

**GAS PIPING SPECIFICATION:**

**SECTION 1 - PIPING SYSTEMS**

**1.0 GENERAL**

- A. PROVIDE ISOLATION VALVES AT MAIN BRANCH CONNECTIONS, EQUIPMENT, AND AT BOTTOM OF RISERS WHERE THEY ORIGINATE FROM A CONTINUOUS MAIN AND RISE TO A FLOOR OR FLOORS ABOVE.
- B. SIZE REDUCTIONS SHALL BE MADE BY ECCENTRIC REDUCERS WITH FLAT SIDE ON TOP WHERE SPECIFIED. NO BUSHINGS FOR PIPE REDUCTIONS PERMITTED.
- C. PROVIDE DIELECTRIC UNION AT ALL CONNECTIONS OF DISSIMILAR METALS.
- D. PROPERLY SEAL ALL PIPE PENETRATIONS THROUGH WALLS, ROOFS, FLOORS, OR CEILINGS.
- E. ELBOWS ARE TO BE LONG RADIUS; FIELD FABRICATED FITTINGS ARE NOT ACCEPTABLE.
- F. BRANCH CONNECTIONS TO MAIN MAY BE SADDLE-TYPE, FORGED STEEL WELDED FITTING.
- G. ALL PIPING TAKE-OFFS FOR NATURAL GAS SHALL BE MADE FROM THE SIDE OR TOP OF PIPING. "BULLHEAD" TEE ARE PROHIBITED.
- H. VISUALLY INSPECT ALL PIPING, VALVES AND JOINTS PRIOR TO INSULATING, ENCLOSING, BURYING, OR OTHERWISE CONCEALING.

**1.1 PIPE HANGERS AND SUPPORTS**

- A. PIPE SHALL BE SUPPORTED BY SPLIT RING ADJUSTABLE TYPE, CLEVIS HANGER, TRAPEZE (MULTIPIPE RACK) OR OTHER APPROVED HANGERS, OR ROOF SUPPORTS.
- B. BRACKETS OR CLAMPS MAY BE USED WHERE PIPE RUNS ALONG WALLS, COLUMNS OR CEILINGS, BUT MUST ALLOW FOR EXPANSION AND CONTRACTION.
- C. RADIAL SUPPORTS SHALL BE RIGID TYPE. IF WALL BRACKETS OR LONGITUDINAL SUPPORTS ARE USED ON STRAIGHT LENGTHS OVER 20 FEET LONG, THEY SHALL BE OF THE FLEXIBLE TYPE TO PROVIDE FOR THERMAL EXPANSION AND CONTRACTION.
- D. HANGERS AND SUPPORTS SHALL BE PLACED WITHIN 1 FOOT FROM EACH CHANGE IN DIRECTION AND WITHIN 3 FEET OF THE END OF EACH RUNOUT OR AS DEFINED BY PIPE STRESS ANALYSIS OR PIPE EXPANSION ANALYSIS AS PART OF A DELEGATED DESIGN.
- E. PIPING AT ALL EQUIPMENT AND CONTROL VALVES SHALL BE SUPPORTED TO PREVENT STRAINS OR DISTORTIONS IN THE CONNECTED EQUIPMENT AND CONTROL VALVES.
- F. MAXIMUM ALLOWABLE HANGER ROD LOADING AND SPACING FOR PIPING SYSTEMS ARE SHOWN BELOW. CHECK LOCAL CODES TO DETERMINE IF A DIFFERENT SPACING IS REQUIRED. CLOSER HANGER SPACING MAY BE REQUIRED DUE TO ADDITIONAL VALVES AND FITTINGS

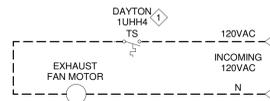
**1.2 NATURAL GAS SYSTEM**

- A. NATURAL GAS PIPING SHALL COMPLY WITH THE INTERNATIONAL FUEL GAS CODE AND NFPA 54 AND LOCAL CODE/AMENDMENTS.
- B. VALVES, UNIONS AND CLOSE NIPPLES SHALL NOT BE INSTALLED IN ANY CONCEALED SPACE.

MAXIMUM ALLOWABLE HANGER SPACING - NATURAL GAS PIPE		
NOMINAL TUBING SIZE	ROD DIAMETER (IN)	MAXIMUM SPACING (FT)
1/2"	3/8"	6'-0"
3/4" - 1"	3/8"	8'-0"
1-1/4" - 2"	3/8"	10'-0"
2-1/2" - 3"	1/2"	10'-0"
4"	5/8"	10'-0"
6"	3/4"	10'-0"
8"-12"	7/8"	10'-0"

MAXIMUM ALLOWABLE HANGER ROD LOADING							
ROD DIA. (IN)	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1-1/8"
MAX. LOAD	610	1130	1810	2710	3770	4960	6230

**120V EXHAUST FAN WITH COOLING-ONLY THERMOSTAT OR WALL SWITCH**



**KEYED NOTES:**

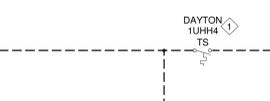
- 1. FURNISHED BY M.C., INSTALLED BY E.C.

TYPICAL BILL OF MATERIAL			
QTY	TAG	MANUFACTURER	DESCRIPTION
1	TS	DAYTON	LINE VOLT MECHANICAL TSTAT FOR COOLING, 120 TO 277VAC

**1 WIRING - 120V EF WITH THERMOSTAT**

NTS

**120V EXHAUST FAN AND LOUVER INTERLOCK WITH COOLING-ONLY THERMOSTAT**



**KEYED NOTES:**

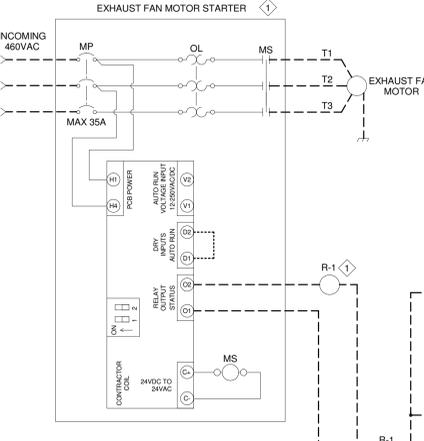
- 1. FURNISHED BY M.C., INSTALLED BY E.C.
- 2. FACTORY-INSTALLED ON LOUVER

TYPICAL BILL OF MATERIAL			
QTY	TAG	MANUFACTURER	DESCRIPTION
1	TS	DAYTON	LINE VOLT MECHANICAL TSTAT FOR COOLING, 120 TO 277VAC
1		HONEYWELL	MS4120F1006 FAST ACTING, TWO POSITION ACTUATOR, 175LB IN. SPRING RETURN BY ORIENTATION, 120VAC

**2 WIRING - 120V EF & LOUVER**

NTS

**460V EXHAUST FAN AND PAIRED 120V LOUVER INTERLOCK**



**KEYED NOTES:**

- 1. FURNISHED BY MC AND INSTALLED BY EC
- 2. FACTORY INSTALLED ON LOUVER REFER TO PLANS FOR QUANTITY OF INTERLOCKED LOUVERS AND REFER TO EQUIPMENT SCHEDULES FOR QUANTITY OF ACTUATORS PER LOUVER.

TYPICAL BILL OF MATERIAL			
QTY	TAG	MANUFACTURER	DESCRIPTION
1		SPRINKLER CONTROLS, INC.	MOTOR STARTER STANDARD CONTROL, NEMA 1 ENCLURE WITH LOCKABLE DOOR, 3 PHASE, 200-600V, 1.25HP
1	R-1	RIBLIC	ENCLOSED RELAY 1/8A SPST RELAY WITH 10-30VAC/DC/120VAC
		RUSKIN	RUS-L120 OR RUS-M120 FAST ACTING, TWO POSITION ACTUATOR, 175LB IN. SPRING RETURN BY ORIENTATION, 120VAC

**3 WIRING - 460V EF & PAIRED LOUVER**

NTS

**DIRECT FIRED MAKE-UP AIR UNIT SCHEDULE**

PLAN MARK	MANUFACTURER	MODEL	LOCATION	SUPPLY FAN				OUTDOOR AIRFLOW [CFM]	NATURAL GAS HEATING				ELECTRICAL			WEIGHT [LBS]	NOTES		
				AIRFLOW [CFM]	ESP [IN WC]	HP	BHP		QTY	EDB [°F]	LDB [°F]	INPUT [MBH]	OUTPUT [MBH]	INLET PRESSURE RANGE [IN WC]	VOLTS/PH			MCA	MCOCP
MAU-9	CAPTVEAIRE	A2-D.500-20D	WAREHOUSE	6,400	0.15	5.0	3.4	1	6,400	13.0	100.0	590.0	540.0	7-14	460/3	13.1	20	1,400.0	1,2,3,4,5,6,7,8,9,10,11
MAU-10	CAPTVEAIRE	A2-D.500-20D	WAREHOUSE	6,400	0.15	5.0	3.4	1	6,400	13.0	100.0	590.0	540.0	7-14	460/3	13.1	20	1,400.0	1,2,3,4,5,6,7,8,9,10,11

**GENERAL REMARKS:**

- 1. EXTERNAL STATIC PRESSURE INCLUDES LOSSES DUE TO DUCTWORK, AIR DEVICES, DAMPERS AND DUCT MOUNTED COILS
- 2. MAINTAIN MINIMUM ELECTRICAL CLEARANCE AS REQUIRED BY NEC
- 3. MAU SHALL NOT BE STARTED OR OPERATED WITHOUT THE REQUIRED FILTERS INSTALLED
- 4. PURCHASED BY NDBS

**NOTES:**

- 1. FURNISHED WITH 24" TALL FULL PERIMETER, INSULATED SLOPED CURB, AND DUCT HANGERS
- 2. FACTORY MOUNTED INLET DAMPER
- 3. FACTORY MOUNTED AND WIRED, NON-FUSED DISCONNECT SWITCH
- 4. FURNISHED WITH WEATHERHOOD WITH E2 WASHABLE FILTERS
- 5. FACTORY MOUNTED AND WIRED FREEZE/STAT
- 6. FURNISHED WITH 3-WAY DIFFUSER, FIELD INSTALLED BY MC
- 7. FURNISHED WITH CONTROL PANEL, INSTALLED AND WIRED BY EC
- 8. FACTORY INSTALLED SINGLE POINT POWER CONNECTION
- 9. INSTALLED WITH NIGHT SETBACK FEATURE ON CONTROLLER
- 10. EC TO FURNISH AND INSTALL 120V GFCI SERVICE OUTLET
- 11. FACTORY MOUNTED AND WIRED VFD FOR SUPPLY FAN MOTOR

**LOUVER SCHEDULE**

PLAN MARK	MANUFACTURER	MODEL	LOCATION	USE (INTAKE / EXHAUST)	AIRFLOW [CFM]	FACE VELOCITY [FPM]	WATER PENETRATION VELOCITY [FPM]	FREE AREA [%]	PD [IN WC]	WIDTH [IN]	HEIGHT [IN]	DEPTH [IN]	ACTUATOR		INTERLOCKED WITH	SECTIONS			NOTES
													VOLT/PH	FAIL POS.		QTY	WIDTH [IN]	HEIGHT [IN]	
L-10	RUSKIN	ELM6DW	WAREHOUSE	INTAKE	19,200	700	1,157.0	56%	0.11	84.0	84.0	8.0	120/1	CLOSED	EF-1	2	42.0	96.0	1,2,3,4,5,6
L-11	RUSKIN	ELM6DW	WAREHOUSE	INTAKE	19,200	700	1,157.0	56%	0.11	84.0	84.0	8.0	120/1	CLOSED	EF-2	2	42.0	96.0	1,2,3,4,5,6
L-12	RUSKIN	ELM6DW	FIRE PUMP ROOM	INTAKE	2,000	571	1,157.0	56%	0.11	30.0	30.0	6.0	120/1	CLOSED	EF-3	1	30.0	30.0	1,2,3,4,5,6

**GENERAL REMARKS:**

- 1. LOUVERS WILL SHIP 14" UNDERSIZED
- 2. PURCHASED BY NDBS

**NOTES:**

- 1. FACTORY PAINTED KYNAR FINISH, COORDINATE FINAL COLOR WITH GC/OWNER
- 2. CHANNEL FRAME CONSTRUCTION
- 3. LOUVER IS DRAINABLE AND INCLUDES GUTTERS AND WEEPS
- 4. FURNISHED WITH MESH ALUMINUM BIRDSCREEN FOR INTAKE
- 5. FURNISHED WITH BLADE AND JAMB SEALS
- 6. FURNISHED WITH EXTENDED SILLS

**EXHAUST FAN SCHEDULE**

PLAN MARK	MANUFACTURER	MODEL	LOCATION	TYPE	AIRFLOW [CFM]	FAN RPM	ESP [IN WC]	HP	BHP	DRIVE TYPE	CONTROL / SWITCH BY	ELECTRICAL		WEIGHT [LBS]	NOTES
												VOLTS/PH	FLA		
EF-7	COOK	54 LXULMO	WAREHOUSE	UPBLAST	38,400	504	0.125	7.5	6.3	BELT	MOTOR STARTER	460/3	11	1,200	1,2,6,7,8
EF-8	COOK	ACE-D 150	FIRE PUMP ROOM	DOWNBLAST	2,000	1,377	0.15	1/2	0.29	DIRECT	LINE VOLT T-STAT	120/1	9.8	100	1,2,3,4,5,8
EF-9	COOK	SON-D 135	ELECTRICAL ROOM	INLINE	1,000	1,081	0.15	1/6	0.088	DIRECT	LINE VOLT T-STAT	120/1	4.4	85	1,2,4,5,9

**GENERAL REMARKS:**

- 1. CURB LEVELING AND BLOCKING, BY GENERAL CONTRACTOR
- 2. PURCHASED BY NDBS

**NOTES:**

- 1. FURNISHED WITH 14" TALL FLAT ROOF CURB, WITH NAILER, INSULATION, LINER, AND DAMPER TRAY
- 2. FACTORY INSTALLED NON-FUSED TOGGLE DISCONNECT SWITCH
- 3. FURNISHED WITH GRAVITY BACKDRAFT DAMPER
- 4. FACTORY MOUNTED AND WIRED SOLID STATE SPEED CONTROLLER
- 5. FAN TO BE CONTROLLED BY LINE VOLTAGE THERMOSTAT, FURNISHED BY MC INSTALLED BY EC
- 6. FURNISHED WITH BUTTERFLY DAMPER WITH MAGNETIC LATCHES
- 7. MOTOR STARTER FURNISHED WITH FAN FROM FACTORY, INSTALLED BY EC
- 8. FAN INTERLOCKED TO MOTORIZED DAMPER ON LOUVER FOR INTAKE BY EC
- 9. FACTORY INSTALLED INLET GUARD

**FIRE DAMPER SCHEDULE**

PLAN MARK	MANUFACTURER	MODEL	LOCATION	SERVICE (SAR/AEA)	APPLICATION (STATIC/DYNAMIC)	DAMPER SIZE			RATING [HRS]	STYLE	MOUNTING (HORIZ/VERT)	NOTES
						WIDTH [IN]	HEIGHT [IN]	SLEEVE LENGTH [IN]				
FD-3	RUSKIN	DIBD2-1	ELECTRIC ROOM	EA	DYNAMIC	14.0	14.0	16.0	1.5	A	HORZ	1,2
FD-4	RUSKIN	DIBD2-1	ELECTRIC ROOM	SA	DYNAMIC	14.0	14.0	16.0	1.5	A	HORZ	1,2

**GENERAL REMARKS:**

- 1. FUSIBLE LINK - 165°F
- 2. PROVIDE SLEEVE AND COORDINATE SIZE AND LENGTH WITH APPLICATION AND MOUNTING LOCATION
- 3. PROVIDE RETAINING CLIPS AND SEAL OPENING PER UL 555 AND LOCAL REQUIREMENTS
- 4. COORDINATE FINAL OPENING SIZE WHEN MULTIPLE DAMPERS ARE REQUIRED
- 5. PURCHASED BY SUBCONTRACTOR

**STYLE:**

- A- BLADES IN AIRSTREAM
- B- BLADES OUT OF AIRSTREAM
- C- BLADES OUT OF AIRSTREAM
- G- BLADES OUT OF WALL

**NOTES:**

- 1. FACTORY PROVIDED GRILL MOUNTING TABS
- 2. MC TO PROVIDE TITUS 350 GRILLE EQUAL TO FIRE DAMPER OPENING SIZE

**GAS PRESSURE REGULATING VALVE SCHEDULE**

PLAN MARK	MANUFACTURER	MODEL	SERVING	LOCATION	CONNECTION		CAPACITY [CFH]	PRESSURE			PILOT	NOTES
					SIZE	TYPE		MAX INLET [IN WC]	MIN INLET [IN WC]	OUTLET [IN WC]		
GPR-9	MAXITROL	325-7AL	MAU-9	ROOF	1 1/4 X 1 1/4	NPT	500	28	22	10	INTERNAL	1
GPR-10	MAXITROL	325-7AL	MAU-10	ROOF	1 1/4 X 1 1/4	NPT	500	28	22	10	INTERNAL	1

**GENERAL REMARKS:**

- 1. VENT TO ATMOSPHERE AS REQUIRED BY LOCAL CODE
- 2. INSTALLER MAY CHOOSE TO SUBMIT ON EQUAL REGULATOR FROM ANOTHER MANUFACTURER.
- 3. PURCHASED BY SUBCONTRACTOR

**NOTES:**

- 1. MC TO FURNISH WITH VENT PROTECTOR EQUIVALENT TO RICHARDS VENT 90, MAXITROL VENT PROTECTORS, OR APPROVED PRODUCT. FIELD FABRICATED WILL NOT BE ACCEPTABLE.

**ARCHITECTURAL WALL HEATER SCHEDULE**

PLAN MARK	MANUFACTURER	MODEL	LOCATION	FAN DATA		ELECTRIC HEAT COIL		ELECTRICAL		NOTES
				AIRFLOW [CFM]	LAT [°F]	CAPACITY [MBH]	KW	VOLTS/PH	AMPS	
AWH-4	Q-MARK	AWH407	FIRE PUMP ROOM	100	135.02	13.65	4.0	277/1	14.4	1,2,3
AWH-5	Q-MARK	AWH407	ELECTRICAL ROOM	100	135.02	13.65	4.0	277/1	14.4	1,2,3
AWH-6	Q-MARK	AWH407	ROOF ACCESS ROOM	100	135.02	13.65	4.0	277/1	14.4	1,2,3

**GENERAL REMARKS:**

- 1. INLET THERMOSTAT - 0°F, UNLESS NOTED
- 2. INTEGRAL THERMOSTAT AND TOGGLE DISCONNECT SWITCH
- 3. PURCHASED BY NDBS

**NOTES:**

- 1. MC TO INSTALL, EC TO WIRE
- 2. FURNISHED WITH SURFACE MOUNTING KIT
- 3. GC TO SPECIFY COLOR, BRONZE OR WHITE.

**MAKE-UP AIR UNIT - 100% OUTDOOR AIR SPACE HEAT AND VENTILATION**

- 1. **DESCRIPTION:** EACH 100% OUTDOOR AIR MAKE-UP AIR UNIT (MAU) WILL BE PROVIDED FROM THE FACTORY WITH AN INTEGRAL CONTROL CENTER THAT INCLUDES A NON-FUSED DISCONNECT, 24VAC TRANSFORMER, INLET DAMPER WITH END SWITCHES, THERMAL STRIP, FREEZE PROTECTION, AND FAN STARTER. THE TWO-POSITION OUTDOOR AIR DAMPER WILL OPERATE BETWEEN OPEN AND CLOSED.

**CONTROL:**

THE SPACE TEMPERATURE AND UNIT MODE WILL BE DETERMINED FROM THE REMOTE PANEL THAT IS SUPPLIED WITH THE MAKE-UP AIR UNIT AND MOUNTED IN THE SPACE. THE OCCUPIED MODE SHALL BE DETERMINED BY AN OCCUPANCY SCHEDULE SET IN CONTROLLER.

**CONTINUOUS (OCCUPIED) MODE:**

- A. **BURNER CONTROL:** THE BURNER WILL BE ENERGIZED AND DE-ENERGIZED PER THE FOLLOWING:
  - (1) SPACE TEMPERATURE SATISFIED AND  $OAT < 65°F$  - BURNER ENERGIZED - MINIMUM FIRE
  - (2) SPACE TEMPERATURE < SPACE SETPOINT (ADJ) AND  $OAT < 65°F$  - MAX FIRE
  - (3)  $OAT > 65°F$  - BURNER DE-ENERGIZED.
- B. **SUPPLY FAN CONTROL:** THE SUPPLY FAN WILL BE RUNNING CONTINUOUSLY.

**AUTO (UNOCCUPIED) MODE:**

- A. **BURNER CONTROL:** THE BURNER WILL BE ENERGIZED AND DE-ENERGIZED PER THE FOLLOWING:
  - (1) SPACE TEMPERATURE < SPACE SETPOINT (ADJ) AND  $OAT < 65°F$  - BURNER ENERGIZED - MAX FIRE
  - (2) SPACE TEMPERATURE SATISFIED - BURNER DE-ENERGIZED
- B. **FAN CONTROL:** THE FAN WILL BE ENERGIZED BASED ON A CALL FOR HEAT AND DE-ENERGIZED ONCE SPACE TEMPERATURE IS SATISFIED.

**EXPECTED FAILURE OPERATIONS:**

- A. SHOULD ANY OF THE FOLLOWING OCCUR, A FAILURE SHALL BE SENSED BY THE UNIT CONTROLLER AND A VISUAL ALARM WILL BE INDICATED ON THE REMOTE PANEL.
  - (1) IF DISCHARGE AIR TEMPERATURE (DAT) FALL BELOW THE LOW TEMPERATURE LIMIT, THE FAN WILL BE DISABLED AND THE "LOW TEMP ALARM" WILL BE ISSUED
  - (2) UPON A LOSS OF GAS PRESSURE, THE BURNER SHALL BE LOCKED OUT AND A "FLAME FAILURE ALARM" SHALL BE ISSUED
  - (3) UPON A LOSS OF AIRFLOW, THE BURNER SHALL BE LOCKED OUT AND THE AIRFLOW PROVING LIGHT WILL BE DE-ENERGIZED

**ELECTRICAL, MECHANICAL, AND ELECTRIC FIRE PUMP ROOM HEAT AND VENTILATION**

- 1. **DESCRIPTION:** EACH SYSTEM SHALL CONSIST OF AN EXHAUST FAN WITH COOLING-ONLY LINE VOLTAGE THERMOSTAT, LOUVER DAMPER WITH 120V FACTORY-PROVIDED ACTUATOR, AND ELECTRIC UNIT HEATER WITH UNIT-MOUNTED THERMOSTAT. THE LOUVER SHALL BE SPRING-CLOSED/POWER-OPEN TO FAIL CLOSED UPON A LOSS OF POWER.

**LOUVER:**

THE 120V LOUVER DAMPER SHALL BE INTERLOCKED TO OPEN THE LOUVER DAMPER WHEN THE EXHAUST FAN IS ENERGIZED AND CLOSE THE LOUVER DAMPER WHEN THE EXHAUST FAN IS DE-ENERGIZED. INTERLOCK BY THE E.C.

**EXHAUST FAN:**

THE EXHAUST FAN SHALL BE CONTROLLED BY A SPACE MOUNTED COOL-ONLY LINE VOLTAGE THERMOSTAT. THE THERMOSTAT WILL ENERGIZE AND DE-ENERGIZE THE EXHAUST FAN TO MAINTAIN A MAXIMUM TEMPERATURE OF 90°F (ADJ) IN THE ROOM. THE EXHAUST FAN SHALL BE INTERLOCKED TO OPEN THE LOUVER DAMPER WHEN THE EXHAUST FAN IS ENERGIZED AND CLOSE THE LOUVER DAMPER WHEN THE EXHAUST FAN IS DE-ENERGIZED.

**HEATING:**

THE ELECTRIC UNIT HEATER SHALL BE CONTROLLED BY A HEAT-ONLY UNIT-MOUNTED THERMOSTAT. THE THERMOSTAT WILL ENERGIZE AND DE-ENERGIZE THE ELECTRIC UNIT HEATER TO MAINTAIN A MINIMUM TEMPERATURE OF 50°F (ADJ) IN THE ROOM.