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

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

DESIGNER'S NOTE:
CHECK VALVE IS OPTIONAL FOR SINGLE PUMPS, EXCEPT FOR COOLING TOWER PUMP.

DOUBLE SUCTION FLOOR-MOUNTED PUMPS - CONNECTIONS WITH FLEXIBLE CONNECTORS

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

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

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

RIGID PIPE HANGER (TYPICAL)

INSTALL HANGER AS CLOSE TO PIPE ELBOW AS POSSIBLE (TYPICAL)

STRAINER

1/2" [15mm]

ECCENTRIC REDUCER

INLET TO PUMP SHALL BE MINIMUM OF 3 PIPE DIAMETERS

FLEXIBLE CONNECTOR TYP.

NOTE 3

1" [25mm] MIN. DIA.

PIPE STAND

CONCRETE BASE (SEE DETAIL)

1. Y TYPE STRAINER BLOWDOWN HEIGHT SHALL ACCOMMODATE 55 GALLON DRUM.

2. PUMP INSTALLATION IS DIAGRAMMATIC AND INTENDED TO SHOW THE MAJOR COMPONENTS REQUIRED FOR INSTALLATION. THE INSTALLED PIPING CONFIGURATION SHALL BE BASED ON THE ACTUAL PUMP PROVIDED. THE CONTRACTOR SHALL SUBMIT FOR APPROVAL A COORDINATION DRAWING SHOWING PUMP, PIPING, AND ACCESSORIES AS REQUIRED BY THIS INSTALLATION DETAIL.

3. ALL PAD, PUMP, AND PIPING DRAINS SHALL BE HARD PIPED TO NEAREST FLOOR DRAIN, TYPICAL.

HORIZONTAL SPLIT CASE PUMP - FLEXIBLE CONNECTORS

DESIGNER'S NOTE:
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 OR WHERE APPROVED BY VA.
CONDENSATE PUMPS - PIPING CONNECTIONS

NTS

Department of Veterans Affairs

DETAIL TITLE: CONDENSATE PUMPS - PIPING CONNECTIONS

SCALE: NONE

DATE ISSUED: 11/01/2017

CADD DETAIL NO.: SD232123-07.DWG
NOTES:
1. SEE FLOOR PLANS FOR PIPE SIZES.
2. SEE EQUIPMENT SCHEDULES FOR VALVE DATA AND PIPE SIZES D1 AND D2. INSTALL VALVES AS RECOMMENDED BY MANUFACTURER.
3. MAKE BYPASS VALVE DISCHARGE PIPE THE SAME SIZE AS D2 FOR THE LARGEST PRV.
4. PROVIDE NECESSARY UNIONS FOR THE REMOVAL OF VALVE WITH SCREWED CONNECTIONS.
5. SLOPE PILOT CONTROL LINE FROM PRESSURE REDUCING VALVE TO DOWN STREAM STEAM PIPING. MINIMUM SLOPE SHALL BE 25'/100', 25mm/300mm [1'/12']

DESIGNER'S NOTES:
D1 DESIGNATE LOWER VALVE A AND UPPER VALVE B (1–PRV1A, 1–PRV1B).
USE SYSTEM PRESSURE FOR 1–PRV1A AND SET PRESSURE 13.8kPa [2 PSIG] HIGHER.
D2 USE DUAL VALVE PRESSURE REDUCING STATION WHEN THE MINIMUM LOAD IS 10% OR LESS THAN PEAK LOAD.
D3 SAFETY VALVES SHALL BE SIZED SO AS TO RELIEVE AT PRESSURES OF 35–70kPa [5–10 PSIG] IN EXCESS OF DELIVERED PRESSURES OF PRV'S AND TO HAVE A CAPACITY EQUAL TO THE MAXIMUM CAPACITY OF PRV IT IS TO RELIEVE. VENT PIPE SHALL BE NO LESS THAN ONE PIPE SIZE LARGER THAN SAFETY VALVE DISCHARGE AND SHALL FURTHER BE SIZED SO THAT FRICTIONAL RESISTANCE OR VENT DOES NOT EXCEED VELOCITY PRESSURE AT SAFETY VALVE OUTLET. VENTS FROM SAFETY VALVES SHALL RUN THE SHORTEST AND MOST DIRECT ROUTE TO OUTDOOR THRU THE ROOF, WHERE VENTS RUN IN FINISHED SPACE THEY SHALL BE FURRED IN TO MATCH ADJACENT BUILDING CONSTRUCTION; IN UNFINISHED SPACE, PIPE TO BE COVERED ONLY. SAFETY VALVES SHALL BE LOCATED AS SHOWN ON THE FLOOR PLANS.
D4 IF ELECTRONIC PRV'S ARE USED, REPLACE PILOT CONTROL LINE WITH ELECTRONIC PILOT ON THE PRV AND PROVIDE A PRESSURE TRANSDUCER DOWNSTREAM OF PRV.
D5 PIPE DIMENSIONS SHALL BE AS INDICATED IN CONTRACT DRAWINGS OR BY MANUFACTURER'S RECOMMENDATION.
D6 DELETE DESIGNER'S NOTE WHEN COMPLETED.
NOTES:
1. ALL DRIp POINTS ON STEAM MAINS SHALL BE PROVIDED WITH A 300mm [12"] MINIMUM HIGH DRIp LEG FROM BOTTOM OF STEAM MAIN TO TRAP INLET. DRIp LEG SHALL HAVE 150mm [6"] SCALE POCKET BELOW TRAP INLET.
2. PROVIDE BYPASS PIPING.

INVERTED BUCKET STEAM TRAP ASSEMBLY

DETAIL TITLE: INVERTED BUCKET STEAM TRAP ASSEMBLY

SCALE : NONE

DATE ISSUED: 11/01/2017 CAD DETAIL NO.: SD232213-02.DWG
NOTE:
ALL DRIP POINTS ON STEAM MAINS SHALL BE PROVIDED WITH A 300mm [12"] MINIMUM HIGH DRIP LEG FROM BOTTOM OF STEAM MAIN TO TRAP INLET. DRIP LEG SHALL HAVE 150mm [6"] SCALE POCKET BELOW TRAP INLET.

FLOAT AND THERMOSTATIC STEAM TRAP ASSEMBLY

DETAIL TITLE: FLOAT AND THERMOSTATIC STEAM TRAP ASSEMBLY

SCALE: NONE

DATE ISSUED: 11/01/2017   CAD DETAIL NO.: SD232213-03.DWG
NOTE:
1. All drip points on steam mains shall be provided with a 300mm [12"] minimum high drip leg from bottom of steam main to trap inlet. Drip leg shall have 150mm [6"] scale pocket below trap inlet.
END OF STEAM LINE DRIP TRAP

STEAM PIPE

WELDED TEE

300mm [12"]

150mm [6”]

SCHEDULE 80 STEEL PIPE

25mm [1”] GATE VALVE

WELDED TEE

TO BUILDING LOAD

MANUAL AIR VENT

MV

TO DRAIN

INVERTED BUCKET TRAP ASSEMBLY

CONDENSATE

NTS

DETAIL TITLE: END OF STEAM LINE DRIP TRAP

SCALE: NONE

DATE ISSUED: 11/01/2017  CAD DETAIL NO.: SD232213-05.DWG
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>0 thru 257 [0 thru 15]</td>
<td>61 [18]</td>
<td>356mm (Dia x 610mm Long) [14 Dia x 24 Long]</td>
</tr>
<tr>
<td>253 thru 346 [16 thru 22]</td>
<td>91 [24]</td>
<td>356mm (Dia x 914mm Long) [14 Dia x 36 Long]</td>
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<tr>
<td>364 thru 475 [23 thru 30]</td>
<td>117 [31]</td>
<td>406mm (Dia x 914mm Long) [16 Dia x 36 Long]</td>
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<tr>
<td>491 thru 586 [31 thru 37]</td>
<td>146 [37]</td>
<td>406mm (Dia x 1067mm Long) [16 Dia x 42 Long]</td>
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<tr>
<td>602 thru 713 [36 thru 45]</td>
<td>159 [42]</td>
<td>406mm (Dia x 1219mm Long) [16 Dia x 48 Long]</td>
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<tr>
<td>729 thru 951 [46 thru 63]</td>
<td>231 [61]</td>
<td>457mm (Dia x 1372mm Long) [18 Dia x 54 Long]</td>
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<tr>
<td>967 thru 1189 [61 thru 75]</td>
<td>284 [75]</td>
<td>457mm (Dia x 1578mm Long) [18 Dia x 66 Long]</td>
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<tr>
<td>1200 thru 1537 [76 thru 97]</td>
<td>360 [95]</td>
<td>610mm (Dia x 1372mm Long) [24 Dia x 54 Long]</td>
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<tr>
<td>1553 thru 2377 [98 thru 150]</td>
<td>587 [150]</td>
<td>610mm (Dia x 1981mm Long) [24 Dia x 78 Long]</td>
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</tbody>
</table>

**Designer's Note:**
1. Indicate the height on floor plans and/or sections. Provide a flash tank for each condensate pump, that serves HP return condensate.
2. For flash steam recovery, flash tank to be vertical type. Provide back pressure valve and safety relief valve at flash steam line. Provide trap at bottom condensate discharge line. No vent interconnection between condensate discharge and the flash steam line.

**Typical Connections to Flash Tank**

Detail Title: Typical Connections to Flash Tank

Scale: None

Date Issued: 11/01/2017

CAD Detail No.: SD232213-06.DWG
STEAM HUMIDIFIER - PIPING CONNECTIONS
(MULTIPLE DISPERSION TUBES)

NOTE:
SEE MANUFACTURER'S PIPING RECOMMENDATIONS FOR FINAL LAYOUT

DESIGNER NOTE:
PROVIDE ADDITIONAL CONTROLS FOR VAV OPERATION AND FOR PREVENTING OVER SATURATION OF THE SUPPLY AIR.
STEAM HUMIDIFIER CONTROL NOTES:
RETURN (OR EXHAUST) AIR HUMIDITY SHALL BE MONITORED. ON A CALL FOR HUMIDIFICATION, HUMIDIFIER VALVE V-1 SHALL MODULATE TO MAINTAIN THE RETURN (OR EXHAUST) AIR HUMIDITY SET POINT TO 30% (ADJUSTABLE). PRIOR TO ACTIVATION OF V-1, THE ON/OFF CONTROL VALVE V-2 SHALL BE ENABLED THROUGH ECC AND JACKET TEMPERATURE SENSED BY TSH SHALL BE WARM ENOUGH TO PREVENT CONDENSATION. THE HIGH LIMIT HUMIDITY SENSOR, LOCATED IN THE SUPPLY AIR DUCT 3000MM [10 FEET] AWAY FROM THE HUMIDIFIER SHALL DISABLE THE HUMIDIFIER AND GIVE AN ALARM SIGNAL TO THE ECC, IF THE SUPPLY AIR HUMIDITY EXCEEDS 90% RH (ADJUSTABLE). THE AIRFLOW SWITCH SHALL PROVE AIRFLOW BEFORE HUMIDITY CONTROLS ARE ACTIVATED.
CONDENSATE RETURN PIPING
AROUND OPENINGS

NTS

DETAIL TITLE: CONDENSATE RETURN PIPING
AROUND OPENINGS

SCALE: NONE

DATE ISSUED: 11/01/2017
CADD DETAIL NO.: SD232213-09.DWG
TO OUTSIDE AIR VENT MANIFOLD

PRESSURE SAFETY VALVE

SET @ 138 kPa [20 PSIG]

MIST ELIMINATOR

SET @ 103 kPa [15 PSIG]

SHUTOFF VALVE

TO HUMIDIFIER(S)

STOCK CONTROL VALVE

HPS

MODULATING LEVEL CONTROL VALVE

WATER LEVEL

F&T TRAP ASSEMBLY

RO FEEDWATER PREHEATED

SEE PLUMBING DWG FOR R.O. SYSTEM

PREHEAT PLATE & FRAME HEAT EXCHANGER

TO CONDENSATE RETURN

DESIGNER NOTE:
PREHEAT HEAT EXCHANGER IS OPTIONAL.

CLEAN STEAM GENERATOR

NTS

DETAIL TITLE: CLEAN STEAM GENERATOR

SCALE: NONE

DATE ISSUED: 11/01/2017 CAD DETAIL NO.: SD232213-10.DWG

Department of Veterans Affairs
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. THE VENT PIPE SHOULD GO VERTICAL THRU THE ROOF WITH NO TURNS OR ANGLES. WHERE REQUIRED THERE SHALL BE NO MORE THEN A TOTAL OR 180 DEGREES IN DIRECTIONAL CHANGES MADE WITH 45 DEG. ELBOWS.

2. VENT PIPE SHALL TERMINATE 1829mm [6'] MIN. ABOVE FINISHED ROOF.

3. DISCHARGE OF DRAIN SHALL BE DIRECTED AWAY FROM PLATFORMS OR OTHER AREAS WHERE PERSONNEL MAY OCCUPY.

4. DO NOT CONNECT ANY OTHER DRAIN TO THE Drip Pan Elbow Drain Pipe.

5. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

STEAM SAFETY VALVE

DETAIL TITLE: STEAM SAFETY VALVE

SCALE: NONE

DATE ISSUED: 11/01/2017 CAD DETAIL NO.: SD232213-11.DWG
DESIGNER’S NOTE:
1. PROVIDE SEDIMENT WATER FILTER ON EACH CHILLED WATER, HOT WATER AND GLYCOL WATER HEATING SYSTEM. CAPACITY SHALL BE APPROXIMATELY 5% OF THE TOTAL CIRCULATING FLOW. SHOW FILTER LOCATIONS ON THE DRAWINGS. INCLUDE THE FILTER FLOW RATE IN PUMP CAPACITIES. SIZE PIPES TO WATER FILTER.
2. SELECT PRESSURE RANGE PER PROJECT NEED. SPECIFY PRESSURE RANGE ON DRAWINGS.
WATER TREATMENT - CLOSED SYSTEMS

NOTE:
TOP OF CHEMICAL POT FEEDER TANK SHALL NOT BE MORE THAN 4'-0" [1200mm] ABOVE FINISHED FLOOR.

DESIGNER'S NOTE:
1. SHOW LOCATION OF ALL CHEMICAL POT FEEDER TANKS ON PIPING DIAGRAMS FOR EACH CHILLED WATER AND HEATING HOT WATER SYSTEM. FEEDER MAY ALSO BE USED FOR MAKE-UP FOR SMALL GLYCOL-WATER SYSTEMS (UNDER 50 GPM [190 LPM] IN LIEU OF A TANK/PUMP MAKE-UP SYSTEM.)
1. Design water treatment system based on the available water sample analysis and recommendations of the water treatment consultant.

2. Provide interface between chemical feed controller and ECC.

3. Chilled water water treatment system shall be operated manually.

4. Additional storage tanks and feed pumps may be required based on the outcome of the water sample analysis.

5. Ensure close coordination between the contract specifications and details.
DESIGNER’S NOTE:

1. PROVIDE EITHER A COMMON SIDESTREAM SOLID SEPARATOR WITH PUMP OR A DEDICATED SEPARATOR FOR EACH CONDENSER WATER SYSTEM.

2. INCREASE CONDENSER WATER PUMP CAPACITY 5%–8% FOR A DEDICATED SIDESTREAM SEPARATOR.

SIDESTREAM SOLID SEPARATOR
NOTE:

1. ALL VANE ELBOWS SHALL BE CONSTRUCTED AND INSTALLED AS DETAILED BY SMACNA.

2. WHEN W1 DOES NOT EQUAL W2, VANE SHALL BE SINGLE THICKNESS VANE TYPE REGARDLESS OF W DIMENSION.

3. ALL SINGLE THICKNESS VANES SHALL HAVE A 2" [50mm] RADIUS, 1 1/2" [40mm] MAXIMUM SPACE BETWEEN VANES AND A 3/4" [20mm] TRAILING EDGE.

4. WHEN W EQUALS W2 AND W1 IS GREATER THAN 20" [500mm] VANES SHALL BE DOUBLE VANE TYPE.

DUCTWORK SQUARE VANE ELBOWS
NOTE:

1. THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.

2. ALL STANDARD RADIUS ELBOWS CAN BE SUBSTITUTED WITH SHORT RADIUS ELBOWS. ALL SHORT RADIUS ELBOWS SHALL HAVE VANES. VANES SHALL BE CONSTRUCTED, SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.

**DUCTWORK RADIUS ELBOWS**

**DESIGNER’S NOTE:**
DO NOT SHOW MITERED ELBOWS AND MITERED OFFSETS (TRANSITIONS) GREATER THAN 15 DEGREES ON DRAWINGS.
DUCTWORK TRANSITIONS
(WITH EQUIPMENT MOUNTED IN DUCT)

TYPICAL DUCTWORK TRANSITION WITH
EQUIPMENT MOUNTED IN DUCT
PLAN OR SIDE VIEW

NOTE:
UNLESS OTHERWISE INDICATED ON PLANS, MAXIMUM ANGLES SHOWN SHALL APPLY.

SD23100-O3.DWG
DECEMBER 2008
NTS

#
**SUPPLY DUCTWORK TAKE-OFFS**

**DESIGNER’S NOTES:**

1. The supply register take-off may be used for up to 25% of the main duct CFM. The branch duct take-off may be used for up to 15% of the main duct CFM anytime and up to 40% when the main duct velocity is 1000 FPM [5.1 M/S] or less. The air split duct take-off shall be used in all other cases and may be used at anytime.

2. Show all volume dampers on floor plans.
SUPPLY DUCT TAKEOFF - AIR TERMINAL UNIT

DETAIL TITLE: SUPPLY DUCT TAKEOFF - AIR TERMINAL UNIT

SCALE: NONE

DATE ISSUED: DECEMBER 2008  CAD DETAIL NO.: SD233100-05.DWG

NTS
SMACNA FIGURE 4-6
45° LEED IN
RIGID DUCT TO AIR TERMINAL UNIT.

PLAN VIEW

ALTERNATE SUPPLY DUCT TAKEOFF -
AIR TERMINAL UNITS

SD233100-06.DWG
DECEMBER 2008

NONE
DESIGNER’S NOTE:

1. SHOW ALL VOLUME DAMPERS ON FLOOR PLANS.
NOTE:

1. DELETE INSULATION STAND-OFF ON DUCTWORK WITHOUT EXTERIOR INSULATION.

2. DETAIL SHOWS SINGLE BLADE DAMPER. DAMPER INSTALLATION SHALL BE SIMILAR FOR MULTI-BLADE DAMPERS & ROUND DAMPERS.
NOTES:
1. LATCHES SHALL BE OF THE WEDGE TYPE TO CLOSE DOORS TIGHTLY.
2. HINGES ON THE ACCESS DOORS SHALL HAVE NON-CORROSIVE PINS.
3. SEE SMACNA 2005, FIGURE 9-15

ACCESS PANEL AND DOOR DETAIL

DESIGNERS NOTES:
1. USE ACCESS DOORS ON AIR HANDLING UNITS AND DUCTWORK INSTALLED IN EQUIPMENT ROOMS.
2. USE ACCESS PANELS ON ALL EQUIPMENT AND DUCTWORK INSTALLED ABOVE FINISHED CEILINGS.
ACCESS SECTION FOR ROUND/OVAL DUCT

HOUSING WELDED TO DUCT SECTION

ROUND OR FLAT OVAL DUCT SECTION

COVER WITH HANDLE AND CHAIN RETAINER
GASKETED AND PRESSURE SEALED
HALF SCALE DETAIL NO.: SD233100-11.DWG
DECEMBER 2008

FLEXIBLE DUCT CONNECTIONS

NTS

DEPARTMENT OF
VETERANS AFFAIRS

DETAIL TITLE / FLEXIBLE DUCT CONNECTIONS
SCALE : NONE
DATE ISSUED: DECEMBER 2008 CAD DETAIL NO.: SD233100-11.DWG
NOTE:

1. A VERTICAL DAMPER IS SHOWN. HORIZONTAL DAMPER INSTALLATION, IS SIMILAR. FOLLOW DAMPER MANUFACTURER'S INSTRUCTIONS, INCLUDING FASTENER OPTIONS AND GAGES FOR SLEEVE AND PERIMETER ANGLES. FIRE DAMPERS MUST BE INSTALLED IN THE PARTITION OR FLOOR AND NOT OUTSIDE THE PENETRATION.

2. GALVANIZED SLEEVE: GAGE NOT LESS THAN CONNECTING DUCT. FASTEN SLEEVE TO DAMPER FRAME AND TO PERIMETER ANGLES.

3. PERIMETER ANGELS: GALVANIZED STEEL, NOT LESS THAN 1 1/2"x1 1/2" [40x40mm], 14 GAGE, TO PROVIDE 1" [25mm] MINIMUM OVERLAP OF OPENING ON ALL 4 SIDES.

4. BREAKAWAY DUCT CONNECTION: CONTRACTOR'S OPTION OF TYPES SHOWN IN SMACNA. ACCESS PANELS: SIZE AND LOCATION TO PERMIT SERVICING THE FUSIBLE LINK OR LINKS.

5. PROVIDE 1/4" TO 1/2" [6 TO 15mm] CLEARANCE ON HEIGHT AND WIDTH. FILL OPEN SPACE WITH ROCK WOOL FIRESTOP FIBER.

6. ALL DUCT WORK RISERS WHICH ARE RUN EXPOSED, SUCH AS THRU ATTIC FLOORS AND MECHANICAL ROOM FLOORS, SHALL BE PROVIDED WITH 3" [75mm] HIGH

7. CONCRETE CURB AROUND OPENING FOR DUCT.

SECTION THRU
FIRE DAMPER INSTALLATION

DETAIL TITLE / SECTION THRU
FIRE DAMPER INSTALLATION

SCALE : NONE

DATE ISSUED: DECEMBER 2008    CAD DETAIL NO.: SD233100-12.DWG
NOTE:

1. PROVIDE BRACING TO LIMIT THE AMPLITUDE OF WALL VIBRATION AND WALL DEFORMATION TO SPECIFIED MAXIMUMS.

2. MINIMUM BRACING REQUIREMENTS:

<table>
<thead>
<tr>
<th>MAXIMUM DUCT WIDTH</th>
<th>MAXIMUM SIZE ANGLE</th>
<th>MAXIMUM SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN. [mm]</td>
<td>IN. [mm]</td>
<td>IN. [mm]</td>
</tr>
<tr>
<td>UP TO 26 [650]</td>
<td>NONE</td>
<td>72 [1800]</td>
</tr>
<tr>
<td>27 [675] TO 40 [1000]</td>
<td>1-1/2x1-1/2x3/16 [40x40x7]</td>
<td>48 [1200]</td>
</tr>
<tr>
<td>41 [1000] TO 60 [1500]</td>
<td>2x2x3/16 [50x50x7]</td>
<td>48 [1200]</td>
</tr>
<tr>
<td>61 [1500] TO 72 [1800]</td>
<td>2x2x3/16 [50x50x7]</td>
<td>24 [600]</td>
</tr>
</tbody>
</table>

3. INSULATION: FOR COLD DUCTS INSULATE BRACES AND PROVIDE VAPOR BARRIER.

FLAT OVAL DUCT HANGERS/REINFORCEMENT

NTS
ROUND DUCT HANGERS

nts

describer's note:
describe or detail upper attachments applicable to particular projects.
NOTE:
ALL DUCT WORK RISERS WHICH ARE RUN EXPOSED, SUCH AS THRU ATTIC FLOORS AND FAN ROOM FLOORS SHALL BE PROVIDED WITH A 3” [75mm] HIGH CONCRETE CURB AROUND OPENING FOR DUCT.

DUCT RISER SUPPORTS

INDICATE ON DRAWING THE DUCT PRESSURE CLASS 2” WG [500Pa] WG, 3” WG [750Pa] OR 4” WG [1000Pa].

SCALE: NONE
DATE ISSUED: DECEMBER 2008
EXHAUST STACK DETAIL

SIZE TO MAINTAIN 3500 FPM [17.8 M/S] OUTLET VELOCITY
WELDED STAINLESS STEEL EXHAUST STACK
1" [25mm] GALVANIZED STEEL STRAP SECURED TO EXHAUST STACK
GUY WIRE (4 REQUIRED)
DRIP LIP
TRANSITION (AS REQUIRED)
F.C.
EXHAUST FAN
SECURE STACK TO ROOF (TYP.)
ROOF

DESIGNER'S NOTE:

1. 10 FEET MINIMUM HEIGHT IS SHOWN. INCREASE THE HEIGHT, AS REQUIRED, TO COMPLY WITH THE RECOMMENDATIONS OF THE DISPERSION ANALYSIS.

2. USE THIS DETAIL FOR FUME HOODS, BIOLOGICAL SAFETY CABINETS, ISOLATION ROOM EXHAUST AND ANY OTHER APPLICABLE AREA.
NOTES:
1. ALL DUCTS SHALL BE WATER TIGHT WELDED STAINLESS STEEL TO EXHAUST FAN.
2. PITCH DUCTS DOWN TOWARD INTAKE OPENINGS OR PROVIDE DRAIN AT ANY POINT WHERE WATER WILL COLLECT.
3. SEE FLOOR PLANS FOR EXHAUST AIR VOLUME AND DUCT SIZES.

EXHAUST DUCTWORK - GLASSWASHER

DESIGNER'S NOTES:
1. DETAIL IS FOR DISHWASHER/GLASSWASHER SEE EQUIPMENT DRAWINGS.
CONNECT TO GENERAL EXHAUST

EXHAUST DUCT

CEILING

CEILING REGISTER

50 CFM, 4" [100mm] DIA.
STAINLESS
STEEL DUCT PER
MANUFACTURER’S
RECOMMENDATION

FILM PROCESSOR

PROVIDE DUCT TRANSITION
FITTING IF REQUIRED
BETWEEN 4" AND
FILM PROCESSOR

NOTE:

1. USE THIS DETAIL ONLY IF THE FILM PROCESSING INVOLVES USE OF CHEMICALS.

DUCTWORK CONNECTION - FILM PROCESSOR

NTS
NOTES:
1. HOODS SHALL BE STAINLESS STEEL, SEE SPECIFICATIONS. FOR HOOD SIZE & LOCATION SEE EQUIPMENT SCHEDULE. FOR EXHAUST DUCT CONNECTIONS – SEE FLOOR PLANS.
2. ALL HOODS SHALL BE 6'-6" [2m] ABOVE FINISHED FLOOR UNLESS OTHERWISE NOTED. HOODS OVER URNS SHALL BE 7'-6" [2.3m] MINIMUM ABOVE FINISHED FLOOR.
3. HOODS OVER 6'-0" [1.9m] LONG WITH 2 OR MORE SECTIONS, SHALL HAVE INSIDE STANDING SEAM AND 1"x1/8" [25x6mm] STIFFENING BAR – SEE SECTION "B–B".
4. EXTEND SIDE & END SHEET TO SUIT HIGH CEILING WHEN REQUIRED.
5. DETAIL SHOWS HOOD IN OPEN SPACE. WHEN HOOD IS INSTALLED AT WALL OR PARTITION SECURE TO WALL OR PARTITION WITH EXPANSION BOLTS.

# HOOD TYPE "A"

DESIGNER’S NOTE:
VERIFY ALL DIMENSIONS. SEE ARCHITECTURAL FLOOR PLANS FOR REQUIRED HOOD LOCATIONS.

SCALE: NONE

DATE ISSUED: DECEMBER 2008  CADD DETAIL NO.: SD233100–19.DWG
NOTE:

1. HOODS SHALL BE STAINLESS STEEL. SEE SPECIFICATIONS. FOR HOOD SIZES & LOCATIONS SEE EQUIPMENT SCHEDULE OR FLOOR PLANS.

2. HOODS SHALL BE 6'–6" [1981mm] ABOVE FINISHED FLOOR.

3. HOODS OVER 6'–0" [1828mm] LONG WITH 2 OR MORE SECTIONS SHALL HAVE INSIDE STANDING SEAM AND 1"x1/8" [25x3mm] STIFFENING BAR. SEE SECTION B.

4. PROVIDE A 20"x 8" [508x203mm] OPENING OVER EACH STERILIZER. LOCATE OPENING AS HIGH AS POSSIBLE IN HOOD, BUT BELOW CEILING IN MECHANICAL EQUIPMENT AREA IF ROOM HAS A CEILING.

# HOOD TYPE "B"

NTS

U.S. Department of Veterans Affairs

DETAIL/TITLE: HOOD TYPE "B"

SCALE: NONE

DATE ISSUED: FEBRUARY 2017  CADD DETAIL NO.: SD233100-20
EXHAUST DUCTWORK - GLASSWARE WASHER

**Designer's Notes:**
1. See VA Standard Detail 23 31 00-20 for construction & installation details.

2. Coordinate hood dimensions and exhaust air volume shown on the equipment drawings. Exhaust air volume shall be based on the 100 FPM [.5 M/sec] velocity thru the face area of the hood.

**Department of Veterans Affairs**

**Detail Title:** Exhaust Ductwork - GLASSWARE WASHER

**Scale:** None

**Date Issued:** December 2008  
**CADD Detail No.:** SD233100-21.DWG
SEQUENCE OF CONTROL
1. WHEN WASHER DOOR IS OPEN CONTROL DAMPER D1 OPENS AND CONTROL DAMPER D2 CLOSES.
2. WHEN WASHER DOOR IS CLOSED CONTROL DAMPER D1 Closes AND CONTROL DAMPER D2 OPENS.
3. MAINTAIN EXHAUST DUCT UNDER NEGATIVE PRESSURE THROUGHOUT ITS RUN.

EXHAUST DUCTWORK - CAGE WASHER

DESIGNER'S NOTES:
1. COORDINATE EXHAUST CFM WITH THE ARCHITECTURAL EQUIPMENT DRAWINGS.
2. COORDINATE DAMPER OPERATION WITH WASHER DOOR, THRU THE WASHER CONTROL PANEL.
DETAIL KEYNOTES:

1. THE DESIGN AND SUPPORTING DOCUMENTATION FOR THE BLAST RESISTANT CONCRETE WALL SHALL BE COORDINATED AND APPROVED BY A REGISTERED PROFESSIONAL STRUCTURAL ENGINEER SPECIALIZING IN BLAST RESISTANT CONSTRUCTION.

2. LIMIT AIR VELOCITY TO 800 FPM [4.0 m/s] THRU PLENUM.

OUTSIDE AIR INTAKE FOR AIR HANDLER UNIT FOR MISSION CRITICAL FACILITY
SEE SPECIFICATIONS FOR CLAMPS AND SEALANT (TYP.)

SUPPORT SADDLE FROM STRUCTURE

FLEXIBLE DUCT SIZE: SAME AS DIFFUSER INLET: 5'-0" MAX LENGTH.

USE RIGID ELBOWS FOR CHANGE OF DIRECTION GREATER THAN 45°

NOTE: THE USE OF FLEXIBLE AIR DUCT CONNECTORS ARE NOT PERMITTED FOR THE DEDICATED AHU SERVING THE SURGICAL SUITE.

FLEXIBLE AIR DUCT CONNECTOR

NTS
NOTES:
1. ALL DUCTWORK IS STAINLESS STEEL

SUPPLY DUCT DETAIL - OPERATING ROOM

DESIGNER'S NOTES:
1. PROVIDE 2 FULL CROSS SECTIONS THRU EACH OR.
LINEAR SLOT DIFFUSER

NOTES:
1. COORDINATE SLOT DIFFUSER FRAME/BORDER TYPE AND END BORDER CONFIGURATION WITH CEILING TYPE.
OPERATING ROOM HVAC SYSTEM (TYPICAL)

NOTES:
1. ROOMS SHOWN ARE TYPICAL FOR VA DESIGN GUIDE PLATE FOR SURGERY. REFER TO ACTUAL FLOOR PLANS FOR SIZE AND LOCATION OF ROOMS.

2. THE AIR DISTRIBUTION LAYOUT IS APPLICABLE TO THE CYSTOSCOPY ROOM WHEN LOCATED WITHIN THE SURGERY SUITE.
# HEPA Filter Sizing Chart and Surgical Room Section A-A

<table>
<thead>
<tr>
<th>Filter in Section View</th>
<th>Airflow Range (CFM)</th>
<th>Nominal HEPA Size (In x In x In x In)</th>
<th>No. Req.</th>
<th>Approximate Overall Housing Size (In x In x In x In)</th>
<th>Net Max Face Velocity (FPM)</th>
<th>Air Side Pressure Drop [IN WG]</th>
<th>Max Initial Resistance [Pa]</th>
<th>Change Out Resistance [Pa]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 230</td>
<td>0 - 109</td>
<td>12 x 12 x 12</td>
<td>1</td>
<td>15 x 15 x 21</td>
<td>380 x 380 x 530</td>
<td>250</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>230 - 500</td>
<td>109 - 236</td>
<td>24 x 12 x 12</td>
<td>1</td>
<td>24 x 15 x 21</td>
<td>610 x 380 x 530</td>
<td>250</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>500 - 1100</td>
<td>236 - 519</td>
<td>24 x 24 x 12</td>
<td>1</td>
<td>24 x 27 x 21</td>
<td>610 x 685 x 530</td>
<td>250</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>500 - 1100</td>
<td>236 - 519</td>
<td>24 x 24 x 12</td>
<td>2</td>
<td>48 x 15 x 21</td>
<td>1220 x 380 x 530</td>
<td>250</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1100 - 2200</td>
<td>519 - 1038</td>
<td>24 x 24 x 12</td>
<td>2</td>
<td>48 x 27 x 21</td>
<td>1220 x 685 x 530</td>
<td>250</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**Notes:**
1. See filter schedule SS234000-01

**Section A-A**

- HEPA Filter
- Operating Room Particulate Control Diffuser
- Filter Access
- Nurse Station
- Semi Restricted Corridor
- Operating Room

**Notes:**
1. Coordinate actual HEPA filter and housing sizes with selected manufacturer.
2. For guidance only.
NOTES:

1. TRANSITION WELDED STAINLESS STEEL 4' [1.22M] UPSTREAM OF HUMIDIFIER AND 8' [2.44M] DOWNSTREAM OF HUMIDIFIER.

2. DETAIL ONLY APPLICABLE TO AHU'S WITHOUT AFTER FILTER DOWNSTREAM OF THE SUPPLY AIR FAN.

3. INTEGRAL STAINLESS STEEL DRAIN PAN SLOPE FROM ALL DIRECTIONS TO DRAIN CONNECTION. SLOPE .125" PER 1'-0" [0.3 CM PER 0.3 M].

4. PROVIDE MIN. 18" [45 CM] WIDE ACCESS DOOR, DIRECTLY UPSTREAM AND DOWNSTREAM OF HUMIDIFIER.

DUCT MOUNTED HUMIDIFIER

NTS DESIGNER’S NOTE:
1. SEE DETAIL SD232213-07 FOR STEAM HUMIDIFIER PIPING CONNECTIONS.
NOTE:

1. SECURE CURB CAP TO WOOD NAILING STRIP WITH 3/8" [10mm] CADMIUM PLATED LAG BOLTS NOT OVER 12" [300mm] ON CENTER.

2. SECURE ROOF CURB, DUCTWORK AND DAMPER TO ROOF WITH EXPANSION BOLTS (CONCRETE ROOF) OR RUST RESISTANT BOLTS (METAL DECK AND BAR JOIST ROOF).

3. RUN ELECTRICAL LINES THROUGH CLEARANCE HOLE PROVIDED IN GRAVITY DAMPER, THEN THROUGH VENTILATOR ELECTRICAL CONDUIT GUIDE.

POWER ROOF VENTILATOR

DESIGNERS NOTES:
1. PROVIDE A MOTORIZED DAMPER, IF APPLICABLE.

2. PROVIDE DIRECT DRIVE FANS FOR LOCATIONS NOT EASILY ACCESSIBLE, AS ATTIC OR PIPE BASEMENT AND LESS THAN 2 HP.

3. MINIMUM CURB HEIGHT SHALL BE 12 INCHES [300 mm]. INCREASE HEIGHT, IF REQUIRED, TO OVERCOME SNOW DRIFT.
NOTE:

1. Secure hood to wood nailing strip with 3/8" [10mm] cadmium plated lag bolts not over 12" [300mm] on center.

2. Secure roof curb, ductwork and damper to roof with expansion bolts (concrete roof) or rust resistant bolts (metal deck & bar joist roof).

LOW-SILHOUETTE EXHAUST OR INTAKE HOOD

DESIGNER’S NOTE:
1. Provide a motorized damper, where applicable.

2. Minimum curb height shall be 12" [300 mm]. Increase height, if required, to overcome snow drift.
A. Upon fall in space temperature below set point valve V-1 will modulate to maintain set point within ± 0.5°F. The adjustable tolerance of ± 0.5°F has been selected to prevent valve hunting.

B. The reverse shall occur on rise in space temperature.

A. Upon fall in space temperature below set point valve V-1 will modulate to maintain set point within ± 0.5°F. The adjustable tolerance of ± 0.5°F has been selected to prevent valve hunting.

B. The reverse shall occur on rise in space temperature.

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B. The reverse shall occur on rise in space temperature.
A. Upon fall in space temperature the VAV damper will modulate to minimum position.
B. Upon further drop in space temperature Valve V-1 will modulate to maintain set point ± 0.5°F. The adjustable tolerance of ± 0.5°F has been selected to prevent valve hunting.
C. The reverse shall occur on the rise in space temperature.

A. Set points shall be set as follows:
   - Cooling: 75°F (Adj)
   - Heating: 70°F (Adj)

B. Upon further drop in space temperature valve V-1 will modulate to maintain set point ± 0.5°F. The adjustable tolerance of ± 0.5°F has been selected to prevent valve hunting.
C. Valve V-2 shall be enabled when outside air falls below 40°F (Adj) and valve V-1 has been modulated open above 30% (Adj). Valve V-2 shall maintain set point ± 0.5°F. The adjustable tolerance of ± 0.5°F has been selected to prevent valve hunting. The reverse shall occur on a rise in space temperature.
D. Valves V-2 shall be enabled when outside air falls below 40°F (Adj) and valve V-1 has been modulated open above 30% (Adj). Valve V-2 shall maintain set point ± 0.5°F. The adjustable tolerance of ± 0.5°F has been selected to prevent valve hunting.
E. The reverse shall occur on the rise in space temperature.
NOTES:
A. TERMINAL UNIT SHALL OPERATE ON A SCHEDULE SET BY THE ECC. THE SERIES FAN SHALL RUN CONTINUOUSLY DURING OCCUPIED HOURS. THE SPACE TEMPERATURE SHALL BE MAINTAINED BETWEEN 70° (ADJ) AND 75°F (ADJ) BY MODULATING PRIMARY AIR VOLUME AND HOT WATER CONTROL VALVE IN SEQUENCE.

B. UPON FALL IN SPACE TEMPETRATURE THE PRIMARY AIR DAMPER SHALL MODULATE TO PRESET MINIMUM AIR VOLUME. UPON FURTHER FALL IN SPACE TEMPERATURE BELOW 70° F THE HOT WATER VALVE SHALL MODULATE TO OPEN POSITION TO MAINTAIN SET POINT WITHIN ±.5° (ADJ). THE TOLERANCE RANGE OF ± .5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING.

C. THE REVERSE SHALL OCCUR ON A RISE IN SPACE TEMPERATURE.
NOTE:

1. RIGID STRAIGHT TERMINAL UNIT INLET LENGTH SHALL BE A MINIMUM OF 3 TIMES THE DIAMETER OF INLET.

2. A FLEXIBLE AIR DUCT CONNECTOR IS NOT MANDATORY FOR INLET TO THIS BOX, BUT ALLOWED TO ACCOMMODATE MINOR OFFSETS. MAXIMUM LENGTH 3'-0" [900mm].

3. A BRANCH DUCT SERVING AN INDIVIDUAL BOX MAY BE THE SAME SIZE AS THE BOX INLET, PROVIDED THE EQUIVALENT LENGTH OF THE BRANCH DUCT, AS SHOWN, DOES NOT EXCEED 10 FEET (3 METERS). FOR LONGER LENGTHS, INCREASE THE DUCT SIZE AND PROVIDE A DUCT TRANSITION TO MAINTAIN THE DUCT STATIC PRESSURE DROP AT OR BELOW 0.2"/100' [1.64Pa/m].

4. FLEXIBLE AIR DUCT CONNECTORS, WHEN USED FROM TERMINAL UNIT SUPPLY AIR DUCT TO DIFFUSER, SHALL NOT EXCEED 5'-0" [1500mm]. USE RIGID ELBOWS FOR CHANGE OF DIRECTION GREATER THAN 45°.

5. COMPONENT ARRANGEMENT MAY VARY BY MANUFACTURER. PROVIDE INSULATION W/VAPOR BARRIER FOR CONNECTING DUCT SECTIONS.

6. USE OF THE FLEXIBLE AIR DUCT CONNECTORS ARE NOT PERMITTED FOR THE DEDICATED AHU SERVING THE SURGICAL SUITE.

**DUCT CONNECTIONS - AIR TERMINAL UNITS**

DESIGNER’S NOTE: 1.INDICATE SOUND ATTENUATOR AS REQUIRED BY ACOUSTICAL ANALYSIS.
1. Rigid straight terminal unit inlet length shall be a minimum of 3 times the diameter of inlet.

2. A flexible air duct connector is not mandatory for inlet to this box, but allowed to accommodate minor offsets. Maximum length 2'−0" [610mm].

3. A branch duct serving an individual box may be the same size as the box inlet, provided the equivalent length of the branch duct, as shown, does not exceed 10 feet [3 m]. For longer lengths, increase the duct size and provide a duct transition to maintain the duct static pressure drop at or below 0.2"/100' [1.6894Pa/m].

4. All ductwork upstream and downstream of the HEPA filter shall be galvanized steel.

5. Provide side access for filter service. See manufacturer's specification for clearance requirement.

**AIR TERMINAL UNITS WITH HEPA FILTER**

(BMT SUITE, POSITIVE ISOLATION ROOMS)

**NTS**

**DESIGNER'S NOTE:**
1. In lieu of duct mounted HEPA filter, ceiling mounted panel HEPA filters may be utilized.
2. This detail shall be used for surgical suite rooms excluding operating and cystoscopy rooms.

**DETAIL TITLE** / AIR TERMINAL UNITS WITH HEPA FILTER

**BMT SUITE, POSITIVE ISOLATION ROOMS**

**SCALE :** NONE

**DATE ISSUED:** MARCH 2010  **CAD DETAIL NO.:** SD233600−05.DWG
NOTE:

1. RIGID STRAIGHT TERMINAL UNIT INLET LENGTH SHALL BE A MINIMUM OF 3 TIMES THE DIAMETER OF INLET.

2. ALL DUCTWORK UPSTREAM OF THE HEPA FILTER SHALL BE GALVANIZED STEEL.

3. A BRANCH DUCT SERVING AN INDIVIDUAL BOX MAY BE THE SAME SIZE AS THE BOX INLET, PROVIDED THE EQUIVALENT LENGTH OF THE BRANCH DUCT, AS SHOWN, DOES NOT EXCEED 10 FEET [3 M]. FOR LONGER LENGTHS, INCREASE THE DUCT SIZE AND PROVIDE A DUCT TRANSITION TO MAINTAIN THE DUCT STATIC PRESSURE DROP AT OR BELOW 0.1”/100’ [0.6894Pa/m].

4. ALL DUCTWORK DOWNSTREAM OF THE HEPA FILTER SHALL BE STAINLESS STEEL, PROVIDE ACCESS DOOR FOR CLEANING. SEE DETAIL SD233100–27 FOR LOCATION.

5. PROVIDE SIDE ACCESS FOR FILTER SERVICE. SEE MANUFACTURER’S SPECIFICATION FOR CLEARANCES.

6. SEE DETAIL SD233100–27 FOR CONTINUATION OF DUCTWORK.

AIR TERMINAL UNITS WITH HEPA FILTER
(OPERAING AND CYSTOSCOPY ROOMS)

NTS
20mm [3/4"] TO BOILER, DEAERATOR, OR STEAM HEADER INJECTOR QUILLS

USE FWPD FOR PURGING CF LINE TO BOILER (NOTE 1)

20mm [3/4"]

0–2000 kPa [0–300 PSIG]

BASE

METERING PUMP

BOILER ROOM FLOOR

ELEVATION

NOTES:
1. DO NOT PROVIDE FWPD ON SYSTEM WHICH SERVES DEAERATOR
2. PROVIDE A SEPARATE CHEMICAL FEED SYSTEM FOR EACH BOILER, FOR THE DEAERATOR AND FOR MAIN STEAM.
3. ONE FEED SYSTEM FOR EACH CHEMICAL

CHEMICAL FEED SYSTEM - PUMPED TYPE

Department of Veterans Affairs

DETAIL TITLE: CHEMICAL FEED SYSTEM - PUMPED TYPE

SCALE: NONE

DATE ISSUED: 11/01/2017 CAD DETAIL NO.: SD235011-02.DWG
NOTE TO DESIGNER:
INSERT NOMINAL PRESSURE (TYP.)

GRAVITY RETURN TO RECEIVER FLASH TANK OR HPR LINE

0-1500kPa [0-200 PSIG]

300mm [12"] MIN.

15mm [1/2"]

FINISHED FLOOR

HPR

TURBINE

OPEN SIGHT DRAIN

CONCRETE PAD

FLEX CONN.

40mm [1-1/2”]

PROVIDE VIBRATION TREATMENT HERE

FROM TURBINE CASING, IF TURBINE CASING DOES NOT HAVE A BUILT-IN TRAP, THEN PROVIDE TRAP HERE.

ELEVATION (END VIEW)

STEAM TURBINE DRIVE

NTS

DETAIL TITLE: STEAM TURBINE DRIVE

SCALE: NONE

DATE ISSUED: 11/01/2017

CADD DETAIL NO.: SD235011-04.DWG
NOTE:
TANK SHALL BE MANUFACTURED AND FURNISHED IN ACCORDANCE WITH THE ASME BOILER AND PRESSURE VESSEL CODE AND AMERICAN NATIONAL STANDARD ANSI/ASME BPV VIII-1. INSPECTION AND REGISTRATION ARE WITH THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS.

BOILER BLOWOFF TANK

DEPARTMENT OF VETERANS AFFAIRS

DETAIL TITLE: BOILER BLOWOFF TANK

SCALE: NONE

DATE ISSUED: 11/01/2017 CAD DETAIL NO.: SD235011-05.DWG
WATER SAMPLE COOLERS BOILER WATER AND FEEDWATER

WATER AND FEEDWATER

DEPARTMENT OF VETERANS AFFAIRS

DETAIL TITLE: WATER SAMPLE COOLERS BOILER WATER AND FEEDWATER

SCALE: NONE

DATE ISSUED: 11/01/2017

CADD DETAIL NO.: SD235011-06.DWG
15mm [1/2"
TO SAMPLE COOLER
10-205°C [50-400°F]
(TYPICAL)
HEAT EXCHANGER
(TUBE BUNDLE) ONE
FOR EACH BOILER
30% OF TANK DIA.
(MIN. WATER LEVEL)
25% OF
TANK DIA.
CONDENSATE
STORAGE TANK
15mm [1/2"] (TYP.)
FROM OTHER HEAT
EXCHANGERS
FROM BOILER BOTTOM
BLOWOFF
CBD CONTROL
FLOW: _____ kg/s [LBS/HR]
ΔP:689kPa [100 PSIG]
50mm [2"]
CBD
BLOWOFF TANK
BO

DESIGNER NOTE:
EVALUATE IF IT IS BETTER TO PRE-HEAT BOILER MAKE-UP WATER INSTEAD OF HEATING THE CONDENSATE STORAGE TANK. THE WIDER TEMPERATURE DIFFERENTIAL BETWEEN MAKE-UP WATER AND CBD MAY RESULT IN OPTIMUM HEAT RECOVERY. HOWEVER, THIS WILL REQUIRE ADDITION OF A SEPARATE HEAT RECOVERY VESSEL. EVALUATION SHOULD INCLUDE AN LCC ANALYSIS.

CONTINUOUS BLOWDOWN HEAT RECOVERY STANDARD PIPING DIAGRAM

NOTE:
BWS/CBD PIPING IS TYPICAL FOR EACH BOILER
AIR STORAGE TANK OR DRYER

10mm [3/8"] MANUAL VALVE

10mm [3/8"] O.D. COPPER TUBING RUN TO NEAREST FLOOR DRAIN

DRAIN TRAP FURNISHED WITH EQUIPMENT

TYPICAL DRAIN FOR AIR COMPRESSOR AND DRYER

NTS

DETAIL TITLE: TYPICAL DRAIN FOR AIR COMPRESSOR AND DRYER

SCALE: NONE

DATE ISSUED: 11/01/2017 CADD DETAIL NO.: SD235011-09.DWG
CONCRETE FOUNDATION

BOILER BASE FRAME

PLATE WELDED TO BASE (PLATE DESIGNED BY BOILER FRAME MANUFACTURER)

ANCHOR BOLTS SIZE AND QUANTITY DETERMINED BY CONTRACTOR BASED ON BOILER FURNISHED

PLAN

CONC. PIERS

TANK SADDLES

ANCHOR BOLTS (TYPICAL)

SLOTTED HOLE LENGTH = BOLT SIZE 15mm [+0.5"] EACH SIDE

10mm [3/8"] THK. STEEL PLATE BOLTED TO PIER

ELEVATION

ANCHOR BOLT

REBAR

FLOOR

BOLTS

REINFORCEMENT PLATES

ALTERNATE FOR TANKS SUPPORTED BY STEEL BEAMS

DESIGNER NOTE:
STATE LOCATION AND QUANTITY OF REINFORCEMENT PLATES

NOTES:
1. REFER TO SYMBOL AND SCHEDULE SHEETS FOR SEISMIC FORCE DESIGN INFORMATION
2. PROVIDE SLOTTED HOLES IN PLATES TO ALLOW THERMAL EXPANSION IF RECOMMENDED BY BOILER MANUFACTURER

EQUIPMENT ANCHORING - PACKAGED BOILER AND DEAERATOR AND CONDENSATE STORAGE TANKS

NTS
ACCESS PLATFORM
ARRANGEMENT D-TYPE WATER TUBE BOILER

NOTE: SUPPORT PLATFORMS FROM FINISHED FLOOR

DEPARTMENT OF VETERANS AFFAIRS

DETAIL TITLE: ACCESS PLATFORM ARRANGEMENT
WATER TUBE BOILER

SCALE: NONE

DATE ISSUED: 11/01/2017

CAD DETAIL NO.: SD235233-02.DWG
FIRE TUBE BOILER AUXILIARY
WATER LEVEL SAFETY PIPING

NTS
NOTE:
SUPPORT PLATFORM FROM FINISHED FLOOR
OR FROM BOILER IF BOILER MANUFACTURER
PROVIDES BOILER ATTACHMENTS AND
APPROVES INSTALLATION.

HANDRAIL
HANDLE FOR VALVE TO BE
ACCESSED FROM PLATFORM
STEAM LEAD
NON-RETURN
STOP-CHECK VALVE

TOP OF
BOILER CASING
LADDER

BOILER
CONCRETE PAD
BOILER ROOM FLOOR

ELEVATION

ACCESS PLATFORM ARRANGEMENT

DETAIL TITLE: ACCESS PLATFORM ARRANGEMENT

SCALE: NONE

DATE ISSUED: 11/01/2017
CADD DETAIL NO.: SD235239-02.DWG
DESIGNER NOTE:

1. PROVIDE HEAT TRACING WHEN THE EXPOSED PIPING CARRYING CHILLED WATER IS NOT MIXED WITH PROPYLENE GLYCOL. ALL VALVES, STRAINER, FLOW SWITCH, FLEXIBLE CONNECTORS, ETC., SHALL BE WRAPPED WITH ELECTRIC HEAT TRACE CABLE UNDER INSULATION.

2. VERIFY NEED FOR FLEXIBLE CONNECTOR.

3. PROVIDE ALUMINUM JACKETING ON ALL EXPOSED, INSULATED PIPING.
NOTE:
1. DRAIN ALL LOW POINTS OF SYSTEMS TO NEAREST FLOOR DRAIN.

2. PROVIDE MARINE WATER BOXES FOR BOTH CONDENSER AND EVAPORATOR.

3. COLLECT VENT PIPES FROM ALL REFRIGERANT PRESSURE RELIEF DEVICES AND EXTEND TO EXTERIOR OF BUILDING IN ACCORDANCE WITH ASHRAE STANDARD 15. HEADER SIZE TO EQUAL OR EXCEED TOTAL AREA OF DEVICES CONNECTED TO THE HEADER.

4. PROVIDE MODULATING BUTTERFLY VALVES ON BOTH CHWR & CWR. VALVES CONTROLLED BY ECC.

5. FOR PIPING 6" AND BELOW, MECHANICAL COUplings ARE OPTIONAL. ABOVE 6", WELDED PIPE WITH FLANGES IS THE ONLY APPROVED JOINING METHOD.
MULTIPLE CELL COOLING TOWER -
PIPING CONNECTIONS

NOTE:
1. THE BASINS SHALL BE INTERCONNECTED BY FLUMES. EACH CELL SHALL BE PROVIDED WITH ITS OWN SUMP AND ANTI-CAVITATION PLATE.

MULTIPLE CELL COOLING TOWER -
PIPING CONNECTIONS

DESIGNERS NOTES:
1. IF TOWER IS INSTALLED MORE THAN 5 FT [1500 MM] ABOVE THE ROOF OR GRADE PROVIDE A PLATFORM AROUND THE PERIMETER.
2. PROVIDE ACCESS FOR ALL ELEVATED VALVES AND CONTROL DEVICES AND TO EACH FAN MOTOR.
3. SEE HVAC DESIGN MANUAL.
4. COORDINATE WITH ELECTRICAL ON BASIN HEATER.
NOTES:
1. TO PREVENT ICING ON EXHAUST COIL MAINTAIN TEMPERATURE OF SOLUTION ENTERING EXHAUST AIR COIL > 35° F BY MODULATING 3 WAY VALVE.

2. DISCONTINUE HEAT RECOVERY IF OUTSIDE AIR TEMPERATURE > BETWEEN 60 TO 80° F (ADJUSTABLE)

3. FOR SYSTEMS WITH WINTER DESIGN CONDITIONS < 32° F, PROVIDE APPROPRIATE PROPYLENE GLYCOL SOLUTION.
SECTION NO:
DATE ISSUED:
DETAIL TITLE / SCALE : 
CAD DETAIL NO.: CAD DETAIL NO.
DECEMBER 2008
NONE

NOTES:

1. ALL AHU SECTIONS SHOWN IN THIS DETAIL MAY NOT BE Applicable TO EACH AIR HANDLING UNIT INCLUDED IN THE PROJECT.
2. SEE DETAIL FOR AIR INTAKE FOR MISSION CRITICAL FACILITIES.
3. USING THIS FORMAT, DESIGNER SHALL DEVELOP A SIMILAR VIEW OF EACH AHU INCLUDED IN THE PROJECT. SELECTION OF THE AHU SECTIONS SHALL BE APPLICATION SPECIFIC. EACH VIEW SHALL INCLUDE OVERALL DIMENSIONS AND AVAILABLE ACCESS SPACE FOR EACH AIR HANDLING UNIT. NOTE THAT THESE VIEWS DO NOT NEGATE THE NEED TO PROVIDE CROSS-SECTIONS/ELEVATIONS OF THE MECHANICAL ROOMS, SHOWING EQUIPMENT SECTIONS AND DETAILS OF EACH AHU.

ACCESS DOOR SWING DETAIL FOR AIR HANDLING UNITS

<table>
<thead>
<tr>
<th>AIR HANDLING UNIT ITEM</th>
<th>MINIMUM OUTSIDE AIR TWO BEDS OF FILTERS VAV</th>
<th>MINIMUM OUTSIDE AIR THREE BEDS OF FILTERS CV</th>
<th>100% OUTSIDE AIR TWO BEDS OF FILTERS CV</th>
<th>100% OUTSIDE AIR THREE BEDS OF FILTERS CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>* MIXING BOX</td>
<td>1 YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>* BLENDER SECTION</td>
<td>2 YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>PRE-FILTERS (SIDE ACCESS)</td>
<td>3 YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>INSPECTION SECTION, SMALL</td>
<td>4 YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>AFTER FILTER (SIDE ACCESS)</td>
<td>5 YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>ACCESS SECTION, MED-LARGE</td>
<td>6 NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>* HEAT RECOVERY COIL</td>
<td>7 NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>* ACCESS SECTION, MED-LARGE</td>
<td>8 NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>PRE-HEAT COIL</td>
<td>9 YES</td>
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<td>YES</td>
<td>YES</td>
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<tr>
<td>* INSPECTION SECTION, SMALL</td>
<td>10 YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>HUMIDIFIER</td>
<td>11 YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>COOLING COIL</td>
<td>12 YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>FAN</td>
<td>13 NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>* DIFFUSER PLATE</td>
<td>14 NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>* ACCESS SECTION, MED-LARGE</td>
<td>15 NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>* HEPA FILTER</td>
<td>16 NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>* DISCHARGE PLENUM (VERTICAL)</td>
<td>17 YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

* AS REQUIRED

NOTE:

1. ACCESS DOORS SHALL BE gasketed and hinged to open against fan operating pressure to prevent air leakage.
2. MINIMUM ACCESS DOOR WIDTH SHALL BE 24" [600mm].
3. ACCESS DOOR HEIGHT SHALL BE DETERMINED BY UNIT CASING BUT NOT TO EXCEED 6'-0" [1800mm].
4. ACCESS DOORS ON FAN SUCTION SHALL OPEN OUTWARD.
5. ACCESS DOORS ON FAN DISCHARGE SIZE SHALL OPEN INWARD.
SPRING LOADED VACUUM BREAKER VENTED TO ATMOSPHERE TYPICAL ON BOTH THE STEAM SUPPLY AND THE CONDENSATE LINES.

ON/OFF CONTROL VALVE

INTEGRAL FACE AND BYPASS DAMPER

FLEXIBLE CONNECTOR INSTALLED PARALLEL TO COIL HEADER AND AS CLOSE AS POSSIBLE TO COIL CONDENSATE CONNECTION.

FLOAT AND THERMOSTATIC TRAP ASSEMBLY

DESIGNER'S NOTE:
1. USE THIS DETAIL FOR UNIT MOUNTED PREHEAT COIL.
2. EDIT DETAIL FOR LOW PRESSURE STEAM, IF NECESSARY.

INTEGRAL FACE AND BYPASS STEAM COIL DETAIL

NTS

DETAIL TITLE: INTEGRAL FACE AND BYPASS STEAM COIL

SCALE : NONE

DATE ISSUED: 11/01/2017 CAD DETAIL NO.: SD237300-02.DWG
FAN COIL SEQUENCE OF OPERATION (COOLING ONLY)

1. FAN COIL UNIT SHALL OPERATE ON A SCHEDULE AS SET BY THE DCC.
2. MODULATE V–1 TO MAINTAIN SPACE SET POINT AND FAN SHALL CYCLE W/TEMPERATURE.
3. ALARM IF SPACE TEMPERATURE OUTSIDE OF RANGES.

ROOM TEMPERATURE SENSOR, WALL MOUNTED 48" [1200mm] AFF.

COOLING ONLY FAN COIL UNIT CONTROLS

1. MODIFY THE DETAIL IF DCC IS NOT USED.
FAN COIL SEQUENCE OF OPERATION (HEATING ONLY)

1. FAN COIL UNIT SHALL OPERATE ON A SCHEDULE AS SET BY THE DCC.
2. MODULATE V-1 TO MAINTAIN SPACE SET POINT AND FAN SHALL CYCLE W/TEMPERATURE.
3. ALARM IF SPACE TEMPERATURE OUTSIDE OF RANGES.

ROOM TEMPERATURE SENSOR, WALL MOUNTED 48" [1200mm] AFF.

DESIGNER'S NOTE
MODIFY DETAIL IF DCC IS NOT USED.
FAN COIL SEQUENCE OF OPERATION (PATIENT ROOMS)

FAN COIL UNIT SHALL OPERATE ON A SCHEDULE AS SET BY THE ECC. FAN SHALL RUN CONTINUOUSLY. FAN STATUS SHALL BE MONITORED AND AN ALARM MESSAGE SHALL BE GENERATED IN THE EVENT THE UNIT FAILS TO RUN. THE ADJUSTABLE ROOM TEMP SET POINT WILL BE 70°–75° WITH 0.5° HEATING/COOLING OFFSETS. VALVE V-1 & V-2 WILL NOT BE OPEN SIMULTANEOUSLY. ROOM OCCUPANT WILL HAVE ABILITY OF ADJUSTING ROOM TEMPERATURE BETWEEN 70°–75°.

FAN COIL SEQUENCE OF OPERATION (NONPATIENT ROOMS)

FAN COIL SHALL OPERATE ON A SCHEDULE AS SET BY ECC. FAN SHALL RUN CONTINUOUSLY IN OCCUPIED MODE. FAN STATUS SHALL BE MONITORED AND AN ALARM MESSAGE SHALL BE GENERATED IN THE EVENT THE UNIT FAILS TO RUN BETWEEN THE RANGE OF 70°–75° SPACE TEMPERATURE BOTH V-1 & V-2 SHALL BE CLOSED. UPON RISE IN TEMPERATURE ABOVE 75° V-2 SHALL MODULATE OPEN TO MAINTAIN 75° F. UPON FALL IN TEMPERATURE BELOW 70° F. HEATING VALVE V-1 SHALL MODULATE TO OPEN TO MAINTAIN 70° F.
HOT WATER CABINET UNIT HEATER SEQUENCE

1. CABINET HEATER SHALL OPERATE ON A SCHEDULE AS SET BY THE ECC. FAN STATUS SHALL BE MONITORED AND AN ALARM MESSAGE GENERATED IN THE EVENT THE UNIT FAILS TO RUN. THE ROOM TEMP SETPOINT WILL BE 74° (ADJ). THE HOT WATER VALVE WILL BE ENABLED AS REQUIRED TO MAINTAIN SPACE TEMP SETPOINT. HI/LO/OFF SWITCH WILL ALLOW LOCAL FAN SPEED ADJUSTMENT.

ROOM THERMOSTAT WALL MTD OR RETURN AIR MTD 48" [1200mm] AFF.

DESIGNER’S NOTES:
1. CONNECT TO ECC NETWORK IS OPTIONAL.
2. PROVIDE NON-DDC CLOSED LOOP AUTOMATIC TEMPERATURE CONTROLS FOR THE HOT WATER CABINET UNIT HEATER. COORDINATE THE INTERFACE, IF ANY, WITH THE DDC SYSTEM FOR APPLICATIONS SUCH AS ALARM INDICATION WITH PROJECT SCOPE OF WORK.
3. PROVIDE A STEP CONTROL FOR NON-CRITICAL APPLICATIONS. WHEN TEMPERATURE FALLS BELOW SET POINT, THE CABINET UNIT HEATER SHALL BE ENERGIZED AND THE TWO-POSITION, TWO-WAY VALVE SHALL OPEN.
HYDRONIC RADIANT CEILING PANELS - PIPING CONNECTIONS

NOTE:

1. MINIMUM FLOW SHALL BE NO LESS THAN 0.5 GPM [1.9 LPM]
UNIT HEATERS (HOT WATER) - PIPING CONNECTIONS

NOTE: UNIT MOUNTED THERMOSTAT SHALL MAINTAIN SPACE TEMPERATURE BY CYCLING

TYPICAL CONNECTIONS TO HORIZONTAL HOT WATER UNIT HEATER

AUTOMATIC FLOW CONTROL VALVE

AIR VENT

TEST PLUG, TYP.

SHUTOFF BALL VALVE, TYP.

WYE STRAINER, TYP.

TYPICAL CONNECTIONS TO VERTICAL HOT WATER UNIT HEATER

UNIT HEATERS (HOT WATER) - PIPING CONNECTIONS

NTS

DETAIL TITLE / UNIT HEATERS (HOT WATER) - PIPING CONNECTIONS

SCALE: NONE

DATE ISSUED: DECEMBER 2008  CAD DETAIL NO.: SD238200-06.DWG
PIPING CONNECTIONS TO HORIZONTAL TYPE STEAM UNIT HEATER

PIPING CONNECTIONS TO VERTICAL TYPE STEAM UNIT HEATER

NOTE:
UNIT MOUNTED THERMOSTAT SHALL MAINTAIN SPACE TEMPERATURE AS INDICATED IN CONTROL SEQUENCE OR HVAC CONTROL DRAWINGS.

UNIT HEATERS (STEAM)
PIPING CONNECTIONS

DETAIL TITLE: UNIT HEATERS (STEAM)
PIPING CONNECTIONS

SCALE: NONE

DATE ISSUED: 11/01/2017 CAD DETAIL NO.: SD238200-07.DWG
DESIGNER'S NOTE:
USE THIS DETAIL WHEN THE CONVECTOR (OR STEAM RADIATOR) IS USED IN CONJUNCTION WITH AN AIR TERMINAL UNIT TO SERVE AN OCCUPIED SPACE, REPLACE RADIATOR VALVE WITH A STEAM CONTROL VALVE AND CONTROL SPACE WITH COMMON THERMOSTAT.
GASKET ALL AROUND WHEN MOUNTED AGAINST CEILING AND/OR WALL

HANGER ROD SUPPORTS SECURE TO STRUCTURE ABOVE (TYP)

FINISHED CEILING

4-WAY DEFLECTION SUPPLY AIR GRILLE
DRAIN PAN & PIPE CONNECTION

COIL

RETURN AIR GRILLE & FILTER
ACCESS DOOR & GRILLS

NOTE:
UNLESS OTHERWISE NOTED, ALL UNITS SHALL BE MOUNTED AGAINST FINISHED CEILING.

FAN COIL UNIT - HORIZONTAL EXPOSED
NOTES:
1. 150mm [6"] PLENUM AS SHOWN SHALL BE SUPPLIED BY MANUFACTURER OF FAN COIL UNIT.
2. SEE DETAIL SD2382216–01 FOR SUPPLY & RETURN PIPING CONNECTIONS.
3. PROVIDE ACCESS FOR FILTER REMOVAL.
4. SEE FAN COIL UNIT SCHEDULE FOR PIPE SIZES.
5. SUPPLY & RETURN GRILLES SHALL BE SIZED TO SUIT CONNECTIONS ON FAN COIL UNIT. DUCTWORK SHALL SUIT GRILLES AND FAN COIL UNIT FURNISHED.

FAN COIL UNIT - HORIZONTAL CONCEALED
NTS

DETAIL TITLE:  FAN COIL UNIT - HORIZONTAL CONCEALED

SCALE :NONE

DATE ISSUED: 11/01/2017  CAD DETAIL NO.:  SD238200–10.DWG
NOTES:

1. WHEN COIL IS INCLUDED IN CASING MOUNTED ON VIBRATION ISOLATORS THE FIRST 2 HANGERS FOR EACH PIPE SHALL BE SPRING & NEOPRENE TYPE. TYPE "H" FOR 100mm [4"] PIPE & SMALLER. TYPE "H-P" FOR 125mm [5"] PIPE & LARGER.

2. PIPING SHALL BE INSTALLED IN SUCH MANNER THAT IT WILL NOT BLOCK THE SWING OR USE OF ACCESS DOORS OR PANELS; NEITHER SHALL IT BLOCK THE SERVICING OF FILTERS, VALVES, OR EQUIPMENT.

3. THE FLOW ELEMENT MAY BE INSTALLED IN THE SUPPLY PIPING IF THE REQUIRED MINIMUM UPSTREAM AND DOWNSTREAM DIMENSIONS CANNOT BE OBTAINED IN THE RETURN PIPING.

WATER COILS - PIPING CONNECTIONS

NTS

DEPARTMENT OF VETERANS AFFAIRS

DETAIL TITLE: WATER COILS - PIPING CONNECTIONS

SCALE: NONE

DATE ISSUED: 11/01/2017 CAD DETAIL NO.: SD238216-01.DWG
NOTE:
SIZE AND SELECT COIL FOR PARALLEL FLOW AND MINIMUM TUBE WATER VELOCITY OF .91 M/S [3.0 FPS]

DESIGNER'S NOTE:
1. COORDINATE WITH HVAC DESIGN MANUAL.
2. CONSIDER REMOVING MANUAL BYPASS, BECAUSE CONTROL VALVES ARE REASONABLY RELIABLE AND THE PRESENCE OF THE BYPASS MAY ENCOURAGE POSTPONING REPAIRS, THEREBY LESSENSING THE EFFECTIVENESS OF VARIABLE SPEED PUMPING SYSTEMS.
NOTES:

1. When coil is included in casing mounted on vibration isolator units, the runout piping for connections to coil shall be installed with swing joints to allow for the vibration.

2. Piping shall be installed in such manner that it will not block the swing or use of access doors or panels; neither shall it block the servicing of filters, valves, or equipment.

3. Trap each coil separately when installed in a bank of two or more high. Also provide separate vacuum breaker for each coil.

4. Two trap assemblies in parallel are shown. Two traps required when condensate load is 2400 kg/hr [5,000 lbs/hr] or greater.

5. Supply & return pipes are shown from same end. Reheat coil may have supply & return pipes from opposite ends.

DESIGNER'S NOTE:
For vacuum return systems connect 15mm [1/2"] check valve vacuum breaker into discharge side of trap set. Change F & T trap set to show piping location connection.