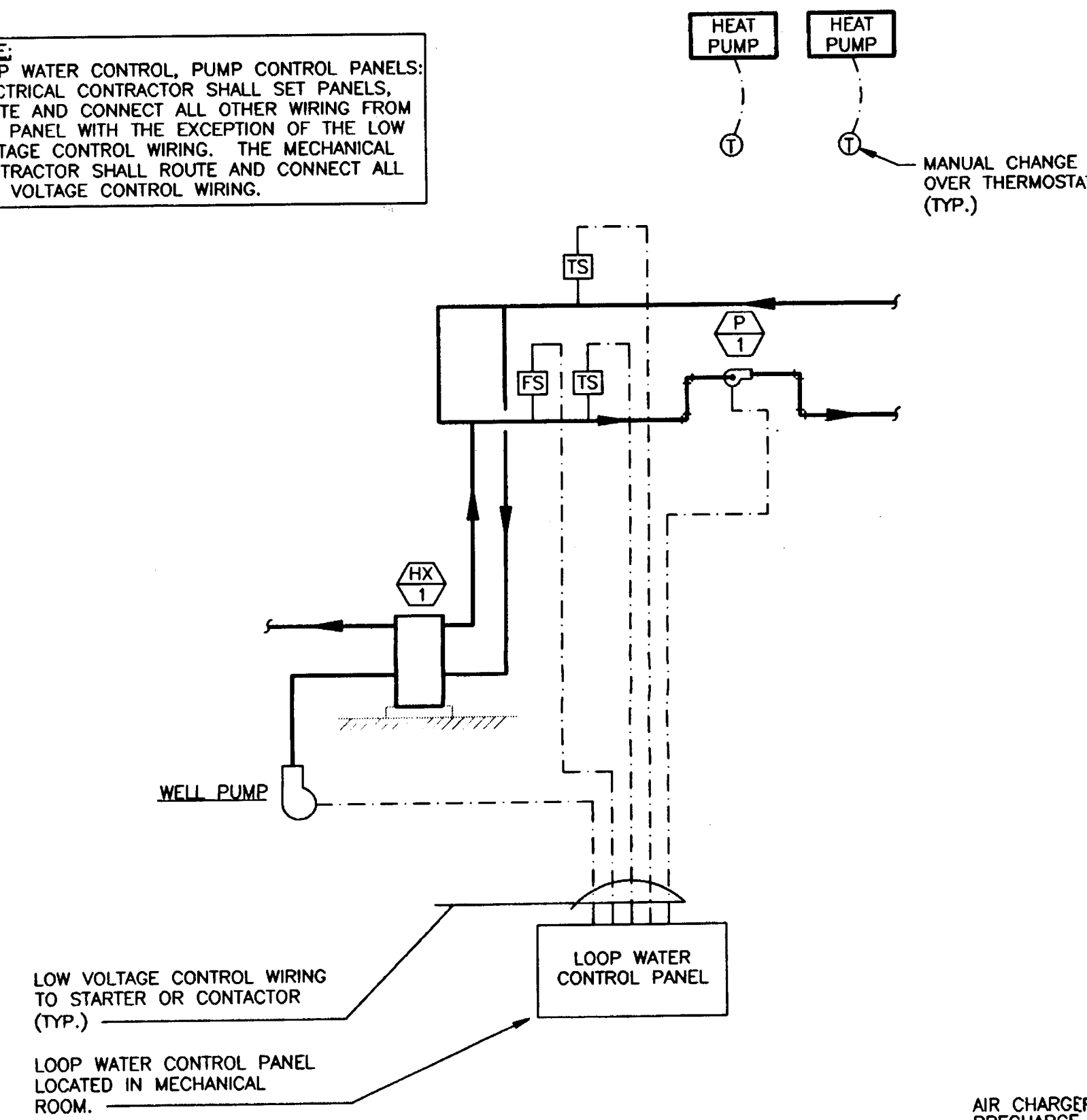


HYDRONIC SYSTEM CONTROL SCHEMATIC

NOTE:
LOOP WATER CONTROL, PUMP CONTROL PANELS:
ELECTRICAL CONTRACTOR SHALL SET PANELS,
ROUTE AND CONNECT ALL OTHER WIRING FROM
THE PANEL WITH THE EXCEPTION OF THE LOW
VOLTAGE CONTROL WIRING. THE MECHANICAL
CONTRACTOR SHALL ROUTE AND CONNECT ALL
LOW VOLTAGE CONTROL WIRING.



CONDENSER WATER SYSTEM FLUSHING AND TREATMENT

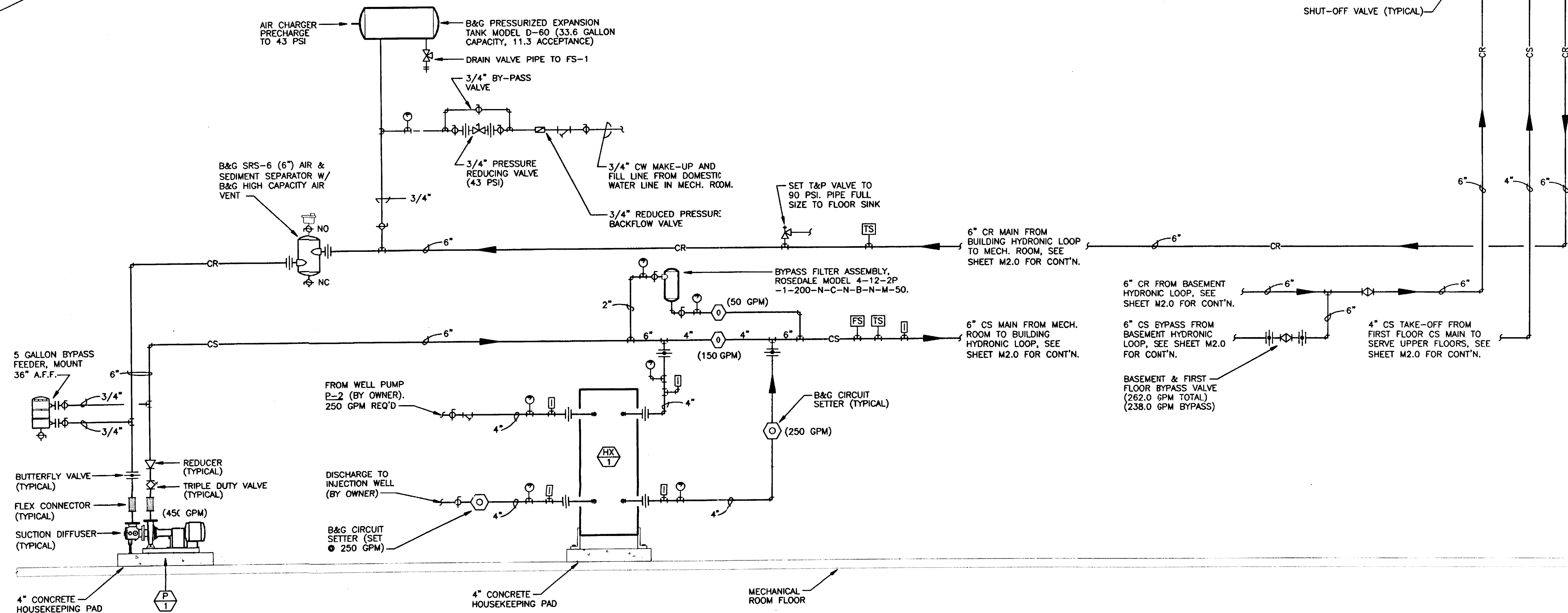
A QUALIFIED WATER TREATMENT CONTRACTOR SHALL BE UTILIZED TO FURNISH THE CLEANING MATERIAL & SUPERVISE THE FLUSHING & TREATMENT OF THE SYSTEM. APPROVED WATER TREATMENT CONTRACTORS MUST SHOW PROOF OF SIMILAR SERVICE FOR NOT LESS THAN 3 YEARS, & SHALL HAVE FULL TIME SERVICE PERSONNEL LOCATED WITHIN ONE-HOUR FROM THE JOB SITE. MONITORING & TREATMENT OF THE SYSTEM SHALL BE PROVIDED FOR A PERIOD OF ONE-YEAR FOLLOWING FINAL ACCEPTANCE OF BUILDING & SYSTEM.

DESCRIPTION OF WORK (CLOSED LOOP):

1. FILL SYSTEM WITH A SOLUTION OF 10% BY WEIGHT OF A HEAVY DUTY ALKALINE LIQUID CLEANER. THE CLEANER SHALL BE CAPABLE OF WETTING & PENETRATING HEAVY SOIL DEPOSITS OF OIL OR GREASE, & KEEPING THESE PRODUCTS IN SUSPENSION.
2. CIRCULATE SOLUTION FOR A MINIMUM OF 8 HOURS, THEN FLUSH SYSTEM WITH CLEAN FRESH WATER UNTIL ALL SOLIDS HAVE BEEN CLEANED FROM THE SYSTEM. CLEAN ALL STRAINERS IN SYSTEM.
3. AFTER CLEANING, REFILL SYSTEM WITH A MIXTURE OF CLEAN WATER & CHEMICAL INHIBITOR. ADD NITRITE TO SYSTEM TO MAINTAIN A NITRITE LEVEL OF 800-1000 PPM. TEST FOR NITRITE USING A "DROP TEST" KIT.
4. AT THE CONCLUSION OF CLEANING & TREATING, WATER TREATMENT CONTRACTOR SHALL CERTIFY IN WRITING THAT THE SYSTEM HAS BEEN CLEANED & TREATED AS SPECIFIED.
5. AT THE END OF ONE-YEAR, SYSTEM SHALL AGAIN BE CHECKED & REFILLED AS REQUIRED TO MEET ABOVE SPECIFICATIONS. SERVICE DURING THE YEAR WARRANTY PERIOD SHALL BE AS REQUIRED TO MAINTAIN ABOVE SPECIFICATIONS.

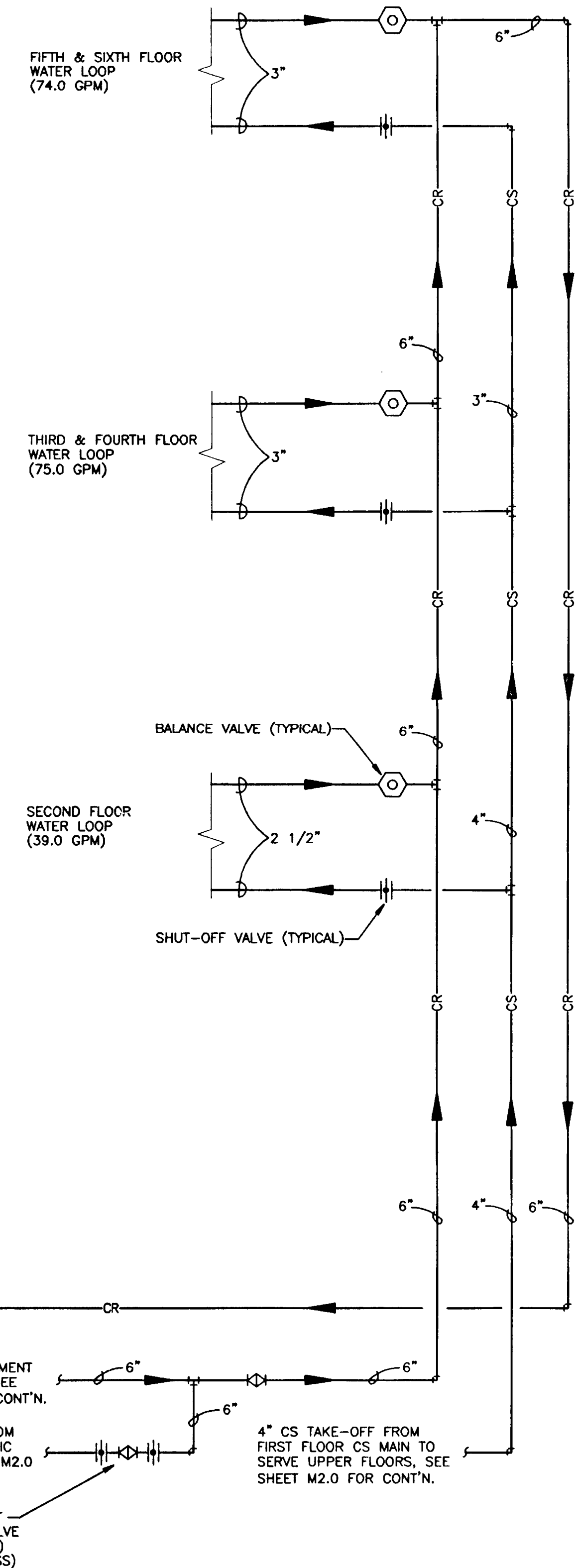
SEQUENCE OF CONTROLS

1. LOOP WATER CONTROL PANEL (LWC) SHALL CONTROL THE OPERATION OF ALL COMPONENTS INCLUDING: CONTROL VALVE & PUMPS.
2. LOOP WATER TEMPERATURE: (ALL TEMP. SET POINTS SHALL BE ADJUSTABLE)
 - A. COOLING:
(80°F RETURN) - PUMP AT WELL SHALL START PROVIDING FLOW THRU HX-1. FLOW SHALL CONTINUE UNTIL THE LOOP WATER RETURN TEMPERATURE OF 78°F IS MAINTAINED. ONCE MAINTAINED, WELL PUMP SHALL SHUT DOWN.
 - B. HEATING:
(40°F RETURN) - PUMP SHALL START PROVIDING FLOW THRU HX-1. FLOW SHALL CONTINUE UNTIL THE LOOP WATER RETURN TEMPERATURE OF 42°F IS MAINTAINED. ONCE MAINTAINED, WELL PUMP SHALL SHUT DOWN.
 - C. NO HEATING OR HEAT REJECTION SHALL OCCUR WHEN THE RETURN WATER TEMPERATURE IS MAINTAINED BETWEEN THE SET POINTS OF 40°F AND 80°F.
3. ALARM LIGHTS AND HORN SHALL BE PROVIDED ON LWC TO INDICATED LOW WATER TEMPERATURE (35°F RETURN), HIGH WATER TEMPERATURE (100°F SUPPLY), AND NO-FLOW CONDITIONS.



CONDENSER WATER PIPING DIAGRAM

NTS



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REVISIONS

DRAWN TDN
PROJECT 9924
FILE NO. 9924A2_0.DWG
DATE 11-15-99
SHEET

M3.0

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PROJECT NUMBER: 99-158

WATER SOURCE HEAT PUMP SCHEDULE (EXTENDED RANGE)																				
SYM	UNIT TYPE	NOMINAL TONS	BLOWER			HEATING REQ'D			COND. WATER				ELECTRICAL			REMARKS	RUN-OUT & HOSE KIT CONNECTOR SIZE ②			
			CFM	ESP	HP	MBH	E.A.T. (DB) (°F)	E.W.T. (°F)	GPM	MAX.PD (FT)	V/ø	MCA	FUSE SIZE							
HP-1	VERTICAL R.H. RET. AIR	.75	300	0.25	1/20	8.92	68	47	8.78	8.31	80/62	82	70	1.8	4.4	208/1	4.8	15	①	3/4"
HP-2	VERTICAL L.H. RET. AIR	.75	300	0.25	1/20	8.92	68	47	8.78	8.31	80/62	82	70	1.8	4.4	208/1	4.8	15	①	3/4"
HP-3	VERTICAL R.H. RET. AIR	1.5	630	0.25	1/8	18.84	68	47	17.83	17.40	80/62	82	70	3.8	13.7	208/1	13.0	20	①	1"
HP-4	VERTICAL L.H. RET. AIR	1.5	630	0.25	1/8	18.84	68	47	17.83	17.40	80/62	82	70	3.8	13.7	208/1	13.0	20	①	1"
HP-5	VERTICAL R.H. RET. AIR	1.5	630	0.25	1/8	18.84	68	47	17.83	17.40	80/62	82	70	3.8	13.7	208/1	13.0	20	①	1"
HP-6	VERTICAL R.H. RET. AIR	2	800	0.40	1/5	23.8	68	47	23.70	22.13	80/62	82	70	5.0	5.9	208/1	14.9	25	①	1"
HP-7	VERTICAL L.H. RET. AIR	2	800	0.40	1/5	23.8	68	47	23.70	22.13	80/62	82	70	5.0	5.9	208/1	14.9	25	①	1"
HP-8	VERTICAL R.H. RET. AIR	1.25	500	0.35	1/8	12.70	68	47	12.35	11.93	80/62	82	70	2.7	2.8	208/1	8.3	15	①	3/4"
HP-9	VERTICAL L.H. RET. AIR	1.25	500	0.35	1/8	12.70	68	47	12.35	11.93	80/62	82	70	2.7	2.8	208/1	8.3	15	①	3/4"
HP-10	VERTICAL R.H. RET. AIR	.50	230	0.25	1/20	7.48	68	47	6.54	6.30	80/62	82	70	1.4	1.5	208/1	4.8	15	①	3/4"

APPROVED MANUFACTURERS: TRANE, CLIMATE MASTER, WATER FURNACE

CCH007: HP-10 CCH019: HP-3,4,5
CCH009: HP-1,2 CCH024: HP-6,7
CCH015: HP-8,9

① PROVIDE W/EXTRA-QUIET CONSTRUCTION, LINE SIZED GRISWOLD 24" AUTOMATIC BALANCING HOSE KIT (W/AUTOMATIC FLOW CONTROL VALVE, TEST PLUGS, BALL VALVES AND STRAINER), DRAIN PAN OVERFLOW SENSOR, INTEGRAL DISCONNECT, AND MAN. HTG./COOLING

② PROVIDE FIRE RATED HOSE KITS

PUMP SCHEDULE											
SYM	TYPE	SERVICE	FLOW CAPACITY			MOTOR			MANUFACTURER & MODEL		REMARKS
			GPM	HEAD FT	MIN EFF	HP	RPM	V/ø			
P-1	BASE MTD. CENTRIFUGAL END SUCTION	CONDENSER WATER	450	100	78	20	1750	460/3	B&G 1510 MODEL 4E		①

APPROVED MANUFACTURERS: TACO, PACO, PEERLESS, ARMSTRONG

① PROVIDE W/B&G GG-3X SUCTION DIFFUSER AND B&G 3DS-6S TRIPLE DUTY VALVE.

HEAT EXCHANGER SCHEDULE											
UNIT	SYSTEM	HOT SIDE (°F)		COLD SIDE (°F)		HX F (GP)	PRESSURE LOSS	MANUFACTURER & MODEL	REMARKS		
		COOLING		COOLING						HOT SIDE	
HX-1	HYDRONIC LOOP	ENT	LVG	ENT	LVG	255	10.0	ALFA-LAVAL M15-BFG	①②③		
		78"	58"	55"	75"						
		HEATING		HEATING							
		ENT	LVG	ENT	LVG						
		42'	52'	55'	45'						

Heat rate
rules?
What size
transfer in
place?

① ALTERNATE MANUFACTURER: ITT STANDARD, BELL & GOSSETT, TRANTER, MUELLER, APV.

② HEAT EXCHANGER SHALL BE ASME RATED, 316 STAINLESS STEEL CONSTRUCTION.

③ PIPING CONNECTIONS TO HEAT EXCHANGERS AS SHOWN ON PIPING SCHEMATICS MAY NOT REFLECT EACH MANUFACTURER'S ACTUAL CONNECTION ORDER.

EXHAUST FAN SCHEDULE											
SYM	TYPE	AREA SERVED	BLOWER			HEATER	ELECTRICAL		SONES	MANUFACTURER & MODEL	
			CFM	ESP	MAX RPM		WATTS	V/ø			
EF-1	CEILING FAN	INTERIOR BATHROOMS	80	.125	1250	--	60	120/1	2.5	BROAN MODEL NO. HD80 WITH AUTOMATIC BACKDRAFT DAMPER	
EF-2	CEILING FAN/HEAT	EXTERIOR BATHROOMS	70	.125	1250	--	20AMPS	120/1	3.5	BROAN MODEL NO. 658 WITH AUTOMATIC BACKDRAFT DAMPER	
EF-3	RANGE HOOD (30")	KITCHEN	160	.125	1250	4436	20AMPS	120/1	6.5	BROAN MODEL NO. 403001 WITH ALUMINUM FILTER & AUTOMATIC BACKDRAFT DAMPER	
EF-4	CEILING FAN	UNIT 202 KITCHEN	110	.125	1160	--	7AMPS	120/1	1.5	BROAN MODEL NO. S110U WITH AUTOMATIC BACKDRAFT DAMPER	
EF-5	CEILING FAN/HEAT	LAUNDRY ROOM	130	.375	1400	--	113	120/1	3.4	GREENHECK MODEL NO. SP-218 WITH AUTOMATIC BACKDRAFT DAMPER	
EF-6	CEILING FAN	H.C. TOILET	104	.250	1100	--	53	120/1	1.9	GREENHECK MODEL NO. SP-216 WITH AUTOMATIC BACKDRAFT DAMPER	
EF-7	CEILING FAN/HEAT	ELEV. EQUIP. RM.	104		1100	--	53	120/1	1.9	GREENHECK MODEL NO. SP-216 WITH AUTOMATIC BACKDRAFT DAMPER	
EF-8	CEILING FAN	MEN'S RESTROOM	220		1000	--	83	120/1	3.4	GREENHECK MODEL NO. SP-224 WITH AUTOMATIC BACKDRAFT DAMPER	
EF-9	CEILING FAN/HEAT	WOMEN'S RESTROOM	220		1000	--	83	120/1	3.4	GREENHECK MODEL NO. SP-224 WITH AUTOMATIC BACKDRAFT DAMPER	
CAF-1	CEILING FAN/HEAT	BASEMENT MECH. RM.	200	--	--	--	15AMPS	120/1	--	TJERNLUND MODEL PAI-6 W/ MULTI-APPLIANCE CTL. PANEL & WALL INTAKE HOOD	

ALTERNATE MANUFACTURERS: NUTONE, EMERSON, PENN, COOK, O.A.E.

ELECTRIC HEATER SCHEDULE											
SYMBOL	TYPE	FAN			ELECTRICAL			MANUFACTURERS			
		HP	RPM	CFM	WATTS	VOLTS	PH				
EH-1	SURFACE MOUNTED WALL	--	--	100	2000	208	1	Q-MARK AWH-4208 W/INTERGRAL T-STAT			
EH-2	SURFACE MOUNTED WALL	--	--	100	4000	208	1	Q-MARK AWH-4408 W/INTERGRAL T-STAT			

ALTERNATE MANUFACTURERS: MARKEL, O.A.E.

SUPPLY GRILLE SCHEDULE			
SYMBOL	NOMINAL SIZE	CFM RANGE	REMARKS
G-1	20"x6"	250-450	①②
G-2	12"x6"	100-200	①②
G-3	6"x4"	0-100	①②
G-4	24"x8"	300-500	②③

REMARKS:

- ① WALL GRILLE SIZES BASED ON HART & COOLY MODEL A661, TWO-WAY THROW BLADES, 3/4" SPACING, OPPOSED BLADE DAMPER W/ OPERATOR HANDLE, OFF-WHITE FINISH. APPROVED MANUFACTURERS MANUFACTURES INCLUDE ANEMOSTAT, CARNES, J&J REGISTER, NAILOR, TUTTLE & BAILEY, METAL-AIRE & TITUS.
- ② SIZES BASED ON A MAXIMUM NC LEVEL OF 25.
- ③ WALL GRILLE SIZES BASED ON TITUS MODEL 272F, DOUBLE DEFLECTION ADJUSTABLE BLADES, 3/4" SPACING, OPPOSED BLADE DAMPER W/ OPERATOR HANDLE, OFF-WHITE FINISH. APPROVED MANUFACTURERS MANUFACTURES INCLUDE ANEMOSTAT, CARNES, J&J REGISTER, NAILOR, TUTTLE & BAILEY, & METAL-AIRE.

DIFFUSER SCHEDULE				
SYMBOL	NOMINAL SIZE	NECK/RUNOUT SIZE	CFM RANGE	REMARKS
D-1	6x6	6"ø	0-90	①②③④
D-2	9x9	8"ø	90-200	①②③④
D-3	12X12	10"ø	200-480	①②③④
D-4	15X15	12"ø	300-500	①②③④

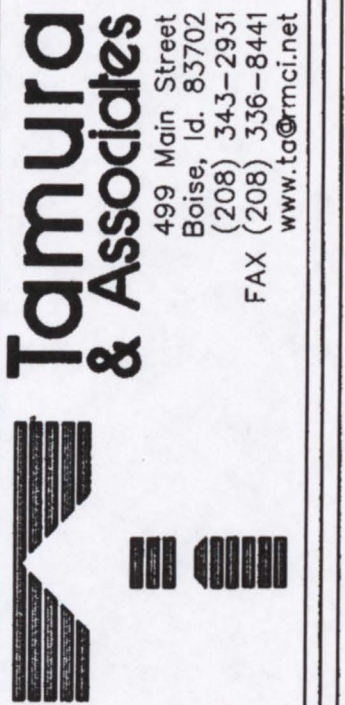
REMARKS:

- ① SIZES BASED ON HART & COOLEY MODEL AFMF SERIES. APPROVED MANUFACTURERS INCLUDE ANEMOSTAT, CARNES, J&J REGISTER, NAILOR, TUTTLE & BAILEY, METAL-AIRE, KRUEGER AND PRICE.
- ② SIZES BASED ON A MAXIMUM NC LEVEL OF 25.
- ③ SEE HVAC FLOOR PLANS FOR DIRECTIONAL THROW REQUIREMENTS FOR EACH DIFFUSER.
- ④ OFF-WHITE FINISH.

RETURN & EXHAUST GRILLE SCHEDULE				
SYMBOL	NOMINAL SIZE	NECK/RUNOUT SIZE	CFM RANGE	REMARKS
R-1	18X16	18X16	0-650	①③④
R-2	12X18	12X18	0-650	①③④
R-3	18X24	18X24	0-800	①③④
R-4	18X18	--	0-650	②③④

REMARKS:

- ① WALL GRILLE SIZES BASED ON HART & COOLY MODEL A700, HEAVY DUTY ALUMINUM BLADES & FRAME 45° DEFLECTION. APPROVED MANUFACTURERS INCLUDE ANEMOSTAT, CARNES, J&J REGISTER, NAILOR, TUTTLE & BAILEY, KRUEGER, METAL-AIRE, AND PRICE.
- ② DOOR GRILLE SIZES BASED ON HART & COOLY MODEL A700, HEAVY DUTY ALUMINUM BLADES & FRAME 45° DEFLECTION. APPROVED MANUFACTURERS INCLUDE ANEMOSTAT, CARNES, J&J REGISTER, NAILOR, TUTTLE & BAILEY, KRUEGER, METAL-AIRE, AND PRICE.
- ③ SIZES BASED ON A MAXIMUM NC LEVEL OF 25.
- ④ OFF-WHITE FINISH



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928 WEST MAIN
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REVISIONS

DRAWN TPN
PROJECT 4424
FILE NO. 4424A2_0.DWG
DATE 11-15-11
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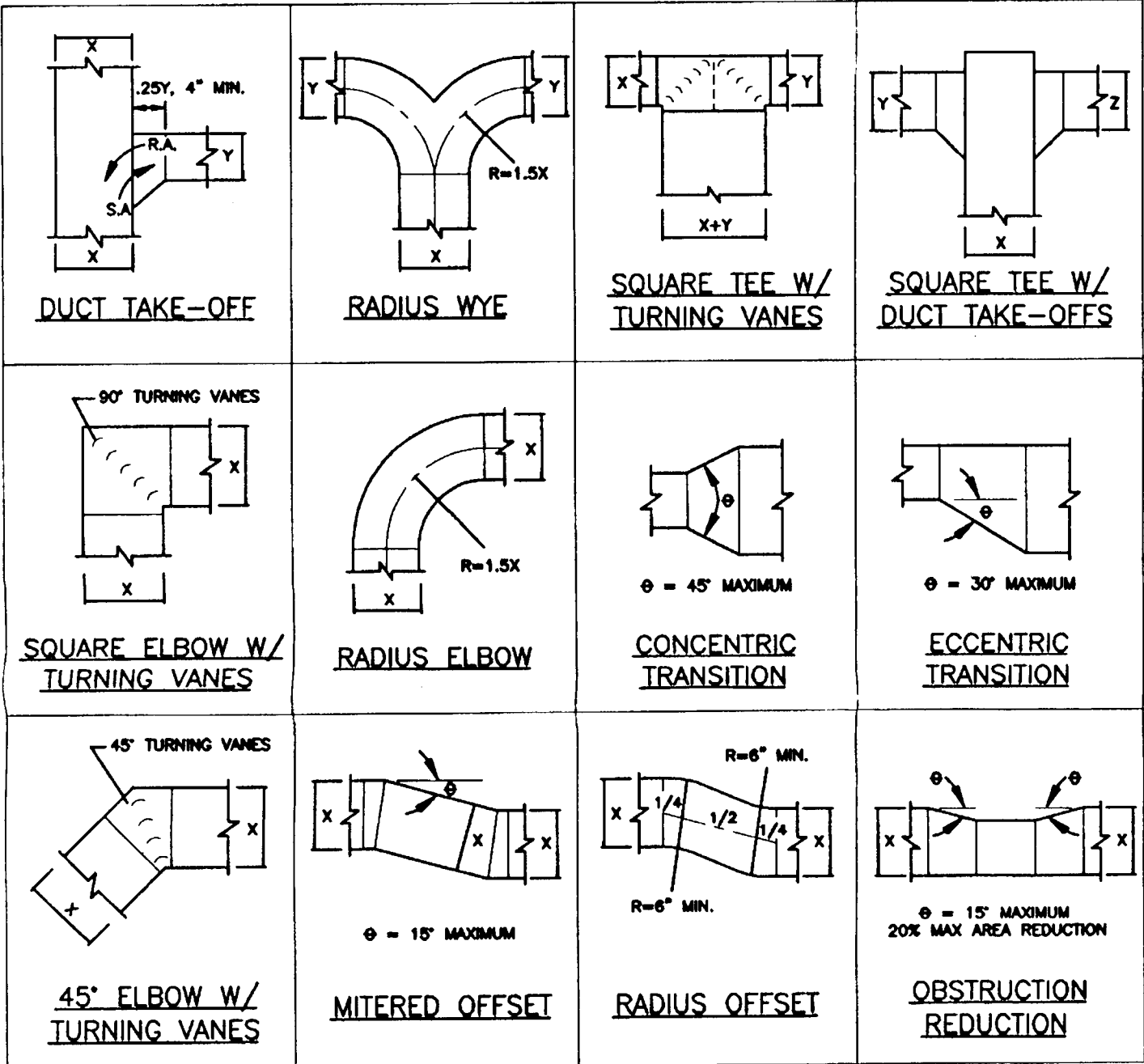
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PROJECT NUMBER: 99-159

MECHANICAL AND PLUMBING DRAWING LEGEND

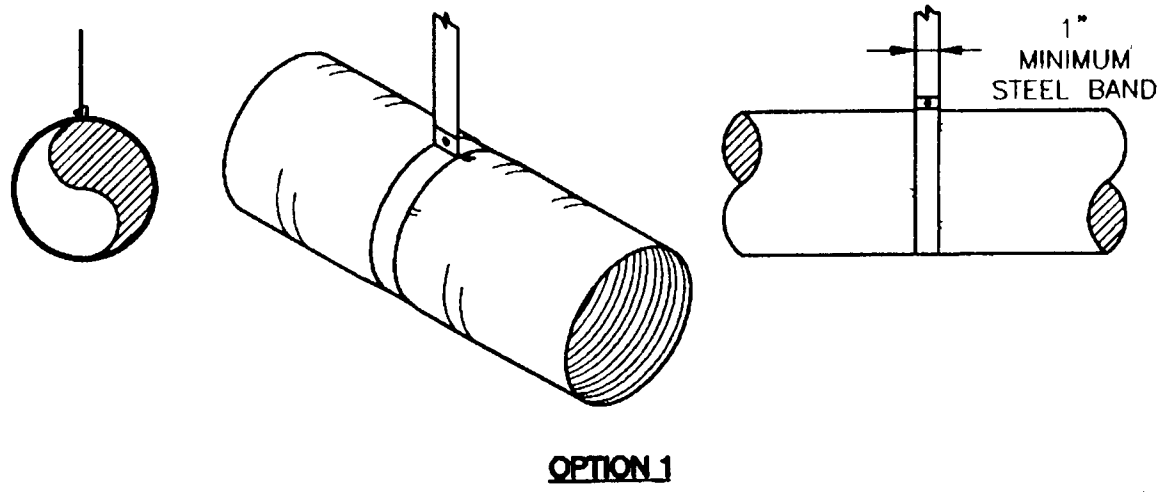
RE: ALL MECHANICAL AND PLUMBING SHEETS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	FLEXIBLE DUCTWORK		BALL VALVE
	THERMOSTAT / TEMP SENSOR		BUTTERFLY VALVE
	MOTORIZED DAMPER		GATE VALVE
	MANUAL VOLUME DAMPER		PRESSURE REDUCING VALVE
	SPIN-IN FITTING W/AIR EXTRACTOR		BALANCE VALVE
	DUCT SMOKE DETECTOR		CHECK VALVE
	COMBINATION SMOKE/FIRE DAMPER		GLOBE VALVE
	FIRE DAMPER		TRIPLE DUTY VALVE
	EQUIPMENT CALLOUT		THREE WAY CONTROL VALVE
	TURNING VANES		TWO WAY CONTROL VALVE
	INTAKE OR EXHAUST		GAS PRESSURE REGULATOR W/GAS COCK
	DIRECTION OF AIRFLOW		PRESSURE RELIEF VALVE
	SUPPLY DIFFUSER		WATER HAMMER ARRESTOR
	RETURN GRILLE		STORM DRAIN
	EXHAUST GRILLE		CONDENSER WATER SUPPLY LINE
	FLOOR GRILLE		CONDENSER WATER RETURN LINE
	DUCTWORK BREAK		CONDENSATE DRAIN LINE
	HEAT PUMP UNIT W/FLEXIBLE CONNECTORS		SOIL, WASTE, OR SANITARY SEWER
	CONCENTRIC SQUARE TO ROUND TRANSITION		VENT
	FLOW DIRECTION		ROOF DRAIN LINE
	TEMPERATURE GAUGE		OVERFLOW DRAIN LINE
	PRESSURE GAUGE (LIQUID FILLED)		DOMESTIC COLD WATER (CW)
	TEMPERATURE SENSOR (DUCT OR PIPING)		DOMESTIC HOT WATER (HW)
	FLOW SWITCH		DOMESTIC HOT WATER RETURN (HWR)
	FLEXIBLE CONNECTOR		MEDIUM PRESSURE NATURAL GAS
	SUCTION DIFFUSER		LOW PRESSURE NATURAL GAS
	Y TYPE STRAINER (ALL 1 1/2" OR LARGER SHALL BE PROVIDED W/BLOW DOWN VALVE)		FIRE SPRINKLER LINE
	REDUCER		SLOPE PIPE IN DIRECTION OF ARROW
	UNION		FLOOR CLEANOUT
	MANUAL AIR VENT		WALL CLEANOUT
	CAP		GRADE CLEANOUT
	REDUCED PRESSURE BACKFLOW PREVENTER		FLOOR DRAIN
	DOUBLE CHECK BACKFLOW PREVENTER		FLOOR SINK

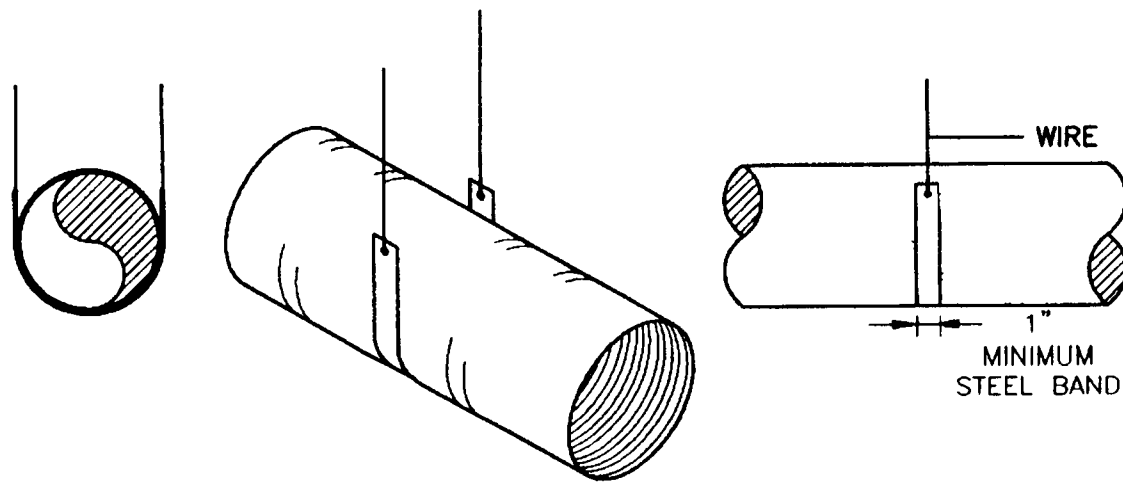


NOTE:
ALL DUCTWORK TRANSITIONS SHALL BE CONSTRUCTED AND INSTALLED TO SMACNA AND THE ABOVE NOTED STANDARDS. ANY DEVIATIONS SHALL BE COORDINATED WITH THE ENGINEER.

RECTANGULAR DUCT FITTING DETAILS
N.T.S.



OPTION 1

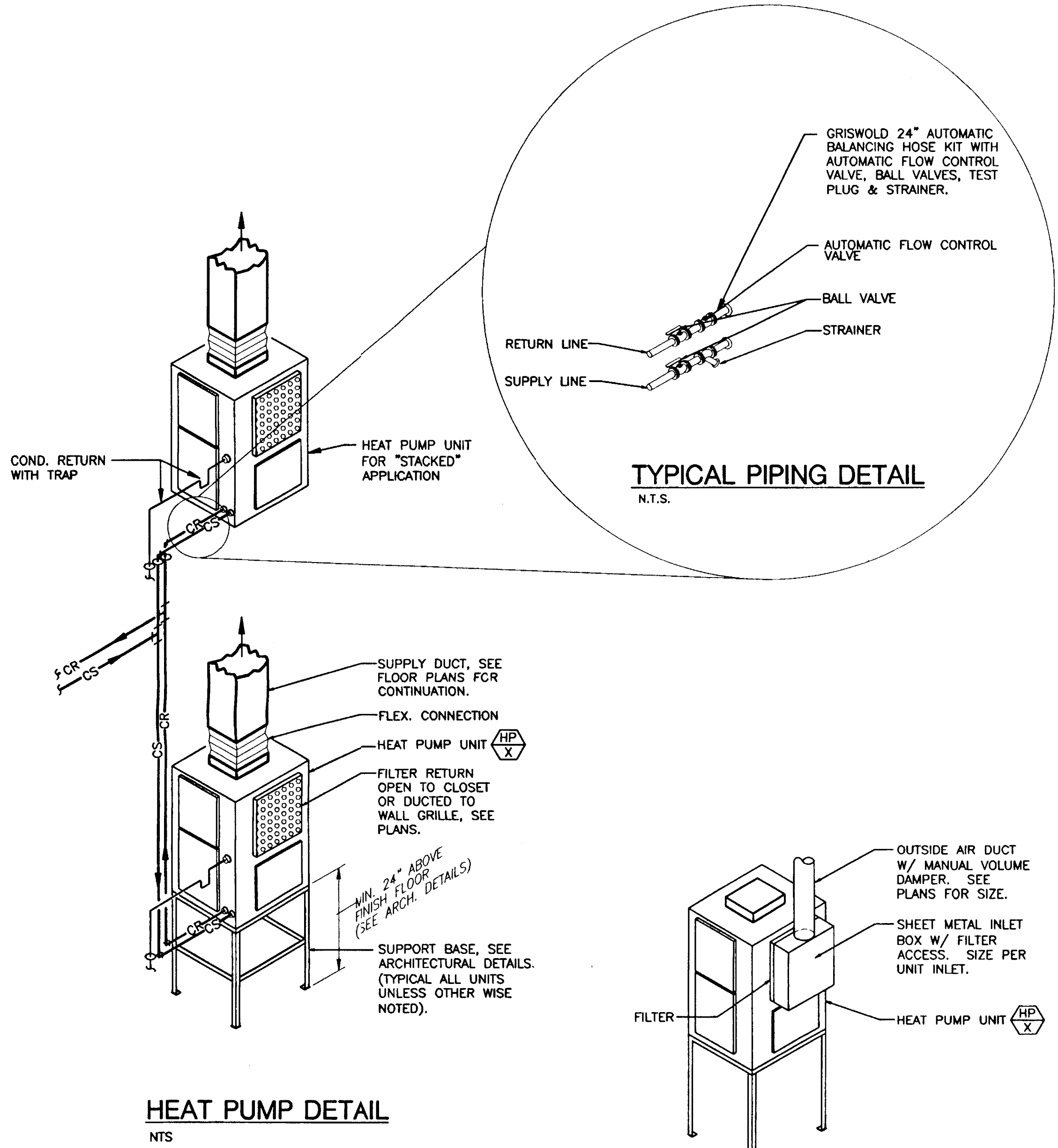


OPTION 2

- NOTES:
- SUPPORT SYSTEM MUST NOT DAMAGE OR CAUSE OUT OF ROUND SHAPE.
 - FLEX DUCT MUST NOT EXCEED 6'-0" FROM CONNECTION TO TERMINATION.
 - MAXIMUM LENGTH BETWEEN SUPPORTS MUST NOT EXCEED 3'-0" O.C.
 - ATTACH BANDS OR WIRES TO SUPPORT STRUCTURE ABOVE.

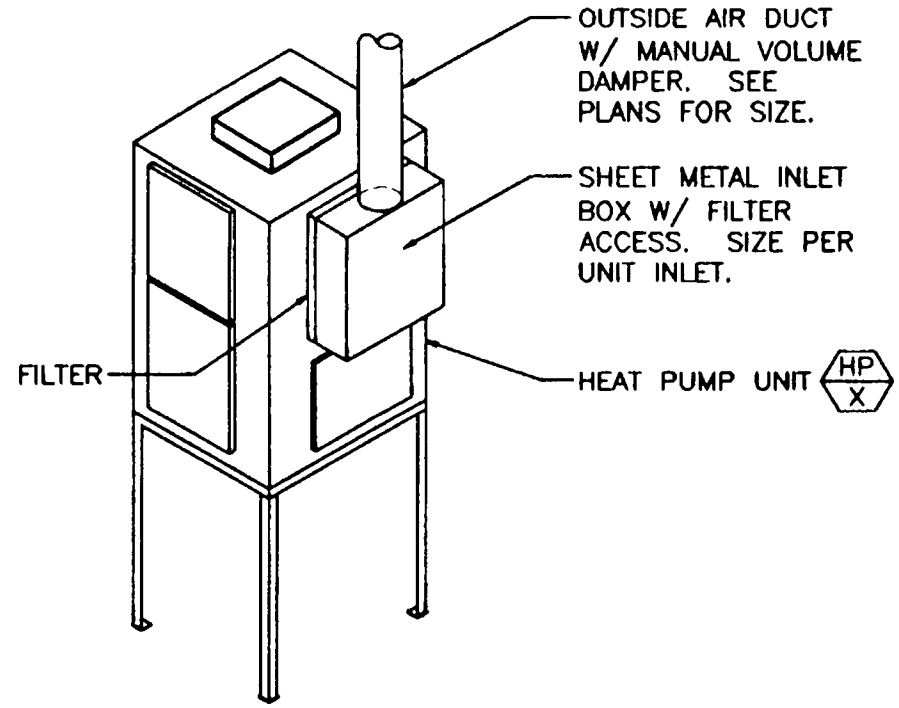
FLEXIBLE DUCT SUPPORT

N.T.S.



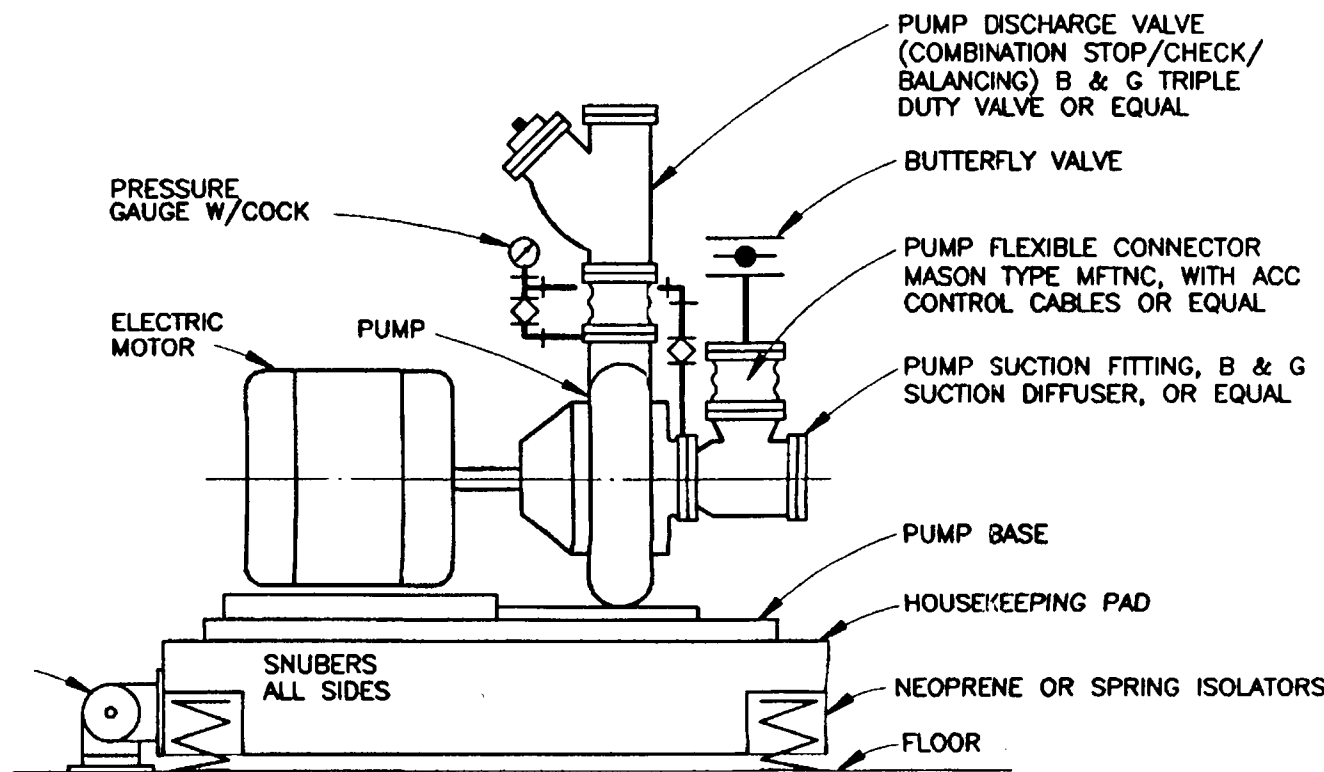
HEAT PUMP DETAIL

N.T.S.



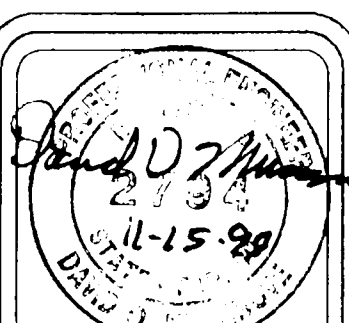
F.A. INLET AT H.P. DETAIL

N.T.S. (FOR MAIN CORRIDOR HEAT PUMPS ONLY)



CIRCULATING PUMP PIPING DETAIL

N.T.S.



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