18x24x4 |
| EVAPORATOR COIL DATA: TACE AREA (SQ. FT.) | 21.4 | 15.4 | 18.9 | 15.4 | 15.4 | 21.4 |
| No. OF ROWS/FPI | 4/15 | 15.4 6/15 | 18.9 4/15 | 6/15 | 4/15 | 4/15 |
| EAT (°F) DB/WB | 79.0/66.2 | 79.8/66.4 | 77.4/64.6 | 81.4/67.1 | 79.8/66.6 | 77.4/64.8 |
| AT (°F) DB/WB | 53.1/53.1 | 79.8/66.4 53.4/53.4 | 55.0/54.9 | 55.2/55.2 | 79.8/66.6 54.5/54.5 | 54.4/54.2 |
| FACE VELOCITY (FPM) | 299.1 | 281.9 | 338.6 | 311.1 | 259.2 | 373.8 |
| FOTAL/SENSIBLE CAP. (MBH) | 252.1/180.5 | 281.9 172.4/125.6 | 338.6 185.9/156.4 | 176.9/137.2 | 259.2 148.7/110.7 | 255.3/202.0 |
| GAS HEATING DATA: | 202.1/ 100.5 | 1/2.4/120.0 | 100.9/100.4 | 170.3/107.2 | 170.//110./ | 200.0/ 202.0 |
| | 000 | 400 | 000 | 700 | 400 | |
| NPUT (MBH) | 600 | 400 | 600 | 300 | 400 | 600 |
| CAPACITY (MBH) | 480 | 320 | 480 | 240 | 320 | 480 |
| EAT/LAT (°F) DB | 29.4/98.5 | 29.1/96.9 | 33.8/102.9 | 40.6/86.7 | 26.0/99.7 | 40.6/95.9 |
| CAPACITY CONTROL | MODULATING 12:1 | MODULATING 10:1 | MODULATING 12:1 | MODULATING 10:1 | MODULATING 10:1 | MODULATING 12:1 |
| FFICIENCY | 80% | 80% | 80% | 80% | 80% | 80% |
| HOT GAS REHEAT COIL DATA | I | | 1 | | | |
| FACE AREA (SQ. FT.) | 21.6 | 14.6 | 21.6 | 14.6 | 14.6 | 21.6 |
| TOTAL CAPACITY (MBH) | 116.8 | 78.3 | 103.8 | 76.8 | 67.1 | 135.8 |
| AT (°F) DB/WB | 70.0/59.5 | 70.0/59.6 | 70.0/60.4 | 70.0/60.6 | 70.0/60.2 | 70.0/60.1 |
| ENERGY RECOVERY WHEEL | DATA: | | | | | |
| EXHAUST AIR (CFM) | 3,510 | 1,575 | 1,520 | _ | 1.750 | 3,100 |
| OUTDOOR AIR (CFM) | 3,510 | 2,400 | 3,040 | _ | 2,400 | 3,000 |
| PRESSURE DROP (IN H ₂ O) | 0.67 | 0.57 | 0.58 | _ | 0.57 | 0.57 |
| MOTOR HP | 0.17 | 0.17 | 0.17 | - | 0.17 | 0.17 |
| MOTOR FLA (AMPS) | 0.4 | 0.4 | 0.4 | _ | 0.4 | 0.4 |
| | FILTER DATA: | | | | | |
| ENERGY RECOVERY WHEEL | | | (| | | |
| | 2" MERV 8 | 2" MERV 8 | 2" MERV 8 | _ | 2" MERV 8 | 2" MERV 8 |
| YPE | 2" MERV 8 6.0 | 2" MERV 8 6.0 | 2" MERV 8 6.0 | - | 2" MERV 8 6.0 | 2" MERV 8 6.0 |
| TACE AREA (SQ.FT.) | | | | | | |
| TYPE FACE AREA (SQ.FT.) QUANTITY/SIZE (In.) | 6.0 2/18x24x2 | 6.0 | 6.0 | _ | 6.0 | 6.0 |
| TYPE FACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL | 6.0 2/18x24x2 | 6.0 | 6.0 | _ | 6.0 | 6.0 |
| TYPE FACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB | 6.0 2/18x24x2 SUMMER DATA: | 6.0 2/18x24x2 | 6.0 2/18x24x2 | - | 6.0 2/18x24x2 | 6.0 2/18x24x2 |
| TYPE FACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB | 6.0 2/18x24x2 SUMMER DATA: 92.0/74.0 | 6.0 2/18x24x2 92.0/74.0 | 6.0 2/18x24x2 92.0/74.0 | - | 6.0 2/18x24x2 92.0/74.0 | 6.0 2/18×24×2 92.0/74.0 |
| TYPE FACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB | 6.0 2/18x24x2 SUMMER DATA: 92.0/74.0 75.0/62.5 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 | - - - | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 |
| TYPE FACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB MIXED AIR T (*F) DB/WB | 6.0 2/18×24×2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 | - - - - | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 |
| TYPE TACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB MIXED AIR T (*F) DB/WB CAPACITY RECOVERED (MBH) | 6.0 2/18×24×2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 | - - - - - | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 |
| TYPE TACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB MIXED AIR T (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) | 6.0 2/18×24×2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 | - - - - - | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 |
| TACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB MIXED AIR T (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) ENERGY RECOVERY WHEEL | 6.0 2/18×24×2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 | - - - - - | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 |
| TACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB MIXED AIR T (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB | 6.0 2/18×24×2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 WINTER DATA: | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 0.67/0.74 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 0.78/0.81 | - - - - - - - | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 0.64/0.72 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 0.51/0.62 |
| TACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB MIXED AIR T (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB | 6.0 2/18x24x2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 WINTER DATA: 0.0/0.0 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 0.67/0.74 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 0.78/0.81 | - - - - - - - | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 0.64/0.72 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 0.51/0.62 |
| TYPE TACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL OUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) ENERGY RECOVERY WHEEL OUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB | 6.0 2/18x24x2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 WINTER DATA: 0.0/0.0 70.0/52.5 43.3/36.1 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 0.67/0.74 0.0/0.0 70.0/52.5 35.1/30.8 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 0.78/0.81 0.0/0.0 70.0/52.5 28.9/26.4 | - - - - - - - | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 0.64/0.72 0.0/0.0 70.0/52.5 38.0/32.7 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 0.51/0.62 0.0/0.0 70.0/52.5 45.9/37.8 |
| TACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB WHEEL LEAVING T (*F) DB/WB | 6.0 2/18x24x2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 WINTER DATA: 0.0/0.0 70.0/52.5 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 0.67/0.74 0.0/0.0 70.0/52.5 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 0.78/0.81 0.0/0.0 70.0/52.5 | - - - - - - - - | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 0.64/0.72 0.0/0.0 70.0/52.5 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 0.51/0.62 0.0/0.0 70.0/52.5 |
| TYPE TACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB CAPACITY RECOVERED (MBH) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB WHEEL LEAVING T (*F) DB/WB MIXED AIR T (*F) DB/WB CAPACITY RECOVERED (MBH) | 6.0 2/18×24×2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 WINTER DATA: 0.0/0.0 70.0/52.5 43.3/36.1 55.4/44.1 199.4 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 0.67/0.74 0.0/0.0 70.0/52.5 35.1/30.8 50.8/41.5 112.7 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 0.78/0.81 0.0/0.0 70.0/52.5 28.9/26.4 50.5/41.4 119.2 | - - - - - - - - - | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 0.64/0.72 0.0/0.0 70.0/52.5 38.0/32.7 50.8/41.4 121.3 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 0.51/0.62 0.0/0.0 70.0/52.5 45.9/37.8 61.0/47.4 180.5 |
| TYPE FACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB WHEEL LEAVING T (*F) DB/WB MIXED AIR T (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) | 6.0 2/18×24×2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 WINTER DATA: 0.0/0.0 70.0/52.5 43.3/36.1 55.4/44.1 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 0.67/0.74 0.0/0.0 70.0/52.5 35.1/30.8 50.8/41.5 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 0.78/0.81 0.0/0.0 70.0/52.5 28.9/26.4 50.5/41.4 | - - - - - - - - - - | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 0.64/0.72 0.0/0.0 70.0/52.5 38.0/32.7 50.8/41.4 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 0.51/0.62 0.0/0.0 70.0/52.5 45.9/37.8 61.0/47.4 |
| TYPE FACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB WHEEL LEAVING T (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) SUPPLY FAN DATA: | 6.0 2/18x24x2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 WINTER DATA: 0.0/0.0 70.0/52.5 43.3/36.1 55.4/44.1 199.4 0.59/0.62 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 0.67/0.74 0.0/0.0 70.0/52.5 35.1/30.8 50.8/41.5 112.7 0.76/0.76 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 0.78/0.81 0.0/0.0 70.0/52.5 28.9/26.4 50.5/41.4 119.2 0.84/0.83 | | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 0.64/0.72 0.0/0.0 70.0/52.5 38.0/32.7 50.8/41.4 121.3 0.73/0.74 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 0.51/0.62 0.0/0.0 70.0/52.5 45.9/37.8 61.0/47.4 180.5 0.63/0.66 |
| TYPE FACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT ('F) DB/WB RETURN AIR EAT ('F) DB/WB MIXED AIR T ('F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT ('F) DB/WB RETURN AIR EAT ('F) DB/WB MIXED AIR T ('F) DB/WB CAPACITY RECOVERY WHEEL DUTDOOR AIR EAT ('F) DB/WB MIXED AIR T ('F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) SUPPLY FAN DATA: SUPPLY AIRFLOW (CFM) | 6.0 2/18×24×2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 WINTER DATA: 0.0/0.0 70.0/52.5 43.3/36.1 55.4/44.1 199.4 0.59/0.62 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 0.67/0.74 0.0/0.0 70.0/52.5 35.1/30.8 50.8/41.5 112.7 0.76/0.76 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 0.78/0.81 0.0/0.0 70.0/52.5 28.9/26.4 50.5/41.4 119.2 0.84/0.83 | - - - - - - - - - - - - - - - - - - - | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 0.64/0.72 0.0/0.0 70.0/52.5 38.0/32.7 50.8/41.4 121.3 0.73/0.74 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 0.51/0.62 0.0/0.0 70.0/52.5 45.9/37.8 61.0/47.4 180.5 0.63/0.66 |
| TYPE TACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT ('F) DB/WB RETURN AIR EAT ('F) DB/WB WHEEL LEAVING T ('F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT ('F) DB/WB RETURN AIR EAT ('F) DB/WB WHEEL LEAVING T ('F) DB/WB WHEEL LEAVING T ('F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) SUPPLY FAN DATA: GUPPLY FAN DATA: GUPPLY AIRFLOW (CFM) | 6.0 2/18x24x2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 WINTER DATA: 0.0/0.0 70.0/52.5 43.3/36.1 55.4/44.1 199.4 0.59/0.62 6,400 1.7/4.0 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 0.67/0.74 0.0/0.0 70.0/52.5 35.1/30.8 50.8/41.5 112.7 0.76/0.76 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 0.78/0.81 0.0/0.0 70.0/52.5 28.9/26.4 50.5/41.4 119.2 0.84/0.83 | - - - - - - - - - - - - - - - - - - - | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 0.64/0.72 0.0/0.0 70.0/52.5 38.0/32.7 50.8/41.4 121.3 0.73/0.74 4,000 2.4/4.3 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 0.51/0.62 0.0/0.0 70.0/52.5 45.9/37.8 61.0/47.4 180.5 0.63/0.66 8,000 2.1/4.6 |
| ENERGY RECOVERY WHEEL TYPE FACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT ('F) DB/WB RETURN AIR EAT ('F) DB/WB WHEEL LEAVING T ('F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT ('F) DB/WB RETURN AIR EAT ('F) DB/WB WHEEL LEAVING T ('F) DB/WB WHEEL LEAVING T ('F) DB/WB MIXED AIR T ('F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) SUPPLY FAN DATA: SUPPLY FAN DATA: SUPPLY AIRFLOW (CFM) ESP/TSP (IN H2O) BHP/HP | 6.0 2/18x24x2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 WINTER DATA: 0.0/0.0 70.0/52.5 43.3/36.1 55.4/44.1 199.4 0.59/0.62 6,400 1.7/4.0 6.4/10.0 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 0.67/0.74 0.0/0.0 70.0/52.5 35.1/30.8 50.8/41.5 112.7 0.76/0.76 4,350 1.75/3.8 4.2/8.0 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 0.78/0.81 0.0/0.0 70.0/52.5 28.9/26.4 50.5/41.4 119.2 0.84/0.83 6,400 2.5/4.8 7.75/10.0 | - - - - - - - - - - - - - - - - - - - | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 0.64/0.72 0.0/0.0 70.0/52.5 38.0/32.7 50.8/41.4 121.3 0.73/0.74 4,000 2.4/4.3 4.5/8.0 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 0.51/0.62 0.0/0.0 70.0/52.5 45.9/37.8 61.0/47.4 180.5 0.63/0.66 8,000 2.1/4.6 8.9/15 |
| TYPE FACE AREA (SQ.FT.) QUANTITY/SIZE (In.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB MHEEL LEAVING T (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) ENERGY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB RETURN AIR EAT (*F) DB/WB WHEEL LEAVING T (*F) DB/WB CAPACITY RECOVERY WHEEL DUTDOOR AIR EAT (*F) DB/WB CAPACITY RECOVERED (MBH) EFFECTIVENESS (TOTAL/SENS.) SUPPLY FAN DATA: GUPPLY AIRFLOW (CFM) ESP/TSP (IN H2O) BHP/HP RPM | 6.0 2/18×24×2 SUMMER DATA: 92.0/74.0 75.0/62.5 82.3/69.0 79.0/66.2 68.7 0.47/0.57 WINTER DATA: 0.0/0.0 70.0/52.5 43.3/36.1 55.4/44.1 199.4 0.59/0.62 6,400 1.7/4.0 6.4/10.0 1527 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.7/69.4 79.8/66.4 43.3 0.67/0.74 0.0/0.0 70.0/52.5 35.1/30.8 50.8/41.5 112.7 0.76/0.76 4,350 1.75/3.8 4.2/8.0 1599 | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 85.1/70.0 79.8/66.2 47.7 0.78/0.81 0.0/0.0 70.0/52.5 28.9/26.4 50.5/41.4 119.2 0.84/0.83 6,400 2.5/4.8 7.75/10.0 1646 | | 6.0 2/18×24×2 92.0/74.0 75.0/62.5 83.1/69.1 79.8/66.6 45.7 0.64/0.72 0.0/0.0 70.0/52.5 38.0/32.7 50.8/41.4 121.3 0.73/0.74 4,000 2.4/4.3 4.5/8.0 1660 | 6.0 2/18x24x2 92.0/74.0 75.0/62.5 81.5/68.5 77.4/64.8 63.6 0.51/0.62 0.0/0.0 70.0/52.5 45.9/37.8 61.0/47.4 180.5 0.63/0.66 8,000 2.1/4.6 8.9/15 1699 |
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 NON−FUSED DISCONNECT SWITCH •FIELD POWERED 115 VOLT GFI OUTLET

• INVERTER RATED PREMIUM EFFICIENCY MOTORS SUITABLE FOR VARIABLE SPEED AND TORQUE APPLICATIONS. • COMPARATIVE ENTHALPY ECONOMIZER.

• STAINLESS STEEL DRAIN PANS. •5 YEAR COMPRESSOR PARTS WARRANTY.

•10 YEAR GAS HEAT EXCHANGER PARTS WARRANTY. •LOW AMBIENT CONTROL.

• 24" HIGH ROOF CURB. • COMBO DIGITAL TEMP AND HUMIDITY SENSOR W/ADJ SETPOINT AND TENENT OVERRIDE •INTELLIGENT EQUIPMENT MODULE FOR REMOTE WEB ACCESS.

4. ROOF CURBS SHALL BE TURNED OVER TO THE GENERAL CONTRACTOR FOR INSTALLATION. 5. ALL UNITS SHALL BE PROVIDED WITH VARIABLE FREQUENCY DRIVES AND POWERED, MODULATING EXHAUST FANS.

6. RTU-1, RTU-2, RTU-3, RTU-5 AND RTU-6 SHALL BE PROVIDED WITH BY-PASS DAMPER FOR ENERGY RECOVERY WHEEL. 7. RTU-3 AND RTU-5 SHALL BE SUPPLIED WITH OUTDOOR AIR MONITORING STATION.

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S Revisions: PERMIT SET 1 10/15/21

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SEQUENCE OF OPERATIONS: 1. <u>GENERAL</u>: A. THIS CONTRACTOR SHALL PROVIDE ALL REQUIRED CONTROL ELEMENTS AS REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM INCLUDING BUT NOT LIMITED TO CONTACTS, RELAYS, WIRING (24V AND 120V), CONDUIT, CONTROL PANELS, TRANSFORMERS, THERMOSTATS, SENSORS, ACTUATORS, DAMPERS, TIME CLOCKS, SPEED 2. <u>DISHWASHER EXHAUST FAN (EF-2)</u>: A. EXHAUST FAN SHALL OPERATE WHEN THE DISHWASHER IS ACTIVATED. LOCAL CONTROLS WITHIN THE DISHWASHER ASSEMBLY SHALL TURN ON/OFF THE EXHAUST FAN. WHEN THE EXHAUST FAN IS CALLED TO RUN, THE ASSOCIATED MOTORIZED BACKDRAFT DAMPER SHALL OPEN AND THEN THE FAN SHALL TURN ON. WHENEVER THE EXHAUST FAN IS SHUT-DOWN THE ASSOCIATED MOTORIZED DAMPER SHALL CLOSE. PROVIDE ALL CONTROLS REQUIRED TO INTERLOCK EXHAUST FAN OPERATION WITH DISHWASHER ASSEMBLY. 3. TOILET AND GENERAL EXHAUST FANS (EF-3, EF-4 AND EF-5): A. THE EXHAUST FAN SHALL RUN CONTINUOUSLY DURING OCCUPIED HOURS AS PROGRAMMED THROUGH A 24-HOUR TIME CLOCK. COORDINATE OCCUPIED HOURS WITH OWNER'S REPRESENTATIVE. WHEN THE EXHAUST FAN IS CALLED TO RUN, THE ASSOCIATED MOTORIZED BACKDRAFT DAMPER SHALL OPEN AND THEN THE FAN SHALL TURN ON. WHENEVER THE EXHAUST FAN IS SHUT-DOWN THE ASSOCIATED MOTORIZED DAMPER SHALL CLOSE. 4. <u>LAB EXHAUST FAN (EF-6)</u>: A. A MANUAL WALL MOUNTED SWITCH, LOCATED IN THE SPACE, SHALL TURN THE FAN ON AND OFF. WHEN THE EXHAUST FAN IS CALLED TO RUN, THE ASSOCIATED MOTORIZED BACKDRAFT DAMPER SHALL OPEN AND THEN THE FAN SHALL TURN ON. WHENEVER THE EXHAUST FAN IS SHUT-DOWN THE ASSOCIATED MOTORIZED DAMPER SHALL CLOSE. 5. EXHAUST FANS (EF-7 AND EF-8): A. EXHAUST SHALL BE COMMANDED ON/OFF BASED ON SPACE TEMPERATURE. ON A RISE IN SPACE TEMPERATURE ABOVE SET-POINT THE MOTORIZED DAMPER ASSOCIATED WITH THE EXHAUST FAN SHALL OPEN AND THEN THE EXHAUST FAN SHALL TURN ON. THE EXHAUST FAN SHALL CONTINUE TO RUN UNTIL THE SPACE TEMPERATURE DROPS BELOW SET-POINT, AT WHICH POINT THE FAN SHALL STOP AND THE MOTORIZED DAMPER SHALL CLOSE. WHENEVER THE EXHAUST FAN IS SHUT-DOWN THE ASSOCIATED MOTORIZED DAMPER SHALL CLOSE. 6. <u>KITCHEN EXHAUST HOOD EXHAUST FAN AND MAKE-UP AIR UNIT (EF-1 AND MUA-1:</u> A. THE EXHAUST FAN AND MAKE-UP AIR UNIT OPERATION SHALL BE OPERATED BY A FACTORY CONTROL PANEL MOUNTED WITHIN THE KITCHEN EXHAUST HOOD ASSEMBLY. WHENEVER THE HOOD PANEL IS INDEXED ON THE EXHAUST FAN AND THE MAKE-UP AIR UNIT SHALL OPERATE. THE GAS BURNER IN THE MAKE-UP AIR UNIT SHALL FIRE TO MAINTAIN DISCHARGE AIR SET-POINT. WHEN THE MAKE-UP AIR UNIT IS ON, ITS ASSOCIATED INTAKE MOTORIZED DAMPER SHALL BE OPEN. WHEN THE MAKE-UP AIR UNIT IS OFF. ITS ASSOCIATED INTAKE MOTORIZED DAMPER SHALL BE CLOSED. WHENEVER THE SYSTEM IS SHUT-DOWN THE OUTSIDE AIR INTAKE DAMPER SHALL REMAIN CLOSED. PROVIDE ALL CONTROLS REQUIRED TO INTERLOCK EXHAUST FAN AND MAKE-UP AIR UNIT OPERATION TO THE EXHAUST HOOD OPERATION. B. PROVIDE A LOW LIMIT SENSOR IN THE MAKE-UP AIR UNIT DISCHARGE ARRANGED TO PREVENT WINTER DISCHARGE TEMPERATURE FROM DROPPING BELOW 50°F (ADJUSTABLE). C. PROVIDE A HIGH LIMIT SENSOR IN THE MAKE-UP AIR UNIT DISCHARGE ARRANGED TO PREVENT WINTER DISCHARGE TEMPERATURE FROM RISING ABOVE 120°F (ADJUSTABLE). 7. <u>ELECTRIC HEATERS (EH-1, EH-3, EH-4 AND EH-5)</u>: A. ELECTRIC HEATERS SHALL BE OPERATED THROUGH FACTORY CONTROLS. A FACTORY THERMOSTAT SHALL ENERGIZE THE ELECTRIC HEATING ELEMENT AS REQUIRED TO MAINTAIN SPACE SET-POINT. WHENEVER ELECTRIC HEATING ELEMENT IS ENERGIZED THE UNIT FAN SHALL BE OPERATIONAL. 8. <u>ELECTRIC HEATER (EH-2)</u>: A. ELECTRIC HEATER SHALL BE MANUALLY CONTROLLED VIA LOCAL CONTROLS PROVIDED WITH ELECTRIC HEATERS. 9. CONSTANT VOLUME GAS FIRED PACKAGED ROOFTOP UNITS (RTU-1, RTU-2, RTU-4 AND RTU-6): GENERAL: UNIT SHALL BE PROVIDED WITH, AND OPERATED THROUGH, A 24-7 PROGRAMMABLE THERMOSTAT WITH NIGHT SET-BACK AND UNIT MOUNTED CONTROLS CAPABLE OF PROVIDING AUTOMATIC OPERATION, SET-POINT ADJUSTMENT AND ALL SEQUENCES INDICATED BELOW. SUMMER OCCUPIED OPERATION: UPON START-UP, THE CONTROL CIRCUITS SHALL BE ENERGIZED. DURING OCCUPIED MODE THE SUPPLY FAN SHALL RUN CONTINUOUSLY. THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL OPEN TO THE MINIMUM POSITION AND THE RETURN DAMPER SHALL BE OPEN. A TEMPERATURE SENSOR LOCATED IN THE SUPPLY AIR DUCTWORK SHALL BE ARRANGED TO CYCLE DX COOLING ON/OFF IN STAGES AS REQUIRED TO MAINTAIN A CONSTANT DISCHARGE SFT-POINT WINTER OCCUPIED OPERATION: UPON START-UP, THE CONTROL CIRCUITS SHALL BE ENERGIZED. DURING OCCUPIED MODE THE SUPPLY FAN SHALL RUN CONTINUOUSLY. THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL OPEN TO THE MINIMUM POSITION AND THE RETURN DAMPER SHALL BE OPEN. A TEMPERATURE SENSOR LOCATED IN THE SUPPLY AIR DUCTWORK SHALL BE ARRANGED TO MODULATE GAS HEAT AS REQUIRED TO MAINTAIN A CONSTANT DISCHARGE AIR TEMPERATURE. D. <u>ECONOMIZER OPERATION</u>: ON A CALL FOR COOLING WHEN THE AMBIENT OUTDOOR AIR CONDITIONS PERMIT (AS DETERMINED BY DIFFERENTIAL ENTHALPY CONTROLS) THE UNIT CONTROLS SHALL MODULATE THE OUTSIDE AIR, RELIEF AIR AND RETURN AS REQUIRED TO PROVIDE "FREE COOLING" AND MAINTAIN DISCHARGE SET-POINT. DURING ECONOMIZER OPERATION THE DX COOLING AND GAS HEATING SHALL NOT BE OPERATIONAL. CONTROL ACTION SHALL BE THAT AN INCREASE IN SUPPLY AIR TEMPERATURE WILL CAUSE THE OUTSIDE AIR AND RELIEF AIR DAMPERS TO MODULATE TOWARDS THE OPEN POSITION AND THE RETURN AIR DAMPER TO MODULATE TOWARDS THE CLOSED POSITION. A DROP IN TEMPERATURE BELOW SET-POINT WILL CAUSE THE REVERSE TO OCCUR. WHEN THE OUTSIDE AIR AND RELIEF AIR DAMPER OPEN TO FULL POSITION AND A FURTHER CALL FOR COOLING OCCURS THE DX COOLING SYSTEM SHALL OPERATE. WHEN AMBIENT AIR CONDITIONS ARE NO LONGER SUITABLE FOR ECONOMIZER OPERATION THE UNIT CONTROLS SHALL REVERT TO NORMAL OPERATION. MORNING WARM-UP OPERATION: THE UNIT SHALL START AND OPERATE FOR A PREDETERMINED PERIOD AS PROGRAMMED INTO THE UNIT CONTROLLER. DURING THIS CYCLE, THE JTSIDE AIR AND RELIEF AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE FULL OPEN. THE GAS HEATING SHALL MODULATE TO MAINTAIN SET—POINT. WHEN ZONE TEMPERATURES ARE WITHIN 2 DEGREES OF SET-POINT THE UNIT SHALL OPERATE IN OCCUPIED MODE. MORNING COOL-DOWN OPERATION: UNIT SHALL START AND OPERATE FOR A PREDETERMINED PERIOD AS PROGRAMMED INTO THE UNIT CONTROLLER. DURING THIS CYCLE, THE OUTSIDE AIR AND RELIEF AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE FULL OPEN. DX COOLING SHALL CYCLE TO MAINTAIN SET-POINT. WHEN ZONE TEMPERATURES ARE WITHIN 2 DEGREES OF SET-POINT THE UNIT SHALL OPERATE IN OCCUPIED MODE. UNOCCUPIED OPERATION: UNIT SUPPLY FAN, GAS HEATING AND DX COOLING SHALL CYCLE AS REQUIRED ON A CALL FOR HEATING OR COOLING. DURING THIS MODE, THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL BE FULL CLOSED AND THE RETURN AIR DAMPER SHALL BE FULL OPEN. H. LIMIT CONTROLS: PROVIDE HIGH/LOW LIMIT CONTROL SENSORS IN THE SUPPLY FAN DISCHARGE ARRANGED TO OVERRIDE TEMPERATURE CONTROLS AND PREVENT DISCHARGE TEMPERATURE FROM DROPPING BELOW 50 DEGREES F OR RISING ABOVE 110 DEGREES F (ADJUSTABLE). MISCELLANEOUS: WHENEVER THE UNITS ARE SHUT-DOWN THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE FULL OPEN. UNIT SHALL SHUT—DOWN UPON DETECTION OF SMOKE AS SENSED BY DUCT MOUNTED SMOKE DETECTOR. PROVIDE A FIRESTAT MOUNTED IN THE SUPPLY AIR DUCTWORK ARRANGED TO SHUT-DOWN THE UNIT WHEN SUPPLY AIR TEMPERATURE EXCEEDS 140° (ADJUSTABLE). FIRESTAT SHALL BE MANUALLY RESET TYPE. 10. <u>DUCTLESS SPLIT SYSTEM CEILING CASSETTE UNIT AND HEAT PUMP (AC-1 AND HP-1)</u>: A. SYSTEM SHALL BE OPERATED THROUGH A FACTORY PROVIDED WIRED REMOTE CONTROLLER, CAPABLE OF PROVIDING SET-POINT ADJUSTMENTS AND ALL PROGRAMMING FOR CONTROL SEQUENCES. THE SYSTEM SHALL CYCLE ON/OFF AS REQUIRED TO MAINTAIN SPACE SET-POINT. THE FACTORY INSTALLED CONTROLS SHALL BE CONFIGURED SUCH THAT A LEAK DETECTOR MOUNTED IN THE INDOOR UNIT DRAIN PAN SHALL BE ARRANGED TO SHUT-DOWN THE SYSTEM WHEN WATER IS DETECTED. 11. VARIABLE AIR VOLUME GAS FIRED PACKAGED ROOFTOP UNITS (RTU-3 AND RTU-5): A. GENERAL: UNIT SHALL BE PROVIDED WITH, AND OPERATED THROUGH, A 24-7 PROGRAMMABLE THERMOSTAT WITH NIGHT SET-BACK AND UNIT MOUNTED CONTROLS CAPABLE OF PROVIDING AUTOMATIC OPERATION, SET-POINT ADJUSTMENT AND ALL SEQUENCES INDICATED BELOW. SUMMER OCCUPIED OPERATION: UPON START-UP, THE CONTROL CIRCUITS SHALL BE ENERGIZED. DURING OCCUPIED MODE THE SUPPLY FAN SHALL RUN CONTINUOUSLY. THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL OPEN TO THE MINIMUM POSITION AND THE RETURN DAMPER SHALL BE OPEN. A TEMPERATURE SENSOR LOCATED IN THE SUPPLY AIR DUCTWORK SHALL BE ARRANGED TO CYCLE DX COOLING ON/OFF IN STAGES AS REQUIRED TO MAINTAIN A CONSTANT DISCHARGE SET-POINT. WINTER OCCUPIED OPERATION: UPON START-UP, THE CONTROL CIRCUITS SHALL BE ENERGIZED. DURING OCCUPIED MODE THE SUPPLY FAN SHALL RUN CONTINUOUSLY. THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL OPEN TO THE MINIMUM POSITION AND THE RETURN DAMPER SHALL BE OPEN. A TEMPERATURE SENSOR LOCATED IN THE SUPPLY AIR DUCTWORK SHALL BE ARRANGED TO MODULATE GAS HEAT AS REQUIRED TO MAINTAIN A CONSTANT DISCHARGE AIR TEMPERATURE D. <u>ECONOMIZER OPERATION</u>: ON A CALL FOR COOLING WHEN THE AMBIENT OUTDOOR AIR CONDITIONS PERMIT (AS DETERMINED BY DIFFERENTIAL ENTHALPY CONTROLS) THE UNIT CONTROLS SHALL MODULATE THE OUTSIDE AIR, RELIEF AIR AND RETURN AS REQUIRED TO PROVIDE "FREE COOLING" AND MAINTAIN DISCHARGE SET-POINT. DURING ECONOMIZER OPERATION THE DX COOLING AND GAS HEATING SHALL NOT BE OPERATIONAL. CONTROL ACTION SHALL BE THAT AN INCREASE IN SUPPLY AIR TEMPERATURE WILL CAUSE THE OUTSIDE AIR AND RELIEF AIR DAMPERS TO MODULATE TOWARDS THE OPEN POSITION AND THE RETURN AIR DAMPER TO MODULATE TOWARDS THE CLOSED POSITION. A DROP IN TEMPERATURE BELOW SET-POINT WILL CAUSE THE REVERSE TO OCCUR. WHEN THE OUTSIDE AIR AND RELIEF AIR DAMPER OPEN TO FULL POSITION AND A FURTHER CALL FOR COOLING OCCURS THE DX COOLING SYSTEM SHALL OPERATE. WHEN AMBIENT AIR CONDITIONS ARE NO LONGER SUITABLE FOR ECONOMIZER OPERATION THE UNIT CONTROLS SHALL REVERT TO NORMAL OPERATION. MORNING WARM-UP OPERATION: THE UNIT SHALL START AND OPERATE FOR A PREDETERMINED PERIOD AS PROGRAMMED INTO THE UNIT CONTROLLER. DURING THIS CYCLE. THE OUTSIDE AIR AND RELIEF AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE FULL OPEN. THE GAS HEATING SHALL MODULATE TO MAINTAIN SET-POINT. VARIABLE AIR VOLUME BOXES SHALL BE OPEN. WHEN ZONE TEMPERATURES ARE WITHIN 2 DEGREES OF SET-POINT THE UNIT SHALL OPERATE IN OCCUPIED MODE. MORNING COOL-DOWN OPERATION: UNIT SHALL START AND OPERATE FOR A PREDETERMINED PERIOD AS PROGRAMMED INTO THE UNIT CONTROLLER. DURING THIS CYCLE, THE OUTSIDE AIR AND RELIEF AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE FULL OPEN. DX COOLING SHALL CYCLE TO MAINTAIN SET-POINT. VARIABLE AIR VOLUME BOXES SHALL BE OPEN. WHEN ZONE TEMPERATURES ARE WITHIN 2 DEGREES OF SET-POINT THE UNIT SHALL OPERATE IN OCCUPIED MODE. UNOCCUPIED OPERATION: UNIT SUPPLY FAN, GAS HEATING AND DX COOLING SHALL CYCLE AS REQUIRED ON A CALL FOR HEATING OR COOLING. DURING THIS MODE, THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL BE FULL CLOSED AND THE RETURN AIR DAMPER SHALL BE FULL OPEN. DURING UNOCCUPIED MODE VARIABLE AIR VOLUME BOXES SHALL BE OPEN. H. STATIC PRESSURE CONTROLS: PROVIDE A STATIC PRESSURE SENSOR LOCATED IN THE MAIN SUPPLY DUCT APPROXIMATELY TWO-THIRDS (3/3) DOWNSTREAM ALONG THE LONGEST RUN. CONTROLS SHALL BE ARRANGED TO MODULATE THE UNIT VARIABLE FREQUENCY DRIVE ON THE SUPPLY FAN TO MAINTAIN A CONSTANT STATIC PRESSURE. A RISE IN PRESSURE SHALL CAUSE THE VARIABLE FREQUENCY DRIVE TO REDUCE FAN SPEED. A DROP IN STATIC PRESSURE SHALL CAUSE THE REVERSE TO TAKE PLACE. LIMIT CONTROLS: PROVIDE HIGH/LOW LIMIT CONTROL SENSORS IN THE SUPPLY FAN DISCHARGE ARRANGED TO OVERRIDE TEMPERATURE CONTROLS AND PREVENT DISCHARGE TEMPERATURE FROM DROPPING BELOW 50 DEGREES F OR RISING ABOVE 110 DEGREES F (ADJUSTABLE). MISCELLANEOUS: WHENEVER THE UNITS ARE SHUT-DOWN THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE FULL OPEN. UNIT SHALL SHUT-DOWN UPON DETECTION OF SMOKE AS SENSED BY DUCT MOUNTED SMOKE DETECTOR. PROVIDE A FIRESTAT MOUNTED IN THE SUPPLY AIR DUCTWORK ARRANGED TO SHUT-DOWN THE UNIT WHEN SUPPLY AIR TEMPERATURE EXCEEDS 140° (ADJUSTABLE). FIRESTAT SHALL BE MANUALLY RESET TYPE. 12. <u>VARIABLE AIR VOLUME BOXES:</u> A. IN OCCUPIED MODE THE SPACE SENSOR SHALL MODULATE THE VAV BOX DAMPER ASSEMBLY TO MAINTAIN SET-POINT. IN SUMMER MODE A RISE IN SPACE TEMPERATURE SHALL CAUSE THE VAV DAMPER TO MODULATE OPEN, AS THE SPACE APPROACHES SET-POINT, THE DAMPER SHALL MODULATE TO THE MINIMUM POSITION. IN THE WINTER MODE A DROP IN SPACE TEMPERATURE SHALL CAUSE THE VAV DAMPER TO MODULATE OPEN, AS THE SPACE APPROACHES SET-POINT, THE DAMPER SHALL MODULATE TO THE MINIMUM POSITION. THE DDC CONTROLLER IN THE ROOFTOP UNIT SHALL RESET THE SUPPLY AIR TEMPERATURE BASED ON SATISFYING THE VAV ZONE THAT IS EITHER FURTHEST FROM SET-POINT OR THE VAV ZONE THAT HAS THE HIGHEST AIR-FLOW WHILE MAINTAINING SET-POINT. WHEN THE ROOFTOP UNIT IS OPERATING IN THE UNOCCUPIED, MORNING COOL-DOWN OR MORNING WARM-UP MODE THE VAV BOXES SHALL REMAIN IN THE FULL OPEN D. FOR VAV-7 ONLY WITH ELECTRIC REHEAT COIL, UPON A FURTHER CALL FOR SPACE HEATING THE ELECTRIC REHEAT COIL SHALL BE ENERGIZED IN STAGES AS REQUIRED TO MAINTAIN SPACE TEMPERATURE SET-POINT. 13. AIR HANDLER UNIT AND HEAT PUMP (HVAC-1 AND HP-1): A. SYSTEM SHALL BE OPERATED THROUGH A FACTORY PROVIDED WIRED REMOTE CONTROLLER, CAPABLE OF PROVIDING SET-POINT ADJUSTMENTS AND ALL PROGRAMMING FOR CONTROL SEQUENCES. THE SYSTEM SHALL CYCLE ON/OFF AS REQUIRED TO MAINTAIN SPACE SET-POINT. THE FACTORY INSTALLED CONTROLS SHALL BE CONFIGURED SUCH THAT A LEAK DETECTOR MOUNTED IN THE INDOOR UNIT DRAIN PAN SHALL BE ARRANGED TO SHUT-DOWN THE SYSTEM WHEN WATER IS DETECTED B. WHENEVER THE SYSTEM IS OPERATING IN THE OCCUPIED MODE THE MOTORIZED OUTSIDE AIR INTAKE DAMPER SHALL BE OPEN. WHENEVER THE SYSTEM IS OPERATING IN THE UNOCCUPIED MODE THE MOTORIZED OUTSIDE AIR INTAKE DAMPER SHALL BE CLOSED.

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