

DESIGNER'S NOTES FOR DETAILS AND SCHEDULES

1. REFER TO DESIGNER'S NOTES ON THE DETAILS. REMOVE DESIGNER'S NOTES PRIOR TO ISSUING.
2. GROUP COMMON DETAILS, SUCH AS PIPING, AS MUCH AS POSSIBLE.
3. MANUAL AIR VENTS ARE REQUIRED ON CHILLED AND HEATING HOT WATER SYSTEMS AND AT LOCAL HIGH POINTS. LOCAL HIGH POINT IS A SECTION OF PIPE AT A HIGHER ELEVATION THAN THE SECTION OF PIPE IMMEDIATELY DOWNSTREAM AND IMMEDIATELY UPSTREAM.
4. FOR EQUIPMENT SCHEDULES:
 - A. PROVIDE SCHEDULES FOR EXISTING FANS OR OTHER EQUIPMENT THAT MUST BE MODIFIED OR REBALANCED. SHOW EXISTING AND FUTURE CAPACITIES AND MOTOR SIZES.
 - B. DO NOT USE DITTO MARKS FOR REPETITIVE ENTRIES.
 - C. USE IN SCHEDULES WHERE THE COLUMN HEADING IS NOT APPLICABLE TO INDICATE THAT THE LACK OF AN ENTRY WAS NOT AN OMISSION.
 - D. GROUP SCHEDULES AS MUCH AS POSSIBLE. SEE HVAC DESIGN MANUAL FOR SEQUENCE OF SCHEDULES.
5. ALL DUCTWORK, WITHOUT EXCEPTION, AND ALL PIPING 150mm [6"] AND LARGER SHALL BE SHOWN IN DOUBLE LINE.

ABBREVIATION AND SYMBOL NOTES

1. THE COMPOSITE LIST OF ABBREVIATIONS IS COORDINATED WITH THE UNITED STATES NATIONAL CAD STANDARD VERSION 4.0, LEGACY VA LIST OF ABBREVIATIONS, AND ASHRAE. THIS LIST SHALL BE USED FOR ALL VA PROJECTS AND EDITED, AS REQUIRED, TO BE PROJECT SPECIFIC. THE DESIGNER MAY SELECT AND USE ADDITIONAL ABBREVIATIONS, IF REQUIRED, FROM ANY KNOWN SOURCES.
2. THE LIST OF SYMBOLS IS MOSTLY BASED ON THE VA MASTER LIST OF STANDARD SYMBOLS AND HAS BEEN UPDATED IN CONSULTATION WITH OTHER SOURCES, SUCH AS, NATIONAL CAD STANDARD VERSION 4, AND ISA (THE INSTRUMENTATION, SYSTEMS, AND AUTOMATION SOCIETY). THIS LIST SHALL BE USED FOR ALL VA PROJECTS AND EDITED, AS REQUIRED, TO BE PROJECT SPECIFIC. THE DESIGNER CAN SELECT AND USE ADDITIONAL SYMBOLS, IF REQUIRED, FROM ANY KNOWN SOURCE



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GENERAL NOTES

1. ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN A FURRED CHASE OR ABOVE HARD SUSPENDED CEILING, OR ACOUSTICAL CEILING.
2. THE FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS.
3. ACCESS PANELS IN HARD SUSPENDED CEILINGS ARE REQUIRED FOR ALL VALVES, TRAPS, DAMPERS, CLEANOUTS, CONTROLS, ETC. ACCESS PANELS SHALL BE FURNISHED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS. COORDINATE LOCATION WITH MECHANICAL INSTALLATION AND DEMONSTRATE ACCESS TO EQUIPMENT SERVED.
4. TOTAL STATIC PRESSURE NOTED IN THE SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC. LOSS FOR FILTERS SHALL BE FOR FILTERS AT 50% LOADING.
5. FOR TYPICAL STEAM AND WATER PIPING CONNECTIONS TO EQUIPMENT, SEE STANDARD EQUIPMENT DETAILS.
6. DIFFUSER, REGISTER AND GRILLE SIZES SHOWN ON FLOOR PLANS ARE NECK SIZES.
7. WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.
8. WALL TYPE EXHAUST REGISTERS NOTED AS "BR" ON DRAWINGS ARE TO BE INSTALLED WITH BOTTOM ELEVATION OF REGISTER AT 175mm [7"] ABOVE FINISHED FLOOR.
9. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF CEILING DIFFUSERS, REGISTERS, AND GRILLES.
10. STEAM HEADER SET PRESSURE: ___ kPa [PSIG] NORMAL
 ___ kPa [PSIG] LOW DEMAND PERIODS
11. ALTITUDE-BOILER ROOM FLOOR: ___ M [FT.] ABOVE SEA LEVEL
12. SEISMIC PROVISIONS // REQUIRED – SEE SPECS // NOT REQUIRED //
 ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS OTHERWISE NOTED



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ABBREVIATIONS

A/E	ARCHITECT / ENGINEER	C	CENTIGRADE (CELSIUS)
AAHX	AIR TO AIR HEAT EXCHANGER	CAV	CONSTANT AIR VOLUME
AAV	AUTOMATIC AIR VENT	CC	COOLING COIL
AB	AIR BLENDER	CCD	COOLING COIL CONDENSATE DRAIN
ACC	AIR COOLED CONDENSER	CD	CEILING DIFFUSER
ACCH	AIR COOLED CHILLER	CD-1	CONSTRUCTION DOCUMENTS (SUBMISSION1)
ACCU	AIR COOLED CONDENSING UNIT	CD-2	CONSTRUCTION DOCUMENTS (SUBMISSION2)
ACD	AUTOMATIC CONTROL DAMPER, MODULATING	CENT	CENTRIFICAL
ACD-TP	AUTOMATIC CONTROL DAMPER, TWO POSITION	CFH	CUBIC FEET PER HOUR
ACU	AIR CONDITIONING UNIT	CFM	CUBIC FEET PER MINUTE
AD	ACCESS DOOR	CFT	CUBIC FEET
AF	AFTER FILTER	CFP	CHEMICAL FEED PUMP
AFCV	AIR FLOW CONTROL VALVE	CG	CEILING GRILLE
AFF	ABOVE FINISHED FLOOR	CH	CHILLER
AFMS	AIR FLOW MEASURING STATION	CHP	CHILLED WATER PUMP
AFW	AIR FOIL WHEEL (FAN)	CHW	CHILLER WATER
AHU	AIR-HANDLING UNIT	CHR	CHILLED WATER RETURN
AMP	AMPERE	CHS	CHILLED WATER SUPPLY
AP	ACCESS PANEL	CI	CAST IRON
APD	AIR PRESSURE DROP	CM	CARBON MONOXIDE
AQST	AQUASTAT	CM	CUBIC METER
ARI	AIR CONDITIONING AND REFRIGERATION INSTITUTE	CM/S	CUBIC METER PER SECOND
AS	AIR SEPARATOR	CO	CLEAN OUT
ASHRAE	AMERICAN SOCIETY OF HEATING REFRIGERATION AIR CONDITIONING ENGINEERS	CO2	CARBON DIOXIDE
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS	COMP	COMPRESSOR UNIT
AW	AIR WASHER	COP	COEFFICIENT OF PERFORMANCE
AXF	AXIAL FLOW	CP	CONDENSATE PUMP
		CR	CEILING REGISTER
		CS	CONDENSATE STORAGE TANK
		CSG	CLEAN STEAM GENERATOR
		CT	COOLING TOWER
		CU	CONDENSING UNIT
		CUH	CABINET UNIT HEATER
		CV	CONSTANT VOLUME
		CW	COLD WATER (POTABLE)
		CWCC	CHILLED WATER COOLING COIL
		CWP	CONDENSER WATER PUMP
		CWR	CONDENSER WATER RETURN (TO COOLING TOWER)
		CWS	CONDENSER WATER SUPPLY (FROM COOLING TOWER)
B	BOILER		
BD	BUTTERFLY DAMPER	D	DAMPER - AUTOMATIC
BDD	BACKDRAFT DAMPER	Db	DRY-BULB TEMPERATURE
BDR	BASE BOARD RADIATOR	DB	DECIBELS
BFP	BACKFLOW PREVENTER	DCW	DOMESTIC COLD WATER
BFT	BOILER PLANT FIRE TUBE	DD-1	DESIGN DEVELOPMENT (SUBMISSION 1)
BG	BOTTOM GRILLE	DD-2	DESIGN DEVELOPMENT (SUBMISSION 2)
BHP	BRAKE HORSEPOWER	DDC	DIRECT DIGITAL CONTROLS
BHW	HOT WATER HEATING BOILER	DEG	DEGREE
BHX	BOILER BLOWDOWN HEAT EXCHANGER	DF	DIFFUSER
BIW	BACKWARD INCLINED WHEEL (FAN)	DHW	DOMESTIC HOT WATER
BMT	BONE MARROW TRANSPLANT	DHWR	DOMESTIC HOT WATER RETURN
BR	BOTTOM REGISTER	DIA	DIAMETER
BSC	BIOLOGICAL SAFETY CABINETS	DIW	DEIONIZED WATER
BT	BLOWOFF TANK	DP	DEW POINT TEMPERATURE
BTC	BLOWOFF TANK CONTROL VALVE	DP	DIFFUSER PLATE
BTU	BRITISH THERMAL UNIT	DPA	DIFFERENTIAL PRESSURE ASSEMBLY
BTUH	BRITISH THERMAL UNIT PER HOUR	DPS	DIFFERENTIAL PRESSURE SENSOR
BWT	BOILER PLANT WATER TUBE	DX	DIRECT EXPANSION
		DXCC	DIRECT EXPANSION COOLING COIL



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ABBREVIATIONS

EA	EXHAUST AIR	GA	GAUGE
EAT	ENTERING AIR TEMPERATURE	GAL	GALLONS
EC	EVAPORATIVE COOLER	GH	GRAVITY HOOD
ECC	ENGINEERING CONTROL CENTER	GPD	GALLONS PER DAY
ECU	EVAPORATIVE CONDENSER UNIT	GPH	GALLONS PER HOUR
EDH	ELECTRIC DUCT HEATER	GPM	GALLONS PER MINUTE
EER	ENERGY EFFICIENCY RATIO	GPR	GAS PRESSURE REGULATOR
EF	EXHAUST FAN	GS	GALVANIZED STEEL
EG	EXHAUST GRILLE		
EGS	EMERGENCY GAS SHUTOFF		
EGT	ENTERING GLYCOL TEMPERATURE	H	HUMIDIFIER
EH	EXHAUST HOOD	HAC	HOUSEKEEPING AID CLOSET
EJ	EXPANSION JOINT	HB	HOSE BIBB
EMD	END OF MAIN DRIP (STEAM)	HC	HEATING COIL
ENT	ENTERING	HD	HOOD
ER	EXHAUST REGISTER	HOA	HAND/OFF/AUTOMATIC
ERC	ELECTRIC REHEAT COIL	HP	HEAT PUMP
ERP	ELECTRIC RADIANT PANEL	HP	HORSEPOWER
ESP	EXTERNAL STATIC PRESSURE	HPDT	HIGH PRESSURE DRIP TRAP
ET	EXPANSION TANK	HPR	HIGH PRESSURE RETURN (STEAM CONDENSATE)
ETO	ETHYLENE OXIDE		
EUH	ELECTRIC UNIT HEATER	HPS	HIGH PRESSURE SUPPLY (STEAM)
EWC	EVAPORATIVE WATER COOLER	HRC	HEAT RECOVERY COIL
EWI	ENTERING WATER TEMPERATURE	HRD	HEAT RECOVERY DEVICE
EX	EXISTING	HRP	HYDRONIC RADIANT (CEILING) PANEL
		HRW	HEAT RECOVERY WHEEL
F	FAHRENHEIT	HSTAT	HUMIDISTAT
F&T	FLOAT AND THERMOSTATIC	HTM	HUMIDIFIER TERMINAL
F/SDPR	COMBINATION FIRE SMOKE DAMPER	HUM	HUMIDIFIER UNIT MOUNTED
FA	FREE AREA	HVU	HEATING AND VENTILATING UNIT
FC	FLEXIBLE CONNECTION	HW	HOT WATER
FCU	FAN COIL UNIT (4 PIPE)	HWC	HOT WATER COIL
FCUC	FAN COIL UNIT COOLING ONLY	HWHC	HOT WATER HEATING COIL
FCUH	FAN COIL UNIT HEATING ONLY	HWP	HEATING HOT WATER PUMP
FCW	FORWARD CURVED WHEEL (FAN)	HWR	HEATING HOT WATER RETURN
FD	FLOOR DRAIN	HWS	HEATING HOT WATER SUPPLY
FD	FIRE DAMPER	HWUH	HOT WATER UNIT HEATER
FF	FINAL FILTER	HVD	HOISTWAY VENT DAMPER
FHX	FLUE GAS/FEEDWATER HEAT EXCHANGER	HX	HEAT EXCHANGER
FM	FLOW METER	HZ	HERTZ
FOP	FUEL OIL PUMP		
FOT	FUEL OIL TANK		
FOHX	FUEL OIL HEAT EXCHANGER		
FPM	FEET PER MINUTE		
FPS	FEET PER SECOND		
FPTU	FAN POWERED TERMINAL UNIT		
FR	FLOOR REGISTER		
FRP	FIBER REINFORCED POLYESTER		
FS	FLOW SWITCH		
FSTAT	FREEZE STAT		
FT	FEET		
FT WC	FEET OF WATER COLUMN		
FT-LB	FOOT-POUND		
FTR	FIN TUBE RADIATION		
FV	FACE VELOCITY		



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ABBREVIATIONS

I/O	INPUT/OUTPUT	M	METER, SI UNIT
IAQ	INDOOR AIR QUALITY	M/S	METERS PER SECOND (OR METERS/SECOND)
IBT	INVERTED BUCKET TRAP	MA	MIXED AIR
ICF	IN-LINE CENTRIFUGAL FAN	MAT	MIXED AIR TEMPERATURE
ICU	INTENSIVE CARE UNIT	MAU	MAKE-UP AIR UNIT
ID	INSIDE DIAMETER	MAV	MANUAL AIR VENT
IFB	INTEGRAL FACE AND BYPASS	MAX	MAXIMUM
IN	INCHES	MB	MIXING BOX
IN HG	INCHES OF MERCURY	MBH	1,000 BTUH
IN WC	INCH WATER COLUMN	MCA	MINIMUM BRANCH CIRCUIT AMPACITY
IN WG	INCH WATER GAUGE	MER	MECHANICAL EQUIPMENT ROOM
IN-LB	INCH-POUND	MERV	MINIMUM EFFICIENCY REPORTING VALUE
IPLV	INTERGRATED PART LOAD VALUE	MH	MANHOLE
IRH	INTRARED HEATER	MHP	MOTOR HORSEPOWER
IS	INSECT SCREEN	MIN	MINIMUM
IU	INDUCTION UNIT	MM	MILLIMETER
IV	INLET VANES	MOV	MOTOR OPERATED VALVE
J	INTENTIONALLY LEFT BLANK	MPR	MEDIUM PRESSURE RETURN (STEAM CONDENSATE)
KG	KILOGRAM	MPS	MEDIUM PRESSURE STEAM
KG/HR	KILOGRAM PER HOUR	MRI	MAGNETIC RESONANCE IMAGING
kPa	KILOPASCAL	MTD	MEAN TEMPERATURE DIFFERENCE
KW	KILOWATT	MVD	MANUAL VOLUME DAMPER
KWH	KILOWATT HOUR	MZ	MULTI-ZONE
L	LITER	NA	NOT APPLICABLE
L/h	LITERS PER HOUR (or LITERS/HOUR)	NC	NOISE CRITERIA
L/m	LITERS PER MINUTE (or LITERS/MINUTE)	NC	NORMALLY CLOSED
L/s	LITERS PER SECOND (or LITERS/SECOND)	NG	NATURAL GAS
LAT	LEAVING AIR TEMPERATURE	NGFM	NATURAL GAS FLOWMETER
LBS/HR	POUNDS PER HOUR	Nm	NEWTON METER
LF	LINEAR FOOT (FEET)	NO	NORMALLY OPEN
LGT	LEAVING GLYCOL TEMPERATURE	NOAA	NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
LH	LATENT HEAT	NOM	NOMINAL
LPG	LIQUEFIED PETROLEUM GAS	NPLV	NON-STANDARD PART LOAD VALUE
LPR	LOW PRESSURE RETURN (STEAM CONDENSATE)	NPSH	NET POSITIVE SUCTION HEAD
LPRC	LOW PRESSURE STEAM RETURN (CLEAN)	NPSHA	NET POSITIVE SUCTION HEAD AVAILABLE
LLHX	LIQUID TO LIQUID HEAT EXCHANGER	NPSHR	NET POSITIVE SUCTION HEAD REQUIRED
LPS	LOW PRESSURE STEAM	NTS	NOT TO SCALE
LPSC	LOW PRESSURE STEAM (CLEAN)	OA	OUTSIDE AIR
LSD	LINEAR SLOT DIFFUSER	OAD	OUTDOOR AIR DAMPER
LTCP	LOCAL TEMPERATURE CONTROL PANEL	OAG	OUTSIDE AIR GRILLE
LVG	LEAVING	OAI	OUTSIDE AIR INTAKE
LVR	LOUVER	OD	OUTSIDE DIAMETER
LWT	LEAVING WATER TEMPERATURE	OFM	OIL FLOWMETER
		OR	OPERATING ROOM



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ABBREVIATIONS

P	PUMP	SA	SUPPLY AIR
Pa	PASCAL	SAD	SOUND ATTENUATING DEVICE
PC	PUMPED CONDENSATE	SAT	SUPPLY AIR TEMPERATURE
PCF	POUNDS PER CUBIC FOOT (FEET)	SC	SHADING COEFFICIENT
PD	PRESSURE DROP	SCFM	STANDARD CUBIC FEET PER MINUTE
PEF	PROPELLER (TYPE) EXHAUST FAN	SCI	SPINAL CODE INJURY
PF	PRE-FILTER	SCR	SILICON CONTROLLED RECTIFIER
PG	PRESSURE GAGE	SD	SMOKE DETECTOR
PGW	PROPYLENE GLYCOL-WATER (SOLUTION)	SD	SUPPLY AIR DIFFUSER
PHC	PREHEAT COIL	SD-1	SCHEMATIC DESIGN (SUBMISSION1)
PPM	PARTS PER MILLION	SD-2	SCHEMATIC DESIGN (SUBMISSION2)
PRS	PRESSURE REGULATING (VALVE) STATION	SDPR	SMOKE DAMPER
PRV	PRESSURE REGULATING VALVE	SDR	SMOKE DAMPER (RETURN)
PSI	POUNDS PER SQUARE INCH	SDS	SMOKE DAMPER (SUPPLY)
PSIA	POUNDS PER SQUARE INCH - ABSOLUTE	SEN	SENSIBLE HEAT
PSIG	POUNDS PER SQUARE INCH - GAGE	SF	SUPPLY FAN
PSS	PRIMARY SECONDARY SYSTEM	SG	SUPPLY AIR GRILLE
PSV	PRESSURE SAFETY VALVE	SH	STEAM HUMIDIFIER
PTAC	PACKAGED TERMINAL AIR CONDITIONER	SHC	STEAM HEATING COIL
		SI	SQUARE INCHES
		SP	STATIC PRESSURE
R/E	RETURN OR EXHAUST	SP GR	SPECIFIC GRAVITY
RA	RETURN AIR	SPD	SUPPLY PROCESS AND DISTRIBUTION
RAD	RETURN AIR DAMPER	SPRV	STEAM PRESSURE REDUCING VALVE
RAF	RADIO FREQUENCY	SPS	STATIC PRESSURE SENSOR
RAHX	ROTARY AIR HEAT EXCHANGER	SQ FT	SQUARE FOOT (FEET)
RAT	RETURN AIR TEMPERATURE	SR	SUPPLY AIR REGISTER
RCCH	REMOTE CONDENSER CHILLER	SS	STAINLESS STEEL
RCU	RECIPROCATING CHILLER UNIT	SSHX	STEAM TO STEAM HEAT EXCHANGER
RD	REFRIGERANT DISCHARGE	SSR	SOLID SEPARATOR
RDS	ROOM DATA SHEETS	ST	STEAM TRAP
REA	RELIEF AIR	SUH	STEAM UNIT HEATER
RELAD	RELIEF AIR DAMPER	SV	STEAM PRESSURE REDUCING VALVE
RF	RETURN FAN	SVS	STEAM VENT SILENCER
RG	RETURN GRILLE	SW	SOFTWATER
RH	RELATIVE HUMIDITY	SWHX	STEAM TO WATER HEAT EXCHANGER
RHC	REHEAT COIL		
RHG	REFRIGERANT HOT GAS		
RL	REFRIGERANT LIQUID LINE	T&PCV	TEMPERATURE AND PRESSURE CONTROL VALVE
RLA	RUN LOAD AMPERE	TAB	TESTING, ADJUSTING, BALANCE
RO	REVERSE OSMOSIS	TD	TEMPERATURE DIFFERENCE
RPM	REVOLUTIONS PER MINUTE	TDH	TOTAL DYNAMIC HEAD
RR	RETURN REGISTER	TDS	TOTAL DISSOLVED SOLIDS
RS	REFRIGERANT SUCTION	TG	TRANSFER GRILLE
RTU	ROOF TOP UNIT	TP	TRAP
RV	RELIEF VALVE	TR	TOP REGISTER
		TSP	TOTAL STATIC PRESSURE
		TSTAT	THERMOSTAT
		TU	TERMINAL UNIT
		TWU	THRU-WALL UNIT



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ABBREVIATIONS

UC	UNDER CUT
UC	UNIT COOLER
UH	UNIT HEATER
U	UNDERWRITERS LABORATORY
URV	UPBLAST UNIT VENTILATOR
V	VALVE
VAF	VANE-AXIAL FAN
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER (MANUAL OPPOSED BLADE)
VFD	VARIABLE FREQUENCY DRIVE
VHA	VETERANS HEALTH ADMINISTRATION
VI	VIBRATION ISOLATOR
VP	VACUUM PUMP
VPS	VARIABLE PRIMARY SYSTEM
VR	VACUUM (STEAM CONDENSATE) RETURN
VSD	VARIABLE SPEED DRIVE
VUH	VERTICAL UNIT HEATER
W	WATTS
WAG	WASTE ANESTHESIA GAS
Wb	WET-BULB (TEMPERATURE)
WC	WATER COOLED
WCCH	WATER COOLED CHILLER
WCCU	WATER COOLED CONDENSING UNIT
WCHP	WATER COOLED HEAT PUMPS
WCPU	WATER COOLED PACKAGED UNIT
WEF	WALL EXHAUST FAN
WF	WATER FILTER
WFCV	WATER FLOW CONTROL VALVE
WFM	WATER FLOWMETER
WFMD	WATER FLOW MEASURING DEVICE
WG	WATER GAGE
WPD	WATER SIDE PRESSURE DROP
YR	YEAR



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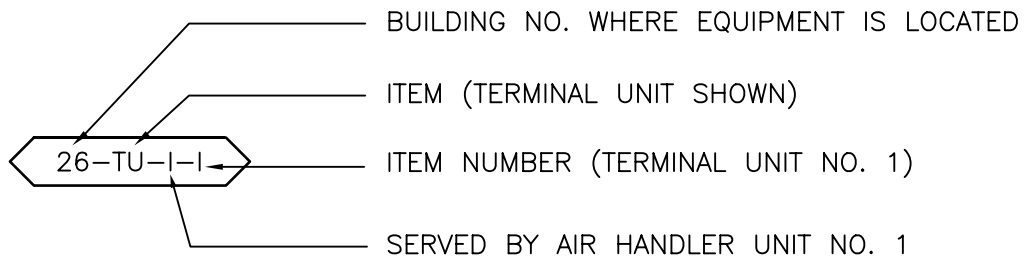
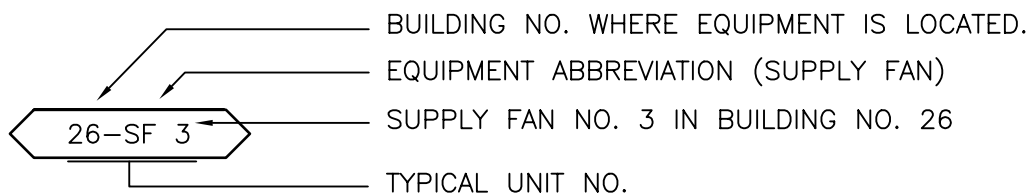
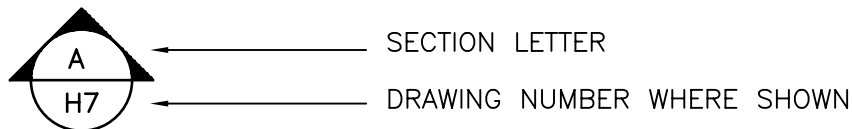
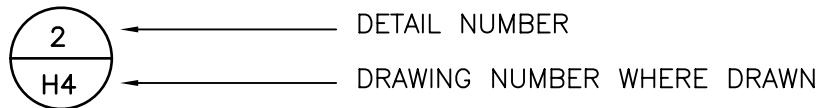
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DRAWING SYMBOLS



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

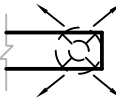
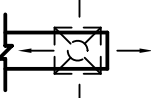
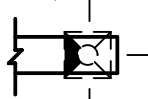
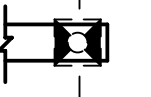
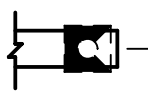

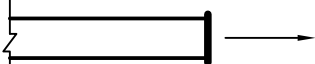

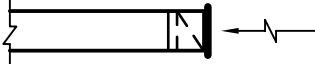
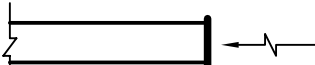
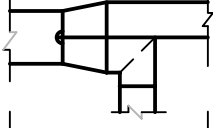
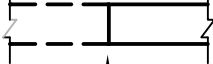

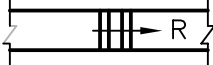


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DUCTWORK SYMBOLS

	UP		DN	SUPPLY DUCT (UP & DOWN)
	UP		DN	EXHAUST DUCT (UP & DOWN)
	UP		DN	RETURN DUCT (UP & DOWN)
				ROUND AND SQUARE 4-WAY CEILING DIFFUSERS
				SQUARE 3-WAY CEILING DIFFUSERS
				SQUARE 2-WAY CEILING DIFFUSERS
				SQUARE 1-WAY CEILING DIFFUSERS
				LINEAR SLOT DIFFUSER
				SUPPLY TOP REGISTER OR GRILLE (WALL TYPE)
				EXHAUST OR RETURN CEILING REGISTER OR GRILLE
				EXHAUST OR RETURN BOTTOM REGISTER OR GRILLE (WALL TYPE)
				EXHAUST OR RETURN REGISTER OR TOP GRILLE (WALL TYPE)
				VANED ELBOW & AIR SPLIT TYPE DUCT TAKE-OFF
				CONNECT NEW DUCT TO EXISTING DUCT
				
				INCLINED RISE, IN DIRECTION OF AIR FLOW
				INCLINED DROP, IN DIRECTION OF AIR FLOW
				LIMIT OF DEMOLITION



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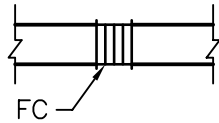
DETAIL TITLE / DUCTWORK SYMBOLS

SCALE :NONE

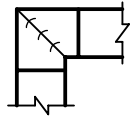
DATE ISSUED: DECEMBER 2008

CAD DETAIL NO.: SD230511-09.DWG

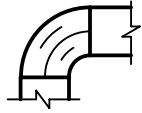
DUCTWORK SYMBOLS



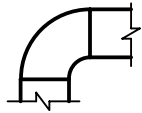
FLEXIBLE CONNECTION, EQUIPMENT,
VIBRATION, OR SEISMIC



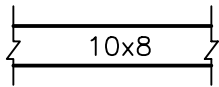
VANED ELBOW (PROVIDE ALL SQUARE OR
RECTANGULAR ELBOWS WITH VANES EVEN IF
SYMBOL IS MISSING)



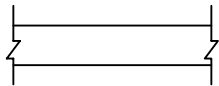
VANED ELBOW (SHORT RADIUS)



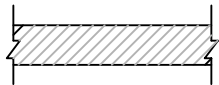
STANDARD RADIUS ELBOW (LONG RADIUS)



NEW DUCT (INSIDE DIMENSIONS: WIDTH x DEPTH)



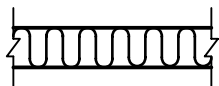
EXISTING DUCT TO REMAIN



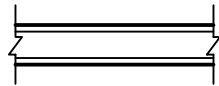
EXISTING DUCT TO BE REMOVED



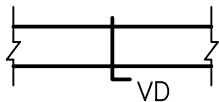
LOUVER (LOUVER SPECIFIED IN ARCHITECTURAL
SECTION.)



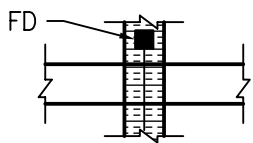
FLEXIBLE DUCTWORK (INSULATED)



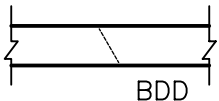
DUCT WITH SOUND LINING



MANUAL VOLUME DAMPER



FIRE DAMPER



BACK DRAFT DAMPER



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DETAIL TITLE / DUCTWORK SYMBOLS

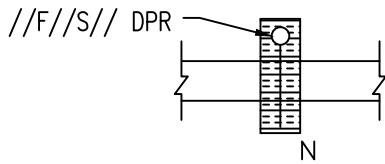
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DATE ISSUED: DECEMBER 2008

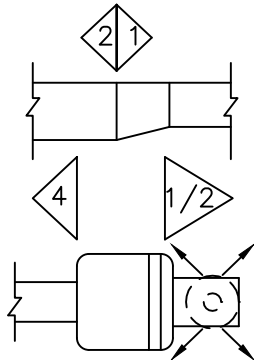
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SD230511-10.DWG

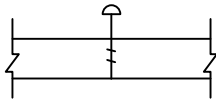
DUCTWORK SYMBOLS



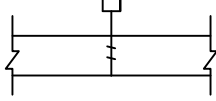
//FIRE//SMOKE// DAMPER
(VA DOES NOT ALLOW COMBINATION FIRE/SMOKE DAMPERS.)



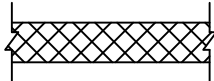
POINT OF CHANGE IN DUCT CONSTRUCTION BY STATIC PRESSURE CLASS. THE NUMBER ASSIGNS PRESSURE CLASS (IN. OF WATER) WHICH WILL ACCOMMODATE MAXIMUM OPERATING PRESSURE IN THE DUCT SUBSECTION. THE SYMBOL CONTINUES THE ASSIGNMENT UNTIL THE DUCT TERMINATES OR ANOTHER SYMBOL APPEARS. A "N" SUPERSCRIPT INDICATES NEGATIVE PRESSURE.



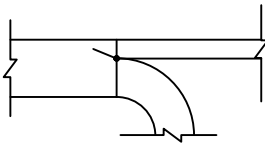
AUTOMATIC CONTROL DAMPER MODULATING



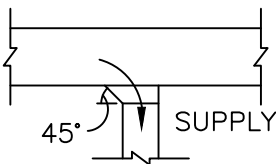
AUTOMATIC CONTROL DAMPER TWO POSITION



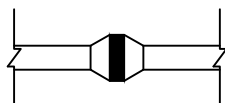
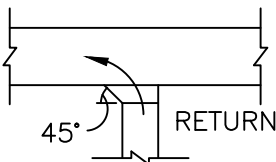
STAINLESS STEEL DUCT



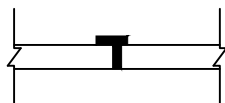
MANUAL SPLITTER DAMPER



STANDARD BRANCH SUPPLY OR RETURN, NO SPLITTER (45° TAP)



DUCT MOUNTED COIL (HOT WATER OR STEAM COIL)



DUCT MOUNTED COIL
(ELECTRIC)



Department of
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DETAIL TITLE: DUCTWORK SYMBOLS

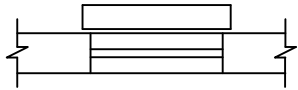
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DATE ISSUED: 11/01/2017

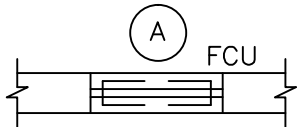
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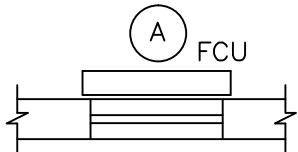
CONVECTOR OR RADIATOR (RECESSED)



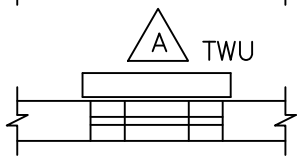
CONVECTOR OR RADIATOR (WALL HUNG)



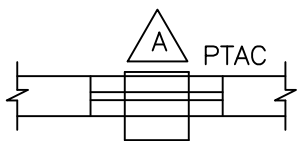
FLOOR MOUNTED VERTICAL RECESSED FAN COIL UNIT.
LETTER INDICATES UNIT SIZE.



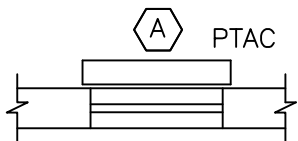
FLOOR MOUNTED VERTICAL CABINET FAN COIL UNIT.
LETTER INDICATES UNIT SIZE.



THRU WALL AIR CONDITIONING UNIT.
LETTER INDICATES UNIT SIZE.



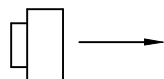
WINDOW TYPE AIR CONDITIONING
UNIT. LETTER INDICATES UNIT SIZE.



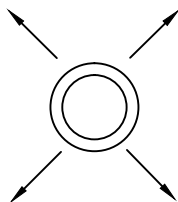
FLOOR MOUNTED HEAT PUMP. LETTER
INDICATES UNIT SIZE.



AIR CURTAIN



UNIT HEATER (HORIZONTAL)



UNIT HEATER (VERTICAL)



2'x2' RADIANT CEILING PANEL



2'x4' RADIANT CEILING PANEL



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DETAIL TITLE: TERMINAL UNIT SYMBOLS

SCALE :NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD230511-12.DWG

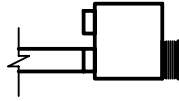
AIR TERMINAL SYMBOLS



TERMINAL UNIT WITH REHEAT COIL



DOUBLE DUCT MIXING BOX.



FAN POWERED VARIABLE VOLUME
TERMINAL UNIT WITH HEATING COIL.



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DETAIL TITLE / AIR TERMINAL SYMBOLS

SCALE :NONE

DATE ISSUED: DECEMBER 2008

CAD DETAIL NO.: SD230511-13.DWG

PIPING SYMBOLS

—————S-60—————	HIGH PRESSURE STEAM (60 PSIG AND ABOVE)
— — — —CR-60— — — —	HIGH PRESSURE STEAM CONDENSATE RETURN
—————S-30—————	MEDIUM PRESSURE STEAM (16 PSIG THRU 59 PSIG)
— — — —CR-30— — — —	MEDIUM PRESSURE STEAM CONDENSATE RETURN
—————S-15—————	LOW PRESSURE STEAM (15 PSIG AND BELOW)
— — — —CR-15— — — —	LOW PRESSURE STEAM CONDENSATE RETURN
—————PC—————	CONDENSATE PUMP DISCHARGE
—————HWS—————	HOT WATER HEATING SUPPLY
— — — —HWR— — — —	HOT WATER HEATING RETURN
—————GHS—————	GLYCOL-WATER HEATING SUPPLY
— — — —GHR— — — —	GLYCOL-WATER HEATING RETURN
—————SWS—————	SOLAR WATER SUPPLY
— — — —SWR— — — —	SOLAR WATER RETURN
—————RL—————	REFRIGERANT LIQUID
—————RS—————	REFRIGERANT SUCTION
—————RHG—————	REFRIGERANT HOT GAS
—————CWS—————	CONDENSER WATER SUPPLY (FROM TOWER)
— — — —CWR— — — —	CONDENSER WATER RETURN (TO TOWER)
—————CHS—————	CHILLED WATER SUPPLY
— — — —CHR— — — —	CHILLED WATER RETURN
—————GCS—————	CHILLED GLYCOL-WATER SUPPLY
— — — —GCR— — — —	CHILLED GLYCOL-WATER RETURN
—————MW—————	MAKE-UP WATER
—————D—————	DRAIN LINE
—————V—————	VENT LINE
—————GRS—————	GLYCOL-WATER RUN AROUND SUPPLY
— — — —GRR— — — —	GLYCOL-WATER RUN AROUND RETURN
—————X—————	EXISTING PIPE TO BE REMOVED



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DETAIL TITLE: PIPING SYMBOLS

SCALE :NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD230511-14.DWG

PIPING SYMBOLS

———— FWP —————	FEEDWATER PUMP DISCHARGE
———— FWPS —————	FEEDWATER PUMP SUCTION
———— CTPD —————	CONDENSATE TRANSFER PUMP DISCHARGE
———— CTPS —————	CONDENSATE TRANSFER PUMP SUCTION
———— VR —————	VACUUM CONDENSATE RETURN
———— TC —————	TUBE CLEANER WATER SUPPLY
———— BO —————	BOILER BLOWOFF
———— CBD —————	CONTINUOUS BLOWDOWN
———— BWS —————	BOILER WATER SAMPLE
———— FWS —————	FEEDWATER SAMPLE (FROM DEAERATOR)
———— CF —————	CHEMICAL FEED
———— OFL —————	OVERFLOW
———— A —————	COMPRESSED AIR
———— G —————	NATURAL GAS MAIN FUEL
———— G(I) —————	NATURAL GAS IGNITER FUEL
———— LPG(I) —————	LIQUEFIED PETROLEUM GAS IGNITER FUEL
———— FOS —————	FUEL OIL SUPPLY
———— FOR —————	FUEL OIL RETURN
———— CW —————	COLD WATER (CITY WATER)
———— SW —————	SOFTENED WATER
———— HW —————	HOT WATER
———— RH —————	ROLLER-TYPE HANGER
———— SH —————	VARIABLE SPRING-TYPE HANGER (TYPE 51)*
———— SCH —————	SPRING CUSHION-TYPE HANGER (TYPE 48 OR 49)*
———— —————	CLEVIS-TYPE HANGER
———— TH —————	TRAPEZE HANGER (PROVIDE U-BOLT PIPE ATTACHMENT TO TRAPEZE EXCEPT WHERE RH ARE INDICATED)
———— PS —————	FLOOR-SUPPORTED PIPE STAND
———— RC —————	RISER CLAMP (TYPE 42)*
———— WB —————	WALL BRACKET (TYPE 31, 32, 33)*
———— CSH —————	CONSTANT SUPPORT HANGER (TYPE 54, 55, 56)*
———— SS —————	SLIDING SUPPORTS (TYPE 35)*

* TYPE NUMBERS REFER TO MANUFACTURER'S STANDARDIZATION SOCIETY STANDARD PRACTICE SP-58



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DETAIL TITLE: PIPING SYMBOLS

SCALE :NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD230511-15.DWG

GENERAL PIPING SYMBOLS

	DIRECTION OF PIPE PITCH (DOWN)
	DIRECTION OF FLOW
	ANCHOR
	REDUCER OR INCREASER
	ECCENTRIC REDUCER
	TOP CONNECTION, 45° OR 90°
	BOTTOM CONNECTION, 45° OR 90°
	SIDE CONNECTION
	CAPPED OUTLET
	RISE OR DROP IN PIPE
	UNION
	PIPE UP
	PIPE DOWN
	INVERTED BUCKET TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
	FLOAT & THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
	THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
	THERMOMETER
	PRESSURE GAGE
	VENTURI FLOW METER
	REFRIGERANT SIGHT GLASS
	TEST PLUG (PRESSURE/TEMPERATURE)
	AUTOMATIC AIR VENT
	MANUAL AIR VENT
	QUICK-COUPLE HOSE CONNECTOR



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Veterans Affairs

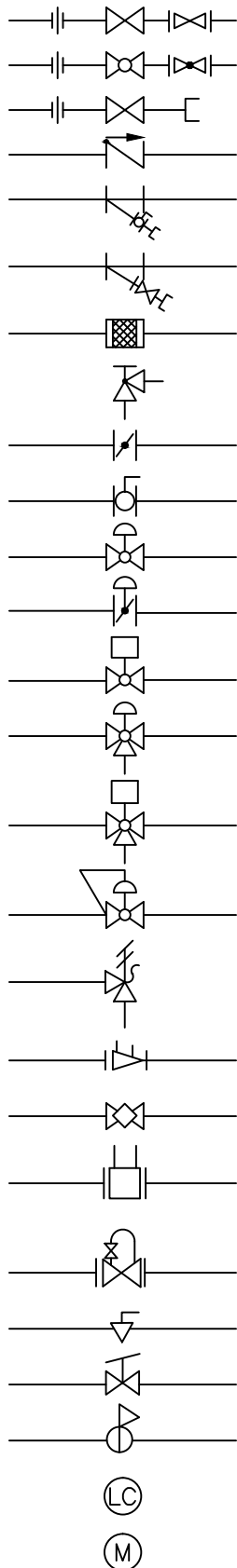
DETAIL TITLE: GENERAL SYMBOLS

SCALE :NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD230511-16.DWG

VALVE SYMBOLS



GATE VALVE – THREADED/FLANGED

GLOBE VALVE – THREADED/FLANGED

GATE VALVE WITH 3/4” HOSE ADAPTER

CHECK VALVE

WYE STRAINER (WITH BALL VALVE & HOSE CONNECTION)

WYE STRAINER WITH VALVED DRAIN AND QUICK–COUPLE
HOSE CONNECTOR

FLEXIBLE CONNECTION

ANGLE GLOBE VALVE

BUTTERFLY VALVE

BALL VALVE

MODULATING CONTROL VALVE

MODULATING CONTROL BUTTERFLY VALVE

TWO POSITION CONTROL VALVE

THREE–WAY MODULATING CONTROL VALVE

THREE–WAY TWO POSITION CONTROL VALVE

PRESSURE REGULATING VALVE

PRESSURE SAFETY VALVE

AUTOMATIC BALANCING CONTROL VALVE

WATER BALANCE DEVICE

CIRCUIT SETTER VALVE

GATE VALVE WITH GLOBE–VALVED BYPASS

PLUG VALVE

CONTROL VALVE (CV) – FLOAT–OPERATED

PRESSURE REDUCING VALVE (PRV)

WATER LEVEL CONTROLLER

FLOW METER



Department of
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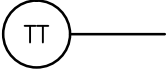





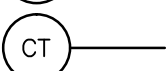
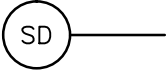










DETAIL TITLE: VALVE SYMBOLS

SCALE :NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD230511–17.DWG

CONTROLS SYMBOLS

	ROOM THERMOSTAT/TRANSMITTER – WALL MOUNT
	ROOM HUMIDISTAT (MOISTURE)/TRANSMITTER – WALL MOUNT
	TEMPERATURE TRANSMITTER
	TEMPERATURE TRANSMITTER, AVERAGING ELEMENT
	MOISTURE (HUMIDITY) TRANSMITTER
	PRESSURE TRANSMITTER
	STATIC PRESSURE SENSOR
	FLOW TRANSMITTER
	CURRENT TRANSMITTER
	CONDUCTIVITY TRANSMITTER
	SMOKE DETECTOR
	PRESSURE DIFFERENTIAL TRANSMITTER
	PRESSURE DIFFERENTIAL SWITCH
	HAND SWITCH (HAND-OFF-AUTO SWITCH)
	VALVE OR DAMPER POSITION CONTROLLER
	LOCAL RECORDING TIME CLOCK (RUNTIME)
	TEMPERATURE SWITCH, LOW (FREEZESTAT)
	TEMPERATURE SWITCH, HIGH (FREEZESTAT)
	LEVEL CONTROLLER
	LEVEL TRANSMITTER



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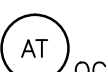











DETAIL TITLE / CONTROLS SYMBOLS

SCALE :NONE

DATE ISSUED: SEPTEMBER 2010

CAD DETAIL NO.: SD230511-18.DWG

CONTROLS SYMBOLS

	PRESSURE SWITCH HIGH
	PRESSURE SWITCH LOW
	ELECTRONIC TO PNEUMATIC TRANSDUCER
	CARBON DIOXIDE TRANSMITTER
	CARBON MONOXIDE TRANSMITTER
	OCCUPANCY SENSOR
	LOCAL TEMPERATURE CONTROL PANEL
	HVAC CONTROL PANEL
	VARIABLE SPEED MOTOR CONTROLLER
	INTEGRATE CONTROL POINT ON REMOTE GRAPHICS WORKSTATION AT ENERGY CONTROL CENTER
	TEMPERATURE CONTROLLER. SEE SEQUENCE OF OPERATION
	PRESSURE CONTROLLER. SEE SEQUENCE OF OPERATION
	SPEED CONTROLLER. SEE SEQUENCE OF OPERATION
	FLOW CONTROLLER. SEE SEQUENCE OF OPERATION
	FLOW SWITCH HIGH
	FLOW SWITCH LOW
	TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE



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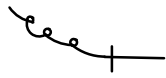
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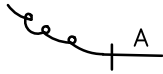
DATE ISSUED: SEPTEMBER 2010

CAD DETAIL NO.: SD230511-19.DWG

CONTROLS SYMBOLS



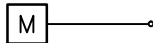
TEMPERATURE SENSING ELEMENT FOR
TRANSMITTING TEMPERATURE TO EMCS
(PROVIDE 12 INCHES [200mm] MINIMUM
LENGTH IN DUCT WHEN SPACE PERMITS.)



SENSOR WITH AVERAGING ELEMENT TO TRANSMIT
TEMPERATURE TO EMCS



MOTOR STARTER



ELECTRIC OPERATED CONTROL DAMPER/OR VALVE



Department of
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DETAIL TITLE / CONTROLS SYMBOLS

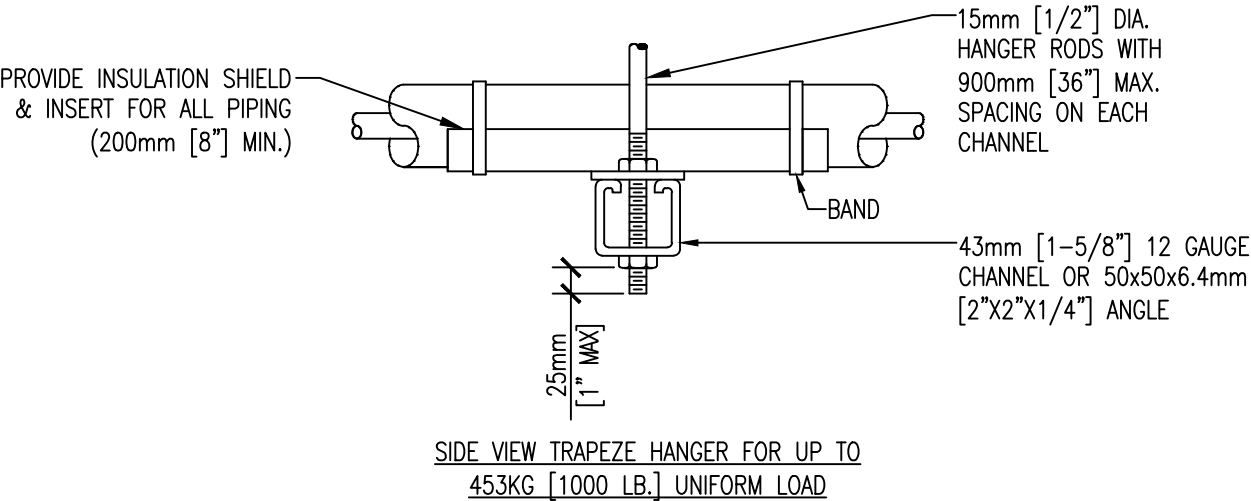
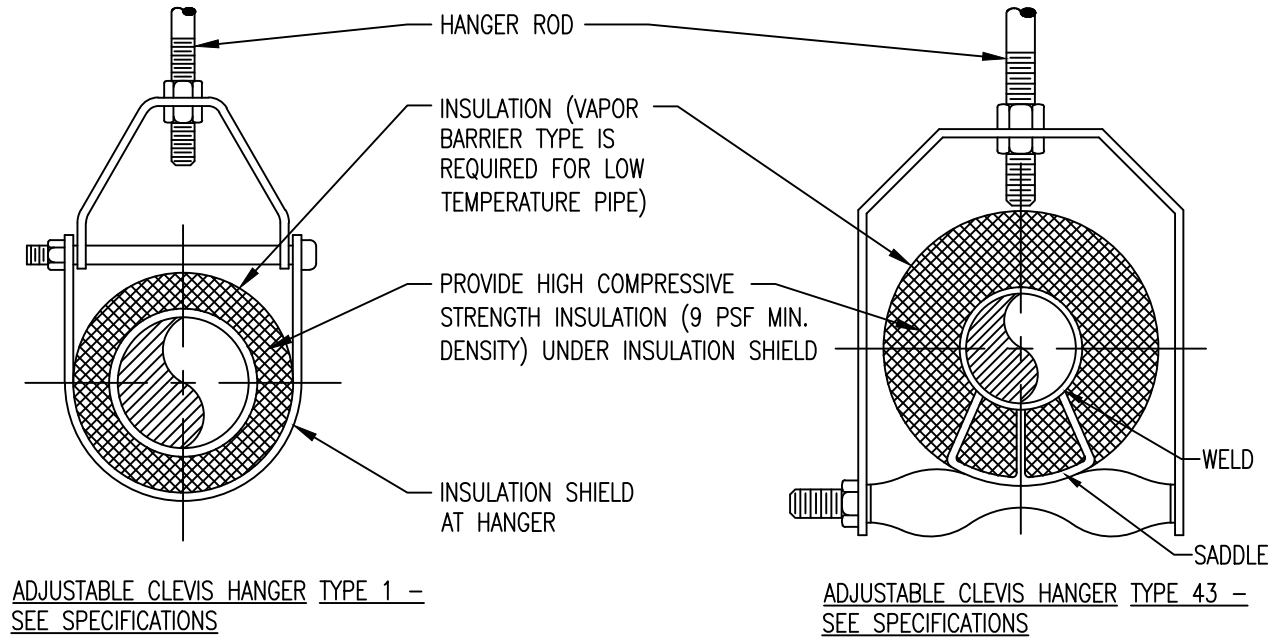
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DATE ISSUED: SEPTEMBER 2010

CAD DETAIL NO.: SD230511-20.DWG

DESIGNER'S NOTE:
SHOW ON THE DRAWINGS OTHER SPECIFIED AND SPECIAL PIPE
SUPPORTS WHERE REQUIRED.

NOTES:
SEE SPECIFER FOR DETAILED HANGER REQUIREMENTS



MAXIMUM PIPE/TUBING SUPPORT SPACING																			
NOM. SIZE	mm [IN]	THRU 20 [THRU ¾]	25 [1]	32 [1¼]	40 [1½]	50 [2]	65 [2½]	75 [3]	100 [4]	125 [5]	150 [6]	200 [8]	250 [10]	300 [12]	350 [14]	400 [16]	450 [18]	500 [20]	600 [24]
PIPE	mm [FT]	2100 [7]	2100 [7]	2100 [7]	2700 [9]	3000 [10]	3400 [11]	3700 [12]	4100 [14]	4900 [16]	5200 [17]	5800 [19]	6700 [22]	7000 [23]	7600 [25]	8200 [27]	8500 [28]	9100 [30]	9600 [32]
TUBING	mm [FT]	1500 [5]	1800 [6]	2100 [7]	2400 [8]	2400 [8]	2700 [9]	3000 [10]	3700 [12]	4000 [13]	4100 [14]	4900 [16]	–	–	–	–	–	–	–
NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE.																			

#

PIPE HANGERS

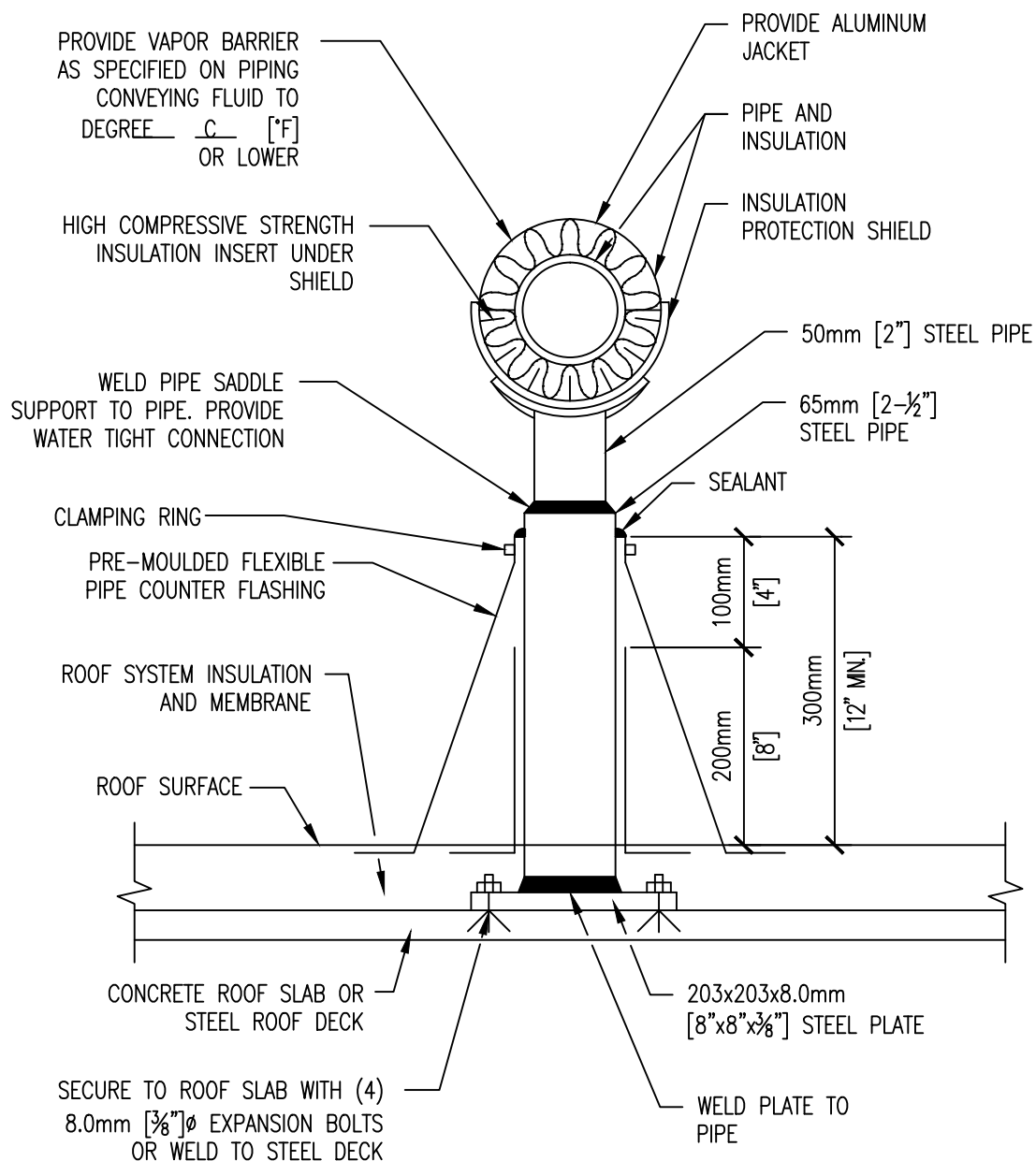
NTS

DETAIL TITLE: PIPE HANGERS

SCALE : NONE

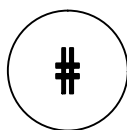
DATE ISSUED :11/01/2017

CADD DETAIL NO. SD230511-21.DWG



NOTES:

PROVIDE RESTRAINING CLAMPS 2438mm [8'-0"] O.C.



DETAIL FOR SUPPORTING PIPE ON ROOF

NTS



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Veterans Affairs

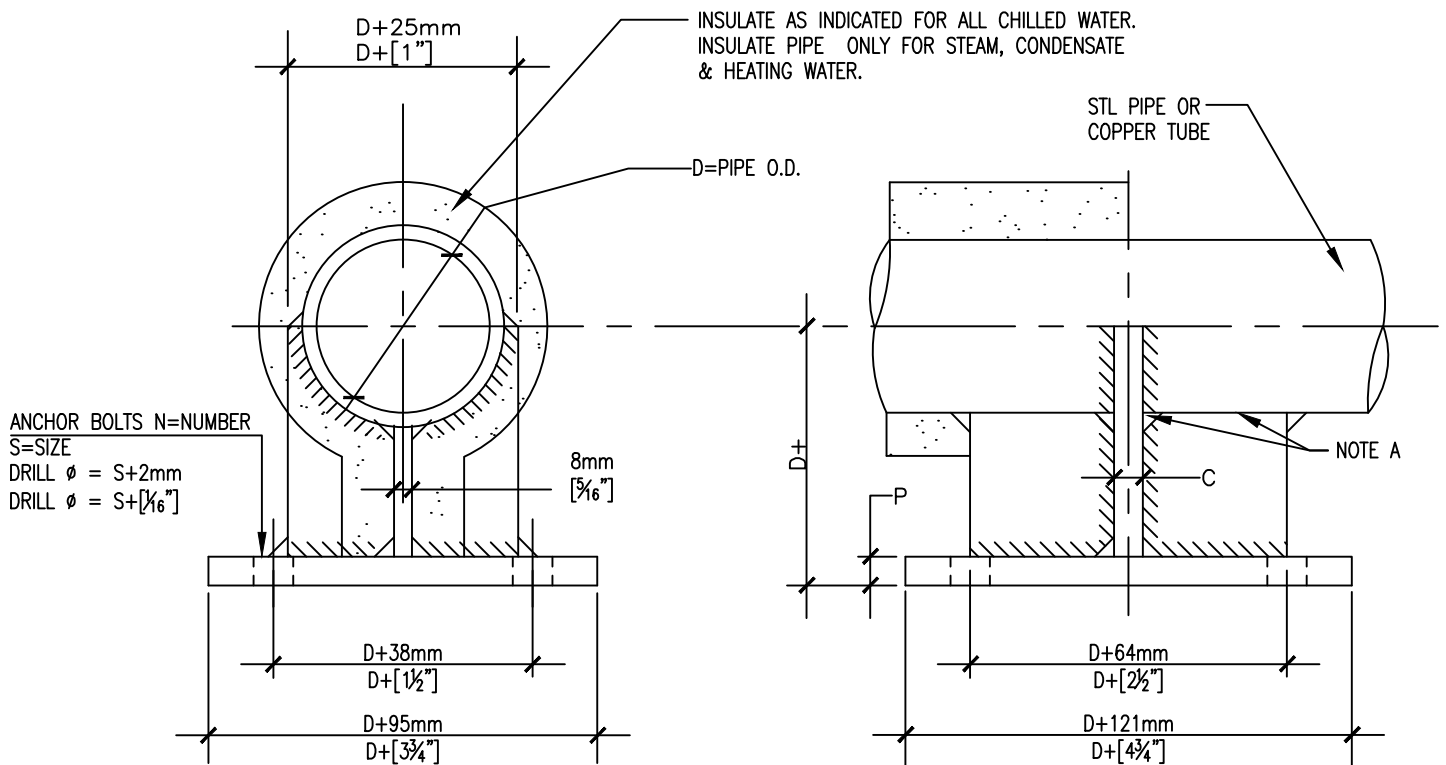
DETAIL TITLE: DETAIL FOR SUPPORTING PIPE ON ROOF

SCALE :NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD230511-22.DWG

PIPE ANCHOR SCHEDULE										
D		P		C		N		S		BOLT PATTERN
mm	in	mm	in	mm	in	mm	in	mm	in	
102	4	16	$\frac{5}{8}$	19	$\frac{3}{4}$	102	4	19	$\frac{3}{4}$	
76	3	13	$\frac{1}{2}$	13	$\frac{1}{2}$	102	4	16	$\frac{5}{8}$	
64	$2\frac{1}{2}$	10	$\frac{3}{8}$	10	$\frac{3}{8}$	102	4	16	$\frac{5}{8}$	
51	2	10	$\frac{3}{8}$	10	$\frac{3}{8}$	102	4	16	$\frac{5}{8}$	
38	$1\frac{1}{2}$	10	$\frac{3}{8}$	6	$\frac{1}{4}$	102	4	13	$\frac{1}{2}$	



NOTE:
WHERE USED FOR COPPER TUBE OR PIPE, BRAZE TO FABRICATED STEEL ANCHOR

SMALL PIPE ANCHOR 38-102mm $[1\frac{1}{2}"-4"]$ NTS







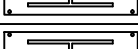

Department of
Veterans Affairs

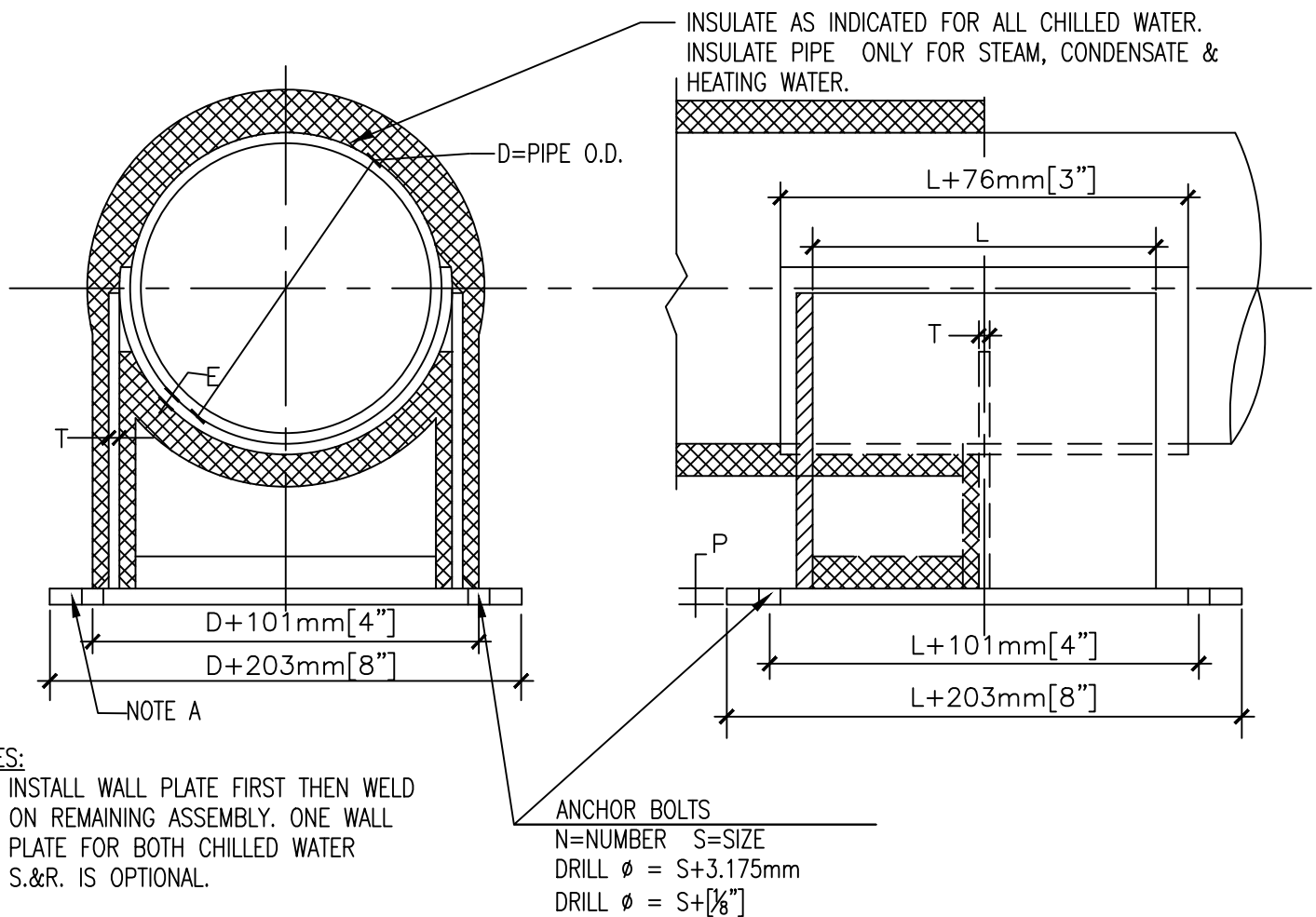
DETAIL TITLE: SMALL PIPE ANCHOR 38-104mm $[1-1\frac{1}{2}"-4"]$

SCALE :NONE

DATE ISSUED: 11/01/2017

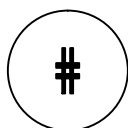
CAD DETAIL NO.: SD230511-23.DWG

PIPE ANCHOR SCHEDULE															
D		L		P		T		E		N		S			
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in		
152	6	216	8½	19	¾	10	⅜	6	¼	102	4	22	⅞		
203	8	254	10	19	¾	13	½	6	¼	102	4	22	⅞		
254	10	305	12	19	¾	13	½	6	¼	102	4	22	⅞		
305	12	356	14	19	¾	13	½	6	¼	102	4	22	⅞		
356	14	406	16	19	¾	13	½	13	½	102	4	22	⅞		
406	16	457	18	19	¾	13	½	13	½	102	4	22	⅞		
457	18	508	20	25	1	13	⅝	13	½	152	6	25	1		



NOTES:

- A. INSTALL WALL PLATE FIRST THEN WELD ON REMAINING ASSEMBLY. ONE WALL PLATE FOR BOTH CHILLED WATER S.&R. IS OPTIONAL.



NTS

LARGE PIPE ANCHOR 152-457mm [6" -18"]



Department of
Veterans Affairs

DETAIL TITLE: LARGE PIPE ANCHOR 152-457mm [6"-18"]

SCALE :NONE

DATE ISSUED: 11/01/2017

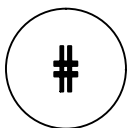
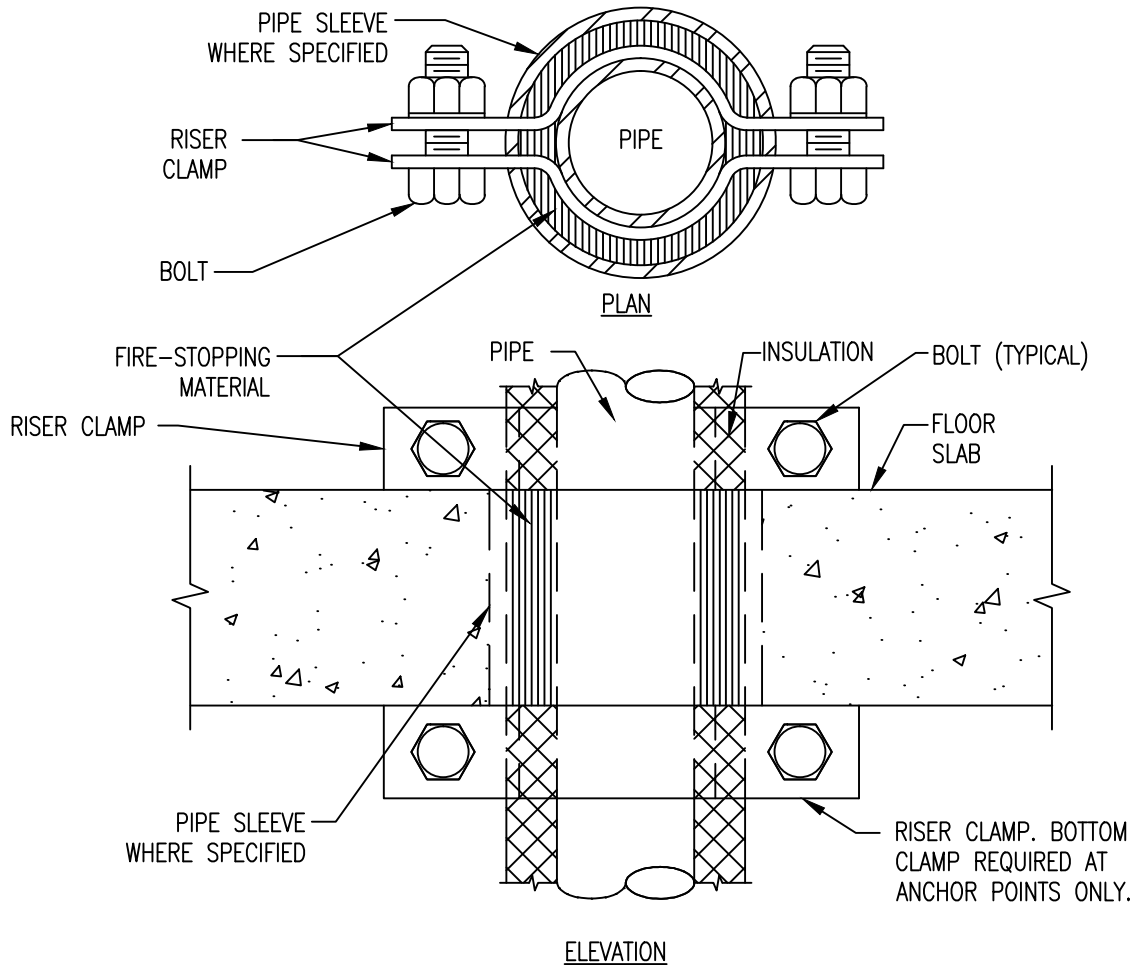
CAD DETAIL NO.: SD230511-24.DWG

NOTES:

1. PROVIDE ANCHORS ONLY WHERE SHOWN ON DRAWINGS.
2. EXTEND SLEEVE ABOVE FLOOR WHERE SPECIFIED.

DESIGNER'S NOTE:

SHOW REQUIRED ANCHORS ON PLAN, SECTIONS OR DIAGRAMS.



SUPPORT/ANCHOR FOR PIPE RISERS

NTS



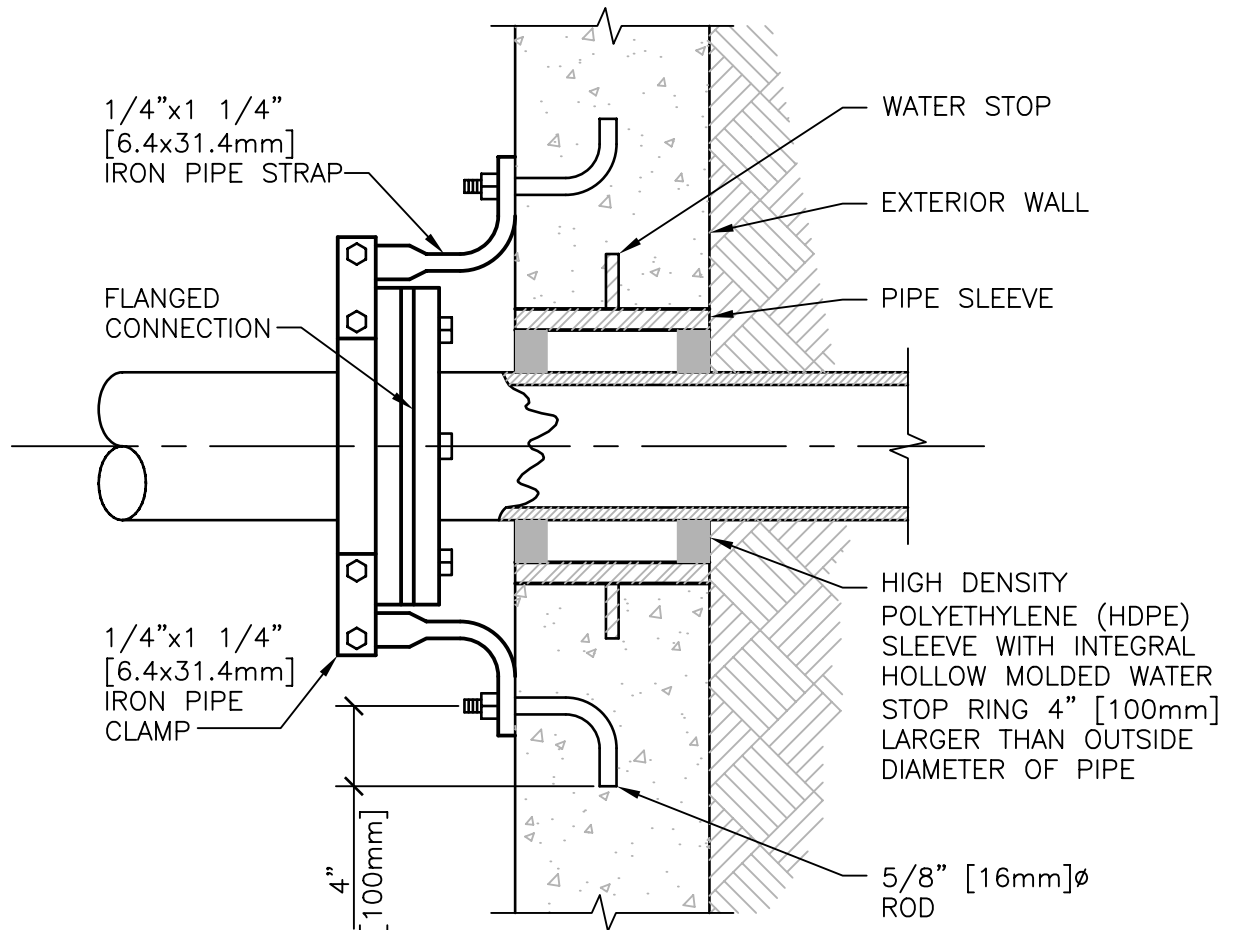
Department of
Veterans Affairs

DETAIL TITLE: SUPPORT/ANCHOR FOR PIPE RISERS

SCALE :NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD230511-25.DWG



SUPPORT ANCHOR (CONDENSER WATER OR CHILLED WATER)

#

NTS



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Veterans Affairs

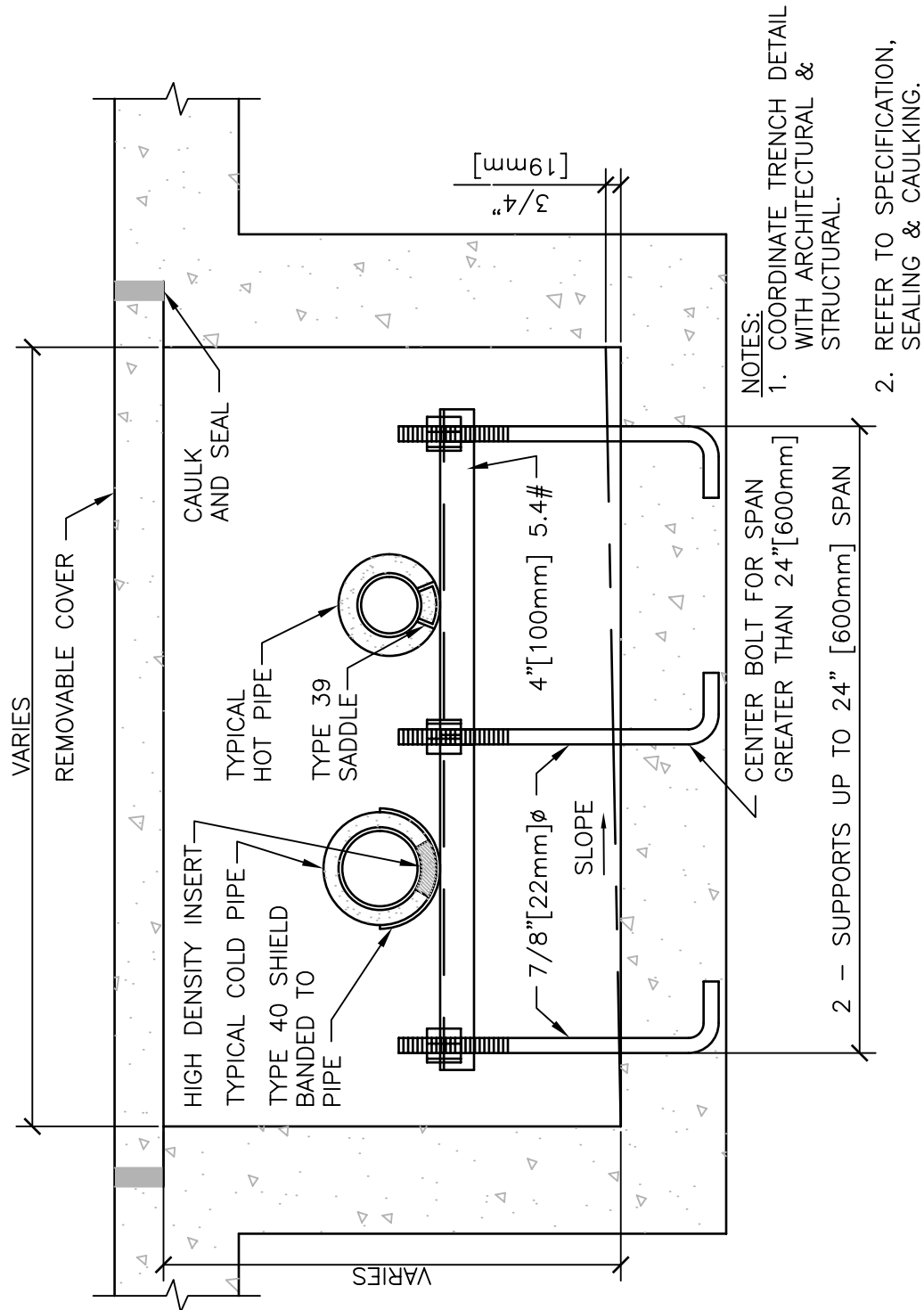
DETAIL TITLE / SUPPORT ANCHOR (CONDENSER WATER
OR CHILLED WATER)

SCALE :NONE

DATE ISSUED: DECEMBER 2008

CAD DETAIL NO.:

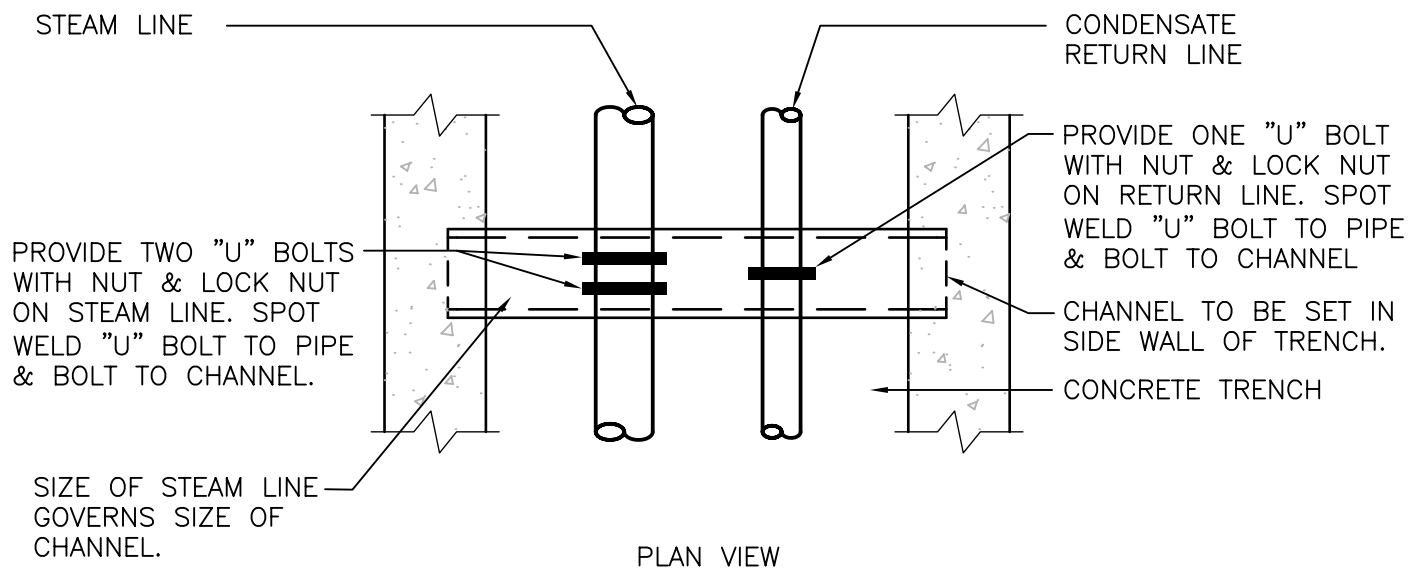
SD230511-26.DWG



PIPE TRENCH IN BUILDING

NTS

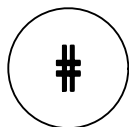
DESIGNER'S NOTE:
COORDINATE TRENCH DETAIL WITH ARCHITECTURAL & STRUCTURAL.



SCHEDULE		
SIZE OF PIPE INCH [mm]	SIZE OF "U" BOLT INCH [mm]	SIZE OF CHANNEL INCH [mm]
1 – 2 [25 – 50]	3/8 [10] DIA.	6 x 10.5 [150x265]
2-1/2 – 5 [65 – 125]	1/2 [15] DIA.	8 x 13.75 [200x345]
6 – 8 [150 – 200]	3/4 [20] DIA.	10 x 20 [250x500]

SCHEDULE FOR 8 FT. [2.4m] SPAN OR LESS.

ANCHOR INSTALLATION STEAM/CONDENSATE PIPING IN TRENCH



NTS



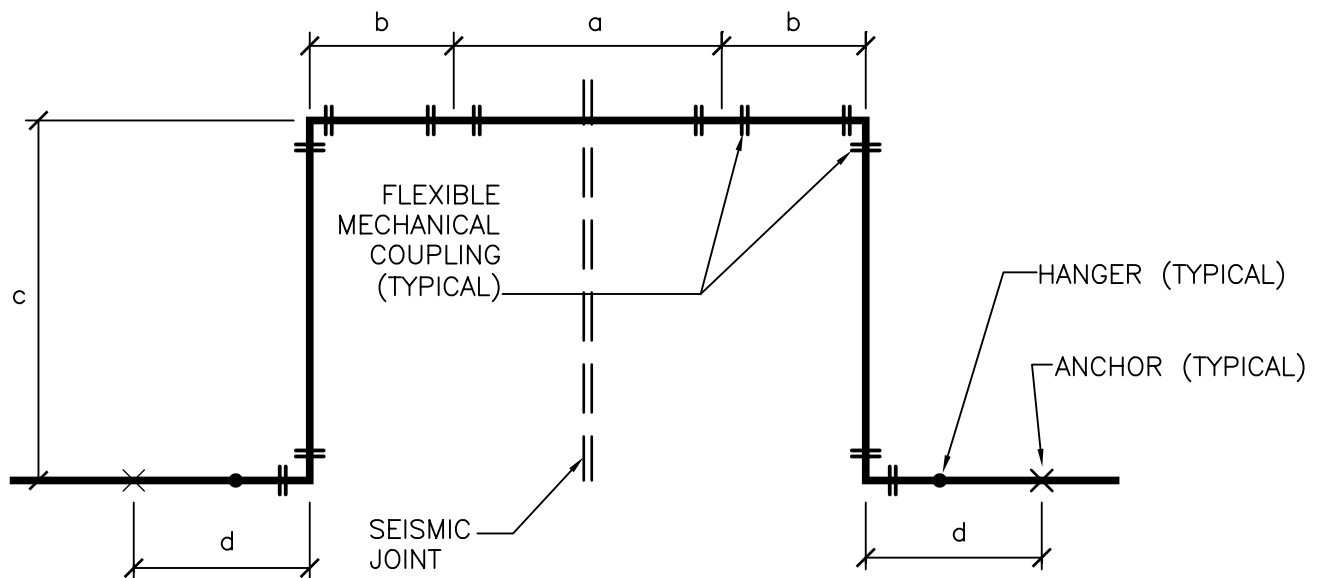
Department of
Veterans Affairs

DETAIL TITLE / ANCHOR INSTALLATION –
STEAM/CONDENSATE PIPING IN TRENCH

SCALE :NONE

DATE ISSUED :DECEMBER 2008

CADD DETAIL NO. : SD230511-28.DWG



DETAIL "A"
(STEEL PIPE FOR WATER/GLYCOL)

NOTE:

1. SEISMIC SEPARATION ASSEMBLY DETAIL SHOWN IN NFPA 13 (SPRINKLER PIPING), UTILIZING FLEXIBLE MECHANICAL COUPLINGS, MAY BE USED IN LIEU OF PIPING DETAIL SHOWN ABOVE.

SCHEDULE FOR PIPING CROSSING A SEISMIC JOINT

LOCATION	PIPE	DETAIL	DIMENSIONS INCHES [mm]					
			a	b	c	d	e	f
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—

PIPING CROSSING A SEISMIC JOINT DETAIL "A"

#

NTS

DESIGNER'S NOTE:

1. THIS CONFIGURATION SHOWN IN THIS DETAIL IS A SUGGESTED ARRANGEMENT, NOT MANDATED FOR USE IN AS IS CONDITION. THE REGISTERED PROFESSIONAL STRUCTURAL ENGINEER IN CHARGE OF THE PROJECT SHALL PROVIDE SEISMIC CALCULATIONS AND MODIFY THE CONFIGURATION AS NEEDED TO MAKE THE ARRANGEMENT PROJECT-SPECIFIC. THE MECHANICAL DESIGNER SHALL COMPLETE THE BLANK SCHEDULES BY INSERTING THE DISTANCES, TO BE CALCULATED AND FURNISHED BY PROVIDED BY THE REGISTERED PROFESSIONAL STRUCTURAL ENGINEER.



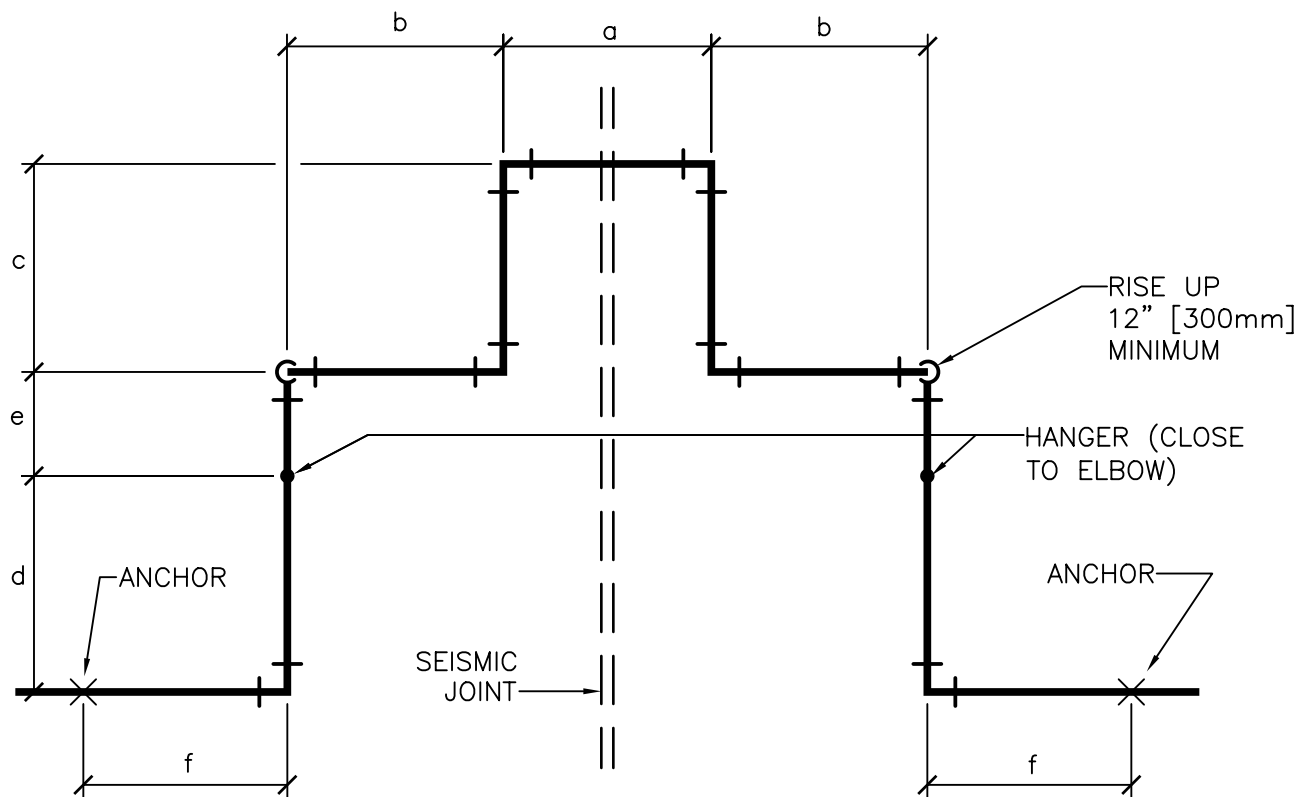
Department of
Veterans Affairs

DETAIL TITLE / PIPING CROSSING A SEISMIC JOINT
DETAIL "A"

SCALE :NONE

DATE ISSUED :DECEMBER 2008

CADD DETAIL NO. : SD230511-29.DWG



DETAIL "B"

(PLASTIC PIPE FOR PRESSURIZED SYSTEMS)

SCHEDULE FOR PIPING CROSSING A SEISMIC JOINT

LOCATION	PIPE	DETAIL	DIMENSIONS INCHES [mm]			
			a	b	c	d
—	—	—	—	—	—	—
—	—	—	—	—	—	—

PIPING CROSSING A SEISMIC JOINT DETAIL "B"

#

NTS

DESIGNER'S NOTE:

1. THIS CONFIGURATION SHOWN IN THIS DETAIL IS A SUGGESTED ARRANGEMENT, NOT MANDATED FOR USE IN AS IS CONDITION. THE REGISTERED PROFESSIONAL STRUCTURAL ENGINEER IN CHARGE OF THE PROJECT SHALL PROVIDE SEISMIC CALCULATIONS AND MODIFY THE CONFIGURATION AS NEEDED TO MAKE THE ARRANGEMENT PROJECT-SPECIFIC. THE MECHANICAL DESIGNER SHALL COMPLETE THE BLANK SCHEDULES BY INSERTING THE DISTANCES, TO BE CALCULATED AND FURNISHED BY PROVIDED BY THE REGISTERED PROFESSIONAL STRUCTURAL ENGINEER.



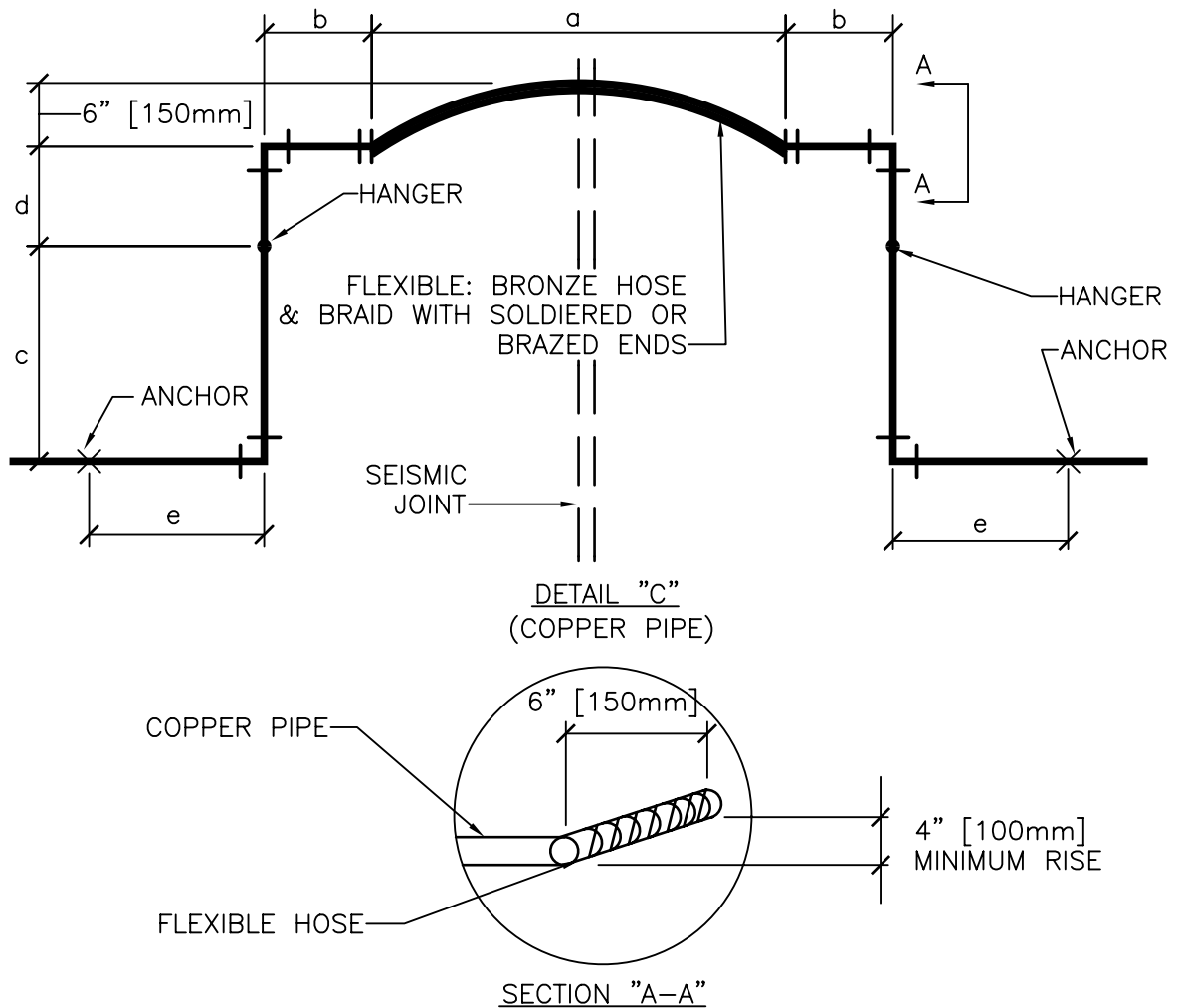
Department of
Veterans Affairs

DETAIL TITLE / PIPING CROSSING A SEISMIC JOINT
DETAIL "B"

SCALE :NONE

DATE ISSUED :DECEMBER 2008

CADD DETAIL NO. : SD230511-30.DWG



SCHEDULE FOR PIPING CROSSING A SEISMIC JOINT

LOCATION	PIPE	DETAIL	DIMENSIONS INCHES [mm]				
			a	b	c	d	e
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—

#

PIPING CROSSING A SEISMIC JOINT DETAIL "C"

NTS

DESIGNER'S NOTE:

1. THIS CONFIGURATION SHOWN IN THIS DETAIL IS A SUGGESTED ARRANGEMENT, NOT MANDATED FOR USE IN AS IS CONDITION. THE REGISTERED PROFESSIONAL STRUCTURAL ENGINEER IN CHARGE OF THE PROJECT SHALL PROVIDE SEISMIC CALCULATIONS AND MODIFY THE CONFIGURATION AS NEEDED TO MAKE THE ARRANGEMENT PROJECT-SPECIFIC. THE MECHANICAL DESIGNER SHALL COMPLETE THE BLANK SCHEDULES BY INSERTING THE DISTANCES, TO BE CALCULATED AND FURNISHED BY PROVIDED BY THE REGISTERED PROFESSIONAL STRUCTURAL ENGINEER.



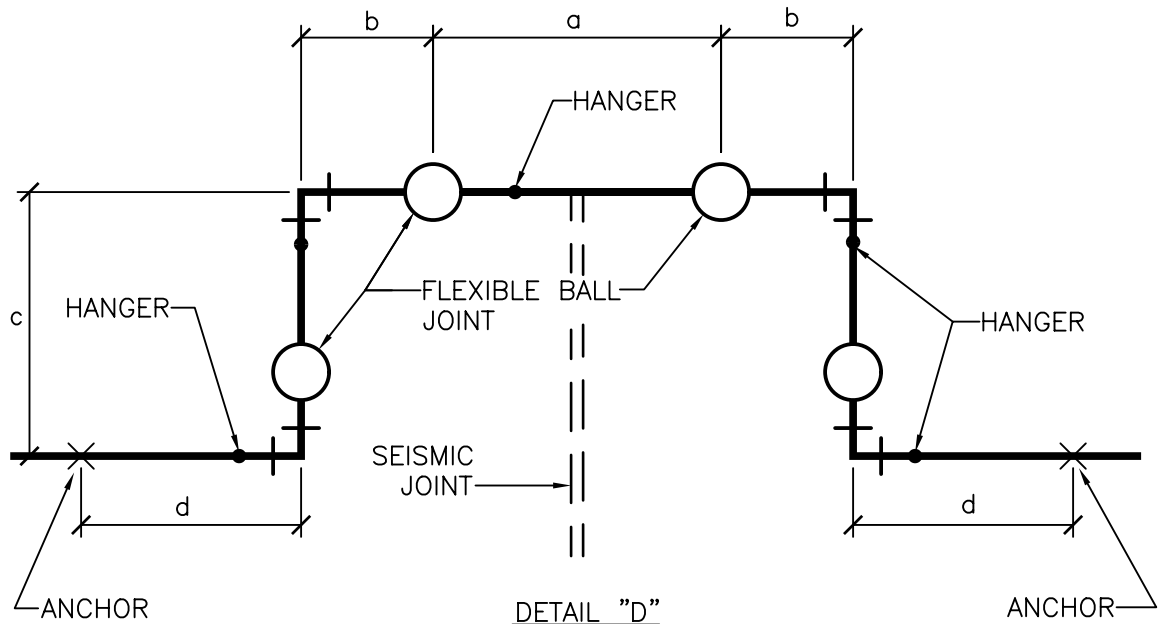
Department of
Veterans Affairs

DETAIL TITLE / PIPING CROSSING A SEISMIC JOINT
DETAIL "C"

SCALE : NONE

DATE ISSUED : DECEMBER 2008

CADD DETAIL NO. : SD230511-31.DWG



(STEEL PIPE FOR STEAM OR WATER)

SCHEDULE FOR PIPING CROSSING A SEISMIC JOINT

LOCATION	PIPE	DETAIL	DIMENSIONS INCHES [mm]			
			a	b	c	d
—	—	—	—	—	—	—
—	—	—	—	—	—	—

PIPING CROSSING A SEISMIC JOINT DETAIL "D"

#

NTS

DESIGNER'S NOTE:

1. THIS CONFIGURATION SHOWN IN THIS DETAIL IS A SUGGESTED ARRANGEMENT, NOT MANDATED FOR USE IN AS IS CONDITION. THE REGISTERED PROFESSIONAL STRUCTURAL ENGINEER IN CHARGE OF THE PROJECT SHALL PROVIDE SEISMIC CALCULATIONS AND MODIFY THE CONFIGURATION AS NEEDED TO MAKE THE ARRANGEMENT PROJECT-SPECIFIC. THE MECHANICAL DESIGNER SHALL COMPLETE THE BLANK SCHEDULES BY INSERTING THE DISTANCES, TO BE CALCULATED AND FURNISHED BY PROVIDED BY THE REGISTERED PROFESSIONAL STRUCTURAL ENGINEER.



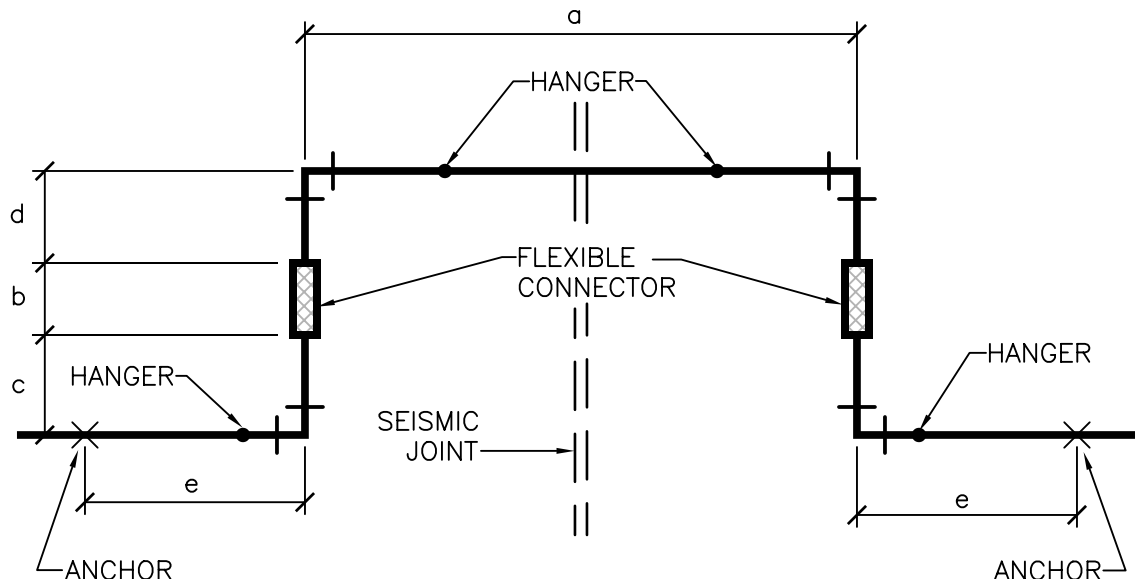
Department of
Veterans Affairs

DETAIL TITLE / PIPING CROSSING A SEISMIC JOINT
DETAIL "D"

SCALE :NONE

DATE ISSUED :DECEMBER 2008

CADD DETAIL NO. : SD230511-32.DWG



DETAIL "E"
(STEEL PIPE FOR WATER)

SCHEDULE FOR PIPING CROSSING A SEISMIC JOINT								
LOCATION	PIPE	DETAIL	DIMENSIONS INCHES [mm]					
			a	b	c	d	e	f
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—

PIPING CROSSING A SEISMIC JOINT DETAIL "E"

#

NTS

DESIGNER'S NOTE:

1. THIS CONFIGURATION SHOWN IN THIS DETAIL IS A SUGGESTED ARRANGEMENT, NOT MANDATED FOR USE IN AS IS CONDITION. THE REGISTERED PROFESSIONAL STRUCTURAL ENGINEER IN CHARGE OF THE PROJECT SHALL PROVIDE SEISMIC CALCULATIONS AND MODIFY THE CONFIGURATION AS NEEDED TO MAKE THE ARRANGEMENT PROJECT-SPECIFIC. THE MECHANICAL DESIGNER SHALL COMPLETE THE BLANK SCHEDULES BY INSERTING THE DISTANCES, TO BE CALCULATED AND FURNISHED BY PROVIDED BY THE REGISTERED PROFESSIONAL STRUCTURAL ENGINEER.



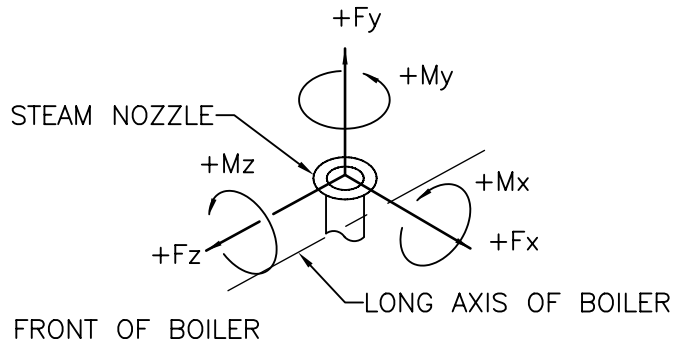
Department of
Veterans Affairs

DETAIL TITLE / PIPING CROSSING A SEISMIC JOINT
DETAIL "E"

SCALE :NONE

DATE ISSUED :DECEMBER 2008

CADD DETAIL NO. : SD230511-33.DWG



ISOMETRIC VIEW

TABLE OF FORCES AND MOMENTS DUE TO THERMAL EXPANSION AND WEIGHT OF STEAM LEAD AND VALVES

BOILER NO.	Fx LB [Kg]	Fy LB [Kg]	Fz LB [Kg]	Mx FT LB [J]	My FT LB [J]	Mz FT LB [J]
-----	--[--]	--[--]	--[--]	--[--]	--[--]	--[--]

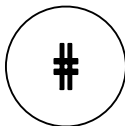
TABLE OF FORCES AND MOMENTS DUE TO SEISMIC ACTION OF THE STEAM LEAD AND VALVES

BOILER NO.	Fx LB [Kg]	Fy LB [Kg]	Fz LB [Kg]	Mx FT LB [J]	My FT LB [J]	Mz FT LB [J]
-----	--[--]	--[--]	--[--]	--[--]	--[--]	--[--]

NOTES:

1. BOILERS SHALL BE DESIGNED TO WITHSTAND THE FORCES AND MOMENTS SHOWN ABOVE.
2. ADD ANY Fy FORCE (500 LB [230 Kg] MINIMUM) AS AN ESTIMATION OF THE WEIGHT EFFECT OF THE STEAM LEAD AND VALVE ON THE BOILER. BOILER AND PIPE HANGER SUPPLIERS SHALL COORDINATE TO DETERMINE THE EXACT Fy FORCE WHICH WILL BE IMPOSED ON THE STEAM NOZZLES.
3. DELETE THE SEISMIC TABLE ON NON-SEISMIC AREAS.

FORCES AND MOMENTS ON BOILER STEAM NOZZLES



NTS



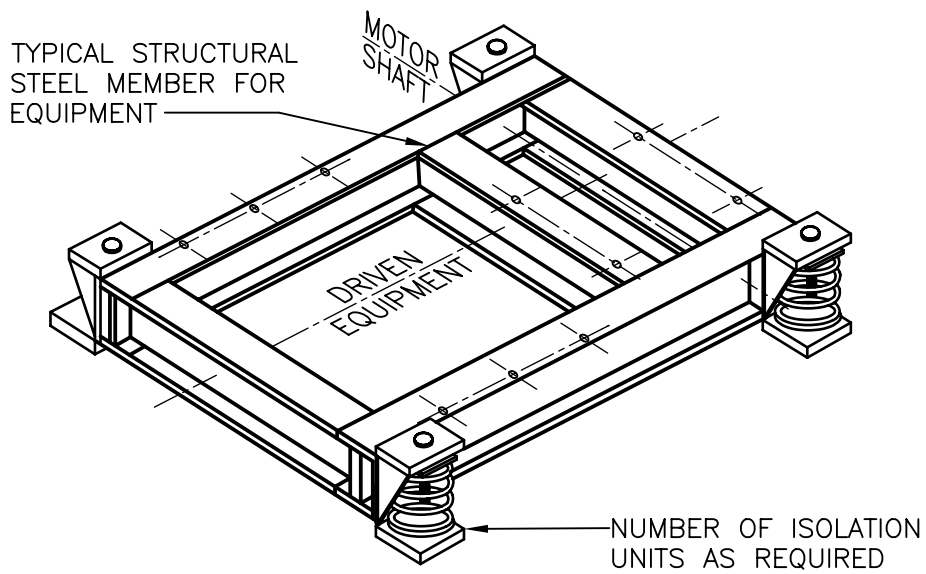
Department of
Veterans Affairs

DETAIL TITLE / FORCES AND MOMENTS ON
BOILER STEAM NOZZLES

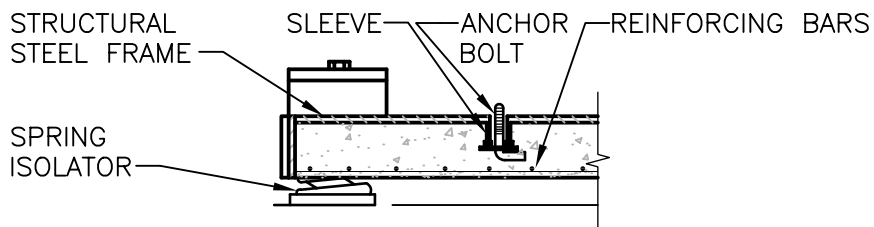
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DATE ISSUED :FEBRUARY 2008

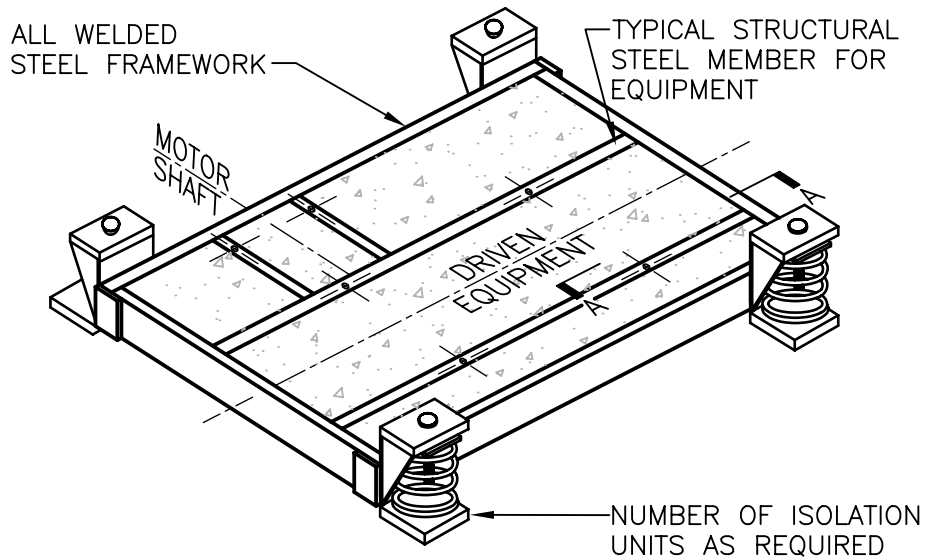
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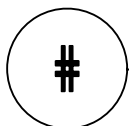
TYPE "B"
WELDED STEEL BASE



SECTION A-A



TYPE "1"
CONCRETE INERTIA BASE



VIBRATION ISOLATION BASES

NTS



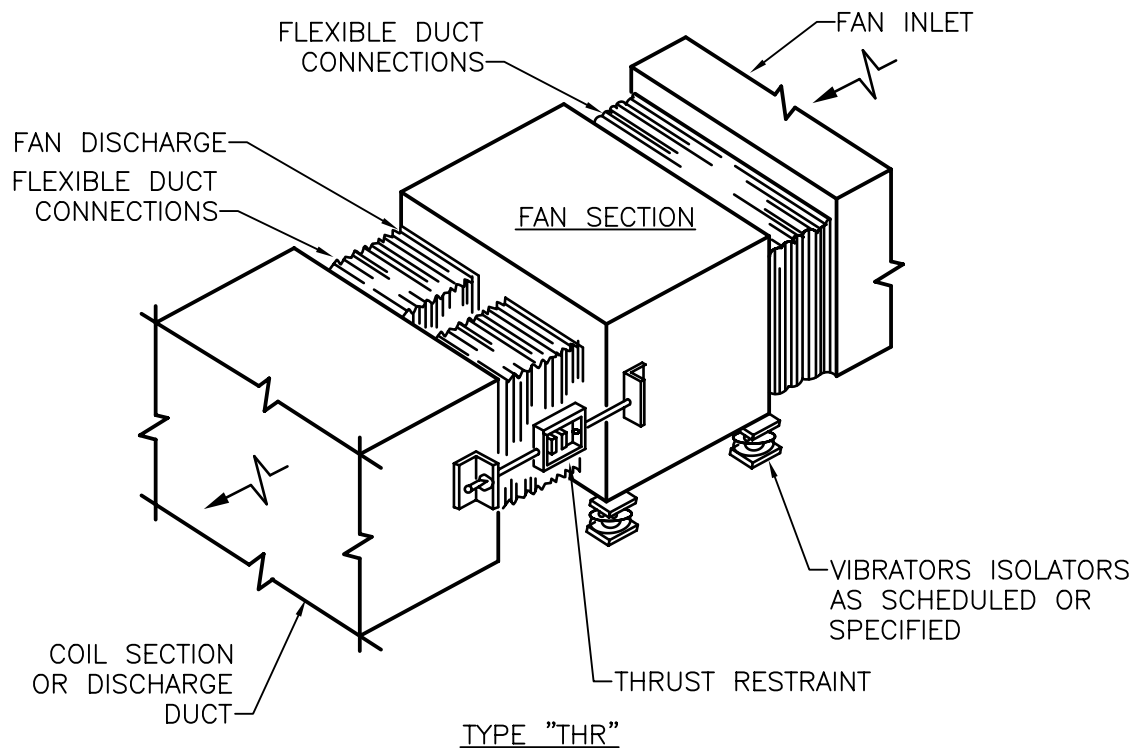
Department of
Veterans Affairs

DETAIL TITLE / VIBRATION ISOLATION BASES

SCALE :NONE

DATE ISSUED : DECEMBER 2008

CADD DETAIL NO. : SD230541-01.DWG



NOTES:

1. ATTACH THRUST RESTRAINTS SYMMETRICALLY ON BOTH SIDES OF THE FAN DISCHARGE.
2. ADJUST RESTRAINT TO ALLOW 1/4" [6 mm] MOVEMENT OF FAN AT START AND STOP.

#

THRUST RESTRAINT FOR FANS

NTS

DESIGNER'S NOTE:

ON THE VIBRATION ISOLATION SCHEDULE OR UNDER THE TITLE OF THIS DETAIL DESIGNATE FANS REQUIRING RESTRAINT. THIS IS USUALLY SEPARATELY MOUNTED FAN SECTIONS FOR STATIC PRESSURE OVER 4" [100 mm] AND POSSIBLY FOR AXIAL FLOW FANS FOR STATIC PRESSURE OVER 4" [100 mm].



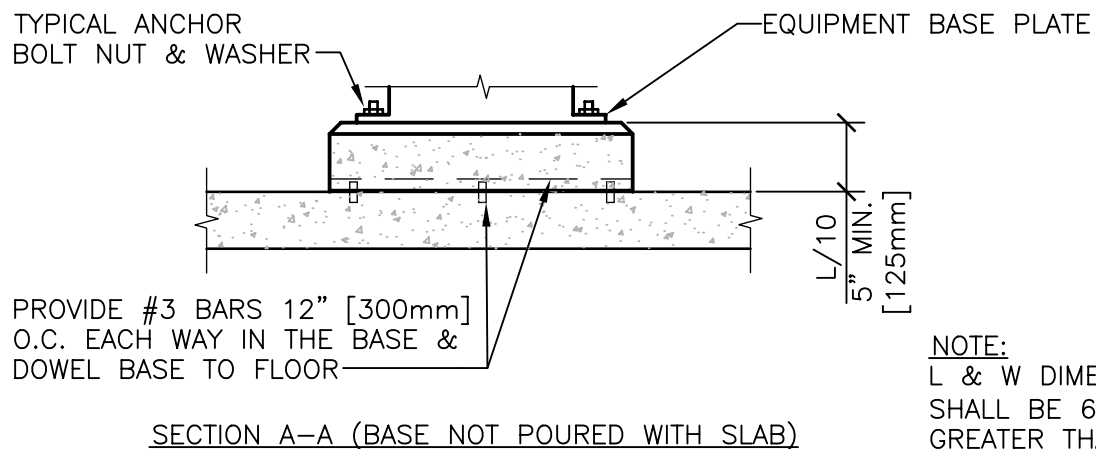
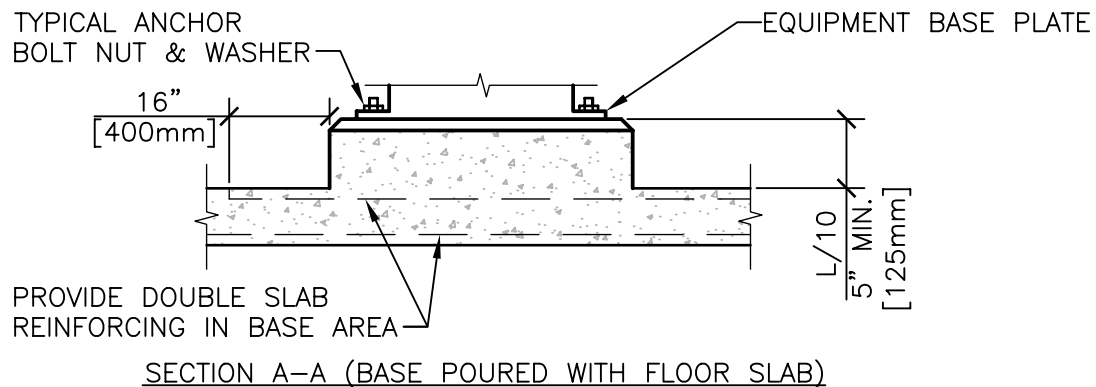
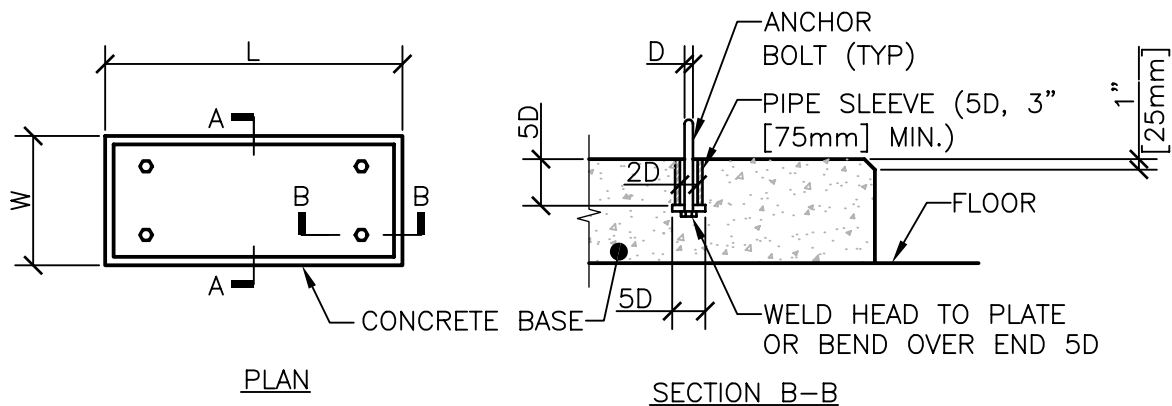
Department of
Veterans Affairs

DETAIL TITLE / THRUST RESTRAINT FOR FANS

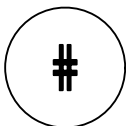
SCALE :NONE

DATE ISSUED : DECEMBER 2008

CADD DETAIL NO. : SD230541-02.DWG



NOTE:
L & W DIMENSIONS
SHALL BE 6" [150mm]
GREATER THAN THE
EQUIPMENT BASE PLATE.



CONCRETE EQUIPMENT BASES

NTS

DESIGNER'S NOTE:

THIS DETAIL IS PRIMARILY FOR PUMPS WITHOUT ISOLATORS. COORDINATE DETAIL WITH ARCHITECTURAL AND STRUCTURAL.



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DETAIL TITLE / CONCRETE EQUIPMENT BASES

SCALE : NONE

DATE ISSUED : DECEMBER 2008

CADD DETAIL NO. : SD230541-03.DWG



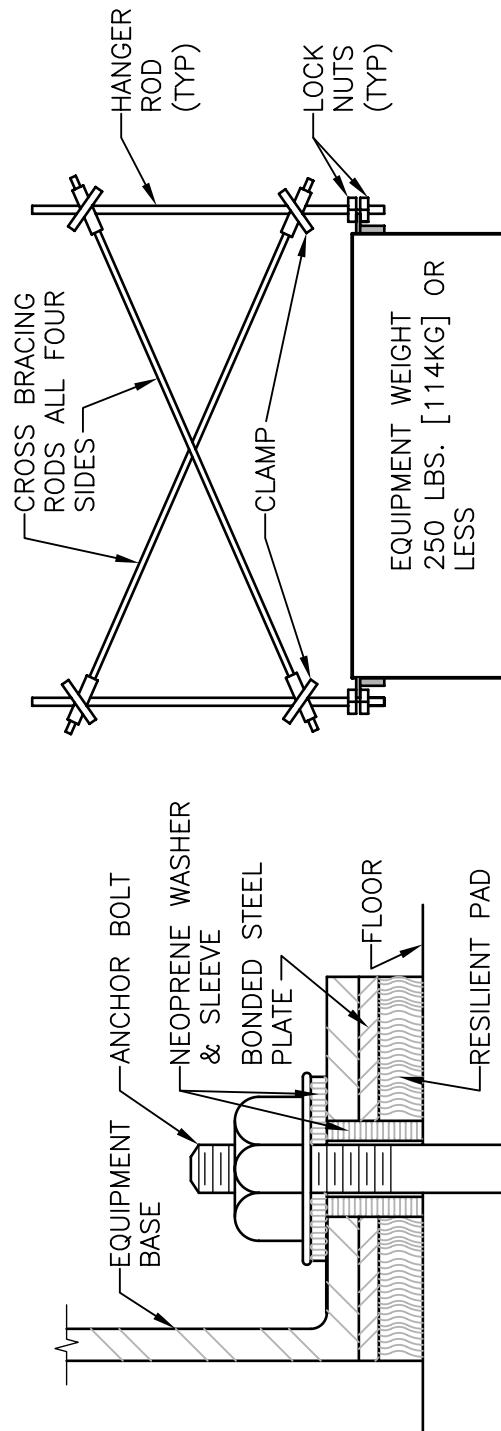
Department of
Veterans Affairs

DETAIL TITLE / SEISMIC BRACING FOR LIGHT SUSPENDED EQUIPMENT/
EQUIPMENT RESTRAINED BY RESILIENT PADS (TYPE DS)

SCALE :NONE

DATE ISSUED : DECEMBER 2008

CADD DETAIL NO. : SD230541-04.DWG



SEISMIC BRACING FOR LIGHT
SUSPENDED EQUIPMENT

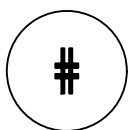
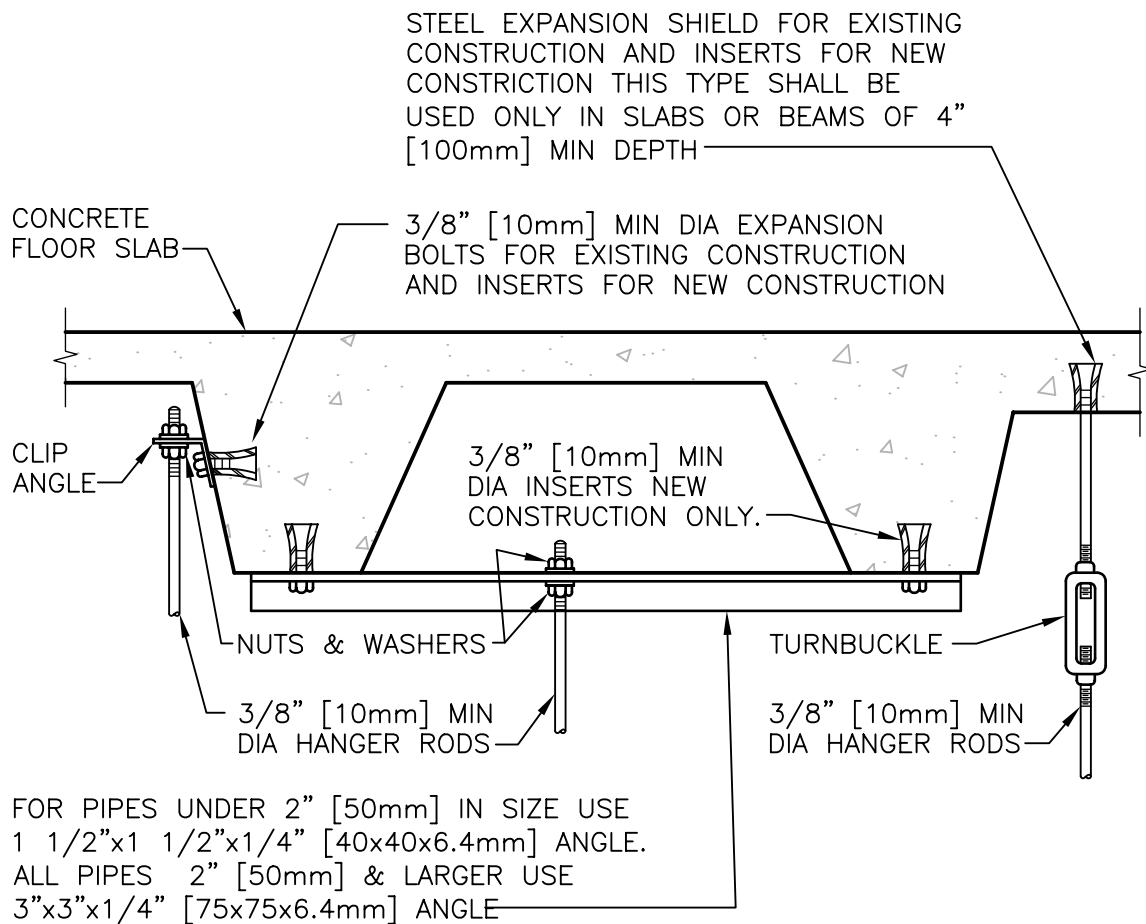
FLOOR MOUNT EQUIPMENT
RESTRAINED BY RESILIENT PADS
(TYPE DS)

NOTE:
NOT REQUIRED FOR
AIR TERMINAL UNITS.

SEISMIC BRACING FOR EQUIPMENT

NTS

#



SECURING HANGER RODS IN CONCRETE

NTS



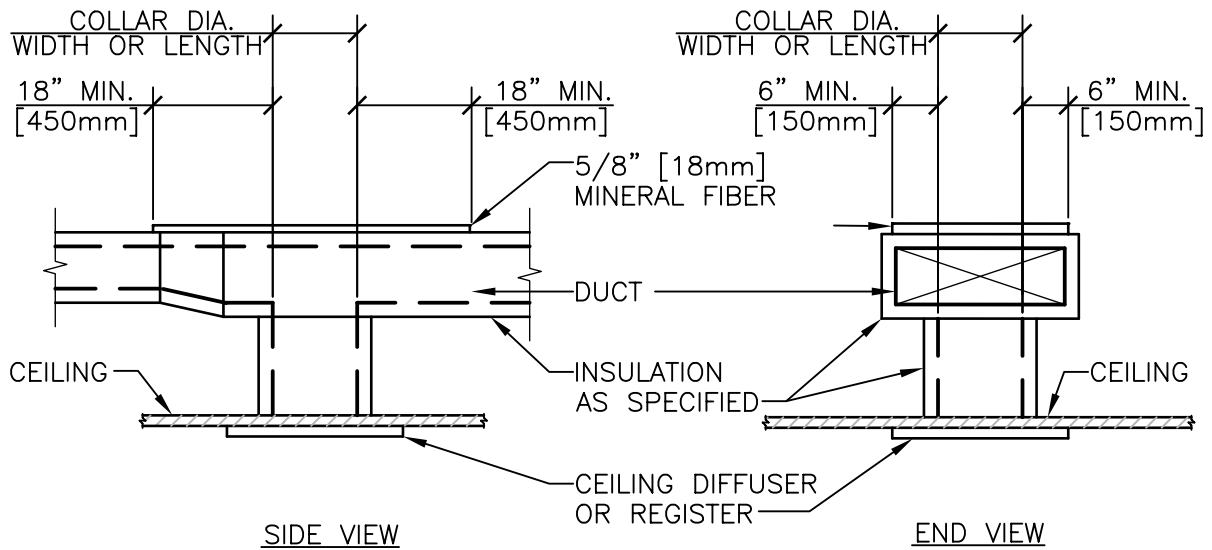
Department of
Veterans Affairs

DETAIL TITLE / SECURING HANGER RODS IN CONCRETE

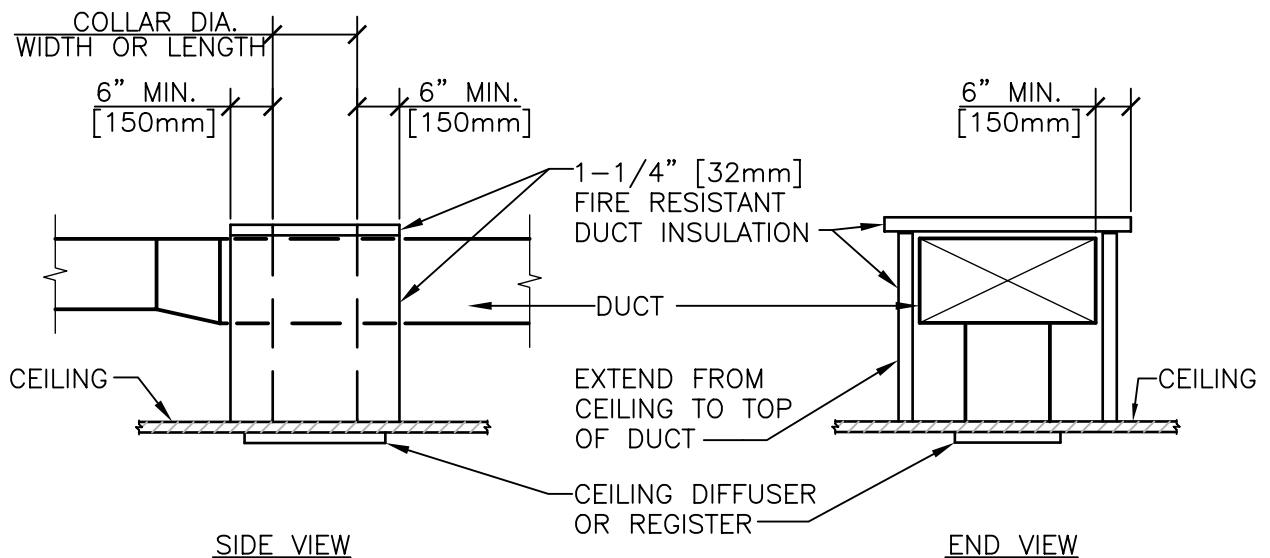
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DATE ISSUED : DECEMBER 2008

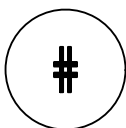
CADD DETAIL NO. : SD230541-05.DWG



INSULATED DUCT TYPE



NON-INSULATED DUCT TYPE



FIRE PROTECTION FOR CEILING OUTLETS

NTS

DESIGNER NOTES:

1.SHOW LOCATION ON FLOOR PLANS



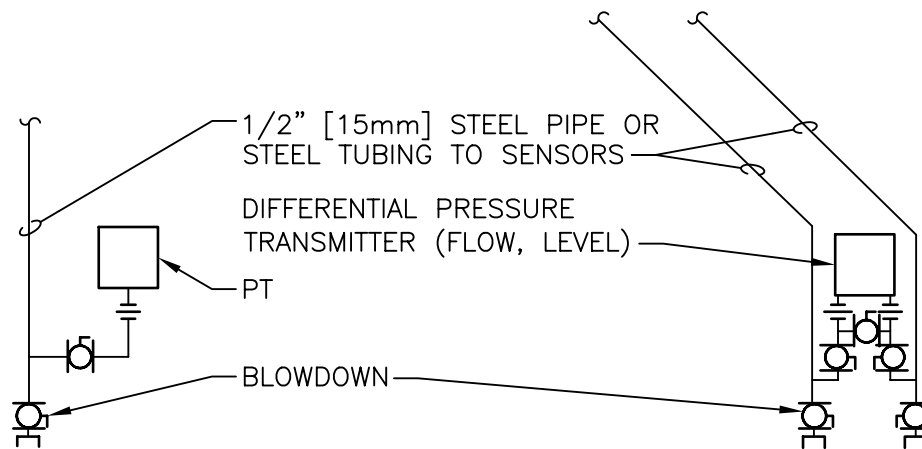
Department of
Veterans Affairs

DETAIL TITLE / FIRE PROTECTION FOR CEILING OUTLETS

SCALE :NONE

DATE ISSUED : DECEMBER 2008

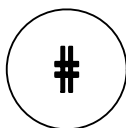
CADD DETAIL NO. : SD230711-01.DWG



ELEVATION

NOTES:

1. INSTALLATION OF SENSORS AND TRANSMITTERS SHALL CONFORM TO RECOMMENDATIONS OF MANUFACTURERS OF TRANSMITTERS.



PRESSURE TRANSMITTER INSTALLATION

NTS



Department of
Veterans Affairs

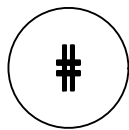
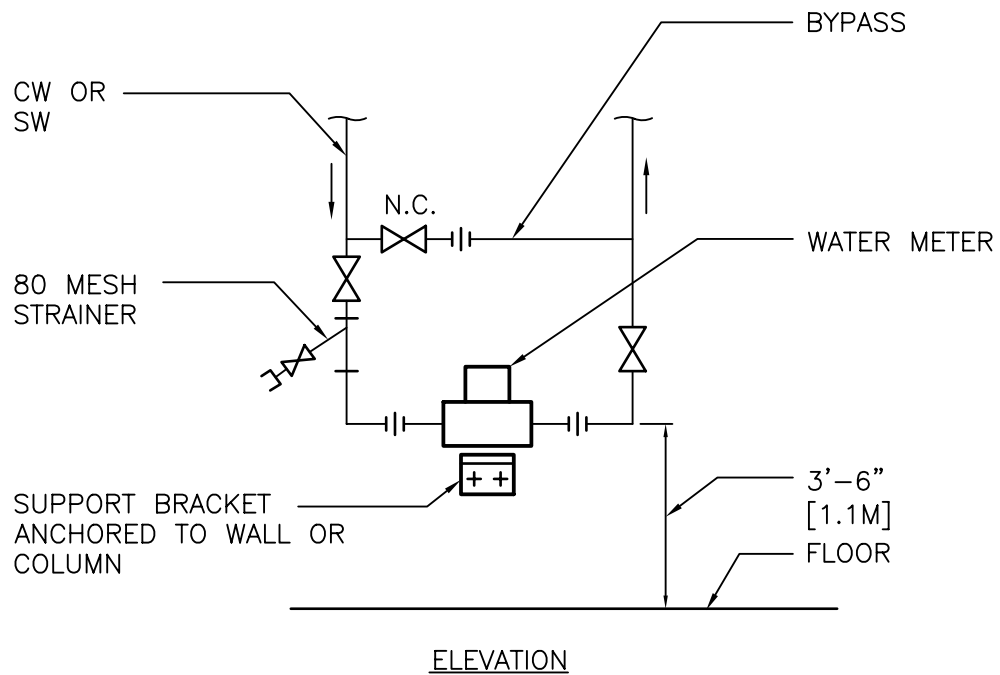
DETAIL TITLE / PRESSURE TRANSMITTER INSTALLATION

SCALE :NONE

DATE ISSUED: DECEMBER 2008

CAD DETAIL NO.:

SD230911-01.DWG



WATER METER INSTALLATION

NTS



Department of
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DETAIL TITLE / WATER METER INSTALLATION

SCALE :NONE

DATE ISSUED :DECEMBER 2008

CADD DETAIL NO. : SD230911-02.DWG



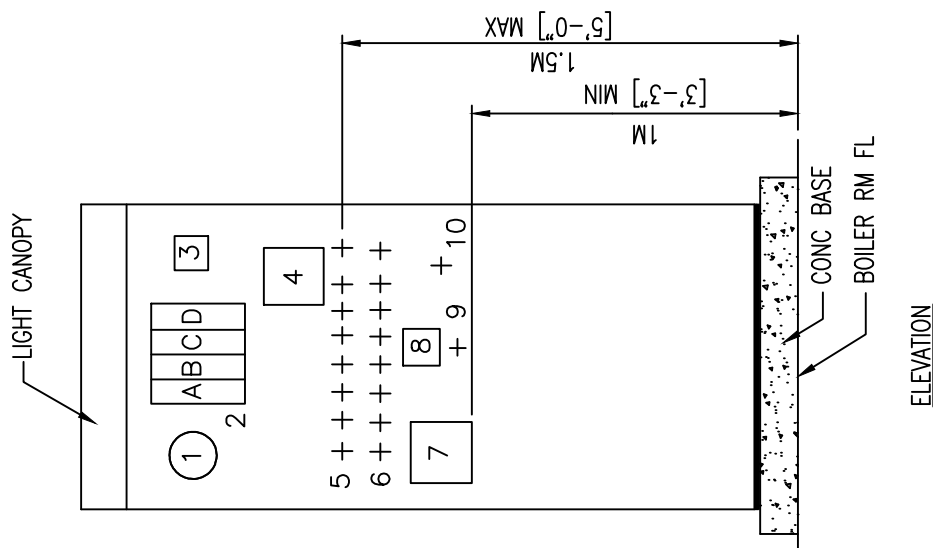
Department of
Veterans Affairs

DETAIL TITLE: BURNER CONTROL PANEL FOR
WATER TUBE BOILERS

SCALE : NONE

DATE ISSUED : 11/01/2017

CADD DETAIL NO. : SD230911-03.DWG



LEGEND

ITEM

DESCRIPTION

NO.

1. ALARM BELL (WATER LEVEL)

2. 2 DRAFT GAUGES

A. WINDBOX (0 TO ____mm(____IN) WC) (SEE NOTE 4)

B. FURNACE (0 TO ____mm(____IN) WC) (SEE NOTE 4)

C. BOILER OUTLET (- ____mm(____IN) TO + ____mm(____IN) WC)
(SEE NOTE 5)

D. ECONOMIZER OUTLET (-25mm(-1") TO +25mm(+1") WC)
(SEE NOTE 5)

3. ALARM HORN (FLAME FAILURE, LOW WATER CUTOFF)

4. BURNER CONTROL SYSTEM ANNUNCIATOR

5. ROW OF BURNER CYCLE PILOT-LIGHTS

6. ROW OF BURNER CONTROL SWITCHES

7. BOILER WATER LEVEL CONTROL STATION

8. ECONOMIZER TEMPERATURE INDICATOR

9. SELECTOR SWITCH FOR ECONOMIZER TEMPERATURE INDICATOR

10. BURNER STOP SWITCH

NOTES:

1. INTERIOR OF PANEL SHALL BE UTILIZED FOR MOUNTING RELAYS, BURNER CONTROL PROGRAMMER, AND OTHER DEVICES.

2. PROVIDE FRONT OR REAR ACCESS DOORS FULL HEIGHT AND WIDTH OF PANEL.

3. PANEL DIMENSIONS APPROX. 1M(3'-0")Wx0.5M(1'-6")Dx2.3M(7'-6")H.

4. WINDBOX AND FURNACE DRAFT GAGE SCALE RANGES RECOMMENDED BY BOILER AND BURNER MANUFACTURER.

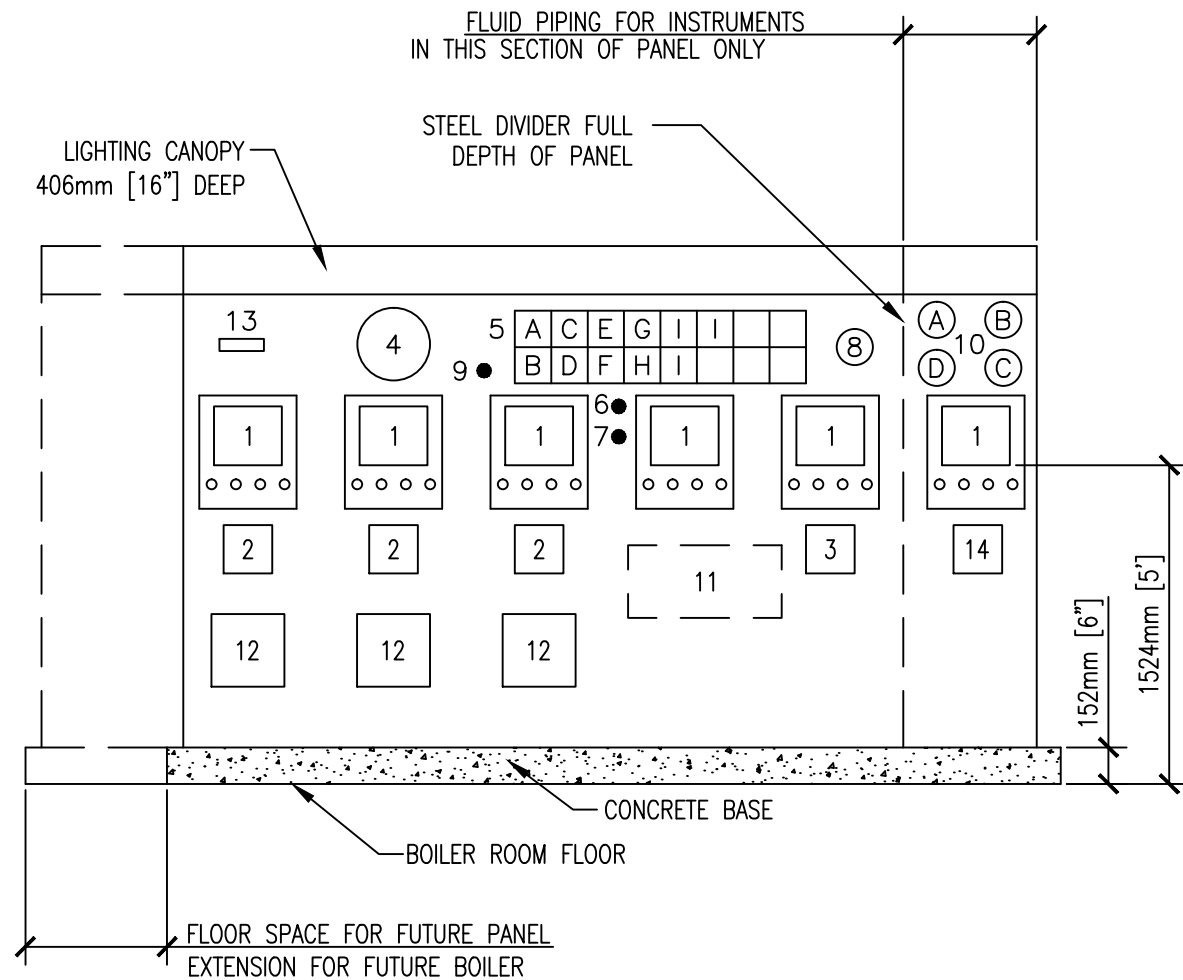
5. SCALE RANGE OF BOILER OUTLET DRAFT GAGE MUST BE COORDINATED WITH ECONOMIZER DRAFT LOSS. IF THERE IS NO ECONOMIZER, RANGE SHOULD BE -25mm(-1") TO +25mm(+1") WC.

6. BOILER COMBUSTION CONTROL SUBMASTER, DRAFT CONTROL AND OXYGEN TRIM CONTROL STATIONS MAY BE LOCATED ON THIS PANEL.

BURNER CONTROL PANEL FOR WATER TUBE BOILERS

NTS

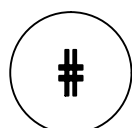
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ELEVATION

DESIGNER NOTES:

- PANEL APPROX. 3810mm[12'-6\"]Wx610mm[2'-0\"]Dx2438mm[8'-0\"]H. SHOW ACTUAL SIZE ON DWGS.
- SOME RECORDING & MONITORING FUNCTIONS MAY BE HANDLED BY A COMPUTER WORK STATION & THEREFORE MAY BE DELETED FROM THIS PANEL.
- ON SOME PROJECTS, IT MAY BE DESIRABLE TO LOCATE EMERGENCY GENERATOR ANNUNCIATORS & METERS ON THIS PANEL.
- PROVIDE SMOKE DENSITY MONITORS ONLY ON PLANTS BURNING HEATED OIL OR WHERE REQUIRED BY LOCAL CODES.
- ON PLANTS WHERE DRAFT CONTROL SYSTEMS ARE PROVIDED, CONSIDER LOCATING THE DRAFT GAGES ON THIS PANEL ABOVE THE BOILER OPERATION RECORDERS. THE GAGES ARE NORMALLY LOCATED ON THE BURNER CONTROL PANELS.
- DELETE THE "ENGINEERING NOTES" FROM THE PROJECT DRAWINGS.



BOILER PLANT INSTRUMENTATION PANEL

NTS

ITEM NO.

DESCRIPTION

- BOILER / BOILER PLANT DIGITAL DATA RECORDER
 - STEAM FLOW: INDICATE, RECORD, INTEGRATE, [0-_____ KG/S [LB/HR]]
 - BOILER OUTLET FLUE GAS TEMPERATURE: RECORD (0-500°C [0-1000°F])
 - FLUE GAS OXYGEN CONTENT: RECORD (0-10% OXYGEN)
 - HIGH PRESS STEAM DIST: RECORD, INTEGRATE, (0-_____ KG/S [LB/HR])
 - MED PRESS STEAM DIST: RECORD, INTEGRATE, (0-_____ KG/S [LB/HR])
 - LAUNDRY STEAM DIST: RECORD, INTEGRATE, (0-_____ KG/S [LB/HR])
 - BOILER PLANT STEAM: RECORD, INTEGRATE, (0-_____ KG/S [LB/HR])
 - STEAM HEADER PRESS: RECORD (0-2000 kPa [0-300 PSIG])
 - BOILER FEEDWATER TEMP: RECORD (0-150°C [0-300°F])
 - OUTSIDE AIR TEMP: RECORD (-35°C[-30°F] TO +50°C[+120°F])
- BOILER CONTROL STATIONS (MANUAL/AUTOMATIC, BIAS)
(THESE CONTROL STATIONS MAY BE LOCATED ON THE BURNER CONTROL PANELS INSTEAD OF ON THE INSTRUMENTATION PANEL.)
 - COMBUSTION CONTROL SUBMASTER
 - DRAFT CONTROL (WHEN SPECIFIED)
 - OXYGEN TRIM (WHEN SPECIFIED)
- MASTER STEAM PRESSURE CONTROLLER
- CLOCK
- ALARM ANNUNCIATOR
 - CONDENSATE STORAGE TANK HIGH LEVEL
 - CONDENSATE STORAGE TANK LOW LEVEL
 - FEEDWATER HEATER HIGH LEVEL
 - FEEDWATER HEATER LOW LEVEL
 - HIGH STEAM HEADER PRESS
 - EMERGENCY GAS VALVE CLOSED
 - HIGH NATURAL GAS HEADER PRESS (SET AT 35 kPa [5 PSIG] ABOVE MAIN REGULATOR SET PRESS)
 - LP IGNITER GAS IN USE-FOR EMERGENCY ONLY (PROVIDE HIGH PRESS SWITCH SET AT 14 kPa [2 PSIG])
 - LOW EXCESS AIR BOILER NO. (PROVIDE ONE POINT FOR EACH BOILER, SET AT ____ % OXYGEN)
- ANNUNCIATOR ACKNOWLEDGE BUTTON
- ANNUNCIATOR TEST BUTTON
- ANNUNCIATOR BELL / HORN
- EMERGENCY GAS SAFETY SHUT OFF VALVE CONTROL
- PRESSURE GAGES
 - STEAM HEADER (0-1500 kPa [0-200 PSIG])
 - NATURAL GAS HEADER (0-100 kPa [0-15 PSIG])
 - FUEL OIL HEADER (0-1500 kPa [0-200 PSIG])
 - BOILER FEEDWATER HEADER (0-2000 kPa [0-300 PSIG]) (WHEN HEADER SERVING ALL BOILERS IS PROVIDED)
- START-STOP BUTTONS AND PILOT LIGHTS FOR PUMPS
- SMOKE DENSITY MONITOR (WHEN SPECIFIED)
- REMOTE REGISTER FOR GAS METER (WHEN SPECIFIED)
- FEEDWATER DEAERATOR TANK AND CONDENSATE STORAGE TANK WATER LEVEL CONTROL STATION

DETAIL TITLE: BOILER PLANT INSTRUMENTATION PANEL

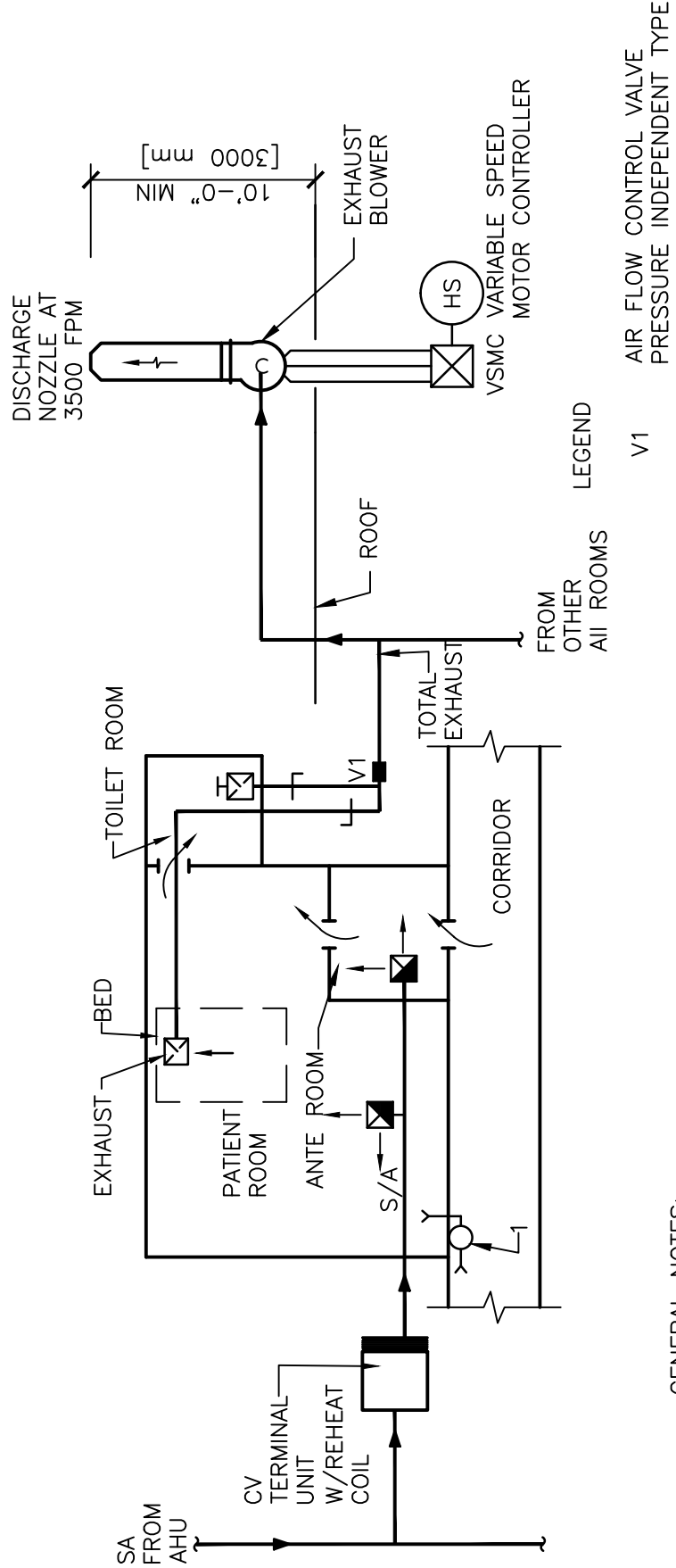
SCALE : NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD230911-04.DWG

Department of
Veterans Affairs





GENERAL NOTES:

1. MAINTAIN NEGATIVE AIR PRESSURE (0.01 INCH WATER COLUMN [2.5 PASCAL]) BETWEEN THE AIIR ROOM AND THE ANTEROOM AND THE ANTEROOM AND THE CORRIDOR BY MODULATING VALVE V1. AIIR ROOMS SHALL HAVE A PERMANENTLY INSTALLED DEVICE AND/OR MECHANISM TO CONSTANTLY MONITOR THE DIFFERENTIAL AIR PRESSURE BETWEEN THE PATIENT ROOM AND THE CORRIDOR. A LOCAL VISUAL MEANS SHALL BE PROVIDED TO INDICATE WHENEVER NEGATIVE DIFFERENTIAL PRESSURE IS NOT MAINTAINED. (STROBE LIGHT)
2. MAINTAIN THE ATTACHED TOILET, IF ANY, AT NEGATIVE AIR PRESSURE WITH RESPECT TO THE AIIR ROOM. HOWEVER, THE DESIGN NEED NOT INCLUDE A PRESSURE DIFFERENTIAL SENSOR FOR VERIFICATION.
3. LOCATE EXHAUST AIR REGISTER OVER THE PATIENT BED ON THE CEILING. AS AN ALTERNATE, THE EXHAUST AIR REGISTER CAN BE LOCATED ON THE WALL NEAR THE PATIENT HEAD, IF FEASIBLE.
4. LOCATE THE SUPPLY AIR OUTLET TO BLOW AIR TOWARDS THE OCCUPIED AREA.
5. PROVIDE A DEDICATED EXHAUST SYSTEM FOR THE AIIR ROOMS WITHOUT MIXING IT WITH ANY OTHER EXHAUST.

TYPICAL AIR BALANCE EXAMPLE:

1. THE PATIENT BEDROOM IS KEPT UNDER NEGATIVE PRESSURE BY ENSURING AIR MOVEMENT INTO THE BEDROOM SPACE FROM THE ANTE ROOM AND ADJOINING CORRIDOR.
2. THE SUPPLY AIR SYSTEM SHALL CONSIST OF THE CONSTANT VOLUME AIR DELIVERY FROM A DEDICATED AIR TERMINAL UNIT WITH REHEAT COIL TO THE ISOLATION SUITE AS FOLLOWS:

A – PATIENT BEDROOM	MINIMUM 12 ACPH SUPPLY AIR (ASHRAE STANDARD 170 2008). INCREASE SUPPLY AIR VOLUME, IF REQUIRED, TO MEET THE INSIDE DESIGN CONDITIONS IN COOLING AND/OR HEATING MODES. EXAMPLE: 400 CFM [190 L/S]
B – ANTE ROOM	MINIMUM 10 ACPH (ASHRAE STANDARD 170 2008) OR MINIMUM 40 CFM [19 L/S] SUPPLY + 100 CFM [47 L/S] INFILTRATED INTO ANTE ROOM FROM CORRIDOR FOR A TOTAL OF 140 CFM [66 L/S].
C – PATIENT TOILET	DO NOT SUPPLY AIR INTO THE TOILET. DRAW MAKE-UP AIR FROM THE PATIENT'S BEDROOM AND EXHAUST AT THE RATE OF 10 ACPH OR 60 CFM [28 L/S]. EXAMPLE: 60 CFM [28 L/S]
3. THE DEDICATED EXHAUST AIR SYSTEM SHALL BE BALANCED AS FOLLOWS:

A – PATIENT BEDROOM	400 CFM [190 L/S](SUPPLY) – 60 CFM [28 L/S](TOILET) + 40 CFM [19 L/S] SUPPLY AIR TO ANTE ROOM + 100 CFM [47 L/S] INFILTRATED FROM CORRIDOR INTO ANTE ROOM THEN 140 CFM [66 L/S] INTO AIIR ROOM = 480 CFM [227 L/S] (EXHAUST), TOTAL EXHAUST 540 CFM [255 L/S]
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4. COORDINATE DOOR UNDER CUTS FOR DOORS BETWEEN ANTE ROOM AND PATIENT (1") [2.54 CM], DOOR TO CORRIDOR.

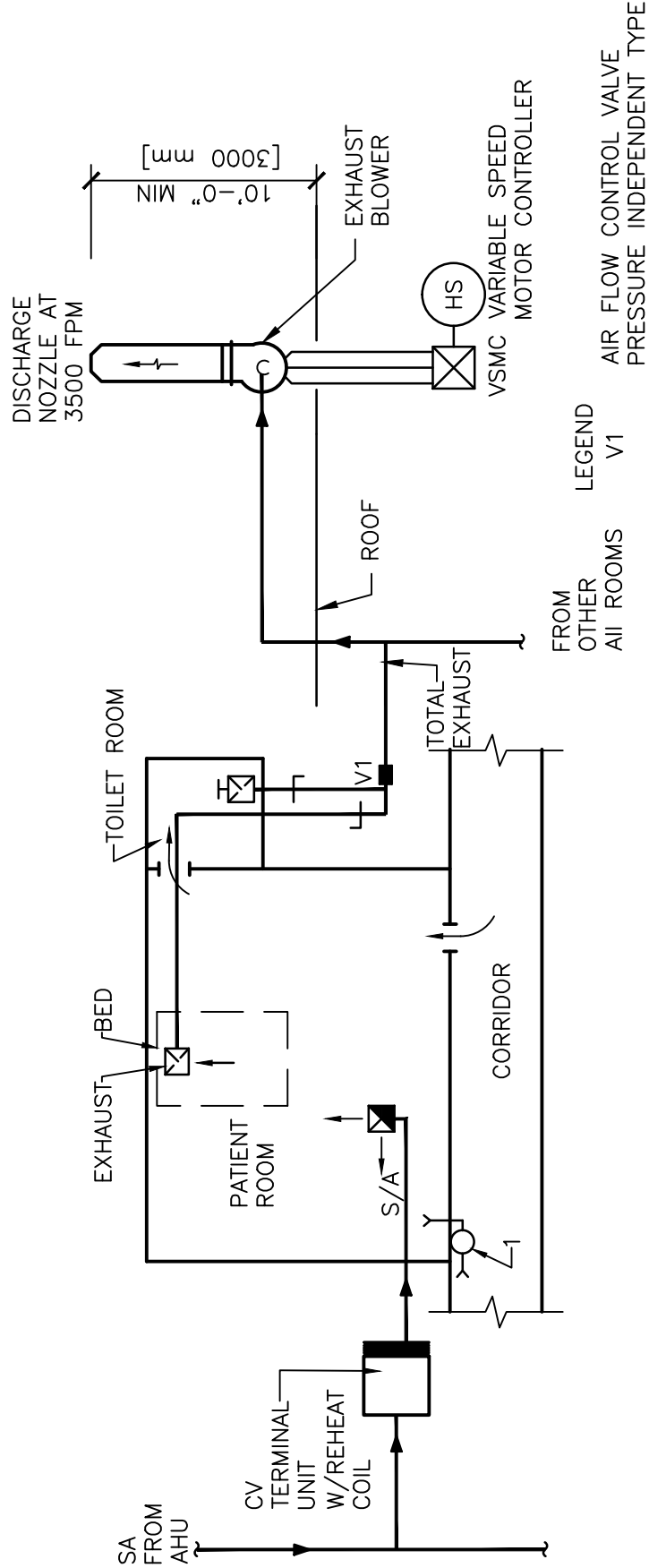
AIR SYSTEM FOR AIRBORNE INFECTION ISOLATION ROOM (AIIR) WITH ANTE ROOM

#

NTS
NEGATIVE PRESSURE

DESIGNER'S NOTE:

1. ENSURE FINAL DESIGN REFLECTS PROJECT SPECIFIC REQUIREMENTS AND MEETS ASHRAE 170, LATEST EDITION WITH **ALL** ADDENDUMS.



GENERAL NOTES:

1. MAINTAIN NEGATIVE AIR PRESSURE (0.01 INCH WATER COLUMN [2.5 PASCAL]) BETWEEN THE AII ROOM AND THE CORRIDOR BY MODULATING VALVE V1. AII ROOMS SHALL HAVE A PERMANENTLY INSTALLED DEVICE AND/OR MECHANISM TO CONSTANTLY MONITOR THE DIFFERENTIAL AIR PRESSURE BETWEEN THE PATIENT ROOM AND THE CORRIDOR.
A LOCAL VISUAL MEANS SHALL BE PROVIDED TO INDICATE WHENEVER NEGATIVE DIFFERENTIAL PRESSURE IS NOT MAINTAINED. (STROBE LITE)
2. MAINTAIN THE ATTACHED TOILET, IF ANY, AT NEGATIVE AIR PRESSURE WITH RESPECT TO THE AII ROOM. HOWEVER, THE DESIGN NEED NOT INCLUDE A PRESSURE DIFFERENTIAL SENSOR FOR VERIFICATION.
3. LOCATE EXHAUST AIR REGISTER OVER THE PATIENT BED ON THE CEILING. AS AN ALTERNATE, THE EXHAUST AIR REGISTER CAN BE LOCATED ON THE WALL NEAR THE PATIENT HEAD, IF FEASIBLE.
4. LOCATE THE SUPPLY AIR OUTLET TO BLOW AIR TOWARDS THE OCCUPIED AREA.
5. PROVIDE A DEDICATED EXHAUST SYSTEM FOR THE AII ROOMS WITHOUT MIXING IT WITH ANY OTHER EXHAUST.

TYPICAL AIR BALANCE EXAMPLE:

1. THE PATIENT BEDROOM IS KEPT UNDER NEGATIVE PRESSURE BY ENSURING AIR MOVEMENT INTO THE BEDROOM SPACE FROM THE ADJOINING CORRIDOR.

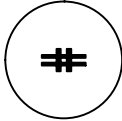
2. THE SUPPLY AIR SYSTEM SHALL CONSIST OF THE CONSTANT VOLUME AIR DELIVERY FROM A DEDICATED AIR TERMINAL UNIT WITH REHEAT COIL TO THE ISOLATION SUITE AS FOLLOWS:

A – PATIENT BEDROOM MINIMUM 12 ACPH SUPPLY AIR (ASHRAE STANDARD 170 2008).
INCREASE SUPPLY AIR VOLUME, IF REQUIRED, TO MEET THE INSIDE
DESIGN CONDITIONS IN COOLING AND/OR HEATING MODES.
EXAMPLE: 400 CFM [190 L/S]

B – PATIENT TOILET DO NOT SUPPLY AIR INTO THE TOILET. DRAW MAKE-UP AIR FROM
THE PATIENT'S BEDROOM AND EXHAUST AT THE RATE OF 10 ACPH
OR 60 CFM [28 L/S]. EXAMPLE: 60 CFM [28 L/S]

3. THE DEDICATED EXHAUST AIR SYSTEM SHALL BE BALANCED AS FOLLOWS:

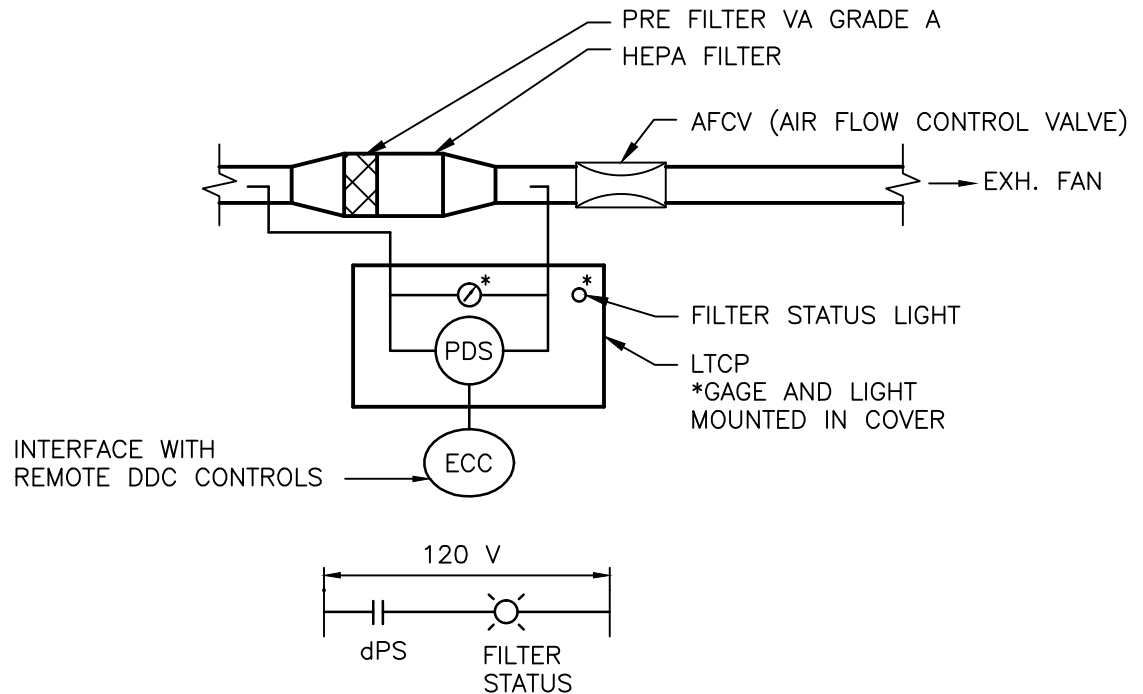
A – PATIENT BEDROOM 400 CFM [190 L/S] (SUPPLY) – 60 CFM [28 L/S] (TOILET) +
100 CFM [47 L/S] INFILTRATED FROM CORRIDOR = 440 CFM
[180 L/S] (EXHAUST), TOTAL EXHAUST 500 CFM [240 L/S].



NTS NEGATIVE PRESSURE

DESIGNER'S NOTE:

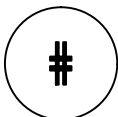
1. ENSURE FINAL DESIGN REFLECTS PROJECT SPECIFIC REQUIREMENTS AND MEETS ASHRAE 170, LATEST EDITION WITH **ALL** ADDENDUMS.



SEQUENCE OF OPERATION:

WHEN FILTER PRESSURE DROP RISES TO 2" [7 KPA] OF WATER COLUMN, FILTER STATUS LIGHT (RED) SHALL BE ENERGIZED.

HEPA FILTER CONTROLS FOR AUTOPSY EXHAUST SYSTEMS



NTS



Department of
Veterans Affairs

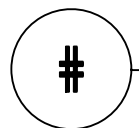
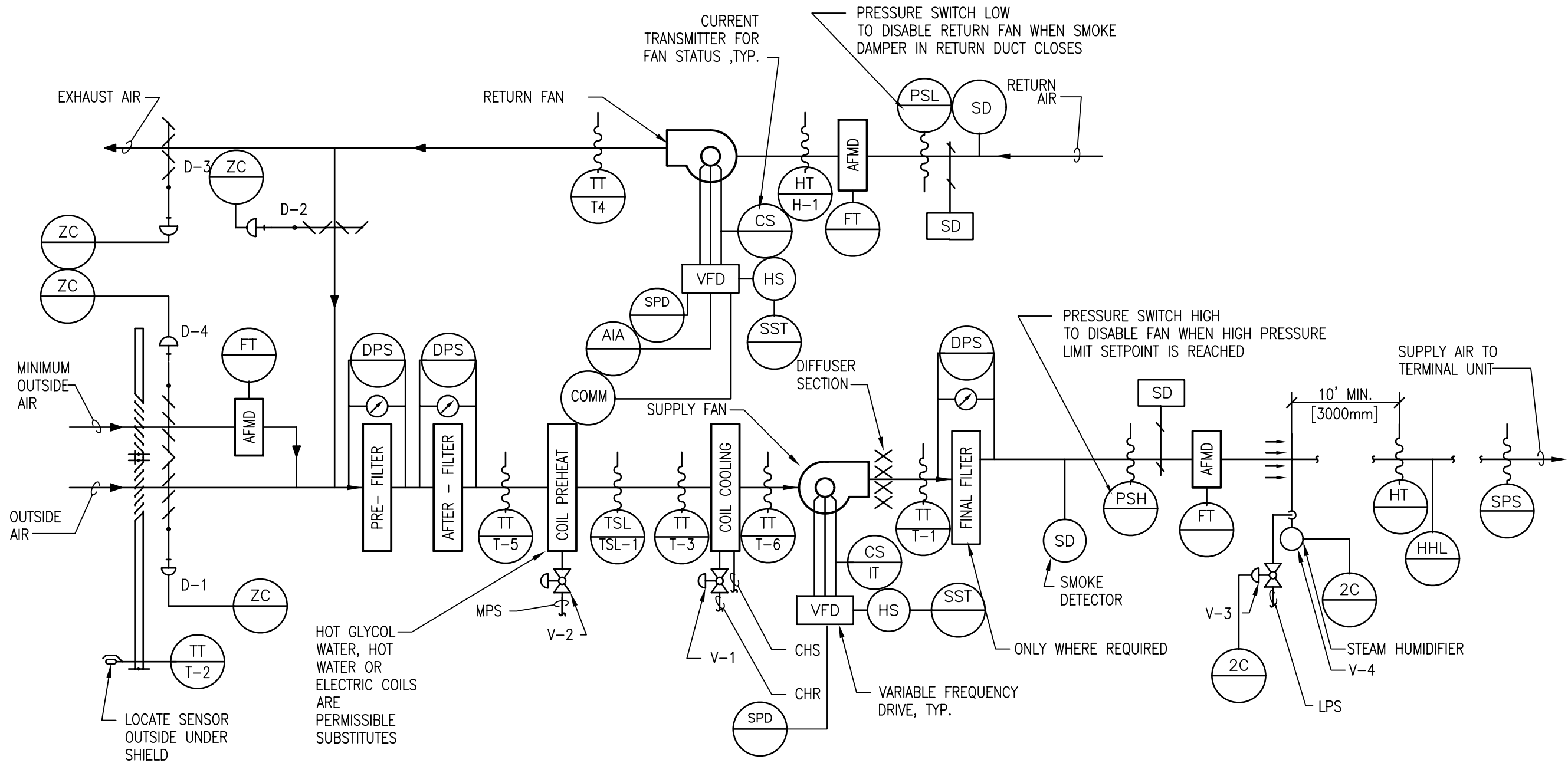
DETAIL TITLE / HEPA FILTER CONTROLS FOR AUTOPSY
EXHAUST SYSTEMS

SCALE :NONE

DATE ISSUED: SEPTEMBER 2010

CAD DETAIL NO.:

SD230923-03.DWG



VARIABLE AIR VOLUME AIR HANDLING UNIT WITH MINIMUM OUTSIDE AIR CONTROL DIAGRAM

NTS

SEQUENCE OF OPERATION FOR VARIABLE AIR VOLUME AIR HANDLING UNIT WITH MINIMUM OUTSIDE AIR

1. GENERAL

- _1.1 UNIT IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. H-0-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN THE UNIT IS "OFF" D-1, D-3, SHALL BE FULLY CLOSED. WHEN THE UNIT IS "ON" D-1, SD-1 AND SD-2 SHALL BE FULLY OPEN. D-2 AND D-3 SHALL MODULATE IN ACCORDANCE WITH THE FOLLOWING SEQUENCE:

2. TEMPERATURE CONTROL

- _2.1 SUPPLY AIR TEMPERATURE, SENSED BY TT-1, SHALL BE MAINTAINED AT SETPOINT VIA DIGITAL CONTROL PANEL BY MODULATING V-1 OR D-2 AND D-3 OR V-2 IN SEQUENCE.
- 2.2 WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY TT-2, IS ABOVE 75°F (ADJ) [23.8°C], THE DIGITAL CONTROL PANEL SHALL PREVENT THE MODULATION OF D-2 AND D-3 AND SHALL ASSUME THE MINIMUM OUTSIDE AIR POSITION (D-2 FULLY OPENED AND D-3 FULLY CLOSED). THE DIGITAL CONTROL PANEL SHALL MODULATE V-1 TO MAINTAIN THE SUPPLY AIR TEMPERATURE, SENSED BY TT-1.
- 2.3 WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY TT-2, IS BETWEEN 65°F [18.3°C] AND THE SUPPLY AIR TEMPERATURE SENSED BY TT-1, DAMPER D-2 SHALL FULLY CLOSE AND D1 AND D3 SHALL BE FULLY OPEN (MAXIMUM OUTSIDE AIR POSITION). THE DIGITAL CONTROL PANEL SHALL MODULATE V-1 TO MAINTAIN THE SUPPLY AIR TEMPERATURE, SENSED BY TT-1.
- 2.4 WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY TT-2, IS BELOW THE SUPPLY AIR TEMPERATURE, SENSED BY TT-1, DAMPERS D1, D-2 AND D-3 SHALL MODULATE TO MAINTAIN THE SCHEDULED SUPPLY AIR TEMPERATURE. IF D-2 IS OPEN AND D-3 IS CLOSED TO MINIMUM OUTSIDE AIR, V-2 SHALL MODULATE OPEN TO MAINTAIN THE SUPPLY AIR TEMPERATURE, SENSED BY TT-1.

3. AIR FLOW CONTROL

- _3.1 THE SUPPLY AIR FLOW SHALL BE CONTROLLED BY THE DIGITAL CONTROL PANEL MODULATING THE SUPPLY FAN VARIABLE SPEED MOTOR CONTROLLER TO MAINTAIN 1.0" [25mm] OF DUCT STATIC PRESSURE (FIELD ADJUSTABLE), SENSED BY SPS-1. RESET STATIC PRESSURE BASED ON ACTUAL BUILDING LOAD BY POLLING ALL ATU
- 3.2 THE DIGITAL CONTROL PANEL, USING TOTAL SUPPLY AIR AND RETURN AIR FLOW SIGNALS, SHALL RESET THE RETURN AIR FAN VSMC TO MAINTAIN A CONSTANT AIR FLOW DIFFERENCE BETWEEN THE SUPPLY AIR AND THE RETURN AIR EQUAL TO MINIMUM OUTSIDE AIR.
- 3.3 USING HIGH PRESSURE SENSOR SPS-2 LOCATED AT THE SUPPLY FAN DISCHARGE, SHALL PREVENT THE SUPPLY FAN FROM DEVELOPING OVER 3" [75mm] OF STATIC PRESSURE (FIELD ADJUSTABLE). IF STATIC PRESSURE AT SPS-2 DOES EXCEED 3" [75mm] THE SUPPLY AIR FAN SHALL STOP. SPS-2 SHALL BE HARDWIRED TO THE SUPPLY FAN VSMC AND UNIT SHALL BE SHUTDOWN IN HAND,AUTO OR BYPASS MODE. SPS-2 WILL REQUIRE MANUAL RESET AT THE DEVICE.

4. HUMIDITY CONTROL

- _4.1 WHEN THE DIGITAL CONTROL PANEL IS NOT CALLING FOR HUMIDITY, SENSED BY RETURN AIR HUMIDITY H-1, 2-WAY "ON-OFF" CONTROL VALVE V-3 SHALL REMAIN CLOSED. WHEN THE DIGITAL CONTROL PANEL IS CALLING FOR HUMIDITY, V-3 SHALL REMAIN OPEN.
- 4.2 RETURN AIR HUMIDITY SHALL BE MAINTAINED AT SETPOINT OF 35% RH (ADJ) VIA DIGITAL CONTROL PANEL BY MODULATING CONTROL VALVE V-4 TO MAINTAIN THE DESIRED HUMIDITY. THE DCP SHALL OVERRIDE THIS CONTROL TO MAINTAIN HUMIDITY OF 80% AS SENSED BY H-2. DCP SHALL CLOSE VALVE V-3 WHENEVER THE SUPPLY FAN IS OFF. VALVE V-4 SHALL BE INTERLOCKED WITH A TEMPERATURE SWITCH TO KEEP THE HUMIDIFIER OFF UNTIL CONDENSATE TEMPERATURE APPROACHES STEAM TEMPERATURE.

5. FREEZE PROTECTION

- _5.1 IF THE AIR TEMPERATURE AS SENSED BY TT-3 FALLS BELOW 45°F [7°C], AN ALARM SIGNAL SHALL INDICATE AT THE DCP AND ECC. IF THIS TEMPERATURE FALLS BELOW 40°F [4.4°C], AS SENSED BY THE TSL THE SUPPLY AND RETURN FANS SHALL SHUT DOWN AND A CRITICAL ALARM SHALL INDICATE AT THE DIGITAL CONTROL PANEL AND ECC. TSL SHALL BE HARDWIRED TO THE SUPPLY FAN UFD AND UNIT SHALL BE SHUTDOWN IN HAND,AUTO OR BYPASS MODE. TSL WILL REQUIRE MANUAL RESET AT THE DEVICE.

6. AUTOMATIC SHUTDOWN/RESTART

- 6.1 WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTOR, SD, THE SUPPLY AND RETURN FANS SHALL SHUT "OFF" AND AN ALARM SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM. ALL SMOKE DAMPERS IN THE SUPPLY AND RETURN DUCTS SHALL CLOSE.
- 6.2 EXHAUST FANS SERVING AREA OF THE SUPPLY FAN SHALL CONTINUE TO RUN. SUPPLY AND RETURN FANS SHALL RESTART AND SMOKE DAMPERS SHALL OPEN WHEN FIRE ALARM CIRCUIT IS RESET.

7. EMERGENCY CONSTANT SPEED OPERATION

- _7.1 UPON FAILURE OF THE VSMC, THE SUPPLY AND RETURN FANS SHALL BE STARTED/STOPPED MANUALLY AT THE DIGITAL CONTROL PANEL OR THE ECC THROUGH THE BY-PASS STARTER. FANS SHALL THEN BE OPERATED AT CONSTANT SPEED.

DETAIL TITLE / SEQUENCE OF OPERATION FOR VARIABLE AIR VOLUME AIR HANDLING UNIT WITH MINIMUM OUTSIDE AIR

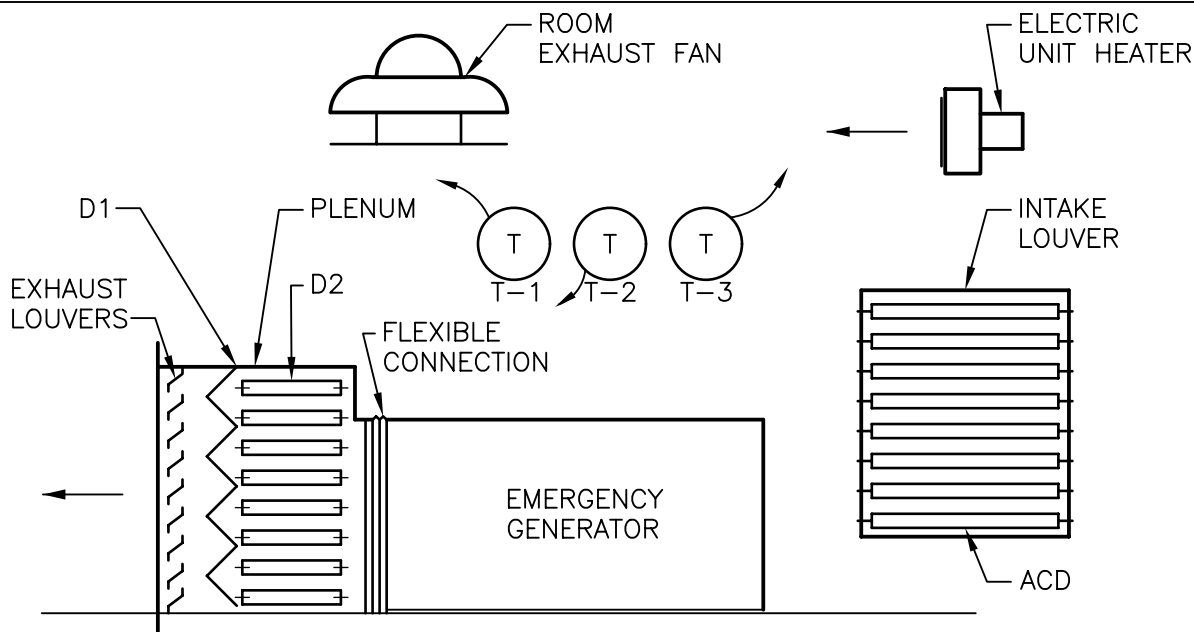
SCALE : NONE

DATE ISSUED: SEPTEMBER 2010

CAD DETAIL NO.: SD30923-05.DWG

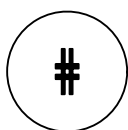
Department of
Veterans Affairs





NOTES:

1. EMERGENCY GENERATOR SHALL BE INTERLOCKED WITH D3. WHEN EMERGENCY GENERATOR IS ENERGIZED D3 SHALL OPEN. WHEN EMERGENCY GENERATOR IS DE-ENERGIZED D3 SHALL CLOSE, PROVIDED ROOM EXHAUST FAN IS OFF.
2. ROOM EXHAUST FAN SHALL BE INTERLOCKED WITH D3 & ROOM THERMOSTAT T1. WHEN ROOM THERMOSTAT RISES ABOVE 85°F [29°C] ROOM EXHAUST FAN SHALL RUN & D3 SHALL OPEN. WHEN ROOM THERMOSTAT DROPS BELOW 80°F [27°C] ROOM EXHAUST FAN SHALL STOP & D3 SHALL CLOSE, PROVIDED EMERGENCY GENERATOR IS DE-ENERGIZED.
3. POWER OPERATED, OPPOSED BLADE, DAMPERS D1 & D2 SHALL BE INTERLOCKED WITH ROOM THERMOSTAT T2 SET AT 60°F [16°C]. ON A RISE IN ROOM TEMPERATURE ABOVE 60°F [16°C] D1 SHALL MODULATE OPEN & D2 SHALL MODULATE CLOSED. ON A DROP IN ROOM TEMPERATURE BELOW 60°F [16°C], D1 SHALL MODULATE CLOSED & D2 SHALL MODULATE OPEN.
4. ELECTRIC UNIT HEATER SHALL BE INTERLOCKED WITH ROOM THERMOSTAT T3 SET AT 45°F [7.2°C]. ON A DROP IN ROOM TEMPERATURE BELOW 43°F [6.1°C] ELECTRIC UNIT HEATER SHALL BE ENERGIZED & ON A RISE IN ROOM TEMPERATURE ABOVE 47°F [8.3°C].



EMERGENCY GENERATOR ROOM CONTROLS

NTS

DESIGNER'S NOTES:

1. IF THE PROJECT INVOLVES MULTIPLE EMERGENCY GENERATORS, EACH GENERATOR SHALL HAVE A DEDICATED SECTION OF THE OUTSIDE AIR INTAKE LOUVER & DAMPER MOTOR(S) ASSIGNED TO IT. THE DESIGNER SHALL SHOW A SCHEDULE OF THE EMERGENCY GENERATORS & THE SPECIFIC INTERLOCKED LOUVER/DAMPER SECTIONS ON THE FLOOR PLANS.
2. WHEN THE ROOM EXHAUST FAN IS RUNNING ALONE, WITHOUT ANY EMERGENCY GENERATOR, ONLY A DESIGNATED PORTION OF THE OUTSIDE AIR INTAKE LOUVER SHALL OPEN. THE DESIGNER SHALL SHOW THIS SECTION ON THE FLOOR PLANS.



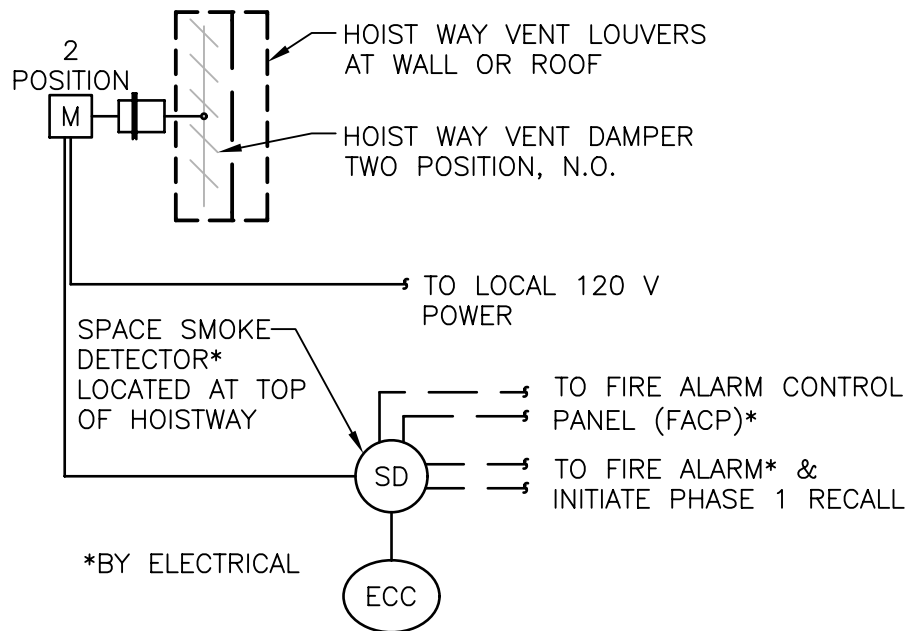
Department of
Veterans Affairs

DETAIL TITLE / EMERGENCY GENERATOR ROOM CONTROLS

SCALE :NONE

DATE ISSUED :DECEMBER 2008

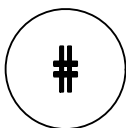
CADD DETAIL NO. : SD230923-07.DWG



NOTES:

1. THE DAMPER SHALL REMAIN CLOSED DURING NORMAL OPERATION AND OPEN UPON LOSS OF POWER FROM A SIGNAL FROM THE SMOKE DETECTOR, LOCATED AT THE TOP OF THE HOISTWAY. COORDINATE NUMBER OF CONTACTS WITH THE ELECTRICAL AND FIRE PROTECTION DESIGNS.
2. SHOW DAMPER LOCATION AND SIZE ON THE DRAWINGS.
3. PROVIDE A BINARY DDC POINT TO SOUND AN ALARM AT ECC.
4. REMOTE ALARM SHALL BE ACTIVATED WHEN THE HOISTWAY SMOKE DETECTOR DETECTS SMOKE.

HOISTWAY VENT DAMPER (HVD) CONTROLS



NTS

DESIGNER'S NOTES:

1. THE AREA OF VENTS SHALL NOT BE LESS THAN 3.0% OF THE TOTAL HOISTWAY AREA OR 3 SQUARE FEET (0.28 SQUARE METERS) FOR EACH ELEVATOR CAR, WHICHEVER IS GREATER.



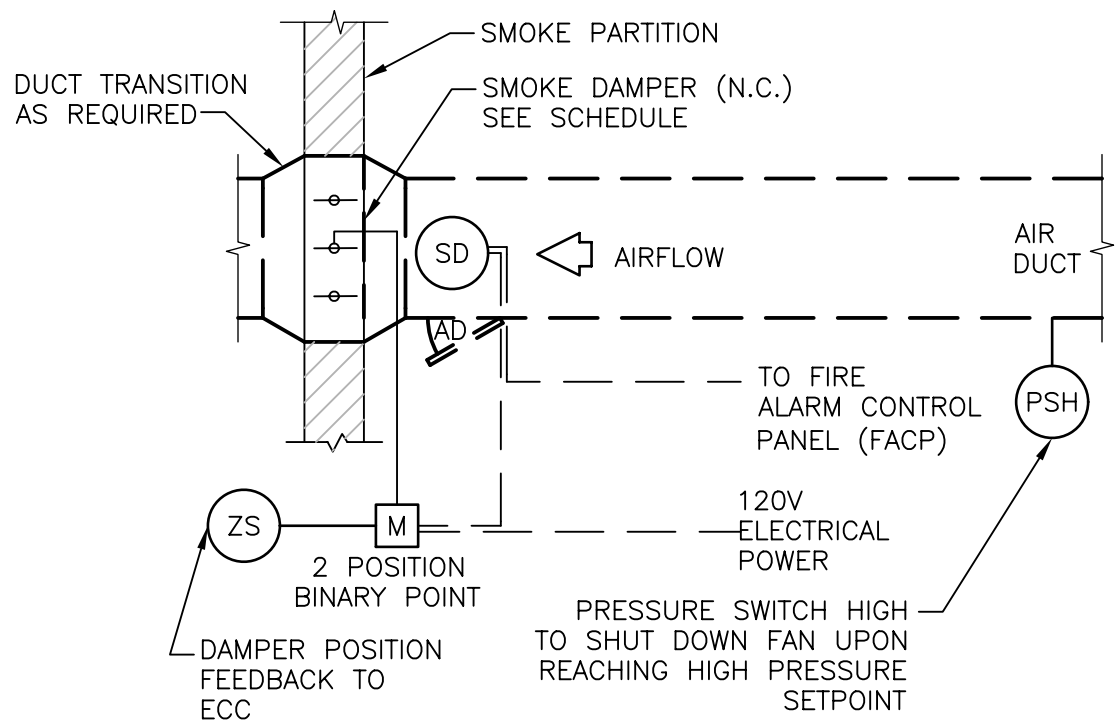
Department of
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DETAIL TITLE / HOISTWAY VENT DAMPER (HVD) CONTROLS

SCALE :NONE

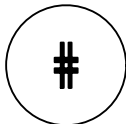
DATE ISSUED :DECEMBER 2008

CADD DETAIL NO. : SD230923-08.DWG



NOTE:

UPON DETECTION OF SMOKE BY THE SMOKE DETECTOR, THE SMOKE DAMPER SHALL CLOSE & SEND AN ALARM TO THE ECC.



SMOKE DAMPER CONTROL DIAGRAM

NTS

DESIGNER'S NOTE:

PROVIDE A DAMPER AND DETECTOR ONLY FOR PARTIALLY SPRINKLERED BUILDINGS WHEN EITHER SIDE OF SMOKE PARTITION IS NOT SPRINKLED AND PROTECTED BY QUICK RESPONSE SPRINKLER HEADS.



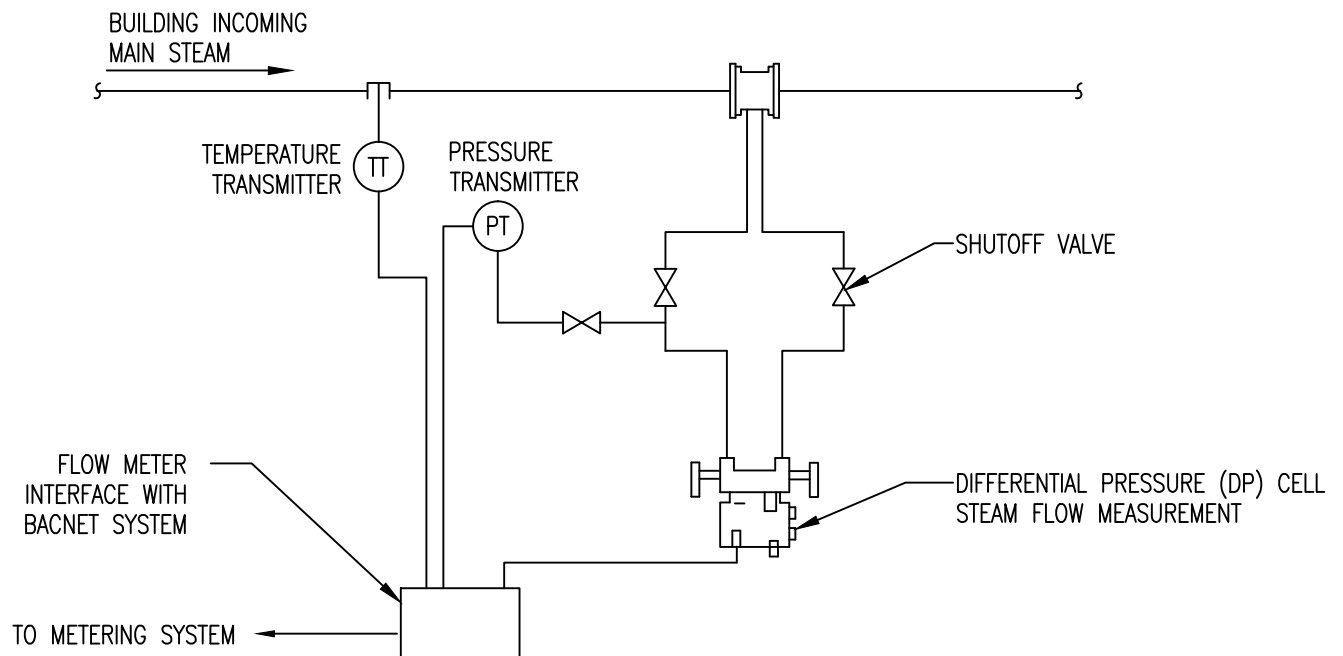
Department of
Veterans Affairs

DETAIL TITLE / SMOKE DAMPER
CONTROL DIAGRAM

SCALE :NONE

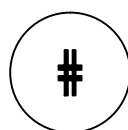
DATE ISSUED :DECEMBER 2008

CADD DETAIL NO. : SD230923-09.DWG



NOTE:
MAINTAIN UPSTREAM AND DOWN STREAM DISTANCES RECOMMENDED BY METER MANUFACTURERS

DESIGNER'S NOTE:
MODIFY DETAIL AS REQUIRED TO BE PROJECT SPECIFIC FOR THE TYPE OF METER BEING USED.



STEAM METER DETAIL

NTS



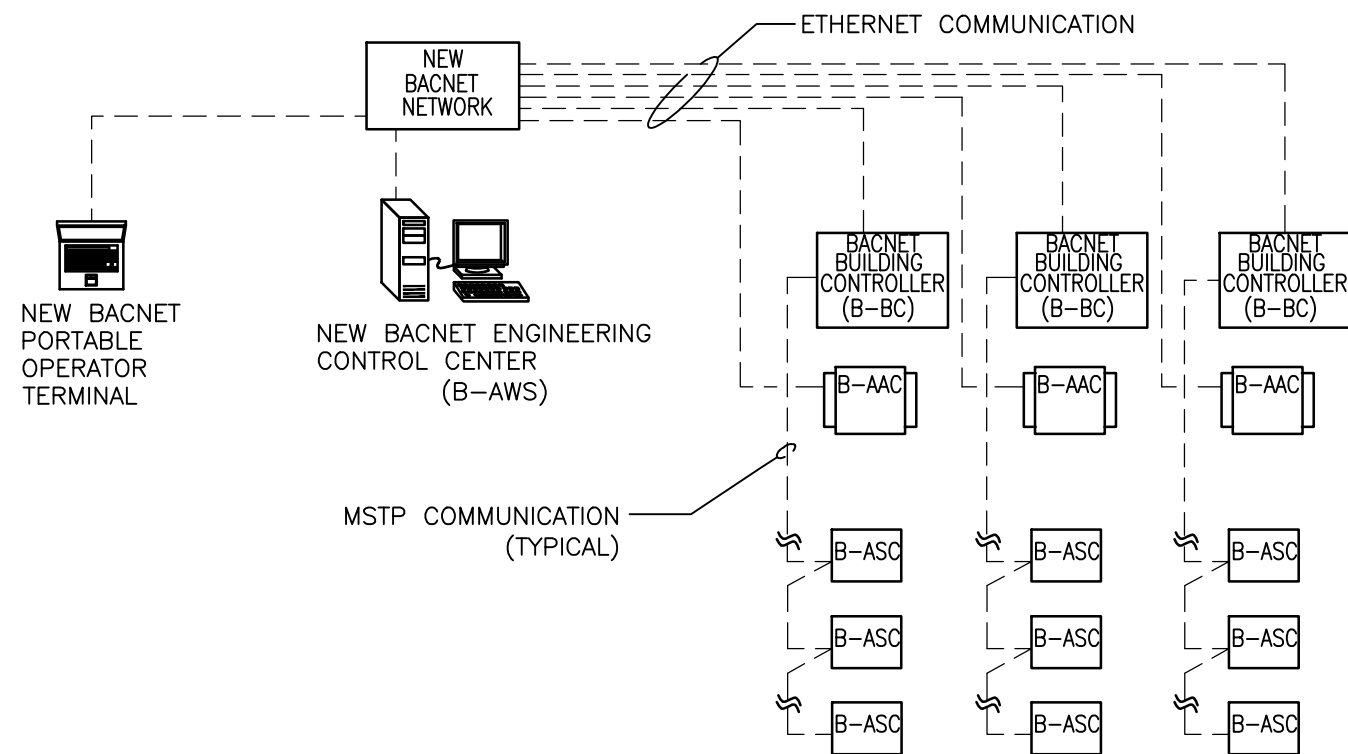
Department of
Veterans Affairs

DETAIL TITLE: STEAM METER DETAIL

SCALE :NONE

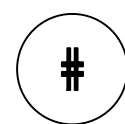
DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD230923-10.DWG



CONTROL SYSTEM CONFIGURATION
 OPTION 1 –
 NEW BACNET ECC, UPGRADE EXISTING
 CONTROLS WITH NEW BACNET CONTROLS
 SYSTEM, INSTALL NEW BACNET
 COMMUNICATIONS NETWORK.

- NOTES:
1. REPLACE EXISTING ECC WITH NEW BACNET (B-AWS) ENGINEERING CONTROL CENTER.
 2. REPLACE ALL EXISTING CONTROLLERS WITH NEW BACNET CONTROLLERS.
 3. INSTALL NEW BACNET COMMUNICATION NETWORK.
 4. INSTALL MULTIPLE BUILDING CONTROLLERS (B-BC) AS REQUIRED.
 5. INSTALL NEW CONTROLLERS (B-AAC, B-ASC) AS REQUIRED.
 6. PROVIDE NEW PORTABLE OPERATORS TERMINAL.



BACNET SYSTEM ARCHITECTURE OPTION 1

NTS

DETAIL TITLE / BACNET SYSTEM ARCHITECTURE OPTION 1

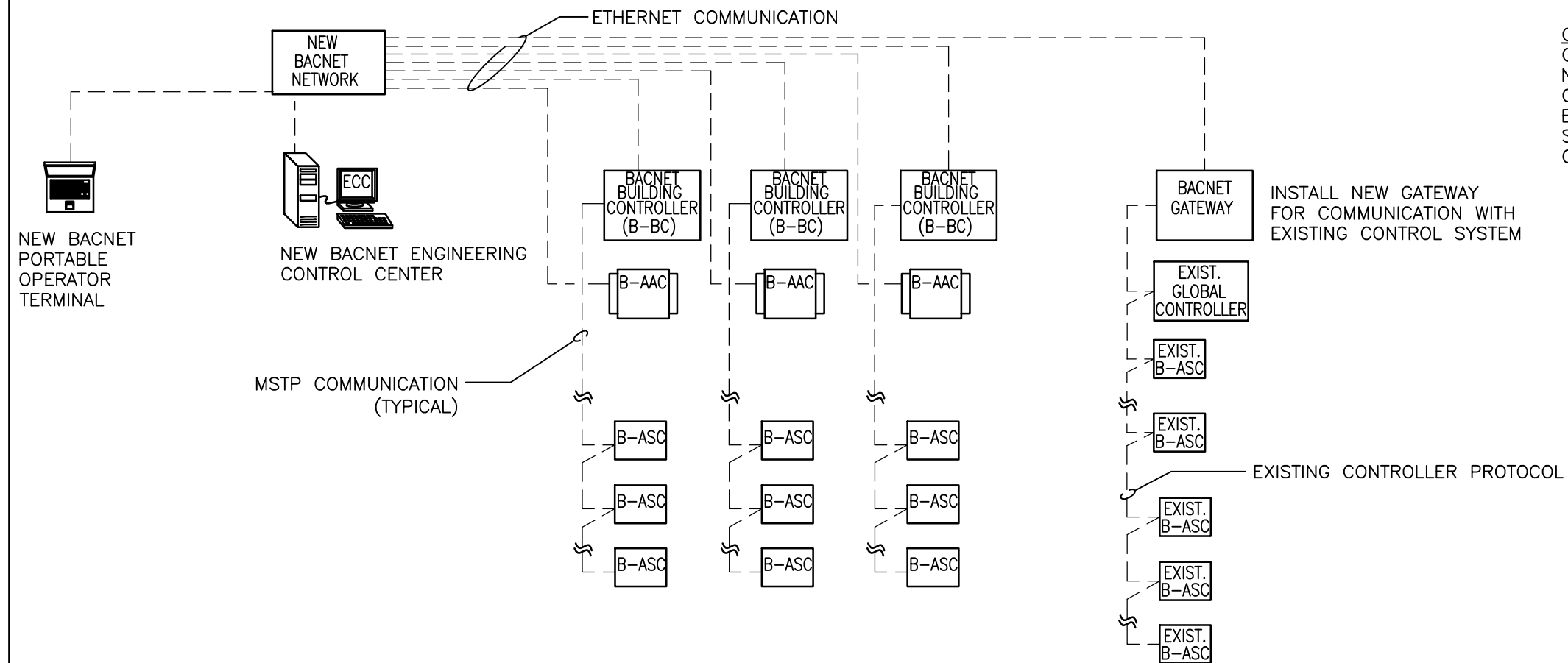
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SCALE : NONE

DATE ISSUED: SEPTEMBER 2010

CAD DETAIL NO.: SD230923-11.DWG

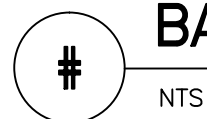


CONTROL SYSTEM CONFIGURATION
 OPTION 2 –
 NEW BACNET ECC, INSTALL NEW BACNET
 CONTROLS ON CURRENT PROJECT, PROVIDE
 BACNET GATEWAY FOR EXISTING CONTROL
 SYSTEM. INSTALL NEW BACNET
 COMMUNICATION NETWORK.

INSTALL NEW GATEWAY
 FOR COMMUNICATION WITH
 EXISTING CONTROL SYSTEM

EXISTING CONTROLLER PROTOCOL

- NOTES:
1. REPLACE EXISTING ECC WITH NEW BACNET (B-AWS) ENGINEERING CONTROL CENTER (ECC).
 2. EXISTING CONTROLLERS TO REMAIN.
 3. INSTALL NEW BACNET GATEWAY WITH FULL COMMUNICATION TO EXISTING CONTROLLERS.
 4. INSTALL NEW BACNET COMMUNICATION NETWORK.
 5. INSTALL MULTIPLE BUILDING CONTROLLERS AS REQUIRED.
 6. INSTALL NEW CONTROLLERS (B-AAC/B-ASC) AS REQUIRED.
 7. PROVIDE NEW PORTABLE OPERATORS TERMINAL.



BACNET SYSTEM ARCHITECTURE OPTION 2

DETAIL TITLE / BACNET SYSTEM ARCHITECTURE OPTION 2

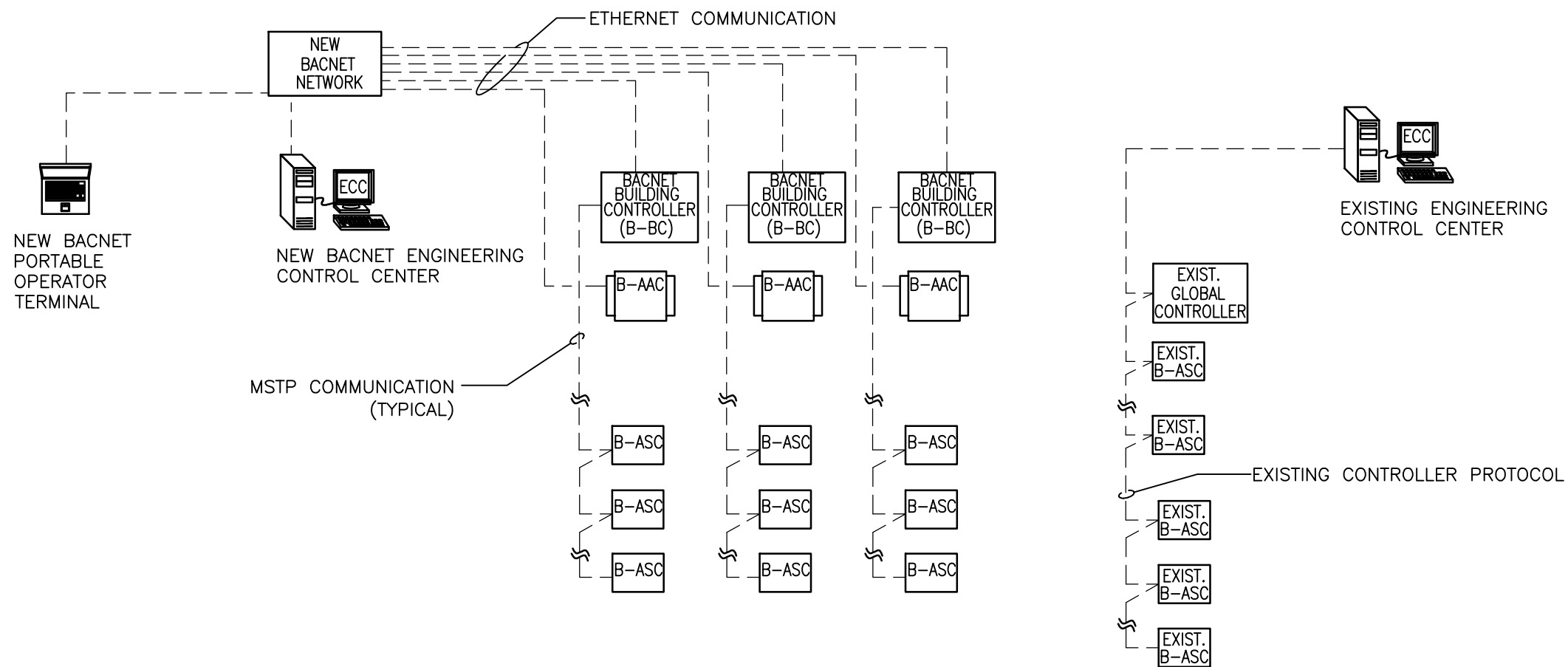
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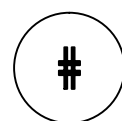
DATE ISSUED: SEPTEMBER 2010

CAD DETAIL NO.: SD230923-12.DWG



CONTROL SYSTEM CONFIGURATION
 OPTION 3 –
 NEW BACNET ECC, INSTALL NEW
 BACNET CONTROLS ON CURRENT
 PROJECT. INSTALL NEW
 COMMUNICATIONS NETWORK. EXISTING
 ECC AND CONTROL TO REMAIN

- NOTES:
1. INSTALL NEW BACNET (B-AWS) ENGINEERING CONTROL CENTER (ECC).
 2. EXISTING ECC, ASSOCIATED COMMUNICATION NETWORK AND CONTROLLERS TO REMAIN.
 3. INSTALL NEW BACNET COMMUNICATION NETWORK.
 4. INSTALL MULTIPLE BUILDING CONTROLLERS (B-BC) AS REQUIRED.
 5. INSTALL NEW CONTROLLERS (B-AAC, B-ASC) AS REQUIRED.
 6. PROVIDE NEW PORTABLE OPERATORS TERMINAL.



BACNET SYSTEM ARCHITECTURE OPTION 3

NTS

DETAIL TITLE / BACNET SYSTEM ARCHITECTURE OPTION 3

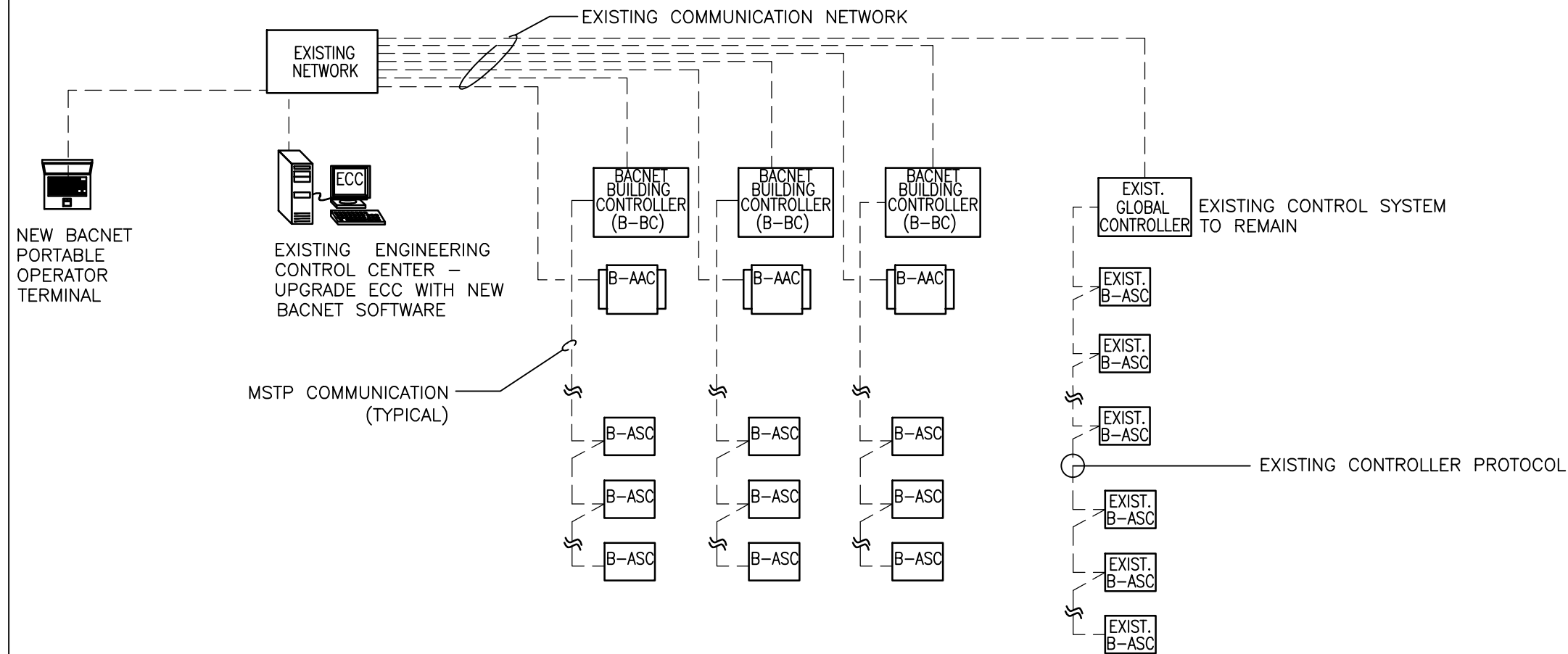
Department of
Veterans Affairs



SCALE : NONE

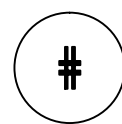
DATE ISSUED: SEPTEMBER 2010

CAD DETAIL NO.: SD230923-13.DWG



CONTROL SYSTEM CONFIGURATION
 OPTION 4 -
 EXISTING ECC TO REMAIN, INSTALL
 NEW BACNET SOFTWARE ON EXISTING
 ECC. EXISTING CONTROL SYSTEM
 SOFTWARE TO CO-EXIST ON ECC.
 INSTALL NEW BACNET CONTROLS ON
 CURRENT PROJECT, EXISTING CONTROL
 SYSTEM TO REMAIN, RE-USE EXISTING
 COMMUNICATION NETWORK.

- NOTES:
1. INSTALL NEW BACNET SOFTWARE ON EXISTING ENGINEERING CONTROL CENTER (ECC.)
 2. REUSE EXISTING COMMUNICATION NETWORK.
 3. EXISTING CONTROLLERS TO REMAIN.
 4. INSTALL MULTIPLE BUILDING CONTROLLERS AS REQUIRED.
 5. INSTALL NEW CONTROLLERS (B-AAC, B-ASC) AS REQUIRED,
 6. PROVIDE NEW PORTABLE OPERATORS TERMINAL.



BACNET SYSTEM ARCHITECTURE OPTION 4

NTS

DETAIL TITLE / BACNET SYSTEM ARCHITECTURE OPTION 4

Department of
Veterans Affairs



SCALE : NONE

DATE ISSUED: SEPTEMBER 2010

CAD DETAIL NO.: SD230923-14.DWG



SEQUENCE OF OPERATION FOR AIR HANDLING UNIT FOR SURGICAL SUITE (VAV)

1. GENERAL

_1.1 UNIT IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. THE UNIT WILL NORMALLY OPERATE 24 HOUR/DAY. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN THE UNIT IS "OFF" D-1, D-3, D-4 AND SHALL BE FULLY CLOSED. WHEN THE UNIT IS "ON" D-4, SD-1 AND SD-2 SHALL BE FULLY OPEN. D-1, D-2 AND D-3 SHALL MODULATE IN ACCORDANCE WITH THE FOLLOWING SEQUENCE:

2. TEMPERATURE CONTROL

- _2.1 SUPPLY AIR TEMPERATURE SETPOINT (AS SET BY ECC), SENSED BY SENSOR TT-1, SHALL BE MAINTAINED BY SEQUENCING V-1 AND V-2. HEATING AND COOLING CONTROL VALVES SHALL BE MODULATED VIA PID CONTROL LOOP TO MAINTAIN THE SUPPLY AIR TEMP. VALVES V-1 AND V-2 SHALL NOT BE OPENED SIMULTANEOUSLY.
- 2.2 WHEN THE OUTSIDE AIR ENTHALPY AS CALCULATED BY TT-2 AND MT-3 IS LOWER THAN THE RETURN AIR ENTHALPY AS CALCULATED BY TT-4 AND MT-1 AND THE OUTSIDE AIR DRY BULB IS LESS THAN THE RETURN/EXHAUST DRY BULB TT-4 THE UNIT ECONOMIZER MODE SHALL BE ENABLED. WHEN THE ECONOMIZER IS ENABLED DAMPERS D-1, D-2, AND D-3 SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR SETPOINT AS SENSED BY THE DISCHARGE AIR SENSOR TT-1.
- 2.3 WHEN THE OUTSIDE AIR ENTHALPY, OR TEMPERATURE, IS HIGHER THAN THE RETURN AIR ENTHALPY, OR TEMPERATURE, THE ECONOMIZER SHALL BE DISABLED, DAMPERS D-1 AND D-3 SHALL CLOSE, D-2 SHALL OPEN AND D-4 SHALL MODULATE TO MAINTAIN THE MINIMUM OUTSIDE AIR CFM SETPOINT.

3. AIR FLOW CONTROL

- _3.1 THE SUPPLY AIR FLOW SHALL BE CONTROLLED BY THE DIGITAL CONTROL PANEL MODULATING THE SUPPLY FAN VARIABLE SPEED MOTOR CONTROLLER TO MAINTAIN THE TOTAL SUPPLY AIR CFM DURING OCCUPIED MODE. RESET SUPPLY AIR CFM AS EACH 2 POSITION AIR TERMINAL UNIT SWITCHES TO UNOCCUPIED MODE.
- 3.2 THE DIGITAL CONTROL PANEL, USING TOTAL SUPPLY AIR AND RETURN AIR FLOW SIGNALS, SHALL RESET THE RETURN AIR FAN TO MAINTAIN A CONSTANT AIR FLOW DIFFERENCE BETWEEN THE SUPPLY AIR AND THE RETURN AIR EQUAL TO MINIMUM OUTSIDE AIR.
- 3.3 USING HIGH PRESSURE SENSOR PSH LOCATED AT THE SUPPLY FAN DISCHARGE, SHALL PREVENT THE SUPPLY FAN FROM DEVELOPING OVER 3" [75mm] OF STATIC PRESSURE (FIELD ADJUSTABLE). IF STATIC PRESSURE AT PSH DOES EXCEED 3" [75mm] THE SUPPLY AIR FAN SHALL STOP. PSH SHALL BE HARDWIRED TO THE SUPPLY FAN AND UNIT SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE. PSH WILL REQUIRE MANUAL RESET AT THE DEVICE.
- 3.4 USING LOW PRESSURE SENSOR PSL LOCATE AT THE RETURN FAN INLET, SHALL PREVENT THE RETURN FAN FROM DEVELOPING OVER - 3" [75mm] OF NEGATIVE STATICE PRESSURE (FIELD ADJUSTABLE) IF STATIC PRESSURE AT PSL DOES EXCEED - 3" [75mm] THE RETURN AIR FAN SHALL STOP. PSL SHALL BE HARDWIRED TO THE RETURN FAN AND UNIT SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE. PSL WILL REQUIRE MANUAL RESET.

4. HUMIDITY CONTROL

- _4.1 WHEN THE DIGITAL CONTROL PANEL IS NOT CALLING FOR HUMIDITY, SENSED BY RETURN AIR HUMIDITY MT-1, 2-WAY "ON-OFF" CONTROL VALVE V-3 SHALL REMAIN CLOSED. WHEN THE DIGITAL CONTROL PANEL IS CALLING FOR HUMIDITY, V-3 SHALL REMAIN OPEN.
- 4.2 RETURN AIR HUMIDITY SHALL BE MAINTAINED AT SETPOINT OF 42° F [5.6° C] DEW POINT (ADJ) VIA DIGITAL CONTROL PANEL BY MODULATING CONTROL VALVE V-4 TO MAINTAIN THE DESIRED HUMIDITY. THE DRYBULB TRANSMITTER T-4 AND HUMIDITY TRANSMITTER H-1 IN RETURN AIR SHALL BE USED TO CALCULATE RETURN AIR DEW POINT TEMPERATURE. V-3 SHALL BE CLOSED WHENEVER THE RETURN AIR DEWPOINT IS > 45° F [7°C]. DCP SHALL CLOSE VALVE V-3 WHENEVER THE SUPPLY FAN IS OFF. VALVE V-4 SHALL BE INTERLOCKED WITH A TEMPERATURE SWITCH TO KEEP THE HUMIDIFIER OFF UNTIL CONDENSATE TEMPERATURE APPROACHES STEAM TEMPERATURE.

5. FREEZE PROTECTION

- _5.1 IF THE AIR TEMPERATURE AS SENSED BY TT-3 FALLS BELOW 45°F [7°C], AN ALARM SIGNAL SHALL INDICATE AT THE DCP AND ECC. IF THIS TEMPERATURE FALLS BELOW 40°F [4.4°C], AS SENSED BY THE TSL THE SUPPLY AND RETURN FANS SHALL SHUT DOWN AND A CRITICAL ALARM SHALL INDICATE AT THE DIGITAL CONTROL PANEL AND ECC. TSL SHALL BE HARDWIRED TO THE SUPPLY FAN AND RETURN FAN AND BOTH SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE. TSL WILL REQUIRE MANUAL RESET AT THE DEVICE.

6. LOSS OF COOLING PROTECTION

- _6.1 IF THE AIR TEMPERATURE AS SENSED BY TT-1 RAISES ABOVE 65°F [18°C], AN ALARM SIGNAL SHALL INDICATE AT THE DCP AND ECC. IF THIS TEMPERATURE RAISES ABOVE 70°F [21°C], AS SENSED BY TT-1 THE SUPPLY AND RETURN FANS SHALL SHUT DOWN AND A CRITICAL ALARM SHALL INDICATE AT THE DIGITAL CONTROL PANEL AND ECC.

7. AUTOMATIC SMOKE SHUTDOWN/RESTART

- 7.1 WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTOR, SD, THE SUPPLY AND RETURN FANS SHALL SHUT "OFF" AND AN ALARM SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM. ALL SMOKE DAMPERS IN THE SUPPLY AND RETURN DUCTS SHALL CLOSE.
- 7.2 EXHAUST FANS SERVING AREA OF THE SUPPLY FAN SHALL CONTINUE TO RUN. SUPPLY AND RETURN FANS SHALL RESTART AND SMOKE DAMPERS SHALL OPEN WHEN FIRE ALARM CIRCUIT IS RESET.

8. EMERGENCY CONSTANT SPEED OPERATION

- _8.1 UPON FAILURE OF THE VSMC, THE SUPPLY AND RETURN FANS SHALL BE STARTED/STOPPED MANUALLY AT THE DIGITAL CONTROL PANEL OR THE ECC THROUGH THE BY-PASS STARTER. FANS SHALL THEN BE OPERATED AT CONSTANT SPEED.

DETAIL TITLE / SEQUENCE OF OPERATION FOR AIR HANDLING UNIT
FOR SURGICAL SUITE (VAV)

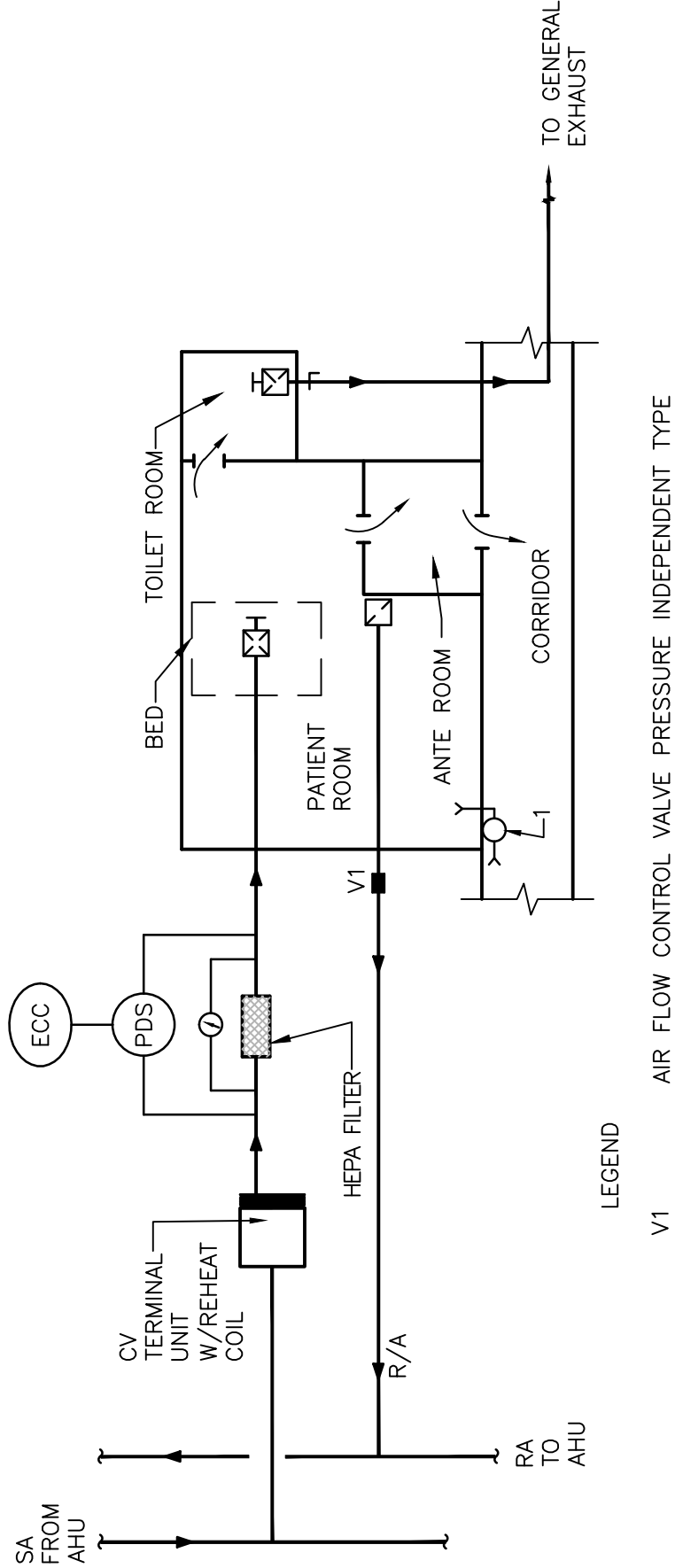
Department of
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SCALE :NONE

DATE ISSUED: SEPTEMBER 2010

CAD DETAIL NO.: SD230923-16.DWG



GENERAL NOTES:

1. MAINTAIN POSITIVE AIR PRESSURE (0.01 INCH WATER COLUMN [2.5 PASCAL]) BETWEEN THE PE ROOM AND THE ANTEROOM AND THE ANTEROOM AND THE CORRIDOR BY MODULATING VALVE V1. PE ROOMS SHALL HAVE A PERMANENTLY INSTALLED DEVICE AND/OR MECHANISM TO CONSTANTLY MONITOR THE DIFFERENTIAL AIR PRESSURE BETWEEN THE PATIENT ROOM AND THE CORRIDOR. A LOCAL VISUAL MEANS SHALL BE PROVIDED TO INDICATE WHENEVER POSITIVE DIFFERENTIAL PRESSURE IS NOT MAINTAINED. (STROBE LITE)
2. MAINTAIN THE ATTACHED TOILET, IF ANY, AT NEGATIVE AIR PRESSURE WITH RESPECT TO THE PE ROOM. HOWEVER, THE DESIGN NEED NOT INCLUDE A PRESSURE DIFFERENTIAL SENSOR FOR VERIFICATION.
3. LOCATE THE SUPPLY AIR OUTLET OVER THE PATIENT BED ON THE CEILING WITHOUT CREATING A DRAFT CAUSING PATIENT DISCOMFORT. LOCATE RETURN AIR INLET NEAR THE ROOM DOOR.

TYPICAL AIR BALANCE EXAMPLE:

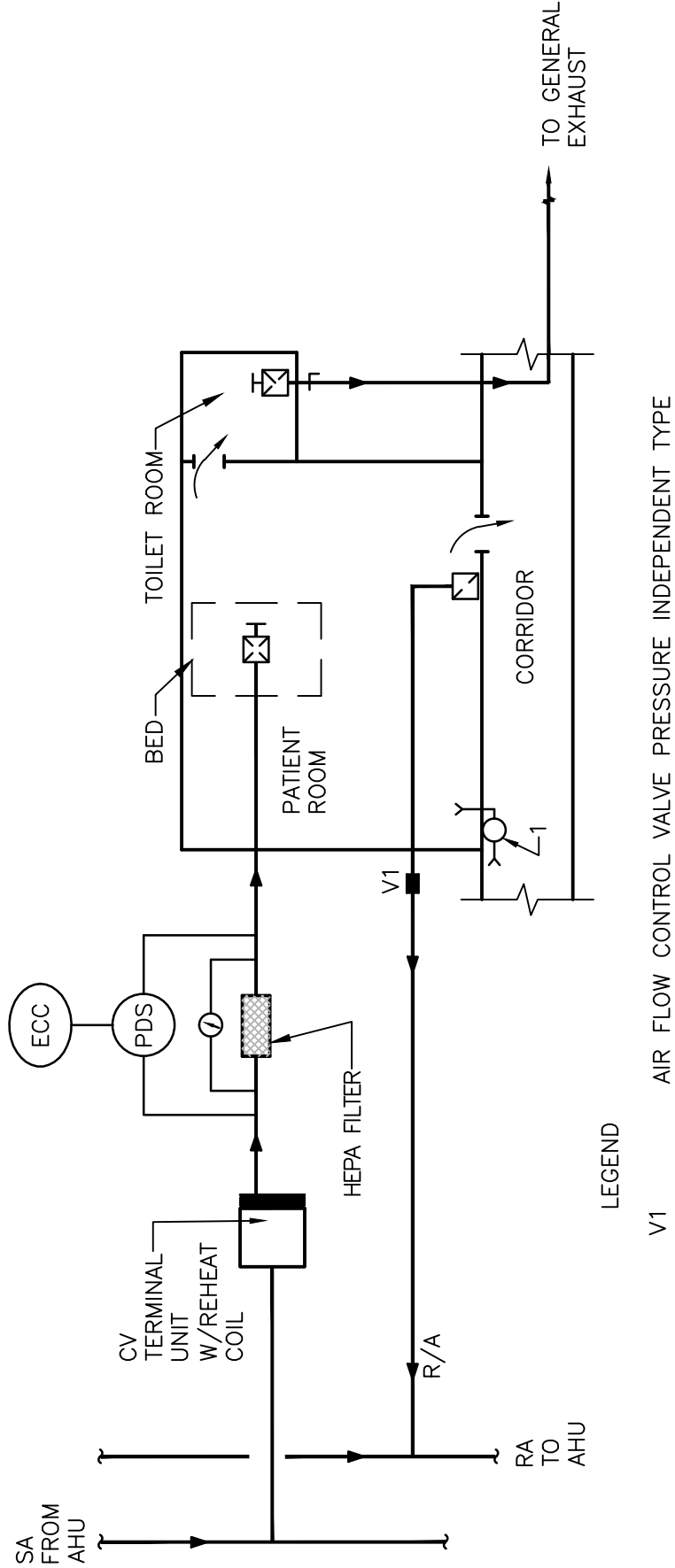
1. THE PATIENT BEDROOM IS KEPT UNDER POSITIVE PRESSURE BY ENSURING AIR MOVEMENT FROM THE BEDROOM SPACE AND THE ADJOINING CORRIDOR INTO THE ANTE ROOM.
2. THE SUPPLY AIR SYSTEM SHALL CONSIST OF THE CONSTANT VOLUME AIR DELIVERY FROM A DEDICATED AIR TERMINAL UNIT WITH REHEAT COIL TO THE ISOLATION SUITE, AS FOLLOWS:

A – PATIENT BEDROOM	12 ACPH (MINIMUM–ASHRAE STANDARD 170 2008). INCREASE THE SUPPLY AIR VOLUME IF REQUIRED TO MEET THE INSIDE DESIGN CONDITIONS IN COOLING AND/OR HEATING MODE. EXAMPLE: 400 CFM [190 L/S]
B – ANTE ROOM	SUPPLY AIR IS NOT REQUIRED FOR THIS SPACE. EXFILTRATE 100 CFM [47 L/S] OF AIR FROM PATIENT ROOM, THRU ANTE ROOM INTO THE CORRIDOR. EXAMPLE: 100 CFM [28 L/S]
C – PATIENT TOILET	DO NOT SUPPLY AIR INTO THE TOILET. DRAW MAKE–UP AIR FROM THE PATIENT’S BEDROOM AND EXHAUST AT THE RATE OF 10 ACPH OR 60 CFM [28]. EXAMPLE: 60 CFM [28 L/S]
D – RETURN AIR FROM PATIENT ROOM	400 CFM [189 L/S] (SUPPLY AIR) – 100 CFM [47 L/S] TO ANTE ROOM + 60 CFM [28 L/S] TO TOILET) = 240 CFM [115 L/S] RETURN AIR SETTING OF AFCV V1, IN THE RA DUCT.

AIR SYSTEM FOR PROTECTIVE ENVIRONMENT ROOM (PE) (WITH ANTEROOM)

NTS
DESIGNER’S NOTE:
POSITIVE PRESSURE

1. ENSURE FINAL DESIGN REFLECTS PROJECT SPECIFIC REQUIREMENTS AND MEETS ASHRAE 170, LATEST EDITION WITH **ALL** ADDENDUMS.



GENERAL NOTES:

1. MAINTAIN POSITIVE AIR PRESSURE (0.01 INCH WATER COLUMN [2.5 PASCAL]) BETWEEN THE PE ROOM AND THE SPACES THAT ARE NOT THE PE ROOMS INCLUDING THE CORRIDOR BY MODULATING VALVE V1. PE ROOMS SHALL HAVE A PERMANENTLY INSTALLED DEVICE AND/OR MECHANISM TO CONSTANTLY MONITOR THE DIFFERENTIAL AIR PRESSURE BETWEEN THE PATIENT ROOM AND THE CORRIDOR. A LOCAL VISUAL MEANS SHALL BE PROVIDED TO INDICATE WHENEVER POSITIVE DIFFERENTIAL PRESSURE IS NOT MAINTAINED. (STROBE LITE)
2. MAINTAIN THE ATTACHED TOILET, IF ANY, AT NEGATIVE AIR PRESSURE WITH RESPECT TO THE PE ROOM. HOWEVER, THE DESIGN NEED NOT INCLUDE A PRESSURE DIFFERENTIAL SENSOR FOR VERIFICATION.
3. LOCATE THE SUPPLY AIR OUTLET OVER THE PATIENT BED ON THE CEILING WITHOUT CREATING A DRAFT CAUSING PATIENT DISCOMFORT. LOCATE RETURN AIR INLET NEAR THE ROOM DOOR.

TYPICAL AIR BALANCE EXAMPLE:

1. THE PATIENT BEDROOM IS KEPT UNDER POSITIVE PRESSURE BY ENSURING AIR MOVEMENT FROM THE BEDROOM SPACE AND THE ADJOINING CORRIDOR.
2. THE SUPPLY AIR SYSTEM SHALL CONSIST OF THE CONSTANT VOLUME AIR DELIVERY FROM A DEDICATED AIR TERMINAL UNIT WITH REHEAT COIL TO THE ISOLATION SUITE, AS FOLLOWS:

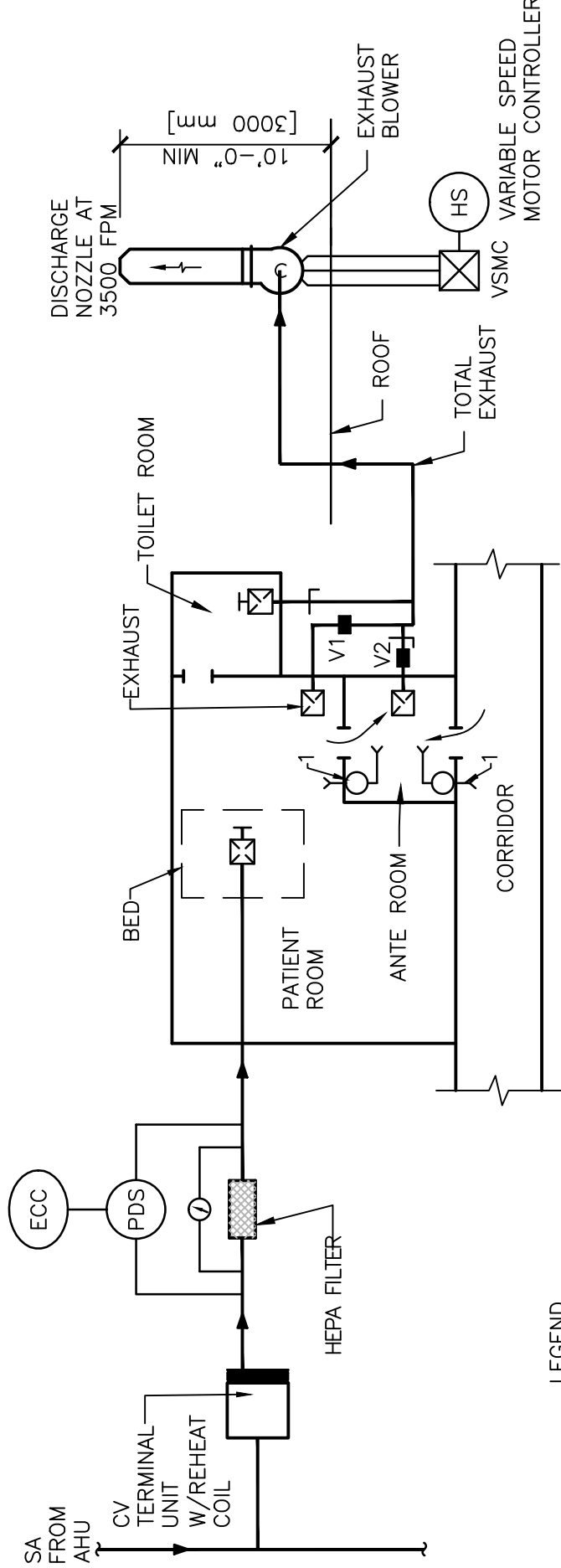
A – PATIENT BEDROOM 12 ACPH (MINIMUM–ASHRAE STANDARD 170 2008). INCREASE THE SUPPLY AIR VOLUME IF REQUIRED TO MEET THE INSIDE DESIGN CONDITIONS IN COOLING AND/OR HEATING MODE.
EXAMPLE: 400 CFM [190 L/S]

B – PATIENT TOILET DO NOT SUPPLY AIR INTO THE TOILET. DRAW MAKE–UP AIR FROM THE PATIENT’S BEDROOM AND EXHAUST AT THE RATE OF 10 ACPH OR 60 CFM [28 L/S]. EXAMPLE: 60 CFM [28 L/S]

C – RETURN AIR FROM PATIENT ROOM 400 CFM [189 L/S] (SUPPLY AIR) – 100 CFM [47 L/S] TO CORRIDOR + 60 CFM [28 L/S] TO TOILET) = 240 CFM [115 L/S] SETTING OF AFCV V1, IN THE RA DUCT.

AIR SYSTEM FOR PROTECTIVE ENVIRONMENT
ROOM (PE) (WITHOUT ANTEROOM)

NTS
DESIGNER’S NOTE:
1. ENSURE FINAL DESIGN REFLECTS PROJECT SPECIFIC REQUIREMENTS AND MEETS ASHRAE 170, LATEST EDITION WITH **ALL** ADDENDUMS.



LEGEND

V1 AND V2 AIR FLOW CONTROL VALVES PRESSURE INDEPENDENT TYPE

GENERAL NOTES:

1. ANTEROOM SHALL BE MAINTAINED AT A NEGATIVE PRESSURE (0.01 INCH WATER COLUMN [2.5 PASCAL] WITH RESPECT TO BOTH AII/PE ROOM AND THE CORRIDOR OR ANY ADJOINING SPACE BY MODULATING VALVE V2. VALVE V1 IS USED TO MAINTAIN A POSITIVE PRESSURE BETWEEN THE PATIENT ROOM AND THE ANTE ROOM. COMBO ROOMS SHALL HAVE PERMANENTLY INSTALLED DEVICES AND/OR MECHANISMS TO CONSTANTLY MONITOR THE DIFFERENTIAL AIR PRESSURE BETWEEN THE PATIENT ROOM AND ANTE ROOM AND THE CORRIDOR AND THE ANTE ROOM. A LOCAL VISUAL MEANS SHALL BE PROVIDED TO INDICATE WHENEVER POSITIVE DIFFERENTIAL PRESSURE IS NOT MAINTAINED IN THE PATIENT ROOM WITH RESPECT TO THE ANTE ROOM (STROBE LITE).A LOCAL VISUAL MEANS SHALL BE PROVIDED TO INDICATE WHENEVER NEGATIVE DIFFERENTIAL PRESSURE IS NOT MAINTAINED IN THE ANTE ROOM WITH RESPECT TO THE CORRIDOR (STROBE LITE).

2. MAINTAIN THE ATTACHED TOILET, IF ANY, AT NEGATIVE AIR PRESSURE WITH RESPECT TO THE AII/PE ROOM. HOWEVER, THE DESIGN NEED NOT INCLUDE A PRESSURE DIFFERENTIAL SENSOR FOR VERIFICATION.
3. LOCATE THE SUPPLY AIR OUTLET OVER THE PATIENT BED ON THE CEILING WITHOUT CREATING A DRAFT CAUSING PATIENT DISCOMFORT. LOCATE EXHAUST AIR INLET NEAR THE PATIENT ROOM DOOR.

TYPICAL AIR BALANCE EXAMPLE:

1. THE PATIENT BEDROOM IS KEPT UNDER POSITIVE PRESSURE BY ENSURING AIR MOVEMENT FROM THE BEDROOM SPACE TO THE ANTE ROOM BY MODULATING VALVE V1. THE ANTE ROOM IS KEPT AT NEGATIVE PRESSURE WITH RESPECT TO THE CORRIDOR BY MODULATING VALVE V2.

2. THE SUPPLY AIR SYSTEM SHALL CONSIST OF THE CONSTANT VOLUME AIR DELIVERY FROM A DEDICATED AIR TERMINAL UNIT WITH REHEAT COIL TO THE ISOLATION SUITE AS FOLLOWS:

A – PATIENT BEDROOM

MINIMUM 12 ACPH SUPPLY AIR (ASHRAE STANDARD 170 2008). INCREASE SUPPLY AIR VOLUME, IF REQUIRED, TO MEET THE INSIDE DESIGN CONDITIONS IN COOLING AND/OR HEATING MODES. EXAMPLE: 400 CFM [190 L/S]

B – ANTE ROOM

SUPPLY AIR IS NOT REQUIRED FOR THIS SPACE. EX-FILTRATE PATIENT ROOM AIR AND CORRIDOR AIR TO EXHAUST MINIMUM 10 ACPH (ASHRAE STANDARD 170) AS MEASURED AND CONTROLLED BY VALVE V-2. FOR THIS EXAMPLE INFILTRATE 100 CFM [47 L/S] FROM CORRIDOR INTO THE ANTEROOM + 60 CFM [28 L/S] FROM THE AII/PE ROOM. THIS WILL ENSURE THE ANTE ROOM IS NEGATIVE WITH RESPECT TO THE AII/PE ROOM AND WITH RESPECT TO THE CORRIDOR.

C – PATIENT TOILET

DO NOT SUPPLY AIR INTO THE TOILET. DRAW MAKE-UP AIR FROM THE PATIENT’S BEDROOM AND EXHAUST AT THE RATE OF 10 ACPH OR 60 CFM [28 L/S]. EXAMPLE: 60 CFM [28 L/S]

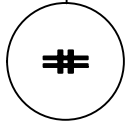
3. THE DEDICATED EXHAUST AIR SYSTEM SHALL BE BALANCED AS FOLLOWS:

A – PATIENT BEDROOM

400 CFM [190 L/S](SUPPLY) – 60 CFM [28 L/S](TOILET) – 40 CFM [19 L/S] (ANTE ROOM). 300 CFM [140 L/S] AII/PE ROOM EXHAUST. 100 CFM [47 L/S] INFILTRATED FROM CORRIDOR INTO ANTE ROOM + 40 CFM [19 LS] EXFILTRATE FROM AII/PE ROOM INTO ANTE ROOM, 140 CFM [65 L/S] EXHAUST, TOTAL EXHAUST 500 CFM [240 L/S]

4. COORDINATE DOORS UNDER CUTS FOR DOOR BETWEEN ANTE ROOM AND PATIENT (1”)[2.54 CM], DOOR TO CORRIDOR.

AIR SYSTEM FOR COMBINATION AIRBORNE INFECTION ISOLATION (AII)/PROTECTIVE ENVIRONMENT (PE) ROOM WITH NEGATIVE ANTEROOM

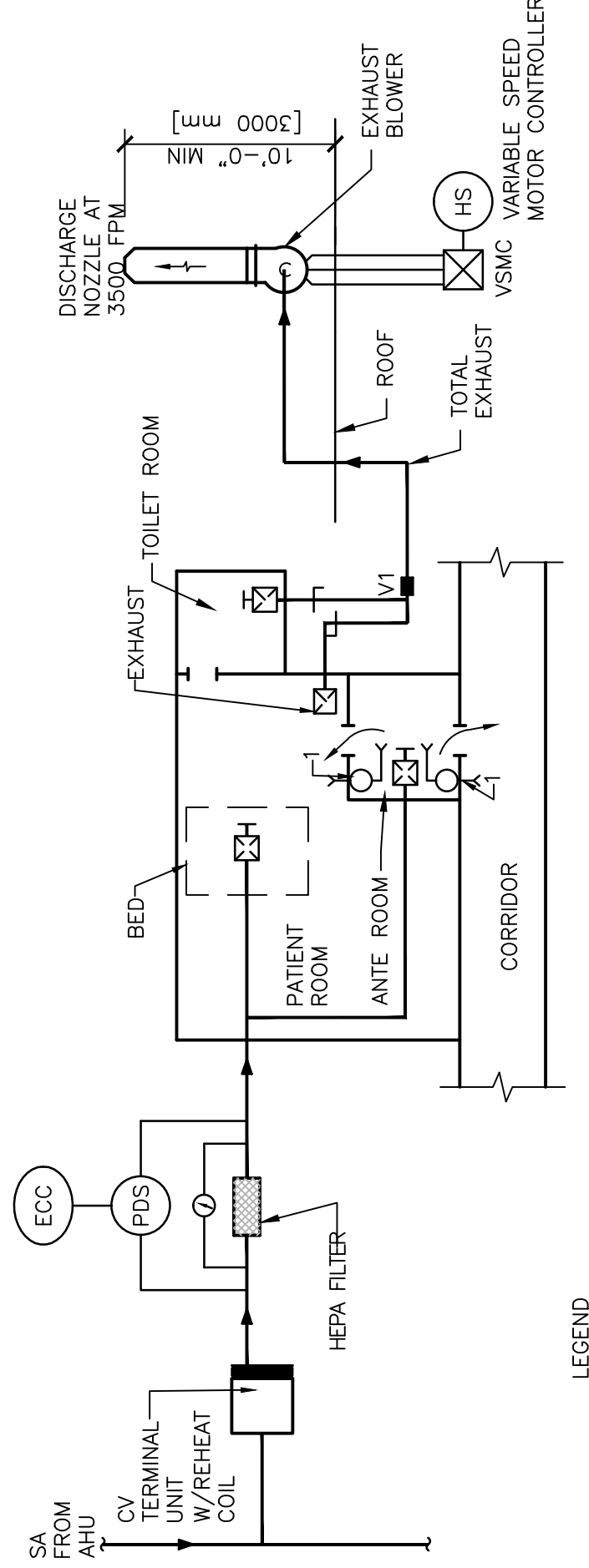


NTS

NEGATIVE PRESSURE

DESIGNER’S NOTE:

1. ENSURE FINAL DESIGN REFLECTS PROJECT SPECIFIC REQUIREMENTS AND MEETS ASHRAE 170, LATEST EDITION WITH **ALL** ADDENDUMS.



LEGEND

V1

AIR FLOW CONTROL VALVE PRESSURE INDEPENDENT TYPE

GENERAL NOTES:

1. ANTEROOM SHALL BE MAINTAINED AT A POSITIVE PRESSURE (0.01 INCH WATER COLUMN [2.5 PASCAL]) WITH RESPECT TO BOTH AII/PE ROOM AND THE CORRIDOR OR ANY ADJOINING SPACE BY MODULATING VALVE V1. COMBO ROOMS SHALL HAVE PERMANENTLY INSTALLED DEVICES AND/OR MECHANISMS TO CONSTANTLY MONITOR THE DIFFERENTIAL AIR PRESSURE BETWEEN THE PATIENT ROOM AND ANTE ROOM AND THE CORRIDOR AND ANTE ROOM. A LOCAL VISUAL MEANS SHALL BE PROVIDED TO INDICATE WHENEVER POSITIVE DIFFERENTIAL PRESSURE IS NOT MAINTAINED WITH RESPECT TO ANTE ROOM AND EITHER THE AII/PE ROOM OR THE CORRIDOR. (STOBE LITE)

2. MAINTAIN THE ATTACHED TOILET, IF ANY, AT NEGATIVE AIR PRESSURE WITH RESPECT TO THE PE ROOM. HOWEVER, THE DESIGN NEED NOT INCLUDE A PRESSURE DIFFERENTIAL SENSOR FOR VERIFICATION.
3. LOCATE THE SUPPLY AIR OUTLET OVER THE PATIENT BED ON THE CEILING WITHOUT CREATING A DRAFT CAUSING PATIENT DISCOMFORT. LOCATE EXHAUST AIR INLET NEAR THE PATIENT ROOM DOOR.

TYPICAL AIR BALANCE EXAMPLE:

1. THE PATIENT BEDROOM IS KEPT UNDER POSITIVE PRESSURE WITH RESPECT TO THE ADJOINING CORRIDOR BY MODULATING VALVE V1.
2. THE SUPPLY AIR SYSTEM SHALL CONSIST OF THE CONSTANT VOLUME AIR DELIVERY FROM A DEDICATED AIR TERMINAL UNIT WITH REHEAT COIL TO THE ISOLATION SUITE AS FOLLOWS:

A – PATIENT BEDROOM

MINIMUM 12 ACPH SUPPLY AIR (ASHRAE STANDARD 170 2008).
INCREASE SUPPLY AIR VOLUME, IF REQUIRED, TO MEET THE INSIDE
DESIGN CONDITIONS IN COOLING AND/OR HEATING MODES.
EXAMPLE: 400 CFM [190 L/S]

B - ANTE ROOM

MINIMUM 10 ACPH (ASHRAE STANDARD 170 2008) TO BE EX-FILTRATED TO THE CORRIDOR AND INTO AII/PE ROOM AS FOLLOWS: SUPPLY ANTE ROOM AT THE RATE OF 140 CFM [66 L/S] WITH 40 CFM [19 L/S] ENTERING THE AII/PE ROOM AND 100 CFM [47 L/S] EX-FILTRATED INTO THE CORRIDOR. EXAMPLE: 140 CFM [66 L/S] TOTAL SUPPLY AIR

C - PATIENT TOILET

DO NOT SUPPLY AIR INTO THE TOILET. DRAW MAKE-UP AIR FROM THE PATIENT'S BEDROOM AND EXHAUST AT THE RATE OF 10 ACPH OR 60 CFM [28 L/S]. EXAMPLE: 60 CFM [28 L/S]

3. THE DEDICATED EXHAUST AIR SYSTEM SHALL BE BALANCED AS FOLLOWS:

A - PATIENT BEDROOM

400 CFM [190 L/S] (SUPPLY) – 60 CFM [28 L/S] (TOILET) +
40 CFM [19 L/S] INFILTRATED FROM ANTE ROOM (ANTE ROOM)
380 CFM [180 L/S] EXHAUSTED FROM ALL/PE ROOM. 100 CFM
[47 L/S] IS EXFILTRATED TO CORRIDOR FROM ANTE ROOM. TOTAL
EXHAUST 440 CFM [210 L/S]

4. COORDINATE DOORS UNDER CUTS FOR DOOR BETWEEN ANTE ROOM AND PATIENT (1") [2.54 CM], DOOR TO CORRIDOR.

AIR SYSTEM FOR COMBINATION AIRBORNE

INFECTION ISOLATION (AI)/PROTECTIVE

ENVIRONMENT (PE) ROOM WITH POSITIVE ANTEROOM

#

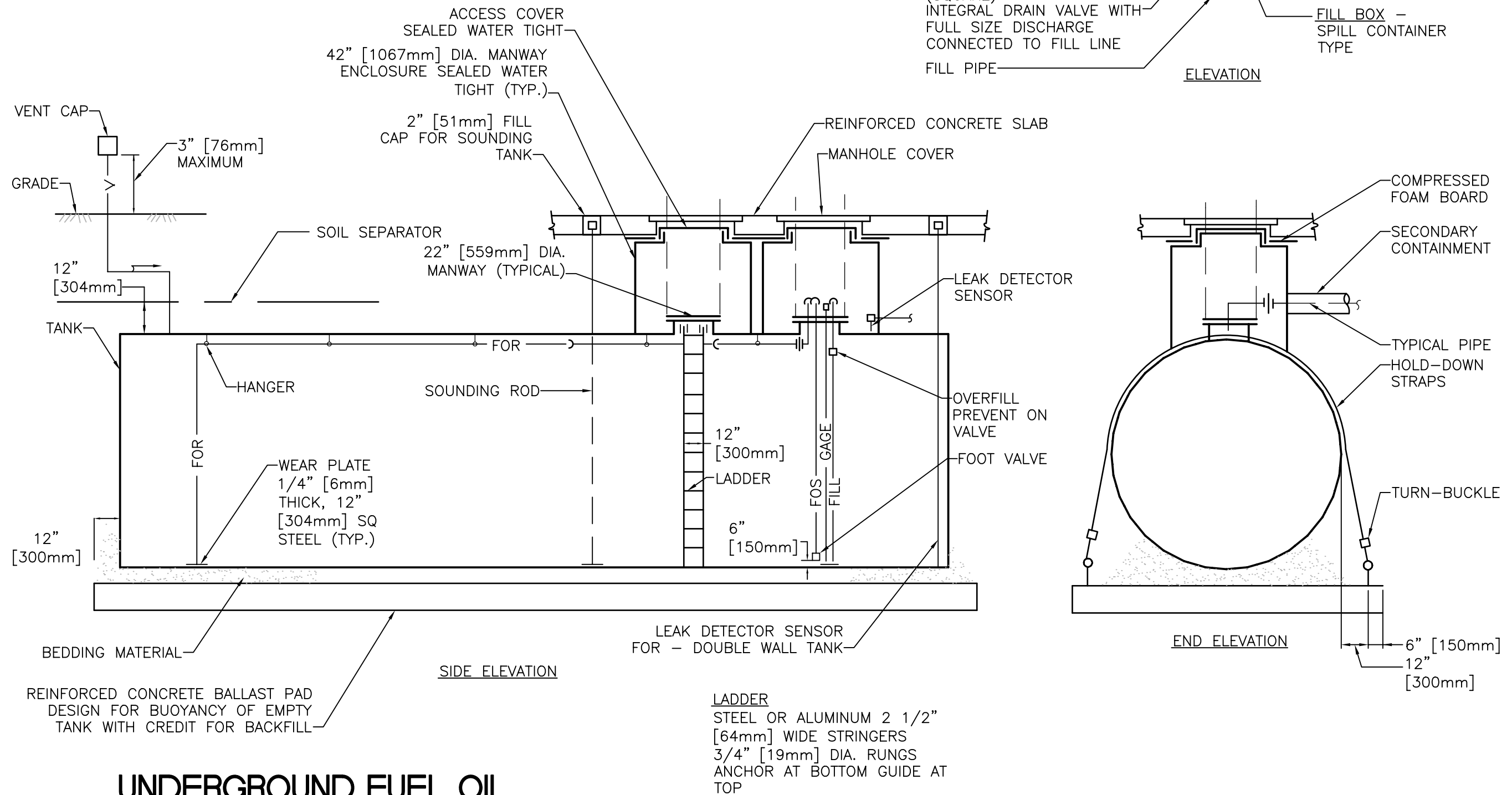
NTS

POSITIVE PRESSURE

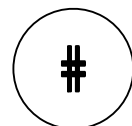
DESIGNER'S NOTE:

1. ENSURE FINAL DESIGN REFLECTS PROJECT SPECIFIC REQUIREMENTS AND MEETS ASHRAE 170, LATEST EDITION WITH **ALL** ADDENDUMS:

NOTE: THIS DETAIL SHOWS BASIC REQUIREMENTS ONLY AND IS NOT INTENDED FOR USE ON PROJECT DRAWINGS. THE PROJECT ENGINEER MUST PROVIDE A COMPLETE DESIGN WHICH CONFORMS TO PROJECT REQUIREMENTS.



UNDERGROUND FUEL OIL STORAGE TANK



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DETAIL TITLE / UNDERGROUND FUEL OIL STORAGE TANK

Department of
Veterans Affairs



SCALE : NONE

DATE ISSUED : DECEMBER 2008

CADD DETAIL NO. SD231000-01.DWG



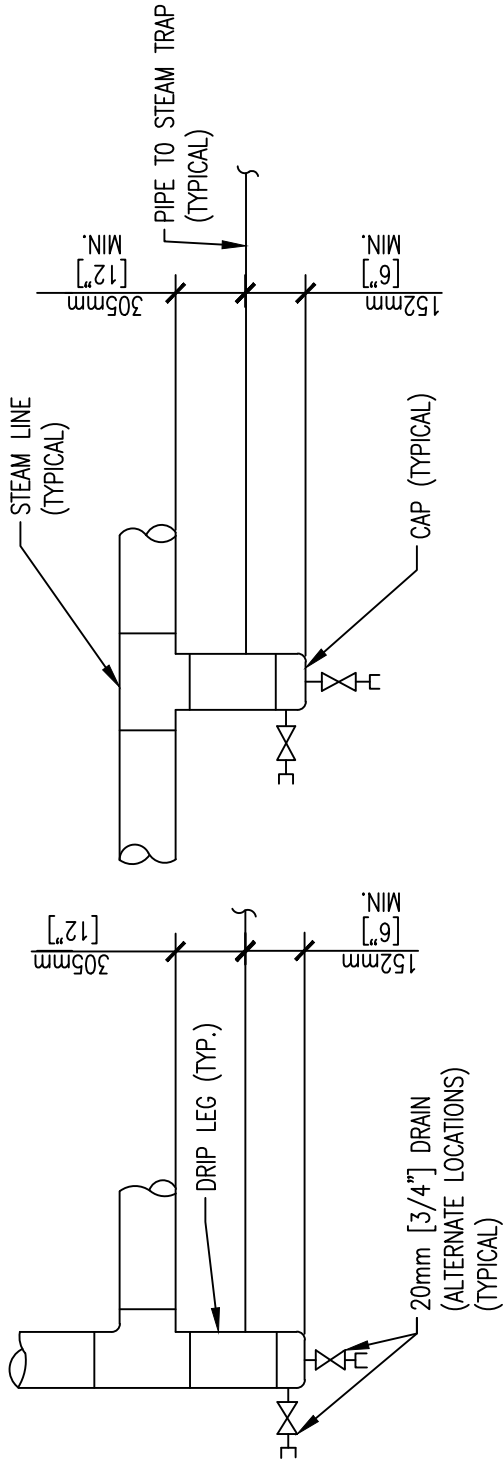
Department of
Veterans Affairs

DETAIL TITLE: STEAM LINE DRIP POCKET
STEAM TRAP ASSEMBLY

SCALE :NONE

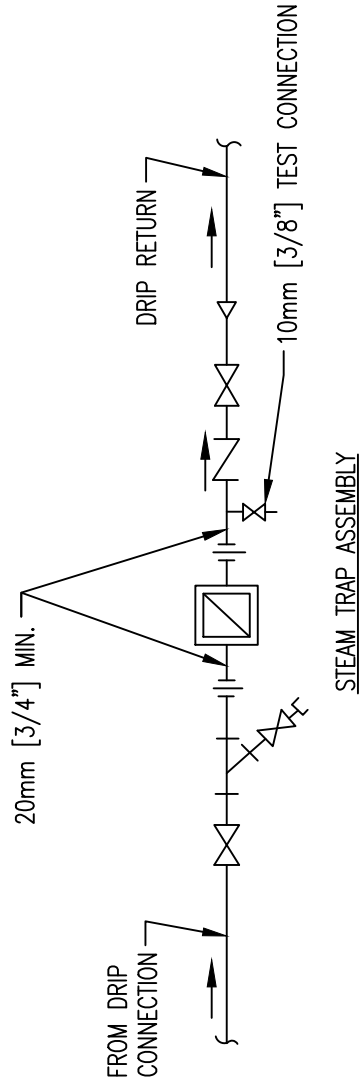
DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD232111-01.DWG



STEAM LINE DRIP POCKET

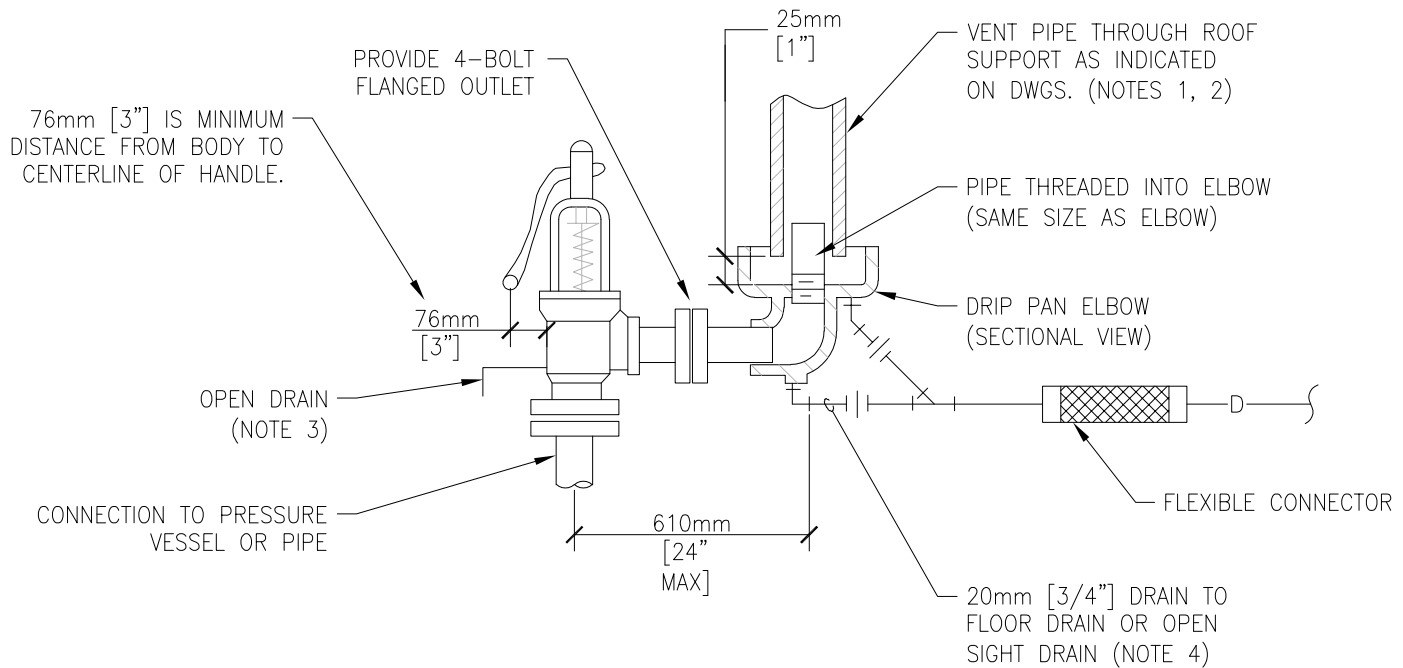
NOTE:
DRIP POCKET PIPE SIZE SAME AS STEAM
MAIN UNLESS OTHERWISE NOTED.



#

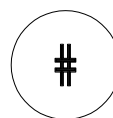
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STEAM LINE DRIP POCKET AND STEAM TRAP ASSEMBLY



NOTES:

1. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, SIZE THE VENT PIPE SO THAT STEAM IS NOT BLOWN OUT AT THE VENT PIPE ENTRANCE. UTILIZE THE CALCULATION METHOD CONTAINED IN ANSI B31.1. POWER PIPING CODE, APPENDIX II.
2. VENT PIPE SHALL TERMINATE 1829mm [6'] MIN. ABOVE FINISHED ROOF.
3. DISCHARGE OF DRAIN SHALL BE DIRECTED AWAY FROM PLATFORMS OR OTHER AREAS WHICH PERSONNEL MAY OCCUPY.
4. NO OTHER DRAIN SHALL BE CONNECTED TO THE DRIP PAN ELBOW DRAIN PIPE.



STEAM SAFETY VALVE

NTS

VA



U.S. Department
of Veterans Affairs

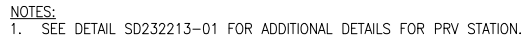
DETAIL TITLE / STEAM SAFETY VALVE

SCALE: NONE

DATE ISSUED: NOVEMBER 1, 2020

SD232111-02 DWG

1. PROJECT DESIGN AND FLOW DIAGRAM SHALL BE IN CONFORMANCE WITH SPECIFICATIONS.
2. SHOW VALVES THREADED OR FLANGED TO SUIT THE PROJECT.
3. ENGINEERING NOTES FOR MPS DISTRIBUTION PRV ARE TYP. FOR ALL PRVS.
4. PRIMARY ELEMENT LOCATIONS SHALL CONFORM TO REQUIREMENTS OF INSTRUMENT MANUFACTURER.
5. DELETE "DESIGNER NOTES" FROM PROJECT DRAWINGS WHEN COMPLETED.
6. SHOW ALL PIPE SIZES.
7. DO NOT SCHEDULE BOILER SAFETY VALVES.
8. DO NOT SIZE VENT PIPES FROM BOILER SAFETY VALVES. CONTRACTOR MUST DO THIS BASED ON VALVES FURNISHED.



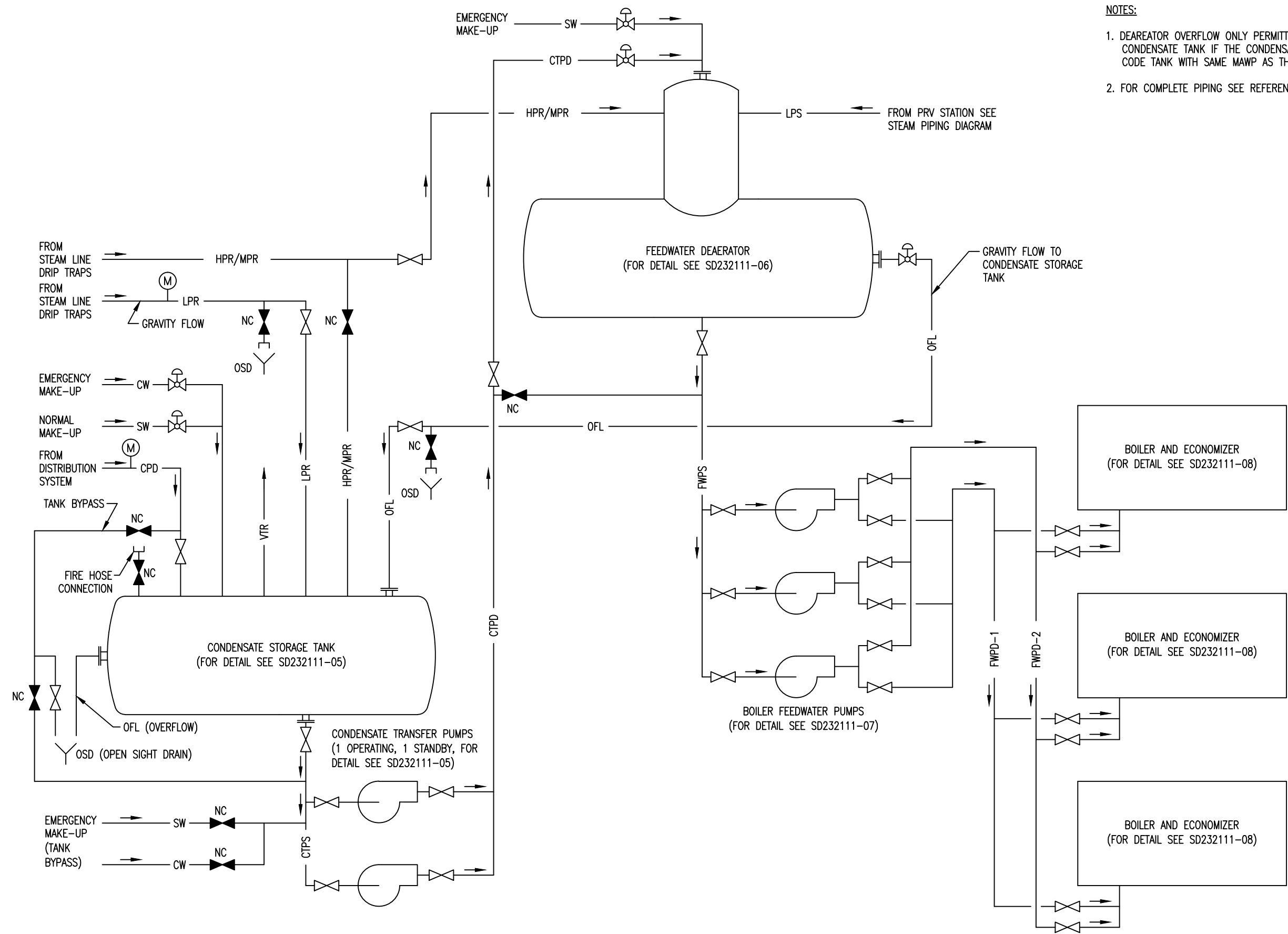
NTS



U.S. Department
of Veterans Affairs

DATE ISSUED: NOVEMBER 1, 2020

SD232111-03.DWG



- NOTES:
- 1. DEAREATOR OVERFLOW ONLY PERMITTED TO GO TO CONDENSATE TANK IF THE CONDENSATE TANK IS A ASME CODE TANK WITH SAME MAWP AS THE DEAREATOR.
 - 2. FOR COMPLETE PIPING SEE REFERENCED DETAILS.

BASIC FLOW DIAGRAM - CONDENSATE AND BOILER FEEDWATER
NTS

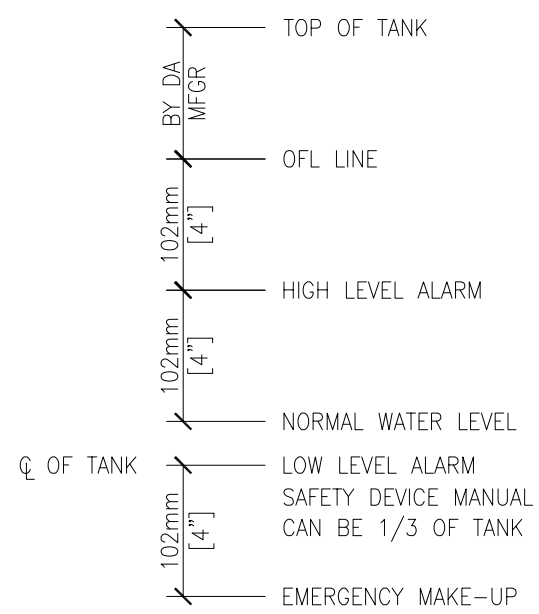
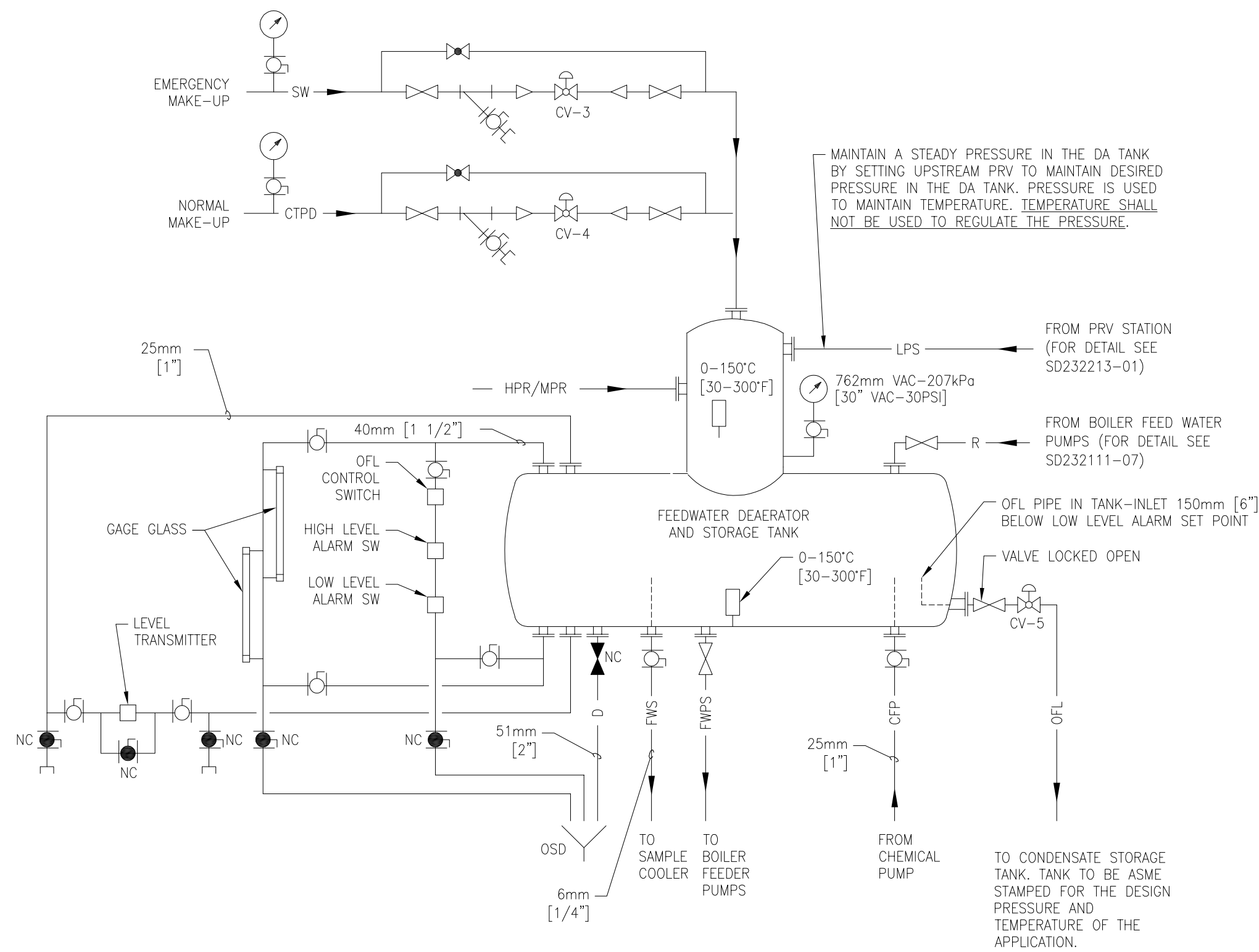


CONDENSATE STORAGE AND TRANSFER FLOW DIAGRAM

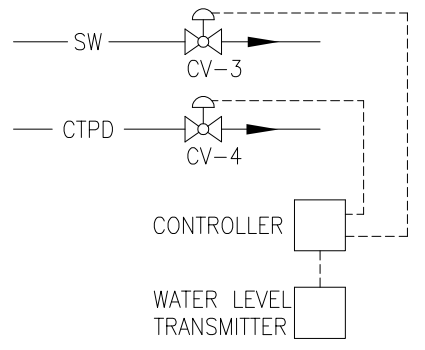
NTS



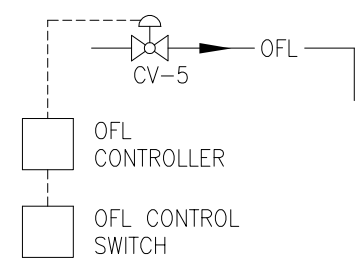
CAD DETAIL NO.: SD232111-05.DWG



WATER LEVEL CONTROL/ALARM POINTS



WATER LEVEL CONTROL SCHEMATIC



OVERFLOW CONTROL SCHEMATIC

DESIGNER'S NOTE:
1. SEE SD232111-04 BASIC FLOW DIAGRAM - CONDENSATE AND BOILER FEEDWATER FOR COMPLETE SYSTEM.
2. DELETE DESIGNER'S NOTE WHEN COMPLETED.

#

FEEDWATER DEAERATOR FLOW DIAGRAM

NTS

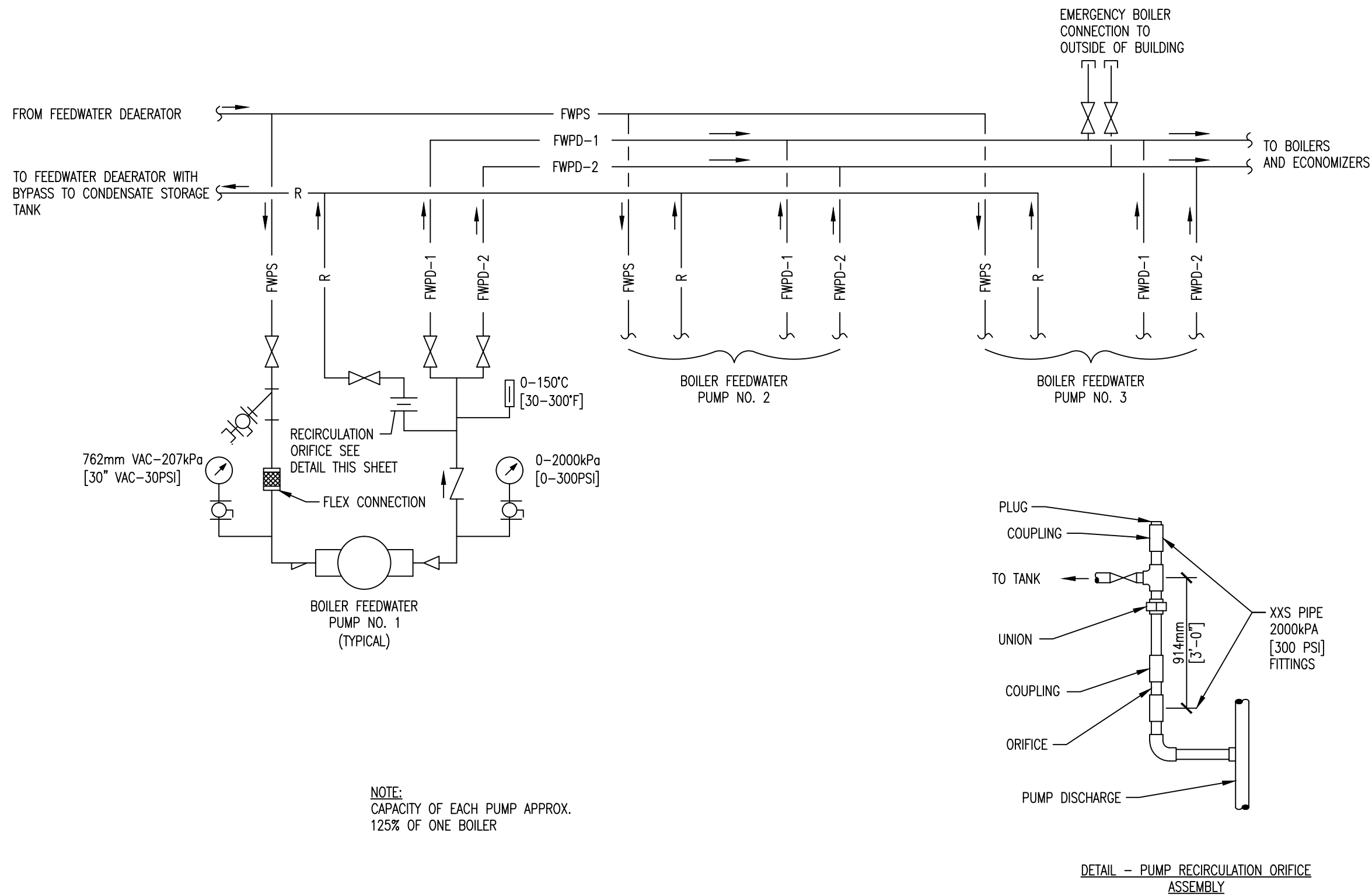
DETAIL TITLE / FEEDWATER DEAERATOR FLOW DIAGRAM



SCALE: NONE

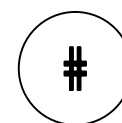
DATE ISSUED: NOVEMBER 1, 2020

SD232111-06.DWG



NOTE:
CAPACITY OF EACH PUMP APPROX.
125% OF ONE BOILER

DESIGNER'S NOTE:
SEE SD232111-04 BASIC FLOW DIAGRAM - CONDENSATE
AND BOILER FEEDWATER FOR COMPLETE SYSTEM.



BOILER FEEDWATER PUMPS FLOW DIAGRAM

NTS

DETAIL TITLE: BOILER FEEDWATER PUMPS FLOW DIAGRAM

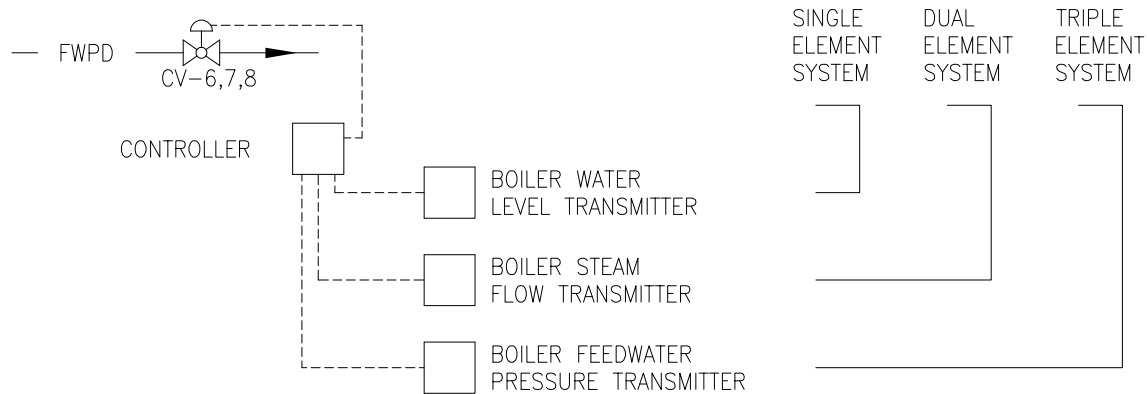
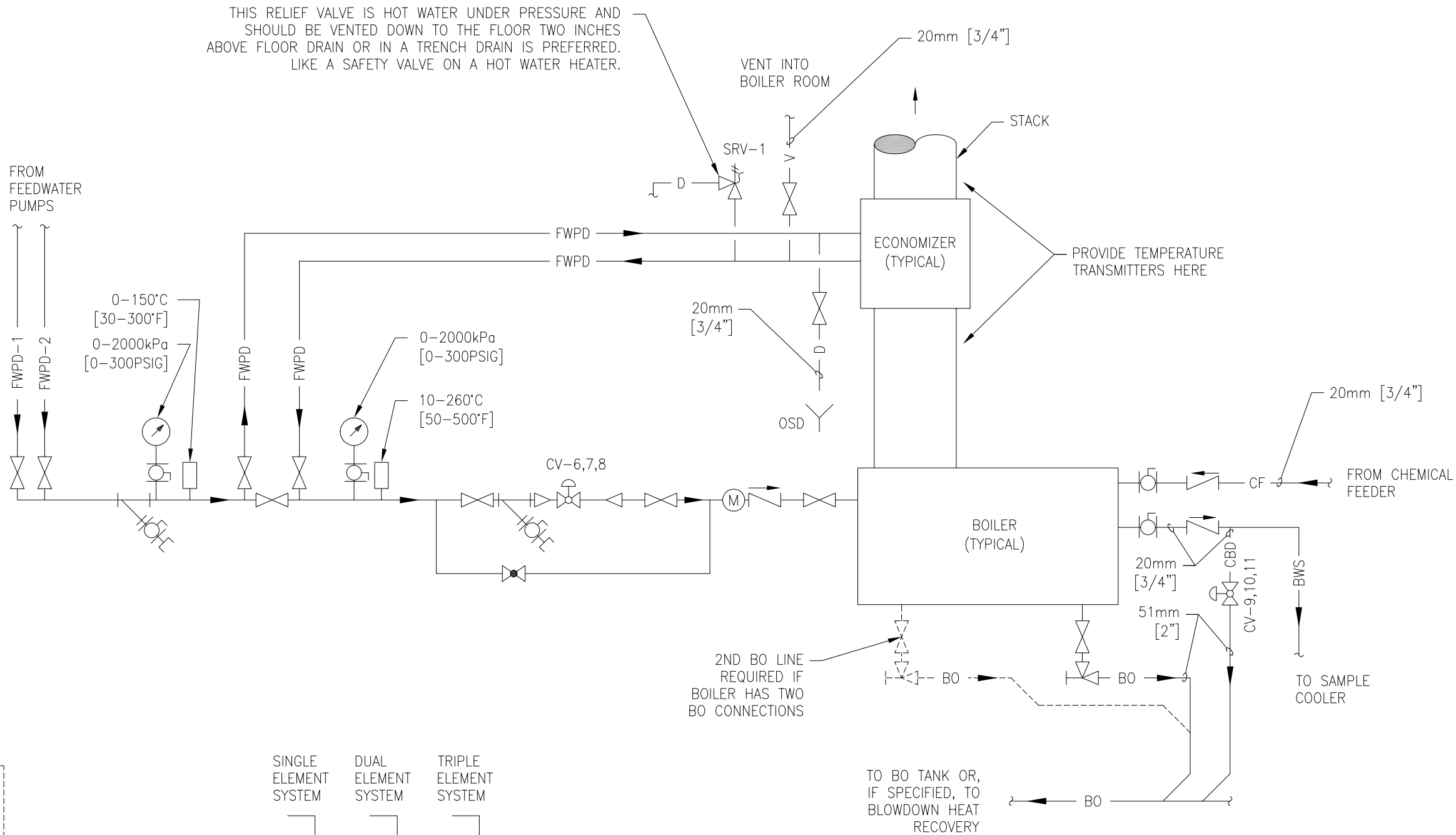
Department of
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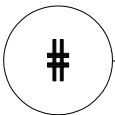
SCALE : NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD232111-07.DWG



BOILER WATER LEVEL CONTROL SCHEMATIC
(SEE SPECS FOR TYPE OF SYSTEM)



BOILER FLOW DIAGRAM

NTS

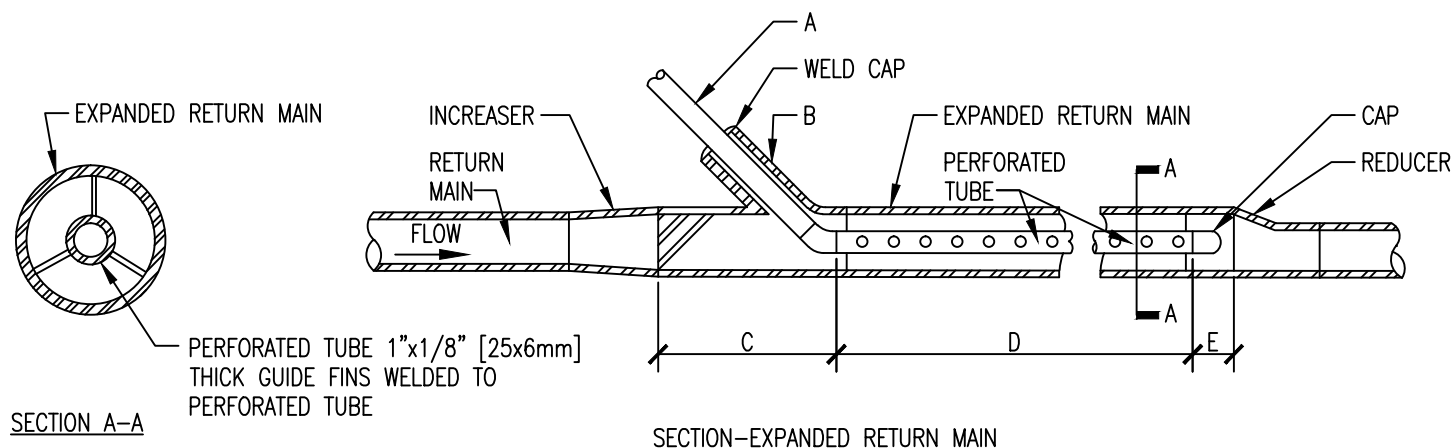
DETAIL TITLE / BOILER FLOW DIAGRAM



SCALE: NONE

DATE ISSUED: NOVEMBER 1, 2020

SD232111-08.DWG



A	SIZE, TRAP DISCHARGE LINE	15mm [1/2"]	20mm [3/4"]
B	SIZE, 45° WELDING NIPPLE	25mm [1"]	32mm [1-1/4"]
C	LENGTH OF EXPANDED MAIN AHEAD OF TRAP DISCHARGE PIPE	175mm [7"]	175mm [7"]
D	LENGTH OF PERFORATED PIPE	415mm [16-1/2"]	415mm [16-1/2"]
E	LENGTH OF EXPANDED MAIN FOLLOWING PERFORATED PIPE	50mm [2"]	50mm [2"]

RETURN MAIN SIZE	UP TO 40mm [1-1/2"]	50mm [2"]	75mm [3"] & OVER
EXPANDED RETURN MAIN SIZE		65mm [2-1/2"]	SAME SIZE

NOTES:

1. 15mm [1/2"] PERFORATED TUBE SHALL HAVE 40 - 16mm [1/8"] DIAMETER HOLES SPACED 40mm [1-1/2"] O.C. IN 4 ROWS.
2. 20mm [3/4"] PERFORATED TUBE SHALL HAVE 78 - 6mm [1/8"] DIAMETER HOLES SPACED 40mm [1-1/2"] O.C. IN 6 ROWS.
3. HOLES IN TUBE SHALL BE SPACED EQUALLY AROUND PERIMETER.

DESIGNER'S NOTE:

THIS DETAIL SHALL ONLY BE USED FOR LIMITED SITUATIONS WHERE THE DESIGNER CONDUCTS A FULL ANALYSIS OF THE SYSTEM AND ITS IMPACTS, TO ENSURE THAT CONDENSATE DOES NOT FLASH AND CREATE A WATER HAMMER. REFERENCE THE STEAM DESIGN MANUAL VOLUME 3.

HIGH PRESSURE STEAM TRAP DISCHARGE INTO PUMPED CONDENSATE RETURN LINE

#

NTS



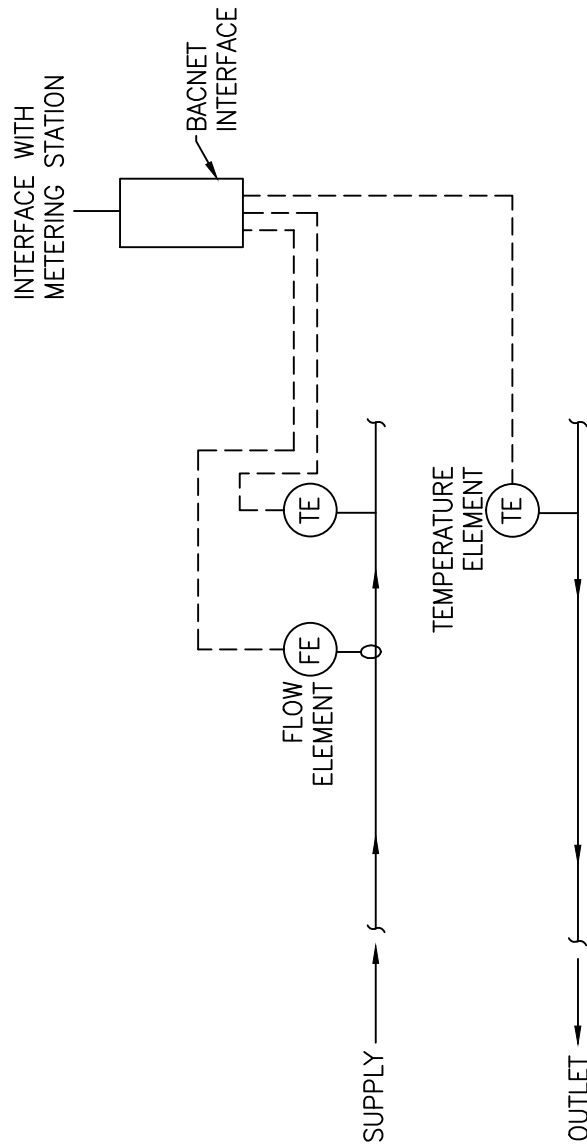
Department of
Veterans Affairs

DETAIL TITLE: HIGH PRESSURE STEAM TRAP DISCHARGE
INTO PUMPED CONDENSATE RETURN LINE

SCALE :NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD232111-09.DWG



NOTE:
MAINTAIN UPSTREAM AND DOWNSTREAM DISTANCES RECOMMENDED BY METER MANUFACTURERS.

DESIGNER'S NOTE:
MODIFY DETAIL AS REQUIRED TO BE PROJECT SPECIFIC FOR THE TYPE OF METER BEING USED.

WATER FLOW MEASURING STATION (WITH BTU METER)

#

NTS



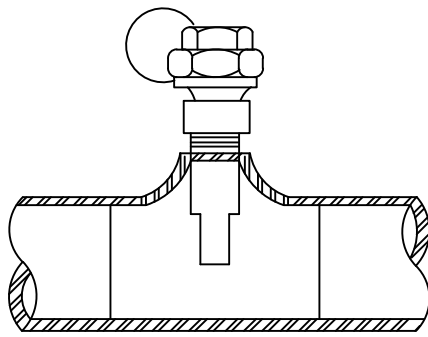
Department of
Veterans Affairs

DETAIL TITLE: WATER FLOW MEASURING STATION

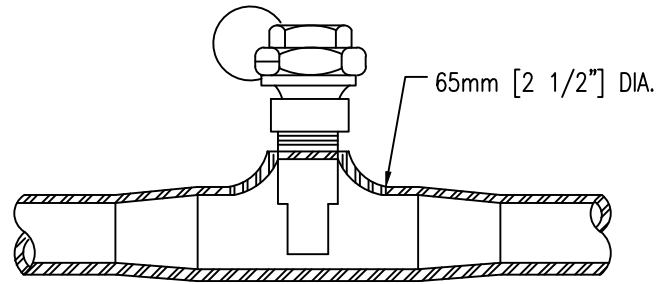
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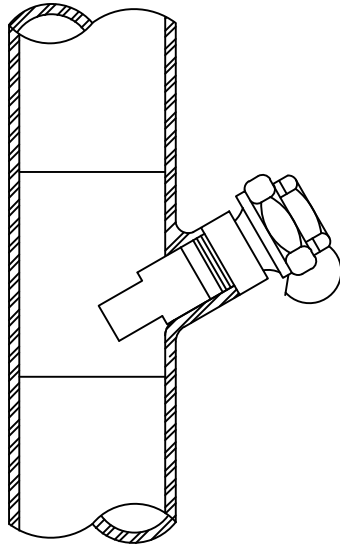


GREATER THAN 50mm [2"] DIA. PIPE

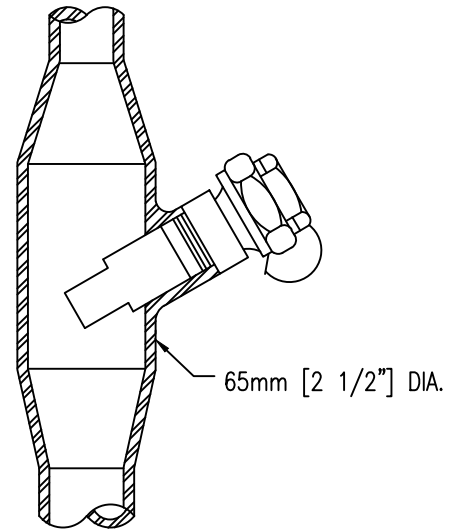


50mm [2"] DIA. & SMALLER

HORIZONTAL



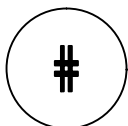
GREATER THAN 50mm [2"] DIA. PIPE



50mm [2"] DIA. & SMALLER

VERTICAL

NOTE:
PROVIDE THE APPROPRIATE WELL DEPTH TO HAVE THE NECESSARY
INSULATION STAND-OFF DISTANCE.



INSTALLATION OF THERMOMETER WELLS

NTS



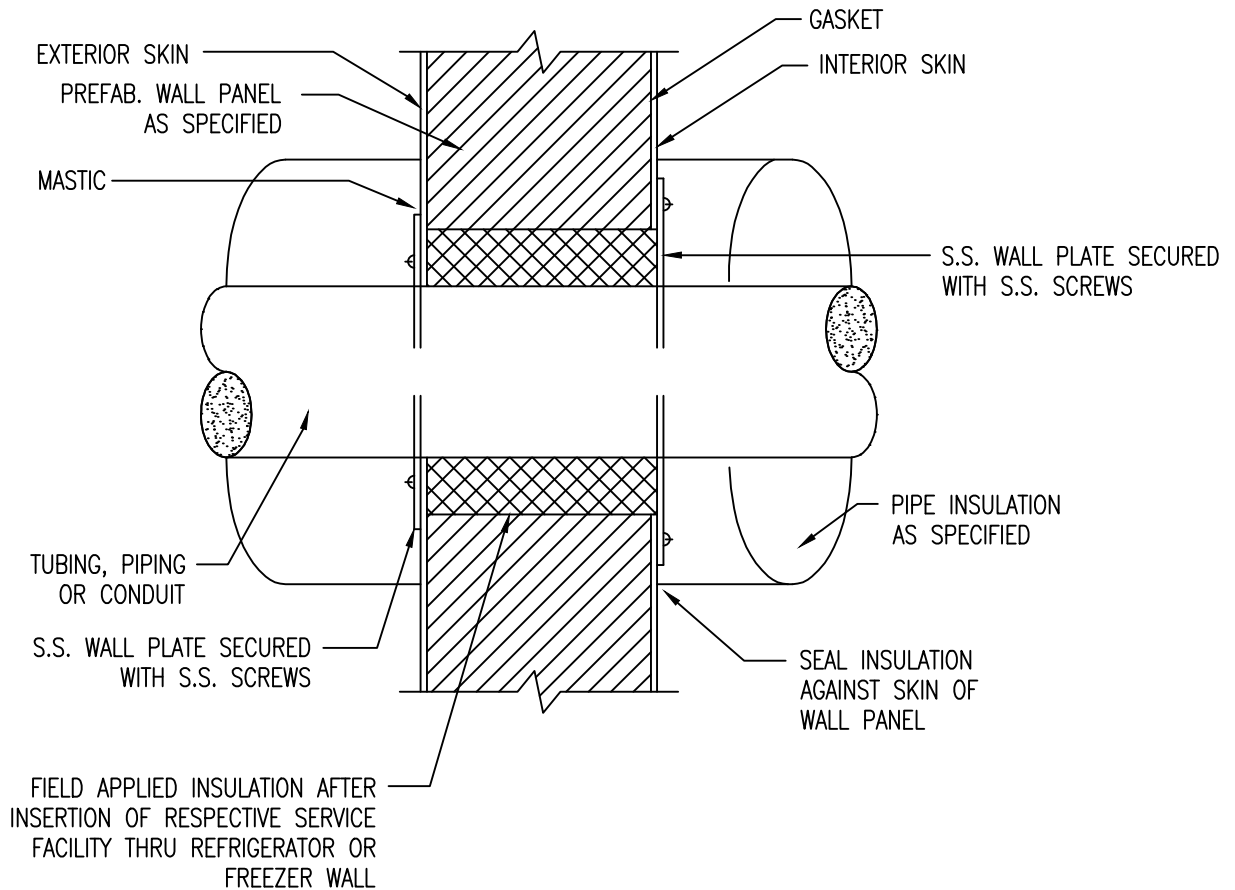
Department of
Veterans Affairs

DETAIL TITLE: INSTALLATION OF THERMOMETER WELLS

SCALE :NONE

DATE ISSUED :11/01/2017

CADD DETAIL NO. : SD232113-02.DWG



TUBING, PIPING, AND CONDUITS PASSING THROUGH PRE-FAB INSULATED WALL PANELS

#

NTS



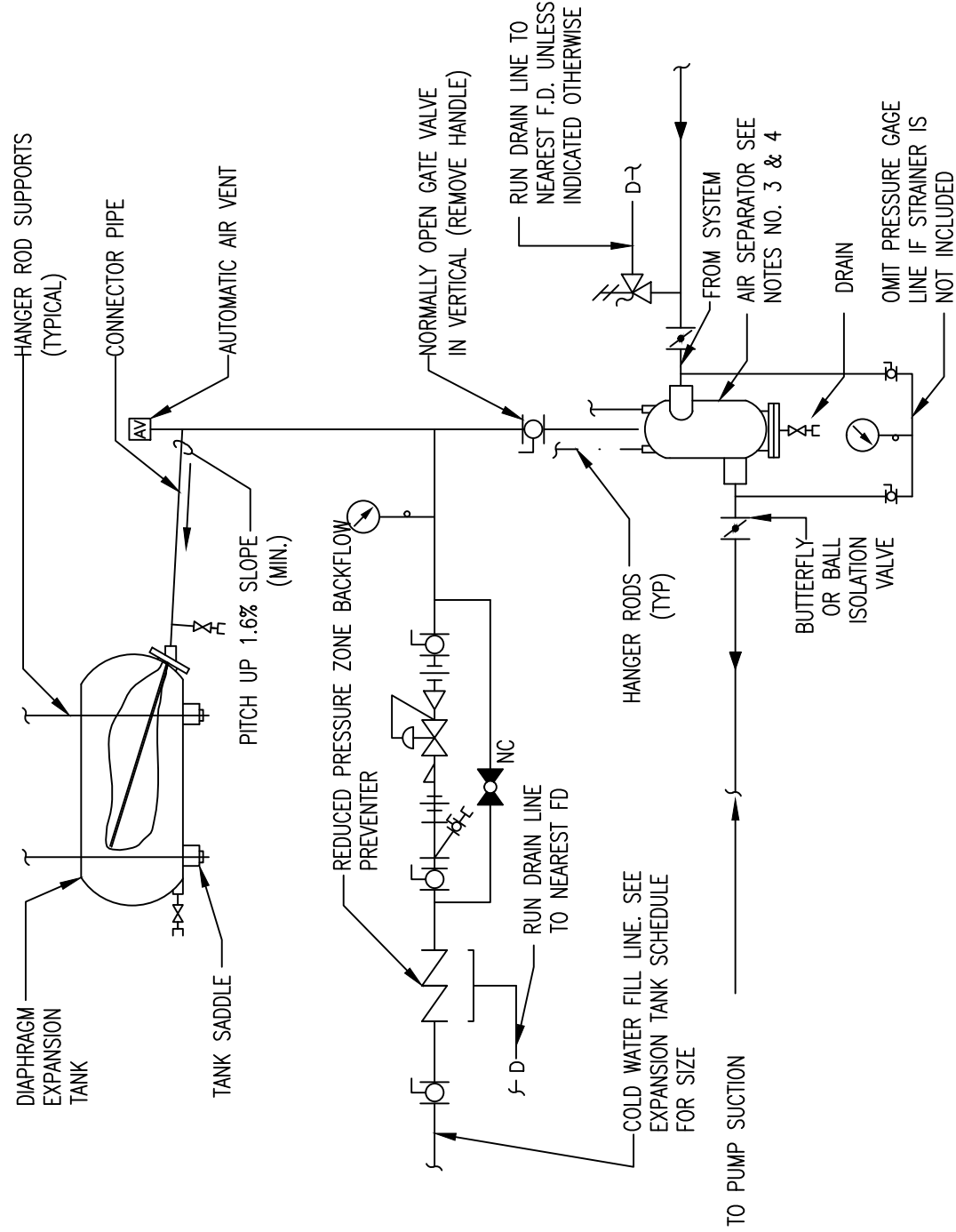
Department of
Veterans Affairs

DETAIL TITLE: TUBING, PIPING, AND CONDUITS PASSING
THROUGH PRE-FAB INSULATED WALL PANELS

SCALE :NONE

DATE ISSUED :11/01/2017

CADD DETAIL NO. : SD232113-03.DWG



NOTES:

1. SEE EXPANSION TANK SYSTEM SCHEDULE FOR COMPONENT SIZES.
2. RELIEF VALVE FOR CHILLED WATER SYSTEM IS SHOWN. OMIT WHEN RELIEF VALVE IS SHOWN ON HEAT EXCHANGER DETAIL & SYSTEM IS USED ONLY FOR HOT WATER HEATING.
3. PROVIDE STRAINER IN AIR SEPARATOR WHEN INDICATED IN EXPANSION TANK SCHEDULE.
4. FOR HOT WATER SYSTEMS 50mm [2"] AND SMALLER AND CHILLED WATER SYSTEMS USE IN-LINE AIR PURGER IN LIEU OF AIR SEPARATOR.
5. SET PRESSURE REDUCING VALVE SO PRESSURE AT HIGHEST POINT IN SYSTEM HAS A MINIMUM OF 28kPa. [4 PSIG]

DESIGNER'S NOTE:
VALVES SHALL BE INDICATED ON EITHER SIDE OF AIR SEPARATOR AS REQUIRED BY CLOSENESS OF VALVES SERVING ADJACENT EQUIPMENT. WHERE CHARGING OF TANK IS PROPOSED PROVIDE NECESSARY TAPPINGS. PROVIDE AND SHOW A LOW WATER ALARM ON CHARGED SYSTEMS TO INDICATE NO WATER IN TANK.

HORIZONTAL EXPANSION TANK - PIPING CONNECTIONS

#

NTS



1. SEE EXPANSION TANK SYSTEM SCHEDULE FOR COMPONENT SIZES.

2. FOR HOT WATER SYSTEMS 50mm [2"] AND SMALLER AND CHILLED WATER SYSTEMS USE IN-LINE AIR PURGER IN LIEU OF AIR SEPARATOR.
3. SET PRESSURE REDUCING VALVE SO PRESSURE AT HIGHEST POINT IN SYSTEM HAS A MINIMUM OF 28kPa [4 PSIG].
4. PROVIDE STRAINER IN AIR SEPARATOR IF INDICATED IN EXPANSION TANK SCHEDULE.
5. RELIEF VALVE FOR CHILLED WATER SYSTEM IS SHOWN. OMIT WHEN RELIEF VALVE IS SHOWN ON HEAT EXCHANGER DETAIL AND SYSTEM IS USED ONLY FOR HOT WATER HEATING.

DESIGNER'S NOTE:
GATE VALVES SHALL BE INDICATED ON EITHER SIDE OF AIR SEPARATOR AS REQUIRED BY CLOSENESS OF VALVES SERVING ADJACENT EQUIPMENT.
WHERE CHARGING OF TANK IS PROPOSED PROVIDE NECESSARY TAPPINGS. PROVIDE AND SHOW A LOW WATER ALARM ON CHARGED SYSTEMS TO INDICATE NO WATER IN TANK.

FLOOR MOUNTED EXPANSION TANK - PIPING CONNECTIONS

NTS

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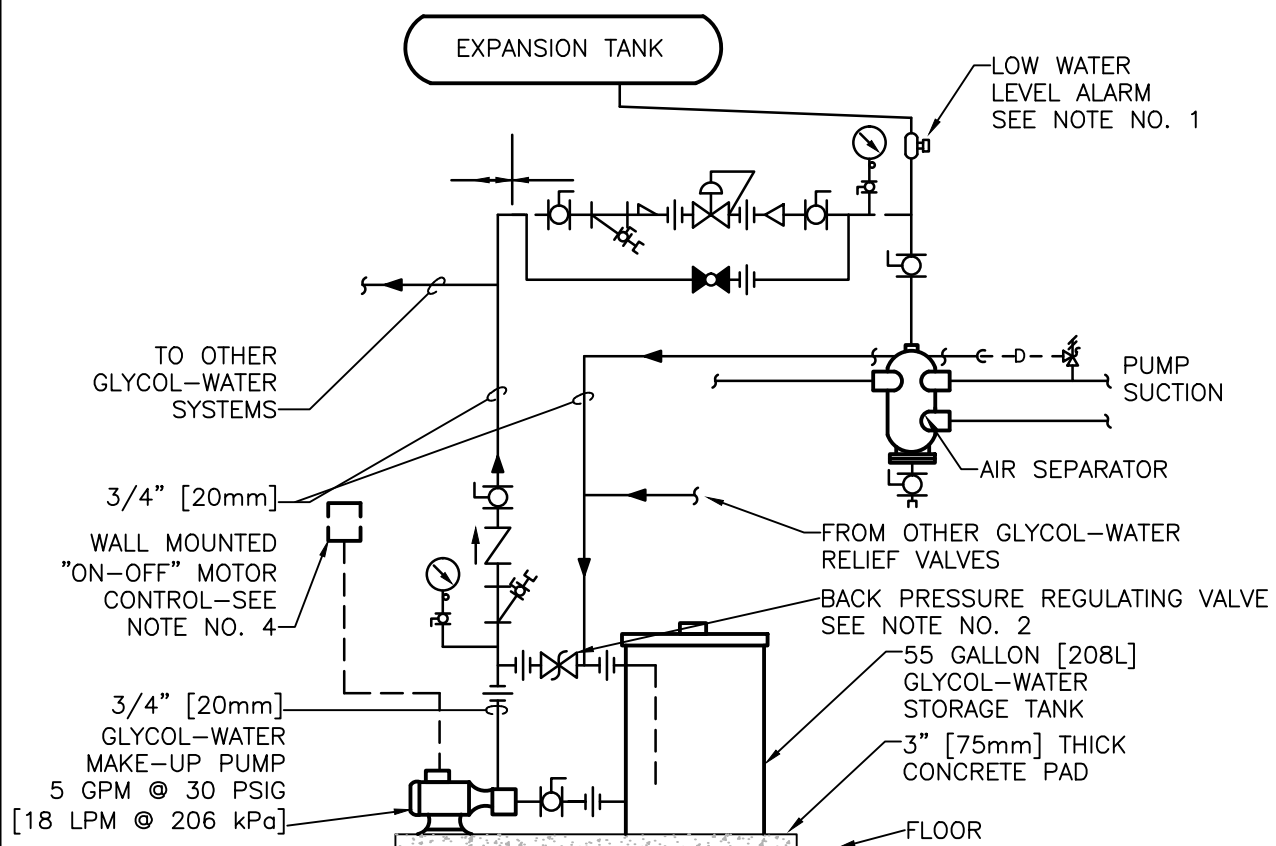


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DETAIL TITLE: FLOOR MOUNTED EXPANSION TANK-
PIPING CONNECTIONS

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD232113-05.DWG



NOTES:

1. PROVIDE LOW WATER LEVEL ALARM. PROVIDE A LOW WATER LEVEL AT ECC. RELIEF VALVE DRAIN SHALL RETURN TO TANK AS SHOWN ON THIS DETAIL.
2. SET REGULATING VALVE TO MAINTAIN MAKE-UP PRESSURE AT 15 PSIG [103 kPa] ABOVE HIGHEST SYSTEM PRV SETTING.
3. MAKE-UP PIPING SYSTEM DOES NOT REQUIRE INSULATION.
4. OPERATE PUMP MANUALLY AS REQUIRED TO FILL.

INDIRECT GLYCOL MAKE-UP SYSTEM (PIPING AND CONTROLS)

#

NTS

DESIGNER'S NOTE:

PLUMBING DRAWINGS SHOULD INCLUDE DOMESTIC COLD-WATER HOSE BIB NEAR THE GLYCOL-WATER MAKE-UP SYSTEM. FOR SMALL SYSTEMS (50 GAL [200 L] OR LESS) A POT FEEDER, AT THE HIGH POINT IN THE PIPING, MAY BE USED FOR MAKE-UP IN LIEU OF THE PUMPED MAKE-UP.



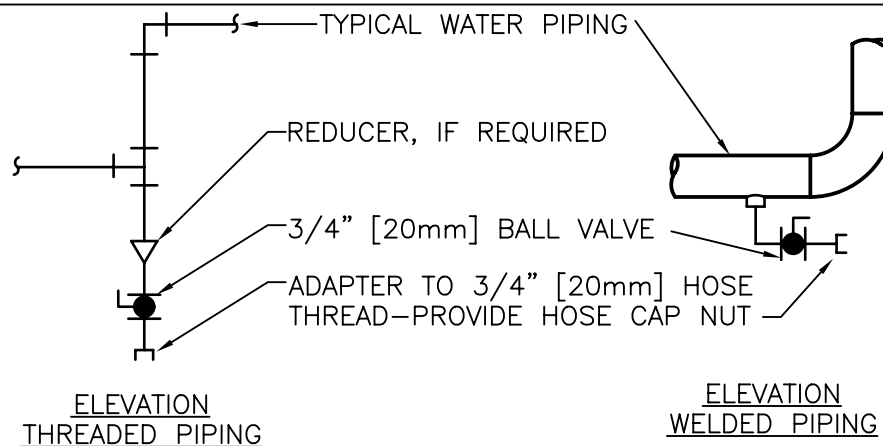
Department of
Veterans Affairs

DETAIL TITLE / INDIRECT GLYCOL MAKE-UP SYSTEM
(PIPING AND CONTROLS)

SCALE :NONE

DATE ISSUED :MARCH 2010

CADD DETAIL NO. : SD232113-06.DWG



TYPICAL CHILLED AND HOT WATER PIPING DRAIN VALVE CONNECTIONS

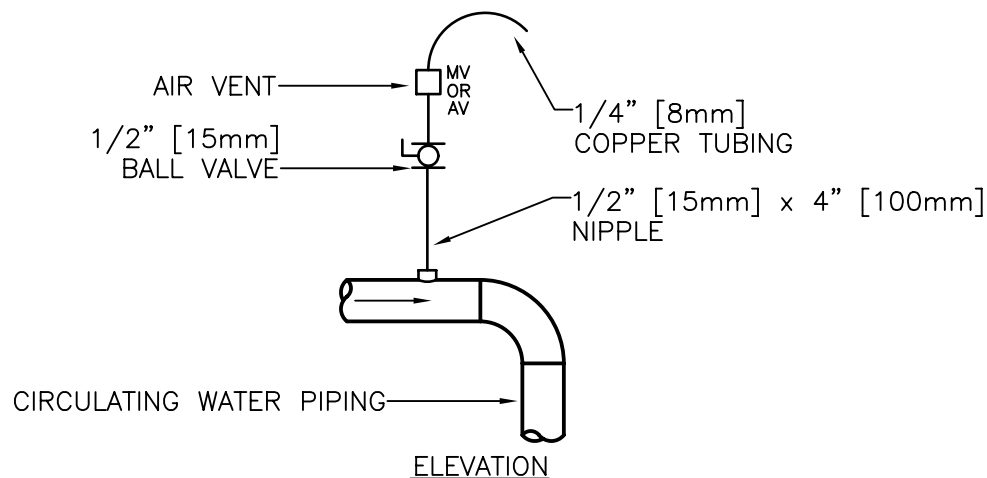
NOTES:

1. DRAIN ALL LOW POINTS AS INDICATED ABOVE.

2. WHERE SCALE POCKETS ARE SHOWN ON PIPE RISER DIAGRAMS AND/OR PLANS LOCATE DRAIN AT BOTTOM OF SCALE POCKET.

DESIGNER'S NOTE:

SHOW SCALE POCKETS ON MAJOR CIRCULATING WATER PIPING RISER DIAGRAMS AND/OR PLANS.



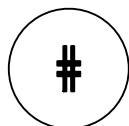
TYPICAL MANUAL AIR VENT

NOTES:

1. VENT ALL HIGH POINTS INDICATED ABOVE.

2. IF AUTOMATIC AIR VENTS ARE USED, PIPE DISCHARGE TO DRAIN.

DRAIN VALVE AND AIR VENT CONNECTIONS (HYDRONIC SYSTEMS)



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Department of
Veterans Affairs

DETAIL TITLE / DRAIN VALVE AND AIR VENT CONNECTIONS
(HYDRONIC SYSTEMS)

SCALE :NONE

DATE ISSUED :DECEMBER 2008

CADD DETAIL NO. : SD232113-07.DWG

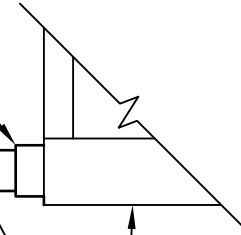
DRAIN LINE SHALL BE AT LEAST THE SAME
SIZE AS THE NIPPLE ON THE DRAIN PAN
PIPING SHALL BE RIGID COPPER TYPE L OR
TYPE M UNLESS NOTE BELOW IS MET

PITCH DOWN
TOWARD DRAIN

CLEAN OUT

1"
[25mm]

FLOOR SINK



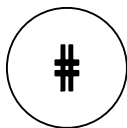
DRAIN
PAN

DIELECTRIC
FITTING

NOTE: 1. CPVC PIPE MAY BE USED ONLY IF APPROVED BY
LOCAL VA AND IS INDOORS AND DOES NOT PASS THROUGH
RATED BARRIERS.
2. DIELECTRIC FITTING TO BE USED WHEN TWO DISSIMILAR
METALS ARE TO BE CONNECTED.

UNIT TYPE	A	B
DRAW THRU	2" [50mm] PLUS X	X
BLOW THRU	1" [25mm] MINIMUM	2X

WHERE X = STATIC PRESSURE IN PAN



AIR HANDLING UNIT DRAIN TRAP DETAIL

NTS



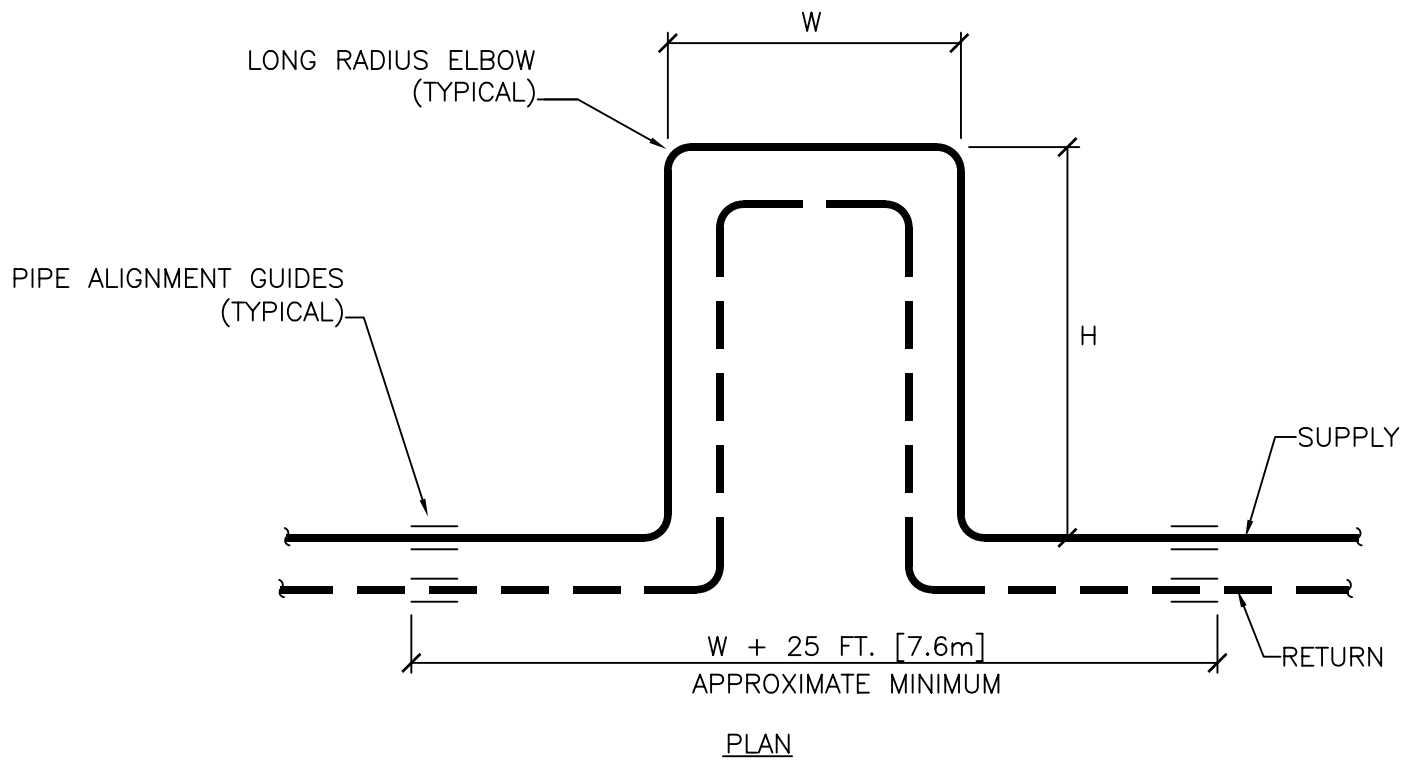
Department of
Veterans Affairs

DETAIL TITLE / AIR HANDLING UNIT DRAIN TRAP DETAIL

SCALE :NONE

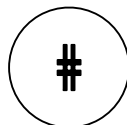
DATE ISSUED: DECEMBER 2008

CAD DETAIL NO.: SD232113-08.DWG



EXPANSION LOOP		
LOOP NO.	W	H
100-ELI	---	---
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EXPANSION LOOP DETAIL



EXPANSION LOOP DETAIL

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Veterans Affairs

DETAIL TITLE / EXPANSION LOOP DETAIL

SCALE :NONE

DATE ISSUED :DECEMBER 2008

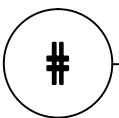
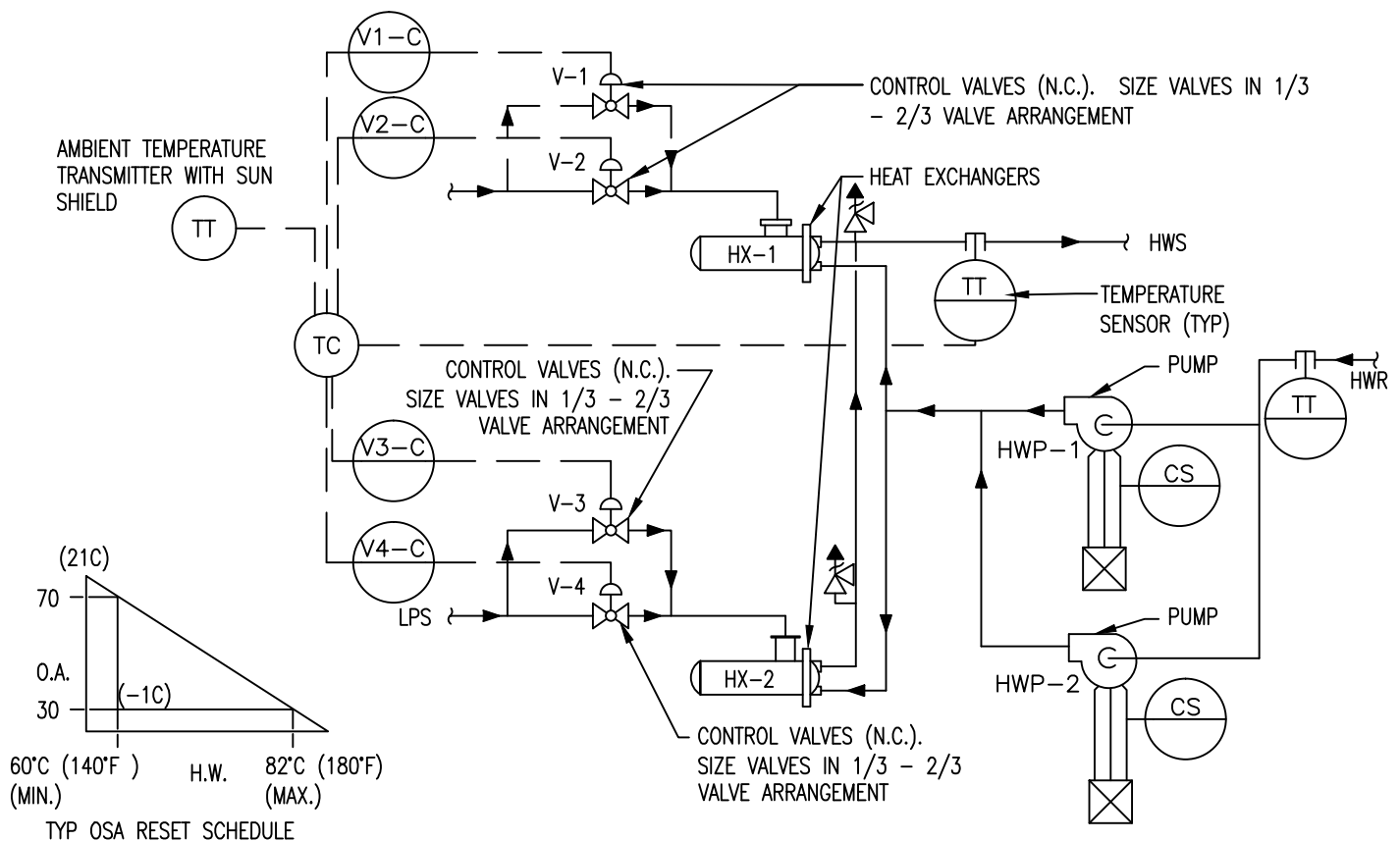
CADD DETAIL NO. : SD232113-09.DWG

SEQUENCE OF OPERATION:

1. STEAM CONTROL VALVE SHALL MODULATE TO MAINTAIN THE LEAVING HOT WATER TEMPERATURE AT SET POINT.
2. THE LEAVING HOT WATER TEMPERATURE SHALL BE RESET INVERSELY WITH THE OUTDOOR TEMPERATURE AS SCHEDULED.
3. THE LEAD AND LAG PUMPS AND HEAT EXCHANGERS SHALL BE SEQUENTIAL BY THE OPERATOR CONTROLS AT THE PRE-DETERMINED INTERVAL (USUALLY 7 DAYS). IN THE EVENT THE PUMP FAILS TO START WITHIN 30 SECONDS, AN ALARM SHALL BE INITIATED AND THE SECOND PUMP SHALL START AUTOMATICALLY.

VALVE SEQUENCE:

1. SUGGESTED VALVE SEQUENCE. DELETE THIS SEQUENCE FROM THIS DETAIL IF SEQUENCE IS SHOWN ON CONTROLS DRAWINGS OR SPECS.
2. V-1 (1/3) MODULATES TO MAINTAIN HW TEMPERATURE AT SETPOINT. WHEN V-1 HAS REACHED FULLY OPEN POSITIONS, V-2 (2/3) STARTS TO MODULATE OPEN.
3. IF HX-2, V-3 AND V-4 ARE NOT REDUNDANT BACKUP, THEN THE STAGING ABOVE CONTINUES AS FOLLOWS: PROVIDE, ADDITIONAL MOTORIZED ISOLATION VALVES AT THE THE HWS AND HWR FOR EACH HX'S. WHEN V-2 HAS REACHED FULLY OPEN POSITION, THE ISOLATION VALVES AT HX-2 HWS HWS AND HWR LINES FULLY OPEN, AFTER WHICH V-3 (1/3) STARTS TO MODULATE OPEN. WHEN V-3 HAS REACHED FULLY OPEN POSITION. V-4 (2/3) STARTS TO MODULATE OPEN.



DUAL HEAT EXCHANGER CONTROLS (HEATING SYSTEM)

NTS



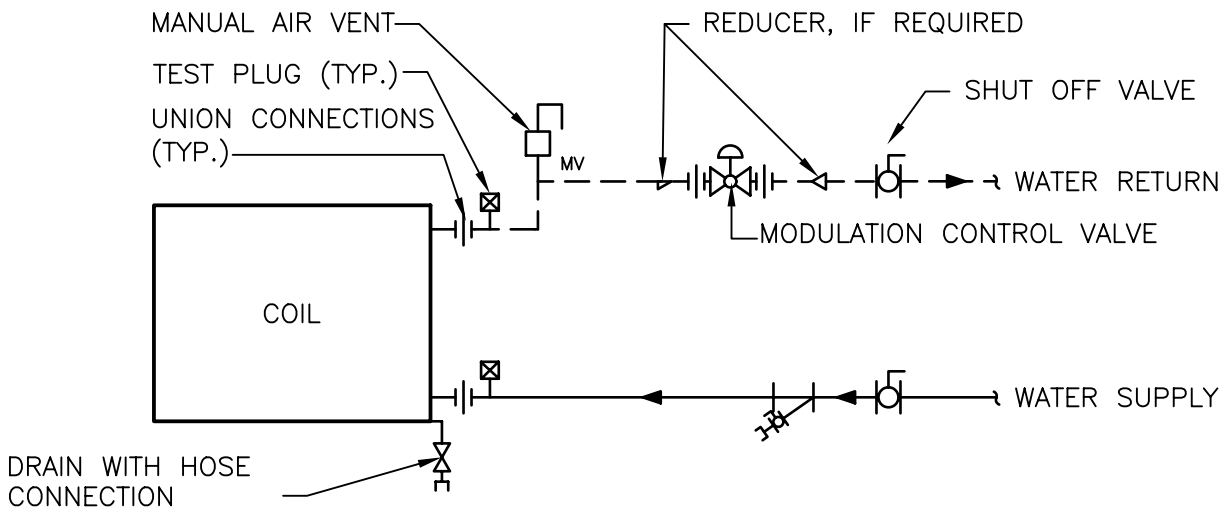
Department of
Veterans Affairs

DETAIL TITLE: DUAL HEAT EXCHANGER CONTROLS (HEATING SYSTEM)

SCALE :NONE

DATE ISSUED :11/01/2017

CADD DETAIL NO. : SD232113-10.DWG



TERMINAL UNIT WATER COILS - PIPING CONNECTIONS

#

NTS

DESIGNER'S NOTE:

1. THIS DETAIL IS APPLICABLE TO: 2-PIPE FAN COIL UNITS (CHILLED OR HOT WATER)
 - VAV/CV AIR TERMINAL UNITS (REHEAT COIL)
 - DUCT-MOUNTED REHEAT COIL
 - CABINET UNIT HEATERS



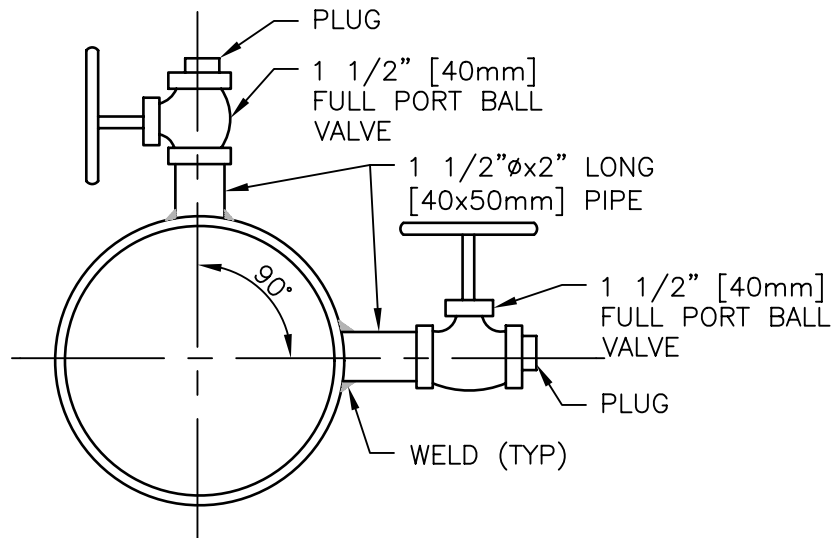
Department of
Veterans Affairs

DETAIL TITLE / TERMINAL UNIT WATER COILS -
PIPING CONNECTIONS

SCALE :NONE

DATE ISSUED: DECEMBER 2008

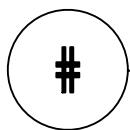
CAD DETAIL NO.: SD232113-12.DWG



NOTE:

1. PROVIDE IN CHILLED WATER MAIN AND IN CONDENSER WATER MAIN.
2. LOCATE PILOT TUBE TAPS 20 PIPE DIAMETERS DOWNSTREAM AND 10 PIPE DIAMETERS UPSTREAM FROM THE NEAREST PIPE FITTING.

EITHER TOP OR SIDE LOCATION. BOTH ARE NOT REQUIRED AT SAME LOCATION.



PITOT TEST CONNECTIONS

NTS

DESIGNER'S NOTE:

SHOW LOCATION OF PILOT TEST CONNECTIONS ON FLOOR PLANS FOR CONDENSER WATER PIPING TO COOLING TOWER. THIS IS REQUIRED FOR FLOW MEASUREMENT BY ASME COOLING TOWERS TEST CODE.



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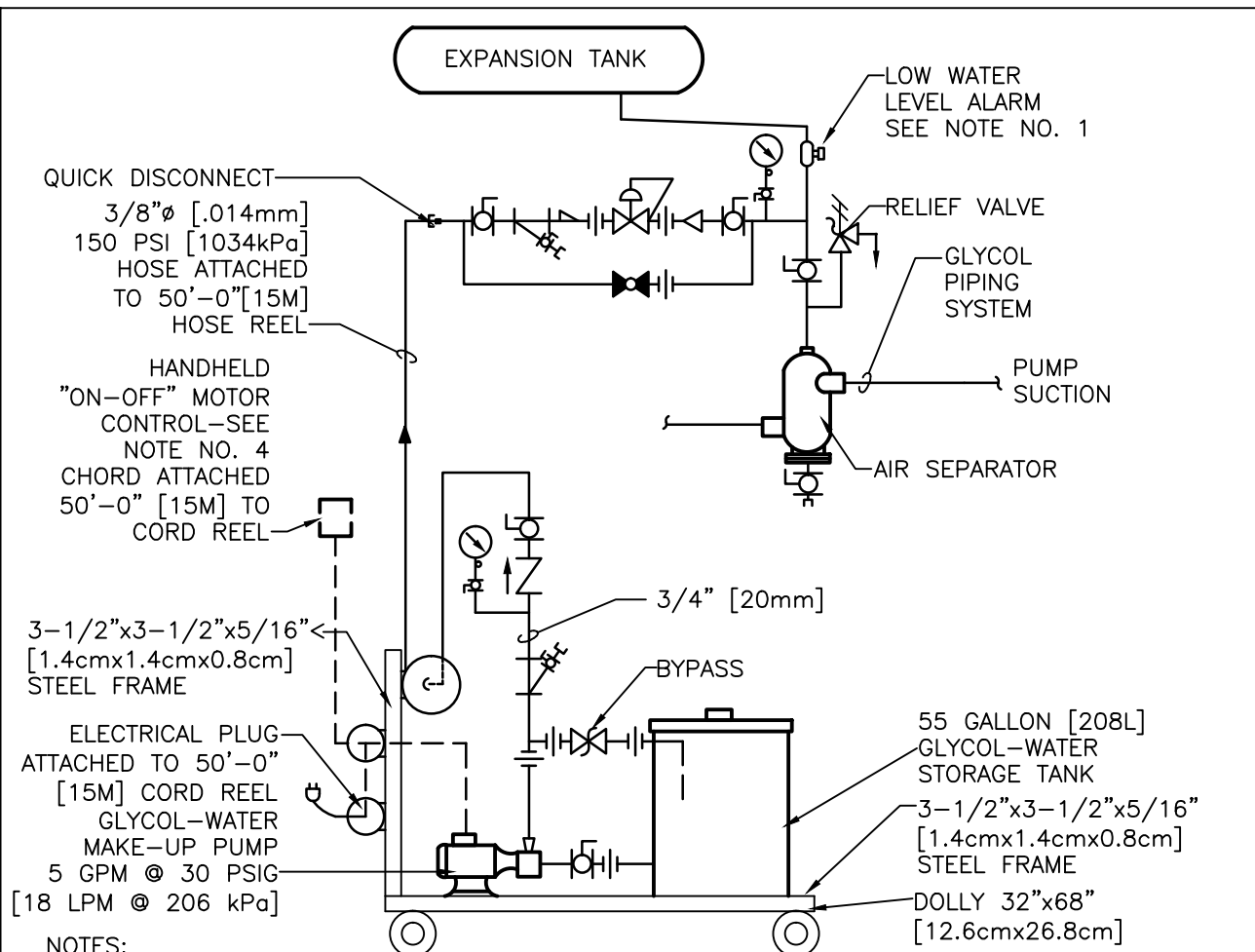
DETAIL TITLE / PITOT TEST CONNECTIONS

SCALE :NONE

DATE ISSUED: DECEMBER 2008

CAD DETAIL NO.:

SD232113-13.DWG



NOTES:

1. PROVIDE LOW WATER LEVEL ALARM. PROVIDE A LOW WATER LEVEL AT ECC. RELIEF VALVE DRAIN SHALL RETURN TO A 55 GALLON DRUM.
2. SET REGULATING VALVE TO MAINTAIN MAKE-UP PRESSURE AT 15 PSIG [103 kPa] ABOVE HIGHEST SYSTEM PRV SETTING.
3. MAKE-UP PIPING SYSTEM DOES NOT REQUIRE INSULATION.
4. OPERATE PUMP MANUALLY AS REQUIRED TO FILL.

MOBILE INDIRECT GLYCOL MAKE-UP SYSTEM (PIPING AND CONTROLS)

#

NTS

DESIGNER'S NOTE:

PLUMBING DRAWINGS SHOULD INCLUDE DOMESTIC COLD-WATER HOSE BIB NEAR THE GLYCOL-WATER MAKE-UP SYSTEM. FOR SMALL SYSTEMS (50 GAL [200 L] OR LESS) A POT FEEDER, AT THE HIGH POINT IN THE PIPING, MAY BE USED FOR MAKE-UP IN LIEU OF THE PUMPED MAKE-UP.



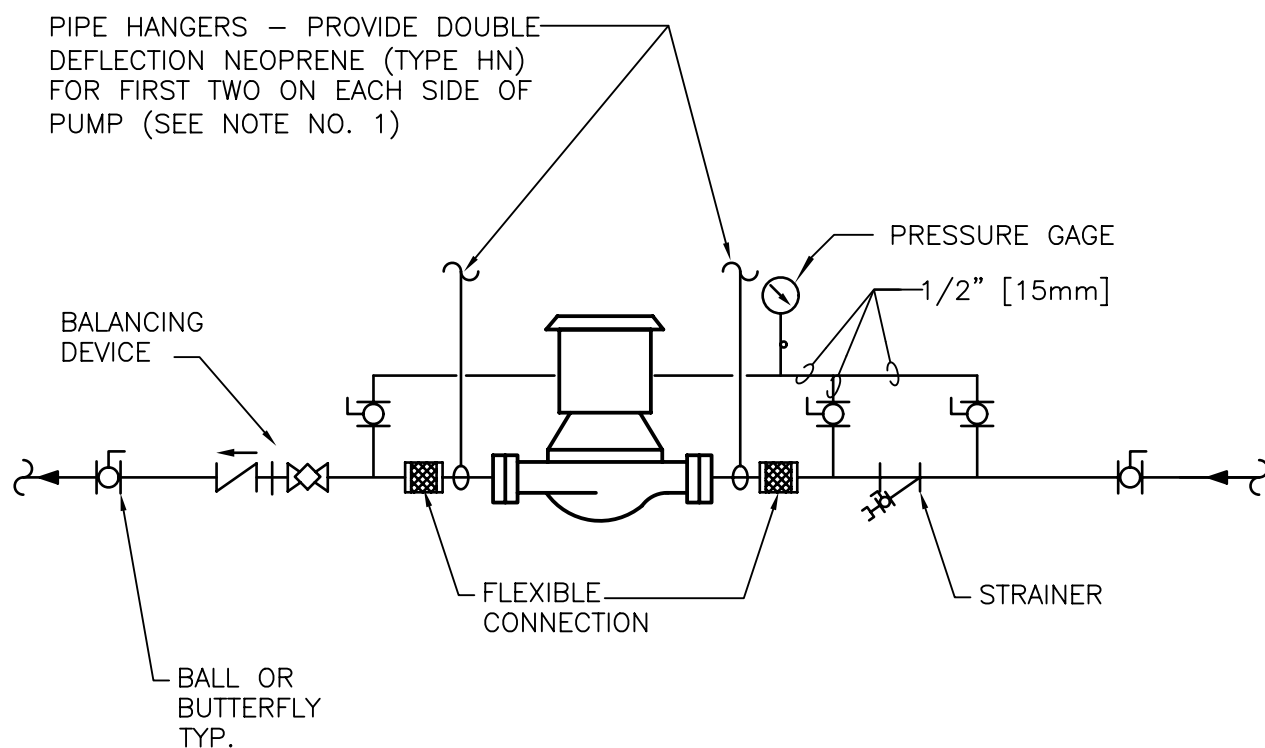
Department of
Veterans Affairs

DETAIL TITLE / MOBILE INDIRECT GLYCOL MAKE-UP SYSTEM
(PIPING AND CONTROLS)

SCALE :NONE

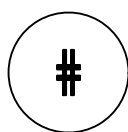
DATE ISSUED :MARCH 2010

CADD DETAIL NO. : SD232113-14.DWG



NOTES:

1. SUPPORT PUMP FROM PIPING ONLY. DO NOT SUPPORT PUMP FROM MOTOR.



IN-LINE PUMPS - CONNECTIONS

NTS

DESIGNER'S NOTE:

1. CHECK VALVE IS OPTIONAL FOR SINGLE PUMP, EXCEPT FOR COOLING TOWER PUMP.
2. ELIMINATE BALANCING DEVICE WHEN PUMP CONTROLLED BY VARIABLE SPEED DRIVE.



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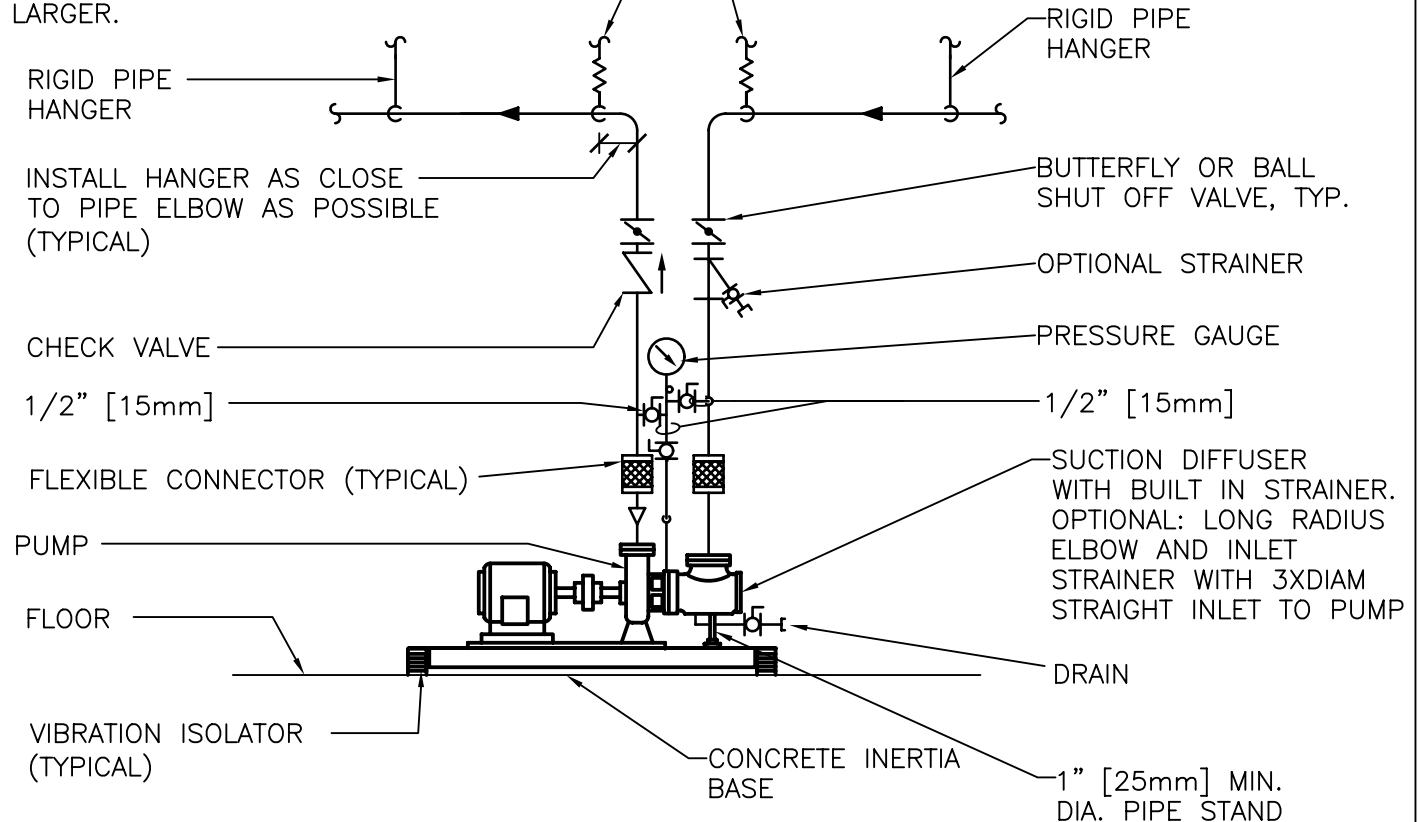
DETAIL TITLE / IN-LINE PUMPS - CONNECTIONS

SCALE :NONE

DATE ISSUED :DECEMBER 2008

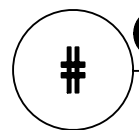
CADD DETAIL NO. : SD232123-01.DWG

FIRST 3 HANGERS FOR EACH PIPE AND BRANCH SHALL BE SPRING & NEOPRENE TYPE. TYPE "H" FOR 4" [100mm] DIA. PIPE & SMALLER. TYPE "H-P" FOR 5" [125mm] DIA. PIPE & LARGER.



NOTES:

SEE SPECIFICATION SECTION "PUMPS" FOR Y STRAINER OPTION



NTS

SINGLE SUCTION FLOOR-MOUNTED PUMPS - CONNECTIONS WITH FLEXIBLE CONNECTORS

DESIGNER'S NOTE:

CHECK VALVE IS OPTIONAL FOR SINGLE PUMP, EXCEPT FOR COOLING TOWER PUMP.



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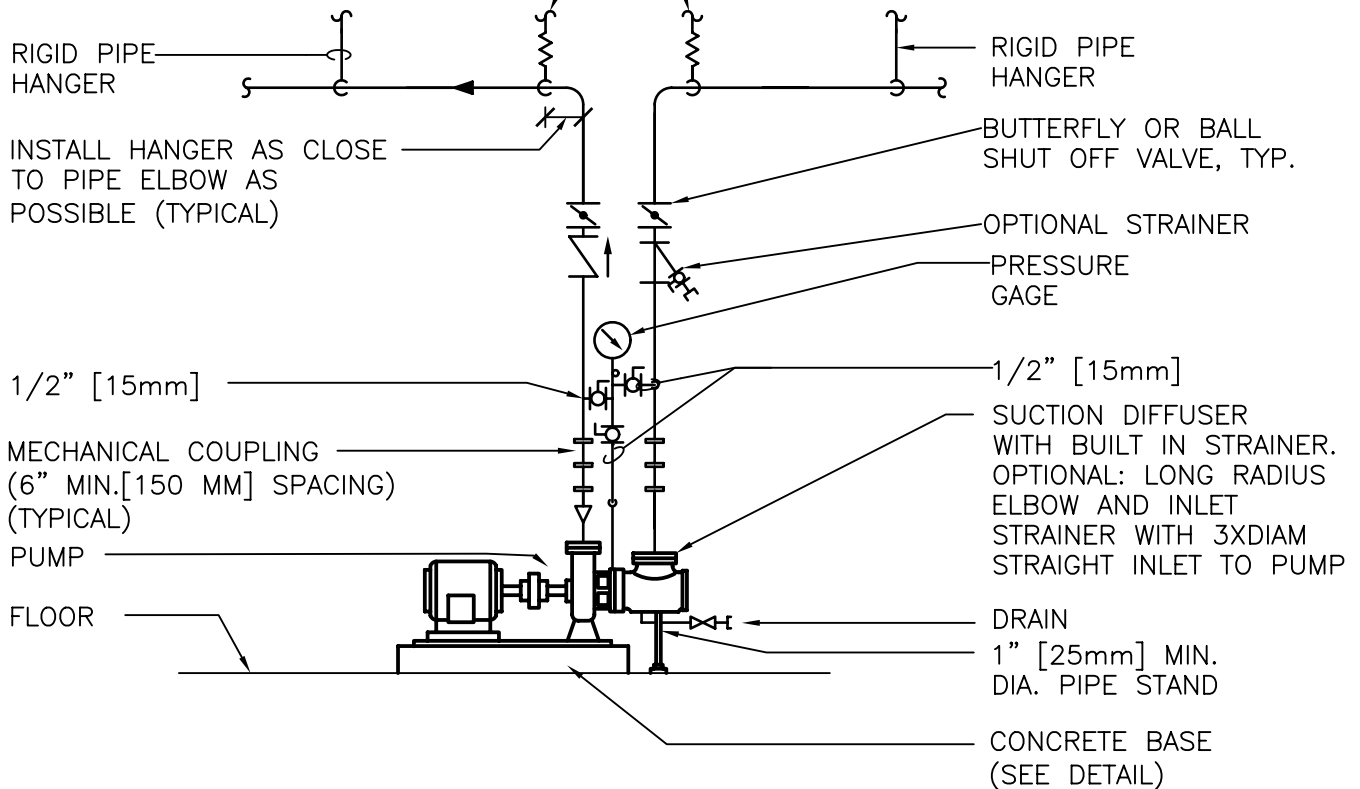
DETAIL TITLE / SINGLE SUCTION FLOOR-MOUNTED PUMPS -
CONNECTIONS WITH FLEXIBLE CONNECTORS

SCALE :NONE

DATE ISSUED :DECEMBER 2008

CADD DETAIL NO. : SD232123-02.DWG

FIRST 3 HANGERS FOR EACH PIPE AND BRANCH SHALL BE SPRING & NEOPRENE TYPE. TYPE "H" FOR 4" [100mm] DIA. PIPE & SMALLER. TYPE "H-P" FOR 5" [125mm] DIA. PIPE & LARGER.



NOTES:

SEE SPECIFICATION SECTION "PUMPS" FOR Y STRAINER OPTION

SINGLE SUCTION FLOOR-MOUNTED PUMPS - CONNECTIONS WITH MECHANICAL COUPLINGS

#

NTS

DESIGNER'S NOTE:

1. CHECK VALVE IS OPTIONAL FOR SINGLE PUMP, EXCEPT FOR COOLING TOWER PUMP. USE THIS DETAIL ONLY FOR PUMPS IN A MECHANICAL BUILDING WHERE POSSIBLE VIBRATION WILL NOT BE OBJECTIONABLE AND WHERE APPROVED BY VA.
2. COUPLINGS SHALL NOT BE USED ON HOT WATER SYSTEMS.



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DETAIL TITLE / SINGLE SUCTION FLOOR-MOUNTED PUMPS -
CONNECTIONS WITH MECHANICAL COUPLINGS

SCALE :NONE

DATE ISSUED :DECEMBER 2008

CADD DETAIL NO. : SD232123-03.DWG