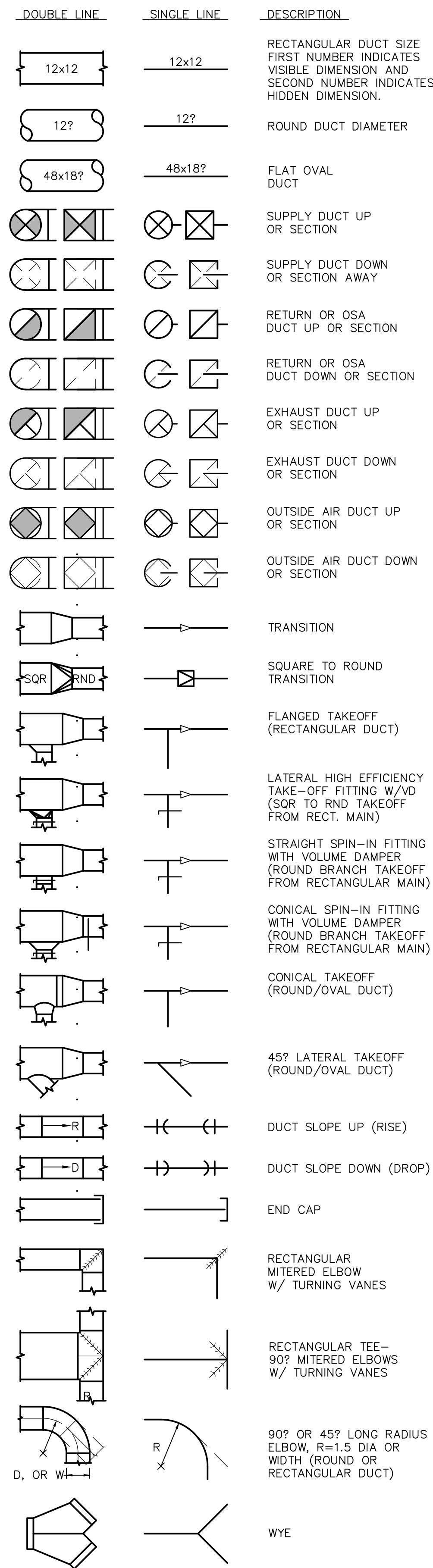
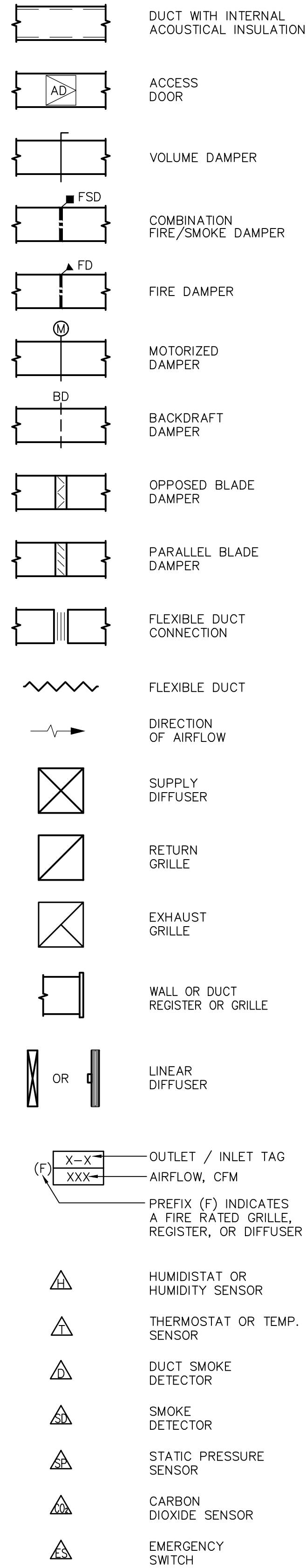


**DUCT & FITTING SYMBOLS**



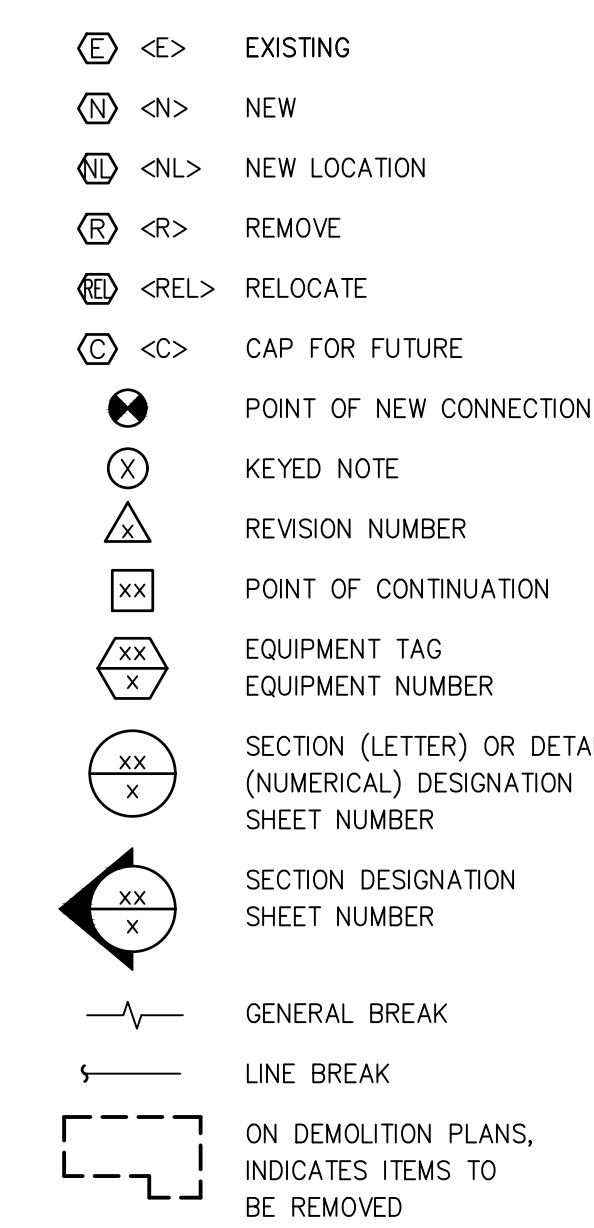
**HVAC SYMBOLS**



**HVAC ABBREVIATIONS**

ACFM	ACTUAL AIR - CUBIC FEET PER MINUTE
ACH	AIR CHANGES PER HOUR
AD	ACCESS DOOR
AFF	ABOVE FINISH FLOOR
AHU	AIR HANDLING UNIT
AL	ALUMINUM
AP	ACCESS PANEL
ARCH	ARCHITECT OR ARCHITECTURAL
BD	BACKDRAFT DAMPER
BLDG	BUILDING
BM	BEAM
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BOS	BOTTOM OF STEEL
BTU	BRITISH THERMAL UNIT
CFM	CUBIC FEET PER MINUTE
CLG	CEILING
CONSTR	CONSTRUCTION
CV	CONSTANT VOLUME
DB	DRY BULB
DIA	DIAMETER
DN	DOWN
DWG	DRAWING
DX	DIRECT EXPANSION (REFRIGERATION)
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EC	ELECTRICAL CONTRACTOR
ELEV	ELEVATION
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
FC	FLEXIBLE CONNECTION
FD	FIRE DAMPER
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FLA	FULL LOAD AMPS
FLR	FLOOR
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FFM	FEET PER MINUTE
FFM/CFSD	COMBINATION FIRE/SMOKE DAMPER
GALV	GALVANIZED STEEL
GC	GENERAL CONTRACTOR
GPM	GALLONS PER MINUTE
GRD	GRILLES, REGISTERS, DIFFUSERS
H	HUMIDISTAT
HEPA	HIGH EFFICIENCY PARTICULATE AIR
HP	MOTOR HORSEPOWER
HVAC	HEATING, VENTING AND AIR CONDITIONING
LB(S)	POUND, POUNDS
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MA	MIXED AIR
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MC	MECHANICAL CONTRACTOR
MCA	MINIMUM CIRCUIT AMPACITY
MECH	MECHANICAL
MFR	MANUFACTURER
MIN	MINIMUM
MOCP	MAXIMUM OVERCURRENT PROTECTION
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NG	NATURAL GAS
NO	NOT IN CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER
OA or OSA	OUTSIDE AIR
PBD	PARALLEL BLADE DAMPER
PSI	POUNDS PER SQUARE INCH
PT	PRESSURE/TEMPERATURE PLUG
PVC	POLYVINYL CHLORIDE
RA	RETURN AIR
RECT	RECTANGULAR
RPM	REVOLUTIONS PER MINUTE
REQ'D	REQUIRED
SA	SUPPLY AIR
SCFM	STANDARD AIR - CUBIC FEET PER MINUTE
SD	SMOKE DAMPER
SF or SQ FT	SQUARE FEET
SIM	SIMILAR
SM	SHEET METAL
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION
SP	STATIC PRESSURE
SPEC	SPECIFICATION OR SPECIFIED
SS	STAINLESS STEEL
STD	STANDARD
T	THERMOSTAT
TC	TEMPERATURE CONTROLS
TEMP	TEMPERATURE
TOS	TOP OF STEEL
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VFD	VARIABLE FREQUENCY DRIVE
WC	WATER COLUMN
WB	WET BULB

**GENERAL SYMBOLS**



**GENERAL NOTES**

- ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN A FURRED CHASE OR ABOVE THE SUSPENDED CEILING.
- ACCESS PANELS ARE REQUIRED FOR ALL VALVES, TRAPS, DAMPERS, CLEANOUTS, CONTROLS, ETC. ACCESS PANELS SHALL BE FURNISHED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS.
- COORDINATE ALL WORK WITH THE STRUCTURAL MEMBERS, WIRING, PIPING, AND OTHER MATERIAL IN THE AREA OF WORK.
- CONTRACTOR TO SECURE, MAINTAIN, AND PAY FOR ALL REQUIRED LICENSES AND INSPECTIONS FOR DURATION OF WORK UNLESS DIRECTED OTHERWISE.
- CONTRACTOR IS RESPONSIBLE FOR DISPOSAL OF ALL ITEMS THAT OWNER DOES NOT WISH TO RETAIN FOR FUTURE USE.
- MECHANICALLY FASTEN CONNECTIONS BETWEEN METAL DUCTS AND THE INNER CORE OF FLEXIBLE DUCTS. 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 IN ACCORDANCE WITH UL 181A OR UL 181B.
- ALL DUCTWORK SHALL BE GALVANIZED STEEL, ROUND OR RECTANGULAR. SUPPORT PER SMACNA DUCT CONSTRUCTION STANDARDS AND INSTALL IN CONFORMANCE TO MECHANICAL CODES. FLEXIBLE DUCTS SHALL BE INSULATED NONMETALLIC, FORM "NM-IL", MAXIMUM LENGTH OF 5'-0" AT DIFFUSER OR GRILLE CONNECTION. BUTTERFLY BALANCING DAMPERS WHERE SHOWN OR REQUIRED. ROUND OR RECTANGULAR, GALVANIZED SHEET METAL, WITH EXTERNAL INDICATING QUADRANT AND SETSCREW. PROVIDE TURNING VANES FOR ALL RECTANGULAR ELBOWS.
- SHEET METAL DUCT SIZES SHOWN ARE NET CLEAR INSIDE DIMENSIONS. WHEN INTERNAL INSULATION IS REQUIRED, DUCT SIZE SHALL BE INCREASED TO PROVIDE NET CLEAR DIMENSIONS INDICATED.
- SUPPLY AND RETURN DUCTS LOCATED IN CONDITIONED SPACES DO NOT REQUIRE INSULATION.
- SUPPLY AND RETURN DUCTS LOCATED IN UNCONDITIONED SPACES AND PLENUMS (WITHIN CHASES, SHAFTS, OR MECHANICAL ROOMS) SHALL BE INSULATED WITH FIBERGLASS DUCT WRAP FACED WITH OUTER FOIL BLANKET HAVING A MINIMUM INSTALLED R-VALUE OF 6.0.
- SUPPLY AND RETURN DUCTS LOCATED ON THE EXTERIOR PART OF THE BUILDING ENVELOPE (INCLUDING ATTICS ABOVE INSULATED CEILING, PARKING GARAGES, AND CRAWLSPACES) SHALL BE INSULATED WITH FIBERGLASS DUCT WRAP FACED WITH OUTER FOIL BLANKET HAVING A MINIMUM INSTALLED R-VALUE OF 8.0. DUCTS LOCATED ON THE EXTERIOR PART OF THE BUILDING SHALL BE PROTECTED FROM THE ELEMENTS BY ALUMINUM, SHEET METAL, PAINTED CANVAS, OR PLASTIC COVER.
- SUPPLY AND RETURN DUCTS LOCATED IN INDIRECTLY CONDITIONED SPACES WITHIN THE BUILDING ENVELOPE (SUCH AS ATTIC WITH ROOF INSULATION, CEILING PLENUMS SURROUNDED BY CONDITIONED SPACE AND LITTLE TO NO EXTERIOR EXPOSURE) SHALL BE INSULATED WITH FIBERGLASS DUCT WRAP FACED WITH OUTER FOIL BLANKET HAVING A MINIMUM INSTALLED R-VALUE OF 1.9.
- FRESH AIR AND EXHAUST AIR DUCT RUNS BETWEEN THE SHUTOFF DAMPER AND EXTERIOR WALL LOUVER SHALL BE INSULATED WITH FIBERGLASS DUCT WRAP FACED WITH OUTER FOIL BLANKET HAVING A MINIMUM INSTALLED R-VALUE OF 8.0.
- FRESH AIR AND EXHAUST AIR DUCTS LOCATED WITHIN THE BUILDING ENVELOPE SHALL BE UNINSULATED.
- THE FOLLOWING SHALL BE SEISMICALLY BRACED IN ACCORDANCE WITH THE 2022 OREGON STRUCTURAL SPECIALTY CODE:
  - PIPING IN MECHANICAL EQUIPMENT ROOMS LARGER THAN 1" DIAMETER WITH HANGERS LONGER THAN 12".
  - ALL OTHER PIPING LARGER THAN 2" DIAMETER WITH HANGERS LONGER THAN 12".
  - DUCTWORK WITH CROSS-SECTIONAL AREA 6.0 S.F. OR GREATER SUPPORTED WITH HANGERS LONGER THAN 12".
  - COMPONENTS INSTALLED IN-LINE WITH DUCTWORK WEIGHING MORE THAN 75 POUNDS.
  - SUSPENDED EQUIPMENT 20 LBS. OR GREATER.
  - FLOOR MOUNTED EQUIPMENT 400 LBS. OR GREATER.

**OREGON ENERGY CODE COMPLIANCE NOTES**

- THERMOSTATS SHALL BE PROGRAMMED SO THERE IS A 5 DEGREE F DEADBAND BETWEEN HEATING AND COOLING.
- MECHANICALLY FASTEN CONNECTIONS BETWEEN METAL DUCTS AND THE INNER CORE OF FLEXIBLE DUCTS. 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 IN ACCORDANCE WITH UL 181A OR UL 181B.
- AN OPERATING AND MAINTENANCE MANUAL SHALL BE PROVIDED TO THE BUILDING OWNER BY THE MECHANICAL CONTRACTOR. PROVIDE WITHIN 30 DAYS OF SYSTEM ACCEPTANCE. SEE ASHRAE 90.1-2019 SECTION 6.7 FOR ADDITIONAL REQUIREMENTS.
- PROVIDE RECORD DRAWINGS WITHIN 30 DAYS OF SYSTEM ACCEPTANCE. INCLUDE AS A MINIMUM, THE LOCATION AND PERFORMANCE DATA ON EACH PIECE OF EQUIPMENT, GENERAL CONFIGURATIONS OF DUCT AND PIPE DISTRIBUTION SYSTEM, INCLUDING SIZES, AIR FLOW RATE, AND WATER FLOW RATE.
- FOR HVAC SYSTEMS SERVING ZONES WITH A TOTAL CONDITIONED AREA OF 5,000 SF OR MORE, HVAC SYSTEMS SHALL BE BALANCED IN ACCORDANCE WITH GENERALLY ACCEPTED ENGINEERING STANDARDS. PROVIDE THE OWNER WITH A WRITTEN BALANCE REPORT.
- DUCTS AND PLENUMS SHALL BE CONSTRUCTED PER SMACNA STANDARDS AND SEALED PER SEAL CLASS A.
- ALL DUCTS ARE LOW PRESSURE DUCTS WITH 1"-2" IN W.G. STATIC PRESSURE. SEAL ALL CONNECTIONS ACCORDING TO SEAL CLASS A.
- ZONE THERMOSTATIC CONTROL SHALL PREVENT REHEATING, RECOOLING, MIXING OR SIMULTANEOUS SUPPLY OF AIR THAT HAS BEEN PREVIOUSLY HEATED OR COOLED, SEE SECTION 6.5.2 FOR ADDITIONAL INFORMATION.
- MECHANICAL SYSTEM FANS SHALL HAVE A FAN EFFICIENCY GRADE OF 67 OR HIGHER BASED ON MANUFACTURER'S DATA, SEE ASHRAE 90.1 SECTION 6.5.3.1 FOR ADDITIONAL INFORMATION.
- PROVIDE ECM MOTORS FOR FANS THAT ARE LESS THAN 1 HP. THE MOTOR SHALL HAVE A MEANS FOR ADJUSTING THE SPEED FOR BALANCING AND REMOTE CONTROL, SEE ASHRAE 90.1 SECTION 6.5.3.6 FOR ADDITIONAL INFORMATION.
- MOTORIZED OUTDOOR AIR AND EXHAUST AIR DAMPERS SHALL HAVE A MAXIMUM LEAKAGE RATE OF 4 CFM/SF AT 1.0" W.G.
- FOR DX COOLING SYSTEMS WITH CAPACITY GREATER THAN OR EQUAL TO 65,000 BTU/H, PROVIDE MODULATING FAN AIRFLOW CONTROLS TO REDUCE CAPACITY DURING LOW LOAD REQUIREMENT. SEE ASHRAE 90.1 (2022) SECTION 6.5.3.2.1 FOR MORE INFORMATION.
- PROVIDE HVAC SYSTEM WITH AUTOMATIC SHUTDOWN CONTROLS. FURNISH EACH HVAC SYSTEM WITH CONTROLS THAT CAN START AND STOP THE SYSTEM UNDER DIFFERENT TIME SCHEDULES FOR SEVEN DIFFERENT DAYS PER WEEK. SEE ASHRAE 90.1 (2022) SECTION 6.4.3.3.1 FOR MORE INFORMATION.
- PROVIDE HEATING AND COOLING SYSTEM WITH SETBACK CONTROLS TO ALLOW FOR AUTOMATIC RESTART AND TEMPORARY OPERATION. SEE ASHRAE 90.1 (2022) SECTION 6.4.3.3.2 FOR MORE INFORMATION.

CONTRACTOR SHALL SUBMIT CALCULATIONS AND SHOP DRAWINGS FOR ALL APPLICABLE SYSTEMS.

- FOR FLUIDS OPERATING BETWEEN 40°F TO 60°F, THERMALLY INSULATE HYDRONIC AND REFRIGERANT PIPING AS FOLLOWS:
  - FOR PIPES BETWEEN 1/4" TO LESS THAN 1-1/2" USE 1/2 INCH INSULATION THICKNESS
  - FOR PIPES BETWEEN 1-1/2" TO 8" USE 1 INCH INSULATION THICKNESS.

MECHANICAL DRAWING INDEX	
SHEET NO.	SHEET DESCRIPTION
M-001	MECHANICAL LEGEND, NOTES, SYMBOLS, AND SCHEDULES
M-301	MECHANICAL PLAN
M-501	MECHANICAL DETAILS

**FURNACE SCHEDULE**

TAG	MFR	FURNACE MODEL	SUPPLY FAN		HEATING SECTION				ELECTRICAL				NOTES							
			CFM	WEIGHT	TYPE	MOTOR	ESP	HP	CAPACITY	EER2	IEER	SEER2		INPUT (MBH)	AFUE %	OUTPUT (MBH)	VOLTS	PHASE	MCA	MOCP
F-1	LENNOX	ML296UH090V48C	1,265	163	DIRECT	ECM	0.50	3/4	3 TON	12.5	-	15.2	57.0	96.0	55.0	120	1	10.9	15	(1)(2)(3)(4)
F-2	LENNOX	ML296UH090V48C	1,645	163	DIRECT	ECM	0.50	3/4	4 TON	11.7	-	13.8	57.0	96.0	55.0	120	1	10.9	15	(1)(2)(3)
F-3	LENNOX	ML296UH090V48C	1,265	163	DIRECT	ECM	0.50	3/4	3 TON	12.5	-	15.2	57.0	96.0	55.0	120	1	10.9	15	(1)(2)(3)

- SEE PLANS FOR AIR HANDLER LAYOUT
- PROVIDE MIN MERV 8 FILTERS UPSTREAM OF THE FAN COIL
- PROGRAM THERMOSTATS TO USE LOW HEAT FEATURE ON FURNACE.
- REINSTALL CO2 SENSOR FROM OLD FURNACE EQUIPMENT TO NEW FURNACE EQUIPMENT.

**AIR COOLED SPLIT SYSTEM AIR-CONDITIONER SCHEDULE**

EVAPORATOR (INDOOR UNIT)											CONDENSER (OUTDOOR UNIT)								NOTES		
TAG	MFR	MODEL	MBH	EER2	SEER2	CFM	FAN SPEEDS	VOLTS	PHASE	MCA	MOCP	WEIGHT	TAG	MODEL	SIZE	VOLTS	PHASE	MCA		MOCP	WEIGHT
FC-1	DAIKIN	MSY-GS09NA	9.0	15.4	28.4	381	5	208	1	1	(1)	26 LBS	CU-1	MUY-GS09NA	0.75 TON	208	1	10	15	87	(2)(3)

- INDOOR UNIT USES SAME ELECTRICAL CIRCUIT AS OUTDOOR UNIT.
- COOLING ONLY UNIT. R-410A REFRIGERANT. PROVIDE WITH WIRELESS REMOTE CONTROLLER WITH WALL HOLDER.
- UNIT SHALL BE CAPABLE OF OPERATION DOWN TO 0 DEG. F OUTDOOR AIR TEMPERATURE. PROVIDE WITH WIND BAFFLE ACCESSORY. SECURE OUTDOOR UNIT TO STRUCTURE USING MANUFACTURER RECOMMENDED STAND.

**HEAT PUMP - OUTDOOR UNIT SCHEDULE**

TAG	MFR	MODEL	AIR SYSTEM MARK	COOLING CAPACITY	No. OF COMPR.	No. OF SPEEDS	No. OF FANS	SEER2	MCA	MOCP	dBA	WEIGHT (LBS)	ELECTRICAL	NOTES
HP-1	LENNOX	ML17XC1-036-230	F-1	3 TONS	1	1	1	14.3	17.4	30.0	73.0	200.0	208/230V/1PH	(1)(2)(3)
HP-2	LENNOX	ML17XC1-048-230	F-2	4 TONS	1	1	1	14.3	33.0	50.0	73.0	235.0	208/230V/1PH	(1)(2)(3)
HP-3	LENNOX	ML17XC1-036-230	F-3	3 TONS	1	1	1	14.3	17.4	30.0	73.0	200.0	208/230V/1PH	(1)(2)(4)

- PROVIDE WITH EXPANSION VALVE KIT, LOW AMBIENT KIT, AND OUTDOOR THERMOSTAT.
- PROVIDE WITH FM21 HEAT PUMP CONTROL SYSTEM FOR GAS FURNACE.
- PROVIDE WITH REFRIGERANT LINE KIT.
- CONTRACTOR TO DESIGN AND SIZE REFRIGERANT PIPING AS REQUIRED.

NOTE: ABBREVIATIONS AND SYMBOLS ARE MARQUESS & ASSOCIATES, INC. STANDARDIZED SYMBOL LEGENDS. AS SUCH, ALL SYMBOLS SHOWN MAY NOT APPEAR ON OR WITHIN THIS SET OF CONTRACT DOCUMENTS.

REGISTERED PROFESSIONAL ENGINEER  
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 JUAN MOREIRA  
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**RVSS BUILDING HVAC UPGRADES**  
 138 West Villas Road, Central Point, Oregon  
 REVISIONS  

SYM	DATE	REFERENCE
1		
2		
3		
4		

 DRAWN BY: NRM  
 CHECKED BY: JAM  
 MECHANICAL LEGEND, NOTES, SYMBOLS, AND SCHEDULES  
 Date: 11-01-2023  
 Job No: 23-0095  
 Sheet No: **M-001**