GENERAL HVAC NOTES

- ALL MECHANICAL EQUIPMENT AND INSTALLATIONS SHALL CONFORM WITH THE REQUIREMENTS OF THE LOCAL CODE OFFICE'S LATEST APPROVED VERSION OF THE INTERNATIONAL MECHANICAL CODE, THE INTERNATIONAL BLDG. CODE, THE STATE ENERGY CODE, NFPA 54, NFPA 90A, 101, UNDERWRITERS LABORATORIES AND ALL APPLICABLE LOCAL CODES AND ORDINANCES.
- PRIOR TO PURCHASING ANY MATERIALS OR STARTING ANY WORK, CONTRACTOR SHALL FIELD VERIFY ALL 2 EXISTING CONDITIONS, DUCTWORK SIZES, EQUIPMENT LOCATIONS, ETC. SHOWN ON THE DRAWINGS OR AFFECTING THIS WORK AND SHALL REPORT ANY DEVIATIONS TO THE ARCHITECT.
- SUBMITTALS AND SHOP DRAWINGS SHALL BE SUBMITTED TO AND APPROVED BY THE ARCHITECT AND 3. MECHANICAL ENGINEER PRIOR TO ORDERING, PURCHASING, OR FABRICATING ANY MECHANICAL EQUIPMENT. THESE SHALL INCLUDE ALL EQUIPMENT SPECIFIED ON THE PLANS OR IN THE PROJECT SPECIFICATIONS. IF ANY MECHANICAL EQUIPMENT SUBMITTED DEVIATES FROM THAT SHOWN IN THE PLANS AND SPECIFICATIONS AS BASIS OF DESIGN, THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ANY AND ALL CHANGES REQUIRED OF OTHER TRADES TO ACCOMPLISH THE WORK USING SUBMITTED EQUIPMENT.
- ALL MECHANICAL EQUIPMENT REQUIRING ELECTRICAL POWER SHALL BE INSTALLED WITH DISCONNECT 4. SWITCHES AT EACH PIECE OF EQUIPMENT. COORDINATE SWITCH TYPE (FUSED OR NON-FUSED) WITH EQUIPMENT CHARACTERISTICS, MANUFACTURER'S RECOMMENDATIONS, AND ELECTRICAL PLANS AND SPECIFICATIONS. SEE SPECIFICATIONS FOR DESCRIPTION OF INTERFACE WITH DIVISION 16 WORK.
- 5 ALL ELECTRICAL CHARACTERISTICS OF POWERED MECHANICAL EQUIPMENT SHALL BE VERIFIED AND FIELD COORDINATED WITH DIVISION 16 CONTRACTOR BEFORE ANY EQUIPMENT IS PURCHASED OR ORDERED.
- ALL REQUIRED CONTROL WIRING NOT SHOWN ON ELECTRICAL DRAWINGS SHALL BE INCLUDED AS PART OF 6. THE MECHANICAL WORK. WIRING IN HVAC PLENUM SPACES SHALL BE INSTALLED ACCORDING TO CODE REQUIREMENTS.
- UNLESS OTHERWISE NOTED, STARTERS, TRANSFORMERS, CONTROLS AND CONTROL WIRING REQUIRED FOR 7 ALL MECHANICAL SYSTEMS SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.
- INSTALL FIRE DAMPERS IN ALL RATED WALL, FLOOR, AND CEILING PENETRATIONS AS APPLICABLE. REFER TO 8. ARCHITECTURAL DRAWINGS FOR LOCATIONS OF RATED AREAS. PROVIDE ACCESS DOORS IN DUCT AT EACH FIRE DAMPER LOCATION. INSTALL SMOKE DAMPERS IN ALL DUCT PENETRATIONS THROUGH SMOKE RATED WALLS. WHERE DUCTS PENETRATE WALLS THAT CARRY BOTH SMOKE AND FIRE RATINGS, THE DAMPERS INSTALLED SHALL BE COMBINATION SMOKE AND FIRE DAMPERS. ALL DAMPERS SHALL BE U.L. 555 LABELED.
- FIRE ALARM CONTRACTOR SHALL PROVIDE SMOKE DETECTORS FOR THE SUPPLY AND RETURN AIR TRUNKS OF 9 ALL HVAC EQUIPMENT SUPPLYING GREATER THAN 2000 CFM TO ANY SPACE. PER IMC 606, DUCT SMOKE DETECTORS SHALL SHUT DOWN THE AIR DISTRIBUTION SYSTEM UPON ACTIVATION. PER IMC 606, DUCT SMOKE DETECTORS TO BE CONNECTED TO THE BUILDING FIRE ALARM PANEL AS APPLICABLE. IF THE OCCUPANCY DOES NOT REQUIRE A FIRE ALARM PANEL, THE ACTIVATION OF DUCT SMOKE DETECTORS SHALL ACTIVATE AN AUDIBLE AND VISIBLE SIGNAL IN AN APPROVED LOCATION. SIGNAL TO BE IDENTIFIED AS "AIR DUCT DETECTOR TROUBLE". HVAC UNITS MAY BE RESET AT FIRE ALARM PANEL.
- FIRE ALARM CONTRACTOR IS RESPONSIBLE FOR ALL WIRING AND EQUIPMENT TO MONITOR SMOKE DETECTORS 10. AND SHUT DOWN HVAC UNIT UPON SMOKE DETECTOR ACTIVATION. FIRE ALARM CONTRACTOR SHALL PROVIDE DUCT DETECTORS, AND MECHANICAL CONTRACTOR IS RESPONSIBLE FOR INSTALLING DETECTOR IN DUCT. FIRE ALARM CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND OPERATION OF BUILDING FIRE ALARM SYSTEM.
- 11. ALL MECHANICAL EQUIPMENT SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- SUPPLY, RETURN, EXHAUST, AND OUTDOOR AIR DUCTWORK SHALL BE CONSTRUCTED OF GALVANIZED SHEET 12. METAL AS RECOMMENDED IN SMACNA LOW PRESSURE DUCT CONSTRUCTION STANDARDS, LATEST EDITION. ALL JOINTS, SEAMS, AND TAKE-OFFS IN SUPPLY AND RETURN SHEET METAL DUCTWORK SHALL BE SEALED WITH MASTIC DUCT SEALER TO SMACNA CLASS A, NO CLOTH DUCT TAPE IS ALLOWED.
- 13. ALL SHEET METAL SUPPLY, RETURN, AND VENTILATION AIR DUCT WORK SHALL BE INSULATED WITH FIBERGLASS DUCT INSULATION WITH FOIL VAPOR BARRIER, U.L. LISTED, MINIMUM R-6 OR OTHERWISE AS REQUIRED BY LOCAL ENERGY CODES. USE R-8 IN ATTICS OR OUTSIDE THE BUILDING INSULATION ENVELOPE. EXHAUST DUCT WORK SHALL BE INSULATED WITH THE SAME WITHIN 10' OF EXTERIOR WALL OR ROOF OPENING.
- 14. ALL MECHANICAL EQUIPMENT SHALL BE LABELED WITH BAKELITE NAMEPLATE WITH 2" HIGH WHITE LETTERS ON A BLACK BACKGROUND. NAMEPLATE SHALL SHOW EQUIPMENT TAG USED ON THESE DRAWINGS. ELECTRICAL DISCONNECTS FOR EQUIPMENT SHALL BE LABELED TO MATCH EQUIPMENT SERVED.
- ALL DUCTWORK SHALL BE SUPPORTED BY THE BUILDING STRUCTURE AND SHALL NOT HANG FROM OR REST ON 15. CEILING TILES OR CEILING STRUCTURE. DUCT SUPPORTS AND CONNECTION TO STRUCTURE SHALL BE AS PER SMACNA STANDARDS.
- FLEXIBLE DUCTWORK SHALL BE THERMAFLEX M-KE (U.L. 181 LISTED, CLASS 1 FLEXIBLE AIR DUCT) OR EQUAL. 16. PROVIDE THERMAFLEX M-KE R-6 (R-6 MINIMUM VALUE OR AS REQUIRED BY LOCAL ENERGY CODE) IN UNCONDITIONED SPACES. USE R-8 IN ATTICS AND SPACES OUTSIDE THE BUILDING INSULATION ENVELOPE. AIR CONNECTORS ARE NOT ACCEPTABLE. SIZE TO MATCH DEVICE NECK, PROVIDE ROUND GALVANIZED STEEL DUCT RUN-OUTS TO PROVIDE A MAXIMUM FLEXIBLE DUCT LENGTH OF 5'-0". FLEXIBLE DUCTWORK SHALL BE ROUTED AS STRAIGHT AS POSSIBLE AND SHALL BE ROUTED AND SUPPORTED WITHOUT FORMING CRIMPS OR OTHER AIR FLOW RESTRICTIONS. PROVIDE SQUARE TO ROUND ADAPTERS OR BOOTS AS REQUIRED TO CONNECT TO AIR DEVICE NECK.
- BRANCH RUN-OUT DUCTS SHALL BE SAME SIZE AS DIFFUSER NECK IF NOT NOTED OTHERWISE. 17.
- SHEET METAL DUCTWORK SHOWN AS BEING INTERNALLY LINED SHALL BE LINED WITH 1" THICK, 3 LB/CUFT. 18. DENSITY DUCT LINER, MINIMUM R-4 OR AS REQUIRED BY APPLICABLE ENERGY CODE, CERTAINTEED "TOUGHGARD" OR EQUAL BY JOHNS-MANVILLE OR KNAUF. LINE ALL DUCTWORK A MINIMUM OF 15'-0" DOWNSTREAM AND UPSTREAM (WHERE POSSIBLE) OF ALL AIR HANDLING UNITS, FAN COIL UNITS, AND TERMINAL UNITS. LEADING EDGE OF INSULATION SHALL HAVE SHEET METAL NOSING. DUCT THAT IS INTERNALLY INSULATED SHALL BE EXTERNALLY INSULATED AS WELL TO ACHIEVE REQUIRED TOTAL U-VALUE.
- DUCTWORK DIMENSIONS SHOWN ON DRAWING ARE INSIDE CLEAR DIMENSIONS. CONTRACTOR SHALL ADJUST 19. TOTAL DUCT WORK DIMENSIONS TO ACHIEVE SHOWN INSIDE CLEAR DIMENSIONS.
- DUCTWORK AND EQUIPMENT SHOWN IS DIAGRAMMATIC. COORDINATE AND ROUTE DUCTWORK TO MEET JOB 20. REQUIREMENTS. LOCATION OF EQUIPMENT MUST BE COORDINATED WITH ALL DISCIPLINES BEFORE FINAL LOCATIONS ARE SELECTED. WEIGHTS OF EQUIPMENT MUST BE VERIFIED AND COORDINATED WITH STRUCTURAL SYSTEMS MANAGERS BEFORE EQUIPMENT CAN BE MOVED INTO LOCATION OR INSTALLED.
- 21. ALL CONDENSATE DRAIN LINES FROM HVAC EQUIPMENT LOCATED INSIDE THE BUILDING SHALL BE TRAPPED AND SHALL DRAIN INTO BUILDING FLOOR DRAINS, ROOF DRAINS, OR STORM DRAINS. CONDENSATE SHALL BE INSULATED SCHEDULE 40 PVC (EXCEPT INSULATED TYPE L COPPER IN HVAC PLENUMS). CONDENSTATE SHALL BE PUMPED AS REQUIRED.
- ALL PIPING ABOVE GRADE SHALL BE SUPPORTED BY THE BUILDING STRUCTURE, AND SHALL NOT REST ON 22. CEILING TILES OR CEILING STRUCTURE. PIPE HUNG FROM JOISTS SHALL BE HUNG FROM THE TOP CHORD OF JOISTS.
- ALL PIPE AND DUCT PENETRATIONS OF FIRE AND/OR SMOKE RATED ASSEMBLIES SHALL BE FIRESTOPPED AS 23. REQUIRED TO RESTORE ASSEMBLY TO ORIGINAL INTEGRITY. FIRE BARRIER PRODUCTS SHALL BE MANUFACTURED BY 3M COMPANY, CP25 CAULK, CP195 COMPOSITE PANEL, FS195 WRAP/STRIP, OR PSS 7900 SERIES SYTEMS AS RECOMMENDED BY MFG. FOR PARTICULAR APPLICATIONS, OR EQUIVALENT SYSTEM AS APPROVED BY LOCAL CODE OFFICIALS.
- ANY WALL, FLOOR, OR CEILING SURFACE THAT IS DISTURBED DURING THE COURSE OF THIS WORK SHALL BE 24. REPAIRED TO EXISTING OR LIKE-NEW CONDITION.
- 25. OUTSIDE HARDWARE FOR EXHAUST FANS SHALL BE PLACED IN A LOCATION SUITABLE TO OWNER. CONTRACTOR SHALL COORDINATE PLACEMENT WITH OWNER BEFORE FINAL INSTALLATION. OUTSIDE HARDWARE FOR EXHAUST FANS AND FRESH AIR INTAKES SHOULD BE CONSTRUCTED SO AS TO BE WEATHERTIGHT AND SHOULD INCLUDE INTEGRAL BIRD OR INSECT SCREENS.
- CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ALL MECHANICAL EQUIPMENT, DUCTWORK, ETC. TO 26. FIT WITHIN THE SPACE ALLOWED BY ARCHITECTURAL AND STRUCTURAL CONDITIONS. CUTTING OR OTHERWISE ALTERING ANY STRUCTURAL MEMBERS SHALL NOT BE PERMITTED WITHOUT WRITTEN PERMISSION FROM THE ARCHITECT.
- 27. CONTRACTOR SHALL PROVIDE ALL NECESSARY PRODUCTS AND MATERIALS FOR A COMPLETE MECHANICAL SYSTEM.

SYMBOL - SINGLE LINE	SYMBOL - DOUBLE LINE	DESCRIPTION
		CELING DIFFUSER
		CEILING RETURN GRILLE
		SIDEWALL SUPPLY REGISTER OR GRILLE
		SIDEWALL RETURN REGISTER OR GRILLE
		EQUIPMENT DESIGNATION
(A8) 200	(A8) 200	DIFFUSER TAG: TYPE "A", NECK SIZE 8", BALANCED FOR 200 CFM
<u>WL-1</u> 75	<u>WL-1</u> 75	LOUVER TAG: TYPE "WL-1", SIZE FOR 75 CFM @ 500 FPM
++		DROP
++	R	RISE
16x12	16x12	DUCT SIZE - RECTANGULAR
10"ø	10"ø	DUCT SIZE - ROUND
		DUCT TRANSITION
Z		RETURN AIR DUCT TURNED DOWN
		RETURN AIR DUCT TURNED UP
		RECT. ELBOW WITH TURNING VANES
====		LINED DUCT
~~~		FLEXIBLE DUCT
DD	DD	DUCT SMOKE DETECTOR
FD	FD	FIRE DAMPER
——————————————————————————————————————	F/s	FIRE/SMOKE DAMPER
		CEILING RADIATION DAMPER
MOD	MOD	MOTOR OPERATED DAMPER
— <del>[</del> —–		MANUAL VOLUME DAMPER
		BACKDRAFT DAMPER
		FLEXIBLE EQUIPMENT CONNECTOR
		THERMOSTAT, HUMIDISTAT, CARBON DIOXIDE WALL-MOUNTED SENSOR, OR AS NOTED
$\triangleright$	$\triangleright$	REVISION TAG (#1)
	<u> Au</u>	UNDER CUT (DOOR) 1"
$\bullet$	$\bullet$	CONNECT TO EXISTING

SYMBOL	DESCRIPTION
MBH	1000 BTU/HR
A/C	ABOVE CEILING
AFF	ABOVE FINISH FLOOR
AHU	AIR HANDLING UNIT
CD	CONDENSATE DRAIN
EF	EXHAUST FAN
ESP	EXTERNAL STATIC PRESSURE (IN. W.C.)
HP	HEAT PUMP UNIT OR HORSEPOWER
CU	CONDENSING UNIT
OA	OUTSIDE AIR
WL	WALL LOUVER
FC	FLEXIBLE EQUIPMENT CONNECTOR
IDU	DUCTED OR DUCTLESS MINI-SPLIT FAN COIL
ODU	MINI-SPLIT HEAT PUMP OR CONDENSING UNIT
FNU	FURNACE UNIT
DN	DOWN
CTE	CONNECT TO EXISTING

## HVAC LEGEND

# HVAC ABBREVIATIONS

# OPERATING SEQUENCE: DEDICATED OUTDOOR AIR SYSTEM

## 1.1 INFORMATION APPLICABLE TO ALL CONTROL SEQUENCES

A. Contractor shall provide a relay interlock with the building fire alarm system such that all ventilation air systems will shut down upon alarm. Extend control circuits to the fire alarm panel. B. Unit shall interface w/ building automation system. Provide BacNET cards as required.

1.2DEDICATED OUTDOOR AIR SYSTEM

## Run Conditions - Scheduled:

The unit shall run according to a user definable time schedule.

Mode of Operation:

- The purpose of the DOAS is to deliver dry, neutral ventilation air to each zone in all seasons. All unit operation shall be controlled by manufacturer's on-board controls. No setpoints or commands affecting
- unit operation (except that of scheduling) shall be delivered by the graphical user interface. Graphical user interface shall be for monitoring and alarm only. • Unit shall intake 100% outdoor air as shown and stage fans, heating, and cooling to deliver filtered, dry (50-55
- degree dew point), neutral (70-75 degrees F) air to each zone during Occupied Mode in all seasons. Unit shall shut down during Unoccupied Mode.

### Zone Control:

- The facility is divided into two zones (Fire & Public Safety). Zone damper shall open to 100% when Public Safety zone is occupied. Unit shall ramp up as required based on feedback from duct pressure sensor / schedule
- When zone is unoccupied the respective zone damper shall close. Unit shall ramp down as required based on feedback from duct pressure sensor / schedule.

**Emergency Shutdown:** 

• The unit shall shut down and generate an alarm upon receiving an emergency shutdown signal.

## Smoke Detection:

• The unit shall shut down and generate an alarm upon receiving a smoke detector status.

### Graphical Interface:

 The BAS Graphical User Interface shall show the following points on a graphical depiction of each of the DOAS units:

- Supply Fan Status •••
- Compressor(s) Status ••• ••• Cooling Stage(s) Status
- ... Heating Stage(s) Status
- ••• **Emergency Shutdown Status**
- ••• Smoke Detector Status

ОA

••• Unit LAT Facility OAT ...

	HAR	DWAR	E PO	INTS	S	SOFTW				
ZONE	AI	AO	BI	во	AV	BV	SCHED	TREND	ALARM	SHOW ON GRAPHIC
ZONE TEMP	Х							Х		Х
ZONE SETPT ADJUST	Х									Х
OUTSIDE AIR HUMIDITY	Х							Х		Х
OUTSIDE AIR TEMP	Х							Х		Х
SUPPLY AIR TEMP	Х							Х		Х
ZONE OVERRIDE			Х					Х		Х
SUPPLY FAN STATUS			Х					Х	Х	Х
COMPRESSOR(S) STATUS			Х					Х	Х	Х
SMOKE DETECTOR			Х					Х	х	Х
COOLING STAGE(S)				Х				Х		Х
HEATING STAGE (S)				Х				Х		Х
EMERGENCY SHUTDOWN						X			х	Х
SCHEDULE							Х			
HEATING SETPOINT									Х	Х
COOLING SETPOINT									х	Х

(FILTER)

BI — Supply Fan Status



BO - Cooling Stage 1 (Subsequent stages as

applicable)

# VENTILATION MOTORIZED DAMPER SCHEDULE

TAG	BASIS OF DESIGN	MIN. VALVE CFM	DESIGN CFM	SIZE (IN.)	NOTES
BDD-1	CAPTIVEAIRE	0	1,060	22x12	1,2,3

NOTES

SINGLE POINT CONNECTION 24V.

CONTROLS TO INTERFACE w/ BUILDING AUTOMATION SYSTEM AND DOAS-1 TERMINAL UNIT TO MODULATE BETWEEN CLOSED AND CONSTANT VOLUME BASED ON SCHEDULED CFM

Bl - Zone Override





		FOR QUES Atlan RE PHONE EMAIL: reg1	TIONS, CALL T ta Mechanical EGION 122 : (470) 419-4768 22@captiveaire.cor	THE		Ē	PATENT NUMBERS EXHAUST HOODS ND-2/BD-2/SND-2 (CANADA) - CA PATENT 2520435 C.															
HOOL	INF	ORMATION	<u>V – JOB#58</u>	<u>866</u>	<u>083</u>		1				ЕХНА					1						
HOOD	TAG	MODEL						DESIGN	TOTAL		F	RISER(S	R(S)			HOOD						
NO	IAO	MODEL				TEMP		CFM/FT	EXH CFM	WIDTH LENG	HEIGHT	DIA	CFM	VEL	SP	CONSTRUCTION	END	ROW				
1		5424 ND-2	CAPTIVEAIRE		4' 2"	600 DEG	I HEAVY	204	850		4"		850	1558	-0.654"	430 SS WHERE EXPOSED	ALONE	ALONE				
<u>H00L</u>	INF	ORMATION	V																			
ноор	TAO	FILTER(S)				S)				LIGHT(S)		_				L FIRE	JTILITY CAE	BINET(S)	FLECTRICAL	SWITCHES	FIRE	HOOD
NO	TAG	Т	YPE	HEIGHT	LENGTH	EFFICIENCY @ 7 MICF	ONS QTY		TYPE	GUAR		OCATIO	N	SIZE	TYPE	SIZE		MODEL #	QUANTITY		WEIGHT	
1		CAPTRATE	SOLO FILTER	3	16"	16"	85% SEE FILTER SP	EC 2	RECE	SSED ROUND	) NO		RIGHT	12	"x54"x24"	TANK FS	4.0		SC-110110MA	1 LIGHT 1 FAN	YES	448 LBS
HOOL	0PT	TONS			•						•	•		•		•						
HOOD	TAG				OPTI	ON																
		FIELD WRAPI	PER 6.00" HIGH	FRO	NT, LEFT	, RIGHT.																
1		BACKSPLASH	122.00" HIGH X	98.00	" LONG	430 SS V	/ERTICAL.															
		RISER SENSO	R INSTALL 6IN PLE	EN.																		
<u>FIRE</u>	SYS2	<u>TEM INFC</u>	<u> DRMATION</u> -	-J	0B#58	<u>366083</u>	}															
FIRE							FLOV	/		INSTALLATION	١											
NO			TYPE			SIZE	POIN	s	SYSTE	M	LOCATION C		DOD									
1		TANK	( FS			4.0	18	F	IRE CABINE	T RIGHT	RIGHT,	HOOD	1									



_RECESSED ROUND LED FIXTURE AND LED LIGHT, 3500 K WARM OUTPUT.

![](_page_1_Figure_4.jpeg)

![](_page_1_Picture_5.jpeg)

![](_page_1_Figure_6.jpeg)

_ -

LOCATION LOCATION2

<b>FV</b> U																																	
FAN UNIT	TAG	<u>, АМ</u>	FAN UNIT MODEL #	MANUFACTURI	ER CFM	ESP	RPM	MOTOR	НР	BHP	PHASE	VOLT	FLA	DIS	SCHARGE	WE	EIGHT	SONES	]														
NO 1	KFF-1	1	DU50HEA	CAPTIVEAIRE	- 850	0.850	1387 T	ENCL	1 0.500	0 2650	1	115	6.3		323 FPM	(1	LBS) 	13.1	-														
DOAS		FAN	SCHEDULE – JOB	#5866083						0.2000									]														
FAN					N		MAX TO		FIGHT		ELEC	CTRICA		ATION	01	JTSIDE AI	R		DOLING IN G AIR						DISCHARG	REHE E	EAT INFO CAPAC	RMATION	MOISTURE	GAS		GA	S HEAT INFO
UNIT NO	TAG	QTY	DOAS/RTU MODEL #	MANUFACTUREF	R BLOWER	AIR CFM	UTSIDE CI	=M (	(LBS)	ESP	HP PHA	SE VO	OLT M	CAN		B WE	B DE	B WB	DP	TOTAL	. SE	NS.	IEER	MRE -	DB W	B DES	SIRED	MAX	REMOVAL RAT	E TYPE	BTU	s BTUs	; RISE
2	DOAS-1	1	CASRTU3-I.250-18-15T	CAPTIVEAIRE	18P-3	0	2640 26	40 2	2565	1.500 5	5.00 3	2	208 70	.3A	80A 81.0	0°F 75.7	7°F 55.4	4°F 54.5°	°F 54.0°	F 186.0 ME	3H 70.5	MBH	18.8	5.7 7	0.0°F 60.	l°F 41.6	6 MBH   1	29.6 MBH	104.3 LBS/HR	NATUR	AL 2469	14 20000	0 67°F
1. IN 2. C 3. IN 4. F 5. E 6. E 7. S 8. F 9. A 10. 1 11. 1 12. 1 13. 1 14. 1 15. 1 FAN UNIT NO 1	IVERTER S IRECT DRIV ITEGRATEI EFRIGERA C MOTOR ( LECTRONIC UCTION LIN ACTORY CP VERAGING 2" EXTERIC 31% EFFICI SUPPLY CP FULLY MOE HAIL GUAR SIDE DISCH OPTION TAG	CROLL VE PLE D MONI TION PL CONDE C EXPA NE ACC OMMISS INTAKI DR DUAL IENT FL INTAKI DR DUAL IENT FL INTAKI DR DUAL IENT FL INTAKI DR DUAL IENT FL INTAKI DR DUAL IENT FL INTAKI DR DUAL IENT FL INTAKI DR DUAL IENT FL INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INTAKI INT	COMPRESSOR WITH INTEGRAT NUM BLOWER. BELT DRIVEN BI TORING VIA CELLULAR CONNEC RESSURE MONITORING ON HIG NSING FANS INSION VALVE. TXV NOT ACCEF UMULATOR SIONING WITH 5 YEAR PARTS W E, EVAP AND DISCHARGE TEMP L-WALL CONSTRUCTION W/ R-13 JRNACE, WITH MODULATING INI IJTORING INTEGRAL TO UNIT WI NG HOT GAS REHEAT CONDENSING COIL 'NO RETURN Y GREASE BOX FAN BASE CERAMIC SEAL - ECM WIRING PACKAGE - PW	TED OIL SENSOR. DIGITA LOWERS ARE NOT ACCEI CTION BY MANUFACTURE H AND LOW PRESSURE S PTABLE VARRANTY, 25 YEAR WAR PERATURE SENSORS (DIS 3 INSULATION-MINIMUM 2 DUCER TO MAINTAIN CON ITH CFM MEASUREMENT	L OR STAGED PTABLE ER SIDE OF SYST RANTY ON ST CHARGE SEN 20GA EXTERIO NSTANT COME INCLUDED TH DESCRIPTION DESCRIPTION DR GREASE D 3 PREWIRE (1	D SCROLL NO EM INCLUDE FAINLESS ST ISOR TO BE DR W/ 14GA BUSTION EF IROUGH DIG IROUGH DIG	DT AN APPRO	VED EQU, DIGITAL II CHANGEI UNTED W ROSS FIRI CE	AL NTERFAC R VITHIN UN ING RANG	E IIT) SE. 6:1 TU		N WITH I	NG AND 5	5:1 TUR	NDOWN WI	TH LP																	
2	DOAS-1	1 FAN BASE CERAMIC SEAL - INSTALLED AT PLANT - FOR GREASE DUCTS   1 ECM WIRING PACKAGE - PWM SIGNAL FROM ECPM03 PREWIRE (TELCO MOTOR), CCW ROTATION   1 2 YEAR PARTS WARRANTY   1 INLET PRESSURE GAUGE, 0 TO 10" WC, 1 FURNACE   1 MANIFOLD PRESSURE GAUGE, 0 TO 10" WC, 1 FURNACE   1 MANIFOLD PRESSURE GAUGE, 0 TO 10" WC, 1 FURNACE   1 RTU TOTAL CFM MONITORING   1 SINGLE POINT ELECTRICAL CONNECTION FOR RTU. 750VA TRANSFORMER USED. IF A NON-DCV   PREWIRE CONTROLS THIS UNIT, THE #28, #47, "MA", OR "E2" PREWIRE OPTION MUST   BE SELECTED. DOES NOT PROVIDE SUPPLY STARTER IN PREWIRE   1 CASLINK BUILDING MONITORING SYSTEM - INTERNET OR CELLULAR CONNECTION REQUIRED   1 2" MERV 13 FLITERS FOR RTU3 (QTY. 4)   1 2" MERV 3 FLITERS FOR RTU3 (QTY. 4)   1 OVERREAT STAT   1 VFD FACTORY MOUNTED AND WIRED IN RTU COMMERCIAL CONTROL VESTIBULE   1 15 TON MODULATING COOLING OPTION. 208/230V. R410A REFRIGERANT, VARIABLE SPEED   1 COMPRESSOR, ECM CONDENSING FANS   45.1 15 TON MODULATING COOLING OPTION. 208/230V. R410A REFRIGERANT, VARIABLE SPEED   1 COMPRESSOR, ECM CONDENSING FANS   1 STON MODULATING COOLING OPTION. 208/230V. R410A REFRIGERANT, VARIA																	<u>FAN </u>	<u>‡1 DU50HFA - </u> 21	EXHAUST F/			- 28 7/8	3"		GREASE	2ª E DRAIN.	1 1/2"	FEAT - DIRECT D - ROOF MO - RESTAUR - UL705 ANI - VARIABLE - INTERNAL - HIGH HEA - GREASE C - NEMA 3R - MORMAL T EXHAUST F WHILE EXH AUDIT ALL THERMAL I DETERIOR WOULD CA ABNORMAL EXHAUST F WHILE EXH AT 600°F (3 15 MINUTE: DAMAGED AN UNSAFE OPTION	URES: RIVE CONST JNTED FAN: JNTED FAN: JNT MODEL 0 UL762 ANE SPEED CON WIRING. OVERLOAD COPERATION COPERATION AUSTING AL SAFETY DISU COPERATUR AN MUST O AUSTING AL STAN PARTS GUILIBRIUM TING EFFE JSE UNSAF FLARE-UP AN MUST O AUSTING BL 16°C) FOR A S WITHOUT TO ANY EXT CONDITION S	RUCTION (N S. ) ULC-S645 NTROL. PROTECTIO N 300°F (149 ON TESTIN CONNECT S RETEST PERATE CO R AT 300°F ( HAVE REAC M, AND WITH CTS TO THE E OPERATIO DERATE CO JRNING GRE PERATE CO JRNING GRE PERATE CO IPERATE	IO BELTS/PULLS N (SINGLE PHA 9°C). G. WITCH. 'NTINUOUSLY (149°C) HED HED HED HOUT ANY FAN WHICH N. NTINUOUSLY FASE VAPORS COMING COULD CAUSE
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NO F	2N # 1	TA KEF	G WEIGHT F-1 34 LBS	ITEM CURB	19.500"W X	19.500"L X 2	4.000"H ALON	SI.	ZE <u>'H, RIGHT</u>	VENTED	) HINGED	D.									TOF			21"							9 1/2"		

![](_page_2_Figure_3.jpeg)

![](_page_2_Figure_4.jpeg)

![](_page_2_Figure_15.jpeg)

KYLE ( Prototype Equipment Replacement for the County Multi-Purpose Bldgs G  $\bigcirc$  $\cup$ rokee Chet Drawn By Dote February 24, 2023 Revisions Revisions Project No 2207 Sheet title CAPTIVEAIRE EQUIPMENT PLANS Sheet No M0.3

![](_page_3_Figure_0.jpeg)

![](_page_3_Figure_1.jpeg)

![](_page_3_Figure_2.jpeg)

![](_page_3_Figure_3.jpeg)

![](_page_3_Figure_4.jpeg)

### FAN #2 CASRTU3-I.250-18-15T - HEATER (DOAS-1)

### NOTES:

- 1. DO NOT OBSTRUCT OUTSIDE AIR INLET, OUTSIDE AIR COIL
- OR OUTSIDE AIR FAN. 2.
- DENOTES CORNER WEIGHT. FLOOR MOUNT ISOLATORS LOCATED 1" FROM END OF BASE IN 3. EITHER DIRECTION.

*NOTE: SUPPLY DUCT MUST BE INSTALLED TO MEET SMACNA STANDARDS. A MINIMUM STRAIGHT DUCT LENGTH MUST BE MAINTAINED DOWNSTREAM OF UNIT DISCHARGE AS OUTLINED IN AMCA PUBLICATION 201. WHEN USING RECTANGULAR DUCTWORK, ELBOWS MUST BE RADIUS THROAT, RADIUS BACK WITH TURNING VANES. FLEXIBLE DUCTWORK AND SQUARE THROAT/SQUARE BACK ELBOWS SHOULD NOT BE USED. ANY TRANSITION AND/OR TURNS IN THE DUCTWORK WILL CAUSE SYSTEM EFFECT. SYSTEM EFFECT WILL DRASTICALLY INCREASE STATIC PRESSURE AND REDUCE AIRFLOW. DO NOT RELY ON UNIT TO SUPPORT DUCT IN ANY WAY. FAILURE TO PROPERLY SIZE DUCTWORK MAY CAUSE SYSTEM EFFECTS AND REDUCE PERFORMANCE OF THE EQUIPMENT. SUGGESTED STRAIGHT DUCT SIZE IS 25" x 14".

![](_page_4_Picture_6.jpeg)

(650 LBS)

(466 LBS)

![](_page_4_Figure_9.jpeg)

1″ NPT SS E∨APDRATDR DRAIN (TRAP REQ'D). 4″ MINIMUM TRAP DEPTH.—

![](_page_4_Figure_11.jpeg)

![](_page_4_Figure_12.jpeg)

![](_page_4_Figure_13.jpeg)

![](_page_4_Figure_14.jpeg)

![](_page_4_Figure_15.jpeg)

![](_page_4_Figure_16.jpeg)

![](_page_4_Figure_17.jpeg)

![](_page_5_Figure_0.jpeg)

![](_page_5_Figure_1.jpeg)

![](_page_5_Figure_2.jpeg)

![](_page_5_Picture_3.jpeg)

![](_page_6_Figure_0.jpeg)

![](_page_6_Picture_1.jpeg)

![](_page_7_Figure_0.jpeg)

![](_page_8_Figure_0.jpeg)

SCALE: 3/16" = 1'-0"

![](_page_8_Figure_6.jpeg)

SECTION 15010 - MECHANICAL GENERAL

PART 1 GENERAL

### 1.1 GENERAL REQUIREMENTS

- A. Specification: This specification is intended to cover all portions of this building. B. Reference Codes: This installation shall comply with the following codes and
- regulations, along with all Georgia amendments.
- 1. Current Georgia State Minimum Standard Mechanical Code.
- 2. Current NFPA No. 90A Installation of Air Conditioning and Ventilation Systems. 3. Current Georgia State Minimum standard Plumbing Code.
- 4. Current Georgia State Minimum Standard Gas Code.
- 5. Current NFPA #54 National Fuel Gas Code.
- 6. Current Georgia State Minimum Standard Gas Code.
- 7. Current NFPA No.70, National Electric Code.
- 8. Current Georgia State Minimum Life Safety Code. 9. Current Georgia State Minimum Standard Fire Prevention Code.
- 10. Current Georgia State Energy Code for Buildings
- C. Reference Standards: This installation shall comply with the following standards. 1. Manufacturers Standardization Society of the Valve and fittings Industry (1815 North Ft. Meyer Drive, Arlington, VA 22209). MSS-SP-58-2002, called MSS-SP-58. MSS-SP-69-2003, called MSS-SP-69.
- 2. American Society of Heating and Ventilating and Air Conditioning Engineers Guide, Fundamentals, 2009 Edition.
- 3. Sheet Metal and Air Conditioning Contractor National Association (SMACNA) HVAC Duct Construction Standards, Metal & Flexible, 2005 Edition. Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems. 1986 Edition. Seismic Restraint Manual Guidelines for Mechanical Systems, Second Edition.
- 4. American Society of Sanitary Engineers (ASSE) Standard, Latest Edition.
- 5. North American Insulation Manufacturers Association (NAIMA) Fibrous Glass Duct Construction Standards.
- 1.2 REGULATIONS
- A. Attention is called to the fact that all work shall be done in accordance with all applicable City, County and State regulations, which regulations shall be considered as minimum requirements, and shall not alter the arrangement and pipe sizes indicated on the plans, except where they conflict.
- B. Contractor is responsible for obtaining all permits and paying all fees required to complete the Work
- 1.3 DRAWINGS
- A. The work is shown on the project drawings and specifications.
- 1.4 PROTECTION OF PUBLIC
- A. If the contractor must operate any potentially dangerous devices before all specified safety valves controls and devices are installed, he shall notify the Architect in writing. He shall not operate such devices under these conditions until arrangements for supervision by competent operators have been instituted and Architect's written approval has been issued.
- 1.5 EXCAVATION, SHORING AND BRACING
- A. Excavate and back-fill for the installation of all underground work.
- B. Provide all shoring and bracing to prevent cave-ins during the construction period. 1.6 SHOP DRAWINGS
- A. Shop drawings shall be submitted for but not limited to the following items:
- 1. All Scheduled Equipment
- 2. Ductwork & Accessories 3. Hangers
- 4. Piping & Accessories
- 5. Supports
- 6. Vibration Isolation
- 7. Fixtures 8. Roof Portals
- 9. Control System
- 10. Duct Systems
- 11. Equipment Curbs
- 12. Insulatio 13. Filters
- 14. Access Panels
- 15. Louvers
- 16. Refrigerant Pipe Sizes
- B. Provide with the submittal package the proposed Test & Balance Company's credentials as described in Section 15950. Include a latter from the Test & Balance company indicating that they have read Section 15950 and will perform testing and balancing of the mechanical systems as described in that Section.
- C. Provide a complete list of all accessories and options (indicate factory or field installed) for all scheduled mechanical equipment, including air distribution devices. Provide manufacturer generated specifications and ratings sheets for each individual piece of air conditioning and heating equipment. Generic photocopies from manufacturers catalog will not be accepted.
- D. In addition to cut sheets, provide a summary sheet indicating exactly what pipe material joining methods, valves, etc. will be provided in the various piping systems. E. The Contractor shall produce ¼" scale CAD-generated ductwork and piping shop
- drawing for every area of the building. Contractor shall coordinate all new mechanical systems with other Divisions, specifically including piping, lights, the building structure, and ceiling heights. It shall be the Contractor's responsibility to ensure that the mechanical work is coordinated with all other trades. The shop drawings submitted shall reflect this coordination in its entirety, including location of piping 2" and larger, all ductwork (except runouts to diffusers), and all equipment by dimensions to column lines. Bottom of duct and bottom of pipe dimensions shall be taken from finished floor, and shall be recorded on the shop drawings for review. Any interferences or conflicts not resolved during normal shop drawing coordination between trades shall be specifically noted to the Architect for his instructions. Conflicts arising out of work installed (or ductwork already fabricated) without shop drawings or shop drawings that have no been completely coordinated, shall
- be the Contractor's responsibility and at his expense for any necessary changes. F. The Contract Drawings are diagrammatic and indicated generally the size and location of ductwork and equipment. While duct sizes shall not be decreased, it is recognized that job site conditions may require re-routing or re-sizing of ductwork, and the Contractor shall be responsible for this coordination. Ductwork that has to be re-sized and/or re-routed as a result of this coordination effort shall be the Contractor's responsibility and at his expense. Ductwork re-sized shall be equivalent to that shown on the drawings. G. Steel fabrication shop drawings shall be coordinated with all Division 15 equipment and
- roof openings. The resulting coordination shall be confirmed and verification shall be submitted with associated equipment and roof curbs. H. Division 15 shall coordinate with structural steel contractors to insure where ductwork
- is required to be routed within joist space that an alternate to x bracing is installed. Failure to coordinate shall subject the Contractor to full cost incurred to meet the design intact on the contract documents.
- 1.7 MOTORS, WIRING AND ELECTRICAL EQUIPMENT
- A. All motors required for this work shall be built in accordance with the latest standards of National Electrical Manufacturer's Association, and shall be especially designed for quiet operation. All motors shall be selected for operation within their nameplate amperage. Adjustable bases shall be provided with motors and equipment which have belt drives.
- B. All electrical materials shall comply with requirements of the National Electric Code. All contactors, starters, relays and panels used in this work, which are included in Underwriters Label Service, shall be new and bear the National Board of Fire Underwriters inspection label. Material not included in Underwriters Label service shall be new and conform to NEMA or other applicable industry standard.
- C. Division 16, ELECTRICAL, provides for the furnishing of conduit and wire from electrical source to electrical use, called "path of power," and for the installation of certain line voltage devices specified in Division 15 which lie in the "path of power," including but not

### limited to:

- 1. Manual switches.
- 2. Line voltage thermostats. 3. Solid state speed controllers.
- 4. Operators for operable dampers.
- 5. Aquastats for domestic hot water circulating pumps.
- 6. Alarms for Flow Switches and Valve Supervisor Switches.
- D. The "path of power" terminates at contactors or control panels of the following listed items of equipment. These control panels contain starters/contactors for the motors or heaters installed on or within the unit and are specifies in Division 15. Any wiring past the point of termination described above is Division 15 work.
- 1. Packaged Rooftop Units. 2. Domestic Water Heaters.
- 3. Make-up Air Units.
- 4. Condensing and/or Heat Pump Units.
- 5. Fan Coil Units.
- 6. Ductless Split Systems. 7. Electric Heaters.
- E. Division 16, ELECTRICAL, provides for electrical power to any given item of equipment at the voltage and phase required by the primary use only. If the item of equipment contains devices such as fans, thermostats, motorized dampers or other controls which require other than primary voltage for their proper function, then transformers shall be
- furnished under Division 15 for that purpose.
- F. Voltage and phase for Division 15 equipment shall be as specified by Division 16. Division 15 Contractor shall submit a list of all mechanical equipment requiring electrical connections to the Contractor prior to release of any equipment, for coordination with the Division 16 contractor. A copy of this list that has been reviewed and approved by the General Contractor shall be submitted to the Architect with the submittal for mechanical equipment. Failure to include this list may result in the rejection of the entire mechanical

equipment submittal.

listed in C above, are provided at the combination starters.

15.

initiating the change shall bear all cost increases.

- K. All motors that are 1 HP and larger shall be high efficiency motors with nominal and minimum full load efficiencies equal to or greater than those specified by the State Energy Code. Specifications shall be submitted for each motor furnished.
- L. Starters or contractors shall be furnished in Division 15 for each motor. 1. Magnetic starters shall be NEMA standard sizes adequate for the load served, Size 00, 1, 2, 3, 4. Half sizes and/or quarter sizes are not acceptable.
- 2. Overload relays shall be unit constructed, hand reset melting alloy type, and shall be provided for all ungrounded legs. 3. Units shall have NEMA-1 enclosures, three thermal overloads in three-phase starts,
- HAND-OFF-AUTO switches as required by the "controls" specification section. except where starters are scheduled.
- 4. All fractional HP single-phase motors shall have internal thermal overload protection

Cutler-Hammer subject to full compliance with all criteria.

- access for equipment servicing. 1.8 ACCESS PANELS
- A. Shall be provided to permit operation of concealed valves, dampers, or equipment. The following table lists types of Bilco access frames and doors. Panels of equivalent construction by Titus, Milcor, Hohmann, and Barnard or Zurn are acceptable.
- B. Wall: 1. Sheetrock Style G
- 2. Plaster Style A Style C 3. Masonry
- C. Ceiling:
- 1. Sheetrock Style G
- 2. Plaster Style A
- 3. Concealed spline Style D
- 4. Lay—in tile None D. Fire Rated Wall or CeilingStyle F (U.L Listed)

- E. Sizes shall be: Small valves 12" x 12". Multiple valves and dampers 24" x 24" F. Access panels shall be insulated for sound barrier equal to wall in which it is installed. G. Acoustical Tile: Coordinate with tile installed to provide a removal tile at access point. Install a colored thumb tack to mark the access panel of above ceiling equipment, control
- instrument, valves or relay. 1.9 WARRANTY
- A. The Contractor shall operate the air conditioning, heating and ventilating systems and plumbing systems for a period of one week to the satisfaction of the Architect. Thereafter, the Contractor shall guarantee and be responsible for all materials and workmanship (parts and labor) for a period of one (1) year following the date of
- acceptance by the Architect.

performed.

1.10 CUTTING AND PATCHING

by the Contractor.

1.11 BASIS OF DESIGN

- B. The Contractor shall also provide maintenance for the one (1) year period by providing four (4) periodic inspections at approximately three-month intervals, which shall include the following.
- 1. Check all bearing, align and oil or grease. 2. Check belt tensions and pulley adjustment and adjust as necessary.

- G. The control power source (point of connection for control power) for major equipment except those single phase fans which are thermostatically controlled and those items
- H. The automatic control of signal for STOP-START of major equipment is furnished and installed to and from combination starts as part of Division 15.
- I. All other conduit and wire, not in "path of power" described above is included in Division
- J.If any Division's Contractor makes a change by submittal, by delivery, by wiring rearrangement or power requirements, which results in increased costs, the Contractor
- 5. All motor starters shall be of the same manufacturer and shall be General Electric Type CR-306, or equal by Square-D, Westinghouse, Allen-Bradley, Furnas, Siemens, or
- M. Where power wiring to Division 15 equipment is not within the equipment curb, roof curb and boots shall be provided under Division 16. The portal location shall be coordinated with Division 15 equipment power inlet requirements, and located not to block

- 3. Check filters and advise Owner when change is necessary.
- 4. Check refrigerant charges and oil levels and replenish as necessary.
- 5. Check and re-calibrate controls as necessary. C. Any required maintenance for the above shall be performed and materials needed shall be furnished by the Contractor. Not included in the materials to be furnished by the Contractor are fuel, electricity, water and filters. Provide the Owner with four (4) copies of the inspection reports indicating all items checked and adjustment or repairs
- D. Water heaters shall be guaranteed for five years; parts and labor. E. All equipment compressors shall be guaranteed for five years; parts and labor.
- A. The Contractor shall set sleeves for pipes, ducts and equipment accurately before the concrete walls and floors are poured.
- B. Should the contractor neglect to perform this preliminary work and should cutting and patching be required in order to install the piping, ductwork or equipment, then the expense of the cutting and restoring of surfaces to their original condition shall be borne
- A. When brand, trade or manufacturer's names are used for basis of design, they are used in the interest of brevity to describe the style, type, size, quality or arrangement of articles of equipment and are not intended to limit competition. If articles of equipment by manufacturers other than basis of design are submitted for installation, the Architect shall compare them with specified articles of equipment on basis of qualities mentioned. The size, weight and arrangement of other equipment shall be checked by the Contractor to ascertain that it can be installed, connected, operated, and serviced successfully, and that walking space and service space can be maintained without altering equipment space or enclosures or the work of other trades. Manufacturers not listed as "Acceptable

Manufacturers" will not be considered.

B. If any Division's Contractor makes a change by submittal, by delivery or by wiring rearrangement which results in increased costs, the Contractor initiating the change shall bear all cost increases.

- 1.12 AS-BUILT DRAWINGS
- A. Per the Georgia State energy Code, the Contractor shall produce and submit to the Architect, "As-Built" drawings, four (4) copies, as described below.
- B. As work progresses, neatly and clearly record on four (4) sets of mechanical plans (in red) all changes and deviations from the contract drawings in size, locations, etc., of all piping, ductwork terminal units and other equipment. Record (in red) final location of piping, ductwork, starts, valves, thermostats, etc., by dimensions to adjacent walls and floors. Make sufficient measurement to accurately locate all equipment. Locate underground lines by dimension from building walls.
- 1.13 OPERATION AND MAINTENANCE MANUALS
- A. Operation and Maintenance manuals (6 sets) shall be provided to the Owner or the Owners designated representative. Manuals shall be in accordance with the Georgia State Energy Code for Buildings.
- 1. Manuals shall include as a minimum the following:
- a.Final, corrected submittal data with equipment sizes and selected options for each piece of equipment, including Engineer's submittal review comments. b.Current manufacturer's published operation and maintenance manuals for each piece of equipment.
- c.Name, address and phone number of at least one LOCAL service agency.
- d.HVAC controls system maintenance and calibration information including wiring diagrams, schematics, and control drawings.
- e. Complete narrative of how each system is intended to operate, including suggested set-points.
- f. Copy of the final Test & Balance report. g.Copy of the final As-built drawings.
- h.Controls certification letter.
- i. Copy of Engineer's final punch list items, with each item checked off when completed or an explanation of why the item was not completed.
- 1.14 INTERFACES WITH OTHER WORK A. There are many interfaces between the work involved with Division 15 and the work involved with other Sections and Divisions, particularly with Division 16. Contractor shall be aware of the requirements of these other Sections or Divisions and his responsibilities at the interfaces.
- B. No mechanical equipment, piping, or ductwork shall be places within 42" of switchboards and/or panel boards.
- C. No water piping (domestic, storm, sanitary, etc., except sprinkler piping when required) shall be located above electrical switchboards and/or panel boards. When sprinklers are required, shields must be provided over the panels.
- 1.15 EQUIPMENT IDENTIFICATION
- A. Equipment Identification:
- 1. All mechanical equipment shall be labeled with Bakelite nameplates with 2" high white letters on a black background, securely affixed to equipment for outdoor or indoor
- 2. Equipment Identification numbers shall be the same as those scheduled on the design drawings. Identification shall be located where it can be conveniently read, and shall be located in the same relative position on like equipment
- 3. In addition to the above ID tags, all scheduled equipment shall be provided with permanent factory installed engraved nameplate labels listing complete model and serial numbers, unit voltage, motor sizes, etc.
- 4. Identify all disconnect switches that are not directly attached to the equipment that they serve, with identical ID tags as specified above for the equipment. 1.16 PIPE IDENTIFICATION
- A. All piping systems shall be identified.
- 1. All piping systems within the building except as noted herein shall be identified with clear block letters and number stenciled on the outside surface of the pipe or insulation, indicating the system contents by abbreviated letters and direction of the flow
- 2. This identification marking shall be applied to the pipe systems where pipe enters or leaves a wall or floor, and item of equipment such as pumps, fan coil units and tanks, and at tees. Identification shall be applied no less than 50 feet apart on horizontal pipe; and one identification per floor on vertical pipe.
- 3. Letters and numbers shall be high on pipe 2" and smaller.
- 4. Letters and numbers shall be 1" high on pipe 3" and larger. 5. Directional arrows shall be 4" long and "wide.
- 6. Letters and numbers shall be black on white pipe or insulation.
- 7. Letters and number shall be white on dark pipe or insulation.
- 8. Pipe identification symbols shall be the same as shown on the drawings.
- 9. Soil, vent and refrigerant piping shall not be identified.
- 1.17 PERMITS AND INSPECTIONS A. The Contractor shall secure and pay for all permits, fees, inspections, and utility
- connection costs.
- B. BOILER TEST CERTIFICATES: It shall be the Contractor's responsibility to have each boiler, large (greater than 120 gallon capacity) water heater, and pressure vessel inspected by a State of Georgia certified inspector upon installation. Each inspection report shall be submitted to the Georgia Department of Labor, Safety Engineering Section, 1700 Century Circle, Atlanta, Georgia 30345 to the attention of Direction of Engineering, PLUS a copy of each report transmitted to the Architect. ONE additional copy of each report shall be included in EACH of the FOUR Close-Out Manuals.
- 1.18 EQUIPMENT & MATERIAL PROTECTION
- A. All equipment and material shall be kept clean and free of debris as construction progresses. Closures shall be provided over duct, piping and major equipment openings during storage, erection and prior to connection. Material finishes shall be protected by covers to prevent impingement of corrosive, abrasive and disfiguring foreign matter. Accidental finish damage shall be repaired equivalent to original finish.
- 1.19 TEST, BALANCE AND REPORT A. See Section 15950.
- 1.20 PROHIBITED MATERIALS
- A. All products, materials or assemblies which contain asbestos or polychlorinated biphenyl (PCB) in any form or in any concentration whatsoever, are expressly forbidden from being used on this project.
- 1.21 SITE VISIT AND FAMILIARIZATION
- A. Contractors proposing to undertake work under this Division shall visit the site of the work and fully inform themselves of all conditions that effect the work or cost thereof, examine the drawings and specifications as related to the site conditions, and acquaint themselves with the utility companies from whom services will be supplied; verify locations of utility services and determine requirements for connections.
- B. Consideration will not be granted for any alleged misunderstanding of the amount of work to be performed. Tender of proposal shall convey full agreement to all items and conditions specified, indicated on the drawings, and/or required by nature of the site. C. Attention is called to the fact that this scope of work includes renovation to an
- existed facility and/or an addition to an existing building. When the work is finished, the mechanical systems shall be complete in every respect, and completely integrated with all affected mechanical and control systems.
- D. Existing mechanical systems in the existing facility shall not be interrupted without prior approval of the Owner or Architect.
- 1.22 DISINFECTION AND TESTING OF WATER SYSTEM
- A. Sanitize plumbing potable water systems after cleaning and pressure tests, with chlorinated potable water solution to 200 ppm chlorine residual after 24-hours minimum, then flushed with fresh potable water until effluent chlorine content does not exceed make-up. Water samples shall be sent to Local Health Department (LHP) for testing. A letter of approval must be obtained from the LHD before the system is put into service. B. All domestic water piping shall be disinfected with chlorine before it is placed into

PART 1 GENERAL 1.1 SUMMARY A. Section Includes

E.Perform Work in accordance with AABC National Standards, latest addition. TAB shall include all equipment and distribution systems and shall be reported, as a minimum, on forms as published by the AABC, NEBB, or approved equal. Report shall include a diagram(s) of each system showing all devices in the system. F. The TAB Agency shall, unless approved by the Owner, be an AABC or NEBB member and the work shall be done by an AABC or NEBB certified TAB Technician and Commissioning Agent. G.All corrections required by the report shall be executed by the Contractor to the satisfaction of the Owner, Architect, Engineer, and TAB agency. All costs associated with testing and balancing, as well as costs of any necessary re-testing, shall be borne by the Contractor. H. Testing and Balancing Agency shall be kept informed of any major changes made to the systems during construction, and shall be provided with a complete set of contract documents, as-built drawings, approved submittals, applicable specification sections, addenda and change orders. 1.2 SUBMITTALS

B.Test Reports: Submit prior to final acceptance of Project and for inclusion in operating and maintenance manuals. Assemble in soft cover, letter size, 3-ring binder, with table of contents page and tabs, and cover identification. Include reduced scale drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations. PART 2 EXECUTION 2.1 EXAMINATION A. Before starting work, verify systems are complete and operable. B.The TAB Agency shall check refrigerant superheat settings.

operation. The chlorinating material shall be liquid chlorine conforming to Federal Specification BB-C-120 and shall be introduced to the system by experienced operators only. The chlorine solution applied to the piping sections or system shall contain at least fifty (50) parts per million of available chlorine and shall remain in the sections or system for a period of not less than sixteen (16) hours. During the disinfection period all valves shall be opened and closed at least four (4) times. After the disinfection period, the chlorinated water shall be flushed from the system with clear water until the residual chlorine content is not greater than two-tenths parts per million (0.2PPM). Submit certification to the Architect and Owner that the system was disinfected. END OF SECTION

SECTION 15950 - TESTING, ADJUSTING, AND BALANCING

1. Testing, adjusting, and balancing of air systems.

B.The Contractor shall obtain the services of an independent test, adjustment, and balance (TAB) agency to test, adjust, and balance

1. Each supply, return, exhaust, relief, and outdoor air distribution systems. C.The Contractor and the TAB Agency shall review the proposed system installations and determine all measuring and balancing devices required for proper test and balance of the systems. These shall include, but not be limited to, manual air volume balancing dampers, etc. The Contractor shall be responsible for providing these in the locations recommended by the TAB Agency, in addition to any shown on the drawings.

These devices shall be provided under the Contract. D.Instruments used for testing and balancing shall have been calibrated within a period of six months of the time of the testing and balancing and such instruments shall be checked for accuracy prior to the start of the work. Submit verification for certification to the Architect and the Owner.

A. Draft Reports: Submit for review prior to final acceptance of Project.

C.The TAB Agency shall test drain pans for proper drainage under operating conditions.

D.Report defects, deficiencies, or abnormal conditions in mechanical systems preventing system balance to Owner, Architect, and Engineer.

E.Beginning of work means acceptance of existing conditions. 2.2INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B.Air Outlets and Inlets: Adjust to within plus or minus 10 percent of design.

2.3AIR SYSTEM PROCEDURE

A. Examine all air handling systems to see that they are free from obstructions that may prevent proper balancing of system.

B.Ensure that all dampers, grilles, and registers are open or in normal positions, that moving equipment i lubricated, filters are installed and clean, and perform other inspection and maintenance activities to ensure that the operation of the system is as specified. C.Adjust air handling and distribution systems to deliver design supply, return, and exhaust air quantities

within previously stated tolerances. D.Make air quantity measurements in ducts by traverse of entire cross sectional area of duct.

E.Measure air quantities at air inlets and outlets. F.Use volume control devices to regulate air quantities only to extent those adjustments do not create objectionable air motion or sound levels. Change volume using dampers mounted in ducts, not dampers on

ceiling diffusers. Leave dampers on ceiling diffusers open for seasonal adjustment by Owner. G.Vary total system air quantities by adjustment of fan speeds. Vary branch air quantities by damper reaulation

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across fan. Allow for pressure drop equivalent to 50 percent loading of filters. I. Adjust automatic outside air, return air, and exhaust air dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust air dampers to check leakage. K.At modulating damper locations, take measurements and balance at extreme conditions. L. The TAB Agency shall check all the systems operating together to ensure that the air conditioning spaces

are under an overall positive pressure. 2.4FIFLD QUALITY CONTROL

A. Verify recorded data represents actually measured or observed conditions.

B.Permanently mark settings of valves, dampers, and other adjustment devices. Set and lock memory stops.

END OF SECTION

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Sheet title

MECHANICAL SPECIFICATIONS

Sheet No.

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### SECTION 15195 - FACILITY NATURAL GAS PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: . Natural gas piping buried within 5 feet of building.
- 2. Natural gas piping above grade.
- 3. Unions and flanges. 4. Valves.
- 5. Pipe hangers and supports.
- 6. Strainers.
- 7. Natural gas pressure regulators. 8. Natural gas pressure relief valves.
- 9. Underground pipe markers.
- 10. Bedding and cover materials.
- B. All general conditions of the contract apply.
- C. Related Sections:
- 1. Section 15010 Mechanical General 2. Section 15061 — Hangers and Supports for HVAC Piping and Equipment: Product requirements for pipe hangers and supports for placement by this section.
- 1.2 REFERENCES
- A. American National Standards Institute: 1. ANSI Z21.15 - Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves.
- B. American Society of Mechanical Engineers: 1. ASME B16.3 - Malleable Iron Threaded Fittings.
- 2. ASME B16.26 Cast Copper Alloy Fittings for Flared Copper Tubes.
- 3. ASME B16.33 Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 125 psig (sizes 1/2 - 2).
- 4. ASME B31.9 Building Services Piping.
- 5. ASME Section IX Boiler and Pressure Vessel Code Welding and Brazing Qualifications.
- C. ASTM International:
- 1. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless. 2. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for
- Moderate and High Temperature Service.
- 3. ASTM B88 Standard Specification for Seamless Copper Water Tube. 4. ASTM B88M — Standard Specification for Seamless Copper Water Tube (Metric).
- 5. ASTM B280 Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field
- Service. 6. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.
- 7. ASTM F708 Standard Practice for Design and Installation of Rigid Pipe Hangers.
- D. American Welding Society: 1. AWS D1.1 - Structural Welding Code - Steel.
- E. American Water Works Association:
- 1. AWWA C105 American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
- F. Manufacturers Standardization Society of the Valve and Fittings Industry: 1. MSS SP 58 — Pipe Hangers and Supports — Materials, Design and Manufacturer.
- 2. MSS SP 67 Butterfly Valves.
- 3. MSS SP 69 Pipe Hangers and Supports Selection and Application.
- 4. MSS SP 78 Cast Iron Plug Valves, Flanged and Threaded Ends.
- 5. MSS SP 89 Pipe Hangers and Supports Fabrication and Installation Practices. 6. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- G. National Fire Protection Association:
- 1. NFPA 54 National Fuel Gas Code.
- H. Underwriters Laboratories Inc.:
- 1. UL 842 Valves for Flammable Fluids.
- 1.3 SYSTEM DESCRIPTION
- A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections when joining dissimilar metals in systems.
- B. Provide flanges, unions, or couplings at locations requiring servicing. Use unions, flanges, or couplings downstream of valves and at equipment connections. Do not use direct welded or threaded connections to valves, equipment.
- C. Provide pipe hangers and supports in accordance with ASME B31.9, ASTM F708.
- D. Use plug, ball, or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers. 1.4 QUALITY ASSURANCE
- A. Perform natural gas Work in accordance with NFPA 54, local gas company requirements
- B. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
- 1.5 FIELD MEASUREMENTS
- A. Verify field measurements prior to fabrication.
- PART 2 PRODUCTS
- 2.1 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING
- A. Steel Pipe: ASTM A53/A53M Schedule 40 black. 1. Fittings: ASTM A234/A234M forged steel welding type.
- 2. Joints: ASME B31.9, welded.
- 3. Jacket: AWWA C105 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape. 2.2 NATURAL GAS PIPING, ABOVE GRADE
- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
- 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M forged steel welding type.
- 2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.
- B. Corrugated Stainless Steel Tubing: ANSI LC 1.
- 2.3 Regulator Vent PIPING, ABOVE GRADE
- A. Indoors and outdoors: Same as natural gas piping, above grade.
- 2.4 UNIONS AND FLANGES
- A. Unions for Pipe 2 inches and Smaller:
- 1. Ferrous Piping: Class 150, malleable iron, threaded. 2. Copper Piping: Class 150, bronze unions with [soldered] [brazed joints].
- 3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
- B. Flanges for Pipe 2-1/2 inches and Larger:
- 1. Ferrous Piping: Class 150, forged steel, slip-on flanges.
- 2. Copper Piping: Class 150, slip-on bronze flanges. 3. Gaskets: 1/16 inch thick preformed neoprene gaskets.
- 2.5 BALL VALVES
- A. Acceptable Manufacturers: Crane Valve, Hammond Valve, Milwaukee Valve, NIBCO, Stockham Valves & Fittings. B. 1/4 inch to 1 inch: MSS SP 110, Class 125, two piece, threaded ends, bronze body, chrome plated bronze ball, reinforced teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids and LPG, full
- C. 1-1/4 inch to 3 inch: MSS SP 110, Class 125, two piece, threaded ends, bronze body, chrome plated bronze ball, reinforced teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids and LPG, conventional port.
- 2.6 PLUG VALVES
- A. Acceptable Manufacturers: DeZURIK, Unit of SPX Corp., Flow Control Equipment, Inc., Homestead Valve.
- B. 2 inches and Smaller: MSS SP 78, Class 150 construction, round port, full pipe area, pressure lubricated, teflon packing, threaded ends. Furnish one plug valve wrench for every ten plug-valves with minimum of one wrench.
- C. 2-1/2 inches and Larger: MSS SP 78, Class 150 construction, round port, full pipe area, pressure lubricated, teflon packing, flanged ends.
- 2.7 BUTTERFLY VALVES
- A. Acceptable Manufacturers: Crane Valve, Hammond Valve, Milwaukee Valve, NIBCO, Stockham Valves & Fittinas,
- B. 2 inches and Smaller: MSS SP 67, 175 psi, bronze body, Viton seals, stainless steel trim, lever or tee handle UL 842 listed for gas service, threaded ends, full port.

stainless steel perforated screen. perforated screen. perforated screen. 2.10 NATURAL GAS PRESSURE REGULATORS 1. Comply with ANSI Z21.80. 3. Body: Cast iron or Steel 5. Disk, diaphragm, and O-ring: Nitrile. 6. Maximum inlet pressure: 150 psig. ends. 2.11 NATURAL GAS PRESSURE RELIEF VALVES A. Product Description: Spring loaded type relief valve. 1. Body: Aluminum.

A. Manufacturers:

2.9 STRAINERS

- 2. Diaphragm: Nitrile. 3. Orifice: Aluminum, brass, or stainless steel. 4. Maximum operating temperature: 150 degrees F. 5. Inlet Connections: Threaded. 6. Outlet or Vent Connection: Same size as inlet connection. 2.12 UNDERGROUND PIPE MARKERS
- A. Plastic Ribbon Tape: Bright colored, continuously printed, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service. B. Trace Wire (for non-metallic pipe): Magnetic detectable conductor, brightly colored plastic covering, imprinted
- with "Natural Gas Service" in large letters. 2.13 BEDDING AND COVER MATERIALS
- A. Site specifications override this section as applicable. B. Excavation: Excavate trenches by open cut. Pavement removal and replacement required by the excavation of trenches shall be done in accordance with the requirements of section 02150, Removing and Replacing Pavement. Perform all excavation in accordance with the latest accepted Occupational Safety and Health Act of 1970 as amended. The Developer shall pay particular attention to Safety & Health Regulations Part 1926. subpart P "Excavations, Trenching & Shoring."
- C. Beddina:
- 1. General: Compact stone bedding material by tamping or slicing with a flatblade shovel. Prepare the trench bottom to support the pipe uniformly throughout its length. Provide bell holes to relieve pipe bells of all loads. If the trench is excavated to excessive width or depth, provide the next better class of bedding. 2. Materials: Bedding materials shall be crushed stone unless shown or specified otherwise. Crushed stone bedding material shall meet the requirements of Georgia Department of Transportation Specification 800.01 for No. 57 stone, Group II (quartzite granite).
- 3. Bedding: Excavate the bottom of the trench flat at a minimum 36" depth or as shown on the Site Plans below the bottom of the pipe barrel. Place and compact bedding material to the proper grade. Bedding shall then be carefully placed by hand and compacted to provide full support under and up to the crown of the pipe.
- D. Cover and Backfill: Place initial backfill material carefully around the pipe above bedding in uniform six (6) inch layers to a depth of at least eighteen (18) inches above the pipe bell. Compact each layer thoroughly with suitable hand tools. Do not disturb or damage the pipe. Backfill on both sides of the pipe simultaneously to prevent side pressures. Initial backfill material shall be clean and free of rock, stumps, limbs or other
- unsuitable material. PART 3 EXECUTION

## 3.1 EXAMINATION

- A. 01300 Administrative Requirements: Coordination and project conditions. B. Verify excavations are to required grade, dry, and not over-excavated.
- **3.2 PREPARATION**

- C. Prepare piping connections to equipment with flanges or unions.
- 3.3 INSTALLATION INSERTS

hangers

- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.

## 2.8 PIPE HANGERS AND SUPPORTS

- 1. Carpenter & Paterson, Creative Systems Inc., Flex-Weld, Inc., Glope Pipe Hanger, Michigan Hanger Co., Superior Valve Co.,Cooper B-Line
- B. Conform to NFPA 54, ASME 31.9.
- C. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or carbon steel adjustable swivel, split ring.
- D. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
- E. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- F. Wall Support for Pipe 3 inches and Smaller: Cast iron hook. G. Vertical Support: Steel riser clamp.
- H. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support. I. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- J. Sheet Lead: ASTM B749, 2.5 lb/sq ft, 0.039 inch thick.

### A. Acceptable Manufacturers:

- 1. Mueller Steam Specialty, O.C. Keckley Co., Spirax Sarco
- B. 2 inch and Smaller: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch
- C. 2-1/2 inch to 4 inch: Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel
- D. 5 inch and Larger: Flanged iron body for 175 psig working pressure, basket pattern with 1/8 inch stainless steel
- A. Product Description: Spring loaded, general purpose, self-operating service regulator including internal relief type diaphragm assembly and vent valve. Diaphragm case can be rotated 360 degrees in relation to body.
- 2. Temperatures: minus 20 degrees F to 150 degrees F.
- 4. Spring case, lower diaphragm casing, union ring, seat ring and disk holder: Aluminum.
- 7. Furnish sizes 2 inches and smaller with threaded ends. Furnish sizes 2-1/2 inches and larger with flanged

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt. on inside and outside, before assembly.
- A. Provide inserts for placement in concrete forms.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.
- 3.4 INSTALLATION PIPE HANGERS AND SUPPORTS A. Install hangers and supports in accordance with ASME B31.9, ASTM F708.
- B. Support horizontal piping hangers as scheduled.
- C. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- D. Place hangers within 12 inches of each horizontal elbow.
- E. Install hangers to allow 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
- F. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping. G. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze
- H. Finish paint exposed steel hangers and supports to match ceiling or wall color. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- J. Install pipe hangers and supports in accordance with Section 15061.
- 3.5 INSTALLATION BURIED PIPING SYSTEMS
- A. Site specifications override this section as applicable.
- B. Install natural gas piping in accordance with NFPA 54.
- C. Verify connection to existing piping system size, location, and invert are as indicated on Drawings.
- D. Establish elevations of buried piping with not less than 2 ft of cover.
- E. Establish minimum separation from other services piping in accordance with local codes. F. Remove scale and dirt on inside of piping before assembly.
- G. Excavate pipe trench in accordance with Site Plans or methods utilized by the local AHJ.
- H. Install pipe to elevation as indicated on Drawings.

- I. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches compacted depth; compact to 95 percent maximum density.
- J. Install pipe on prepared bedding.
- K. Route pipe in straight line.
- L. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- M. Install plastic ribbon tape or trace wire continuous over top of pipe.
- N. Pipe Cover and Backfilling: 1. Backfill trench in accordance with Site Plans or methods utilized by the local AHJ.
- 2. Maintain optimum moisture content of fill material to attain required compaction density. 3. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 6 inch compacted layers to 12 inches minimum cover over top of jacket. Compact to 95 percent maximum density.
- 4. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
- 5. Do not use wheeled or tracked vehicles for tamping.
- 3.6 INSTALLATION ABOVE GROUND PIPING SYSTEMS
- A. Install natural gas piping in accordance with NFPA 54.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient.
- E. Install piping to conserve building space and not interfere with use of space.
- F. Size and install gas piping to provide sufficient gas to supply maximum appliance demand at pressure higher
- than appliance minimum inlet pressure.
- G. Group piping whenever practical at common elevations.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. I. Sleeve pipe passing through partitions, walls and floors. Refer to Section 15061
- K. Provide clearance for installation of insulation and access to valves and fittings.
- L. Provide access where valves and fittings are not exposed.
- M. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer.
- N. Provide support for utility meters in accordance with requirements of utility company. O. Install vent piping from gas pressure reducing valves to outdoors and terminate in weatherproof hood. Protect vent against entry of insects and foreign material. 1. Minimum Vent Size: Connection size at regulator vent connection.
- 2. Run individual vent line from each relief device, independent of breather vents. P. Breather vents may be manifolded together with piping sized for combined appliance vent requirements.
- Q. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting.
- R. Install identification on piping systems including underground piping.
- S. Install valves with stems upright or horizontal, not inverted.
- T. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work,
- and isolating parts of completed system.
- U. Install gas pressure regulator with independent vent full size opening on regulator and terminate outdoors. V. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 2 psi, 5 psi, or as indicated on plans. Provide regulators on each line serving gravity type
- appliances, sized in accordance with equipment. 3.7 FIELD QUALITY CONTROL

1.1 SCHEDULES

A. Pipe Hanger Spacing:

inches

1/2

3/4

1

1-1/4

1-1/2

2

2-1/2

3

4

5

6

8

- A. Where gas appliance will be damaged by test pressure, disconnect appliance and cap piping during pressure test.
- Reconnect appliance after pressure test and leak test connection
- B. Where gas appliance is designed for operating pressures equal to or greater than piping test pressure, provide gas valve to isolate appliance or equipment from gas test pressure.
- C. Pressure test natural gas piping in accordance with NFPA 54.

GAS PIPE HANGER SPACING

IPIPE

Feet

6

7

7

7

10

10

10

10

10

10

10

COPPER STEEL

PIPE SIZE HANGER HANGER ROD

4

6

6

8

8

8

8

8

8

8

8

8 9

UBING

Feet

- D. Where new branch piping is extended from existing system, pressure test new branch piping only. Leak test joint
- between new and existing piping with noncorrosive leak detection fluid or other approved method. E. When pressure tests do not meet specified requirements, remove defective work, replace and retest.
- F. Immediately after gas is applied to a new system, or a system has been restored after gas service interruption, check pipe for leakage.

MAXIMUM MAXIMUM MINIMUM MAXIMUM

SPACING SPACING HANGER HANGER

COPPER STEEL

TUBING PIPE

nches

3/8

3/8

3/8

3/8

1/2

1/2

1/2

1/2

1/2

1/2 3/4

IROD

Inches

3/8

3/8

3/8

3/8

1/2

1/2

5/8

5/8

3/4

DIAMETER DIAMETER

3/8 3/8

3/8 3/8

D. Where required, bend pipe with pipe bending tools in accordance with procedures intended for that purpose.

J. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping.

Where leakage is detected, shut off gas supply until necessary repairs are complete

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