MECHANICAL SYMBOLS LEGEND

SUPPLY AIR DUCT UP (PLAN)	MARK-#	EQUIPMENT MARK AND NUMBER	CHECK VALVE, SWING GATE
SUPPLY AIR DUCT DOWN (PLAN)	T	THERMOSTAT - MOUNT 48" AFF UNO	ANGLE PRESSURE RELIEF VALVE
RETURN OR OUTSIDE AIR DUCT UP (PLAN)	H	HUMIDISTAT	PRESSURE REDUCING VALVE
RETURN OR OUTSIDE AIR DUCT DOWN (PLAN)	F	FIRESTAT	LOCK SHIELD
EXHAUST AIR DUCT UP (PLAN)	P	PRESSURE MONITOR	QUICK OPENING/CLOSING VALVE
EXHAUST AIR DUCT DOWN (PLAN)	SD	SMOKE DETECTOR	PRESSURE REGULATOR
RETURN AIR/TRANSFER AIR BOOT		PIPE UP	STRAINER W/BLOW DOWN VALVE
CEILING SUPPLY AIR DEVICE		PIPE DOWN	THREE-WAY VALVE (ELECTRIC)
SIDEWALL SUPPLY/EXHAUST REGISTER		CAP	TWO-WAY VALVE (ELECTRIC)
CEILING RETURN AIR / EXHAUST REGISTER		90° ELBOW	FLEXIBLE CONNECTION
RETURN AIR GRILLE WITH BOOT		45° ELBOW	EXPANSION JOINT
BRANCH DUCT TAP		45° ELBOW DOWN (OGEE)	THERMOMETER
DUCT SPLIT WITH SPLITTER DAMPER		TEE	THERMOMETER WELL
AD ACCESS DOOR		TEE UP	TEST PLUG
TRANSITION IN DUCT		TEE DOWN	PRESSURE GAUGE W/GAUGE COCK
FLEXIBLE DUCT CONN. TO RECTANGULAR DUCT WITH SPIN-IN CONNECTOR		TOP CONNECTION	MANUAL AIR VENT
AP ACCESS PANEL		CROSS	AUTOMATIC AIR VENT
DUCT ELBOW WITH TURNING VANES		UNION (SCREWED)	SOLENOID VALVE
DUCT ELBOW WITHOUT VANES		UNION (FLANGED)	FLOW SWITCH
FLEXIBLE CONNECTION, FLEXIBLE DUCT	T	DUCT MOUNTED TEMPERATURE SENSOR	TEMPERATURE AND PRESSURE RELIEF VALVE
VD VOLUME DAMPER	P	DUCT MOUNTED PRESSURE SENSOR	STEAM TRAP
M MOTORIZED VOLUME DAMPER	SD	DUCT MOUNTED SMOKE DETECTOR	STEAM MOISTURE SEPARATOR
FIRE DAMPER		PIPE BREAK	STEAM CONTROL VALVE
SMOKE DAMPER		CONCENTRIC REDUCER	CONTROL, ELECTRIC-PNEUMATIC
COMBINATION FIRE/SMOKE DAMPER		ECCENTRIC REDUCER	CONTROL, PNEUMATIC-ELECTRIC
AFS AIR FLOW SWITCH		END SUCTION PUMP	RED. PRESS PRINCIPAL BACKFLOW PREVENTER
APD AIR PRESSURE DIFFERENTIAL SWITCH		BALL VALVE OR	CHWR CHILLED WATER RETURN
R RISE IN DUCT ELEVATION		BUTTERFLY VALVE	CHWS CHILLED WATER SUPPLY
D DROP IN DUCT ELEVATION		ISOLATION VALVE	CWR CONDENSER WATER RETURN
SD DIM. SPLITTER DAMPER - DIMENSION AS NOTED ON DRAWING		GATE VALVE WITH QUICK DISCONNECT	CWS CONDENSER WATER SUPPLY
BDD BACK DRAFT DAMPER		TWO-WAY VALVE (PNEUMATIC)	HWR HOT WATER RETURN
UCD 1" UNDERCUT DOOR 1"		THREE-WAY VALVE (PNEUMATIC)	HWS HOT WATER SUPPLY
RE: I/M-7 REFER TO DETAIL #1 ON DRAWING M-7		BALANCING VALVE	CD CONDENSATE DRAIN
CONNECTION POINT OF NEW TO EXISTING		PIPE ALIGNMENT GUIDE	C CENTER LINE
INDICATES DISCONNECTION POINT		PIPE ANCHOR	∅ DIAMETER
A / 100E AIR DEVICE MARK / AIR FLOW WITH LETTER DESIGNATION (E = EXHAUST) (R = RETURN)		FLANGED END	ST SOUND TRAP
INDICATES SECTION NUMBER / INDICATES DRAWING NUMBER	H	HUMIDIFIER	+ - RELATIVE ROOM PRESSURE
INDICATES DETAIL NUMBER / INDICATES DRAWING NUMBER		HEAT TRACING ON PIPE	NEW CONSTRUCTION
	D/P	DIFFERENTIAL PRESSURE SENSOR	EXISTING TO REMAIN

ELECTRICAL SYMBOLS LEGEND

EMERGENCY BATTERY PACK FIXTURE		T	TRANSFORMER
CEILING EXIT LIGHT - DIRECTIONAL ARROWS WHERE INDICATED, SHADED QUADRANTS INDICATE ILLUMINATED FACES		400A / 3P	AUTOMATIC TRANSFER SWITCH AMPS / POLES AS INDICATED ON PLANS
WALL EXIT LIGHT - DIRECTIONAL ARROWS WHERE INDICATED SHADED QUADRANTS INDICATE ILLUMINATED FACES			MOTOR
OS OCCUPANCY SENSOR CEILING MOUNT			MAGNETIC MOTOR STARTER, H-O-A-P U.O.N.
VS VACANCY SENSOR CEILING MOUNT			COMBINATION MOTOR CONTROLLER AND NON-FUSED DISCONNECT SWITCH
PP LIGHTING CONTROL POWER PACK		VFD	VARIABLE FREQUENCY DRIVE FURNISHED BY DIV 23, CONNECTED BY DIV 26
$X TOGGLE SWITCH, 15A / 277VAC UON 2 = DOUBLE POLE 3 = THREE-WAY 4 = FOUR-WAY a = CONTROLS OUTLET OR FIXTURE NOTED "a" K = KEY OPERATED P = WITH PILOT LIGHT T = INTERVAL TIMER, 30 MIN. UON M = MOTOR RATED SWITCH, RATED FOR MOTOR SERVED MO = SPDT MOMENTARY CONTACT D = DIMMER SWITCH OC = OCCUPANCY SENSOR VS = VACANCY SENSOR LV = LOW VOLTAGE		IR	INFRARED SENSORS. SENSORS SHALL BE CONNECTED TO CORRIDOR LIGHTING
PC PHOTOCELL CONTROL SWITCH		KP	KEY PAD. CONTRACTOR RESPONSIBLE TO PROVIDE ALL REQUIRED HARDWARE AND ELECTRICAL CONNECTIONS.
TC TIME CLOCK		DC	DOOR CONTACT. CONTRACTOR RESPONSIBLE TO PROVIDE ALL REQUIRED HARDWARE AND ELECTRICAL CONNECTIONS.
2 IG / 20A G DUPLEX CONVENIENCE RECEPTACLE NUMERAL INDICATES CKT NUMBER IG = ISOLATED GROUND (ORANGE DEVICE) G = GROUND FAULT INTERRUPER 20A = 20 AMP RATED RECEPTACLE * * ALL RECEPTACLES ON DEDICATED 20 AMP CIRCUITS SHALL BE RATED 20A.		E	PUSHBUTTON K = KEY OPERATED SWITCH (UP/OFF/DOWN POSITION) E = EMERGENCY POWER OFF BUTTON
		R	RELAY
+XX" INDICATES WALL OUTLET AT NON-STANDARD HEIGHT WHEN SHOWN ADJACENT TO ANY OUTLET OR RECEPTACLE. AT COUNTERS, MOUNT 6" ABOVE SPLASH UON.		100	UNFUSED SWITCH - 100 AMP 3 POLE, UON
QUADRUPLEX RECEPTACLE		100	CIRCUIT BREAKER - 100 AMP FRAME, 3 POLE, UON
SINGLE POWER RECEPTACLE, 20A, 125V 3W GNDG UON.		100/100	FUSED SWITCH 100 AMP SWITCH/100 AMP TYPE "FA" FUSE 3 POLE UON
FLUSH FLOOR DUPLEX RECEPTACLE		FACP	FIRE ALARM CONTROL PANEL
FLUSH FLOOR QUADRUPLEX RECEPTACLE		FAAP	FIRE ALARM REMOTE ANNUNCIATOR
PLUGMOLD WITH DUPLEX OUTLETS, 18" OC U.O.N. "12" INDICATES OUTLETS 12" OC "24" INDICATES OUTLETS 24" OC. "C" INDICATES WITH COMM COMPARTMENT			FIRE ALARM STROBE
			FIRE ALARM SPEAKER STROBE
		SP	FIRE ALARM SPEAKER
TV TELEVISION SIGNAL OUTLET		TS	FIRE ALARM TAMPER SWITCH
WALL MOUNTED DATA/TELEPHONE		WF	FIRE ALARM WATER FLOW
FLOOR DATA OUTLET		S	SMOKE DETECTOR
W WALL TELEPHONE OUTLET WITH PLATE (W-WALL MOUNTED)		D	DUCT SMOKE DETECTOR
		H	HEAT DETECTOR
J CEILING MOUNTED JUNCTION BOX		F	MANUAL PULL STATION
J FLUSH WALL MOUNTED JUNCTION BOX FOR MOUNTING HEIGHT REFER TO ARCHITECTURAL AND MEDICAL EQUIPMENT PLAN DRAWINGS.		DH	FIRE ALARM MAGNETIC DOOR HOLD-OPEN
		F	FIREMAN'S PHONE
J FLOOR MOUNTED JUNCTION BOX		FT	FIREMAN'S PHONE HANDSET
CONDUIT TURNING UP/DOWN		GAP	GENERATOR ANNUNCIATOR PANEL
CAPPED CONDUIT		NCM	NURSE CALL MASTER STATION
GROUND CONNECTION		ES P	ENHANCED SINGLE PATIENT STATION
1LB-1,3,5 CONDUIT HOME RUN TO PANEL BOARD "1LB" WITH CIRCUITS 1,3,5		EP	EMERGENCY PULL STATION
		DS	DUTY STATION
DISCONNECT SWITCH - 30A, NON-FUSED, 3-POLE UON. NEMA 1 ENCLOSURE EXCEPT "3R" INDICATES NEMA 3R.		SS	STAFF STATION
		CB	NURSE CALL CODE BLUE
		RK	BED INTERFACE
CB 100/60 FLUSH MOUNTED CIRCUIT BREAKER 100A FRAME/60A TRIP 3 POLE UON		Z	CEILING MOUNTED ZONE LIGHT
		D	CEILING MOUNTED DOME LIGHT
PANELBOARD		NCC	NURSE CALL CENTRAL EQUIPMENT CABINET
LRP LIGHTING RELAY PANEL			

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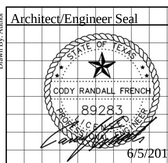
Architect/Engineer Seal



6/5/2019

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PLUMBING SYMBOLS LEGEND

- W — SANITARY WASTE PIPING
- GW — GREASE WASTE PIPING
- SV — SANITARY VENT PIPING
- GV — GREASE VENT PIPING
- (E)SS — EXISTING SANITARY VENT PIPING
- SD — STORM DRAIN PIPING
- OD — STORM OVERFLOW DRAIN PIPING
- SSD — SUB-SOILED DRAIN PIPING
- OW — OILY WASTE
- F — FIRE PROTECTION MAIN
- A/S — AUTOMATIC SPRINKLER
- G — NATURAL GAS
- CD — CONDENSATE DRAIN
- SCW — SOFTENED COLD WATER
- MV — MEDICAL VACUUM
- MO — MEDICAL OXYGEN
- N — NITROGEN
- MA — MEDICAL AIR
- N20 — NITROUS OXIDE
- AV — ACID VENT
- AW — ACID WASTE
- CA — COMPRESSES AIR
- RO — REVERSE OSMOSIS
- DOMESTIC COLD WATER
- DOMESTIC HOT WATER
- DOMESTIC HOT WATER RETURN
- EXISTING DOMESTIC COLD WATER
- GATE VALVE
- GLOBE VALVE
- CHECK VALVE
- BUTTERFLY VALVE
- HEAT TRACE AND INSULATE
- DFS — DIESEL FUEL SUPPLY
- DFR — DIESEL FUEL RETURN

- PLUG VALVE
- PRESSURE REDUCING VALVE
- TEMPERATURE AND PRESSURE RELIEF VALVE
- BALL VALVE
- STRAINER
- UNION
- ITEMS TO BE REMOVED
- PRESSURE GAUGE
- THERMOMETER
- CD — CONDENSATE DRAIN LINE
- BRANCH CONNECTION, TOP
- BRANCH CONNECTION, BOTTOM
- ELBOW UP
- ELBOW DOWN
- FLOOR CLEANOUT
- WALL CLEANOUT
- FLOOR DRAIN
- VENT THRU ROOF
- HOSE BIBB
- (N)NEW CONNECTION TO (E)EXISTING
- P / X — PLUMBING RISER IDENTIFICATION
- DS / X — DOWN SPOUT RISER IDENTIFICATION
- F / X — FIRE RISER IDENTIFICATION
- AW / X — ACID WASTE RISER IDENTIFICATION

ABBREVIATIONS

SYMBOL	DESCRIPTION
A	AMPS
AC	ALTERNATING CURRENT/ABOVE COUNTER
A.D.	AREA DRAIN
ADJ	ADJACENT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ARCH	ARCHITECTURAL
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
ASYM	ASYMMETRICAL
ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILLARY
A/V	AUDIO/VISUAL
AWG	AMERCIAN WIRE GAUGE
BLDG	BUILDING
B.F.P.	BACKFLOW PREVENTER
B.V.	BALANCING VALVE
B.D.	BALCONY DRAIN
B.S.	BAR SINK
B.T.	BATHTUB/SHOWER
BLW.	BELOW
C	CONDUIT
C/B	CIRCUIT BREAKER
CAT	CATALOG
CKT	CIRCUIT
CL	CLOCK
CLG	CEILING
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUOUS
CONV	CONVENIENCE
C/T	CURRENT TRANSFORMER
C.V.	CHECK VALVE
C.O.	CLEANOUT
C.W.	COLD WATER
COND.	CONDENSATE
CONT.	CONTINUED
D.D.	DECK DRAIN
°F	DEGREES FAHRENHEIT
D.	DRAIN
IG	ISOLATED GROUND
INCAND	INCANDESCENT
INSUL	INSULATION
INT	INTERCOM
J-BOX	JUNCTION BOX
KVA	KILOVOLT AMPERES
KW	KILOWATT
KWH	KILOWATT HOURS
LBS	POUNDS
LOC.	LOCATED
LP	LIGHTING PANEL
LTG	LIGHTING
MA	MILLIAMPS
MACH	MACHINE
MC	METAL-CLAD CABLE
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCM	THOUSAND CIRCULAR MILS
MCP	MOTOR CONTROL PANEL
MIC	MICROPHONE
MLO	MAIN LUGS ONLY
MTD	MOUNTED
MTR	MOTOR
N	NEUTRAL
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELEC MANUFACTURERS ASSOC.
NETA	NATIONAL ELECTRICAL TESTING ASSOC.
NF	NON-FUSE
NFPA	NATIONAL FIRE PROTECTION ASSOC.
NL	ON NIGHT LIGHTING CIRCUIT
NO	NORMALLY OPEN
O/C	OVERCURRENT
OL	OVERLOAD
LB.	POUNDS
P.S.I.	POUNDS PER SQUARE INCH
P	POLES
PB	PULL BOX
PF	POWER FACTOR
PH	PHASE

ABBREVIATIONS

SYMBOL	DESCRIPTION
D.F.U.	DRAINAGE FIXTURE UNITS
DC	DIRECT CURRENT
DIA	DIAMETER
DP	DISTRIBUTION PANEL
DWG	DRAWING
E	EXISTING TO REMAIN
EC	EMPTY CONDUIT
EL	ELEVATION
ELEC	ELECTRIC
ELEV	ELEVATOR
EM	ON EMERGENCY CIRCUIT
EQ	EQUIVALENT
EMT	ELECTRICAL METALLIC TUBING
EPO	EMERGENCY POWER OFF
EQMT	EQUIPMENT
(E)	EXISTING
F.D.C.	FIRE DEPARTMENT CONNECTION
F.H.C.	FIRE HOSE CABINET
F.	FIRE
FA	FIRE ALARM
FC	FOOT CANDLE
FDR	FEEDER
FIXT	FIXTURE
FL	FLUSH
FLA	FULL LOAD AMPERES
FLR	FLOOR
FLUOR	FLUORESCENT
FT	FEET
F.F.	FINISHED FLOOR
FLR.	FLOOR
F.C.O.	FLOOR CLEAN OUT
F.D.	FLOOR DRAIN
F.S.	FLOOR SINK
G.P.H.	GALLONS PER HOUR
G.P.M.	GALLONS PER MINUTE
G.V.	GREASE VENT
G.C.O.	GRADE CLEAN OUT
GA	GUAGE
GALV	GALVANIZED
GFI	GROUND FAULT CIRCUIT INTERRUPTER
GFP	GROUND FAULT PROTECTION
GND	GROUND
GRC	GALVANIZED RIGID CONDUIT
H.W.	HOT WATER
H.W.R.	HOT WATER RETURN
HGT	HEIGHT
HOA	HAND OFF AUTOMATIC
HORIZ	HORIZONTAL
HP	HORSEPOWER
HTG	HEATING
HVAC	HEATING, VENTILATING & AIR CONDITIONING
INV.	INVERT
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS
PLB	PLUMBING
PNL	PANEL
PP	POWER PANEL
P/T	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PWR	POWER
QUAD	QUADRUPLEX
R	REMOVE
RC	REMOTE CONTROL
RECEPT	RECEPTACLE
REL	RELOCATE
REQ	REQUIRED
REV	REVERSE
RM	ROOM
RMS	ROOT MEAN SQUARE
SP	SPARE
SPD	SURGE PROTECTION DEVICE
SPECS	SPECIFICATIONS
SPKLR	SPRINKLER
SPKR	SPEAKER
SQ	SQUARE
STD	STANDARD
SURF	SURFACE
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SUSP	SUSPENDED
SYM	SYMMETRICAL
TEL	TELEPHONE
TELCO	TELEPHONE COMPANY
TV	TELEVISION
TYP	TYPICAL
UC	UNDERCOUNTER
UFD	UNDERFLOOR DUCT
UL	UNDERWRITERS LABORATORIES, INC.
V.T.R.	VENT THRU ROOF
V	VOLTS
VA	VOLT AMPERES
VENT	VENTILATING
VERT	VERTICAL
VP	VAPORPROOF
W.C.O.	WALL CLEAN OUT
W.H.	WALL HYDRANT
W.B.	WASHER BOX
W.C.	WATER CLOSET
WG	WIRE GUARD
WP	WEATHERPROOF
XFMR	TRANSFORMER
YD	YARD
1/C, 2/C,	1 CONDUCTOR, 2 CONDUCTORS, ETC.

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BASIC REQUIREMENTS

A.CODES AND STANDARDS:

1. ALL WORK SHALL COMPLY WITH THE MOST RECENTLY REVISED VERSIONS OF ALL APPLICABLE LAWS, RULES, REGULATIONS AND ORDINANCES OF ALL FEDERAL, STATE AND LOCAL AUTHORITIES AND APPLICABLE UTILITIES. NONE OF THE TERMS OR PROVISIONS OF THIS SPECIFICATION SHALL BE CONSTRUED AS WAIVING ANY PART OF THE RULES, REGULATIONS OR REQUIREMENTS OF THESE AUTHORITIES.

B.DRAWINGS AND SPECIFICATIONS

1. DRAWINGS: THE DRAWINGS ARE SCHEMATIC IN NATURE AND INDICATE APPROXIMATE LOCATIONS OF THE HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS, FIRE PROTECTION SYSTEMS, PLUMBING EQUIPMENT, FIXTURES AND PIPING SYSTEMS, EXCEPT WHERE SPECIFIC LOCATIONS ARE NOTED AND DIMENSIONED ON THE DRAWINGS. ALL ITEMS ARE SHOWN APPROXIMATELY TO SCALE. THE INTENT IS TO SHOW HOW THESE ITEMS SHALL BE INTEGRATED INTO THE CONSTRUCTION. LOCATE ALL ITEMS BY ON THE JOB MEASUREMENTS AND IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. COORDINATE WITH OTHER TRADES.

C.COMPLETENESS OF WORK

1. THE CONTRACT DOCUMENTS DEPICT MECHANICAL AND PLUMBING SYSTEMS WHICH ARE INTENDED TO BE COMPLETE AND FUNCTIONING SYSTEMS. ALL PRODUCTS, MATERIALS, AND LABOR NECESSARY TO RENDER A FULLY FUNCTIONAL SYSTEM TO FULFILL THE DESIGN INTENT SHOWN ON THE DOCUMENTS SHALL BE PROVIDED BY THE CONTRACTOR.

2. CATALOG NUMBERS REFERENCED THROUGHOUT THE DIVISION 15 DRAWINGS AND SPECIFICATIONS ARE INTENDED TO CONVEY A GENERAL UNDERSTANDING OF THE TYPE AND QUALITY OF THE PRODUCT REQUIRED. WHERE WRITTEN DESCRIPTIONS DIFFER FROM INFORMATION CONVEYED BY A CATALOG NUMBER, THE WRITTEN DESCRIPTION SHALL GOVERN. NO EXTRA SHALL BE ALLOWED BECAUSE A CATALOG NUMBER IS FOUND TO BE INCOMPLETE OR OBSOLETE.

D.COORDINATION

1. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF ALL ITEMS THAT WILL AFFECT THE INSTALLATION OF THE WORK OF THIS DIVISION. THE COORDINATION SHALL INCLUDE, BUT NOT BE LIMITED TO, VOLTAGE, AMPACITY, CAPACITY, ELECTRICAL/PIPING CONNECTIONS, STRUCTURAL SUPPORTS, SPACE REQUIREMENTS, LOCATING DEVICES IN ARCHITECTURAL FINISH ELEMENTS, STAGING THE CONSTRUCTION AND BUILDING REQUIREMENTS, AND SPECIAL CONDITIONS.

2. BY SUBMITTING SHOP DRAWINGS ON THE PROJECT, THIS CONTRACTOR IS INDICATING THAT ALL NECESSARY COORDINATION HAS BEEN COMPLETED AND THAT THE SYSTEMS, PRODUCTS AND EQUIPMENT SUBMITTED CAN BE INSTALLED IN THE BUILDING AND WILL OPERATE AS SPECIFIED AND INTENDED, IN FULL COORDINATION WITH ALL OTHER DISCIPLINES.

E.EQUIPMENT NOISE AND VIBRATION

1. IT IS THE INTENT TO SPECIFY AND FOR THE CONTRACTOR TO INSTALL SYSTEMS THAT ARE QUIET AND FREE OF VIBRATION. EQUIPMENT SHALL BE BALANCED AND VIBRATION ISOLATED TO MEET THE REQUIREMENTS SPECIFIED HEREIN FOR BOTH THE EQUIPMENT ITSELF AND CONDITIONS WITHIN OCCUPIED SPACES. THIS CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND INSTALLING EQUIPMENT THAT IS QUIET IN OPERATION AS COMPARED TO OTHER AVAILABLE EQUIPMENT OF ITS SIZE, CAPACITY, AND TYPE.

2. EQUIPMENT NOT MEETING THESE REQUIREMENTS SHALL BE CORRECTED BY THE CONTRACTOR TO AN ACCEPTABLE LEVEL BUT WITHIN THE REQUIREMENTS OF THE SPECIFICATIONS AT NO COST TO THE OWNER, ARCHITECT OR ENGINEER.

3. AIR DISTRIBUTION EQUIPMENT SHALL BE SOUND TESTED AT THE DESIGN OPERATING CONDITIONS AND SHALL NOT EXCEED AN NC OF 35 AT RATED CFM.

4. NOISE LEVEL: UNLESS NOTED OTHERWISE HEREIN OR ON THE DRAWINGS, THE NOISE LEVEL IN ALL OCCUPIED SPACES SHALL NOT EXCEED THE "LOWEST VALUE IN THE RANGE" OF THE NOISE CRITERIA CURVES PUBLISHED IN THE CURRENT FUNDAMENTALS EDITION OF THE ASHRAE GUIDE AND DATA BOOK. THE NOISE CRITERIA CURVES SHALL BE BASED ON ANSI STANDARD S1.6-1967 OCTAVE BANDS AND A SOUND PRESSURE LEVEL IN DECIBELS REFERENCED TO 0.002 MICROBARS. SOUND LEVELS IN OCCUPIED SPACES MUST MEET THE DESIGN CRITERIA WITH ALL CONSTRUCTION IN PLACE.

5. VERIFICATION: SHOULD A QUESTION ARISE REGARDING THE ACCEPTABLE LEVEL OF NOISE OR VIBRATION IN A PARTICULAR SPACE OR PIECE OF EQUIPMENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE SERVICES OF AN APPROVED ACOUSTICAL CONSULTANT TO DETERMINE ACTUAL NOISE/VIBRATION CONDITIONS.

F.WARRANTIES AND GUARANTEES

1. GENERAL: CONTRACTOR SHALL GUARANTEE ALL MATERIAL AND EQUIPMENT INSTALLED BY HIM AGAINST DEFECTS IN WORKMANSHIP AND MATERIAL FOR A PERIOD OF TWELVE (12) MONTHS AFTER FINAL ACCEPTANCE OF THE WORK BY THE OWNER, AND HE SHALL REPAIR OR REPLACE ANY MATERIALS OR EQUIPMENT DEVELOPING SUCH DEFECTS WITHIN THAT TIME, PROMPTLY ON DUE NOTICE GIVEN HIM BY THE OWNER AND AT CONTRACTOR'S SOLE COST AND EXPENSE.

2. EQUIPMENT: ALL EQUIPMENT BEARING A MANUFACTURER'S GUARANTEE SHALL BE CONSTRUED TO HAVE AN EXTENDED GUARANTEE TO THE OWNER BY THE MANUFACTURER. ANY SUCH EQUIPMENT THAT PROVES DEFECTIVE IN MATERIALS OR WORKMANSHIP WITHIN THE GUARANTEE PERIOD IS TO BE REPLACED BY THE CONTRACTOR IN ACCORDANCE WITH THE MANUFACTURER'S GUARANTEE.

G.BASE BUILDING STANDARDS

1. THE INTENT OF THIS SPECIFICATION IS TO PROVIDE A LEVEL OF QUALITY THAT MEETS OR EXCEEDS APPLICABLE CODES AND OWNERS EXPECTATIONS. IF ANY PORTION OF THESE SPECIFICATIONS ARE DIFFERENT THAT THE BUILDING STANDARDS, THIS SHOULD BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY TO DETERMINE WHICH IS THE CORRECT SPECIFICATION. ANY CHANGE WILL NOT BE CONSIDERED A CHANGE ORDER AS THE CONTRACTOR SHOULD BID ON THE MOST STRINGENT OF THE TWO.

H.SYSTEM CLEANING

1. DUCTWORK: THE DUCT SYSTEM SHALL BE KEPT CLEAN AND FREE FROM DUST AND DIRT DURING THE FABRICATION AND ERECTION PROCESS. WIPE EACH SECTION OF DUCT DOWN PRIOR TO HANGING IN PLACE. OPEN ENDS OF DUCT SYSTEMS SHALL BE SEALED WITH SHEET PLASTIC UNTIL FINAL CONNECTION TO AIR DEVICES HAS BEEN MADE. CLEAN ALL INTERIOR SURFACES OF DUCTWORK PRIOR TO STARTING THE SYSTEM FAN. REPAIR ALL TEARS IN INTERNAL DUCT LINER WITH MASTIC RATED FOR THE INSULATION SYSTEM.

2. EQUIPMENT: KEEP EQUIPMENT CLEAN AND DRY DURING THE CONSTRUCTION PROCESS. PRIOR TO START UP, INSPECT AND CLEAN ALL INTERIOR EQUIPMENT SURFACES, CLEAN AND REPAIR TORN INSULATION, REMOVE ALL DIRT AND DEBRIS. PROVIDE TEMPORARY FILTER MEDIA AS REQUIRED FOR UNIT OPERATION PRIOR TO FINAL COMMISSIONING.

GENERAL MECHANICAL NOTES

A. BEFORE SUBMITTING A BID, IT WILL BE NECESSARY FOR EACH CONTRACTOR WHOSE WORK IS INVOLVED TO VISIT THE SITE AND ASCERTAIN FOR HIMSELF THE CONDITIONS TO BE MET IN INSTALLING THE WORK AND MAKE PROVISIONS FOR THE CONDITIONS IN HIS FINAL PRICE. FAILURE ON THE PART OF THE CONTRACTOR TO COMPLY WITH THIS REQUIREMENT SHALL NOT BE CONSIDERED JUSTIFICATION FOR THE OMISSION OR FAULTY INSTALLATION OF ANY WORK COVERED BY THE CONTRACT DOCUMENTS.

B. THE CONTRACTOR SHALL SECURE ALL PERMITS, LICENSES AND INSPECTIONS REQUIRED FOR HIS WORK, AND SHALL PAY ALL FEES IN CONNECTION WITH SUCH PERMITS, LICENSES AND INSPECTIONS.

C. WORK SHALL COMPLY WITH THE MOST RECENT VERSION OF ALL APPLICABLE LAWS, RULES, REGULATIONS AND ORDINANCES OF ALL FEDERAL, STATE AND LOCAL AUTHORITIES. IN THE EVENT OF CONFLICT BETWEEN THE CONTRACT DOCUMENTS AND THE LOCAL ENFORCING AUTHORITY, THE LATTER SHALL RULE. ANY MODIFICATION RESULTING THEREFROM SHALL BE MADE WITHOUT ADDITIONAL COST TO THE OWNER OR ARCHITECT/ENGINEER. THE CONTRACTOR SHALL REPORT ANY SUCH MODIFICATIONS TO THE ARCHITECT/ENGINEER AND SECURE HIS APPROVAL BEFORE PROCEEDING. SHOULD THE REQUIREMENTS OF THE CONTRACT DOCUMENTS EXCEED THE REQUIREMENTS OF THE CODES, THE CONTRACT DOCUMENTS SHALL TAKE PRECEDENCE PROVIDED THEY ARE NOT IN CONFLICT WITH THOSE CODES.

D. ALL ITEMS OF EQUIPMENT AND ALL MATERIALS FOR WHICH APPROVAL STANDARDS HAVE BEEN ESTABLISHED BY UNDERWRITERS' LABORATORIES, INC. (UL), FACTORY MUTUAL (FM), CERTIFIED BALLAST MANUFACTURER (CBM), ELECTRICAL TESTING ASSOCIATION (NEMA) SHALL BE SO APPROVED AND SHALL BEAR APPROVAL LABELS.

E. PENETRATIONS THROUGH FLOORS OR FIRE-RATED CONSTRUCTION SHALL BE FIRESAFED TO COMPLY WITH ASTM E-814 (UL 1479), AND LOCAL CODE REQUIREMENTS.

SUBMITTALS AND SHOP DRAWINGS

A. CONTRACTOR SHALL PROVIDE THE ENGINEER WITH PRODUCT DATA AND SHOP DRAWINGS FOR ALL MATERIALS & EQUIPMENT SPECIFIED BELOW. SUBMITTALS SHALL BE PROVIDED IN AN ELECTRONIC FORMAT. SUBMITTAL DATA SHALL INCLUDE:

1. COVER SHEET WITH NAMES AND ADDRESSES OF PROJECT, ARCHITECT MEP ENGINEER, GENERAL CONTRACTOR & SUB CONTRACTOR.
2. DRAWING REFERENCE NUMBER, PRODUCT NAME AND/OR DESCRIPTION.
3. INDEX OF ALL DATA IN SUBMITTAL.
4. DIMENSIONAL DATA AND SKETCHES SHOWING THAT SUBMITTED EQUIPMENT WILL FIT INTO SPACE AVAILABLE AND WILL HAVE REQUIRED CODE AND MAINTENANCE CLEARANCES.
5. IDENTIFICATION OF EACH ITEM MATCHING THAT INDICATED ON THE DRAWINGS.
6. SUFFICIENT PERFORMANCE DATA, CAPACITY, SOUND DATA, DIAGRAMMATIC DATA AND DESCRIPTIVE INFORMATION TO SHOW ITS COMPLIANCE'S WITH THE CONTRACT DOCUMENTS. OPTIONS OR SPECIAL REQUIREMENTS SHALL BE CLEARLY INDICATED. APPLICABLE INFORMATION SHALL BE CLEARLY INDICATED AND NON APPLICABLE DATA SHALL BE CROSSED OFF.
7. MATERIALS AND EQUIPMENT PURCHASED OR INSTALLED WITHOUT A "NO EXCEPTIONS TAKEN" SHOP DRAWING REVIEW SHALL BE AT THE RISK OF THE CONTRACTOR. THE COST OF REMOVAL AND AT THE RISK OF THE CONTRACTOR. THE COST OF REMOVAL AND REPLACEMENT OF SUCH MATERIALS WHICH IS JUDGED UN-SATISFACTORY BY THE ENGINEER FOR ANY REASON SHALL BE AT THE EXPENSE OF THE CONTRACTOR.
8. ANY ITEMS KNOWINGLY SUBMITTED THAT DO NOT COMPLY WITH SPECIFICATIONS SHALL BE LISTED WITH EXPLANATION AS TO WHY THEY ARE BEING SUBMITTED.

B. REQUIRED SUBMITTALS/SHOP DRAWINGS.

1. DUCT CONSTRUCTION AND ROUTING
2. DUCTWORK INSULATION
3. ROOF TOP UNITS
4. DAMPERS
5. FANS
6. FILTERS
7. GRILLES, REGISTERS AND DIFFUSERS
8. CONTROLS

GENERAL MATERIALS AND METHODS

A.HANGERS AND SUPPORTS

1. GENERAL: PROVIDE PIPE HANGERS AND SUPPORT MATERIALS AS SPECIFIED HEREIN. ALL HORIZONTAL AND VERTICAL PIPING SHALL BE THOROUGHLY AND SUBSTANTIALLY SUPPORTED IN ACCORDANCE WITH ANSI B31.1 STANDARD CODE FOR PRESSURE PIPING AND MANUFACTURERS' STANDARDIZATION SOCIETY MSS SP-69 PIPE HANGERS AND SUPPORTS - SELECTION AND APPLICATION. THE DESIGN, TYPE, SPACING AND APPLICATION OF ALL HANGERS, SUPPORTS, ANCHORS AND GUIDES SHALL COMPLY WITH THE ABOVE STANDARDS. HANGER RODS SHALL BE GALVANIZED OR CADMIUM PLATED. HANGER ROD CLAMPS AND INSERTS SHALL BE AS RECOMMENDED BY THE CLAMP OR INSERT MANUFACTURER FOR THE INTENDED USE AND SHALL BE APPROVED IN WRITING BY THE STRUCTURAL ENGINEER. ALL METHODS OF ATTACHMENT TO THE STRUCTURE AND THE USE OF AFTER-SET INSERTS SHALL BE APPROVED IN WRITING BY THE STRUCTURAL ENGINEER. THE LOAD AND SPACING ON EACH HANGER AND/OR INSERT SHALL NOT EXCEED THE SAFE ALLOWABLE LOAD FOR ANY COMPONENT OF THE SUPPORT SYSTEM, INCLUDING THE CONCRETE WHICH HOLDS THE INSERTS. REINFORCEMENT AT INSERTS SHALL BE PROVIDED AS REQUIRED TO DEVELOP THE STRENGTH REQUIRED.

B.PAINTING

1. ALL MACHINERY AND EQUIPMENT NOT FINISHED AT THE FACTORY SHALL BE GIVEN A PRIME COAT AND THEN FINISH PAINTED WITH TWO COATS OF ENAMEL IN COLORS AS DIRECTED BY THE ARCHITECT/ENGINEER OR OWNER'S REPRESENTATIVE. NO NAMEPLATES ON EQUIPMENT SHALL BE PAINTED, AND SUITABLE PROTECTION SHALL BE AFFORDED SUCH PLATES TO PREVENT THEIR BEING RENDERED ILLEGIBLE DURING THE PAINTING OPERATIONS.

2. ALL UNINSULATED BLACK STEEL PIPE, HANGERS AND SUPPORTS SHALL BE GIVEN TWO COATS OF PRIMER. WHERE EXPOSED TO OUTDOOR WEATHER OR PUBLIC VIEW, THESE ITEMS SHALL BE PRIMED AND FINISHED WITH TWO COATS OF ENAMEL IN COLORS .

3. ALL INSULATED PIPING EXPOSED TO VIEW SHALL HAVE THE FINISHED INSULATION PAINTED WITH TWO COATS OF ACRYLIC IN COLORS AS INDICATED IN THE PIPING SYSTEM IDENTIFICATION TABLE. PIPING CONCEALED IN FURRINGS, CHASES, OR ABOVE SUSPENDED CEILINGS, NEED NOT BE PAINTED.

C.IDENTIFICATION AND LABELING

1. ROOFTOP EQUIPMENT, AIR HANDLING UNITS, SUPPLY FANS, EXHAUST FANS, AND ANY OTHER EQUIPMENT DESIGNATED BY THE ARCHITECT/ENGINEER SHALL BE LABELED WITH PERMANENTLY ATTACHED ENGRAVED NAMEPLATES CONSTRUCTED FROM LAMINATED PHENOLIC PLASTIC, AT LEAST 1/16 INCH THICK, 3-PLY, BLACK SURFACES AND WHITE CORE. ENGRAVING SHALL BE CONDENSED GOTHIC AT LEAST 3/8 INCH HIGH. ENGRAVING SHALL INCLUDE EQUIPMENT NAME AND NUMBER AND ELECTRICAL PANEL AND CIRCUIT WHICH SERVICES THE EQUIPMENT. CONSULT ARCHITECT/ENGINEER FOR LABEL NOMENCLATURE.

2. ALL VALVES AT MAJOR EQUIPMENT AND IN ALL EQUIPMENT ROOMS SHALL BE MARKED WITH 1-1/2" DIAMETER ALUMINUM OR ENGRAVED PLASTIC TAGS SECURELY ATTACHED TO VALVE STEMS WITH "S" HOOKS.

AIR BALANCE

A. UPON COMPLETION OF THE INSTALLATION OF THE HVAC SYSTEMS, THE AIR VOLUME FOR EACH GRILLE HALL BE SET TO DELIVER THE LISTED AIR VOLUME AND THE EXHAUST SYSTEM SHALL BE ADJUSTED TO ITS RATED EXHAUST VOLUME. AN INDEPENDENT, NEBB OR AABC CERTIFIED AIR BALANCE CONTRACTOR SHALL PERFORM THE AIR BALANCE AND SHALL SUBMIT A REPORT TO THE ENGINEER INDICATING AIR QUANTITIES AT ALL AIR HANDLING EQUIPMENT AND AIR DISTRIBUTION DEVICES. THE REPORT SHALL SHOW DESIGN QUANTITIES AND MEASURED QUANTITIES. ALL SUPPLY AND EXHAUST VOLUMES MUSTBE EQUAL TO OR WITHIN +5% OF THE LISTED AIRFLOW RATE.

ACCESS DOORS

A. ACCESS DOORS SHALL BE PROVIDED FOR ACCESS TO VALVES, DAMPERS OR ANY OTHER ITEM WHICH MAY REQUIRE SERVICING OR ADJUSTING AND WHICH IS CONCEALED BEHIND AN INACCESSIBLE SURFACE SUCH AS SPLINED CEILINGS AND PLASTER WALLS OR CEILINGS. ACCESS DOORS SHALL BE AS MANUFACTURED BY MILCOR OR AN APPROVED EQUAL FOR SPECIFIC APPLICATION.

DUCTWORK

A. ALL DUCTWORK SHALL BE CONSTRUCTED OF NEW LOCK FORMING QUALITY GALVANIZED SHEET METAL IN ACCORDANCE WITH THE LATEST SMACNA STANDARDS TO THE 2" W.G. PRESSURE CLASSIFICATION. ALL LONGITUDINAL SEAMS AND TRANSVERSE JOINTS SHALL BE SEALED PER SMACNA DUCT SEALING REQUIREMENTS SEAL CLASS "B". SEAL WITH A WATER BASED ADHESIVE SEALER DESIGNED FOR MEDIUM VELOCITY DUCT SYSTEMS. SEALER SHALL BE HARDCAST, INC., "IRON GRIP WATER BASE DUCT SEALANT #601." DUCTWORK SHALL BE HUNG AS HIGH AS POSSIBLE FROM THE BUILDING STRUCTURE WITH HANGER ASSEMBLIES IN ACCORDANCE WITH "SMACNA" REQUIREMENTS. THE CONTRACTOR SHALL PROVIDE ADDITIONAL RISES, DROPS, AND OFFSETS IN DUCTWORK AS REQUIRED. IF AFTER INSTALLED, NEW DUCTWORK IS FOUND TO BE IN CONFLICT WITH ARCHITECTURAL, STRUCTURAL, OR MEP ELEMENTS WHICH ARE EITHER EXISTING OR SHOWN ON THE CONTRACT DOCUMENTS, THE DUCTWORK SHALL BE RELOCATED WITHOUT ADDITIONAL COST TO THE OWNER.

B. ALL INSULATION SHALL HAVE A COMPOSITE (INSULATION, JACKET OR FACING, AND ADHESIVE USED TO ADHERE FACING OR JACKET TO INSULATION) FIRE AMD SMOKE HAZARD RATING (AS TESTED BY PROCEDURE ASTM E84, NFPA 225, AND UL 273) NOT EXCEEDING A FLAME SPREAD RATING OF 25 AND A SMOKE DEVELOPED RATING OF 50.

C. ALL NEW SUPPLY, RETURN, AND OUTSIDE AIR DUCTWORK SHALL BE EXTERNALLY INSULATED WITH 2" THICK DUCT WRAP, 3/4 LB/CU.FT. INSULATION. INSULATION SHALL HAVE A FACTORY APPLIED FOIL-SKRIM-KRAFT FACING CONSISTING OF 0.35 MIL. ALUMINUM FOIL REINFORCED WITH GLASS YARN MESH AND LAMINATED TO 40 POUND CHEMICAL TREATED, FIRE RESISTANT KRAFT. OVERLAP ALL SEAMS, STAGGER LONGITUDINAL SEAMS. SEAL SEAMS WITH 4" WIDE PRESSURE SENSITIVE TAPE AND OUTWARD CLINCHING STAPLES. USE SPEED CLIP PINS ADHERED TO DUCT SURFACES OVER 18" IN WIDTH ON 16" ENTERS AND MAX. 3" FROM INSULATION SEAMS. APPLY BRUSH ON VAPOR RETARDANT MASTIC OVER TAPE EDGES, PINS, AND TEARS IN THE FOIL VAPOR BARRIER.

D. ROUND FLEXIBLE DUCT SHALL HAVE 1" THICK, 1-1/2 LB/CU.FT. DENSITY FIBERGLASS INSULATION, VINYL VAPOR BARRIER. MINIMUM LENGTH 4'-0"; MAXIMUM LENGTH 6'-0". IF EXTENSION IS REQUIRED, USE ROUND SHEET METAL DUCT THAT IS EXTERNALLY INSULATED WITH 1" THICK, 1-1/2 LB/CU.FT. FIBERGLASS INSULATION AND FOIL-SKRIM-KRAFT VAPOR BARRIER. SECURE FLEXIBLE DUCT TO SPIN-IN AND AIR DEVICE NECK WITH CORROSION RESISTANT METAL CLAMPS AND SEAL VAPOR BARRIER AS DESCRIBED ABOVE IN NOTE 3. SUSPEND FLEX DUCT FROM STRUCTURE AT DUCT CONNECTION AND EVERY 4 FEET. DO NOT ALLOW IT TO REST ON CEILING WHERE FLEXIBLE DUCT PENETRATES A WALL THAT EXTENDS TO STRUCTURE, PROVIDE INSULATED RIGID DUCT EXTENDING 12" ON EITHER SIDE OF THE PARTITION.

E. FLEXIBLE DUCT SHALL BE USED WHERE FLEXIBLE DUCT CONNECTIONS ARE SHOWN ON THE DRAWINGS TO AIR DISTRIBUTION DEVICES AND TERMINAL UNITS. MAXIMUM LENGTH SHALL BE 6'-0" FOR AIR DISTRIBUTION DEVICE CONNECTIONS. WHERE LONGER RUNS ARE REQUIRED, PROVIDE RIGID ROUND DUCTWORK. FLEXIBLE DUCTS SHALL BE SUPPORTED IN SUCH A MANNER TO PREVENT SAGS AND KINKS. BENDS IN ANY LENGTH OF FLEXIBLE DUCT SHALL NOT EXCEED A TOTAL TURNING OF 90D. EXTEND INSULATION AND OUTER JACKET OVER THE SECURED CLAMP AND TAPE DOWN TO THE SLEEVE/COLLAR TO MAINTAIN VAPOR BARRIER INTEGRITY. "R-VALUE" OF 8 MUST BE MAINTAINED THROUGH INSTALLATION. INSULATION ON FLEXIBLE DUCT SHALL NOT BE COMPRESSED. IF IT COMPLIES WITH THESE SPECIFICATIONS, FLEXIBLE DUCTWORK EQUAL TO FLEXMASTER TYPE 8M OR THERMAFLEX M-KE WILL BE ACCEPTABLE.

F. FLEXIBLE DUCTWORK SHALL NOT BE USED IN AREAS OF EXPOSED CEILINGS.

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6/5/2019

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Sheet: MEP0.02

Sheet Name: **MEP SPECIFICATIONS - MECHANICAL**

6/5/2019 12:03:1 AM

DX PACKAGED ROOFTOP UNITS

A.RELATED DOCUMENTS

1. THE REQUIREMENTS OF THE GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, DIVISION AND DRAWINGS APPLY TO ALL WORK HEREIN.

B.QUALITY ASSURANCE

1. MANUFACTURERS SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING ROOFTOP UNITS WHICH MAY BE INCORPORATED IN THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1.1. DAIKIN
1.2. TRANE
1.3. AAON
1.4. CARRIER
1.5. JOHNSON CONTROLS

C.GENERAL

1. UNITS SHALL BE FACTORY-ASSEMBLED AND TESTED, DESIGNED FOR ROOF OR SLAB INSTALLATION. CAPACITIES AND ELECTRIC CHARACTERISTICS ARE SCHEDULED ON THE DRAWINGS.

D.CASING

1. MANUFACTURER'S STANDARD CASING CONSTRUCTION, HAVING CORROSION PROTECTION COATING, AND EXTERIOR FINISH.

2. CASING SHALL HAVE REMOVABLE PANELS OR ACCESS DOORS FOR INSPECTION AND ACCESS TO INTERNAL PARTS AND FILTERS 2" THICK THERMAL INSULATION.

3. KNOCKOUTS FOR ELECTRICAL AND PIPING CONNECTIONS.

4. INTERIOR CONDENSATE DRAIN CONNECTION AND LIFTING LUGS. IF EXTERIOR DRAIN, DRAIN MUST PENETRATE CURB AND CONTINUE AS DETAILED AND SHOWN ON PLAN.

E.ROOF CURB

1. FURNISH ONE COMPLETE INSULATED FINAL FILTER ROOF CURB FOR EACH PACKAGED UNIT, DESIGNED FOR WEATHERPROOF INSTALLATION. KCC INTERNATIONAL MODEL KCC-OA OR APPROVED EQUAL. CURB SHALL BE FURNISHED APPROVED BY UNIT MANUFACTURER. ROOF CURB SHALL BE EQUIPPED TO ACCOMMODATE ALL TYPES OF ROOFING SYSTEMS. REFER TO UNIT SCHEDULE FOR FINAL FILTER TYPE.

2. PLY AND RETURN DUCT SHALL CONNECT THROUGH THE CURBED OPENING WITH FLEXIBLE CONNECTIONS TO THE BOTTOM OF THE AC UNIT, UNLESS SHOWN OTHERWISE ON THE DRAWINGS.

3. CURB SHALL COMPLY WITH NATIONAL ROOFING CONTRACTORS ASSOCIATION REQUIREMENTS.

4. SLOPE OF ROOF CURB SHALL MATCH ROOF SLOPE TO PROVIDE FOR LEVEL SUPPORT OF PACKAGED UNIT.

5. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF CURB, SUPPLY AND RETURN DUCTS, AND WEATHERPROOFING OF THE ENTIRE INSTALLATION.

F.EVAPORATOR FANS

1. FORWARD-CURVED, CENTRIFUGAL, DIRECT OR BELT-DRIVEN FANS WITH ADJUSTABLE SHEAVES (ON BELT-DRIVEN FANS) AND 100,000 HOUR LIFE PERMANENTLY LUBRICATED MOTOR BEARINGS. PROVIDE STEEL FANS WITH CORROSION RESISTANT FINISH. AFTER BALANCING (OR TO ACHIEVE BALANCE) REPLACE ADJUSTABLE SHEAVE WITH THE PROPER COMBINATION OF FIXED SHEAVES NEEDED TO ACHIEVE THE REQUIRED AIR FLOW AMOUNTS.

G.CONDENSER FANS

1. PROPELLER-TYPE, DIRECT-DRIVEN FANS WITH PERMANENTLY LUBRICATED MOTOR BEARINGS.

H.COILS

1. ALUMINUM FIN AND COPPER TUBE TYPE. FINS SHALL HAVE COLLARS DRAWN, BELLED AND FIRMLY BONDED TO THE TUBES BY MEANS OF MECHANICAL EXPANSION OF THE TUBES. NO SOLDERING OR TINNING SHALL BE USE IN THE BONDING PROCESS. COILS SHALL HAVE A GALVANIZED STEEL OR STAINLESS STEEL CASING. COILS SHALL BE MOUNTED IN THE COIL CASING WITH SAME END CONNECTIONS ACCESSIBLE FOR SERVICE. COIL SECTION SHALL BE COMPLETELY INSULATED.

I.REFRIGERANT COOLING COILS

1. HAVE AN EQUALIZING TYPE VERTICAL DISTRIBUTOR TO ENSURE EACH COIL CIRCUIT RECEIVES THE SAME AMOUNT OF REFRIGERANT. COILS SHALL BE PROOF (450 PSIG) AND LEAK (300 PSIG) TESTED WITH AIR PRESSURE UNDER WATER, THEN CLEANED, DEHYDRATED, AND SEALED WITH A HOLDING CHARGE OF NITROGEN.

J.REFRIGERATION SYSTEM

1. EACH SCROLL COMPRESSOR SHALL BE FITTED WITH CRANKCASE HEATER, VIBRATION ISOLATORS, REFRIGERANT DRYER, EXTERNAL CONNECTIONS FOR EXTERNAL OIL LEVEL CONTROL IF MULTIPLE COMPRESSORS ARE REQUIRED, MOTOR WINDING PROTECTION, HIGH AND LOW PRESSURE CUTOUTS, PLUS ANY OTHER PROTECTIVE OR OPERATING DEVICE OR FITTING REQUIRED AND PROVIDED AS STANDARD BY THE COMPRESSOR MANUFACTURER. COMPRESSORS SHALL BE DESIGNED FOR CONTINUOUS OR CYCLING OPERATION AT THE SPECIFIED DESIGN CONDITIONS WITHOUT DETRIMENTAL EFFECT.

2. COMPRESSOR(S) SHALL BE MOUNTED IN AN ISOLATED COMPARTMENT TO PERMIT OPERATION OF THE UNIT WITHOUT AFFECTING CONDENSER AIR FLOW WHEN THE COMPRESSOR COMPARTMENT IS OPEN.

3. COMPRESSOR(S) SHALL BE ISOLATED FROM THE BASE PAN AND SUPPLY AIR TO AVOID ANY TRANSMISSION OF NOISE FROM THE COMPRESSOR INTO THE BUILDING AREA.

4. SYSTEM SHALL BE EQUIPPED WITH THERMOSTATIC EXPANSION VALVE TYPE REFRIGERANT FLOW CONTROL.

5. SYSTEM SHALL BE EQUIPPED WITH AUTOMATIC RESET LOW PRESSURE AND MANUAL RESET HIGH PRESSURE REFRIGERANT CONTROLS.

6. UNIT SHALL BE EQUIPPED WITH REFRIGERANT LIQUID LINE FILTER DRIERS.

K.HEATING ELEMENTS

1. OPEN COIL OF RESISTANCE WIRE, 80 PERCENT NICKEL AND 20 PERCENT CHROMIUM. SUPPORTED AND INSULTED BY FLOATING CERAMIC BUSHINGS. RECESS BUSHINGS INTO CASING OPENING AND FASTEN TO SUPPORTING BRACKETS. MOUNTED IN GALVANIZED-STEEL FRAME.

2. OVER-TEMPERATURE PROTECTION SERVICEABLE VIA A REMOVABLE ACCESS PANEL, WITHOUT REMOVING THE HEATER FROM THE UNIT, UTILIZING DISK-TYPE, AUTOMATIC RESET, THERMAL CUT-OUT SAFETY DEVICES FOR PRIMARY PROTECTION AND LOAD CARRYING, MANUAL RESET OR MANUALLY REPLACEABLE THERMAL CUT-OUTS, FACTORY WIRED IN SERIES WITH EACH HEATER STAGE, FOR SECONDARY PROTECTION. PROVIDE AN AIRFLOW SWITCH, CONSISTING OF A DIAPHRAGM OPERATED DIFFERENTIAL PRESSURE SWITCH TO PREVENT HEATER FROM OPERATING WHEN THERE IS NO AIR FLOW IN THE SYSTEM.

3. CONTROL PANEL MOUNTED ON UNIT, WHICH MEANS OF SAFETY DISCONNECT AND STAGE OVER CURRENT PROTECTION, INCLUDING A MAGNETIC CONTACTOR, [TOGGLE SWITCHES; ONE PER STEP, WITH A STEP CONTROLLER] [SILICON-CONTROLLED RECTIFIER (SCR) WITH 4-20 MA OR 0-10 VOLT INPUT] AND A TIME-DELAY RELAY.

L.FILTER SECTION

1. STANDARD FILTER SECTION SHALL CONSIST OF FACTORY INSTALLED LOW VELOCITY, DISPOSABLE 2" THICK, 30% EFFICIENT, PLEATED GLASS FIBER FILTER.

2. PROVIDE FINAL FILTER AS SPECIFIED IN SCHEDULE IF APPLICABLE.

M.ELECTRICAL REQUIREMENTS

1. ALL UNIT POWER WIRING SHALL ENTER UNIT CABINET AT A SINGLE LOCATION. INCLUDE FACTORY MOUNTED DISCONNECT SWITCH AND UNIT POWERED CONVENIENCE OUTLET WITH FACTORY INSTALLED INTERNAL WIRING.

N.MOTORS

1. COMPRESSOR MOTOR SHALL BE COOLED BY SUCTION GAS PASSING THROUGH MOTOR WINDING AND SHALL HAVE LINE BREAK THERMAL AND CURRENT OVERLOAD PROTECTION.

2. OUTDOOR TOTALLY ENCLOSED MOTOR SHALL HAVE PERMANENTLY LUBRICATED BEARINGS, AND INHERENT AUTOMATIC RESET THERMAL OVERLOAD PROTECTION.

O.COMPRESSOR CYCLE DELAY

1. COMPRESSOR SHALL BE PREVENTED FROM RESTARTING FOR A MINIMUM OF 5 MINUTES AFTER SHUTDOWN.

P.THERMOSTAT

1. CAPABLE OF USING DELUXE FULL-FEATURED ELECTRONIC THERMOSTAT.

FANS

A.SCOPE

1. PROVIDE FAN UNIT INCLUDING, THE FURNISHING AND INSTALLATION OF CONTROLS, ELECTRONIC VARIABLE SPEED DRIVES, MOTORS AND CONTROLLERS, NOISE AND VIBRATION ISOLATION AS REQUIRED BY LOCAL, STATE, AND OTHER APPLICABLE CODES.

B.QUALITY ASSURANCE

1. MANUFACTURERS: IF THEY COMPLY WITH THESE SPECIFICATIONS AND REQUIREMENTS, PRODUCTS:

1.1 GREENEHCK
1.2 COOK
1.3 ACME
1.4 APPROVED EQUAL

C.GENERAL REQUIREMENTS

1. SHEAVES: VARIABLE PITCH MOTOR SHEAVES SHALL BE FURNISHED FROM THE FACTORY ON ALL BELT DRIVEN EQUIPMENT. AFTER THE PROPER SPEED HAS BEEN DETERMINED AND ALL BALANCING IS COMPLETED AND ACCEPTED, VARIABLE SHEAVES SHALL BE REPLACED WITH FIXED SHEAVES. FAN SHEAVES SHALL BE OF THE NON-ADJUSTABLE TYPE.

1.1 THE MOTOR SHEAVES SHALL BE BROWNING TYPE LVP OR MVP CAST IRON ADJUSTABLE TYPE WITH DOUBLE LOCKING FEATURES.
1.2 SHEAVES SHALL BE ADJUSTABLE AS CLOSE TO 10% ABOVE AND BELOW THE RATED FAN SELECTION RPM AS POSSIBLE.
1.3 FAN SHEAVES SHALL BE OF THE NON-ADJUSTABLE TYPE WITH REMOVABLE MACHINED BUSHINGS AND SHALL BE MACHINED ON ALL SURFACES.
1.4 SHEAVES SHALL BE CAST IRON.

2. DRIVES: FAN DRIVES SHALL BE SELECTED WITH A MINIMUM BELT HORSEPOWER CAPACITY OF 150% OF THE MOTOR NAMEPLATE HORSEPOWER. BELT RATINGS SHALL BE IN ACCORDANCE WITH "ENGINEERING STANDARDS FOR MULTIPLE V-BELT DRIVES". FOR ALL EXHAUST FANS REQUIRING 1-1/2 HP OR LARGER MOTORS, THE FAN DRIVE SELECTION CALCULATIONS SHALL BE SUBMITTED WITH THE SUBMITTAL FOR REVIEW.

3. BELTS: BELTS SHALL BE STANDARD V-GROOVED TYPE SUITABLE FOR THE SERVICE INTENDED.

4. SPEED CONTROLLERS: ALL DIRECT DRIVE FANS, EXCEPT THOSE WITH ECM MOTORS, SHALL BE FURNISHED WITH A SOLID STATE SPEED CONTROLLER UNLESS OTHERWISE NOTED. SOLID STATE SPEED CONTROLLERS SHALL BE MOUNTED ABOVE THE CEILING ADJACENT TO THE FAN BEING SERVED WHEN A SPECIFIC LOCATION IS NOT SHOWN.

D.CURBS:

1. FAN MANUFACTURER SHALL PROVIDE A PREFABRICATED, INSULATED ALUMINUM ROOF CURB FOR ALL ROOF MOUNTED FANS. CURB SHALL BE OF WELDED CONSTRUCTION AND ROOF-OVER-FLASHING TYPE WITH BUILD-IN CANT AND OVERALL HEIGHT OF 8" ABOVE ROOF SURFACE, UNLESS OTHERWISE NOTED. ROOF CURB SHALL BE EQUIPPED TO ACCOMMODATE ALL TYPES OF ROOFING SYSTEMS. COORDINATION WITH THE ARCHITECTURAL DRAWINGS IS REQUIRED. DAMPER TRAY SHALL BE PROVIDED TO FACILITATE THE MOUNTING OF THE BACKDRAFT DAMPERS. EXTENDED BASE CURBS SHALL BE PROVIDED WHEN SCHEDULED OR REQUIRED BY APPLICABLE CODES.

E.EQUIPMENT

1. CENTRIFUGAL ROOF EXHAUST FANS

2.1 FANS SHALL BE CENTRIFUGAL BELT DRIVEN TYPE OR DIRECT DRIVEN TYPE WITH ECM MOTOR. FAN WHEEL SHALL BE CENTRIFUGAL BACKWARD INCLINED, CONSTRUCTED OF ALUMINUM. WHEELS SHALL BE STATICALLY AND DYNAMICALLY BALANCED. FAN HOUSING SHALL BE HEAVY GAUGE ALUMINUM WITH A RIGID INTERNAL SUPPORT STRUCTURE. FAN SHROUD SHALL HAVE A ROLLED BEAD FOR ADDED STRENGTH. FAN HOUSING SHALL HAVE A GALVANIZED RIGID WIRE BIRD SCREEN. MOTORS SHALL BE HEAVY DUTY, BALL BEARING TYPE, MOUNTED ON VIBRATION ISOLATORS. PRECISION GROUND AND POLISHED FAN SHAFT SHALL BE MOUNTED IN PERMANENTLY LUBRICATED PILLOW BLOCK BEARINGS. MOTOR PULLEYS SHALL BE ADJUSTABLE.

2.2 ACCESSORIES SHALL INCLUDE PREFABRICATED ROOF CURB, DISCONNECT SWITCH AND MOTORIZED BACKDRAFT DAMPER.

F.INSTALLATION

1. ALL FANS MOUNTED ON ROOF CURBS SHALL BE SECURELY ATTACHED TO THE ROOF CURB WITH APPROPRIATE FASTENERS LOCATED 8 INCHES ON CENTER WITH A MINIMUM OF TWO FASTENERS PER SIDE. THE ROOF CURB SHALL BE SECURELY ATTACHED TO THE BUILDING STRUCTURE.

2. FURNISH AND COORDINATE ALL ROOF MOUNTED FAN CURB OPENINGS PRIOR TO ROOFING INSTALLATIONS.

3. ALL FANS WITH 2000 CFM OR GREATER AIRFLOW SHALL HAVE A FIRESTAT WITH MANUAL RESET SET TO OPEN AT 50 DEGREES ABOVE MAXIMUM SYSTEM OPERATING TEMPERATURE AND SHUT DOWN THE FAN. FIRESTAT SHALL BE FURNISHED AND INSTALLED BY MECHANICAL CONTRCTOR WITH WIRING BY ELECTRICAL CONTRACTOR.

4. WHEN INSTALLING UTILITY STYLE FAN SETS, PAY CLOSE ATTENTION TO POTENTIAL PROBLEMS WITH SO CALLED "SYSTEM EFFECTS" ASSOCIATED WITH THE PLACEMENT OF TURNS AND OFFSETS OF DUCTWORK TOO CLOSE TO THE INLET OF THE FAN. EACH FAN SHALL HAVE A STRAIGHT SECTION OF DUCT OF A MINIMUM LENGTH EQUAL TO THREE (3) DIAMETERS OF THE INLET DUCT. SHOULD THIS CONDITION NOT BE POSSIBLE TO ACHIEVE DUE TO FIELD RESTRAINTS, CONTACT THE ENGINEER IMMEDIATELY FOR ASSISTANCE IN THE RESOLUTION OF THE MATTER. COSTS INCURRED BECAUSE OF A FAILURE TO DO SO IN A TIMELY MANNER WILL BE THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR.

AIR DISTRIBUTION DEVICES AND DAMPERS

A.SCOPE

1. GENERAL: FURNISH AND INSTALL AIR DISTRIBUTION DEVICES AS SHOWN, SCHEDULED, SPECIFIED, AND REQUIRED. DEVICES SHALL BE COMPLETE WITH ALL REQUIRED MOUNTING ACCESSORIES FOR INSTALLATION IN THE ACTUAL CONSTRUCTION AT THE INSTALLATION LOCATION.QUALITY ASSURANCE

B.QUALITY ASSURANCE

1. MANUFACTURERS: IF THEY COMPLY WITH THESE SPECIFICATIONS AND REQUIREMENTS, PRODUCTS OF THE FOLLOWING MANUFACTURERS WILL BE ACCEPTABLE:

1.1 NAILOR
1.2 KRUEGER
1.3 METALAIRE
1.4 TITUS
1.5 PRICE
1.6 RUSKIN

C. PRODUCTS

1. GENERAL: PROVIDE AIR DISTRIBUTION DEVICES OF THE SIZE, SHAPE, AND TYPE CONSTRUCTED OF MATERIALS AND COMPONENTS AND WITH FINISHES AS SPECIFIED, SCHEDULED, AND SHOWN. GRILLES, REGISTERS, AND CEILING DIFFUSERS SHALL BE PROVIDED WITH NEOPRENE OR SOFT FELT GASKETS. IF A MANUFACTURER OTHER THAN THE ONE SCHEDULED IS USED, THE SIZES SHOWN ON THE DRAWINGS SHALL BE CHECKED FOR PERFORMANCE, NOISE LEVEL, FACE VELOCITY, THROW, PRESSURE DROP, ETC., BEFORE THE SUBMITTAL IS MADE. SELECTIONS SHALL MEET THE MANUFACTURER'S OWN PUBLISHED DATA FOR THE ABOVE PERFORMANCE CRITERIA. THE THROW SHALL BE SUCH THAT THE VELOCITY AT THE END OF THE THROW IN THE FIVE FOOT OCCUPANCY ZONE WILL BE NOT MORE THAN 50 FPM NOR LESS THAN 25 FPM. NOISE LEVELS SHALL NOT EXCEED THOSE PUBLISHED IN THE ASHRAE APPLICATIONS HANDBOOK FOR THE TYPE OF SPACE BEING SERVED (NC LEVEL) EXCEPT NONE SHALL EXCEED NC 35.

2. SURFACE COMPATIBILITY: AIR DISTRIBUTION DEVICES SHALL HAVE FRAMES FULLY COMPATIBLE WITH THE CEILING, WALL, AND FLOOR SURFACES IN WHICH THEY ARE INSTALLED AND SHALL BE PROVIDED WITH ALL REQUIRED MOUNTING ACCESSORIES FOR INSTALLATION IN THE ACTUAL CONSTRUCTION AT THE INSTALLATION LOCATION. PROVIDE CONCEALED FASTENING ON ALL SURFACES.

3. FINISHES: ALL CEILING AND WALL MOUNTED AIR DEVICES SHALL HAVE CORROSION RESISTANT TREATED SURFACES AND BE PAINTED WHITE OR OFF-WHITE WITH BAKED ENAMEL UNLESS SPECIFIED OTHERWISE AND ALL AIR DEVICES SHALL BE THE SAME COLOR. WHERE THE FACTORY FINISH ON ALL DEVICES IS NOT THE SAME AS DETERMINED BY THE ARCHITECT/ENGINEER, THE DIVISION 15 CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING FIELD PAINTING OF ALL AIR DEVICES BY THE DIVISION 9 CONTRACTOR. THE MECHNAICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH DIVISION 9 FIELD PAINTING OF WHITE OR OFF-WHITE AIR DEVICES. SPECIAL COLOR PAINTING OF AIR DEVICES SHALL BE THE RESPONSIBILITY OF THE DIVISION 9 CONTRACTOR. THE ARCHITECT/ENGINEER'S DECISION ON WHITE COLOR COMPATIBILITY IS FINAL. THE INTERIOR OF ALL PERFORATED PLATE DIFFUSERS SHALL BE PAINTED FLAT BLACK. ALL STEEL COMPONENTS SHALL BE FULLY PHOSPHATIZED PRIOR TO PAINTING AND THERE SHALL BE NO UNPAINTED STEEL PARTS.

4. CEILING DIFFUSERS: PROVIDE OPPOSED BLADE VOLUME CONTROL DAMPERS WITH SUPPLY AIR DIFFUSERS WHERE DIFFUSERS ARE INSTALLED ABOVE INACCESSIBLE CEILINGS AND WHERE SCHEDULED. WHERE APPLICABLE, PROVIDE ADAPTERS WITH DIFFUSERS TO PERMIT CONNECTION TO ROUND SUPPLY DUCT. PERFORATED PLATE SUPPLY AIR DIFFUSERS SHALL HAVE PATTERN CONTROL BLADES INSTALLED IN THE DIFFUSER NECK UNLESS NOTED OTHERWISE. PATTERN CONTROLLERS ATTACHED TO THE PERFORATED PLATE ARE NOT ACCEPTABLE. PROVIDE CONCEALED FASTENING ON ALL CEILING DIFFUSERS. DEVICE NECK SIZE SHALL BE AS SHOWN ON THE DRAWINGS.

5. REGISTERS AND GRILLES: PROVIDE REGISTERS WHICH CONTAIN A KEY-OPERATED OPPOSED BLADE DAMPER OPERABLE FROM THE FACE SIDE WHERE REGISTERS ARE DUCTED AND INSTALLED IN INACCESSIBLE SURFACES. SUPPLY AIR REGISTERS SHALL BE OF THE DOUBLE DEFLECTION TYPE. RETURN AIR GRILLES AND REGISTERS SHALL HAVE FIXED FACE BLADES AND MATCH THE FACE OF THE SUPPLY AIR CEILING DIFFUSERS, UNLESS OTHERWISE INDICATED. PROVIDE CONCEALED FASTENING FOR ALL REGISTERS AND GRILLES.

DAMPERS

A. AUTOMATIC DAMPERS

1. SEE SECTION "BUILDING CONTROL AND AUTOMATION SYSTEM" FOR REQUIREMENTS, INCLUDING BLANK-OFF AND TRANSITION PROVISIONS. PROVIDE ACCESS DOORS FOR DAMPERS AS REQUIRED.

B.VOLUME BALANCING DAMPERS

1. BALANCING DAMPERS SHALL BE PROVIDED IN ALL ZONES OF MULTI-ZONE AIR HANDLING UNITS, BRANCH TAP TO ALL AIR DEVICES, AND WHERE SHOWN ON THE DRAWINGS AND SHALL CONSIST OF SINGLE BLADE DAMPERS ON RECTANGULAR DUCT UP TO 11" HIGH AND OPPOSED BLADE DAMPERS IN DUCTS 12" AND LARGER. SINGLE BLADE DAMPERS SHALL BE IN ACCORDANCE WITH FIG. 2-11 OF THE SMACNA MANUAL AND OPPOSED BLADE DAMPERS SHALL BE IN ACCORDANCE WITH FIG. 2-12 OF THE SMACNA MANUAL. DAMPERS SHALL BE OF THE FOLLOWING TYPES:

a. SINGLE BLADE DAMPERS FOR RECTANGULAR DUCT SHALL BE RUSKIN MD35 SINGLE BLADE SERIES OR AN APPROVED EQUAL.

b. OPPOSED BLADE DAMPERS FOR RECTANGULAR DUCT SHALL BE RUSKIN MD 35/OB OR LISTED MANUFACTURER APPROVED EQUAL.

c. RIGID ROUND DUCT DAMPERS SHALL BE DURODYNE "JDS" SERIES JIFFY DAMPER OR AND APPROVED EQUAL.

d. SPIN-IN FITTING WITH DAMPER, 2" BUILD-OUT, 3/8" SQUARE SHAFT, U-BOLT, NYLON BUSHINGS, EVERLOCK LOCKING QUADRANT WITH HANDLE FOR ALL ROUND BRANCH DUCTS TO AIRDEVICES.

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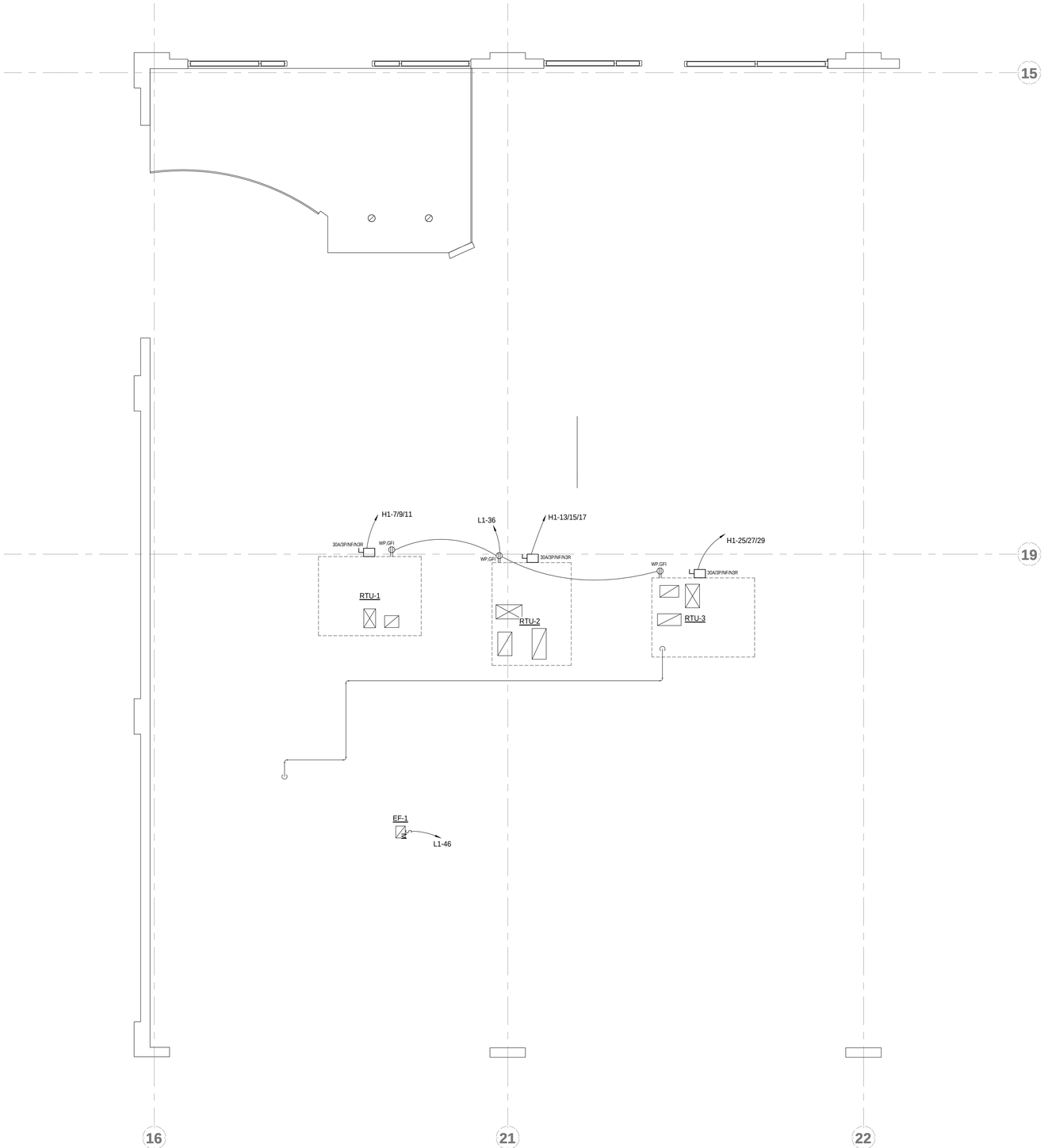

1 **MEP ROOF PLAN**
SCALE: 1/4" = 1'-0"

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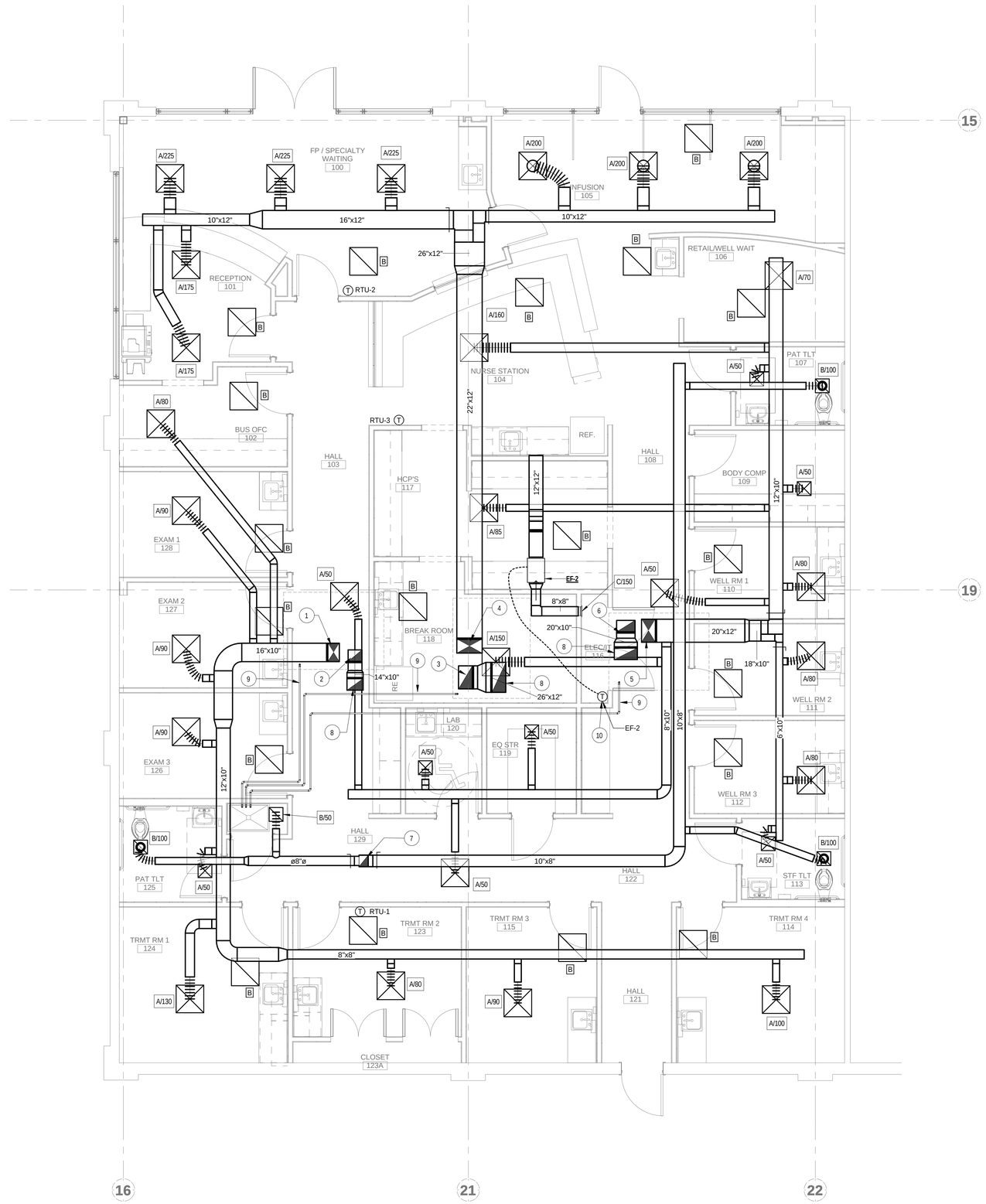

1 **MECHANICAL PLAN**
SCALE: 1/4" = 1'-0"

MECHANICAL GENERAL NOTES

1. REFER TO MECHANICAL INFORMATION SHEET FOR ABBREVIATIONS AND NOTES.
2. COORDINATE CEILING AIR DEVICES WITH LIGHT FIXTURES AND OTHER CEILING MOUNTED DEVICES.
3. MAINTAIN MANUFACTURERS RECOMMENDED CLEARANCES ON ALL EQUIPMENT.
4. PROVIDE YOUNG REGULATORS FOR ALL VOLUME DAMPERS ABOVE INACCESSIBLE CEILINGS UNLESS OTHERWISE NOTED. COORDINATE CEILING MOUNTED ADJUSTING PORTS WITH EXISTING CEILING ELEMENTS, LINE UP FOR VISUAL PURPOSES. PROVIDE PORT LOCATIONS TO ARCHITECT FOR APPROVAL.
5. PROVIDE ACCESS CEILING PANELS TO MOTORIZED DAMPERS, VALVES, AND EQUIPMENT ABOVE INACCESSIBLE CEILINGS. COORDINATE LOCATIONS WITH ARCHITECT.
6. PRIOR TO ORDERING SHEET METAL FIELD VERIFY AND COORDINATE EXACT DUCT ROUTING WITH NEW AND EXISTING STRUCTURAL CONDITIONS.
7. COORDINATE FINAL THERMOSTAT LOCATIONS WITH ARCHITECT.
8. CONTRACTOR SHALL VERIFY CLEARANCE REQUIREMENTS AND ROUTING OF NEW SYSTEMS PRIOR TO FABRICATION AS RISES, DROPS, AND OFFSETS MAY BE NECESSARY BECUASE OF EXISTING FIELD CONDITIONS.
9. CONTRACTOR SHALL COMPLY WITH ALL LOCAL, STATE, AND FEDERAL CODES AND AUTHORITIES HAVING JURISDICTION.
10. CONTRACTOR SHALL COORDINATE WITH STRUCTURAL CONDITIONS AND PROVIDE OFFSETS AND CLEARANCES AS REQUIRED.
11. DUCT SIZES SHOWN ARE FOR CLEAR INSIDE DIMENSIONS. ALL DUCTWORK SHALL BE INSTALLED PER THE LATEST SMACNA STANDARDS.
12. ALL SUPPLY AND RETURN AIR DEVICES SHALL BE INSULATED ON THE TOP/BACK OF THE DEVICE TO PREVENT CONDENSATION. SURFACE SHALL BE COMPLETELY COVERED AND SECURED IN PLACE WITH TAPE USED TO SEAL JOINTS. INSULATION SHOULD BE APPLIED PRIOR TO INSTALLATION.
13. DRAWINGS ARE SCHEMATIC IN NATURE AND SHALL NOT BE SCALED. THE CONTRACTOR IS RESPONSIBLE FOR CREATING SHOP DRAWINGS AND FOR COORDINATING THE EXACT ROUTING OF ALL DUCTWORK AND PIPING WITH EXISTING FIELD CONDITIONS AND WITH OTHER TRADES.

KEYED NOTES

1 16x10 SUPPLY AIR DUCT UP THROUGH ROOF TO RTU-1. TRANSITION DUCT TO RTU OPENING.
2 ROUTE 12x10 RETURN AIR DUCT DOWN FROM RTU-1 AND TERMINATE IN PLENUM SPACE. TRANSITION DUCT TO RTU OPENING.
3 ROUTE 20x12 RETURN AIR DUCT DOWN FROM RTU-2 AND TERMINATE IN PLENUM SPACE. TRANSITION DUCT TO RTU OPENING.
4 22x12 SUPPLY AIR DUCT UP THROUGH ROOF TO RTU-2. TRANSITION DUCT TO RTU OPENING.
5 20x12 SUPPLY AIR DUCT UP THROUGH ROOF TO RTU-3. TRANSITION DUCT TO RTU OPENING.
6 ROUTE 16x10 RETURN AIR DUCT DOWN FROM RTU-3 AND TERMINATE IN PLENUM SPACE. TRANSITION DUCT TO RTU OPENING.
7 10x8 EXHAUST AIR DUCT UP THROUGH ROOF TO EXHAUST FAN EF-1. TRANSITION DUCT TO FAN OPENING.
8 TURN RETURN AIR DUCT UP ABOVE CEILING FOR FOR SOUND ATTENUATION.
9 ROUTE CONDENSATE PIPING FROM RTU ON CEILING DOWN TO FLOOR SINK.
1 0 THERMOSTAT TO BE TIED INTO EF-2 IN CEILING SPACE OF HCP'S. THERMOSTAT TO BE SET FOR 76 DEGREES AND WILL EXHAUST HOT AIR AFTER HOURS OR WEEKENDS INTO PLENUM SPACE.

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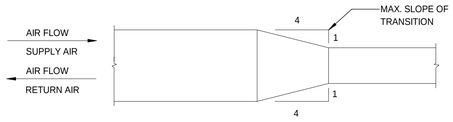
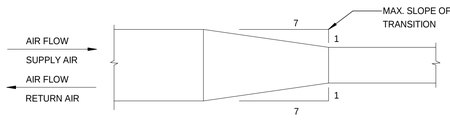
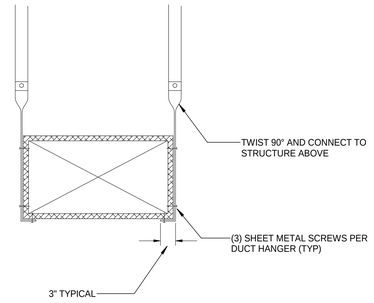


LOW VELOCITY SUPPLY AND RETURN AIR DUCTWORK
DUCT VELOCITY LESS THAN 2000 FPM

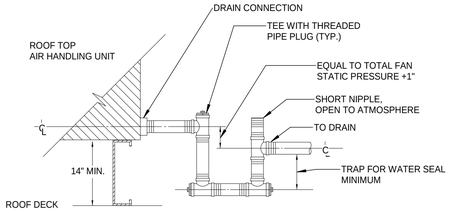


HIGH VELOCITY SUPPLY AND RETURN AIR DUCTWORK
DUCT VELOCITY MORE THAN 2000 FPM

RECTANGULAR DUCT TRANSITION DETAIL 1



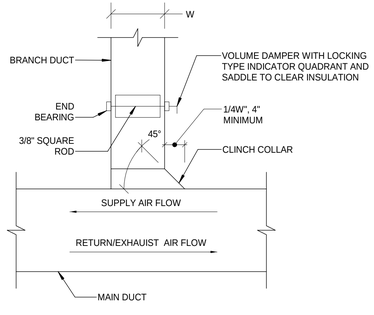
DUCT HANGER DETAIL 2



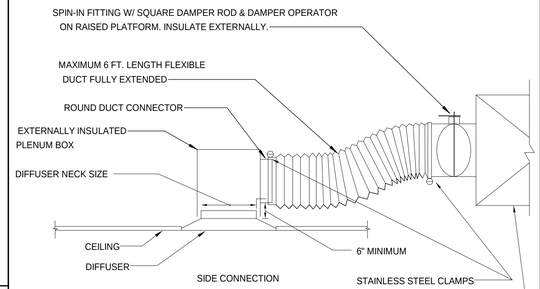
NOTES:

1. PIPE SAME SIZE AS DRAIN CONNECTION.

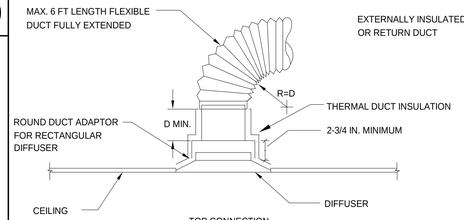
DRAW THROUGH AND CONDENSATE DRAIN 3



TYPICAL BRANCH DUCT DETAIL 4



SIDE CONNECTION

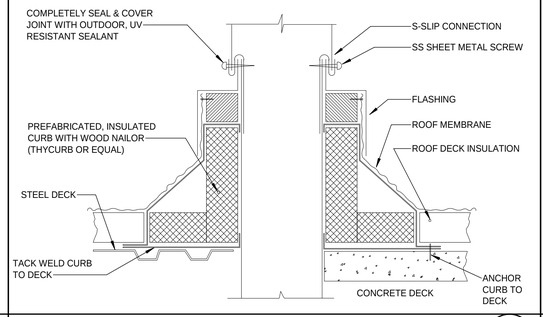


TOP CONNECTION

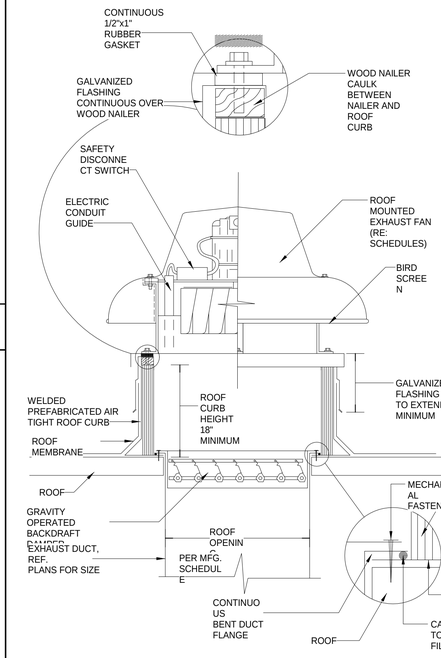
NOTES:

1. IF THERE IS INSUFFICIENT HEADROOM FOR TOP CONNECTION AS DETAILED, USE SIDE CONNECTION.
2. USE RIGID ROUND INSULATED DUCT FOR LENGTHS IN EXCESS OF 6'-0".
3. USE ONLY ON SUPPLY AND RETURN BRANCHES TO CEILING DEVICES.
   USE RIGID DUCT ON ALL BRANCHES TO EXHAUST DEVICES AND ON EXPOSED APPLICATIONS.
4. BRANCH DUCT SHALL BE SAME SIZE AS DIFFUSER CONNECTION.

FLEXIBLE DUCT CONNECTION DETAIL 5



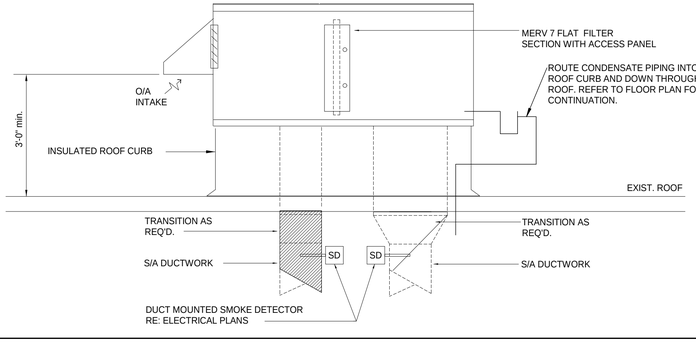
DUCT PENETRATION THROUGH ROOF DETAIL 6



GENERAL NOTES:

1. SEAL PENETRATION AIR TIGHT AROUND CONDUIT THRU WELDED PREFABRICATED ROOF CURB.
2. SEAL AIR TIGHT ANY PENETRATIONS THRU WELDED PREFABRICATED ROOF CURB.

ROOF MOUNTED EXHAUST FAN DETAIL 7



NOTES:

1. THIS DETAIL SHOWS GENERAL ARRANGEMENT OF A/C UNIT COMPONENTS ONLY.
2. ACCESS DOOR SWING LOCATIONS SHALL BE COORDINATED WITH PROJECT SPECIFIC CONDITIONS.
3. ROUTE CONDENSATE DRAIN LINE TO PLUMBING FIXTURE INSIDE OF BUILDING AS INDICATED ON FLOOR PLAN. SLOPE CONDENSATE DRAIN TOWARDS DRAIN AS SPECIFIED ON SPECIFICATIONS. CONDENSATE DRAIN LINE SHALL NOT DISCHARGE ON ROOF. (REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION).
4. SUPPORT STRUCTURE MAY VARY. COORDINATE WITH STRUCTURAL TRADE OR FIELD CONDITIONS FOR EXACT TYPE.
5. THE ROOF CURB SHALL COMPENSATE FOR ROOF SLOPE AND KEEP THE UNIT LEVEL. PROVIDE VIBRATION ISOLATION RAILS.
6. ROOF TOP UNIT AND INSTALLATION SHALL BE CAPABLE OF WITHSTANDING 110 MPH WINDS.
7. PROVIDE DUCT MOUNTED SMOKE DETECTORS TO UNITS 2,000 CFM AND ABOVE.

ROOFTOP UNIT DETAIL 8

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PACKAGED ROOFTOP UNIT SCHEDULE (UNITS 4-TONS AND UNDER)

GENERAL					SUPPLY FAN				PRE-FILTER		D.X. COOLING COIL									ELECTRIC RE-HEAT			UNIT ELECTRICAL					
UNIT TAG	AREA	TYPE	MANUFACTURER MODEL	AMBIENT TEMP. DEGREES F.	SA CFM	OA CFM	EXT. SP. WG *	HP	TYPE	DIRTY FILTER LOSS (IN WG.)	MAX FACE VELOCITY, FPM	SENSIBLE LOAD (MBTUH)	TOTAL LOAD (MBTUH)	OA DB TEMP. (F)	OA WB TEMP. (F)	EA DB TEMP. (F)	EA WB TEMP. (F)	LA DB TEMP. (F)	LA WB TEMP. (F)	EA DB TEMP. (F)	LA DB TEMP. (F)	KW	MCA	MOCP	VOLTAGE	WEIGHT LBS.	MINIMUM SEER/EER	REMARKS
RTU-1	EXAM RM	DOWNFLOW	DAIKIN	107	800	150	1	1.3	MERV 8	0.5	450	22	31	105.9	72.5	80.2	66.5	54	52.8	58.4	85	6.7	10.8	15	460/60/3	1304	15.6/12.5	1-13
RTU-2	WAITING	DOWNFLOW	DAIKIN	107	1,625	125	1	2.3	MERV 8	0.5	450	39	47	105.9	72.5	76.1	62.5	54.6	52.6	65.7	85	9.9	20.9	25	460/60/3	1334	15.6/11.3	1-13
RTU-3	PATIENT CARE	DOWNFLOW	DAIKIN	107	1,105	270	1	2.3	MERV 8	0.5	450	30	46	105.9	72.5	81.5	68.2	54.3	53.2	55.6	85	10.3	20.9	25	460/60/3	1334	15.6/11.3	1-13

NOTES:

1 EXTERNAL STATIC PRESSURE INCLUDES LOSSES DUE TO DUCS, FITTINGS, DAMPERS, GRILLES, VAV BOXES AND DIRTY FILTERS.
2 PROVIDE FILTERS AS SCHEDULED. EXTERNAL STATIC INCLUDES LOSSES DUE TO DIRTY FILTERS AS SCHEDULED..
3 PROVIDE AND INSTALL FLOAT SWITCH. IF ENABLED, FLOAT SWITCH SHALL DISABLE FAN AND SEND AN ALARM TO THE UNIT CONTROLLER. FLOAT SWITCH SHALL BE PROVIDED IN THE FIELD BY THE CONTRACTOR.
4 PROVIDE UNIT WITH DIRECT DRIVE PLUG FAN.
5 PROVIDE INTERNAL FAN ISOLATION.
6 PROVIDE FACTORY RECOMMENDED ROOF CURB WITH VIBRATION ISOLATION RAIL. ROOF CURB HEIGHT SHALL BE SUCH THAT THE DIMENSION FROM THE ROOF TO THE OUTSIDE AIR OPENING ON THE RTU IS 36" MINIMUM.
7 PROVIDE UNIT WITH DOWNFLOW OPENINGS.
8 UNIT SHALL BE MINIMUM 1" DOUBLE WALL CONSTRUCTION, DESIGNED FOR OUTDOOR APPLICATION WITH SLOPED ROOF AND MINIMUM R-6 INSULATION.
9 PROVIDE WITH FACTORY INSTALLED WEATHERPROOF GFCI OUTLET. OUTLET SHALL REMAIN ENERGIZED IF UNIT DISCONNECT IS IN "OFF" POSITION. IT SHALL BE POWERED FROM A SEPARATE 120V CIRCUIT. RE: ELECT.
10 PROVIDE LOW AMBIENT KIT FOR COOLING OPERATION DOWN TO 20 DEGREES.
11 PROVIDE SCR CONTROL FOR ELECTRIC HEATER.
12 PROVIDE UNIT WITH MODULATING MOTORIZED OUTSIDE AIR DAMPER.
13 REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

FAN SCHEDULE

GENERAL				PERFORMANCE DATA			MOTOR DATA							
MARK	LOCATION	FAN TYPE	SERVICE	AIRFLOW CFM	EXTERNAL SP (IN H20 W.G.)	FAN RPM	HP	VOLT/PHASE/HZ	DRIVE TYPE	STARTER TYPE	EMERGENCY POWER	INTERLOCK	MANUFACTURER/ MODEL	REMARKS
EF-1	ROOF	DOWNBLAST	GENERAL EXHAUST	350	0.50	1725	1/10	115/1/60	DIRECT	COMBINATION STARTER/ DISCONNECT	NO	NONE	GREENHECK: G-080-VG	1-3
EF-2	CEILING	INLINE	I.T.	150	0.25	1115	1/4	115/1/60	DIRECT	COMBINATION STARTER/ DISCONNECT	NO	THERMOSTAT	GREENHECK: SQ-97-VG	1

NOTES:

1) PROVIDE WITH BACKDRAFT DAMPER.
2) PROVIDE WITH 12" INSULATED MANUFACTURER'S ROOF CURB.
3) PROVIDE WITH BIRD SCREEN, DISCONNECT SWITCH.

AIR DEVICE SCHEDULE

MARK	TYPE	MANUFACTURER/MODEL	REMARKS
A	ARCHITECTURAL SQUARE PANEL SUPPLY AIR DEVICE	TITUS: OMNI-AA	24"X24" OR 12"X12" FACE AREA. AIR PATTERN SHALL BE 4-WAY THROW UNLESS OTHERWISE NOTED ON DRAWINGS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPE AND CONSTRUCTION DETAILS. FLEX SUPPLYING DIFFUSER TO BE SAME AS NECK SIZE.
B	PERFORATED PANEL RETURN/EXHAUST AIR DEVICE	TITUS: PAR-AA	24"X24" OR 12"X12" FACE AREA WITH 22"X22" AND 10"X10" NECK RESPECTIVELY FOR OPEN GRILLES. PROVIDE PER SCHEDULE FOR DUCTED GRILLES. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPE AND CONSTRUCTION DETAILS. FLEX SUPPLYING GRILLE TO BE SAME AS NECK SIZE.
C	SIDEWALL RETURN/EXHAUST GRILLE	TITUS: 350FL	SIDEWALL RETURN/EXHAUST GRILLE. 3/4" SPACE BLADES, 45 DEGREE DEFLECTION. BLADES PARALLEL TO LONG DIMENSION. REFER TO PLANS FOR SIZE (W"XH") AND AIR QUANTITY.

NOTES:

1 CEILING DIFFUSERS ARE 4-WAY UNLESS INDICATED OTHERWISE IN THE DRAWINGS.
2 PROVIDE BLOW CLIPS TO DIRECT AIR FLOW AWAY FROM WALLS AND GLASS WHEN DEVICES ARE WITHIN 4' OF A WALL.
3 ALL VISIBLE SURFACES OF THE RETURN/EXHAUST PLENUM AND DUCT CONNECTION SHALL BE PAINTED FLAT BLACK.
4 AIR DEVICE FRAME AND STYLE SHALL MATCH CEILING TYPE. COORDINATE WITH ARCHITECTURAL REFLECTED CEILING PLAN.
5 PROVIDE MANUFACTURER'S INSULATED BACKPAN FOR ALL SUPPLY AIR DEVICES.
6 ALL AIR DEVICES SHALL BE ALUMINUM CONSTRUCTION.
7 REFER TO ARCHITECT FOR FINISHES AND COLOR OF DEVICES.

AIR DEVICE CONNECTION SCHEDULE

AIR QUANTITY (CFM)	DEVICE NECK SIZE	BRANCH DUCT SIZE	
		ROUND DUCT	ALTERNATE RECTANGULAR DUCT
0-125	6"ø	6"ø	REFER TO DRAWINGS
126-190	8"ø	8"ø	REFER TO DRAWINGS
191-290	10"ø	10"ø	REFER TO DRAWINGS
291-390	12"ø	12"ø	REFER TO DRAWINGS
391-530	14"ø	14"ø	REFER TO DRAWINGS
531-850	16"ø	16"ø	REFER TO DRAWINGS
851-1200	-	-	REFER TO DRAWINGS
1200-1500	-	-	REFER TO DRAWINGS
1500-2000	-	-	REFER TO DRAWINGS

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