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.
1. **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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**Department of Veterans Affairs**

**Detail Title:**  GENERAL NOTES

**Scale:** NONE

**Date Issued:** 11/01/2017  **Cad Detail No.:** SD230511-02.DWG
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Department of Veterans Affairs

DETAIL TITLE: ABBREVIATIONS

SCALE: NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD230511-04.DWG
I/O  INPUT/OUTPUT
IAQ  INDOOR AIR QUALITY
IBT  INVERTED BUCKET TRAP
ICF  IN-LINE CENTRIFUGAL FAN
ICU  INTENSIVE CARE UNIT
ID  INSIDE DIAMETER
IFB  INTEGRAL FACE AND BYPASS
IN  INCHES
IN HG  INCHES OF MERCURY
IN WC  INCH WATER COLUMN
IN WG  INCH WATER GAUGE
IN-LB  INCH-POUND
IP LV  INTEGRATED PART LOAD VALUE
IRH  INFRARED HEATER
IS  INSECT SCREEN
IU  INDUCTION UNIT
IV  INLET VANES
J  INTENTIONALLY LEFT BLANK
KG  KILOGRAM
KG/HR  KILOGRAM PER HOUR
kPa  KILOPASCAL
KW  KWATT
KWH  KWATT HOUR
L  LITER
L/h  LITERS PER HOUR (OR LITERS/HOUR)
L/m  LITERS PER MINUTE (OR LITERS/MINUTE)
L/s  LITERS PER SECOND (OR LITERS/SECOND)
LAT  LEAVING AIR TEMPERATURE
LBS/HR  POUNDS PER HOUR
LF  LINEAR FOOT (FEET)
LGT  LEAVING GLYCOL TEMPERATURE
LH  LATENT HEAT
LPG  LIQUEFIED PETROLEUM GAS
LPR  LOW PRESSURE RETURN (STEAM CONDENSATE)
LPRC  LOW PRESSURE STEAM RETURN (CLEAN)
LLHX  LIQUID TO LIQUID HEAT EXCHANGER
LPS  LOW PRESSURE STEAM
LPS/C  LOW PRESSURE STEAM (CLEAN)
LSD  LINEAR SLOTTED DIFFUSER
LTCP  LOCAL TEMPERATURE CONTROL PANEL
LVG  LEAVING
LVR  LOUVER
LWT  LEAVING WATER TEMPERATURE

M  METER, SI UNIT
M/S  METERS PER SECOND (OR METERS/SECOND)
MA  MIXED AIR
MAT  MIXED AIR TEMPERATURE
MAU  MAKE-UP AIR UNIT
MAV  MANUAL AIR VENT
MAX  MAXIMUM
MB  MIXING BOX
MBH  1,000 BTUH
MCA  MINIMUM BRANCH CIRCUIT AMPACITY
MER  MECHANICAL EQUIPMENT ROOM
MERV  MINIMUM EFFICIENCY REPORTING VALUE
MH  MANHOLE
MHP  MOTOR HORSEPOWER
MIN  MINIMUM
MM  MILLIMETER
MOV  MOTOR OPERATED VALVE
MPR  MEDIUM PRESSURE RETURN (STEAM CONDENSATE)
MPS  MEDIUM PRESSURE STEAM
MRI  MAGNETIC RESONANCE IMAGING
MTD  MEAN TEMPERATURE DIFFERENCE
MVD  MANUAL VOLUME DAMPER
MZ  MULTI-ZONE
NA  NOT APPLICABLE
NC  NOISE CRITERIA
NC  NORMALLY CLOSED
NG  NATURAL GAS
NGFM  NATURAL GAS FLOWMETER
N M  NEWTON METER
NO  NORMALLY OPEN
NOAA  NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NOM  NOMINAL
NPLV  NON-STANDARD PART LOAD VALUE
NPSH  NET POSITIVE SUCTION HEAD
NPSH A  NET POSITIVE SUCTION HEAD AVAILABLE
NPSH R  NET POSITIVE SUCTION HEAD REQUIRED
NTS  NOT TO SCALE
OA  OUTSIDE AIR
OAD  OUTDOOR AIR DAMPER
OAG  OUTSIDE AIR GRILLE
OAI  OUTSIDE AIR INTAKE
OD  OUTSIDE DIAMETER
OFM  OIL FLOWMETER
OR  OPERATING ROOM

Department of Veterans Affairs

SCALE : NONE

DATE ISSUED: 11/01/2017  CAD DETAIL NO.: SD230511-05.DWG
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<td>P</td>
<td>PUMP</td>
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<td>Po</td>
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<td>PCF</td>
<td>POUNDS PER CUBIC FOOT (FEET)</td>
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<td>PD</td>
<td>PRESSURE DROP</td>
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<td>PF</td>
<td>PROPELLER (TYPE) EXHAUST FAN</td>
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<td>PG</td>
<td>PRESSURE GAGE</td>
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<td>PGW</td>
<td>PROPYLENE GLYCOL—WATER (SOLUTION)</td>
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<td>PHC</td>
<td>PREHEAT COIL</td>
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<td>PPM</td>
<td>PARTS PER MILLION</td>
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<td>PRS</td>
<td>PRESSURE REGULATING (VALVE) STATION</td>
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<td>PRESSURE REGULATING VALVE</td>
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<tr>
<td>PSI</td>
<td>POUNDS PER SQUARE INCH</td>
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<td>PSIA</td>
<td>POUNDS PER SQUARE INCH - ABSOLUTE</td>
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<td>PSG</td>
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<td>PTAC</td>
<td>PACKAGED TERMINAL AIR CONDITIONER</td>
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<td>R/E</td>
<td>RETURN OR EXHAUST</td>
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<td>RA</td>
<td>RETURN AIR</td>
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<td>ROTARY AIR HEAT EXCHANGER</td>
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<td>RH</td>
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<td>RLA</td>
<td>RUN LOAD AMPERE</td>
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<td>RO</td>
<td>REVERSE OSMOSIS</td>
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<td>SC</td>
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<td>STANDARD CUBIC FEET PER MINUTE</td>
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<td>SCHEMATIC DESIGN (SUBMISSION1)</td>
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<td>SH</td>
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<td>SHC</td>
<td>STEAM HEATING COIL</td>
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<tr>
<td>SI</td>
<td>SQUARE INCHES</td>
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<td>SPD</td>
<td>SUPPLY: PRESSURE</td>
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<td>SQUARE FOOT (FEET)</td>
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<td>SUH</td>
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<td>STEAM VENT SILENCER</td>
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<td>TEMPERATURE AND PRESSURE CONTROL VALVE</td>
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<td>TRAP</td>
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<td>THERMOSTAT</td>
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<td>TERMINAL UNIT</td>
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<tr>
<td>TWU</td>
<td>THRU-WALL UNIT</td>
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<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>UC</td>
<td>UNDER CUT</td>
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<td>UH</td>
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<td>VALVE</td>
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<td>VAF</td>
<td>VANE-AXIAL FAN</td>
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<tr>
<td>VD</td>
<td>VOLUME DAMPER (MANUAL OPPOSED BLADE)</td>
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<td>VARIABLE FREQUENCY DRIVE</td>
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<td>VUH</td>
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<td>WATTS</td>
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<td>WASTE ANESTHESIA GAS</td>
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<td>Wb</td>
<td>WET-BULB (TEMPERATURE)</td>
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<td>WATER FLOW CONTROL VALVE</td>
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<td>WATER FLOWMETER</td>
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<td>WFMD</td>
<td>WATER FLOW MEASURING DEVICE</td>
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<td>WATER GAGE</td>
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<td>WPD</td>
<td>WATER SIDE PRESSURE DROP</td>
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<td>YR</td>
<td>YEAR</td>
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</table>
DRAWING SYMBOLS

- **2**
  - Detail Number

- **H4**
  - Drawing Number Where Drawn

- **A**
  - Section Letter

- **H7**
  - Drawing Number Where Shown

- **26–SF 3**
  - Building No. Where Equipment Is Located
  - Equipment Abbreviation (Supply Fan)
  - Supply Fan No. 3 in Building No. 26
  - Typical Unit No.

- **26–TU–I–I**
  - Building No. Where Equipment Is Located
  - Item (Terminal Unit Shown)
  - Item Number (Terminal Unit No. 1)
  - Served by Air Handler Unit No. 1

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**SD230511–08.DWG**

**DECEMBER 2008**
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
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
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 ASSIGN 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)
TERMINAL UNIT SYMBOLS

- 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

DETAIL TITLE: TERMINAL UNIT SYMBOLS

SCALE: NONE

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AIR TERMINAL SYMBOLS

TERMINAL UNIT WITH REHEAT COIL

DOUBLE DUCT MIXING BOX.

FAN POWERED VARIABLE VOLUME TERMINAL UNIT WITH HEATING COIL.
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
<table>
<thead>
<tr>
<th>Symbol</th>
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<tr>
<td>FWPD</td>
<td>FEEDWATER PUMP DISCHARGE</td>
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<td>FWPS</td>
<td>FEEDWATER PUMP SUCTION</td>
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<td>CTPD</td>
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<td>VR</td>
<td>VACUUM CONDENSATE RETURN</td>
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<td>TC</td>
<td>TUBE CLEANER WATER SUPPLY</td>
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<tr>
<td>BO</td>
<td>BOILER BLOWOFF</td>
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<tr>
<td>CBD</td>
<td>CONTINUOUS BLOWDOWN</td>
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<td>BWS</td>
<td>BOILER WATER SAMPLE</td>
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<td>FWS</td>
<td>FEEDWATER SAMPLE (FROM DEAERATOR)</td>
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<td>A</td>
<td>COMPRESSED AIR</td>
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<tr>
<td>G</td>
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<tr>
<td>G(I)</td>
<td>NATURAL GAS IGNIITER FUEL</td>
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<td>LPG(I)</td>
<td>LIQUEFIED PETROLEUM GAS IGNIITER FUEL</td>
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<td>CW</td>
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<td>HOT WATER</td>
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<td>RH</td>
<td>ROLLER-TYPE HANGER</td>
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<td>SH</td>
<td>VARIABLE SPING-TYPE HANGER (TYPE 51)*</td>
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<tr>
<td>SCH</td>
<td>SPRING CUSHION-TYPE HANGER (TYPE 48 OR 49)*</td>
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<tr>
<td>TH</td>
<td>CLEVIS-TYPE HANGER</td>
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<td>PS</td>
<td>TRAPEZE HANGER (PROVIDE U-BOLT PIPE ATTACHMENT TO TRAPEZE EXCEPT WHERE RH ARE INDICATED)</td>
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<tr>
<td>RC</td>
<td>FLOOR-SUPPORTED PIPE STAND</td>
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<tr>
<td>WC</td>
<td>RISER CLAMP (TYPE 42)*</td>
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<tr>
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<td>WALL BRACKET (TYPE 31, 32, 33)*</td>
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<td>CSH</td>
<td>CONSTANT SUPPORT HANGER (TYPE 54, 55, 56)*</td>
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<tr>
<td>SS</td>
<td>SLIDING SUPPORTS (TYPE 35)*</td>
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* TYPE NUMBERS REFER TO MANUFACTURER’S STANDARDIZATION SOCIETY STANDARD PRACTICE SP–58
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
CONTROLS SYMBOLS

T
ROOM THERMOSTAT/TRANSmitter – WALL MOUNT

M
ROOM HUMIDISTAT (MOISTURE)/TRANSmitter – WALL MOUNT

TT
TEMPERATURE TRANSmitter

TT
TEMPERATURE TRANSmitter, AVERAGING ELEMENT

MT
MOISTURE (HUMIDITY) TRANSmitter

PT
PRESSURE TRANSmitter

SPS
STATIC PRESSURE SENSOR

FT
FLOW TRANSmitter

IT
CURRENT TRANSmitter

CT
CONDUCTIVITY TRANSmitter

SD
SMOKE DETECTOR

PDT
PRESSURE DIFFERENTIAL TRANSmitter

PDS
PRESSURE DIFFERENTIAL SWITCH

HS
HAND SWITCH (HAND-OFF-AUTO SWITCH)

ZC
VALVE OR DAMPER POSITION CONTROLLER

KR
LOCAL RECORDING TIME CLOCK (RUNTIME)

TSL
TEMPERATURE SWITCH, LOW (FREEZESTAT)

TSH
TEMPERATURE SWITCH, HIGH (FREEZESTAT)

LC
LEVEL CONTROLLER

LT
LEVEL TRANSmitter
CONTROLS SYMBOLS

PSH  PRESSURE SWITCH HIGH
PSL  PRESSURE SWITCH LOW
EPT  ELECTRONIC TO PNEUMATIC TRANSDUCER
AT\CO\  CARBON DIOXIDE TRANSMITTER
AT\CO\  CARBON MONOXIDE TRANSMITTER
AT\OC\  OCCUPANCY SENSOR
LTCP  LOCAL TEMPERATURE CONTROL PANEL
HVC  HVAC CONTROL PANEL
VSNC  VARIABLE SPEED MOTOR CONTROLLER
ECC  INTEGRATE CONTROL POINT ON REMOTE GRAPHICS WORKSTATION AT ENERGY CONTROL CENTER
TC  TEMPERATURE CONTROLLER. SEE SEQUENCE OF OPERATION
PC  PRESSURE CONTROLLER. SEE SEQUENCE OF OPERATION
SC  SPEED CONTROLLER. SEE SEQUENCE OF OPERATION
FC  FLOW CONTROLLER. SEE SEQUENCE OF OPERATION
FSH  FLOW SWITCH HIGH
FSL  FLOW SWITCH LOW
KC  TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE

DETAIL TITLE / CONTROLS SYMBOLS

SCALE :NONE

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
HANGER ROD

INSULATION (VAPOR BARRIER TYPE IS REQUIRED FOR LOW TEMPERATURE PIPE)

PROVIDE HIGH COMPRESSIVE STRENGTH INSULATION (9 PSF MIN. DENSITY) UNDER INSULATION SHIELD

ADJUSTABLE CURVE HANGER TYPE 1 - SEE SPECIFICATIONS

ADJUSTABLE CURVE HANGER TYPE 43 - SEE SPECIFICATIONS

WELD

SADDLE

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

NOTES:
SEE SPECIFIER FOR DETAILED HANGER REQUIREMENTS

MAXIMUM PIPE/TUBING SUPPORT SPACING

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NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE

45286 [1000 LB] UNIFORM LOAD

SIDE VIEW TRAPEZE HANGER FOR UP TO 45.368 [1000 LB] UNIFORM LOAD

15mm [1/2"] O.D. HANGER RODS WITH 900mm [36"] MAX. SPACING ON EACH CHANNEL

13mm [1/2"] 12 GAUGE CHANNEL ON 50.8x6.35mm [2x21/4"] ANGLE

PIPE HANGERS

NTS
Provide vapor barrier as specified on piping conveying fluid to degree C [°F] or lower.

High compressive strength insulation insert under shield.

Weld pipe saddle support to pipe, provide water tight connection.

Clamping ring.

Pre-moulded flexible pipe counter flashing.

Roof system insulation and membrane.

Roof surface.

Concrete roof slab or steel roof deck.

Secure to roof slab with (4) 8.0mm [⅛"] # expansion bolts or weld to steel deck.

Provide restraining clamps 2438mm [8'-0"] O.C.

Detail for supporting pipe on roof

[Diagram details not transcribed]
PIECE ANCHOR SCHEDULE

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<td>10</td>
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**NOTES:**
- WHERE USED FOR COPPER TUBE OR PIPE, BRAZE TO FABRICATED STEEL ANCHOR

**SMALL PIPE ANCHOR 38-102mm [1½”-4”]**

**DETAIL TITLE:** SMALL PIPE ANCHOR 38-104mm [1-1/2”-4”]

**SCALE:** NONE

**DATE ISSUED:** 11/01/2017  
**CAD DETAIL NO.:** SD230511-23.DWG
**PIPE ANCHOR SCHEDULE**

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<th>P (mm)</th>
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**NOTES:**

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

**LARGE PIPE ANCHOR 152-457mm [6” -18”]**

**ANCHOR BOLTS**

N = NUMBER  S = SIZE
DRILL $\phi = S + 3.175$ mm
DRILL $\phi = S + (3/8)$

**INSULATE AS INDICATED FOR ALL CHILLED WATER. INSULATE PIPE ONLY FOR STEAM, CONDENSATE & HEATING WATER.**

**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

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)
NOTES:
1. Coordinate trench detail with architectural & structural.
2. Refer to specification, sealing & caulking.

DESIGNER'S NOTE:
Coordinate trench detail with architectural & structural.
Provide two "U" bolts with nut & lock nut on steam line. Spot weld "U" bolt to pipe & bolt to channel. Size of steam line governs size of channel.

Provide one "U" bolt with nut & lock nut on return line. Spot weld "U" bolt to pipe & bolt to channel. Channel to be set in side wall of trench.

Plan View

### Schedule

<table>
<thead>
<tr>
<th>Size of Pipe [inch (mm)]</th>
<th>Size of &quot;U&quot; Bolt [inch (mm)]</th>
<th>Size of Channel [inch (mm)]</th>
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Schedule for 8 ft. [2.4m] span or less.

**Anchor Installation**

Steam/Condensate Piping in Trench

DETAIL TITLE / Anchor Installation - Steam/Condensate Piping in Trench

SCALE: NONE

DATE ISSUED: DECEMBER 2008  CADD DETAIL NO.: SD230511-28.DWG
NOTE:
1. SEISMIC SEPARATION ASSEMBLY DETAIL SHOWN IN NFPA 13 (SPRINKLER PIPING), UTILIZING FLEXIBLE MECHANICAL COUPLINGS, MAY BE USED IN LIEU OF PIPING DETAIL SHOW ABOVE.

SCHEDULE FOR PIPING CROSSING A SEISMIC JOINT

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>PIPE</th>
<th>DETAIL</th>
<th>DIMENSIONS INCHES [mm]</th>
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PIPING CROSSING A SEISMIC JOINT DETAIL "A"

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.
SCHEDULE FOR PIPING CROSSING A SEISMIC JOINT DETAIL "B"

(PLASTIC PIPE FOR PRESSURIZED SYSTEMS)

SCHEDULE FOR PIPING CROSSING A SEISMIC JOINT

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PIPING CROSSING A SEISMIC JOINT
DETAIL "B"

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.
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.

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

SCALE : NONE

DATE ISSUED : DECEMBER 2008  CADD DETAIL NO. : SD230511-31.DWG
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.
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.
TABLE OF FORCES AND MOMENTS DUE TO THERMAL EXPANSION AND WEIGHT OF STEAM LEAD AND VALVES

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

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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
VIBRATION ISOLATION BASES

TYPICAL STRUCTURAL STEEL MEMBER FOR EQUIPMENT

NUMBER OF ISOLATION UNITS AS REQUIRED

TYPE "B"
WELDED STEEL BASE

STRUCTURAL STEEL FRAME
SLEEVE
ANCHOR BOLT
REINFORCING BARS

SECTION A-A

ALL WELDED STEEL FRAMEWORK

NUMBER OF ISOLATION UNITS AS REQUIRED

TYPE "1"
CONCRETE INERTIA BASE

MOTOR SHAFT
DRIVEN EQUIPMENT

SD230541-01.DWG
DECEMBER 2008

NONE

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

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].
CONCRETE EQUIPMENT BASES

SECTION A-A (BASE NOT POURED WITH SLAB)

TYPICAL ANCHOR BOLT NUT & WASHER

SECTION A-A (BASE POURED WITH FLOOR SLAB)

TYPICAL ANCHOR BOLT NUT & WASHER

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

CONCRETE EQUIPMENT BASES

DESIGNER'S NOTE:
THIS DETAIL IS PRIMARILY FOR PUMPS WITHOUT ISOLATORS. COORDINATE DETAIL WITH ARCHITECTURAL AND STRUCTURAL.
NOTE: NOT REQUIRED FOR AIR TERMINAL UNITS.

- EQUIPMENT WEIGHT 250 LBS. [114KG] OR LESS
- SEISMIC BRACING FOR LIGHT SUSPENDED EQUIPMENT
- FLOOR MOUNT EQUIPMENT RESTRAINED BY RESILIENT PADS (TYPE DS)

- SEISMIC BRACING FOR EQUIPMENT
- CROSS BRACING RODS ALL FOUR SIDES
- HANGER ROD (TYP)
- LOCK NUTS (TYP)
- CLAMP

- FLOOR MOUNT EQUIPMENT RESTRAINED BY RESILIENT PADS (TYPE DS)
- ANCHOR BOLT
- NEOPRENE WASHER & SLEEVE
- BONDED STEEL PLATE
- RESILIENT PAD
- FLOOR

SCALE : NONE

DATE ISSUED : DECEMBER 2008       CADD DETAIL NO. : SD230541-04.DWG
STEEL EXPANSION SHIELD FOR EXISTING CONSTRUCTION AND INSERTS FOR NEW CONSTRUCTION. THIS TYPE SHALL BE USED ONLY IN SLABS OR BEAMS OF 4" [100mm] MIN DEPTH.

3/8" [10mm] MIN DIA EXPANSION BOLTS FOR EXISTING CONSTRUCTION AND INSERTS FOR NEW CONSTRUCTION.

3/8" [10mm] MIN DIA INSERTS NEW CONSTRUCTION ONLY.

CONCRETE FLOOR SLAB

CLIP ANGLE

NUTS & WASHERS

TURNBUCKLE

SECURING HANGER RODS IN CONCRETE

FOR PIPES UNDER 2" [50mm] IN SIZE USE
1 1/2"x1 1/2"x1/4" [40x40x6.4mm] ANGLE.
ALL PIPES 2" [50mm] & LARGER USE
3"x3"x1/4" [75x75x6.4mm] ANGLE.
FIRE PROTECTION FOR CEILING OUTLETS

INSULATED DUCT TYPE

- 5/8" [18mm] MINERAL FIBER
- DUCT
- INSULATION AS SPECIFIED
- CEILING DIFFUSER OR REGISTER

NON-INSULATED DUCT TYPE

- 1-1/4" [32mm] FIRE RESISTANT DUCT INSULATION
- EXTEND FROM CEILING TO TOP OF DUCT
- CEILING DIFFUSER OR REGISTER

DESIGNER NOTES:
1. SHOW LOCATION ON FLOOR PLANS

DATE ISSUED: DECEMBER 2008
CADD DETAIL NO.: SD230711-01.DWG
NOTES:

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

BYPASS WATER METER 3'-6"

[1.1M] FLOOR

SUPPORT BRACKET ANCHORED TO WALL OR COLUMN

80 MESH STRAINER

N.C.

WATER METER

3'-6" [1.1M] FLOOR

ELEVATION

WATER METER INSTALLATION

DETAIL TITLE / WATER METER INSTALLATION

SCALE : NONE

DATE ISSUED : DECEMBER 2008  CADD DETAIL NO. : SD230911-02.DWG
LEGEND

ITEM NO. DESCRIPTION
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 CUTOUT)
4. BURNER CONTROL SYSTEM ANNUCiator
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
1. PANEL APPROX. 3810mm [12'-6"]x610mm [2'-0"]x2438mm [8'-0"] H. SHOW ACTUAL SIZE ON DWS.
2. SOME RECORDING & MONITORING FUNCTIONS MAY BE HANDLED BY A COMPUTER WORK STATION AND THEREFORE MAY BE DELETED FROM THE PANEL.
3. ON SOME PROJECTS, IT MAY BE DESIRABLE TO LOCATE EMERGENCY GENERATOR AnnunciATORS & METERS ON THIS PANEL.
4. PROVIDE SMOKE DENSITY MONITORS ONLY ON PLANTS BURNING HEATED OIL OR WHERE REQUIRED BY LOCAL CODES.
5. ON PLANTS WHERE DRAFT CONTROL SYSTEMS ARE PROVIDED, CONSIDER LOCATING THE DRAFT GAGES ON THIS PANEL ABOVE THE BOILER OPERATION RECORDERS. THE GAGES ARE TYPICALLY LOCATED ON THE BURNER CONTROL PANELS.
6. DELETE THE "ENGINEERING NOTES" FROM THE PROJECT DRAWINGS.
GENERAL NOTES:

1. MAINTAIN NEGATIVE AIR PRESSURE (0.01 INCH WATER COLUMN [25 PASCAL]) BETWEEN THE AIR ROOM AND THE ANTEROOM AND THE ANTERoom AND THE CORRIDOR BY MODULATING VALVE V1. ALL 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 SIGNAL SHALL BE PROMPTED TO INFORM WHENEVER NEGATIVE DIFFERENTIAL PRESSURE IS NOT MAINTAINED. (STROBE LIGHT)

2. MAINTAIN THE ATTACHED TOILET, IF ANY, AT NEGATIVE AIR PRESSURE WITH RESPECT TO THE AIR 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 AIR 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 ANTERoom 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 - ANTERoom MINIMUM 10 ACPH (ASHRAE STANDARD 170 2008) OR MINIMUM 40 CFM [19 L/S] SUPPLY + 100 CFM [47 L/S] INFILTRATED INTO ANTERoom FROM CORRIDOR FOR A TOTAL OF 140 CFM [68 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:
   

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

AIR SYSTEM FOR AIRBORNE INFECTION ISOLATION ROOM (AIR) WITH ANTERoom

NTP 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 AIR ROOM AND THE CORRIDOR BY MODULATING VALVE V1. ALL 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 AIR 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 AIR 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 ACMH 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 ACMH OR 60 CFM [28 L/S]. EXAMPLE: 60 CFM [28 L/S]

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


AIR SYSTEM FOR AIRBORNE INFECTIOUS ISOLATION ROOM (AII) (WITHOUT ANTEROOM)

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
VARIABLE AIR VOLUME AIR HANDLING UNIT WITH MINIMUM OUTSIDE AIR CONTROL DIAGRAM
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=O-4 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, D=3 AND D=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 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 D=1 AND D=3 SHALL BE FULLY OPEN (MAXIMUM OUTSIDE AIR POSITION). THE DIGITAL CONTROL PANEL SHALL MODULATE V=1 PERIODICALLY 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 D=1, 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 SPR-1. RESET STATIC PRESSURE BASED ON REAL BUILDING LOAD BY PULLING 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 SPR-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 SPR-2 DOES EXCEED 3" (75mm) THE SUPPLY AIR FAN SHALL STOP. SPR-2 SHALL BE HARDWired TO THE SUPPLY FAN VSMC AND UNIT SHALL BE SHUT DOWN IN HAND/AUTO OR BYPASS MODE. SPR-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=2 SHALL REMAIN CLOSED. WHEN THE DIGITAL CONTROL PANEL IS CALLING FOR HUMIDITY, V=2 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 OVERHAUL 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 MISTED OFF UNLESS 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 THE 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 SIGNAL ALARM SIGNAL AT THE DIGITAL CONTROL PANEL AND ECC. TSL SHALL BE HARDWIRED TO THE SUPPLY FAN UTD AND UNIT SHALL BE SHUT DOWN IN HAND/AUTO OR BYPASS MODE. TSL WILL REQUIRE MANUAL RESET AT THE DEVICE.

6. AUTOMATIC SHUTDOWN/RESTART
definition

   _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
### Points List for VAV Air Handling Unit with Minimum Outside Air

**System: VAV Air Handler**

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<td>Discharge Air Temperature</td>
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<td>Static Pressure High Limit</td>
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<td>Minimum Outside Air (Damper)</td>
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<td>Cooling Valve V-1</td>
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<td>Return Fan Start/Stop</td>
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<td>R</td>
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<tr>
<td>Supply Fan Start/Stop</td>
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<tr>
<td>Steam Isolation Valve V-3</td>
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</tbody>
</table>

**Notes:**
- Full Communication

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**System Legend:**
- **R:** Binary
- **B:** Analog
- **S:** Alarm Processing
- **A:** Application/Function

**Remarks:**
- N/A
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].

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.
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

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

SMOKE DAMPER CONTROL DIAGRAM

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.
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.

STEAM METER DETAIL
NTS

DETAIL TITLE: STEAM METER DETAIL
SCALE: NONE
DATE ISSUED: 11/01/2017  CAD DETAIL NO.: SD230923-10.DWG
**BACNET SYSTEM ARCHITECTURE OPTION 1**

- **ETHERNET COMMUNICATION**
- **MSTP COMMUNICATION (TYPICAL)**

**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.

**CONTROL SYSTEM CONFIGURATION**
OPTION 1 — NEW BACNET ECC. UPGRADE EXISTING CONTROLS WITH NEW BACNET CONTROLS SYSTEM. INSTALL NEW BACNET COMMUNICATIONS NETWORK.
**BACNET SYSTEM ARCHITECTURE OPTION 2**

**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.

**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.
BACNET SYSTEM ARCHITECTURE OPTION 3

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 4

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.

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.
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-6, 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), SENSORED 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.


2.3 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 UNOCUPIED 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 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 LOCATED AT THE RETURN FAN INLET, SHALL PREVENT THE RETURN FAN FROM DEVELOPING OVER -3" [75mm] OF NEGATIVE STATIC 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, SENSORED BY RETURN AIR HUMIDITY MT-1, A "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 (AUD) 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 DEWPOINT TEMPERATURE. V-3 SHALL BE CLOSED WHENEVER THE RETURN AIR DEWPOINT IS > 45°F [7.2° C]. V-3 WILL BE CLOSED 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 SENSORED BY TT-3 FALLS BELOW 45°F [7° C], AN ALARM SIGNAL SHALL INDICATE AT THE OCP AND ECC. IF THIS TEMPERATURE FALLS BELOW 40°F [4.4° C], AS SENSORED 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 SENSORED BY TT-1 RAISES ABOVE 65°F [18° C], AN ALARM SIGNAL SHALL INDICATE AT THE OCP AND ECC. IF THIS TEMPERATURE RAISES ABOVE 70°F [21° C], AS SENSORED 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, SO, 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

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. (SYRACUSE LIFE)
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:


   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 ACFH OR 60 CFM [28 L/S]; 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)

NOT: DESIGNER’S NOTE:
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 ACFM (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 ACFCM 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)

NOTES

DESIGNER'S NOTE:
1. ENSURE FINAL DESIGN REFLECTS PROJECT SPECIFIC REQUIREMENTS AND MEETS ASHRAE 170, LATEST EDITION WITH ALL ADDENDUMS.
GENERAL NOTES:

1. ANTEROOM SHALL BE MAINTAINED AT A NEGATIVE PRESSURE (0.01 INCH WATER COLUMN [0.25 PASCAL]) WITH RESPECT TO BOTH AIR/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. CORRIDOR 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 NEGATIVE DIFFERENTIAL PRESSURE IS NOT MAINTAINED IN THE PATIENT ROOM WITH RESPECT TO THE ANTE ROOM (STROBE LIGHT). 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 LIGHT).

2. MAINTAIN THE ATTACHED TOILET, IF ANY, AT NEGATIVE AIR PRESSURE WITH RESPECT TO THE AIR/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 ACH AIR 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 [189 L/S]

   B - ANTE ROOM
   SUPPLY AIR IS NOT REQUIRED FOR THIS SPACE. EX-PURGE
   PATIENT ROOM AIR AND CORRIDOR AIR TO EXHAUST MINIMUM 10
   ACH AIR (ASHRAE STANDARD 170) AS MEASURED AND CONTROLLED
   BY VALVE V-2. WITH THIS EXAMPLE INFLATE 100 CFM [47 L/S]
   FROM CORRIDOR INTO THE ANTE ROOM [20 L/S] FROM
   THE AIR/PE ROOM. THIS WILL ENSURE THE ANTE ROOM IS
   NEGATIVE WITH RESPECT TO THE AIR/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 ACH
   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 [189 L/S] [SUPPLY] — 60 CFM [28 L/S] [TOILET] — 40 CFM
   [19 L/S] [ANTE ROOM], 300 CFM [140 L/S] AIR/PE ROOM EXHAUST.
   100 CFM [47 L/S] INFLATED FROM CORRIDOR INTO ANTE ROOM +
   40 CFM [19 L/S] EXHAUST FROM AIR/PE ROOM INTO ANTE ROOM, 140
   CFM [65 L/S] EXHAUST, TOTAL EXHAUST 500 CFM [240 L/S]

4. ORIGINATE 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 NEGATIVE ANTEROOM

DESIGNER'S NOTE:

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

DEPARTMENT

DETAIL TITLE / AIR SYSTEM FOR COMBINATION AIRBORNE INFECTION ISOLATION /
PROTECTIVE ENVIRONMENT ROOM W/ NEGATIVE ANTEROOM

SCALE: NONE

DATE ISSUED: MAY 2011

CAD DETAIL NO. SD230923-19.DWG
GENERAL NOTES:
1. ANTRROOM SHALL BE MAINTAINED AT A POSITIVE PRESSURE (0.01 INCH WATER COLUMN [2.5 PASCAL]) WITH RESPECT TO BOTH AI/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 SIGNALS SHALL BE PROVIDED TO INDICATE WHENEVER THE DIFFERENTIAL AIR PRESSURE IS NOT MAINTAINED WITH RESPECT TO ANTE ROOM AND EITHER THE AI/PE ROOM OR THE CORRIDOR. (STORIE LITE)

2. MAINTAIN THE ATTACHED TOILET AT A NEGATIVE AIR PRESSURE WITH RESPECT TO THE PE ROOM. HOWEVER, THE DESIGN NEEDS TO 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 ACFH SUPPLY AIR (ASHRAE STANDARD 170 2008)
INCREASE SUPPLY AIR VOLUME, IF REQUIRED, TO MEET THE INSIDE DESIGN CONDITIONS IN COOLING AND/OR HEATING MODS.
EXAMPLE: 400 CFM [190 L/S]

B - ANTE ROOM
EXAMPLE: 140 CFM [65 L/S] 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 ACFH 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] INFLTRATED FROM ANTE ROOM (ANTE ROOM)
350 CFM [180 L/S] EXHAUSTED FROM AI/PE ROOM. 100 CFM
[47 L/S] IS EX-FLTRATED 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

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

SCALE: NONE

DATE ISSUED: MAY 2011

CAD DETAIL NO.: SD230923-20.DWG
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.
STEAM LINE DRAIN POCKET AND STEAM TRAP ASSEMBLY

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

DETAIL TITLE: STEAM SAFETY VALVE

SCALE: NONE

DATE ISSUED: 11/01/2017  CAD DETAIL NO.: SD232111-02.DWG
BASIC FLOW DIAGRAM - CONDENSATE AND BOILER FEEDWATER
BOILER FEEDWATER PUMPS FLOW DIAGRAM

NOTE:
Capacity of each pump approx. 125% of one boiler

DESIGNER'S NOTE:
See 50232111-04 BASIC FLOW DIAGRAM - CONDENSATE AND BOILER FEEDWATER FOR COMPLETE SYSTEM.
CONTROLLED BY WATER LEVEL TRANSMITTER

300PSIG

0-2000kPa

10-150°C

[30-300°F]

0-2000kPa

10-260°C

[50-500°F]

20mm [3/4"]

VENT INTO BOILER ROOM

PRO

PRO

PRO

PRO

FLOW REJECTORS

PRO

PRO

PRO

PRO

CV-6,7,8

STACK

20mm 3/4" FROM CHEMICAL FEEDER

BOILER (TYPICAL)

ECONOMIZER (TYPICAL)

PRO

PRO

FLOW REJECTORS

2ND BD LINE REQUIRED
IF BOILER HAS TWO BD CONNECTIONS

TONED BBD TANK
OR IF SPECIFIED TO
BLOWDOWN HEAT
RECOVERY

BOILER WATER LEVEL CONTROL SYSTEM

(SEE SPECS FOR TYPE OF SYSTEM)

BOILER WATER LEVEL TRANSMITTER

BOILER STEAM FLOW TRANSMITTER

BOILER FEEDWATER PRESSURE TRANSMITTER

BOILER FLOW DIAGRAM

NTS

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

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**HIGH PRESSURE STEAM TRAP**

**DISCHARGE INTO PUMPED CONDENSATE RETURN LINE**

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**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:
M AINTAIN 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)
NOTE:
provide the appropriate well depth to have the necessary insulation stand-off distance.

INSTALLATION OF THERMOMETER WELLS

GREATER THAN 50mm [2"] DIA. PIPE

50mm [2"] DIA. & SMALLER

GREATER THAN 50mm [2"] DIA. PIPE

50mm [2"] DIA. & SMALLER

HORIZONTAL

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

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. A SYSTEM IS USED ONLY FOR HOT WATER HEATING.
3. PROVIDE STRAINER IN AIR SEPARATOR WHEN MENTIONED 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 VALUE SO PRESSURE AT HIGHEST POINT IN SYSTEM HAS A MINIMUM OF 286kPa. [4 PSI].

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

HORIZONTAL EXPANSION TANK - PIPING CONNECTIONS

NPS
FLOOR MOUNTED EXPANSION TANK - PIPING CONNECTIONS

NOTES:
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.
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)

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.

DATE ISSUED: MARCH 2010
CADD DETAIL NO.: SD232113-06.DWG
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.

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)
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

FLOOR SINK

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
LONG RADIUS ELBOW (TYPICAL)

PIPE ALIGNMENT GUIDES (TYPICAL)

W + 25 FT. [7.6m] APPROXIMATE MINIMUM

PLAN

EXPANSION LOOP

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EXPANSION LOOP DETAIL

NTS

EXPANSION LOOP DETAIL

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.

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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
SEE SCHEDULES FOR RELIEF VALVE SETTING

DDC TEMPERATURE SENSORS (TYP.)

THERMOMETER (TYP.)

15 mm [1/2"] CHECK VALVE VACUUM BREAKER (TYP.)

TEST PLUG (TYP.)

HEAT EXCHANGER (TYP.)

HPS TO FLASH TANK OR TO HPR MAIN LINE (TYP.)

THERMOSTATIC AIR VENT (TYP.)

HPS STEAM SUPPLY

DDC PRESSURE SENSORS (TYP.)

IF INSTALLED LOWER THAN MAIN HPS LINE, PROVIDE ANOTHER SCALE POCKET/TRAP HERE.

RUN DRAIN LINE FROM RELIEF VALVE TO NEAREST FLOOR DRAIN. (TYP.)

CONTROL VALVES IN 2/3 & 1/3 SIZE ARRANGEMENT, TYP.

IF THE SECOND HEAT EXCHANGER IS NOT A REDUNDANT 100% BACK UP UNIT, THEN PROVIDE A MOTORIZED ISOLATION VALVE HERE.

IF THE SECOND HEAT EXCHANGER IS NOT A REDUNDANT 100% BACK UP UNIT, THEN PROVIDE A MOTORIZED ISOLATION VALVE HERE.

NOTES:
1. THE ABOVE DETAIL SHOWS REQUIRED PIPING FOR TWO HEAT EXCHANGERS IN PARALLEL. INDICATE IF 100% REDUNDANT OR NOT.

2. PROVIDE SADDLE SUPPORTS AND LEGS OR HANGERS FOR HEAT EXCHANGER. MOUNTING HEIGHT SHALL BE ADJUSTED TO FACILITATE GRAVITY RETURN OF STEAM CONDENSATE.

3. MAKE THE BYPASS THE SAME SIZE AS THE CONNECTIONS TO THE CONTROL VALVES.

4. CONTROL VALVES SHALL BE IN A 1/2 AND 3/4 SIZE ARRANGEMENT.
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
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

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.
**MOBILE INDIRECT GLYCOL MAKE-UP SYSTEM**

**(PIPING AND CONTROLS)**

**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.

**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
PIPE HANGERS - PROVIDE DOUBLE DEFLECTION NEOPRENE (TYPE HN) FOR FIRST TWO ON EACH SIDE OF PUMP (SEE NOTE NO. 1)

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

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.
NOTES:
SEE SPECIFICATION SECTION "PUMPS" FOR Y STRAINER OPTION

SINGLE SUCTION FLOOR-MOUNTED PUMPS - CONNECTIONS WITH FLEXIBLE CONNECTORS

DESIGNER'S NOTE:
CHECK VALVE IS OPTIONAL FOR SINGLE PUMP, EXCEPT FOR COOLING TOWER PUMP.
NOTES:
SEE SPECIFICATION SECTION "PUMPS" FOR Y STRAINER OPTION

SINGLE SUCTION FLOOR-MOUNTED PUMPS -
CONNECTIONS WITH MECHANICAL COUPLINGS

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.