

MECHANICAL SHEET LIST	
SHEET NUMBER	SHEET NAME
M0.01	MECHANICAL COVER SHEET
M0.02	MECHANICAL SCHEDULES
M0.03	MECHANICAL SCHEDULES
M0.04	MECHANICAL SPECIFICATIONS
M0.05	MECHANICAL SPECIFICATIONS
M2.01	MECHANICAL PLAN
M6.01	MECHANICAL DETAILS
M6.02	MECHANICAL DETAILS
M6.03	MECHANICAL DETAILS

CODE SUMMARY	
A. APPLICABLE CODES INCLUDE BUT ARE NOT LIMITED TO:	1. STATE OF MISSOURI MECHANICAL CODE: 2015 IMC. 2. STATE OF MISSOURI BUILDING CODE: 2015 IBC. 3. STATE OF MISSOURI COMMERCIAL ENERGY CONSERVATION CODE: 2009 IECC.
B. HVAC DESIGN CRITERIA	1. INDOOR TEMPERATURE: 75°F COOLING; 72°F HEATING 2. OUTDOOR DESIGN CONDITIONS (COLUMBIA, MO) PER 2009 IECC COH AMENDMENTS, TABLE 302.2: a. 94°F DB, 75°F WB SUMMER; 3.2°F DB WINTER b. 3059 DEGREE DAYS COOLING; 1371 DEGREE DAYS HEATING c. CLIMATE ZONE 4A
C. OUTSIDE AIR REQUIREMENTS- MISSOURI, IMC TABLE 403.3.1.1	1. OFFICES: 0.06 CFM /SQ FT + 5 CFM/ PERSON 2. RECEPTION: 0.06 CFM /SQ FT + 5 CFM/ PERSON 3. CORRIDOR: 0.08 CFM /SQ FT 4. CONFERENCE: 0.06 CFM /SQ FT + 5 CFM/ PERSON

MECHANICAL GENERAL NOTES	
1	ALL WORK PERFORMED FOR THIS PROJECT SHALL BE IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL BUILDING CODES, MECHANICAL CODES, ENERGY CODES AND THEIR AMENDMENTS. THE MORE STRINGENT CODE SHALL APPLY.
2	CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL WORK UNDER THEIR CONTACT PRIOR TO FABRICATION, ROUGH-IN AND FINAL CONNECTION.
3	HVAC WORK IS SHOWN DIAGRAMMATIC IN NATURE. DRAWINGS SHOULD NOT BE SCALED. PROVIDE ALL OFFSETS AND FITTINGS REQUIRED TO FIT WITHIN AVAILABLE SPACE. COORDINATE WORK WITH STRUCTURAL, ARCHITECTURAL, PLUMBING AND ELECTRICAL PRIOR TO INSTALLATION.
4	LOCATE ALL EQUIPMENT TO ALLOW FOR SERVICE ACCESS. COORDINATE LOCATION WITH OTHER TRADES. DO NOT ALLOW ACCESS TO BE ENCRONACHED UPON BY CONDUITS, PIPE AND OTHER MATERIALS.
5	PROVIDE ACCESS DOORS FOR ALL EQUIPMENT, VALVES, DAMPERS, ETC. ABOVE ALL NON-LAY-IN CEILINGS FOR MAINTENANCE AND SERVICE.
6	ALL RECTANGULAR AND ROUND DUCTWORK IS TO BE CONSTRUCTED OF GALVANIZED SHEET METAL, UNLESS NOTED OTHERWISE. ALL DUCTWORK SHALL BE CONSTRUCTED PER THE LATEST SMACNA DUCT STANDARDS.
7	ALL DUCTWORK SIZES INDICATED ARE CLEAR INSIDE DIMENSIONS. CONTRACTOR TO ALLOW FOR DUCT LINING AS REQUIRED. IF RESIZING IS REQUIRED IT SHALL BE DONE PER THE EQUAL FRICTION METHOD.
8	DUCT RUNWAYS TO SUPPLY AIR DIFFUSERS SHALL BE THE SAME SIZE AS THE DIFFUSER NECK.
9	FOR EACH HEATING OR COOLING UNIT PROVIDE A TEMPERATURE SENSING DEVICE. LOCATE DEVICE WHERE SHOWN ON DRAWINGS AND COORDINATE LOCATION WITH ARCHITECT, OTHER WALL DEVICES AND PER ADA GUIDELINES.
10	INSTALL ALL MECHANICAL EQUIPMENT PER MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. IF CONTRACTOR SUBSTITUTES EQUIPMENT AND AFTER APPROVAL BY THE ENGINEER, THE CONTRACTOR SHALL MAKE ALL NECESSARY MODIFICATIONS TO THE SYSTEM AS REQUIRED TO PROVIDE INSTALLATION.
11	CONTRACTOR TO VERIFY ALL ELECTRICAL CHARACTERISTICS OF MECHANICAL EQUIPMENT WITH ELECTRICAL DRAWINGS BEFORE EQUIPMENT RELEASE.
12	COORDINATE ALL SLEEVE, CHASE AND SLAB BLOCK-OUTS WITH EXISTING STRUCTURE. COORDINATE ACTUAL EQUIPMENT DIMENSION WITH OTHER TRADES.
13	CEILING DIFFUSER FRAME TYPES COLORS TO BE WHITE.
15	PROVIDE 1-1/2" ACOUSTICAL LINING ON ALL DUCTWORK WITHIN 10'-0" OF RTU/AHU. ALL OTHER DUCTWORK IS TO BE INSULATED WITH 1-1/2" FIBERGLASS WRAP/INSULATION.
16	PROVIDE ALL TRANSITION AS NECESSARY TO MAKE CONNECTION TO HVAC EQUIPMENT.
17	ALL PIPING, DUCTWORK AND EQUIPMENT SHALL BE SUPPORTED PER THE LATEST EDITION OF SMACNA.
18	PROVIDE DUCT ACCESS DOORS ON ALL MOTORIZED DAMPERS, FIRE DAMPERS, SMOKE DAMPERS, BACKDRAFT DAMPERS AND FIRE/SMOKE DAMPERS.
19	FLEXIBLE DUCTWORK FOR CONNECTION TO AIR DEVICES SHALL BE LIMITED TO 5'-0" IN LENGTH. FOR LONGER CONNECTIONS USE INSULATED RIGID SPIRAL ROUND DUCTWORK. SPLIT SEAM ROUND DUCTWORK IS NOT ALLOWED.
20	PROVIDE MANUAL VOLUME DAMPERS AT DUCT TAKEOFFS FROM MAINS. DAMPERS SHALL BE LOCATED IN ACCESSIBLE LOCATIONS. AVOID THE INSTALLATION OF DAMPERS AT DIFFUSERS DUE TO NOISE ISSUES.
21	PROVIDE SMACNA DUCT TRANSITIONS TO ALL TERMINAL UNIT INLETS AND OUTLETS FOR CONNECTION TO DUCTWORK.
22	ALL EXHAUST FAN OUTLETS SHALL BE A MINIMUM OF 10' FROM ALL BUILDING AIR INTAKES AND OPENINGS.
23	ALL EXTERIOR BUILDING PENETRATION SHALL BE SEALED WATER TIGHT. ALL INTERIOR WALL AND FLOOR PENETRATIONS FOR DUCTWORK AND PIPING SHALL BE MEET THE FIRE RATING OF THE ARCHITECTURAL PLANS AND WILL BE INSTALLED TO MEET ALL UL ASSEMBLY REQUIREMENTS.
24	PROVIDE MANUAL BALANCE DAMPERS AT EACH BRANCH DUCT TO ALL SUPPLY DIFFUSERS, EXHAUST GRILLES AND DUCTED RETURN GRILLES.
26	REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOUVER LOCATIONS AND COORDINATE LOUVER PLACEMENT WITH ARCHITECT.
27	PROVIDE MOTORIZED DAMPERS ON ALL EXTERIOR BUILDING PENETRATIONS. INTERLOCK WITH RESPECTIVE FANS. DAMPER TO FAIL CLOSED, UNLESS NOTED OTHERWISE.
28	PROVIDE SMOKE DETECTOR/S ON ALL AIR HANDLING EQUIPMENT 2,000 CFM OR GREATER TO MEET ALL NFPA REQUIREMENTS. FOR AIR HANDLING EQUIPMENT 15,000 CFM OR GREATER PROVIDE MOTORIZED ISOLATION DAMPERS ON ALL INLETS AND OUTLETS OF THE UNIT TO MEET ALL NFPA REQUIREMENTS. DAMPERS TO BE INTERLOCKED WITH UNIT.

MECHANICAL LEGEND	
	POINT OF CONNECTION (NEW TO EXISTING)
	DUCT SIZE (CLEAR INSIDE DIMENSION) FIRST FIGURE INDICATES PLAN SIZE
	ROUND DUCT DIAMETER SIZE (CLEAR INSIDE DIMENSION)
	RECTANGULAR OR SQUARE TO ROUND OR OVAL TRANSITION
	ROUND EXHAUST DUCT UP
	ROUND EXHAUST DUCT DOWN
	ROUND RETURN DUCT UP
	ROUND RETURN DUCT DOWN
	ROUND SUPPLY DUCT UP
	ROUND SUPPLY DUCT DOWN
	RECTANGULAR EXHAUST DUCT UP
	RECTANGULAR EXHAUST DUCT DOWN
	RECTANGULAR RETURN DUCT UP
	RECTANGULAR RETURN DUCT DOWN
	RECTANGULAR SUPPLY DUCT UP
	RECTANGULAR SUPPLY DUCT DOWN
	VOLUME DAMPER (MANUAL)
	FLEXIBLE CONNECTION
	MOTORIZED DAMPER
	SMOKE DAMPER
	FUSIBLE LINK FIRE DAMPER
	MOTORIZED FIRE SMOKE DAMPER
	BACK DRAFT DAMPER
	VANED ELBOW
	RADIUS ELBOW
	ACCESS DOOR (AD)
	BRANCH DUCT TAKE-OFF
	INTERNALLY LINED DUCT
	EXISTING TO REMAIN
	DEMOLISHED OR RELOCATED EQUIPMENT OR MATERIALS
	NEW CONSTRUCTION

MECHANICAL LEGEND	
	BUTTERFLY VALVE
	BALL VALVE
	SWING CHECK VALVE
	GATE VALVE, ANGLE
	THREE WAY CONTROL VALVE
	TWO WAY CONTROL VALVE
	SOLENOID VALVE
	PRESSURE REDUCING VALVE (PRV)
	MANUAL AIR VENT
	BALANCING VALVE
	DIRECTION OF FLOW
	STRAINER
	STRAINER WITH BLOW OFF VALVE
	PIPE RISING UP
	PIPE DROPPING DOWN
	PIPE CAP
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	UNION
	ANCHOR
	GUIDE
	EXPANSION JOINT
	THERMOMETER
	GAS PRESSURE REGULATOR
	STRAINER
	ELECTRICALLY TRACED PIPING
	EXPANSION LOOP (WxH)
	RETURN LINEAR DIFFUSER
	LINEAR DIFFUSER WITH PLENUM
	SUPPLY DIFFUSER
	FLEXIBLE DUCTWORK
	RETURN GRILLE
	EXHAUST GRILLE
	DIRECTION OF FLOW
	THERMOSTAT
	HUMIDISTAT
	PRESSURE SENSOR
	EQUIPMENT DESIGNATION
	AIR OUTLET/INLET DEVICE DESIGNATION

MECHANICAL ABBREVIATIONS	
(E)	EXISTING TO REMAIN
AC	AIR CONDITIONING UNIT
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AL	ACOUSTICAL LINING
AP	ACCESS PANEL
BDD	BACK DRAFT DAMPER
BFC	BELOW FINISHED CEILING
BHP	BRAKE HORSEPOWER
BMS	BUILDING MANAGEMENT SYSTEM
BTU	BRITISH THERMAL UNIT
CA	COMPRESSED AIR
CD	CEILING DIFFUSER
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CHP	CHILLED WATER PUMP
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CO	CLEAN OUT
COND	CONDENSATE DRAIN
CP	CONDENSATE PUMP
CRAC	COMPUTER ROOM AIR CONDITIONING UNIT
CT	COILING TOWER
CU	CONDENSING UNIT
CUH	CABINET UNIT HEATER
CWP	CONDENSER WATER PUMP
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
DB	DRY BULB
DWP	DOMESTIC WATER PUMP
DX	DIRECT EXPANSION
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
ERU	ENERGY RECOVERY UNIT
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
EUH	ELECTRIC UNIT HEATER
EWC	ELECTRIC WATER COOLER
EWT	ENTERING WATER TEMPERATURE
FA	FREE AREA
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FLA	FULL LOAD AMPS
FLR	FLOOR
FOP	FUEL OIL PUMP
FP	FIRE PUMP
FPM	FEET PER MINUTE
FPTU	FAN POWERED TERMINAL UNIT
FSD	COMBINATION FIRE AND SMOKE DAMPER
GPM	GALLONS PER MINUTE
HP	HORSEPOWER
HP	HEAT PUMP
HW	HOT WATER
HWP	HOT WATER PUMP
HWR	HEATING HOT WATER RETURN
HWS	HEATING HOT WATER SUPPLY
HX	HEAT EXCHANGER
HZ	HERTZ
ID	INSIDE DIAMETER
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LB	POUND
LF	LINEAR FEET
LWT	LEAVING WATER TEMPERATURE
MA	MAKE-UP AIR (OUTSIDE AIR)
MBH	THOUSAND BTU PER HOUR
MOC	MAXIMUM OVERCURRENT PROTECTION
MOD	MOTOR OPERATED DAMPER
MTD	MOUNTED
MUA	MAKE-UP AIR UNIT
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NK	NECK
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAHU	OUTSIDE AIR HANDLING UNIT
OAT	OUTSIDE AIR TEMPERATURE
OBD	OPPOSED BLADE DAMPER
OD	OUTSIDE DIAMETER
PBD	PARALLEL BLADE DAMPER
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH (GAUGE)
PTAC	PACKAGED TERMINAL AIR CONDITIONER
RA	RETURN AIR
RAG	RETURN AIR GRILL
RCP	REFLECTED CEILING PLAN
RF	RETURN FAN
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RPM	REVOLUTIONS PER MINUTE
RTU	ROOFTOP UNIT
SA	SUPPLY AIR
SD	SMOKE DAMPER
SEF	SMOKE EXHAUST FAN
SF	SUPPLY FAN
SP	STATIC PRESSURE
TYP	TYPICAL
UH	UNIT HEATER
UN	UNLESS OTHERWISE NOTED
VAV	VARIABLE AIR VOLUME UNIT
VD	VOLUME DAMPER
VFD	VARIABLE FREQUENCY DRIVE
VTR	VENT THROUGH ROOF
WB	WET BULB
*F	DEGREES FAHRENHEIT

DIFFUSER NECK SIZES

SUPPLY CFM (MIN-MAX)	RETURN CFM (MIN-MAX)	RECTANGULAR NECK SIZE (IN.)	ROUND NECK SIZE (ø)
0 - 100	0-90	6x6	6"
101 - 200	91-200	8x8	8"
201 - 400	201-300	10x10	10"
401 - 600	301-450	12x12	12"
601 - 900	451-700	14x14	14"
--	701-2000	22 x 22	--

AIR DEVICE SCHEDULE

DESIGNATION	MANUFACTURER	MODEL	MATERIAL	SERVICE	FACE DIMENSIONS	NECK DIMENSIONS	DESCRIPTION	NOTES
A	TITUS	OMNI	STEEL	SUPPLY	24X24	PER PLANS	PLAQUE DIFFUSER	1,2,3
B	TITUS	PFA	STEEL	RETURN	24X24	PER PLANS	PERFORATED GRILLE	7
C	TITUS	300	STEEL	SUPPLY	PER PLANS	PER PLANS	3/4" BLADE SPACING, 0" DEFLECTION	1,2

NOTES:
1. PROVIDE WITH BALANCING DAMPER AT BRANCH TAKEOFF.
2. BORDER TYPE AND COLOR TO BE WHITE.
3. PROVIDE REMOTE CABLE DAMPER WHERE MANUAL BALANCING DAMPER WOULD BE LOCATED IN INACCESSIBLE CEILING.

DUCT INSULATION SCHEDULE

DUCT INSULATION	TYPE	MIN./INSTALLED INSULATION VALUE	MIN. THICKNESS	MIN. NOMINAL DENSITY	CONCEALED					EXPOSED IN NON-SERVICE SPACES					EXPOSED IN SERVICE/ MECHANICAL ROOMS					NOTES		
					SUPPLY	RETURN	EXHAUST	OUTSIDE AIR	JACKET	SUPPLY	RETURN	EXHAUST	OUTSIDE AIR	JACKET	SUPPLY	RETURN	EXHAUST	OUTSIDE AIR	JACKET			
INDOOR ROUND/ FLAT-OVAL/ RECTANGULAR DUCT	MINERAL FIBER BLANKET	R-6	2	3/4	X	X			X	FSK						X	X		X		FSK	1
	MINERAL FIBER BOARD	R-6	1-1/2	2																		

NOTES:
1. REFER TO SPECIFICATIONS FOR ADDITIONAL INSULATION REQUIREMENTS AND JACKET DETAILS.
2. AIR CONDITIONING AND REFRIGERATION PIPE AND TUBING LINES SHALL BE INSULATED WITH ACR TYPE INSULATION HAVING A THERMAL RESISTIVITY OF NOT LESS THAN R-4.

FAN SCHEDULE

EQUIPMENT			UNIT TYPE				MOTOR			ELECTRICAL DATA				EMERGENCY POWER	VARIABLE SPEED	OPERATIONAL WEIGHT (LBS.)	WALL OPENING SIZE (IN)	NOTES	
TYPE	NUMBER	SERVICE	LOCATION	MANUFACTURER	MODEL	CFM	EXT. S.P. (IN W.G.)	RPM	BHP	HP	VOLTAGE	PHASE	FLA						MOCP
EF	2	EXHAUST	RESTROOM	BY SUBMITTAL	CEILING MTD.	100	0.25	950	-	-	120	1	0.19	15	N	N	20	-	1.2,5
F	3	VENTILATION	IT ROOM	BY SUBMITTAL	CEILING MTD.	500	0.3	1200	-	1/4	120	1	3.5	15	N	Y	35	-	1.3,5

NOTES:
1. PROVIDE WITH FACTORY MOUNTED ELECTRICAL DISCONNECT AND EC MOTOR.
2. FAN SHALL BE CONTROLLED BY A LIGHT SWITCH.
3. FAN SHALL BE CONTROLLED BY A THERMOSTAT.
4. NOT USED.
5. PROVIDE WITH CEILING MOUNTING KIT AND BACK DRAFT DAMPER.
6. PROVIDE WITH WALL MOUNTING KIT AND DISCHARGE LOUVER WITH 90 WEATHER HOOD.

OUTSIDE AIR CALCULATION

ROOM TYPE	PEOPLE	PEOPLE OUTSIDE AIR RATE	OCCUPANT AIR RATE	ROOM AREA	AREA OUTSIDE AIR RATE	AREA AIR RATE 2	BREATHING ZONE OUTDOOR AIR	ZONE AIR DISTRIBUTION EFFECTIVENESS	ZONE OUTDOOR AIR
CONFERENCE	6	5	30	640	0.06	38	68	0.8	85.5
OFFICE	1	5	5	150	0.06	9	14	0.8	17.5
STORAGE	0	0	0	95	0.06	6	6	0.8	7.125
TOTAL:							88 CFM		110 CFM

BALANCE OUTSIDE AIR DAMPER FOR FCU-1 TO: 110 CFM

OUTSIDE AIR CALCULATION

ROOM TYPE	PEOPLE	PEOPLE OUTSIDE AIR RATE	OCCUPANT AIR RATE	ROOM AREA	AREA OUTSIDE AIR RATE	AREA AIR RATE 2	BREATHING ZONE OUTDOOR AIR	ZONE AIR DISTRIBUTION EFFECTIVENESS	ZONE OUTDOOR AIR
WAREHOUSE	10	5	50	1000	0.06	60	110	1	110
TOTAL:							110 CFM		110 CFM

BALANCE OUTSIDE AIR DAMPER FOR FCU-3 TO: 110 CFM

LOUVER SCHEDULE

EQUIPMENT			UNIT		DIMENSIONS			CFM	MAX FACE VELOCITY (FPM)	MINIMUM FREE AREA (%)	MAX. PRESSURE DROP (IN W.G.)	NOTES
TYPE	NUMBER	SERVICE	MANUFACTURER	MODEL	LENGTH (IN)	HEIGHT (IN)	WIDTH (IN)					
L	2	EXHAUST	BY SUBMITTAL	BY SUBMITTAL	6	12	12	100	600	50	0.04	ALL
L	3	INTAKE	BY SUBMITTAL	BY SUBMITTAL	6	12	12	110	600	50	0.04	ALL
L	4	INTAKE	BY SUBMITTAL	BY SUBMITTAL	6	12	12	110	600	50	0.04	ALL

NOTES:
1. CONFIRM FINAL LOUVER SIZE, COLOR, AND DETAILING WITH ARCHITECT PRIOR TO PURCHASE. MATCH PEMB OR GALVANIZED.
2. PROVIDE WITH MOTORIZED DAMPER BEHIND STATIONARY LOUVER. DAMPER TO BE INTERLOCK WITH EXHAUST/ SUPPLY FAN TO SEAL THE BUILDING WHEN NOT ENERGIZED.
3. LOUVER SHALL BE WIND DRIVEN RAIN WITH TYPE WITH 90 DEGREE WEATHER HOOD.

HUCK FINN SOLAR OPERATIONS & MAINTENANCE BUILDING

Project Address:
(39.322039, -91.541742) Vandalia, MO



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Sheet Content:
MECHANICAL SCHEDULES

SCALE: NOT TO SCALE

Drawn By: WT
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Date Issued:

02/23/24
06/26/24

Issue for Construction
IFC Set Addendum 02

DX FAN COIL UNIT WITH HEAT PUMP SCHEDULE																											
EQUIPMENT		UNIT											DX COOLING COIL				HEAT PUMP HEATING		ELECTRICAL DATA				EMERGENCY POWER		VARIABLE SPEED	OPERATIONAL WEIGHT (LBS.)	NOTES
TYPE	NUMBER	LOCATION	MANUFACTURER	MODEL	TYPE	TOTAL AIRFLOW (CFM)	MIN. OUTSIDE AIRFLOW (CFM)	TONNAGE	SUPPLY FAN	DX COOLING COIL				CAPACITY (MBH)	EAT (°F)	LAT (°F)	VOLTAGE	PHASE	MCA	MOCP	EMERGENCY POWER	VARIABLE SPEED	OPERATIONAL WEIGHT (LBS.)	NOTES			
										EAT (°F)	WB (°F)	DB (°F)	WB (°F)														
FCU	1	PLENUM	BY SUBMITTAL	BY SUBMITTAL	HORIZONTAL	1100	110	3	0.8	76.9	63.8	55	54	34	28.2	40	65.12	90	208-230	1	2.9	15	N	N	100	ALL	
FCU	2	PLENUM	BY SUBMITTAL	BY SUBMITTAL	HORIZONTAL	850	85	3	0.8	76.9	63.8	55	54	24	24	40	65.12	90	208-230	1	2.9	15	N	N	100	ALL	
FCU	3	PLENUM	BY SUBMITTAL	BY SUBMITTAL	HORIZONTAL	1100	110	3	0.8	76.9	63.8	55	54	31	24	40	65.12	90	208-230	1	2.9	15	N	N	100	ALL	

NOTES:

- PROVIDE WITH ELECTRICAL DISCONNECT SWITCH AND SINGLE POINT POWER CONNECTION.
- PROVIDE WITH EC MOTORS.
- UNIT TO BE SELECTED AT MEDIUM SPEED.
- PROVIDE WITH 2" DISPOSABLE FILTER.
- IF REQUIRED FOR FINAL CONDENSATE ROUTING; PROVIDE WITH CONDENSATE PUMP, 115W/ 1/4 MOTOR. INTERLOCK CONDENSATE PUMP WITH INTEGRAL FLOAT SWITCH.

AIR COOLED CONDENSING UNIT SCHEDULE																		
EQUIPMENT			UNIT				ELECTRICAL DATA					EMERGENCY POWER				VARIABLE SPEED	OPERATIONAL WEIGHT (LBS.)	NOTES
TYPE	NUMBER	SERVICE	LOCATION	MANUFACTURER	MODEL	AMBIENT TEMP (°F)	REFRIGERANT TYPE	MATCHED TOTAL CAPACITY (MBH)	EER	VOLTAGE	PHASE	MCA	MOCP	EMERGENCY POWER	VARIABLE SPEED	OPERATIONAL WEIGHT (LBS.)	NOTES	
																		HP
HP	2	FCU-2	ON GRADE	BY SUBMITTAL	BY SUBMITTAL	105	R-410 A	24	11.1	230	1	29.1	35	N	N	100	ALL	
HP	3	FCU-3	ON GRADE	BY SUBMITTAL	BY SUBMITTAL	105	R-410 A	31	11.1	230	1	29.1	35	N	N	225	ALL	

NOTES:

- MOUNT ON SIDEWALK CONCRETE.
- MAINTAIN ALL MANUFACTURER REQUIRED CLEARANCES.
- PROVIDE WITH ELECTRICAL DISCONNECT SWITCH.
- PROVIDE WITH LOW AMBIENT STANDARD.

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SCALE:
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MECHANICAL SPECIFICATIONS

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

- 1. COORDINATION: PROVIDE ELECTRICAL CONTRACTOR WITH ELECTRICAL REQUIREMENTS OF APPROVED EQUIPMENT IN SUFFICIENT TIME TO ORDER PANEL BOARDS, DISCONNECTS, ETC.
2. ACCESS DOORS: PROVIDE ACCESS DOORS FOR ACCESS TO ALL VALVES, FILTERS, CONTROLS, DAMPERS OR OTHER DEVICES REQUIRING ATTENTION.
3. SLEEVES: PROVIDE METAL SLEEVES WHERE PIPES OR CONTROL WIRING PENETRATE WALLS.
4. WARRANTY: GUARANTEE LABOR AND MATERIALS FOR 2 YEAR.
5. SUBMITTALS: SUBMIT DATA STATING EQUIPMENT SIZE AND SELECTED OPTIONS FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE.

SECTION 23 05 13 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

- 1. TEST MOTORS IN ACCORDANCE WITH NEMA MG 1, INCLUDING WINDING RESISTANCE, NO-LOAD SPEED AND CURRENT, LOCKED ROTOR CURRENT, INSULATION THERMAL TENSILE TEST, AND MECHANICAL ALIGNMENT TESTS.
2. SINGLE-PHASE MOTORS: PERMANENT SPLIT-CAPACITOR TYPE, WHERE AVAILABLE.
3. SINGLE-PHASE MOTORS: NEMA MG 1 DESIGN B, PREMIUM-EFFICIENCY SQUIRREL-CAGE INDUCTION MOTOR, WITH WINDINGS TO ACCOMPLISH STARTING METHODS AND NUMBER OF SPEEDS INDICATED.

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC

- 1. METAL PIPE HANGERS AND SUPPORTS CARBON-STEEL PIPE HANGERS AND SUPPORTS.
A. DESCRIPTION: MSS SP-58, TYPES 1 THROUGH 58, FACTORY-FABRICATED COMPONENTS, GALVANIZED METALLIC.
2. TRAPEZE PIPE HANGERS.
A. DESCRIPTION: MSS SP-69, TYPE 69, SHOP-OR-FIELD-FABRICATED PIPE-SUPPORT ASSEMBLY MADE FROM STRUCTURAL CARBON-STEEL SHAPES WITH MSS SP-58 GALVANIZED METALLIC HANGER RODS, NUTS, SADDLES, AND U-BOLTS.

SECTION 23 05 48.13 - VIBRATION CONTROLS FOR HVAC

- 1. AIR HANDLERS, FURNACES, FANS AND FAN COILS SHALL BE SUSPENDED OR SUPPORTED WITH SPRING ISOLATOR UNLESS INTERNALLY ISOLATED.
2. PROVIDE FLEXIBLE DUCT CONNECTIONS AT ALL AIR HANDLERS, ROOFTOP UNITS AND FANS, UNLESS INTERNALLY ISOLATED.
3. PIPE: ALL PIPING SHALL BE VIBRATION ISOLATED WITHIN 90 FT OF VIBRATING EQUIPMENT.
4. ELASTOMERIC MOUNT IN A STEEL FRAME WITH UPPER AND LOWER STEEL HANGER RODS.

SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

- 1. EQUIPMENT: PERMANENT LABEL (STENCIL, METAL TAG OR ENGRAVED PLASTIC) WITH UNIT TAG OR NAME AND AREA OR SPACE SERVED.
2. CEILING TACKS: PROVIDE CEILING TACKS TO LOCATE VALVES OR DAMPERS ABOVE T-BAR TYPE PANEL CEILING.
A. YELLOW: FIRE DAMPERS/SMOKE DAMPERS; RED: VALVES; BLUE:

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC EXECUTION

- 1. REPORT DEFICIENCIES DISCOVERED BEFORE AND DURING PERFORMANCE OF TAB PROCEDURES. OBSERVE AND RECORD SYSTEM REACTIONS TO CHANGES IN CONDITIONS.
2. NO ADJUSTMENT TO EXISTING AIR HANDLERS AND FANS SERVING THE AREA ARE ALLOWED WITHOUT OWNERS EXPRESS KNOWLEDGE AND CONSENT.
3. PERFORM SYSTEM-READINESS CHECKS OF HVAC SYSTEMS AND EQUIPMENT TO VERIFY SYSTEM READINESS FOR TAB WORK.

SECTION 23 07 03 - DUCT INSULATION

- 1. MINERAL-FIBER BLANKET INSULATION: MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN, COMPLY WITH ASTM C 553, TYPE II AND ASTM C 1290, TYPE III WITH FACTORY-APPLIED FSK JACKET.
2. MANUFACTURERS: JOHNS MANVILLE; A BERKSHIRE HATHAWAY COMPANY, OWENS CORNING, OR APPROVED EQUAL.
3. FIRE-RATED BLANKET: HIGH-TEMPERATURE, FLEXIBLE, BLANKET INSULATION WITH FSK JACKET THAT IS TESTED AND CERTIFIED TO PROVIDE A 1-HOUR FIRE RATING BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.

SECTION 23 09 23.12 - CONTROL DAMPERS

- 1. RECTANGULAR DAMPERS WITH ALUMINUM AIRFOIL BLADES.
A. MANUFACTURERS: ARROW UNITED INDUSTRIES, RUSKIN COMPANY (REQUIREMENTS IN SUBPARAGRAPHS BELOW ARE BASED ON RUSKIN'S "CD50 SERIES.")
2. GENERAL CONTROL-DAMPER ACTUATORS REQUIREMENTS
A. ACTUATORS SHALL OPERATE RELATED DAMPERS(S) WITH SUFFICIENT RESERVE POWER TO PROVIDE SMOOTH MODULATING ACTION OR TWO-POSITION ACTION AND PROPER SPEED OF RESPONSE AT VELOCITY AND PRESSURE CONDITIONS TO WHICH THE DAMPER IS SUBJECTED.

SECTION 23 37 13.13 - AIR DIFFUSERS, REGISTERS AND GRILLES

- 1. PRODUCTS
A. MANUFACTURERS: METALAIRE, INC., NAILOR INDUSTRIES INC., PRICE INDUSTRIES, TITUS, OR APPROVED EQUAL.
2. DEVICES SHALL BE SPECIFICALLY DESIGNED FOR VARIABLE-AIR-VOLUME FLOWS.
3. VERIFICATION OF PERFORMANCE: RATE DIFFUSERS ACCORDING TO ASHRAE 70, "METHOD OF TESTING FOR RATING THE PERFORMANCE OF AIR OUTLETS AND INLETS."

SECTION 23 09 23.01 - BUILDING CONTROL SYSTEM FOR HVAC

- 1. ELECTRIC CONTROLS FOR HVAC
A. ELECTRIC, PROGRAMMABLE MULTISTAGE THERMOSTATS, AUTOMATIC CHANGEOVER, BATTERY BACKUP, HONEYWELL TB7200 SERIES OR EQUAL.

SECTION 23 06 00 - COMMISSIONING OF HVAC

- 1. ALL THIRD PARTY COMMISSIONING AGENTS SHALL BE CERTIFIED BY ONE OF THE FOLLOWING ORGANIZATIONS:
A. CBCP - CERTIFIED BUILDING COMMISSIONING PROFESSIONAL - ASSOCIATION OF ENERGY ENGINEERS
B. CCP - CERTIFIED COMMISSIONING PROFESSIONAL - BUILDING COMMISSIONING ASSOCIATION
C. CPMP - CERTIFIED PROCESS MANAGEMENT PROFESSIONAL - ASHRAE
D. CEA - CERTIFIED COMMISSIONING AUTHORITY - AABC COMMISSIONING GROUP
E. BSC - BUILDING SYSTEM COMMISSIONING CERTIFICATION - NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB)
2. CERTIFY THAT HVAC SYSTEMS, SUBSYSTEMS, AND EQUIPMENT HAVE BEEN INSTALLED, CALIBRATED, AND STARTED AND OPERATING ACCORDING TO THE CONTRACT DOCUMENTS, APPROVED SHOP DRAWINGS AND SUBMITTALS.

SECTION 23 31 13 - METAL DUCT

- 1. MANUFACTURERS: MCGILL AIRFLOW LLC, SEMCO LLC, SHEET METAL CONNECTORS, INC. OR APPROVED EQUAL.
2. TRANSVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE ACCORDING TO SMACNAS "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" FIGURE 3-1, "ROUND DUCT TRANSVERSE JOINTS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNAS "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."
3. TRANSVERSE JOINTS IN DUCTS LARGER THAN 60 INCHES IN DIAMETER: FLANGED.
4. ALUMINUM SYSTEMS: COMPLY WITH ASTM B 209 ALLOY 3003, H14 TEMPER, WITH MILL FINISH FOR CONCEALED DUCTS, AND STANDARD, ONE-SIDE BRIGHT FINISH FOR DUCT SURFACES EXPOSED.

SECTION 23 31 13.01 - METAL DUCT

- 1. FABRICATE FLAT-OVAL DUCTS LARGER THAN 72 INCHES IN WIDTH (MAJOR DIMENSION) WITH BUTT-WELDED LONGITUDINAL SEAMS.
2. TEES AND LATERALS: SELECT TYPES AND FABRICATE ACCORDING TO SMACNAS "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" FIGURE 3-5, "90 DEGREE TEES AND LATERALS," AND FIGURE 3-6, "CONICAL TEES," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNAS "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."
3. SHEET METAL MATERIALS
A. GENERAL MATERIAL REQUIREMENTS: COMPLY WITH SMACNAS "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" FOR ACCEPTABLE MATERIALS, MATERIAL THICKNESS, AND DUCT CONSTRUCTION METHODS UNLESS OTHERWISE INDICATED.

SECTION 08 91 00 - STATIONARY BLADE WALL LOUVERS

- 1. MANUFACTURERS: RUSKIN, PRICE, GREENHECK, NAILOR, OR APPROVED EQUAL.
A. MANUFACTURER SHALL BE ISO 9001 ACCREDITED.
2. PERFORMANCE: LOUVERS LICENSED TO BEAR AMCA CERTIFIED RATINGS SEAL. RATINGS BASED ON TESTS AND PROCEDURES PERFORMED IN ACCORDANCE WITH AMCA 511 AND COMPLY WITH AMCA CERTIFIED RATINGS PROGRAM.
3. RATINGS: LOUVER
WARRANTY: MANUFACTURER SHALL PROVIDE STANDARD LIMITED WARRANTY FOR LOUVER SYSTEMS FOR A PERIOD OF FIVE YEARS (60 MONTHS) FROM DATE OF INSTALLATION, NO MORE THAN 60 MONTHS AFTER SHIPMENT FROM MANUFACTURING PLANT.
4. STATIONARY BLADE LOUVER:
A. FABRICATION:
a. DESIGN: STATIONARY DRAINABLE LOUVER TYPE WITH DRAIN GUTTERS IN EACH BLADE AND HEAD WITH DOWNSPOUTS IN JAMBS AND MULLIONS WITH ALL WELDED CONSTRUCTION.
b. FRAME:
- FRAME DEPTH: 6 INCHES (152 MM)
- WALL THICKNESS: 0.081 INCH (2.1 MM), NOMINAL
- MATERIAL: EXTRUDED ALUMINUM, ALLOY 6063-T6.

SECTION 23 82 30 - WALL AND CEILING UNIT HEATERS

- 1. MANUFACTURERS: INDECO, REZNOR, TRANE, OR APPROVED EQUAL.
2. DESCRIPTION:
A. ASSEMBLY INCLUDING CHASSIS, ELECTRIC HEATING COIL, FAN, MOTOR, AND CONTROLS. COMPLY WITH UL 2021.
3. CABINET:
A. FRONT PANEL: STAMPED-STEEL LOUVER, WITH REMOVABLE PANELS FASTENED WITH TAMPERPROOF FASTENERS.
B. FINISH: BAKED ENAMEL, OVER BAKED-ON PRIMER WITH MANUFACTURER'S STANDARD COLOR SELECTED BY ARCHITECT, APPLIED TO FACTORY-ASSEMBLED AND TESTED WALL AND CEILING HEATERS BEFORE SHIPPING.
C. SURFACE-MOUNTED CABINET ENCLOSURE: STEEL WITH FINISH TO MATCH CABINET.
4. COIL:
A. ELECTRIC-RESISTANCE HEATING COIL: NICKEL-CHROMIUM HEATING WIRE, FREE FROM EXPANSION NOISE AND 60-HZ HUM EMBEDDED IN MAGNESIUM OXIDE REFRACTORY AND SEALED IN CORROSION-RESISTANT METALLIC SHEATH. TERMINATE ELEMENTS IN STAINLESS-STEEL, MACHINE-STAKED TERMINALS SECURED WITH STAINLESS-STEEL HARDWARE, AND LIMIT CONTROLS FOR HIGH-TEMPERATURE PROTECTION. PROVIDE INTEGRAL CIRCUIT BREAKER FOR OVERCURRENT PROTECTION.

SECTION 23 34 00 - HVAC FANS

- 1. DIRECT DRIVE CENTRIFUGAL FAN
A. MANUFACTURERS: COOK, TWIN CITY, GREENHECK, OR APPROVED EQUAL. MANUFACTURER SHALL BE ISO 9001 ACCREDITED.
2. PERFORMANCE CONFORM TO AMCA STANDARD 211 AND 311. FANS MUST BE TESTED IN ACCORDANCE WITH ANS/AMCA STANDARD 210-99 AND AMCA STANDARD 300-96 IN AN AMCA ACCREDITED LABORATORY.
3. WARRANTY: MANUFACTURER SHALL PROVIDE STANDARD LIMITED WARRANTY FOR FAN EQUIPMENT (EXCLUDING MOTOR) FOR A PERIOD OF ONE YEAR (12 MONTHS) FROM DATE OF PURCHASE.
4. FABRICATION:
a. MOTOR: OPEN TYPE, EC MOTOR SPECIFICALLY DESIGNED FOR FAN APPLICATIONS. AC INDUCTION TYPE MOTORS ARE NOT ACCEPTABLE.
b. HOUSING: MATERIAL: MINIMUM 22 GAUGE GALVANIZED STEEL, MATERIAL: MINIMUM 22 GAUGE GALVANIZED STEEL, DAMPER ON INLET/OUTLET AS SPECIFIED ON SCHEDULE. INLET AND OUTLET SHALL INCLUDE SQUARE DUCT COLLARS.
c. WHEEL: STATICALLY AND DYNAMICALLY BALANCED IN ACCORDANCE TO AMCA STANDARD 284-05. THE WHEEL CONE AND FAN INLET WILL BE MATCHED AND SHALL HAVE PRECISE RUNNING TOLERANCES FOR MAXIMUM PERFORMANCE AND OPERATING EFFICIENCY; BLADES CONSTRUCTED OF ALUMINUM OR INJECTION MOLDED OF POLYPROPYLENE RESIN.

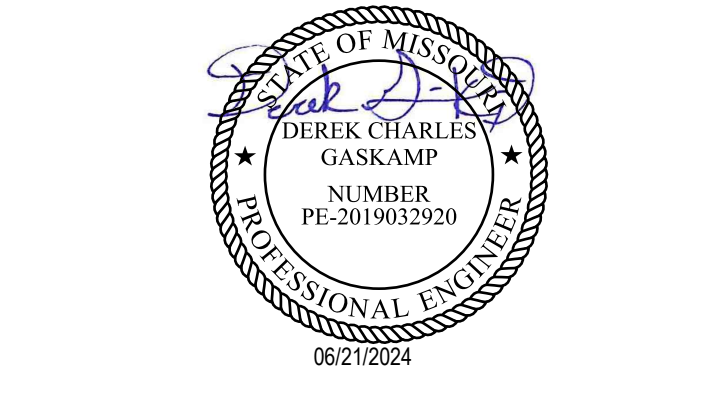


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MECHANICAL SPECIFICATIONS

<p>SECTION 23 33 00 – AIR DUCT ACCESSORIES</p> <p>1. STANDARD STEEL, MANUAL VOLUME DAMPERS: A. MANUFACTURERS: MCGILL AIRFLOW LLC., NAILOR INDUSTRIES INC., RUSKIN COMPANY, OR APPROVED EQUAL. B. STANDARD LEAKAGE RATING, WITH LINKAGE OUTSIDE AIRSTREAM. SUITABLE FOR HORIZONTAL OR VERTICAL APPLICATIONS.</p> <p>2. FIRE DAMPERS: A. FIRE DAMPERS MANUFACTURERS: NAILOR INDUSTRIES INC., POTTORFF, OR APPROVED EQUAL. B. TYPE: STATIC, RATED AND LABELED ACCORDING TO UL 555 BY AN NRTL. C. CLOSING RATING IN DUCTS UP TO 4-INCH WG STATIC PRESSURE CLASS AND MINIMUM 2000-FPM VELOCITY. D. FIRE RATING: 1-HOURS. E. FRAME: CURTAIN TYPE WITH BLADES OUTSIDE AIRSTREAM, FABRICATED WITH ROLL-FORMED, 0.034-INCH-THICK GALVANIZED STEEL, WITH MITERED AND INTERLOCKING CORNERS. F. MOUNTING SLEEVE: FACTORY-OR FIELD-INSTALLED, GALVANIZED SHEET STEEL. G. MINIMUM THICKNESS: 0.39 INCH THICK, AS INDICATED, AND OF LENGTH TO SUIT APPLICATION. H. MOUNTING ORIENTATION: VERTICAL OR HORIZONTAL, AS INDICATED. I. BLADES: ROLL-FORMED, INTERLOCKING, 0.034-INCH-THICK, GALVANIZED SHEET STEEL, IN PLACE OF INTERLOCKING BLADES, USE FULL-LENGTH, 0.034-INCH-THICK, GALVANIZED-STEEL BLADE CONNECTORS. J. HORIZONTAL DAMPERS: INCLUDE BLADE LOCK AND STAINLESS-STEEL CLOSURE SPRING. K. HEAT-RESPONSIVE DEVICE: REPLACEABLE, 165 DEG F RATED, FUSIBLE LINKS. L. HEAT-RESPONSIVE DEVICE: REPLACEABLE LINK AND SWITCH PACKAGE, FACTORY INSTALLED, 165 DEG F RATED.</p> <p>3. SMOKE DAMPERS: A. MANUFACTURERS: GREENHECK FAN CORPORATION, NAILOR INDUSTRIES INC., RUSKIN COMPANY. GENERAL REQUIREMENTS: LABEL ACCORDING TO UL 555S BY AN NRTL, OR APPROVED EQUAL. B. SMOKE DETECTOR: INTEGRAL, FACTORY WIRED FOR SINGLE-POINT CONNECTION. C. FRAME: HAT-SHAPED, 0.094-INCH-THICK, GALVANIZED SHEET STEEL, WITH WELDED CORNERS AND MOUNTING FLANGE. D. BLADES: AIR FOIL, ROLL-FORMED, HORIZONTAL, INTERLOCKING, 0.063-INCH-THICK, GALVANIZED SHEET STEEL. E. LEAKAGE: CLASS I. F. RATED PRESSURE AND VELOCITY TO EXCEED DESIGN AIRFLOW CONDITIONS. G. MOUNTING SLEEVE: FACTORY-INSTALLED, 0.05-INCH THICK, GALVANIZED SHEET STEEL; LENGTH TO SUIT WALL OR FLOOR APPLICATION WITH FACTORY-FURNISHED SILICONE CALKING. H. DAMPER MOTORS: TWO-POSITION ACTION; DEFAULT MOTOR CHARACTERISTICS ARE SPECIFIED IN SECTION 230513 "COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT." I. COMPLY WITH NEMA DESIGNATION, TEMPERATURE RATING, SERVICE FACTOR, ENCLOSURE TYPE, AND EFFICIENCY REQUIREMENTS FOR MOTORS SPECIFIED IN SECTION 230513 "COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT." J. MOTOR SIZES: MINIMUM SIZE AS INDICATED; IF NOT INDICATED, LARGE ENOUGH SO DRIVEN LOAD WILL NOT REQUIRE MOTOR TO OPERATE IN SERVICE FACTOR RANGE ABOVE 1.0. K. CONTROLLERS, ELECTRICAL DEVICES, AND WIRING: COMPLY WITH REQUIREMENTS FOR ELECTRICAL DEVICES AND CONNECTIONS SPECIFIED IN SECTION 230923 "DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC." L. PERMANENT SPLIT-CAPACITOR OR SHADED-POLE MOTORS: WITH OIL-IMMERSED AND SEALED GEAR TRAINS. SPRING-RETURN MOTORS: EQUIP WITH AN INTEGRAL SPIRAL SPRING MECHANISM WHERE INDICATED. ENCLOSE ENTIRE SPRING MECHANISM IN A REMOVABLE HOUSING DESIGNED FOR SERVICE OR ADJUSTMENTS. SIZE FOR RUNNING TORQUE RATING OF 150 IN. X LBF AND BREAKAWAY TORQUE RATING OF 150 IN. X LBF. OUTDOOR MOTORS AND MOTORS IN OUTDOOR-AIR INTAKES: EQUIP WITH O-RING GASKETS DESIGNED TO MAKE MOTORS WEATHERPROOF. EQUIP MOTORS WITH INTERNAL HEATERS TO PERMIT NORMAL OPERATION AT MINUS 40 DEG F. M. NONSPRING-RETURN MOTORS: FOR DAMPERS LARGER THAN 25 SQ. FT. SIZE MOTOR FOR RUNNING TORQUE RATING OF 150 IN. X LBF AND BREAKAWAY TORQUE RATING OF 300 IN. X LBF. N. ELECTRICAL CONNECTION: 115 V, SINGLE PHASE, 60 HZ. O. ACCESSORIES: AUXILIARY SWITCHES FOR SIGNALING. TEST AND RESET SWITCHES, DUCT MOUNTED.</p> <p>4. COMBINATION FIRE AND SMOKE DAMPERS A. MANUFACTURERS: GREENHECK FAN CORPORATION, POTTORFF, RUSKIN COMPANY, OR APPROVED EQUAL. B. TYPE: DYNAMIC, RATED AND LABELED ACCORDING TO UL 555 AND UL 555S BY AN NRTL. C. CLOSING RATING IN DUCTS UP TO 4-INCH WG STATIC PRESSURE CLASS AND MINIMUM 2000-FPM VELOCITY. D. FIRE RATING: 1-HOURS. E. FRAME: HAT-SHAPED, 0.094-INCH-THICK, GALVANIZED SHEET STEEL, WITH WELDED CORNERS AND MOUNTING FLANGE. F. HEAT-RESPONSIVE DEVICE: RESETTABLE LINK AND SWITCH PACKAGE, FACTORY INSTALLED, RATED. G. SMOKE DETECTOR: INTEGRAL, FACTORY WIRED FOR SINGLE-POINT CONNECTION. H. BLADES: AIR FOIL, ROLL-FORMED, HORIZONTAL, INTERLOCKING THICK, GALVANIZED SHEET STEEL. I. LEAKAGE: CLASS I. RATED PRESSURE AND VELOCITY TO EXCEED DESIGN AIRFLOW CONDITIONS. J. MOUNTING SLEEVE: FACTORY-INSTALLED, 0.05-INCH-THICK, GALVANIZED SHEET STEEL; LENGTH TO SUIT WALL OR FLOOR APPLICATION WITH FACTORY-FURNISHED SILICONE CALKING. K. MANUFACTURED TURNING VANES FOR METAL DUCTS; CURVED BLADES OF GALVANIZED SHEET STEEL; SUPPORT WITH BARS PERPENDICULAR TO BLADES SET; SET INTO VANE RUNNERS SUITABLE FOR DUCT MOUNTING. L. VANE CONSTRUCTION: DOUBLE WALL. M. VANE CONSTRUCTION: SINGLE WALL FOR DUCTS UP TO 36 INCHES WIDE AND DOUBLE WALL FOR LARGER DIMENSIONS.</p> <p>5. REMOTE DAMPER OPERATORS A. MANUFACTURERS: POTTORFF, VENTFABRICS, INC., YOUNG REGULATOR COMPANY, OR APPROVED EQUAL.</p> <p>6. DUCT-MOUNTED ACCESS DOORS A. MANUFACTURERS: GREENHECK FAN CORPORATION, MCGILL AIRFLOW LLC., NAILOR INDUSTRIES INC. OR APPROVED EQUAL. B. FABRICATE ACCESS PANELS ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE", FIGURES 7-2, "DUCT ACCESS DOORS AND PANELS," AND 7-3, "ACCESS DOORS - ROUND DUCT."</p> <p>7. FLEXIBLE DUCT A. MANUFACTURERS: FLEXMASTER U.S.A., INC., JP LAMBORN CO., MCGILL AIRFLOW LLC., THERMAFLEX; A FLEX-TEK GROUP COMPANY, OR APPROVED EQUAL.</p>	<p>SECTION 23 34 23 - HVAC POWER VENTILATORS</p> <p>1. MANUFACTURERS: GREENHECK, TWIN CITY, LOREN COOK COMPANY, OR APPROVED EQUAL. 2. FAN PERFORMANCE SHOULD BE SELECTED IN ACCORDANCE TO THE "CODE INFORMATION" AND LOCATION LISTED ON THE MECHANICAL COVER SHEET.</p> <p>3. SIDEWALL PROPELLER FANS A. HOUSING: GALVANIZED-STEEL SHEET WITH FLANGED EDGES AND INTEGRAL ORIFICE RING, WITH BAKED-ENAMEL FINISH COAT APPLIED AFTER ASSEMBLY. B. FAN WHEEL: REPLACEABLE, CAST-ALUMINUM, AIRFOIL BLADES FASTENED TO CAST-ALUMINUM HUB. C. DRIVE: BELT DRIVE, RESILIENTLY MOUNTED TO HOUSING, STATICALLY AND DYNAMICALLY BALANCED, SELECTED FOR CONTINUOUS OPERATION AT MAXIMUM RATED FAN SPEED AND MOTOR HORSEPOWER, WITH FINAL ALIGNMENT AND BELT ADJUSTMENT MADE AFTER INSTALLATION; EXTEND GREASE FITTING TO ACCESSIBLE LOCATION OUTSIDE OF UNIT; SERVICE FACTOR BASED ON FAN MOTOR SIZE: 1.4; FAN SHAFT: TURNED, GROUND, AND POLISHED STEEL; KEYS TO WHEEL HUB; SHAFT BEARINGS: PERMANENTLY LUBRICATED, PERMANENTLY SEALED, SELF-ALIGNING BALL BEARINGS WITH A RATING LIFE: ABMA 9, L10) OF 100,000 HOURS; PULLEYS: CAST IRON WITH SPLIT, TAPERED BUSHING, DYNAMICALLY BALANCED AT FACTORY; MOTOR-PULLEYS: ADJUSTABLE PITCH FOR USE WITH MOTORS THROUGH 5 HP; FIXED PITCH FOR USE WITH LARGER MOTORS. SELECT PULLEY SO PITCH ADJUSTMENT IS AT THE MIDDLE OF ADJUSTMENT RANGE AT FAN DESIGN CONDITIONS; BELTS: OIL RESISTANT, NONSPARKING, AND NONSTATIC; MATCHED SETS FOR MULTIPLE BELT DRIVES; BELT GUARDS: FABRICATE OF STEEL FOR MOTORS MOUNTED ON OUTSIDE OF FAN CABINET.</p> <p>4. ACCESSORIES: a. DISCONNECT SWITCH: NONFUSIBLE TYPE, WITH THERMAL-OVERLOAD PROTECTION MOUNTED INSIDE FAN HOUSING, FACTORY WIRED THROUGH AN INTERNAL ALUMINUM CONDUIT. b. MOUNTED DAMPERS: PARALLEL-BLADE DAMPERS WITH ELECTRIC ACTUATOR WIRED TO CLOSE WHEN FAN STOPS. c. MOTOR-SIDE BACK GUARD: GALVANIZED STEEL, COMPLYING WITH OSHA SPECIFICATIONS, REMOVABLE FOR MAINTENANCE. d. WALL SLEEVE: GALVANIZED STEEL TO MATCH FAN AND ACCESSORY SIZE.</p> <p>5. MOTORS: COMPLY WITH NEMA DESIGNATION, TEMPERATURE RATING, SERVICE FACTOR, AND EFFICIENCY REQUIREMENTS FOR MOTORS SPECIFIED IN SECTION 230513 "COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT."</p> <p>6. FIELD QUALITY CONTROL: A. INCLUDING TECHNICAL BULLETINS, PRODUCT CATALOG INSTALLATION INSTRUCTIONS. B. EXAMINATION: EXAMINE AREAS TO RECEIVE FANS. NOTIFY THE ENGINEER OF CONDITIONS THAT WOULD ADVERSELY AFFECT INSTALLATION OR SUBSEQUENT UTILIZATION AND MAINTENANCE OF FANS. DO NOT PROCEED WITH INSTALLATION UNTIL UNSATISFACTORY CONDITIONS ARE CORRECTED. C. PREPARATION: ENSURE ROOF OPENINGS ARE SQUARE, ACCURATELY ALIGNED, CORRECTLY LOCATED, AND IN TOLERANCE; ENSURE DUCT IS PLUMB, SIZED CORRECTLY, AND TO PROPER ELEVATION ABOVE ROOF DECK. INSTALL DUCT AS SPECIFIED IN AIR DISTRIBUTION (DIVISION 23). D. INSTALLATION: INSTALL FANS SYSTEM AS INDICATED ON THE INSTALLATION, OPERATION AND MAINTENANCE MANUAL (IOM) AND CONTRACT DRAWINGS; INSTALL FANS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. E. SYSTEM STARTUP: REFER TO INSTALLATION, OPERATION, AND MAINTENANCE MANUAL (IOM). F. CLEANING: CLEAN AS RECOMMENDED BY MANUFACTURER. DO NOT USE MATERIAL OR METHODS WHICH MAY DAMAGE FINISH SURFACE OR SURROUNDING CONSTRUCTION. G. PROTECTION: PROTECT INSTALLED PRODUCT AND FINISHED SURFACES FROM DAMAGE DURING CONSTRUCTION; PROTECT INSTALLED EXHAUST FANS TO ENSURE THAT, EXCEPT FOR NORMAL WEATHERING, FANS WILL BE WITHOUT DAMAGE OR DETERIORATION AT TIME OF SUBSTANTIAL COMPLETION.</p>	<p>SECTION 23 82 19 – WALL MOUNTED MINI SPLIT FAN COIL UNITS</p> <p>1. MANUFACTURERS: TRANE, DAIKIN, SAMSUNG, MITSUBISHI, LG ELECTRONICS, OR APPROVED EQUAL. 2. FAN COIL UNIT COIL WILL BE SINGLE REFRIGERANT CIRCUIT. 3. SURFACE-BURNING CHARACTERISTICS: INSULATION AND ADHESIVE SHALL HAVE A COMBINED MAXIMUM FLAME-SPREAD INDEX OF 25 AND SMOKE-DEVELOPED INDEX OF 50 WHEN TESTED ACCORDING TO ASTM E 84 BY A QUALIFIED TESTING AGENCY. 4. DRAIN PANS: STAINLESS STEEL OR HIGH IMPACT POLYSTYRENE RESIN (HIPS). STAINLESS STEEL PANS AND DRAIN CONNECTIONS TO COMPLY WITH ASHRAE 62.1. DRAIN PANS SHALL BE REMOVABLE. 5. CHASSIS: HEAVY DUTY ACRYLONITRILE BUTADIENE STYRENE (ABS) AND HIGH IMPACT POLYSTYRENE (HIPS). 6. CABINET: HEAVY DUTY ACRYLONITRILE BUTADIENE STYRENE (ABS) AND HIGH IMPACT POLYSTYRENE (HIPS). 7. STEEL RECESSING FLANGES FOR RECESSING FAN COIL UNITS INTO CEILING OR WALL. 8. FILTERS: FACTORY PROVIDED WASHABLE FILTER. 9. INDOOR REFRIGERANT COILS: COPPER TUBE, WITH MECHANICALLY BONDED ALUMINUM FINS BRAZED JOINTS AT FITTINGS. NO MORE THAN 21 FINS PER INCH. COMPLY WITH AHRI 210/240, AND LEAK TEST TO MINIMUM 450 PSIG FOR A MINIMUM 300-PSIG WORKING PRESSURE. 10. FAN AND MOTOR BOARD: REMOVABLE. 11. FANS: DIRECTLY DRIVEN AND MOUNTED ON A COMMON SHAFT, MADE OF HIGH STRENGTH ABS GP-2200 POLYMERIC RESIN OR APPROVED ALTERNATIVE. 12. MOTOR: PERMANENTLY LUBRICATED, MULTISPEED, RESILIENTLY MOUNTED ON MOTOR BOARD, COMPLY WITH REQUIREMENTS IN SECTION 230513 "COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT." 13. WIRING TERMINATION: CONNECT MOTOR TO CHASSIS WIRING WITH PLUG CONNECTION. 14. PROVIDE UNITS THAT ARE FACTORY WIRED WITH NECESSARY ELECTRICAL COMPONENTS, INTEGRAL MICROPROCESSORS, PRINTED CIRCUIT BOARDS, THERMISTORS, SENSORS, TERMINAL BLOCKS, AND LUGS FOR POWER WIRING. 15. PROVIDE MICROPROCESSOR-BASED ALGORITHMS FOR COMPONENT PROTECTION, SOFT-START CAPABILITY, REFRIGERATION SYSTEM PRESSURE, TEMPERATURE, DEFROST, AND AMBIENT CONTROL. 16. PROVIDE A MATCHED WIRED TEMPERATURE SENSOR WITH SIMPLE OPERATOR INTERFACE TO CONTROL UNIT MODE, COOLING AND HEATING SETPOINTS, 7 DAY SCHEDULING, AND FAN SPEED. 17. PROVIDE EXTERNAL CONDENSATE PUMP.</p> <p>SECTION 23 82 20 – MINI SPLIT CONDENSING UNITS</p> <p>1. MANUFACTURERS: TRANE, DAIKIN, SAMSUNG, MITSUBISHI, LG ELECTRONICS, OR APPROVED EQUAL. 2. CASE: OUTDOOR UNIT CASE TO BE CONSTRUCTED FORM 22-GAUGE COATED METAL. EXTERIOR PANELS ARE TO HAVE A WEATHER-RESISTANT BAKED ENAMEL FINISH. OUTDOOR UNIT COIL IS TO BE PROTECTED WITH A HEAVY GAUGE STEEL WIRE GUARD FINISHED WITH BAKE ENAMEL. 3. COILS: OUTDOOR UNIT COILS TO BE MANUFACTURED USING COPPER TUBS WITH MECHANICALLY BONDED ALUMINUM LOUVERED FINS. COILS TO BE PRESSURE TESTED AT A MINIMUM OF 551 PSI. FACTORY APPLIED CORROSION RESISTANT GOLDFIN MATERIAL WITH HYDROPHILIC COATING. 4. FANS: FAN BLADES TO BE MADE OF DURABLE ACRYLONITRILE BUTADIENE STYRENE (ABS) POLYMERIC RESIN OR APPROVED ALTERNATIVE. OUTDOOR FAN TO BE VARIABLE SPEED PROPELLER TYPE. THE BRUSHLESS DIGITALLY CONTROLLED FAN MOTOR SHALL HAVE INHERENT PROTECTION, PERMANENTLY LUBRICATED BEARINGS, AND VARIABLE SPEED. 5. REFRIGERATION SYSTEM: THE REFRIGERATION SYSTEM CONSISTS OF A SINGLE REFRIGERANT CIRCUIT AND USES R410A REFRIGERANT. THE OUTDOOR UNIT SHALL BE PROVIDED WITH FACTORY INSTALLED COMPONENTS INCLUDING A REFRIGERANT STRAINER, FOUR-WAY REVERSING VALVE, ELECTRONIC CONTROLLED EXPANSION VALVE (EEV), HIGH AND LOW SIDE CHARGING PORTS, SERVICE VALVES, AND INTERCONNECTING PIPING. 6. COMPRESSOR: UNIT SHALL BE EQUIPPED WITH A HERMETIC, DIGITALLY-CONTROLLED INVERTER COMPRESSOR. MODULATION RANGE SHALL BE BETWEEN 10 Hz TO 84 Hz FOR 3/4-TON UNIT, BETWEEN 10 Hz TO 92 Hz FOR 1-TON UNIT, BETWEEN 10 Hz TO 93 Hz FOR 1.5-TON UNIT, AND BETWEEN 10Hz TO 100 Hz FOR 2.5, AND 3 TON UNITS. EXTERNAL SUCTION AND DISCHARGE TEMPERATURE AND PRESSURE SENSORS TO BE PROVIDED TO PROTECT COMPRESSOR FROM DAMAGE CAUSED BY OVER/ UNDER TEMPERATURE OR OVER/ UNDER PRESSURE CONDITIONS. COMPRESSOR SHALL BE PROVIDED WITH A CENTRIFUGAL OIL SEPARATOR AND CONTROLS TO ENSURE SUFFICIENT OIL SUPPLY IS MAINTAINED. 7. WARRANTY: PROVIDE A 2 YEAR LIMITED PARTS WARRANTY ON THE COMPLETE UNIT AND 5-YEAR PARTS WARRANTY ON THE COMPRESSOR.</p>	<p>SECTION 23 82 19 – INDOOR DX AIR HANDLING UNIT/ FAN COIL UNITS</p> <p>1. MANUFACTURERS: TEMPMASTER, TRANE, DAIKIN, CARRIER LENNOX, OR APPROVED EQUAL. 2. SURFACE-BURNING CHARACTERISTICS: INSULATION AND ADHESIVE SHALL HAVE A COMBINED MAXIMUM FLAME-SPREAD INDEX OF 25 AND SMOKE-DEVELOPED INDEX OF 50 WHEN TESTED ACCORDING TO ASTM E 84 BY A QUALIFIED TESTING AGENCY. 3. DRAIN PANS: GALVANIZED STEEL OR POLYMER RESIN. PANS AND DRAIN CONNECTIONS TO COMPLY WITH ASHRAE 62.1. DRAIN PANS SHALL BE REMOVABLE. 4. CABINET: 18 GAUGE, ZINC COATED STEEL, FIBERGLASS INSULATED, FINISHED WITH A POWDER PAINT PROCESS CAPABLE OF WITHSTANDING A MINIMUM 750 SALT SPRAY HOURS ACCORDING TO ASTM B117. 5. FILTERS: PROVIDE FACTORY INSTALLED 2" FILTER RACK WITH SCHEDULED FILTERS. 6. INDOOR REFRIGERANT COILS: COPPER TUBE, WITH MECHANICALLY BONDED ALUMINUM FINS BRAZED JOINTS AT FITTINGS. COMPLY WITH AHRI 210/240, AND LEAK TEST TO MINIMUM 450 PSIG FOR A MINIMUM 300-PSIG WORKING PRESSURE. PROVIDE FACTORY MOUNTED DISTRIBUTORS, EXPANSION VALVES, AND SOLENOID VALVES. 7. FAN AND MOTOR BOARD: REMOVABLE. 8. FANS: PROVIDE A BELT DRIVE FAN WITH ADJUSTABLE PITCH MOTOR PULLEY. FAN WHEEL SHALL BE DOUBLE-INLET TYPE WITH FORWARD CURVED BLADES, DYNAMICALLY BALANCED TO OPERATE SMOOTHLY THROUGHOUT THE ENTIRE RANGE OF OPERATION. BEARINGS SHALL BE PERMANENTLY SEALED AND PERMANENTLY LUBRICATED. 9. SCHEDULE: REFER TO MECHANICAL SCHEDULE NOTES FOR ADDITIONAL UNIT OPTION REQUIREMENTS. IF ANY NOTES CONFLICT WITH THE SPECIFICATION ABOVE, THE SCHEDULE NOTES SHALL SUPERSEDE THE SPECIFICATION.</p> <p>SECTION 23 82 20 – OUTDOOR DX CONDENSING UNITS</p> <p>1. MANUFACTURERS: TEMPMASTER, TRANE, DAIKIN, CARRIER OR APPROVED EQUAL. 2. CASE: OUTDOOR UNIT CASE TO BE CONSTRUCTED FROM ZINC-COATED GALVANIZED STEEL. EXTERIOR SURFACES SHALL BE BONDED AND COATED WITH BAKED ENAMEL FINISH BY A POWDER PAINT PROCESS CAPABLE OF WITHSTANDING A MINIMUM 1000 HOUR SALT SPRAY TEST. UNIT TO HAVE PERMANENTLY ATTACHED HEAVY-GAUGE PERIMETER BASE RAILS WITH FORKULT SLOTS AND LIFTING HOLES. 3. COILS: OUTDOOR UNIT COILS TO BE MANUFACTURED USING ALL ALUMINUM MICRO-CHANNEL FINS AND TUBING. 4. FANS: PROVIDE DIRECT DRIVEN PROPELLER-TYPE FANS. FANS SHALL BE ALUMINUM CONSTRUCTION BLADES RIVETED TO CORROSION RESISTANT STEEL SPIDER BRACKETS. PROVIDE PVC COATED STEEL WIRE SAFETY GUARDS. FAN MOTORS TO BE TEAO WITH PERMANENTLY LUBRICATED BEARINGS. 5. REFRIGERATION SYSTEM: PROVIDE A FULL REFRIGERATION SYSTEM UTILIZING R-410A REFRIGERANT. PROVIDE SOLID CORE FILTER-DRIERS FOR FIELD INSTALLATION, LIQUID AND SUCTION LINE SERVICE VALVES WITH GAUGE PORTS, AND LIQUID LINE MAGNETIC CHECK VALVES. 6. COMPRESSOR: UNIT SHALL BE EQUIPPED WITH HERMETIC SCROLL TYPE COMPRESSORS THAT ARE INTERNALLY PROTECTED WITH HIGH PRESSURE RELIEF AND OVER TEMPERATURE PROTECTION. PROVIDE COMPRESSORS THAT ARE SUCTION GAS COOLED. MOUNT COMPRESSORS ON NEOPRENE ISOLATORS DESIGNED TO MINIMIZE SOUND TRANSMISSION AND VIBRATION. PROVIDE BELLY-BAND CRANKCASE HEATERS. 7. CONTROLS: PROVIDE A 24-VOLT CONTROL CIRCUIT POWERED BY A 24 VOLT TRANSFORMER AND PROTECTED BY A RESETTABLE BREAKER. PROVIDE FIELD INSTALLED THERMOSTAT. PROVIDE LOW VOLTAGE TERMINAL STRIP FOR SERVICE LOCK-UP. PROVIDE COMPRESSOR MOTOR PROTECTION TO SHUT DOWN UNIT FOR MOTOR OVER-CURRENT, OVER-TEMPERATURE, OR LOW VOLTAGE CONDITIONS. PROVIDE SAFETY LOCKOUTS, A LOSS OF CHARGE/LOW PRESSURE SWITCH, A HIGH PRESSURE SWITCH, AND A CONTROL BOARD WITH DIAGNOSTICS AND FAULT MESSAGE DISPLAY. 8. WARRANTY: PROVIDE A 2 YEAR LIMITED PARTS WARRANTY ON THE COMPLETE UNIT AND 5-YEAR PARTS WARRANTY ON THE COMPRESSOR. 9. SCHEDULE: REFER TO MECHANICAL SCHEDULE NOTES FOR ADDITIONAL UNIT OPTION REQUIREMENTS. IF ANY NOTES CONFLICT WITH THE SPECIFICATION ABOVE, THE SCHEDULE NOTES SHALL SUPERSEDE THE SPECIFICATION.</p> <p>SECTION 23 23 00 – REFRIGERANT PIPING</p> <p>1. SIZE PER A/C UNIT MANUFACTURER'S RECOMMENDATION, INCLUDING REQUIREMENT FOR LONG LINE APPLICATIONS. PROVIDE SOLENOID VALVES, TRAPS AND/OR ACCUMULATOR WHEN RECOMMENDED BY CONDENSING UNIT VENDOR, SUCH AS FOR UNDERGROUND LINES. USE FACTORY SEALED LINE SETS, UNLESS SIZE OR DISTANCE EXCEEDS FACTORY SET AVAILABILITY. ROUTE HIDDEN FROM VIEW. INSULATE SUCTION LINE IN INDOOR APPLICATIONS AND BOTH REFRIGERANT LIQUID AND SUCTION FOR OUTDOOR APPLICATIONS. 2. WALL PENETRATIONS TO BE PROVIDED AND INSTALLED WITH COMPRESSION GASKET AND SEAL, CONSISTING OF A WALL FASTENING COMPRESSION MOUNTING METHOD AND TO MUST BE SUPPLIED AND FASTENED WITH CO-ES LISTED NON-CORROSIVE SCREWS WITH PRE-LOADED NEOPRENE WASHERS. WALL OUTLET MUST PROVIDE AN INTEGRATED OVER-MOLDED FLEXIBLE ELASTOMERIC SLEEVE FOR SEALING, ISOLATING, AND SUPPORTING REFRIGERANT PIPES FOR VIBRATION. THE WALL OUTLET MUST ALSO PROVIDE EXPANSION AND CONTRACTION WALL PROTECTION FEATURES WITH GASKETS AND SEALS AS PER ENERGY CODE REQUIREMENTS. A STAINLESS STEEL CLAMP MUST BE SUPPLIED TO ALLOW A MECHANICAL CONNECTION AS INTENDED PER THE ENERGY CODES. ALLOWING OFF/ ON REMOVABLE/ REUSABLE MAINTENANCE CAPABILITIES, AND SIZED TO CONTACT AND FIT WITH THE PIPE INSULATION PROTECTIVE COVER. WALL OUTLET INSTALLED MUST ENSURE THAT THE INSULATION PROTECTOR AND THE WALL SEAL ARE BOTH SECURELY AND MECHANICALLY FASTENED TOGETHER WITHOUT THE USE OF ADHESIVES OR ADHESIVES TAPES AS PER ENERGY CODE REQUIREMENTS. WALL OUTLET SHALL BE TESTED AND MEET THE FOLLOWING TESTING: ASTM E 331, ASTM E 283, AND ASTM E 2178. SEAL WALL PENETRATIONS WATER TIGHT. 3. PROVIDE A FLEXIBLE PVC PLASTIC UV/WEATHER PROTECTIVE COVER FOR EXTERIOR PIPING INSULATION SIMILAR TO AIREX PRO-SYSTEM KIT. THE PIPE INSULATION UV/PROTECTIVE COVER SHALL FEATURE AN OUTDOOR INDUSTRIAL GRADE COMBINED METHOD WITH MOLECULAR BONDING THAT FEATURES AN INTEGRAL PRE-FASTENING SYSTEM THAT ALLOWS REMOVABLE/ REUSABLE USE FOR MAINTENANCE AND FULL-ENCLOSURE INCLUDING CUT TO LENGTH CAPABILITIES WITHOUT THE USE OF ADHESIVES AS AN ATTACHMENT. ALL PIPE INSULATION MATERIAL MUST BE COMPLETELY COVERED AND PROTECTED. THE USE OF ANY ADHESIVES IS NOT PERMITTED FOR THIS APPLICATION. INSULATION PROTECTIVE COVER SHALL BE TESTED AND MEET ASTM E 96, ASTM G 153, ASTM D 412, ASTM 570, ASTM E 84, AND ASTM G 21, AND SHALL MEET CLASS II VAPOR RETARDER PER ASTM E 96 - 1 PERM OR LESS. WRAPPING TAPE OR ADHESIVE TAPE IS NOT PERMITTED AS PER ENERGY CODES.</p> <p>SECTION 23 07 19 – HVAC PIPING INSULATION</p> <p>1. PIPE INSULATIONS, MASTICS AND JACKETS LOCATED IN ENVIRONMENTAL AIR PLENUMS SHALL HAVE MAXIMUM FLAME SPREAD INDEX OF 25 AND MAXIMUM SMOKE DEVELOPED INDEX OF NOT EXCEEDING 50 IN ACCORDANCE WITH ASTM E84. 2. FLEXIBLE ELASTOMERIC INSULATION: A. CLOSED-CELL, SPONGE- OR EXPANDED-RUBBER MATERIALS. COMPLY WITH ASTM C 534, TYPE I FOR TUBULAR MATERIALS. B. MANUFACTURERS: AIREX MANUFACTURING, ARMACELL LLC, K-FLEX USA, OR APPROVED EQUAL. 3. PRIMARY CONDENSATE DRAINS: A. INSIDE BUILDINGS- 3/4" ELASTOMERIC INSULATION FOR ENTIRE LENGTH. NO INSULATION REQUIRED OUTDOORS. INSULATION OF SECONDARY (OVERFLOW) CONDENSATE DRAINS NOT REQUIRED. 4. REFRIGERANT SUCTION PIPING: A. 1" ELASTOMERIC INSULATION. PAINT OUTDOOR PORTIONS WITH MANUFACTURER'S RECOMMENDED WATER RETARDANT ULTRAVIOLET SOLAR RADIATION PROTECTIVE COATING.</p>
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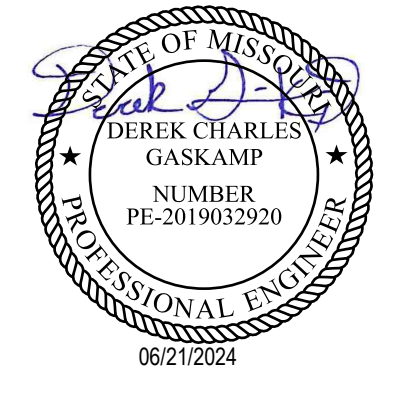


Date Issued: 02/23/24 Issue for Construction

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HUCK FINN SOLAR OPERATIONS & MAINTENANCE BUILDING

Project Address: (39.322039, -91.541742) Vandellia, MO



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Sheet Content: MECHANICAL SPECIFICATIONS

SCALE: 1/8" = 1'-0"

Drawn By: WT
Checked By: NB
Plot Date: 01/29/2024
Project Number: H23233

Sheet: M0.05

GENERAL NOTES

A	SHALL VERIFY THERMOSTATS SERVE THEIR RESPECTIVE ZONES.
C	SHALL REPORT ANY DISCREPANCIES, OMISSIONS, OR INCONSISTENCIES ON THE DRAWINGS TO THE ENGINEER FOR VERIFICATION BEFORE STARTING CONSTRUCTION.

KEYNOTES

KEYNOTE	DESCRIPTION
1	WALL MOUNTED EXTERIOR LOUVER SHALL BE LOCATED IN APPROXIMATE LOCATION SHOWN. COORDINATE EXACT MOUNTING HEIGHT AND LOCATION WITH ARCHITECT. RE: SCHEDULE AND DETAILS. EXHAUST LOUVER SHALL BE 10'-0" AWAY FROM ANY OUTDOOR AIR INTAKES.
4	NEW PROGRAMMABLE THERMOSTAT TO BE LOCATED IN APPROXIMATE LOCATION SHOWN. THERMOSTAT TO CONTROL INDICATED UNIT.
5	NEW CEILING MOUNTED EXHAUST FAN SHALL BE LOCATED IN APPROXIMATE LOCATION SHOWN. ROUTE EXHAUST DUCT TO EXTERIOR OF BUILDING. PROVIDE WALL LOUVER AT PENETRATION. SEE SCHEDULES. MAINTAIN MINIMUM 10'-0" SEPARATION BETWEEN OUTSIDE AIR INTAKE AND EXHAUST OUTLET.
6	NEW FAN COIL UNIT LOCATED ABOVE CEILING. MAINTAIN ALL MANUFACTURER'S RECOMMENDED CLEARANCES. ROUTE 3/4" CONDENSATE TO FUNNEL DRAIN AS SHOWN. ROUTE REFRIGERANT LINES TO ASSOCIATED HEAT PUMP LOCATED ON GRADE. MANUFACTURER TO SIZE REFRIGERANT PIPING BASED ON FINAL EQUIPMENT PLACEMENT. PROVIDE REQUIRED MANUAL BALANCING DAMPERS TO BALANCE RETURN/OUTDOOR AIR. SIZE DAMPERS AS INDICATED. PROVIDE 1/2" BIRD SCREEN ON RETURN AIR OPENING. SEE SCHEDULE.
7	NEW WALL MOUNTED MINI SPLIT SYSTEM. MAINTAIN ALL MANUFACTURER'S RECOMMENDED CLEARANCES. ROUTE 3/4" CONDENSATE TO FUNNEL DRAIN AS SHOWN. ROUTE REFRIGERANT LINES TO ASSOCIATED CONDENSING UNIT LOCATED ON GRADE. MANUFACTURER TO SIZE REFRIGERANT PIPING BASED ON FINAL EQUIPMENT PLACEMENT. SEE SCHEDULE.
8	NEW CONDENSING UNIT TO BE IN APPROXIMATE LOCATION SHOWN. UNIT TO BE PLACED ON SIDEWALK CONCRETE. ROUTE REFRIGERANT PIPING TO ASSOCIATED FAN COIL UNIT PER MANUFACTURER REQUIREMENTS. RE: SCHEDULES AND DETAILS.
9	NEW HEAT PUMP TO BE IN APPROXIMATE LOCATION SHOWN. UNIT TO BE PLACED ON SIDEWALK CONCRETE. ROUTE REFRIGERANT PIPING TO ASSOCIATED FAN COIL UNIT PER MANUFACTURER REQUIREMENTS. RE: SCHEDULES AND DETAILS.
10	PROVIDE NEW CEILING MOUNTED EXHAUST FAN IN IT ROOM. FAN TO DISCHARGE INTO THE PLENUM. FAN TO BE CONTROLLED BY ASSOCIATED THERMOSTAT. FAN SHALL ENERGIZE WHEN ROOM TEMP EXCEEDS 70 DEGREES. SEE SCHEDULES AND DETAILS.
11	PROVIDE NEW RETURN AIR JUMPER DUCT, AS SHOWN. SIZE AS INDICATED.
12	PROVIDE 1-HOUR FIRE/SMOKE DAMPER AT THE WALL PENETRATION. COORDINATE PER MANUFACTURER'S ELECTRICAL REQUIREMENTS. SIZE AS INDICATED.
13	SET EMERGENCY VENTILATION FAN THERMOSTATIC TO +2 DEGF HIGHER (ADJ.) THAN THE PRIMARY FCU-2 THERMOSTAT.



Date Issued:
02/23/24
06/26/24

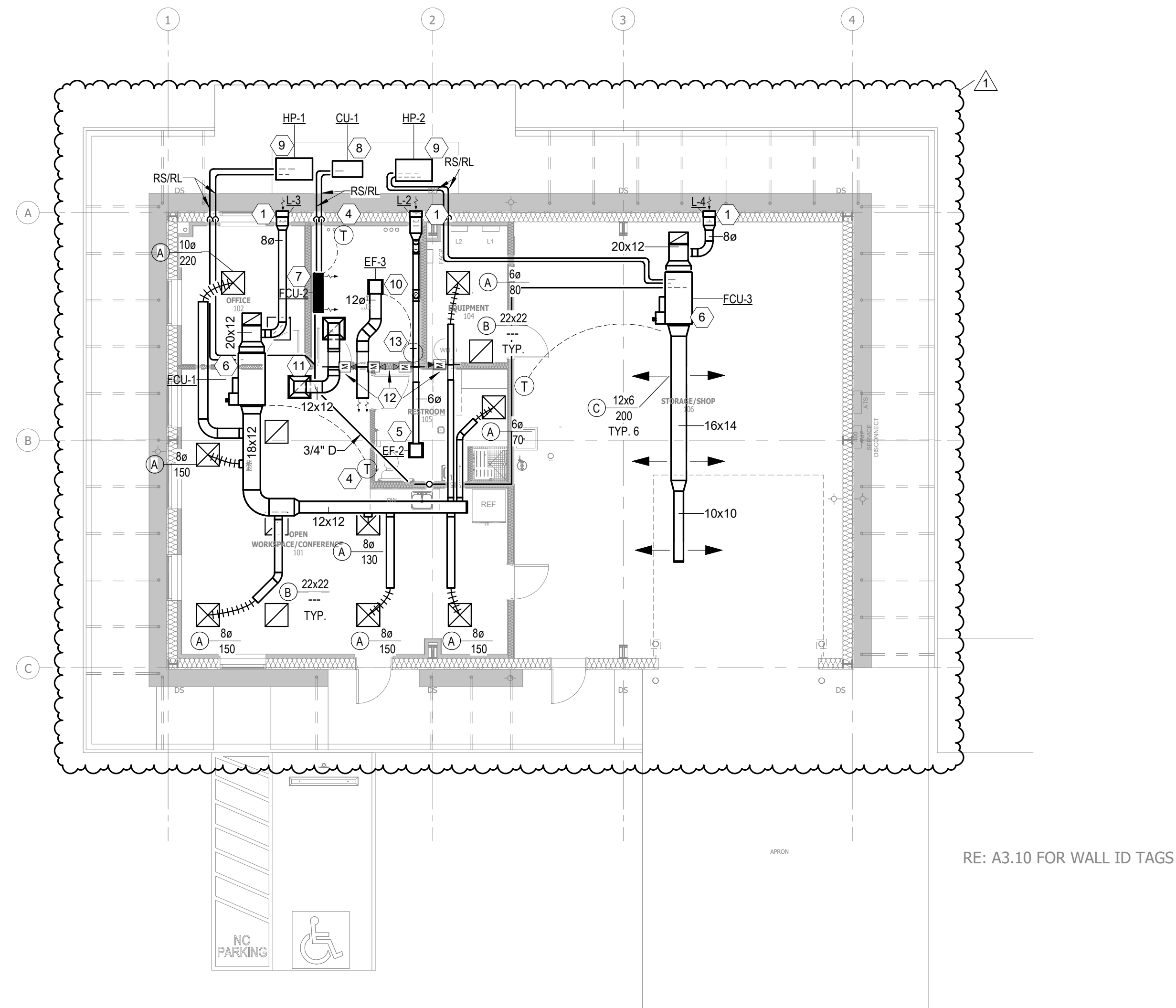
Issue for Construction
IFC Set Addendum 02



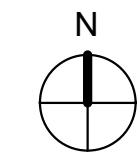
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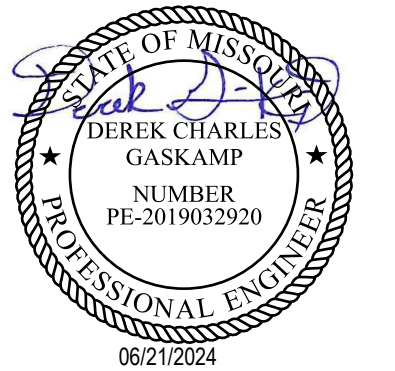
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(39.322039, -91.541742) Vandalia, MO



1 MECHANICAL PLAN
1/8" = 1'-0"



BUILDING ORIENTATION UPDATED.



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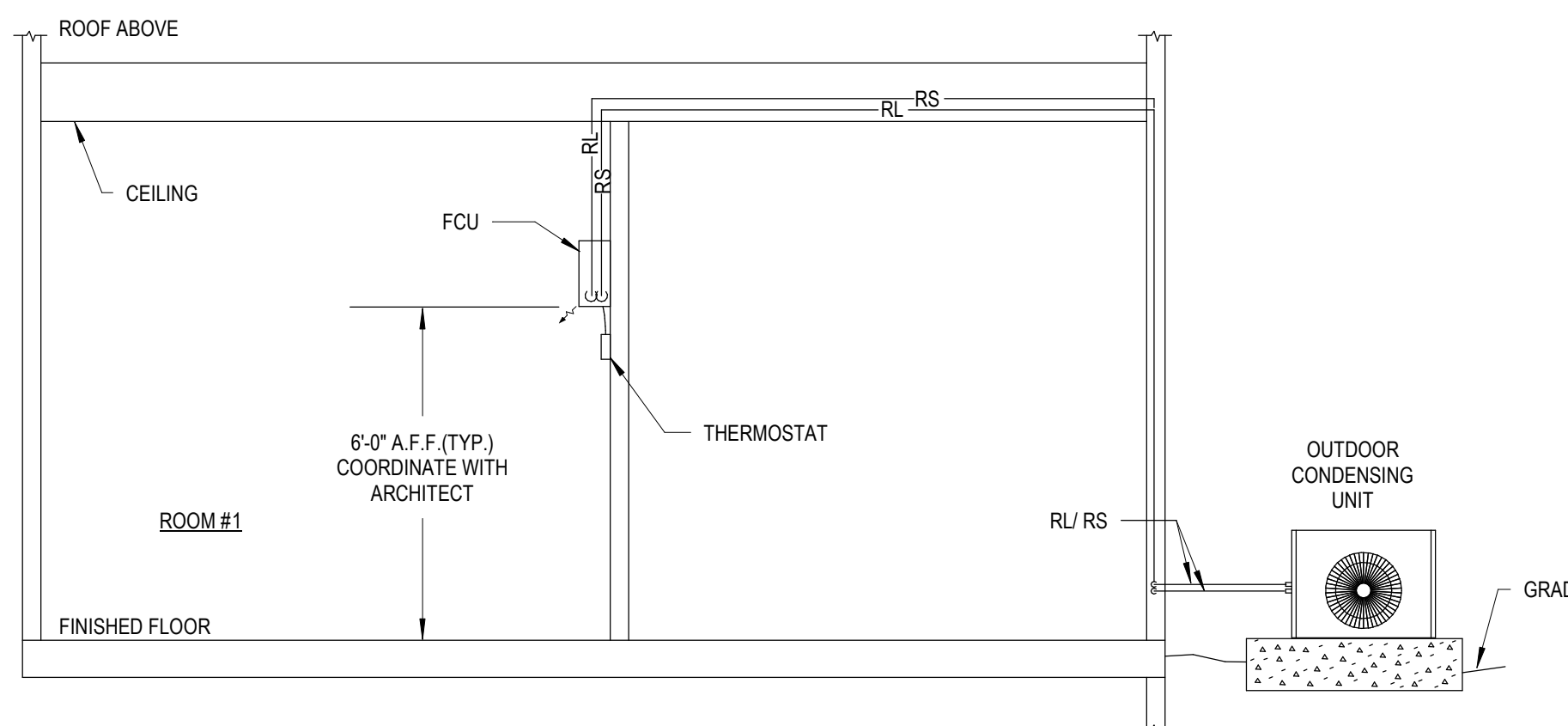
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MECHANICAL PLAN

SCALE: 1/8" = 1'-0"

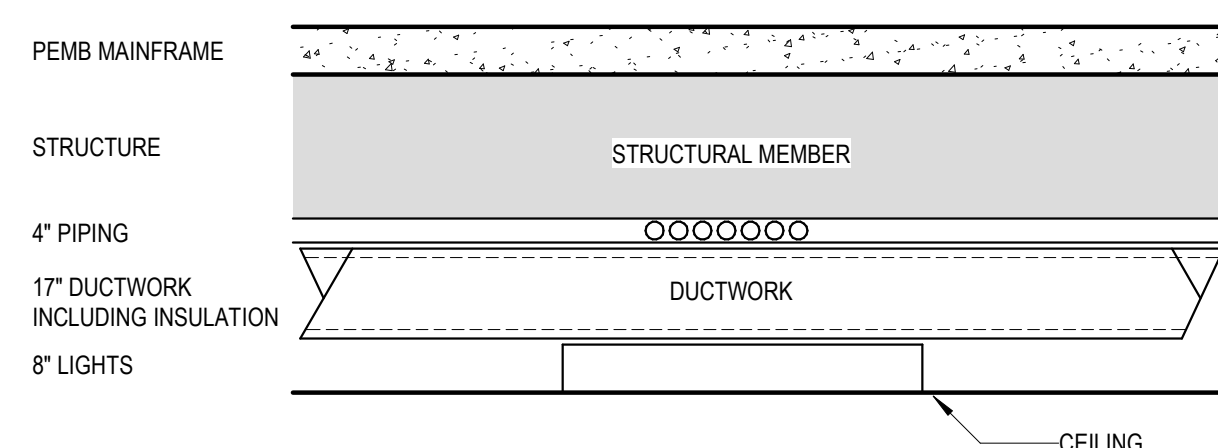
Drawn By: WT
Checked By: NB
Plot Date: 01/29/2024
Project Number: H23233

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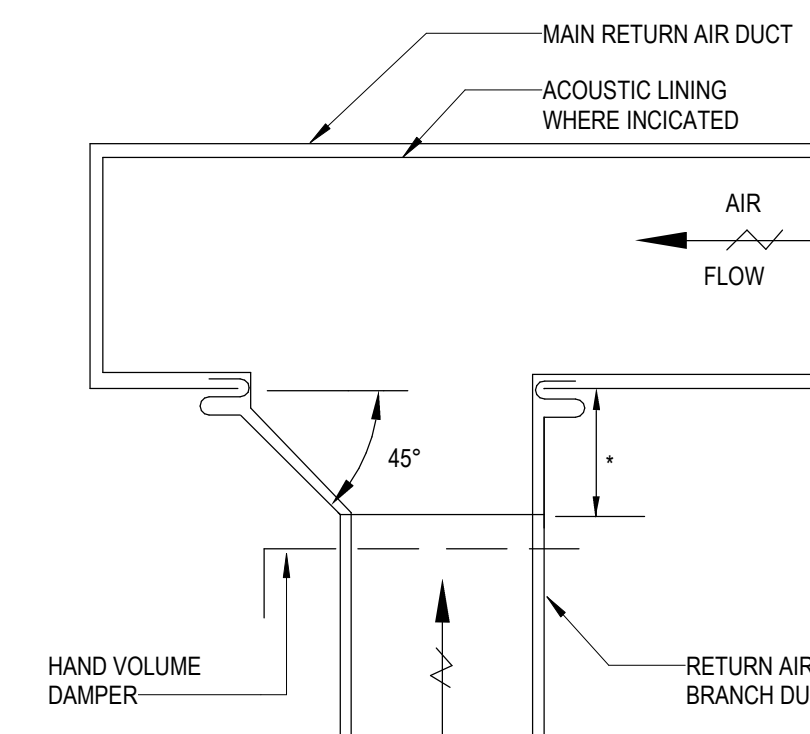
M2.01



6 DUCTLESS SPLIT SYSTEM (GRADE MOUNTED) DETAIL
NOT TO SCALE

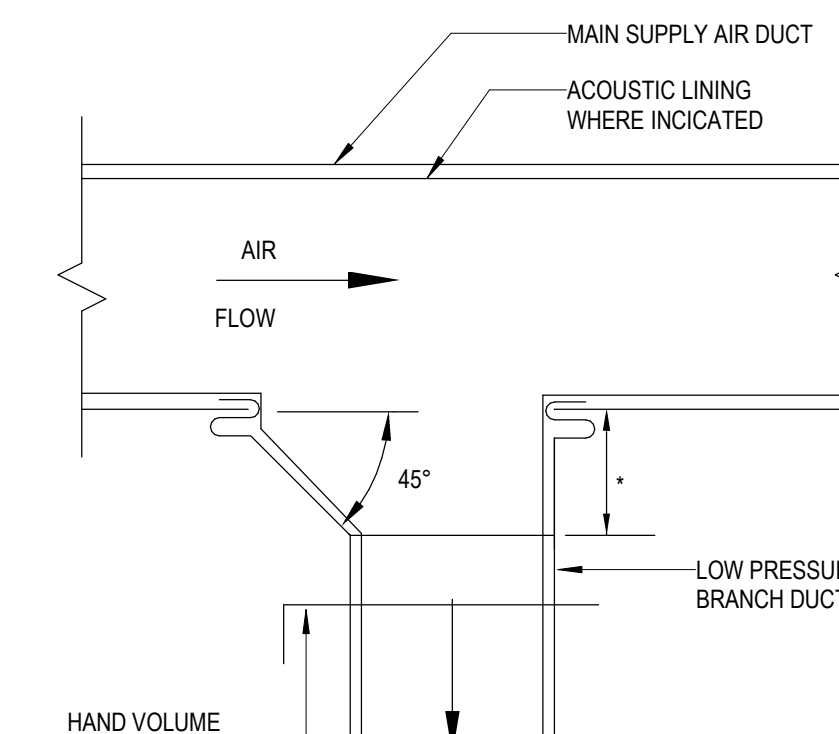


5 TYPICAL PLENUM ARRANGEMENT DETAIL
NOT TO SCALE



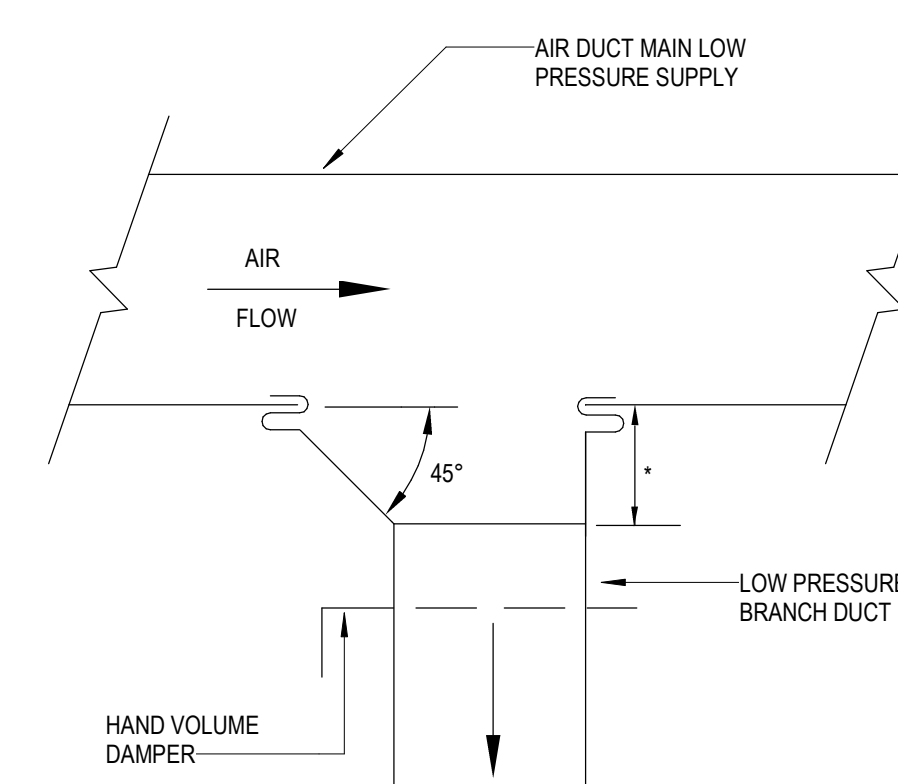
*EQUALS WIDTH OF BRANCH DUCT UP TO 12\"/>

TYPICAL RETURN/EXHAUST AIR BRANCH TAKE-OFF



*EQUALS WIDTH OF BRANCH DUCT UP TO 12\"/>

TYPICAL SUPPLY AIR BRANCH TAKE-OFF

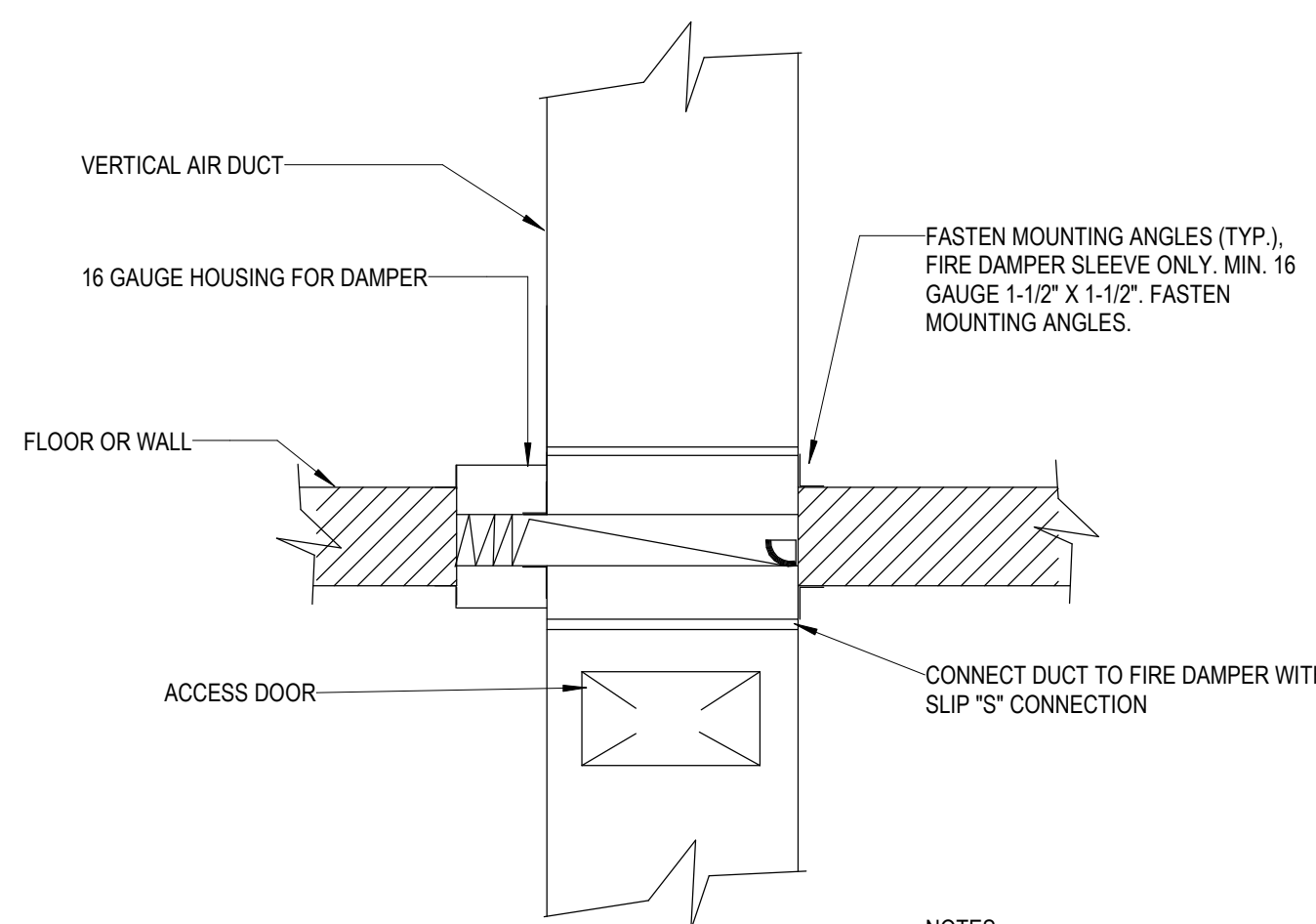


*EQUALS WIDTH OF BRANCH DUCT UP TO 12\"/>

NOTES:

1. PROVIDE BALANCING DAMPER AT BRANCH TAKEOFF.
2. SEAL FLEX DUCT TO METAL COLLAR WITH DUCT TAPE (NASHUA 398 OR APPROVED EQUAL), INSTALL TIE-WRAP (ULINE JUMBO NATURAL NYLON CABLE TIES) OVER DUCT TAPE. INSTALL DUCT INSULATION OVER METAL COLLAR AND SECURE WITH TIE-WRAP.

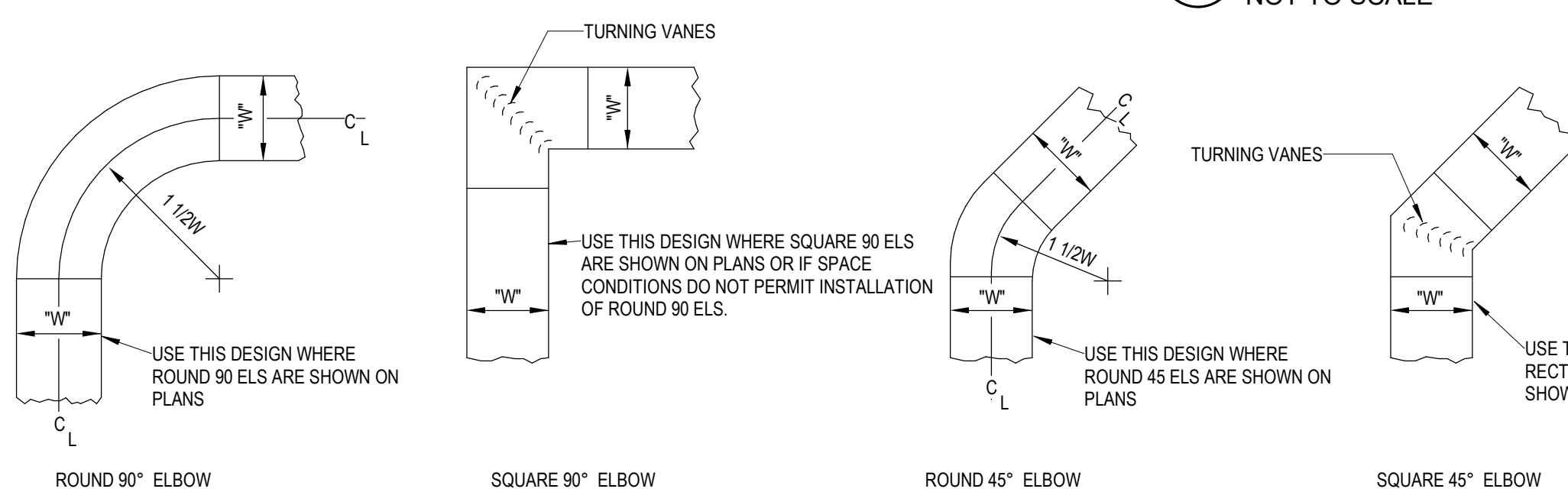
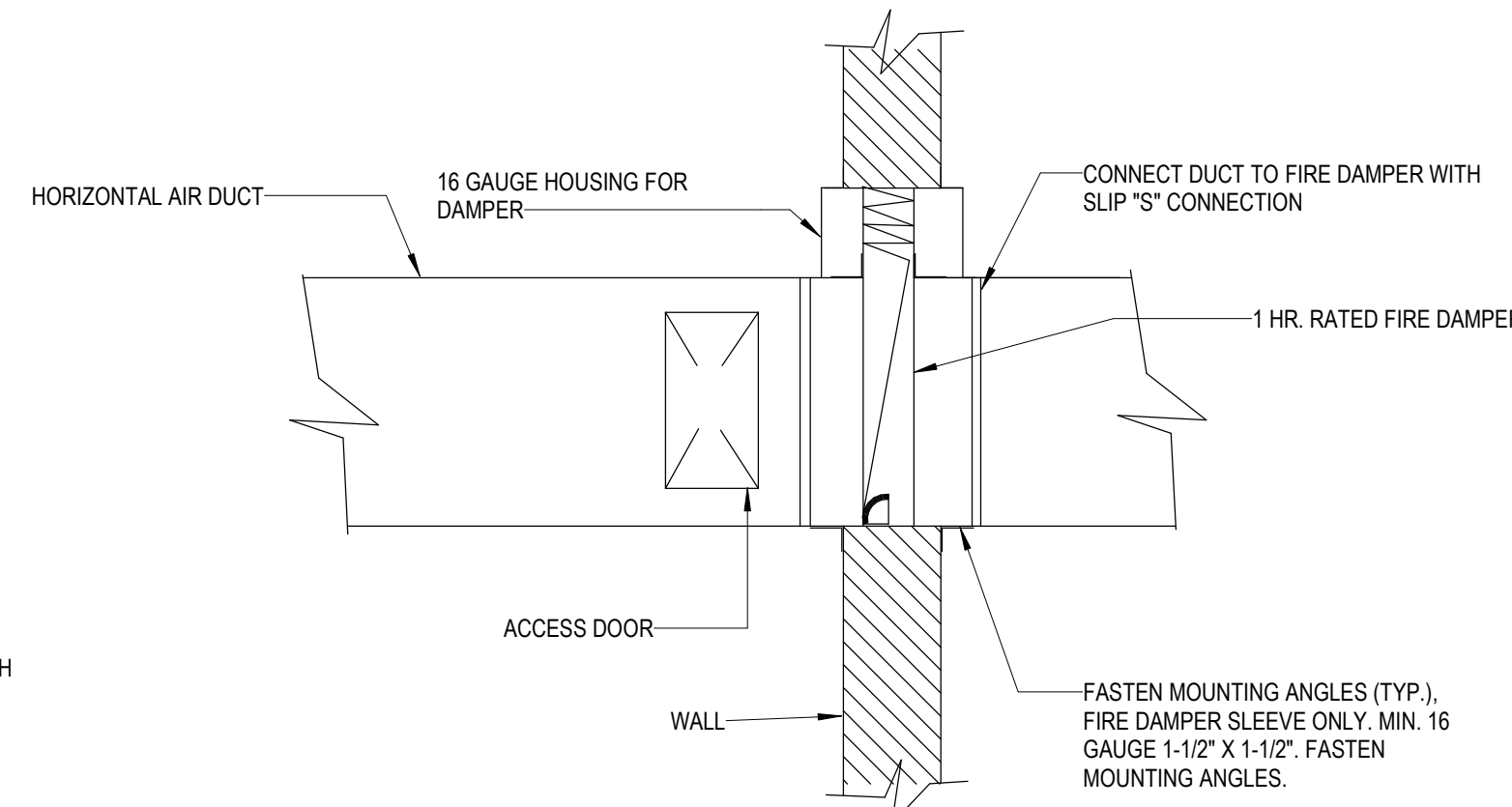
2 TYPICAL LOW PRESSURE BRANCH DUCT TAKE-OFF DETAIL
NOT TO SCALE



NOTES:

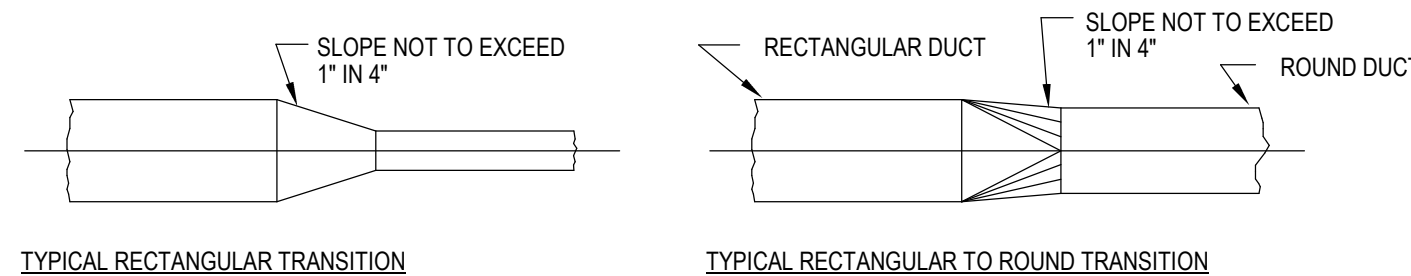
1. DAMPER ASSEMBLY INSTALLED IN AND FASTENED TO THE SLEEVE.
2. MAINTAIN FULL DUCT SIZE. DAMPER HOUSING SHALL NOT OBSTRUCT AIRFLOW, (TYPE 'B').

4 FIRE DAMPER INSTALLATION DETAIL
NOT TO SCALE



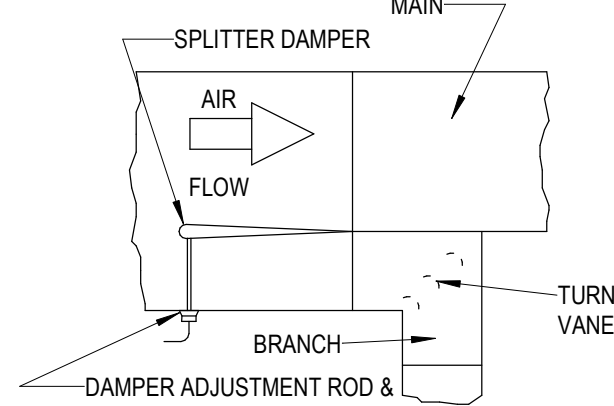
CONSTRUCTION OF 90° ELBOWS

CONSTRUCTION OF 45° ELBOWS

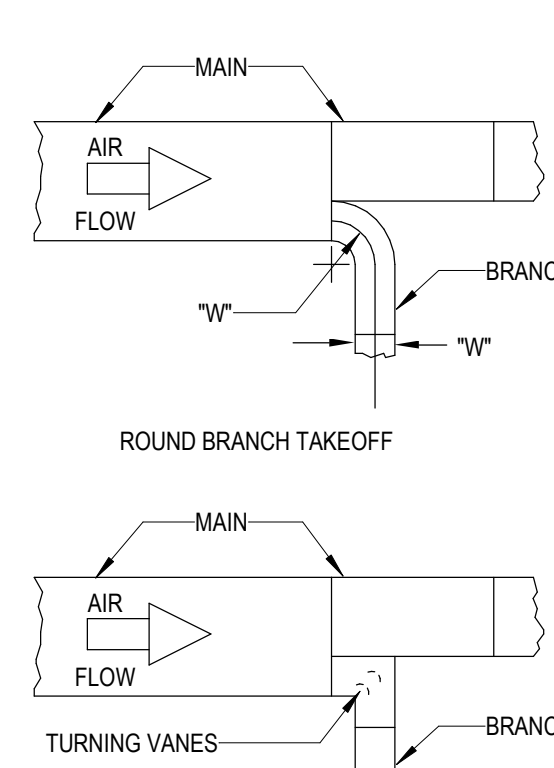


TYPICAL RECTANGULAR TRANSITION

TYPICAL RECTANGULAR TO ROUND TRANSITION



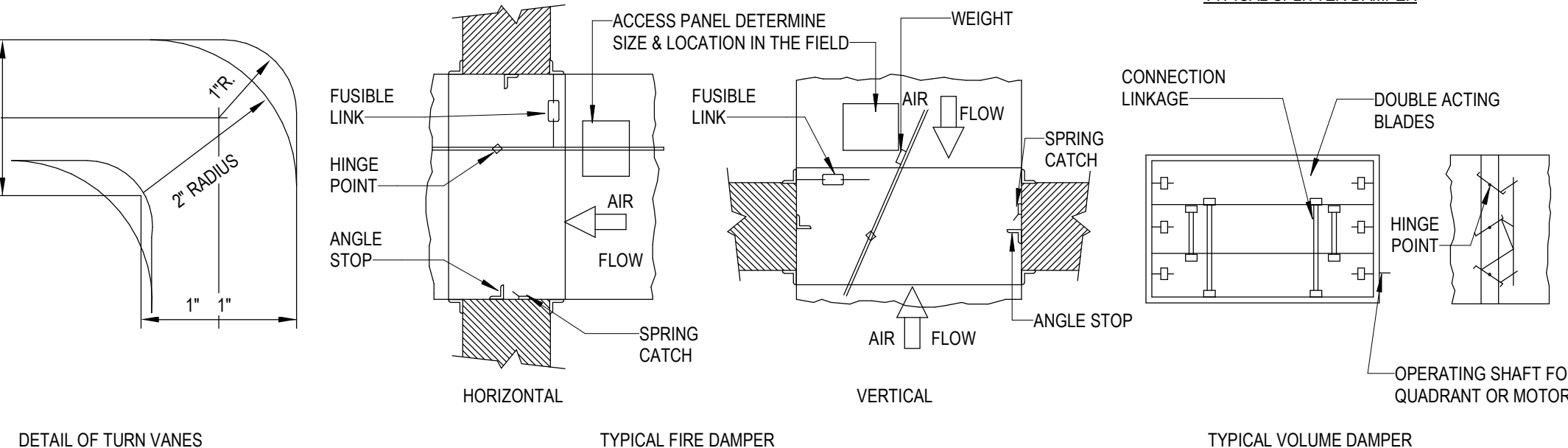
TYPICAL SPLITTER DAMPER



CONSTRUCTION OF BRANCH TAKEOFFS FROM MAIN

INSTALLATION NOTES:

1. ALL DUCTS SHALL BE CONSTRUCTED AND ERECTED IN A NEAT AND WORKMANLIKE MANNER.
2. DUCTS SHALL BE CONSTRUCTED OF THE WEIGHTS, GAGES AND MATERIAL SHOWN IN THE SCHEDULE ON THESE DRAWINGS.
3. THE DIMENSION SHOWN FOR ALL DUCTS SHOWN IN PLAN GIVE THE WIDTH FIRST AND THEN THE HEIGHT.
4. DUCT RISERS SHOULD BE SUPPORTED BY ANGLES AT EVERY FLOOR.
5. AIR TURNING VANES SHALL BE INSTALLED IN ALL ABRUPT ELBOWS TO PREVENT TURBULENCE.
6. DUCTS SHALL BE SECURELY ATTACHED TO THE BUILDING CONSTRUCTION IN AN APPROVED MANNER.
7. DIVERGING TRANSITION PIECES SHALL BE MADE AS GRADUAL AS POSSIBLE.
8. INSTALL FIRE DAMPERS IN ACCORDANCE WITH UL 555.
9. ACCESS PANELS SHOULD BE PLACED BEFORE AND/OR AFTER EQUIPMENT INSTALLED IN THE DUCT.
10. DUCT AREA SHOULD NOT BE DECREASED MORE THAN 10% WHEN OBSTRUCTIONS CANNOT BE AVOIDED, AND THEN A STREAMLINED FITTING SHOULD BE USED.
11. JOINTS AND SEAMS OF SUPPLY DUCTS SHALL BE FASTENED SECURELY AND MADE AIR TIGHT.

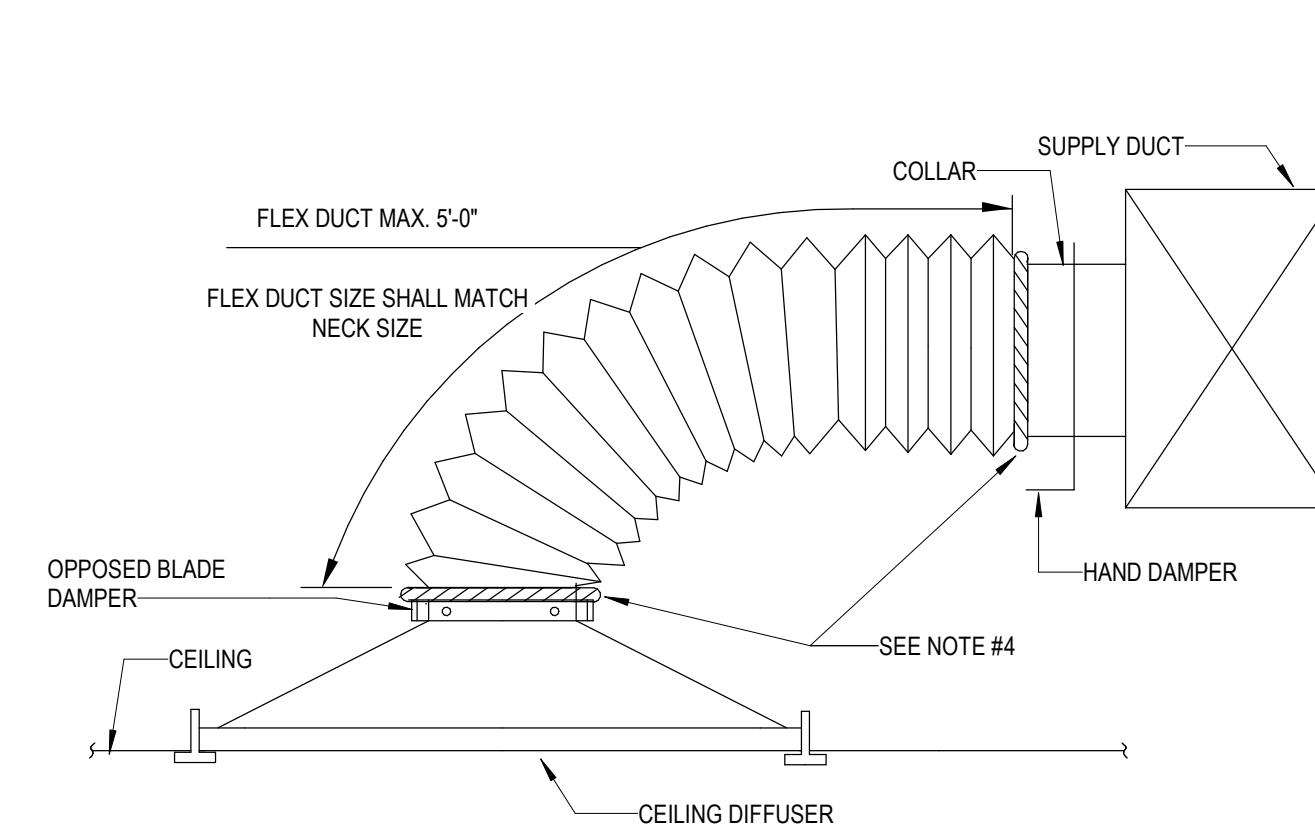


DETAIL OF TURN VANES

TYPICAL FIRE DAMPER

TYPICAL VOLUME DAMPER

3 LOW VELOCITY DUCT DETAIL
NOT TO SCALE

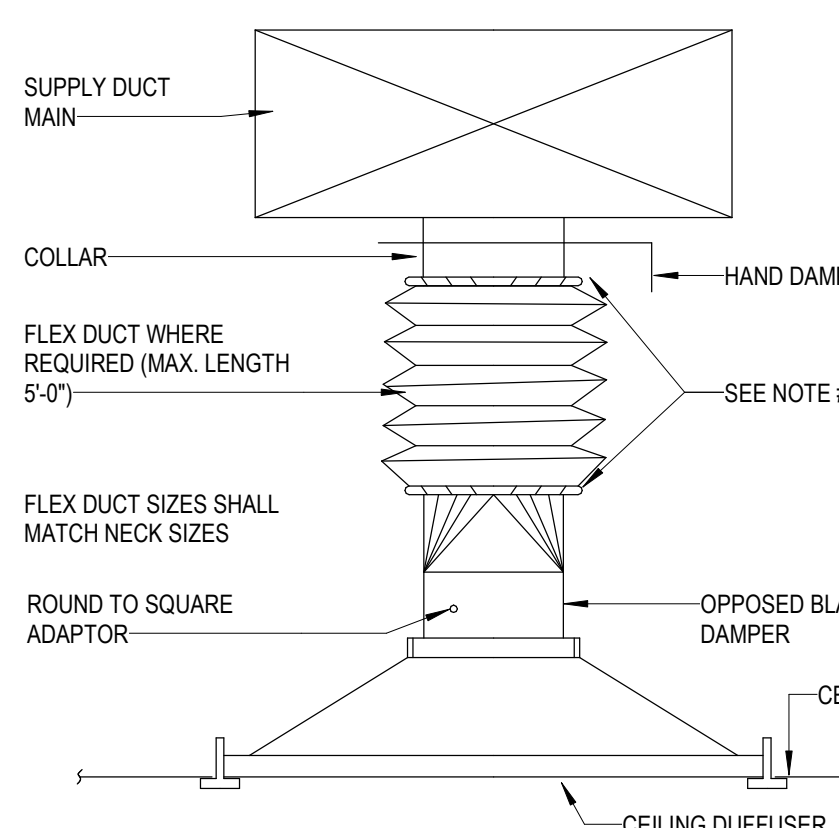


TYPICAL DIFFUSER CONNECTION (SIDE OF DUCT CONNECTION)

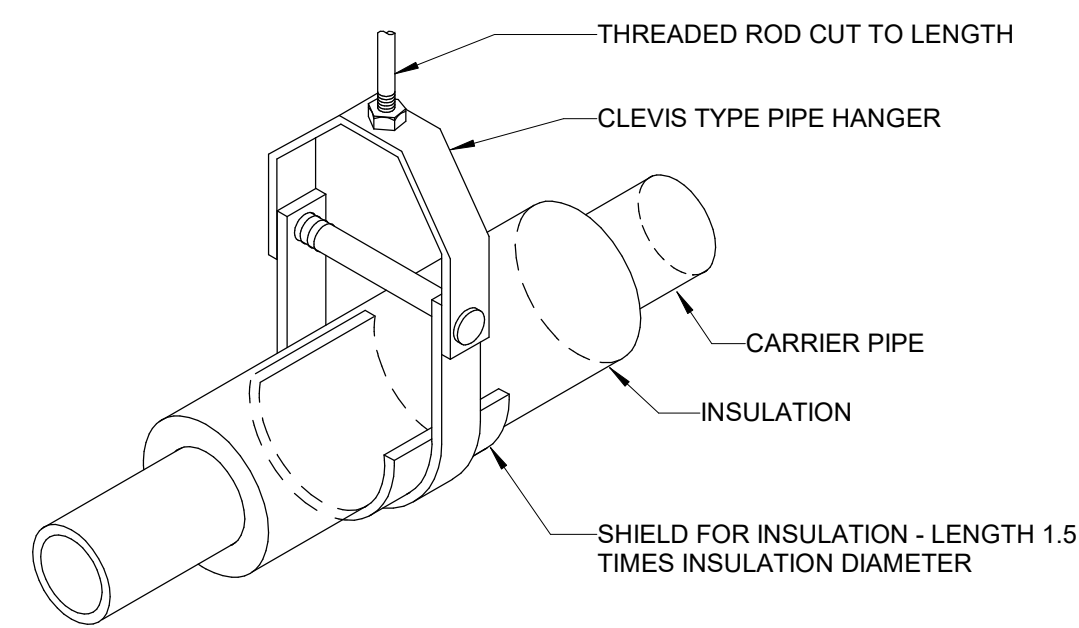
NOTES:

1. PROVIDE REMOTE CABLE DAMPERS FOR ALL GYP / NON ACCESSIBLE CEILINGS.
2. PROVIDE BALANCING DAMPER AT BRANCH TAKEOFF.
3. PROVIDE WITH APPROVED EQUAL TO TITUS 'TITUS FLEX RIGHT' OR HARD RIGHT ELBOW TO ENSURE ADEQUATE AIRFLOW.
4. SEAL FLEX DUCT TO METAL COLLAR WITH DUCT TAPE (NASHUA 398 OR APPROVED EQUAL), INSTALL TIE-WRAP (ULINE JUMBO NATURAL NYLON CABLE TIES) OVER DUCT TAPE. INSTALL DUCT INSULATION OVER METAL COLLAR AND SECURE WITH TIE-WRAP.

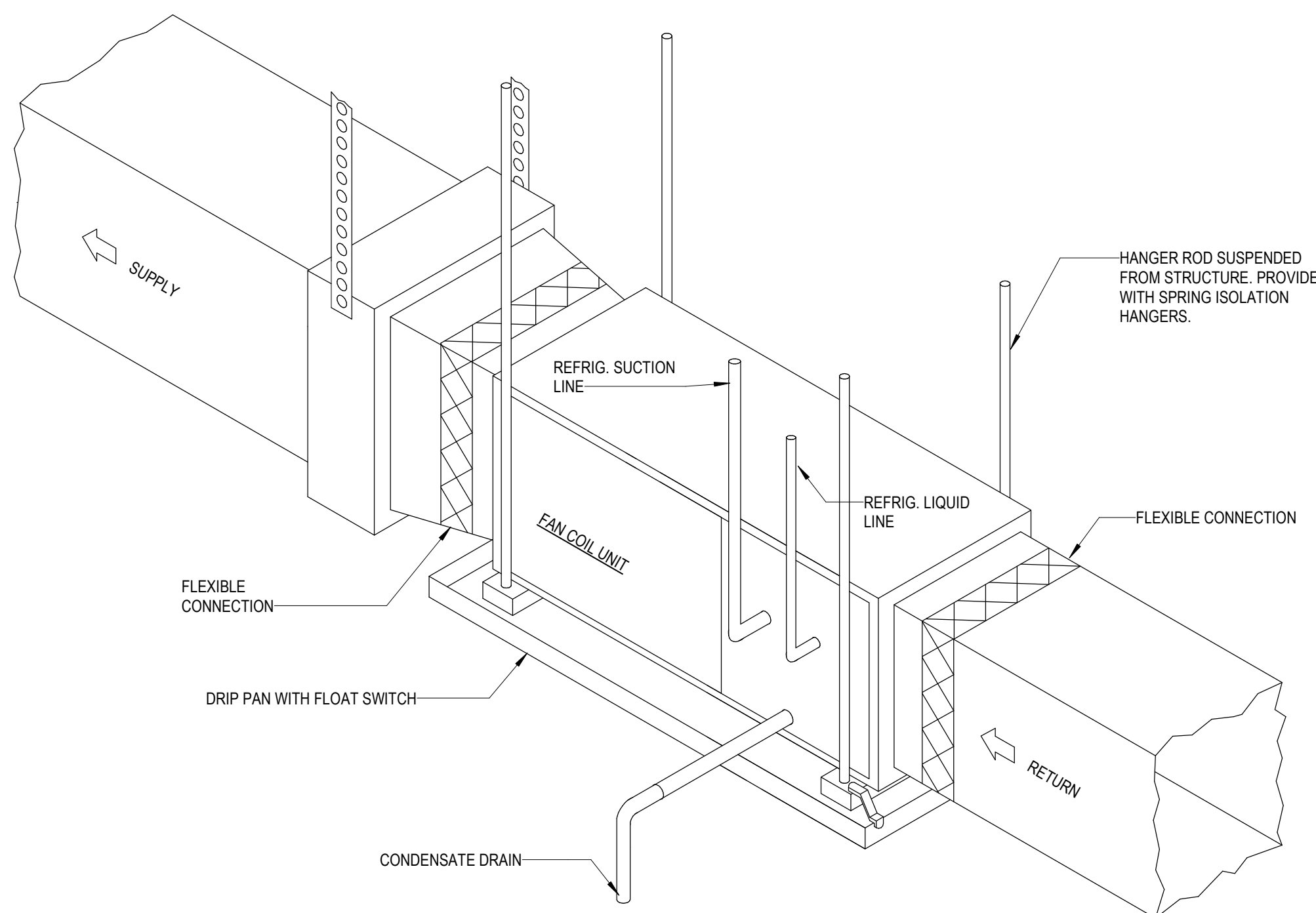
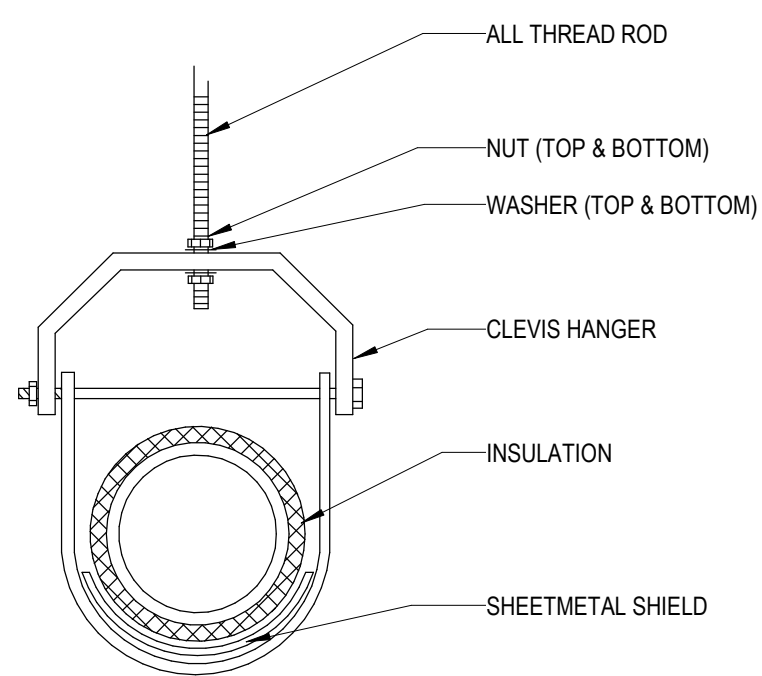
1 TYPICAL DIFFUSER CONNECTION DETAIL
NOT TO SCALE



TYPICAL DIFFUSER CONNECTION (BOTTOM OF DUCT CONNECTION)



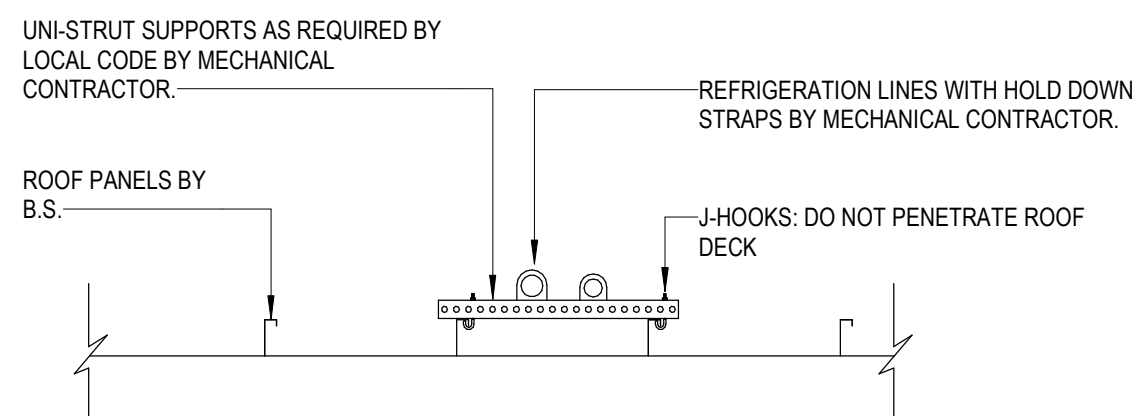
9 PIPE SUPPORT - CLEVIS HANGER DETAIL
NOT TO SCALE



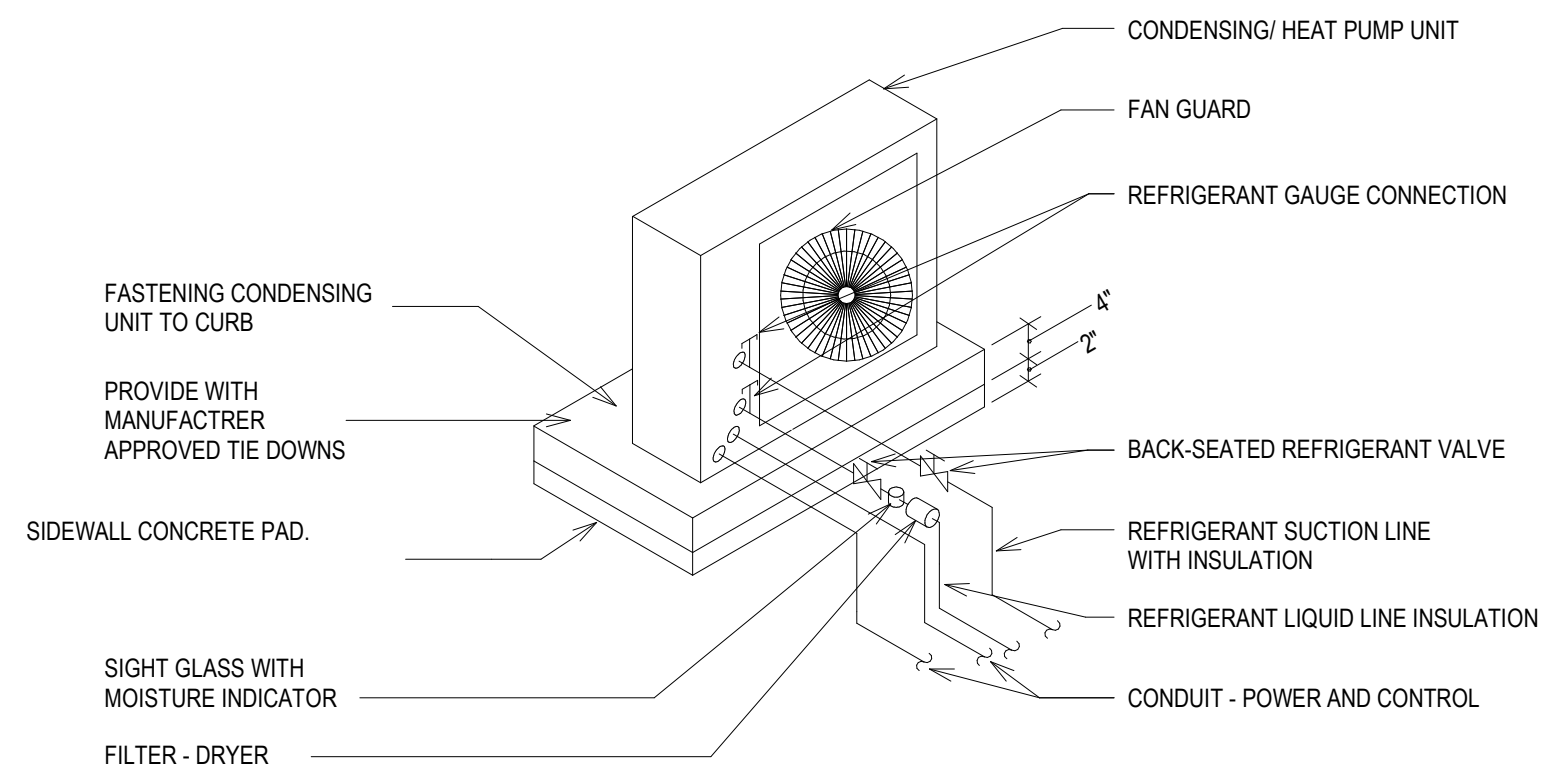
NOTE:

1. CONTRACTOR TO COORDINATE HANGER ROD INSTALLATION WITH EXISTING CONDITIONS AND STRUCTURAL ENGINEER.

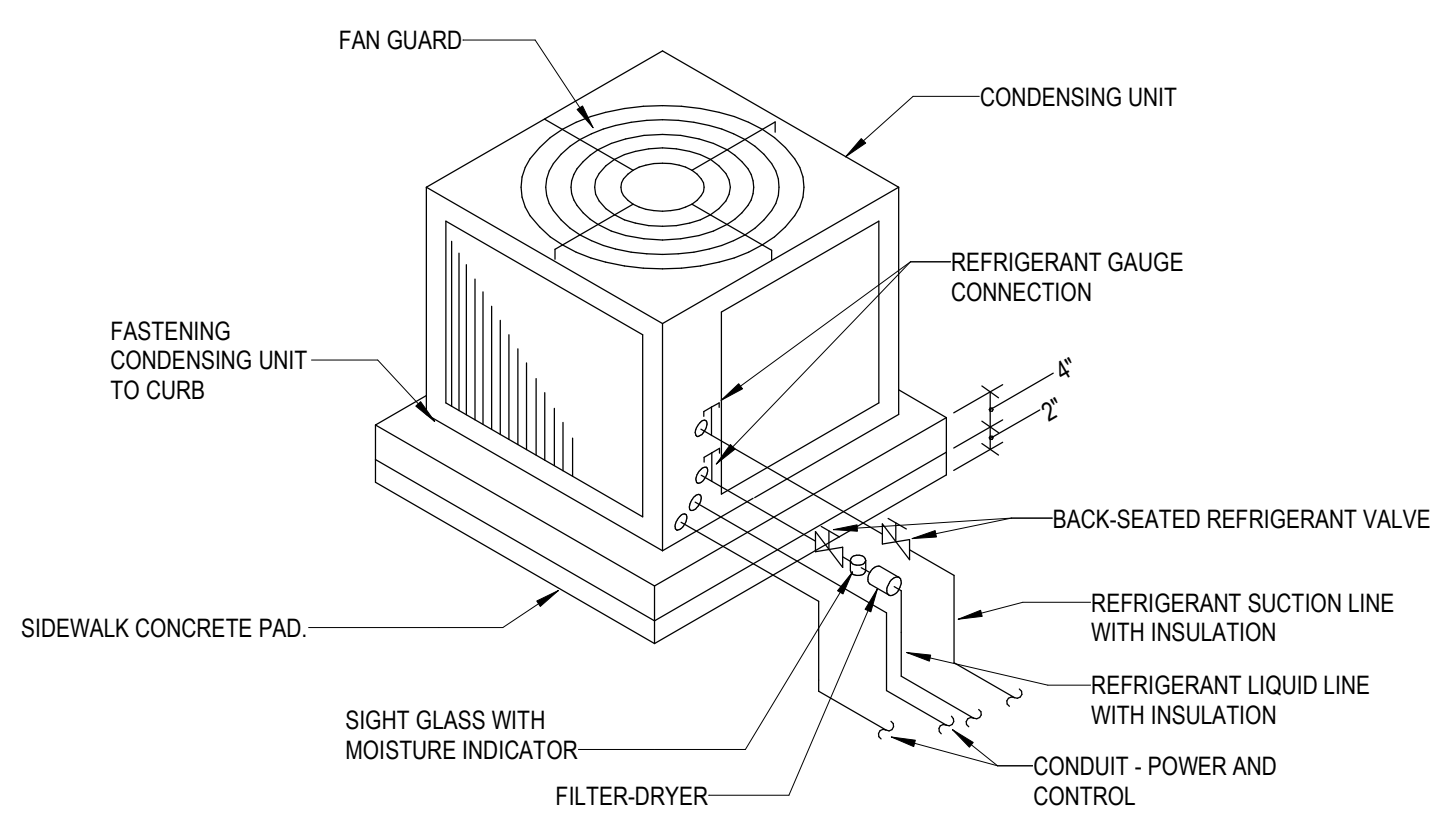
8 HORIZONTAL FAN COIL UNIT DETAIL
NOT TO SCALE



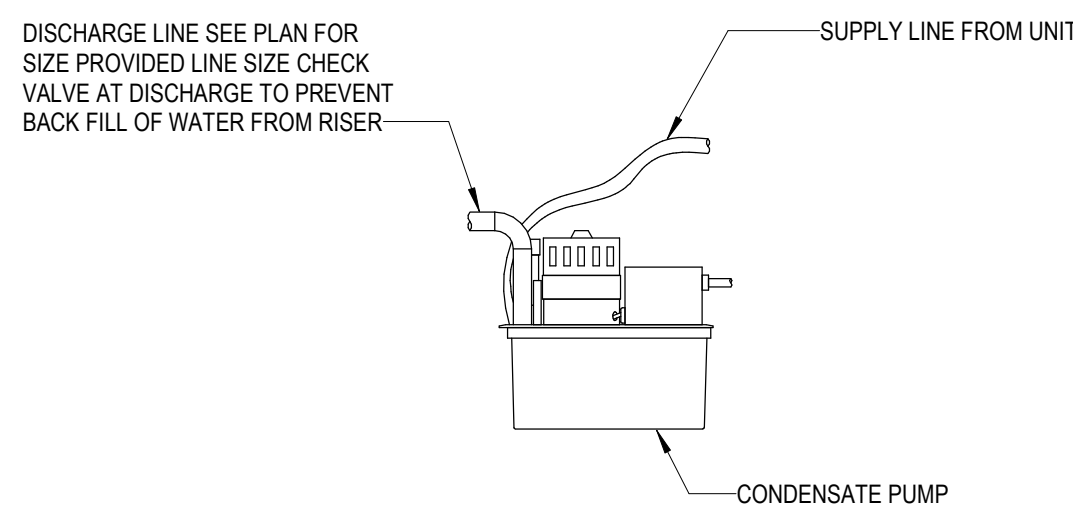
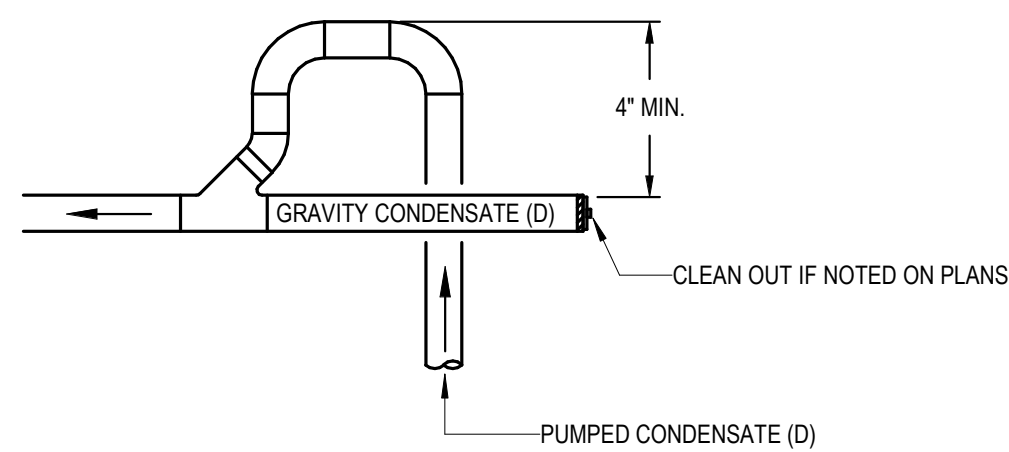
7 PIPE SUPPORT - REFRIGERANT LINE DETAIL
NOT TO SCALE



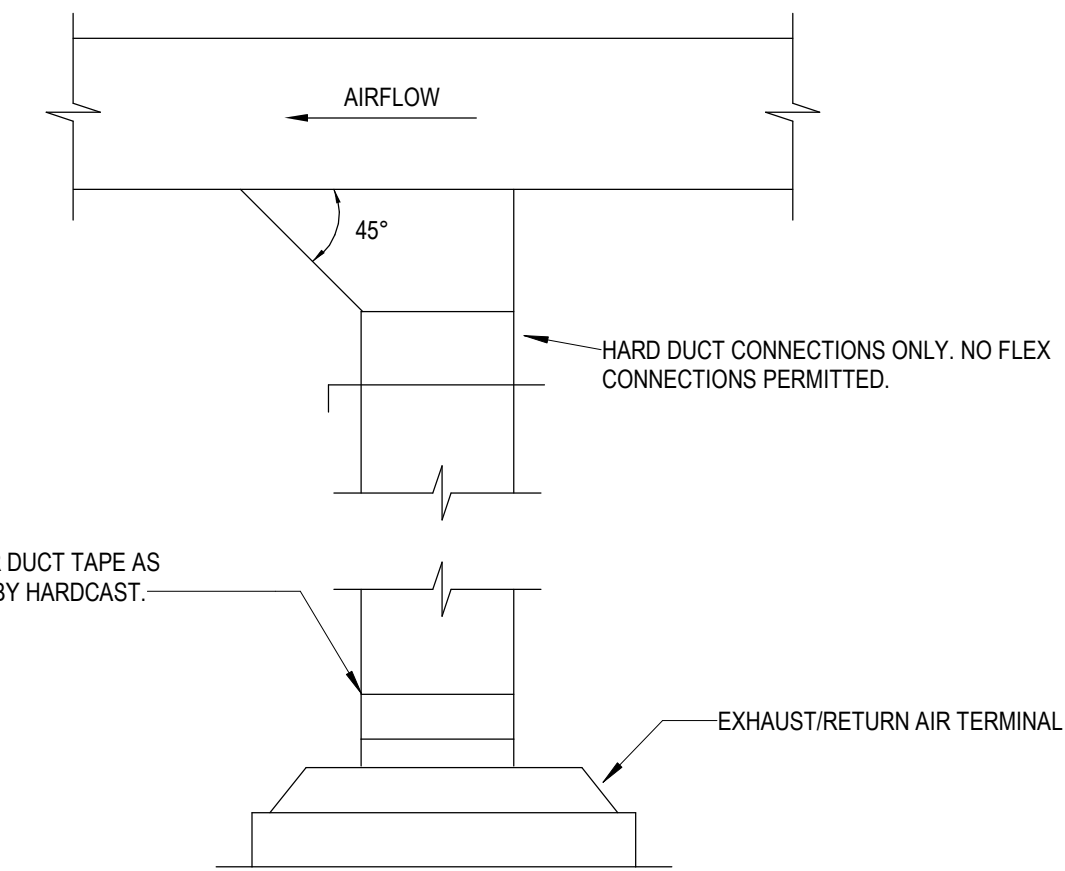
6 DX MINI-SPLIT CONDENSING UNIT/ HP -SLAB MOUNTED AT GRADE
NOT TO SCALE



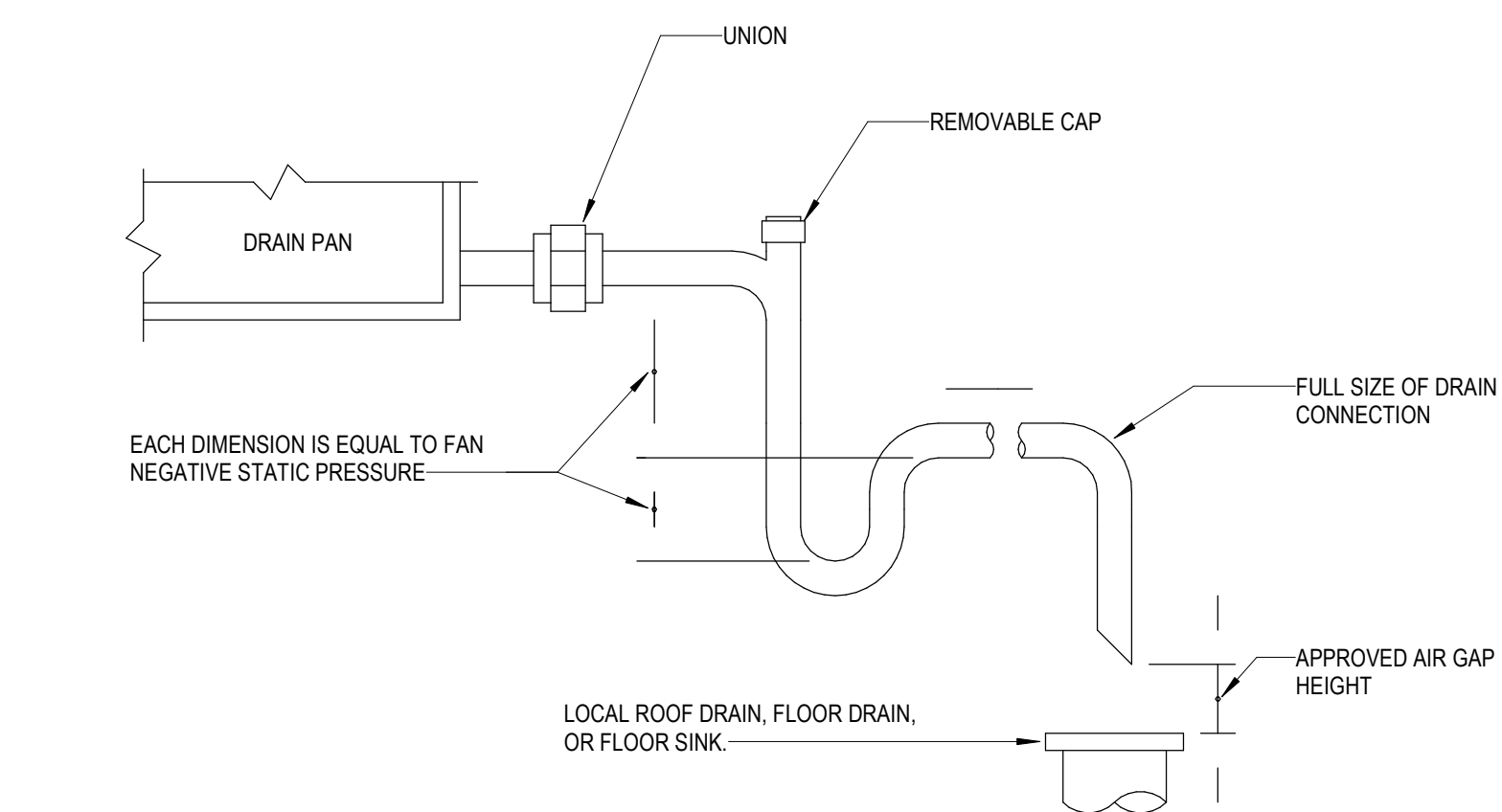
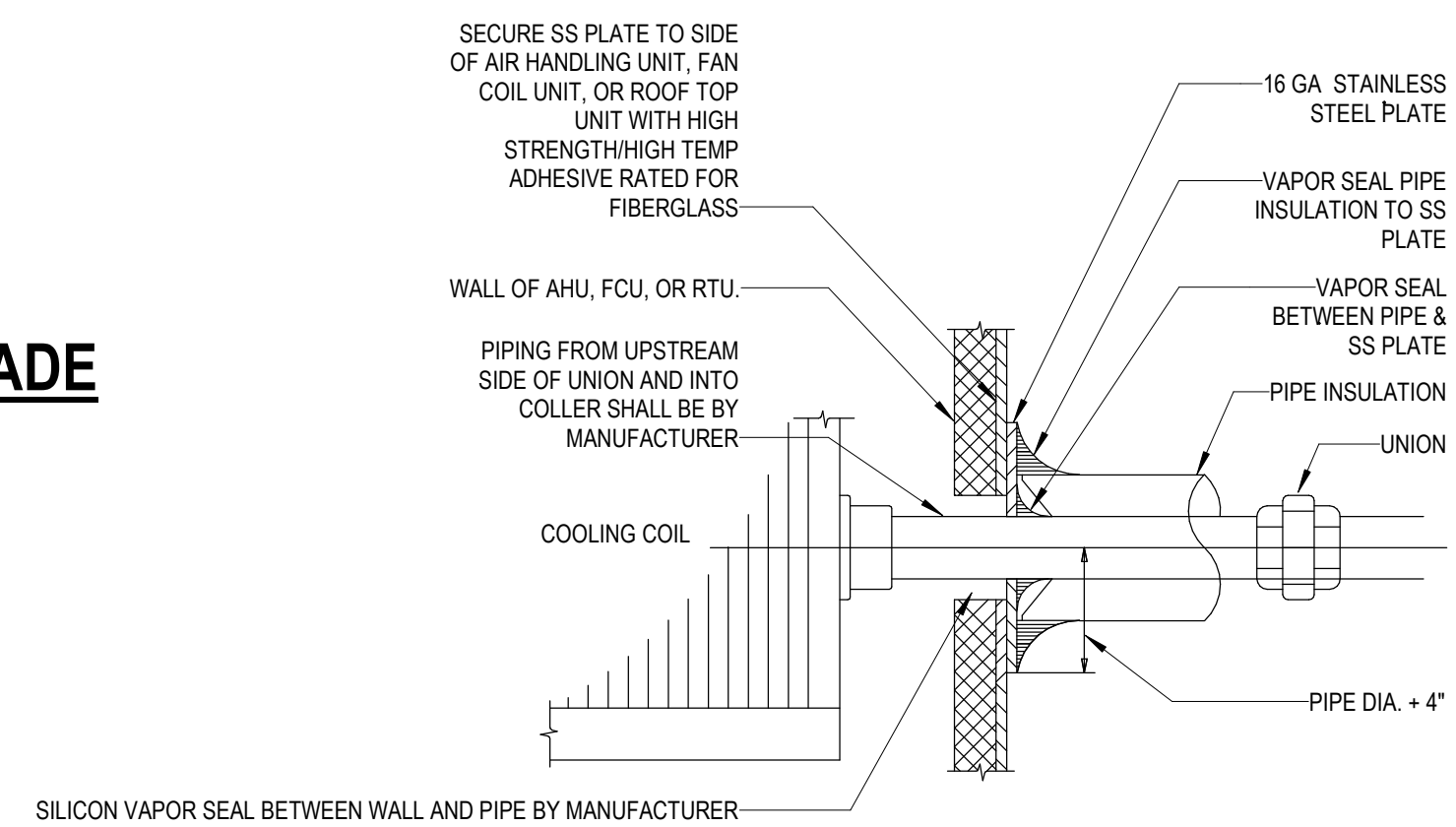
5 DX CONDENSING UNIT - SLAB MOUNTED AT GRADE
NOT TO SCALE



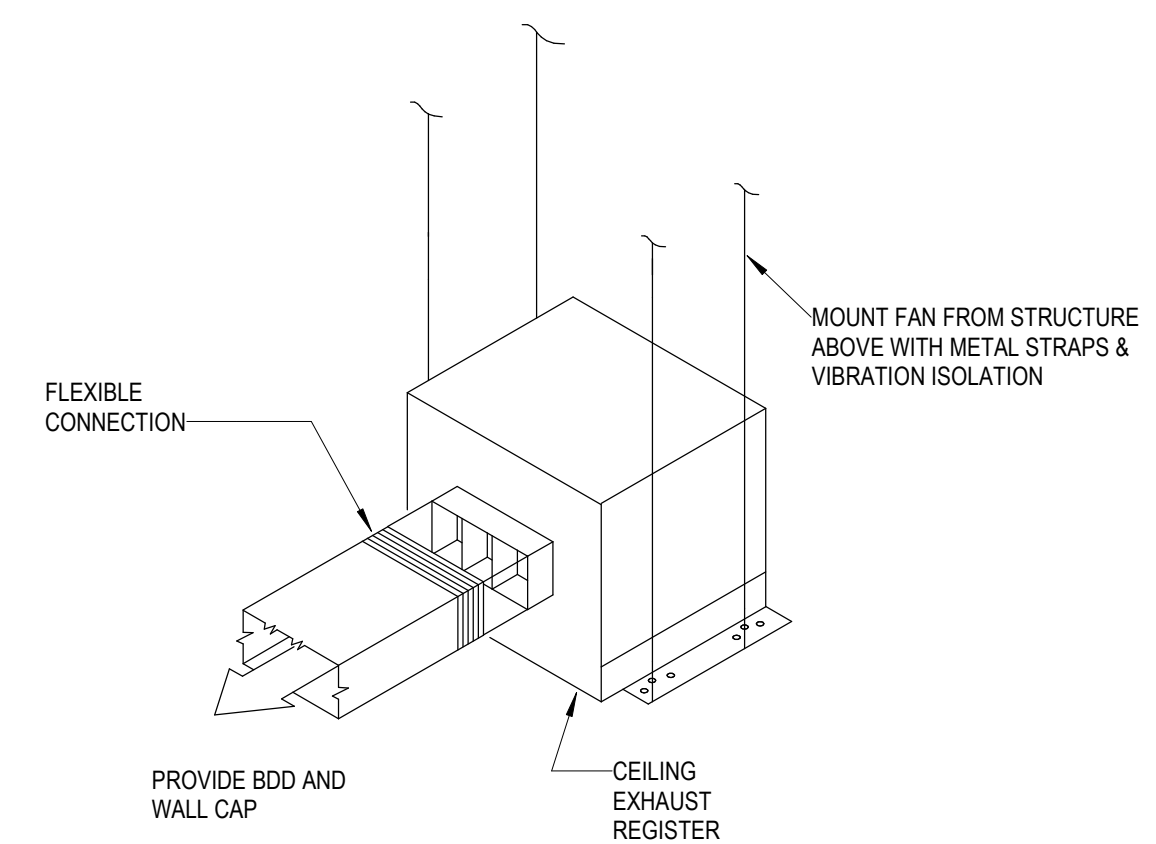
4 CONDENSATE PUMP AND PIPING DETAIL
NOT TO SCALE



3 EXHAUST/RETURN DUCT BRANCH TAKE-OFF DETAIL
NOT TO SCALE

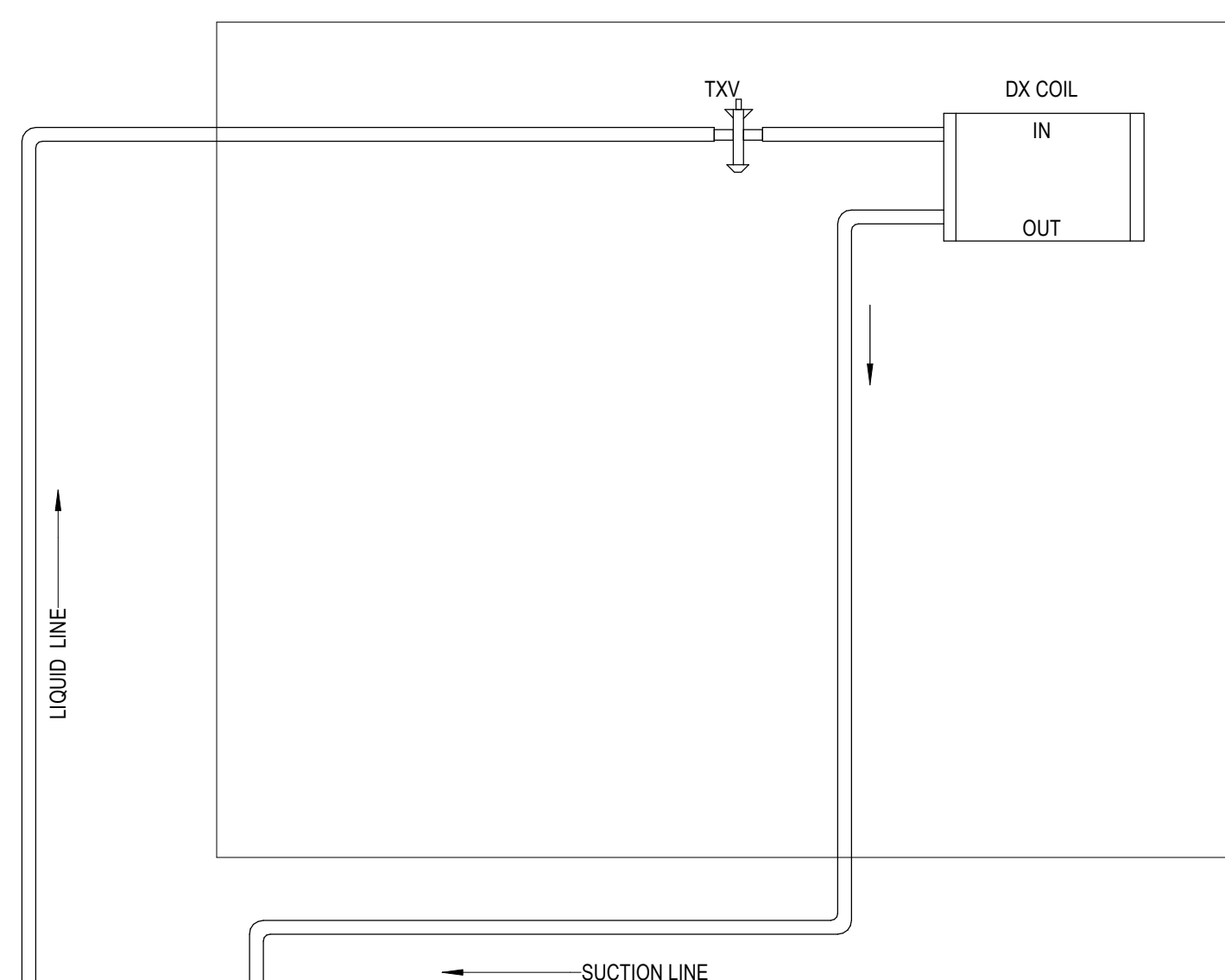


2 CONDENSATE DRAIN DETAIL
NOT TO SCALE

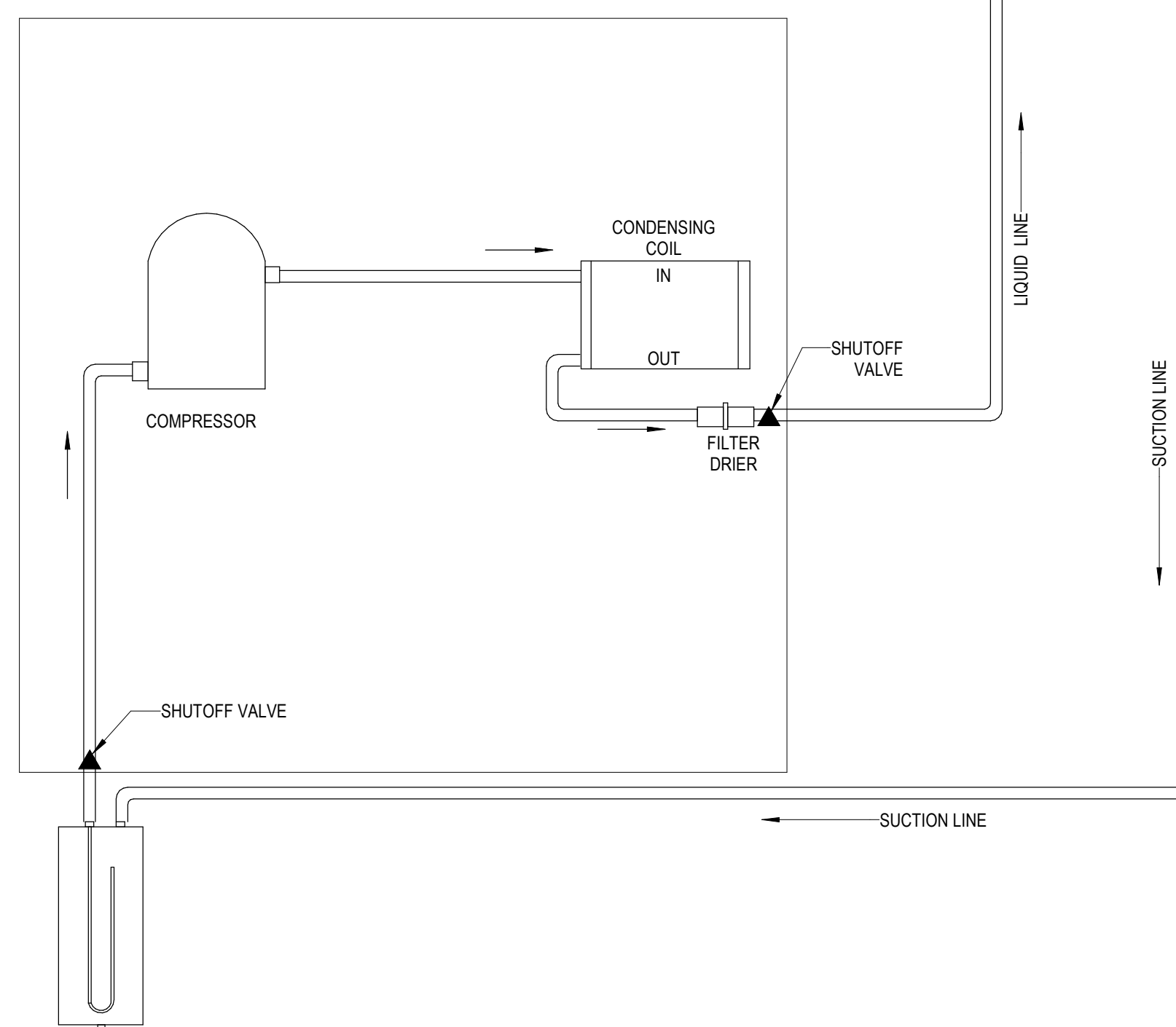


1 CEILING EXHAUST FAN (SIDE DISCHARGE) DETAIL
NOT TO SCALE

FAN COIL UNIT



HEAT PUMP

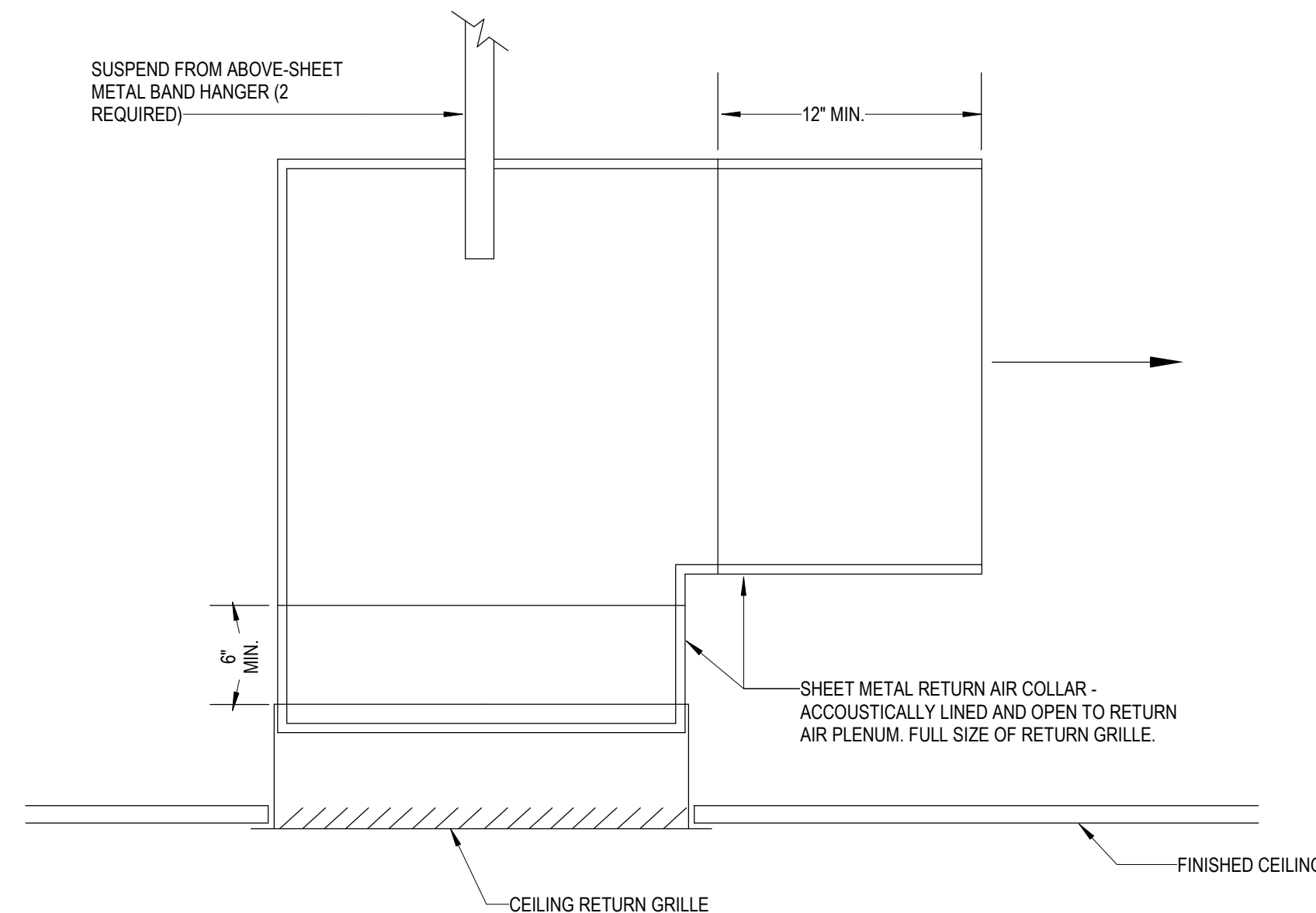


NOTES:

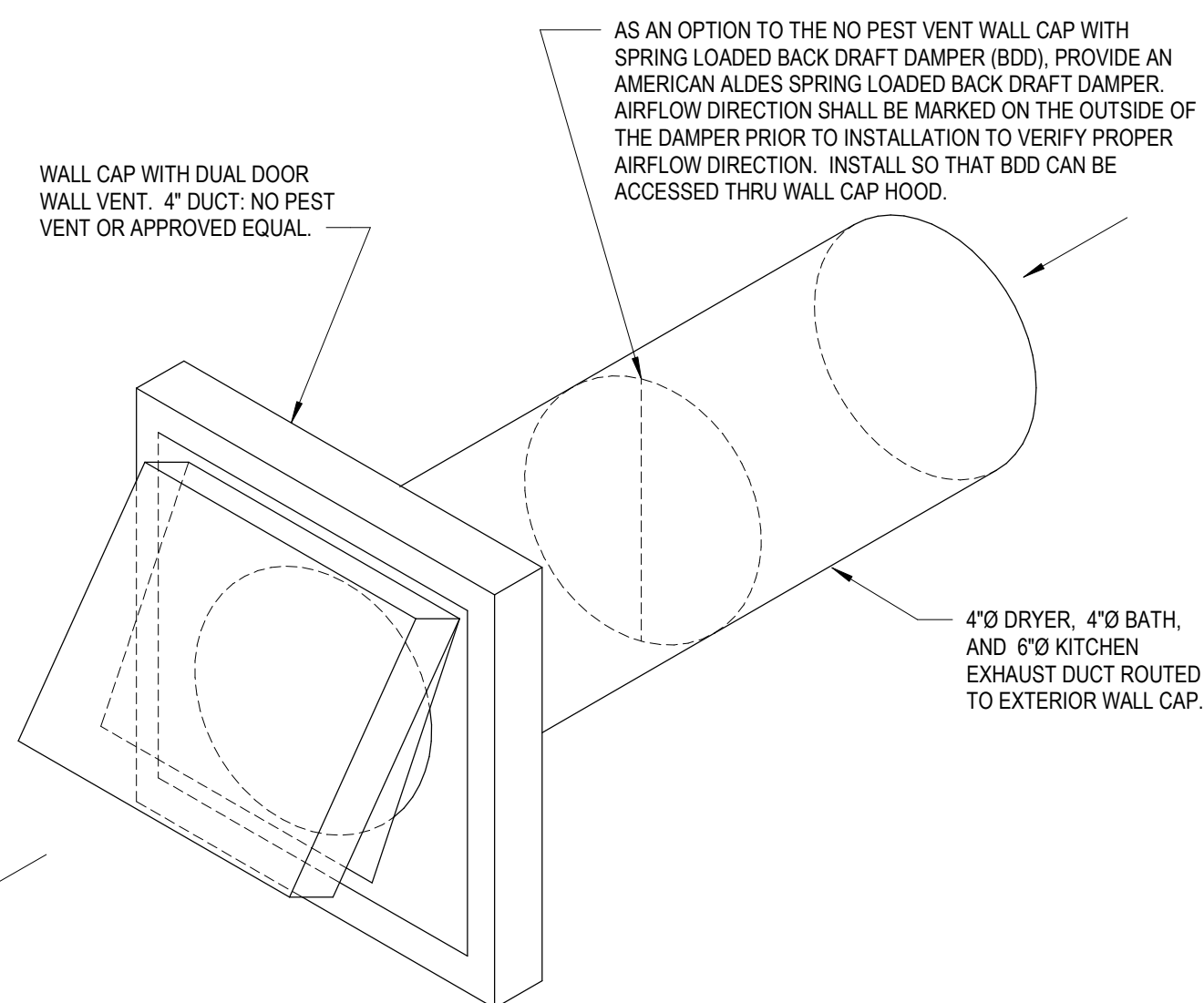
1. SUBMIT TO MANUFACTURER TO CONFIRM PIPE SIZES PRIOR TO PURCHASE.

SUCTION LINE ACCUMULATOR RECOMMENDED ON ALL SYSTEMS BUT IS REQUIRED ON ANY LINE LENGTHS GREATER THAN 55 FEET. FIELD SUPPLIED FIELD INSTALLED

4 DX SPLIT SYSTEM (DOWNFLOW)
NOT TO SCALE



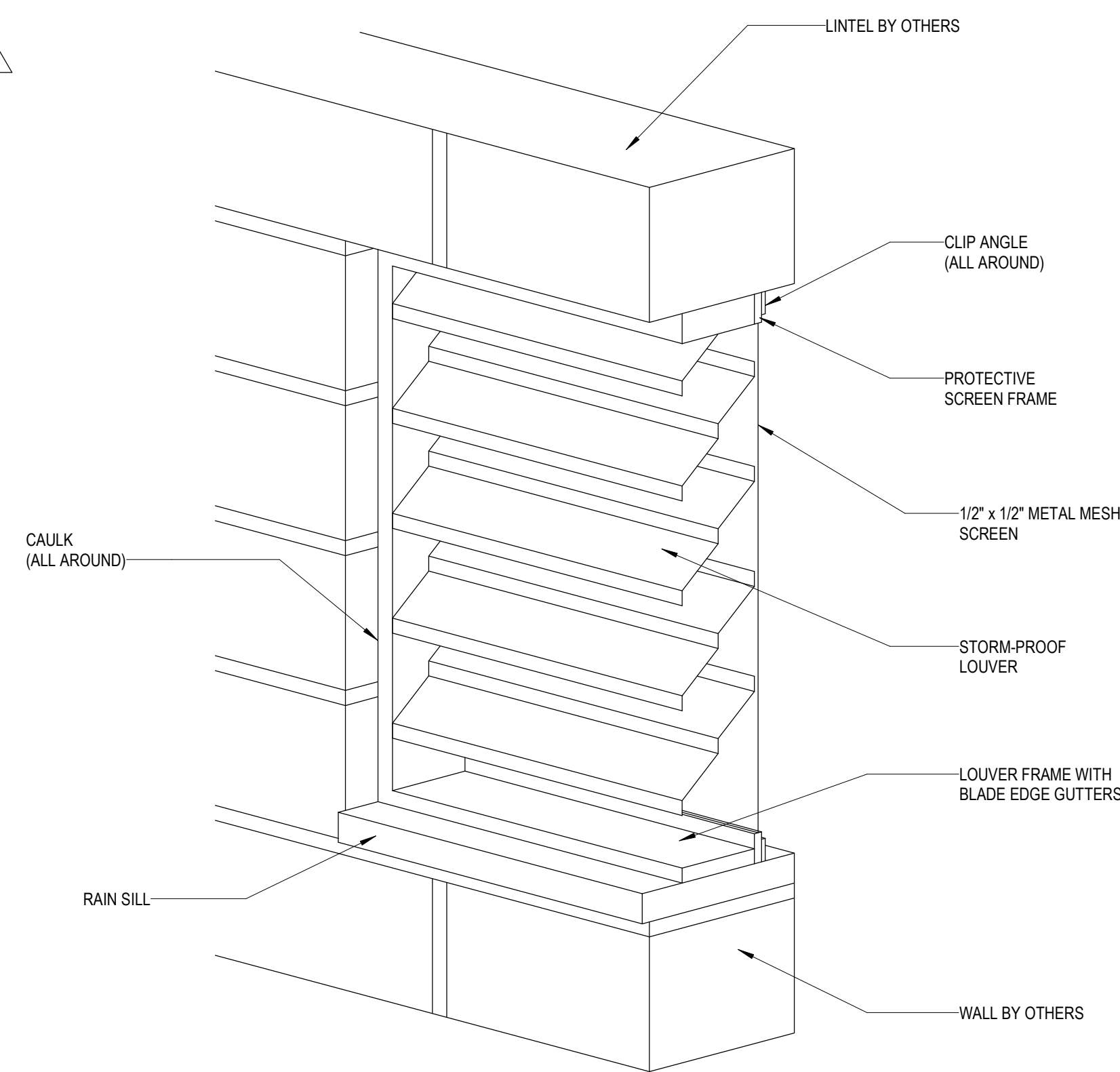
3 RETURN AIR TRANSFER DUCT (GRILLE AND COLLAR) DETAIL
NOT TO SCALE



NOTES:

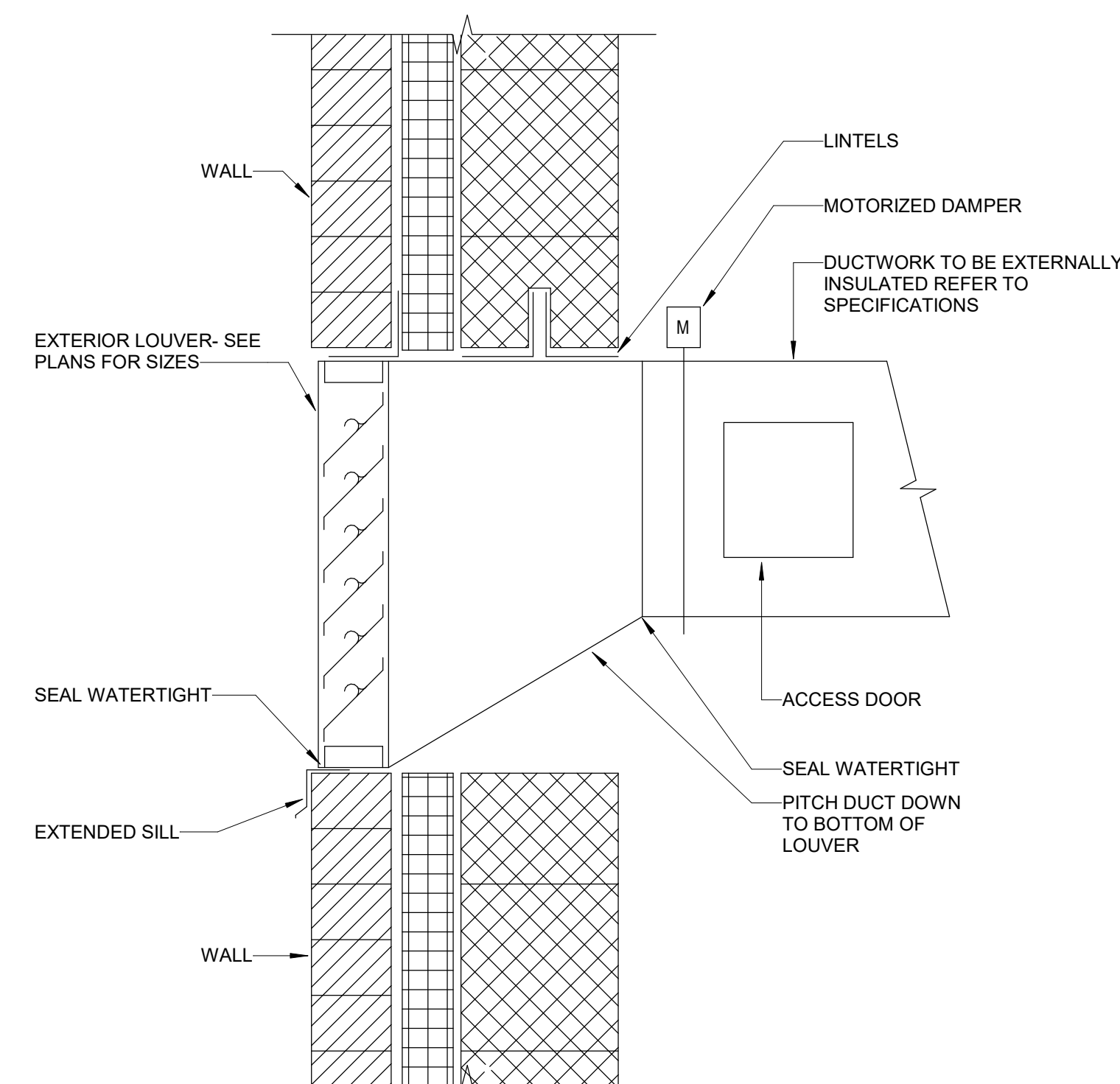
1. "NO PEST VENT" OR APPROVED EQUAL WALL CAP SHALL BE THE SAME SIZE AS THE EXHAUST DUCT. REFER TO FLOOR PLANS FOR SIZE.
2. WALL CAP SHALL BE ALUMINUM OR GALVANIZED STEEL WITH PAINT GRIP COATING FOR FIELD PAINTING (FIELD PAINTING BY OTHERS) COORDINATE PAINTING WITH GENERAL CONTRACTOR AND ARCHITECT.
3. WALL CAP AND BACK DRAFT DAMPER SHALL BE ALUMINUM CONSTRUCTION FOR COASTAL APPLICATIONS.

2 EXHAUST WALL CAP DETAIL
NOT TO SCALE



ISOMETRIC

1 EXTERIOR LOUVER DETAIL
NOT TO SCALE



SIDE