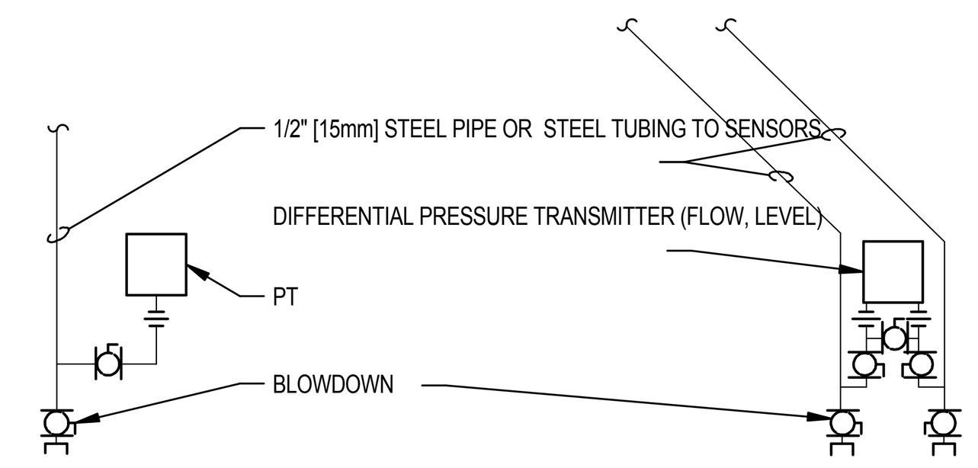
CONTROLS SYMBOLS

Symbol	Description
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
EPT	ELECTRONIC TO PNEUMATIC TRANSDUCER
AT CO2	CARBON DIOXIDE TRANSMITTER
AT CO	CARBON MONOXIDE TRANSMITTER
AT OC	OCCUPANCY SENSOR
LTCP	LOCAL TEMPERATURE CONTROL PANEL
HVAC	HVAC CONTROL PANEL
VSMC	VARIABLE SPEED MOTOR CONTROLLER
AFMD	AIR FLOW MEASURING DEVICE - (AIR FLOW MEASURING STATION)
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



NOTES:

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

C3 PRESSURE TRANSMITTER INSTALLATION
NTS

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

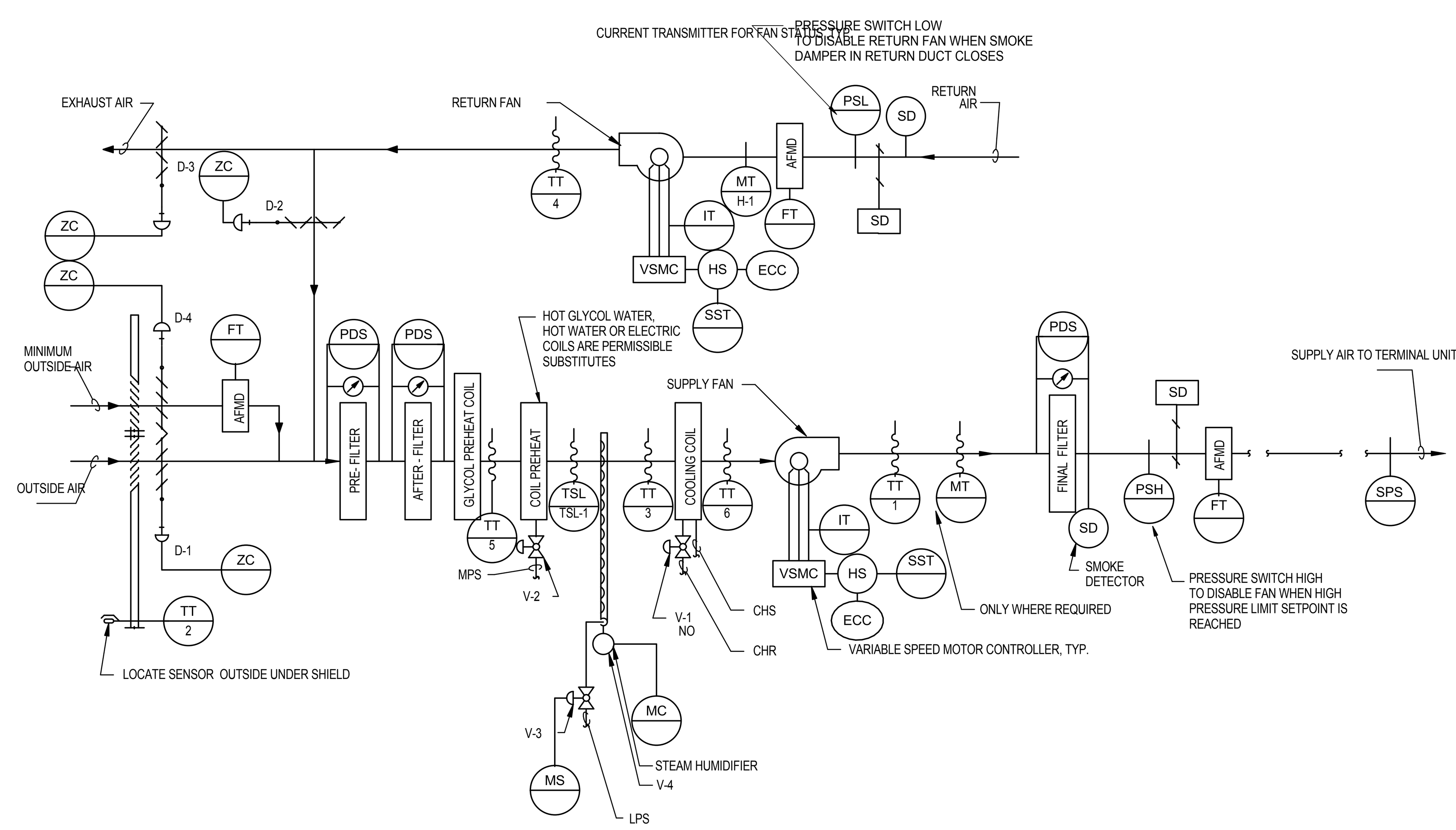
BUILDING: 5 - SIOUX FALLS, SD

SYSTEM: VAV AIR HANDLER

Column groups: POINT LEGEND; SYSTEM OUTPUTS (BINARY, ANA-LOG); SYSTEM INPUTS (BINARY, ANALOG); SYSTEM SOFTWARE/CONTROL (ALARM PROCESSING, APPLICATION/FUNCTION)

SYSTEM COMPONENT:	POINT ID	ABBREVIATION	PRIORITY/ADD-ALTERNATE NO.	--	ELECTRIC DEVICE	START/STOP	OPEN/CLOSE	--	SPEED COMMAND	VALVE POSITION	DAMPER POSITION	STATUS	ALARM	PRESSURE	HIGH HUMIDITY	HIGH STATIC PRESSURE	LOW TEMPERATURE	--	TEMPERATURE (TI)	PRESSURE	POSITION	FLOW	PERCENT	STATIC PRESSURE	CARBON MONOXIDE	HUMIDITY	VACUUM	Local Alarm Panel	Area Alarm Panel	Master Alarm Panel	HIGH LIMIT	LOW LIMIT	--	--	SCHEDULE START/STOP	FUNCTION	DUTY CYCLE	TEMPERATURE ECONOMIZER	ENTHALPY ECONOMIZER	TEMPERATURE RESET	DEMAND LIMITING	TEMPERATURE OVERRIDE	STATIC PRESSURE RESET	--	--	PRESSURE/VOLUME CONTROL	FAILURE MODE	SPACE TEMP. CONTROL	FULL COMMUNICATION	TRENDING	REMARKS
Return air Temperature	AI-1	RAT											o						o																																
Return Air Humidity	AI-2	RAH											o													o																								o	
Return Air Flow (cfm)	AI-3	RAF											o									o									o																			o	PROVIDE AIR FLOW MEASURING DEVICE
Mixed Air Temperature	AI-4	MAT											o						o																															o	
Pre-Heat Temperature	AI-5	PHT											o						o																															o	
Cooiling Coil Temperature	AI-6	CCT											o						o												o																			o	
Discharge Air Temperature	AI-7	DAT											o						o																					o										o	
Discharge Static Pressure	AI-8	DASP											o											o							o												o							o	
Discharge Air Humidity	AI-9	DAH											o													o																								o	
Supply Air Flow (cfm)	AI-10	SAF											o									o									o																			o	PROVIDE AIR FLOW MEASURING DEVICE
OUTSIDE AIR TEMPERATURE	AI-11	OAT																	o																															o	
OUTSIDE Air Flow (cfm)	AI-12	OAF											o									o									o																			o	PROVIDE AIR FLOW MEASURING DEVICE
RETURN LOW PRESSURE	BI-1	RLP												o																																				o	
RETURN FAN STATUS	BI-2	RF-STS										o																																						o	
SUPPLY FAN STATUS	BI-3	SF-STS										o																																						o	
MIXED AIR LOW LIMIT	BI-4	TSL-1															o															o																		o	
STATIC PRESSURE HIGH LIMIT	BI-5	SPS-2														o															o																			o	
HUMIDITY HIGH LIMIT	BI-6	HHL													o																o																			o	
SUPPLY FAN VSMC ALARM	BI-7	SF-ALA											o																																					o	
RETURN FAN VSMC ALARM	BI-8	RF-ALA											o																																					o	
RETURN FAN VSMC	AO-1	RF-SPD							o																																								o	o	FULL COMMUNICATION
SUPPLY FAN VSMC	AO-2	SF-SPD							o																																								o	o	FULL COMMUNICATION
OUTSIDE AIR DAMPER	AO-3	OAD									o																												o											o	
RETURN AIR DAMPER	AO-4	RAD									o																												o											o	
EXHAUST AIR DAMPER	AO-5	EAD									o																												o											o	
MINIMUM OUTSIDE AIR DAMPER	AO-7	MIN-OAD									o																																							o	
PRE-HEAT VALVE V-2	AO-8	PHT-V1								o																																								o	
COILING VALVE V-1	AO-9	CLG-V1								o																																								o	
STEAM HUMIDIFIER VALVE V-4	AO-10	HUM-V4								o																																								o	
RETURN FAN START/STOP	BO-1	RF-SST				o																													o															o	
SUPPLY FAN START/STOP	BO-2	SF-SST				o																													o															o	
STEAM ISOLATION VALVE V-3	BO-3	HUM-ISO-V3					o																				o																							o	

D6 POINTS LIST FOR VAV AIR HANDLING UNIT WITH MINIMUM OUTSIDE AIR
NTS



F1 VARIABLE AIR VOLUME AIR HANDLING UNIT WITH MINIMUM OUTSIDE AIR CONTROL DIAGRAM
NTS

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

1. GENERAL

1.1 UNIT IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. H-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, SHALL BE FULLY CLOSED. WHEN THE UNIT IS "ON" D-1, SD-1 AND SD-2 SHALL BE FULLY OPEN. D-2 AND D-3 SHALL MODULATE IN ACCORDANCE WITH THE FOLLOWING SEQUENCE:

2. TEMPERATURE CONTROL

2.1 SUPPLY AIR TEMPERATURE, SENSED BY TT-1, SHALL BE MAINTAINED AT SETPOINT VIA DIGITAL CONTROL PANEL BY MODULATING V-1 OR D-2 AND D-3 OR V-2 IN SEQUENCE.

2.2 WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY TT-2, IS ABOVE 75°F (ADJ) [23.8°C], THE DIGITAL CONTROL PANEL SHALL PREVENT THE MODULATION OF D-2 AND D-3 AND SHALL ASSUME THE MINIMUM OUTSIDE AIR POSITION (D-2 FULLY OPENED AND D-3 FULLY CLOSED). THE DIGITAL CONTROL PANEL SHALL MODULATE V-1 TO MAINTAIN THE SUPPLY AIR TEMPERATURE, SENSED BY TT-1.

2.3 WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY TT-2, IS BETWEEN 65°F [18.3°C] AND THE SUPPLY AIR TEMPERATURE SENSED BY TT-1, DAMPER D-2 SHALL FULLY CLOSE AND D1 AND D3 SHALL BE FULLY OPEN (MAXIMUM OUTSIDE AIR POSITION). THE DIGITAL CONTROL PANEL SHALL MODULATE V-1 TO MAINTAIN THE SUPPLY AIR TEMPERATURE, SENSED BY TT-1.

WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY TT-2, IS BELOW THE SUPPLY AIR TEMPERATURE, SENSED BY TT-1, DAMPERS D1, D-2 AND D-3 SHALL MODULATE TO MAINTAIN THE SCHEDULED SUPPLY AIR TEMPERATURE. IF D-2 IS OPEN AND D-3 IS CLOSED TO MINIMUM OUTSIDE AIR, V-2 SHALL MODULATE OPEN TO MAINTAIN THE SUPPLY AIR TEMPERATURE, SENSED BY TT-1.

2.4

3. AIR FLOW CONTROL

3.1 THE SUPPLY AIR FLOW SHALL BE CONTROLLED BY THE DIGITAL CONTROL PANEL MODULATING THE SUPPLY FAN VARIABLE SPEED MOTOR CONTROLLER TO MAINTAIN 1.0" [25mm] OF DUCT STATIC PRESSURE (FIELD ADJUSTABLE), SENSED BY SPS-1. RESET STATIC PRESSURE BASED ON ACTUAL BUILDING LOAD BY POLLING ALL ATU

3.2 THE DIGITAL CONTROL PANEL, USING TOTAL SUPPLY AIR AND RETURN AIR FLOW SIGNALS, SHALL RESET THE RETURN AIR FAN VSMC TO MAINTAIN A CONSTANT AIR FLOW DIFFERENCE BETWEEN THE SUPPLY AIR AND THE RETURN AIR EQUAL TO MINIMUM OUTSIDE AIR.

3.3 USING HIGH PRESSURE SENSOR SPS-2 LOCATED AT THE SUPPLY FAN DISCHARGE, SHALL PREVENT THE SUPPLY FAN FROM DEVELOPING OVER 3" [75mm] OF STATIC PRESSURE (FIELD ADJUSTABLE). IF STATIC PRESSURE AT SPS-2 DOES EXCEED 3" [75mm] THE SUPPLY AIR FAN SHALL STOP. SPS-2 SHALL BE HARDWIRED TO THE SUPPLY FAN VSMC AND UNIT SHALL BE SHUTDOWN IN HAND,AUTO OR BYPASS MODE. SPS-2 WILL REQUIRE MANUAL RESET AT THE DEVICE.

4. HUMIDITY CONTROL

4.1 WHEN THE DIGITAL CONTROL PANEL IS NOT CALLING FOR HUMIDITY, SENSED BY RETURN AIR HUMIDITY H-1, 2-WAY "ON-OFF" CONTROL VALVE V-3 SHALL REMAIN CLOSED. WHEN THE DIGITAL CONTROL PANEL IS CALLING FOR HUMIDITY, V-3 SHALL REMAIN OPEN.

4.2 RETURN AIR HUMIDITY SHALL BE MAINTAINED AT SETPOINT OF 35% RH (ADJ) VIA DIGITAL CONTROL PANEL BY MODULATING CONTROL VALVE V-4 TO MAINTAIN THE DESIRED HUMIDITY. THE DCP SHALL OVERRIDE THIS CONTROL TO MAINTAIN HUMIDITY OF 80% AS SENSED BY H-2. DCP SHALL CLOSE VALVE V-3 WHENEVER THE SUPPLY FAN IS OFF. VALVE V-4 SHALL BE INTERLOCKED WITH A TEMPERATURE SWITCH TO KEEP THE HUMIDIFIER OFF UNTIL CONDENSATE TEMPERATURE APPROACHES STEAM TEMPERATURE.

5. FREEZE PROTECTION

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

6. AUTOMATIC SHUTDOWN/RESTART

6.1 WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTOR, SD, THE SUPPLY AND RETURN FANS SHALL SHUT "OFF" AND AN ALARM SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM. ALL SMOKE DAMPERS IN THE SUPPLY AND RETURN DUCTS SHALL CLOSE.

6.2 EXHAUST FANS SERVING AREA OF THE SUPPLY FAN SHALL CONTINUE TO RUN. SUPPLY AND RETURN FANS SHALL RESTART AND SMOKE DAMPERS SHALL OPEN WHEN FIRE ALARM CIRCUIT IS RESET.

7. EMERGENCY CONSTANT SPEED OPERATION

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

FULLY SPRINKLERED
100% CONSTRUCTION DOCUMENTS

MARK	REVISION DESCRIPTION	DATE

CONSULTANTS:

REGISTERED PROFESSIONAL ENGINEER REG. NO. 9068 BRIAN S. WEBSTER SOUTH DAKOTA
8/06/2012

ARCHITECTS/ ENGINEERS:

TSP, Inc.
1112 N. West Ave,
Sioux Falls, SD 57104
phone: (605) 336-1160
fax: (605) 336-7926
www.teamtsp.com

TSP
To Solve. To Excel. Together.

Drawing Title: MECHANICAL DETAILS

Approved: Project Director

Project Title: Sioux Falls VA Health Care System Acute Inpatient Medical Unit Addition and Renovation

Location: VA Medical Center, 2501 W. 22nd Street, PO Box 5046, Sioux Falls, SD 57117-5046

Date: 08/06/2012 | Checked: BSW | Drawn: BSW

Project Number: 04100857

Building Number: 5

Drawing Number: 5-MH503

Dwg. 95 of 123

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231

Copyright TSP, Inc. 2012

C:\Users\costellojt\Documents\04100857_VA_MEP12_Central_costellojt.rvt
8/6/2012 12:01:39 PM