

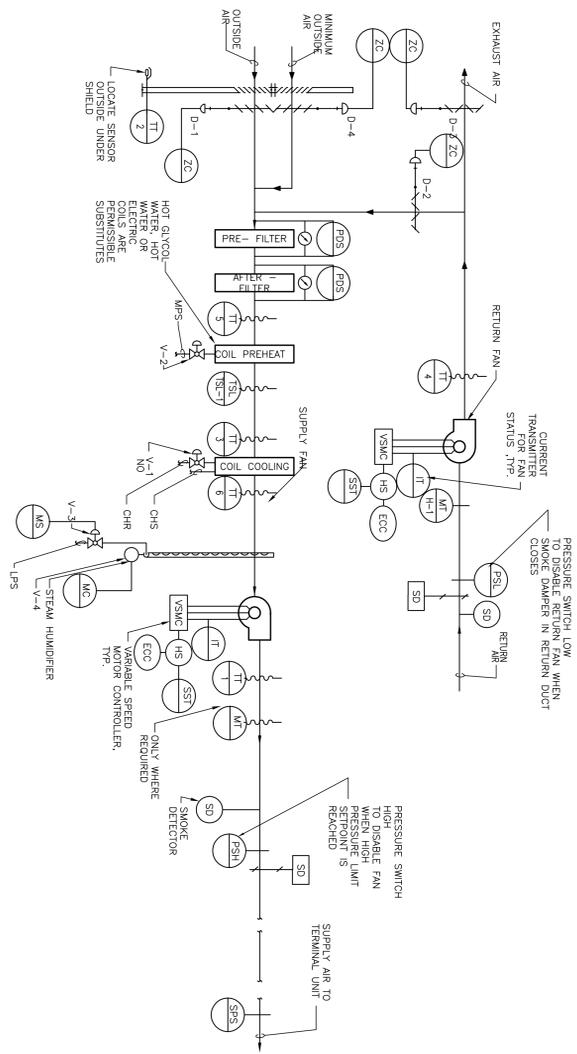
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CONSULTANTS:

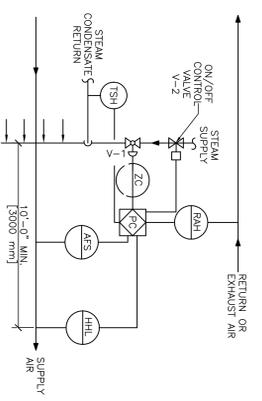
ARCHITECT/ENGINEERS:



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



4 STEAM HUMIDIFIER CONTROLS



STEAM HUMIDIFIER
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 AT THE SETPOINT. THE HUMIDIFIER VALVE V-1 SHALL BE MODULATED THROUGH ECC AND JACKET TEMPERATURE SENSORS. THE HUMIDIFIER VALVE V-1 SHALL BE MODULATED THROUGH ECC AND JACKET TEMPERATURE SENSORS BY TSH SHALL BE WARM ENOUGH TO PREVENT CONDENSATION. THE HIGH LIMIT HUMIDITY SENSOR LOCATED IN THE SUPPLY DUCT FROM THE HUMIDIFIER SHALL BE USED TO SHUT OFF THE HUMIDIFIER. IF THE HUMIDITY SENSOR IN THE SUPPLY DUCT FROM THE HUMIDIFIER SHALL HUMIDITY EXCEEDS 90% RH (ADJUSTABLE), THE AIRFLOW SWITCH SHALL PROVE AIRFLOW BEFORE HUMIDITY CONTROLS ARE ACTIVATED.

2 POINTS LIST FOR VAV AIR HANDLING UNIT WITH MINIMUM OUTSIDE AIR

SYSTEM COMPONENT	POINT ID	ABBREVIATION	SYSTEM QUANTITIES		SYSTEM INPUTS		SYSTEM SOFTWARE/CONTROL		PAGE
			LEADING	TRAILING	BINARY	ANALOG	ALARM PROCESSING	APPLICATION/FUNCTION	
Return air Temperature	AI-1	RA1							
Return air Flow (Gpm)	AI-2	RA2							
Mixed Air Temperature	AI-3	MA1							
Pre-heat Temperature	AI-4	PH1							
Cooling Coil Temperature	AI-5	CC1							
Discharge Air Temperature	AI-6	DA1							
Supply Air Flow (Gpm)	AI-7	SA1							
Outside Air Temperature	AI-8	OA1							
Return Air Pressure	AI-9	RA1							
Return Fan Status	BI-1	RF-1							
Supply Fan Status	BI-2	SF-1							
Static Pressure High Limit	BI-3	SPS-1							
Humidity High Limit	BI-4	HHL							
Return Fan VSMC Alarm	BI-5	RF-AL1							
Supply Fan VSMC Alarm	BI-6	SF-AL1							
Exhaust Air Damper	AO-1	EA1							
Return Air Damper	AO-2	RA1							
Exhaust Air Damper	AO-3	EA2							
Return Air Damper	AO-4	RA2							
Exhaust Air Damper	AO-5	EA3							
Return Air Damper	AO-6	RA3							
Exhaust Air Damper	AO-7	EA4							
Return Air Damper	AO-8	RA4							
Exhaust Air Damper	AO-9	EA5							
Return Air Damper	AO-10	RA5							
Exhaust Air Damper	AO-11	EA6							
Return Air Damper	AO-12	RA6							
Exhaust Air Damper	AO-13	EA7							
Return Air Damper	AO-14	RA7							
Exhaust Air Damper	AO-15	EA8							
Return Air Damper	AO-16	RA8							
Exhaust Air Damper	AO-17	EA9							
Return Air Damper	AO-18	RA9							
Exhaust Air Damper	AO-19	EA10							
Return Air Damper	AO-20	RA10							
Exhaust Air Damper	AO-21	EA11							
Return Air Damper	AO-22	RA11							
Exhaust Air Damper	AO-23	EA12							
Return Air Damper	AO-24	RA12							
Exhaust Air Damper	AO-25	EA13							
Return Air Damper	AO-26	RA13							
Exhaust Air Damper	AO-27	EA14							
Return Air Damper	AO-28	RA14							
Exhaust Air Damper	AO-29	EA15							
Return Air Damper	AO-30	RA15							
Exhaust Air Damper	AO-31	EA16							
Return Air Damper	AO-32	RA16							
Exhaust Air Damper	AO-33	EA17							
Return Air Damper	AO-34	RA17							
Exhaust Air Damper	AO-35	EA18							
Return Air Damper	AO-36	RA18							
Exhaust Air Damper	AO-37	EA19							
Return Air Damper	AO-38	RA19							
Exhaust Air Damper	AO-39	EA20							
Return Air Damper	AO-40	RA20							
Exhaust Air Damper	AO-41	EA21							
Return Air Damper	AO-42	RA21							
Exhaust Air Damper	AO-43	EA22							
Return Air Damper	AO-44	RA22							
Exhaust Air Damper	AO-45	EA23							
Return Air Damper	AO-46	RA23							
Exhaust Air Damper	AO-47	EA24							
Return Air Damper	AO-48	RA24							
Exhaust Air Damper	AO-49	EA25							
Return Air Damper	AO-50	RA25							
Exhaust Air Damper	AO-51	EA26							
Return Air Damper	AO-52	RA26							
Exhaust Air Damper	AO-53	EA27							
Return Air Damper	AO-54	RA27							
Exhaust Air Damper	AO-55	EA28							
Return Air Damper	AO-56	RA28							
Exhaust Air Damper	AO-57	EA29							
Return Air Damper	AO-58	RA29							
Exhaust Air Damper	AO-59	EA30							
Return Air Damper	AO-60	RA30							
Exhaust Air Damper	AO-61	EA31							
Return Air Damper	AO-62	RA31							
Exhaust Air Damper	AO-63	EA32							
Return Air Damper	AO-64	RA32							
Exhaust Air Damper	AO-65	EA33							
Return Air Damper	AO-66	RA33							
Exhaust Air Damper	AO-67	EA34							
Return Air Damper	AO-68	RA34							
Exhaust Air Damper	AO-69	EA35							
Return Air Damper	AO-70	RA35							
Exhaust Air Damper	AO-71	EA36							
Return Air Damper	AO-72	RA36							
Exhaust Air Damper	AO-73	EA37							
Return Air Damper	AO-74	RA37							
Exhaust Air Damper	AO-75	EA38							
Return Air Damper	AO-76	RA38							
Exhaust Air Damper	AO-77	EA39							
Return Air Damper	AO-78	RA39							
Exhaust Air Damper	AO-79	EA40							
Return Air Damper	AO-80	RA40							
Exhaust Air Damper	AO-81	EA41							
Return Air Damper	AO-82	RA41							
Exhaust Air Damper	AO-83	EA42							
Return Air Damper	AO-84	RA42							
Exhaust Air Damper	AO-85	EA43							
Return Air Damper	AO-86	RA43							
Exhaust Air Damper	AO-87	EA44							
Return Air Damper	AO-88	RA44							
Exhaust Air Damper	AO-89	EA45							
Return Air Damper	AO-90	RA45							
Exhaust Air Damper	AO-91	EA46							
Return Air Damper	AO-92	RA46							
Exhaust Air Damper	AO-93	EA47							
Return Air Damper	AO-94	RA47							
Exhaust Air Damper	AO-95	EA48							
Return Air Damper	AO-96	RA48							
Exhaust Air Damper	AO-97	EA49							
Return Air Damper	AO-98	RA49							
Exhaust Air Damper	AO-99	EA50							
Return Air Damper	AO-100	RA50							

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

- GENERAL
 - UNIT IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. H-C-A SWITCH SHALL BE NORMALLY OPEN. WHEN THE UNIT IS STARTED, THE DIGITAL CONTROL PANEL SHALL BE FULLY OPEN. WHEN THE UNIT IS STOPPED, THE DIGITAL CONTROL PANEL 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:
 - TEMPERATURE CONTROL
 - 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.
 - WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY TT-2, IS ABOVE 75°F (AO) 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.
 - WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY TT-2, IS BETWEEN 65°F TO 75°F, D-2 AND D-3 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, DAMPER D1, D-2 AND D-3 SHALL MODULATE TO CLOSE TO MINIMUM OUTSIDE AIR. V-2 SHALL MODULATE OPEN TO MAINTAIN THE SUPPLY AIR TEMPERATURE, SENSED BY TT-1.
 - AIR FLOW CONTROL
 - THE SUPPLY AIR FLOW SHALL BE CONTROLLED BY THE DIGITAL CONTROL PANEL.
 - THE DIGITAL CONTROL PANEL SHALL MAINTAIN A CONSTANT AIR FLOW OF 1.0" (25mm) OF DUCT STATIC PRESSURE (FIELD ADJUSTABLE), SENSED BY SPS-1. RESET SHALL BE BASED ON ACTUAL BUILDING LOAD BY POLLING ALL AHU.
 - 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 OUTSIDE AIR, BETWEEN THE SUPPLY AIR AND THE RETURN AIR EQUAL TO MINIMUM.
 - USING HIGH PRESSURE SENSOR SPS-2 LOCATED AT THE SUPPLY FAN DISCHARGE, SHALL BE HARDWIRED TO THE SUPPLY FAN START/STOP. SPS-2 DOES EXCEED 3" (75mm) THE SUPPLY AIR FAN SHALL STOP. SPS-2 SHALL BE HARDWIRED TO THE SUPPLY FAN VSMC. IN HAND/OFF OR BYPASS MODE, SPS-2 WILL REQUIRE MANUAL RESET AT THE DEVICE.
- EMERGENCY CONSTANT SPEED OPERATION
 - UPON FAILURE OF THE VSMC, THE SUPPLY AND RETURN FANS SHALL BE OPERATED AT CONSTANT SPEED.
 - UPON FAILURE OF THE VSMC, THE SUPPLY AND RETURN FANS SHALL BE OPERATED AT CONSTANT SPEED.
- HUMIDITY CONTROL
 - WHEN THE DIGITAL CONTROL PANEL IS NOT CALLING FOR HUMIDITY, SENSED BY RETURN AIR HUMIDITY, V-3 SHALL REMAIN OPEN.
 - RETURN AIR HUMIDITY SHALL BE MAINTAINED AT SETPOINT OF 55% RH (AO) 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 V-4 SHALL BE INTERLOCKED WITH A TEMPERATURE SWITCH TO KEEP THE HUMIDIFIER OFF UNTIL CONDENSATE TEMPERATURE APPROACHES STEAM TEMPERATURE.
- EMERG PROTECTION
 - 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°C), THE DCP SHALL OVERRIDE THIS CONTROL TO MAINTAIN HUMIDITY OF 80% AS V-4 SHALL BE INTERLOCKED WITH A TEMPERATURE SWITCH TO KEEP THE HUMIDIFIER OFF UNTIL CONDENSATE TEMPERATURE APPROACHES STEAM TEMPERATURE.
- AUTOMATIC SHUTDOWN/RESET
 - 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.
 - 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.

FULLY SPRINKLERED

MECHANICAL CONTROLS	Project Title REPLACEMENT OF AHU S-10B IN BUILDING 30	Project Number 537-07-138	Building Number BUILDING 30
Approved Project Director	Location 820 S. DAMEN AVE CHICAGO, IL 60612	Drawing Number 30-M-600	Dwg 08 p 09
	Date 07/25/2012	Checked YW	Drawn YW

