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SMOKE EXHAUST SYSTEM SPECIFICATIONS

DETECTION AND CONTROL SYSTEMS -

FIRE DETECTION SYSTEMS PROVIDING CONTROL INPUT OR OUTPUT SIGNALS TO MECHANICAL SMOKE CONTROL SYSTEMS OR ELEMENTS THEROF SHALL COMPLY WITH THE REQUIREMENTS OF IBC SECTION 907. SUCH SYSTEMS SHALL BE EQUIPPED WITH A CONTROL UNIT COMPLYING WITH UL 864 AND AS SMOKE CONTROL EQUIPMENT. CONTROL SYSTEMS FOR MECHANICAL SMOKE CONTROL SYSTEMS SHALL INCLUDE PROVISIONS FOR VERIFICATION. VERIFICATION SHALL INCLUDE POSITIVE CONFIRMATION OF ACTUATION, TESTING, MANUAL OVERRIDE, THE PRESENCE OF POWER DOWNSTREAM OF ALL DISCONNECTS AND, THROUGH A PREPROGRAMMED WEEKLY TEST SEQUENCE REPORT, ABNORMAL CONDITIONS AUDIBLY, VISUALLY AND BY PRINTED REPORT.

WIRING -

IN ADDITION TO MEETING THE NATIONAL ELECTRICAL CODE, ALL WIRING, REGARDLESS OF VOLTAGE, SHALL BE FULLY ENCLOSED WITHIN CONTINUOUS RACEWAYS.

ACTIVATION -

ACTIVATION OF SMOKE CONTROL SYSTEM SHALL BE INITIATED BY SMOKE DETECTORS OR MANUALLY THROUGH CONTROL TIE-IN AT THE COMMAND CENTER. INITIATION OF SMOKE CONTROL SYSTEM SHALL INITIATE A VISUAL AND AUDIBLE SIGNAL. SIGNAL SYSTEM COMPONENTS SHAL BE UL 864 LISTED.

CONTROL DIAGRAMS -

IDENTICAL CONTROL DIAGRAMS SHOWING ALL DEVICES IN THE SYSTEM AND IDENTIFYING THEIR LOCATION AND FUNCTION SHALL BE KEPT ON FILE WITH THE FIRE DEPARTMENT AND IN THE COMMAND CENTER IN A FORMAT APPROVED BY THE FIRE COMMISSION.

FIRE-FIGHTER'S SMOKE CONTROL PANEL -

A FIRE-FIGHTERS SMOKE CONTROL PANEL SHALL BE PROVIDED AND SHALL INCLUDE MANUAL CONTROL OR OVERRIDE OF AUTOMATIC CONTROL FOR MECHANICAL SMOKE CONTROL SYSTEM. THE PANEL SHALL BE LOCATED IN THE COMMAND CENTER. FIRE DEPARTMENT SHALL AUTHORIZE THE LOCATION OF THE PANEL. THE FIRE FIGHTER'S SMOKE CONTROL PANEL SHALL COMPLY WITH IBC SECTION 909.16.3 AND NFPA 72 ANNEX E. FIRE SERVICE ANNUNCIATOR AND INTERFACE. FIRE FIGHTER'S CONTROL PANEL SHALL BE MANUFACTURED BY A COMPANY WHICH IS ENGAGED SPECIFICALLY IN THIS BUSINESS. THE FACE OF THE PANEL SHALL SHOW THE FLOOR PLAN OF THE SPACE GRAPHICALLY WITH ALL OF THE DEVICES DEPICTED IN THEIR ACTUAL LOCATION WITHIN THE FLOOR PLAN. FIRE FIGHTER'S CONTROL PANEL SHALL BE AS MANUFACTURED BY AUTOMATION DISPLAY, INC.. FIRE FIGHTER'S CONTROL PANEL SHALL BE CONSTRUCTED WITH UL 864 LISTED PRODUCTS.

PANEL INDICATORS -

FANS SHALL BE SHOWN ON THE FIRE-FIGHTER'S CONTROL PANEL. STATUS INDICATORS SHALL BE PROVIDED FOR ALL SMOKE CONTROL EQUIPMENT AND BE ANNUNCIATED BY PILOT-LAMP-TYPE INDICATORS AS FOLLOWS:

- FANS, DAMPERS AND OTHER OPERATING EQUIPMENT IN THEIR NORMAL STATUS - WHITE
- FANS, DAMPERS AND OTHER OPERATING EQUIPMENT IN THEIR OFF OR CLOSED STATUS - RED
- FANS, DAMPERS AND OTHER OPERATING EQUIPMENT IN THEIR ON OR OPEN STATUS - GREEN
- FANS, DAMPERS AND OTHER OPERATING EQUIPMENT IN A FAULT STATUS - YELLOW/ AMBER

PANEL CONTROLS -

THE FIRE-FIGHTER'S CONTROL PANEL SHALL PROVIDE CONTROL OVER THE COMPLETE SMOKE-CONTROL SYSTEM EQUIPMENT WITHIN THE AREA OF SMOKE CONTROL.

- ON-AUTO-OFF CONTROL OVER EACH INDIVIDUAL PIECE OF OPERATING SMOKE CONTROL EQUIPMENT THAT CAN ALSO BE CONTROLLED OTHER SOURCES WITHIN THE BUILDING. THIS INCLUDESROOFTOP UNIT SUPPLY FANS AND EXHAUST FANS.
- OPEN-AUTO-CLOSE CONTROL OVER INDIVIDUAL DAMPERS RELATING TO SMOKE CONTROL AND THAT ARE ALSO CONTROLLED SOURCES WITHIN THE BUILDING.
- ON-OFF OR OPEN-CLOSE CONTROL OVER SMOKE CONTROL AND OTHER CRITICAL EQUIPMENT ASSOCIATED WITH A FIRE OR SMOKE EMERGENCY AND THAT CAN ONLY BE CONTROLLED FROM THE FIRE FIGHTER'S CONTROL PANEL. THE FIRE FIGHTER'S CONTROL PANEL SHALL BE CONFIGURED AS DESCRIBED IN IBC SECTION 911.

CONTROL ACTION AND PRIORITY -

- ON-OFF, OPEN-CLOSE CONTROL ACTION SHALL HAVE THE HIGHEST PRIORITY OF ANY CONTROL POINT WITHIN THE BUILDING. ONCE ISSUED FROM THE FIRE FIGHTER'S CONTROL PANEL, NO AUTOMATIC OR MANUAL CONTROL FROM ANY OTHER CONTROL POINT SHALL CONTRADICT THE CONTROL ACTION.
- ONLY THE AUTO POSITION OF EACH THREE-POSITION FIRE-FIGHTER'S CONTROL PANEL SWITCH SHALL ALLOW AUTOMATIC OR MANUAL CONTROL ACTION FROM OTHER CONTROL POINTS WITHIN THE BUILDING. THE AUTO POSITION SHALL BE THE NORMAL, NONEMERGENCY, BUILDING CONTROL POSITION. WHERE A FIRE-FIGHTER'S CONTROL PANEL IS IN THE AUTO POSITION, THE ACTUAL STATUS OF THE DEVICE (ON/OFF/OPEN, CLOSED) SHALL CONTINUE TO BE INDICATED BY THE STATUS INDICATED THE STATUS INDICATOR DESCRIBED ABOVE. WHEN DIRECTED BY AN AUTOMATIC SIGNAL TO ASSUME AN EMERGENCY CONDITION, THE NORMAL POSITION SHALL BECOME THE EMERGENCY CONDITION FOR THAT DEVICE. IN NO CASE SHALL CONTROL ACTIONS REQUIRE THE SMOKE CONTROL SYSTEM TO ASSUME MORE THAN ONE CONFIGURATION AT ANY ONE TIME.

SYSTEM RESPONSE TIME -

SMOKE-CONTROL SYSTEM SHALL BE INITIATED IMMEDIATELY AFTER RECEIPT OF AN APPROPRIATE AUTOMATIC OR MANUAL ACTIVATION COMMAND. SMOKE CONTROL SYSTEM SHALL ACTIVATE INDIVIDUAL COMPONENTS IN THE SEQUENCE NECESSARY TO PREVENT PHYSICAL DAMAGE TO FANS, DAMPERS, DUCTS AND OTHER EQUIPMENT. FOR PURPOSES OF SMOKE CONTROL, THE FIRE-FIGHTER'S CONTROL PANEL RESPONSE TIME SHALL BE THE SAME FOR AUTOMATIC ORMANUAL SMOKE CONTROL ACTION INITIATED FROM ANY BUILDING CONTROL POINT.THE TOTAL RESPONSE TIME, INCLUDING THAT NECESSARY FORDETECTION, SHUTDOWN OF OPERATING EQUIPMENT AND SMOKE CONTROL SYSTEM STARTUP, SHALL ALLOW FOR OPERATIONAL MODE TO BE ACHIEVED BEFORE CONDITIONS EXCEED THOSE REQUIRED FOR A TENABLE ENVIRONMENT.

ACCEPTANCE TEST -

DEVICES, EQUIPMENT, COMPONENTS AND SEQUENCES SHALL BE INDIVIDUALLY TESTED. THESE TESTS, IN ADDITION TO THOSE REQUIRED BY OTHER PROVISIONS OF THE CODE, SHALL CONSIST OF DETERMINATION OF FUNCTION, SEQUENCE AND CAPACITY. ALL FANS AND DAMPERS SHALL BE TESTED FOR FUNCTION OF THEIR INTENDED FUNCTION. CONTROLS SHALL BE TESTED UTILIZING THE VARIOUS INITIATION DEVISES AND INTENDED SEQUENCES SHALL BE VERIFIED INCLUDING VERIFICATION OF OVERRIDE FROM THE FIRE FIGHTER'S CONTROL PANEL AND SIMULATION OF STANDBY POWER CONDITIONS.

SPECIAL INSPECTIONS FOR SMOKE CONTROL -

SMOKE CONTROL SYSTEMS SHALL BE INSPECTED BY A SPECIAL INSPECTOR. SPECIAL INSPECTORS FOR SMOKE CONTROL SYSTEMS SHALL HAVE CERTIFICATION AS AIR BALANCERS AND EXPERTISE IN FIRE PROTECTION SYSTEMS AND BUILDING AUTOMATION CONTROLS.

REPORTS -

A COMPLETE REPORT OF TESTING SHALL BE PREPARED BY THE SPECIAL INSPECTOR OR APPROVED AGENCY. THE REPORT SHALL INCLUDE IDENTIFICATION OF ALL DEVICES BY MANUFACTURER, NAMEPLATE DATA, DESIGN VALUES, MEASURED VALUES AND IDENTIFICATION TAG OR MARK. THE REPORT SHALL BE REVIEWED BY THE RESPONSIBLE ENGINEER AND WHEN SATISFIED THAT THE DESIGN INTENT HAS BEEN ACHIEVED, THE ENGINEER SHALL SEAL, SIGN AND DATE THE REPORT.

REPORT FILING -

A COPY OF THE FINAL REPORT SHALL BE FILED WITH THE PRISON AND THE FIRE DEPARTMENT COMMISSIONER.

IDENTIFICATION AND DOCUMENTATION -

CHARTS, DRAWINGS AND OTHER DOCUMENTS IDENTIFYING AND LOCATING EACH COMPONENT OF THE SMOKE CONTROL SYSTEM AND DESCRIBING ITS PROPER FUNCTION AND MAINTENANCE REQUIREMENTS, SHALL BE MAINTAINED ON FILE AT THE BUILDING AS AN ATTACHMENT TO THE REPORT. DEVICES SHALL HAVE AN APPROVED IDENTIFYING TAG OR MARK ON THEM CONSISTENT WITH OTHER REQUIRED DOCUMENTATION AND SHALL BE DATED INDICATING THE LAST TIME THEY WERE SUCCESSFULLY TESTED AND BY WHOM.

SMOKE EXHAUST FAN SEQUENCE OF CONTROL (SEF-1)

ALL COMPONENTS AND CONTROLS FOR SMOKE CONTROL SYSTEM SHALL BE IN STRICT COMPLIANCE WITH UL 864.

PROVIDE INTERFACE BETWEEN FIRE ALARM SMOKE DETECTION SYSTEM AND SMOKE CONTROL SYSTEM. IF SMOKE IS SENSED WITHIN THE HOLDING CELL AREA THE SMOKE CONTROL SYSTEM SHALL BE INITIATED.

IN ADDITION PROVIDE SMOKE CONTROL SYSTEM INTERFACE WITH THE CONTROL ROOM WORK STATION. THE SMOKE CONTROL SYSTEM SHALL BE ABLE TO BE INITIATED MANUALLY FROM THIS WORK STATION.

UPON INITIATION OF THE SMOKE CONTROL SYSTEM THE FOLLOWING EVENTS SHALL BE TRIGGERRED.

- ROOFTOP UNITS RTU-1 AND RTU-2 SHALL BE DE-ENERGIZED.
- EXHAUST FAN EF-103 SHALL BE DE-ENERGIZED.
- THE SMOKE CONTROL DAMPERS (SCD) IN THE MAIN SUPPLY AND RETURN DUCTS OF ROOFTOP UNITS RTU-1 AND RTU-2 SHALL CLOSE.
- THE SMOKE CONTROL DAMPERS IN THE RELIEF AIR DUCTS SHALL CLOSE.
- THE SMOKE CONTROL DAMPERS IN EXHAUST FAN EF-103 MAIN DUCT SHALL CLOSE.
- THE SMOKE CONTROL DAMPERS IN ROOF HOOD 102 AND 103 MAIN DUCT SHALL OPEN.
- THE SMOKE CONTROL DAMPER IN SMOKE EXHAUST FAN SEF-1 MAIN DUCT SHALL OPEN.
- SMOKE EXHAUST FAN SEF-1 SHALL ENERGIZE.

ALL SMOKE CONTROL DAMPERS (SCD) SHALL HAVE 24 VOLT ACTUATOR

BUILDING AUTOMATION SYSTEM GENERAL REQUIREMENTS.

PROVIDE A FULLY INTEGRATED WEB BASED BUILDING AUTOMATION SYSTEM (BAS) AS DEPICTED ON THE DRAWINGS AND IN THE SPECIFICATIONS. THE BASIS OF DESIGN SHALL BE STRUXUREWARE AS MANUFACTURED BY SCHNEIDER ELECTRIC AND INSTALLED BY NRG CONTROLS INC., TRIM GROUP LLC OR CM3 BUILDING SOLUTIONS, INC. THE CONTROL SUB-CONTRACTOR SHALL FURNISH ALL EQUIPMENT, MATERIALS, LABOR AND SUPERVISION FOR A COMPLETE ELECTRONIC AUTOMATIC CONTROL SYSTEM. SYSTEM SHALL BE WEB BASED AND SHALL BE CAPABLE OF COMMUNICATING WITH ALL EQUIPMENT ORIGINAL EQUIPMENT MANUFACTURER CONTROLS AND BACNET COMMUNICATIONS. COMMISSION SYSTEM AND PROVIDE OPERATING AND MAINTENANCE MANUALS.

GRAPHICS

PROVIDE COMPLETE DYNAMIC GRAPHICS PROGRAM WITH THE ABILITY TO CONSTRUCT GRAPHICS PAGES FOR MONITORING AND SYSTEMS CONTROL, ALARM AND ALARM OVERRIDE FOR SYSTEM STATUS AND ALARM ACTIVITY. SYSTEM SHALL BE A MICROSOFT WINDOWS BASED INTEGRATED GRAPHICS PACKAGE INCLUDING A COMPREHENSIVE LIBRARY OF SYMBOLS. SYSTEM SHALL HAVE THE ABILITY TO IMPORT CAD DRAWINGS. CREATE ONE MASTER FLOOR PLAN DISPLAY FOR EACH FLOOR FROM WHICH GRAPHICS FOR EACH PIECE OF MECHANICAL EQUIPMENT CAN BE SELECTED INCLUDING BUT NOT HEREBY LIMITED TO ROOFTOP UNITS, VAV BOXES, AIR HANDLING UNITS, SPLIT SYSTEMS, BOILERS, PUMPS, EXHAUST FANS AND HEATING EQUIPMENT. DYNAMIC TEMPERATURE, AIRFLOWS AND STATUS INDICATION SHALL BE SHOWN IN THEIR ACTUAL RESPECTIVE LOCATIONS AND SHALL AUTOMATICALLY UPDATE TO REPRESENT CURRENT OPERATING CONDITIONS.

SYSTEM CONTROLLERS

ALL POINTS IN THE SYSTEM SHALL BE MONITORED AND/ OR CONTROLLED THROUGH "INTELLIGENT" PROCESS CONTROL UNITS (PCU). EACH DISTRIBUTION CONTROL UNIT IN THE SYSTEM SHALL CONTAIN ITS OWN MICROPROCESSOR AND MEMORY WITH 300 HOURS BACKUP. EACH UNIT SHALL BE A COMPLETELY STANDALONE "MASTER" WITH ITS OWN HARDWARE CLOCK CALENDAR AND ALL FIRMWARE AND SOFTWARE TO MAINTAIN COMPLETE CONTROL ON AN INDEPENDANT BASIS. ALL POINTS SHALL BE INTEGRATED INTO THE MASTER WEB BASED SYSTEM.

CONTROLLER SOFTWARE/ FIRMWARE

PROVIDE THE FOLLOWING FEATURES: REAL TIME, DAY OF THE WEEK AND CALENDAR, TIME SCHEDULES, HOLIDAY SCHEDULES, DAYLIGHT SAVING TIME SWITCH, PASSWORD PROTECTION AND ALARM PROCESSING PROGRAM.

CONTROLLER APPLICATION ROUTINES

EACH PCU SHALL PROVIDE SELF-CONTAINED PROGRAMMING FOR AUTOMATIC START/ STOP/SCHEDULING OF DEVICES. EACH PROGRAM SHALL SUPPORT UP TO SEVEN NORMAL DAY SCHEDULES, SEVEN SPECIAL DAY SCHEDULES AND TWO TEMPORARY DAY SCHEDULES. OPERATOR CHOICE SHALL INCLUDE FULL ADJUSTMENT TO ALL SCHEDULES. UP TO 30 HOLIDAY SCHEDULES SHALL BE ABLE TO BE SPECIFIED PER YEAR. IT SHALL BE POSSIBLE TO CREATE TEMPORARY SCHEDULES.

APPLICATION SPECIFIC CONTROLLERS

THE QUANTITY AND TYPE OF ASC CONTROLLERS SHALL BE DETERMINED BY THE CONTRACTOR BASED ON THE REQUIREMENTS TO PROVIDE A FULLY OPERATIONAL SYSTEM AS PER THE INTENT OF THE SPECIFICATION AS SHOWN ON THE DRAWINGS AND RECOMMENDED BY THE MANUFACTURER. AS A MINIMUM THE FOLLOWING FEATURES SHALL BE SUPPORTED IN EACH I/STAT UNIT: INTEGRAL MICROPROCESSOR, LOCAL DISPAY (SPACE TEMPERATURE/ SPACE SETPOINT), LOCAL CONTROL (LIMIT TO PLUS OR MINUS 3 DEGREES FROM STANDARD SET POINT).

I/STAT DIGITAL WALL CONTROLLERS

THE QUANTITY AND TYPE OF I/STATS SHALL BE DETERMINED BY THE CONTRACTOR BASED ON THE REQUIREMENTS TO PROVIDE A FULLY OPERATIONAL SYSTEM AS PER THE INTENT OF THE SPECIFICATION AS SHOWN ON THE DRAWINGS AND RECOMMENDED BY THE MANUFACTURER. AS A MINIMUM THE FOLLOWING FEATURES SHALL BE SUPPORTED IN EACH I/STAT UNIT: INTEGRAL MICROPROCESSOR, LOCAL DISPAY (SPACE TEMPERATURE/ SPACE SETPOINT), LOCAL CONTROL (LIMIT TO PLUS OR MINUS 3 DEGREES FROM STANDARD SET POINT).

MISCELLANEOUS EQUIPMENT

CONTROL DAMPERS SHALL BE EXSTRUDED ALUMINUM WITH VINYL EDGE SEALS, RUSKIN CD-50 OR EQUAL. SMOKE DETECTORS SHALL BE FURNISHED BY THE ELECTRICAL CONTRACTOR, PROVIDE WIRING TO ROOFTOP UNITS. CONTROL VALVES SHALL BE BELIMO B-2 SERIES TWO WAY BALL VALVES.

ROOFTOP UNIT SEQUENCE OF OPERATION

PROVIDE AN INDIVIDUAL PCU FOR EACH OF THE ROOFTOP UNITS WITH INDIVIDUALLY CUSTOMIZABLE TIME OF DAY OCCUPIED/ UNOCCUPIED SCHEDULING. PROVIDE INTERFACE WITH THE ROOFTOP UNIT ORIGINAL EQUIPMENT MANUFACTURER (OEM) CONTROLS TO PROVIDE START/STOP, STATUS AND OCCUPIED/ UNOCCUPIED SIGNALS THRU THE DDC SYSTEM. PROVIDE INTERFACE WITH THE ROOFTOP UNIT BACNET CARD TO READ ALL INFORMATION THROUGH THE BUILDING DDC SYSTEM.

ROOFTOP UNITS SHALL BE EQUIPPED WITH THEIR OEM RELIATEL INTEGRAL CONTROL SYSTEM.

PROVIDE DDC SUPPLY AND RETURN AIR TEMPERATURE SENSORS.

PROVIDE A DUCT PRESSURE SENSOR 2/3 OF THE DISTANCE DOWN THE MAIN SUPPLY AIR DUCT AND TIE INTO THE ROOFTOP UNIT CONTROL SYSTEM. ROOFTOP UNIT TO MAINTAIN 1" STATIC PRESSURE AT THE SENSOR.

WIRE SMOKE DETECTOR TO SHUT ROOFTOP UNIT DOWN.

WIRE ULTRAVIOLET LIGHT RECEPTACLE TO TURN ON WHEN EVER FAN RUNS.

OCCUPIED CYCLE-

DDC SYSTEM SHALL SEND A SIGNAL TO ROOFTOP UNIT CONTROLS TO INITIATE THE OCCUPIED CYCLE. ONCE INITIATED THE ROOFTOP UNIT CONTROLS SHALL FUNCTION TO PROVIDE A CONSTANT 55 DEGREE SUPPLY AIR TEMPERATURE.

ROOFTOP UNITS ARE EQUIPPED WITH A SMALL AMOUNT OF ELECTRIC HEAT TO BE UTILIZED FOR SUB-ZERO WEATHER ONLY. DURING THE OCCUPIED CYCLE WHEN OUTDOOR AIR TEMPERATURE IS BELOW ZERO THE ELECTRIC HEAT SHALL BE ENGAGED AND OPERATE CONTINUOUSLY. PROVIDE ALL DDC INTERFACE WITH ROOFTOP UNIT CONTROLS TO INITIATE THIS HEATING FUNCTION DURING EXTREMELY COLD WEATHER.

UNOCCUPIED HEATING CYCLE-

IF DURING THE UNOCCUPIED MODE ANY SPACE TEMPERATURE ON THE ROOFTOP UNIT SYSTEM FALLS BELOW 65 DEGREES A SIGNAL SHALL BE SENT TO THE ROOFTOP UNIT TO INITIATE THE FAN. WHEN ALL SPACE TEMPERATURE SENSORS REACH 68 DEGREES OR ABOVE THE FAN SHALL DE-ENERGIZE. OUTDOOR AIR DAMPER SHALL REMAIN CLOSED AND MECHANICAL COOLING SHALL BE LOCKED OUT.

UNOCCUPIED COOLING CYCLE-

IF DURING THE UNOCCUPIED MODE ANY SPACE TEMPERATURE ON THE ROOFTOP UNIT SYSTEM RISES ABOVE 82 DEGREES A SIGNAL SHALL BE SENT TO THE ROOFTOP UNIT TO INITIATE THE FAN. OUTDOOR AIR DAMPER SHALL REMAIN CLOSED. ROOFTOP UNIT SHALL FUNCTION UNDER ITS OWN CONTROLS TO MAINTAIN 55 DEGREE SUPPLY AIR TEMPERATURE. WHEN ALL SPACE TEMPERATURE SENSORS FALL TO BELOW 79 DEGREES FAN SHALL DE-ENERGIZE. OUTDOOR AIR DAMPER SHALL REMAIN CLOSED UNLESS IT IS CALLED TO OPEN FROM THE ROOFTOP UNIT CONTROLS FOR ECONOMIZER CYCLE.

AIR HANDLING UNIT SEQUENCE OF OPERATION

PROVIDE AN INDIVIDUAL PCU FOR AIR HANDLING UNIT WITH CUSTOMIZABLE TIME OF DAY OCCUPIED/ UNOCCUPIED SCHEDULING. AIR HANDLING UNIT CONTROLS SHALL BE FULLY THROUGH THE BUILDING DDC CONTROL SYSTEM. PROVIDE START/STOP, STATUS AND OCCUPIED/ UNOCCUPIED SIGNALS THRU THE DDC SYSTEM.

PROVIDE DDC CONTROLS FOR THE ASSOCIATED DUCT MOUNTED MOUNTED HOT WATER REHEAT COIL. PROVIDE TWO WAY CONTROL VALVE.

PROVIDE DDC CONDENSING UNIT START/ STOP AND STATUS.

PROVIDE DDC SUPPLY AIR TEMPERATURE SENSOR.

OCCUPIED CYCLE-

DDC SYSTEM SHALL INITIATE THE OCCUPIED CYCLE. ONCE INITIATED THE FAN SHALL START, OUTDOOR AIR DAMPER SHALL OPEN AND CONTROLS SHALL FUNCTION TO PROVIDE A CONSTANT 73 DEGREE SPACE TEMPERATURE BY MODULATING THE REHEAT COIL AND BY CYCLING THE ASSOCIATED DIRECT EXPANSION CONDENSING UNIT. PROVIDE A 10 MINUTE ANTI-SHORT CYCLING TIMER FOR THE CONDENSING UNIT.

DEHUMIDIFICATION CYCLE-

IF SPACE HUMIDITY RISES ABOVE 60 PERCENT RELATIVE HUMIDITY CONDENSING UNIT SHALL ENERGIZE AND RUN CONTINUOUSLY. REHEAT COIL SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE.

UNOCCUPIED HEATING CYCLE-

IF DURING THE UNOCCUPIED MODE THE SPACE TEMPERATURE FALLS BELOW 65 DEGREES A SIGNAL SHALL BE SENT TO THE AIR HANDLING UNIT TO INITIATE THE FAN. WHEN SPACE TEMPERATURE SENSORS REACH 68 DEGREES OR ABOVE THE FAN SHALL DE-ENERGIZE. OUTDOOR AIR DAMPER SHALL REMAIN CLOSED AND MECHANICAL COOLING SHALL BE LOCKED OUT. UNOCCUPIED COOLING CYCLE-

IF DURING THE UNOCCUPIED MODE THE SPACE TEMPERATURE SENSOR RISES ABOVE 81 DEGREES A SIGNAL SHALL BE SENT TO THE AIR HANDLING UNIT TO INITIATE THE FAN. OUTDOOR AIR DAMPER SHALL REMAIN CLOSED. CONDENSING UNIT SHALL ENERGIZE. WHEN SPACE TEMPERATURE FALLS BELOW 78 DEGREES FAN AND CONDENSING UNIT SHALL DE-ENERGIZE. DEHUMIDIFICATION CYCLE SHALL ALSO INITIATE DURING UNOCCUPIED CYCLE AND FUNCTION AS DESCRIBED ABOVE.

VAV BOX WITH REHEAT COIL SEQUENCE OF OPERATION

VAV BOXES SHALL BE PRESSURE INDEPENDANT UTILIZING A VELOCITY PRESSURE SIGNAL FROM A MULTIPPOINT SENSOR RING. PROVIDE AN APPLICATION SPECIFIC CONTROLLER FOR EACH VAV BOX AND ALL ASSOCIATED DDC CONTROLS. CONTROLS SHALL BE FULLY MODULATING AND BE DESIGNED TO REACH STEADY STATE OPERATION. VAV BOXES SHALL BE CONTROLLED FROM ROOM SPACE I/STATS. ON A CALL FOR COOLING VAV BOX SHALL MODULATE FROM MAXIMM AIR FLOW TO MINIMUM AIRFLOW TO ACHIEVE A SPACE TEMPERATURE ONE DEGREE ABOVE THERMOSTAT SETTING. UPON A FURTHER DROP IN SPACE TEMPERATURE TO ONE DEGREE BELOW SPACE TEMPERATURE SETTING THE HOT WATER COIL VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE ONE DEGREE BELOW THERMOSTAT SETTING.

TERMINAL HEATING EQUIPMENT SEQUENCE OF OPERATION

ALL TERMINAL HEATING EQUIPMENT INCLUDING UNIT HEATERS, CONVECTORS AND RADIANT CEILING PANELS SHALL BE CONTROLLED VIA A DDC CONTROLLER AND DDC SPACE TEMPERATURE SENSOR. THE DDC CONTROLLER SHALL CYCLE THE UNIT HEATER FAN. PROVIDE MODULATING CONTROL VALVES FOR ALL CONVECTORS AND RADIANT CEILING PANELS. DDC CONTROLLER SHALL MODULATE CONTROL VALVE TO REACH A STEADY STATE OPERATING POINT AS REQUIRED TO ACHIEVE THERMOSTAT SET POINT. TERMINAL HEATING EQUIPMENT SHALL BE INCLUDED IN THE GRAPHICS PACKAGE AND STATUS SHALL BE INDICATED. PROVIDE AN ALARM ALGORITHM TO INDICATE IF SPACE TEMPERATURE HAS FALLEN OUTSIDE NORMAL RANGE.

EXHAUST FAN SEQUENCE OF CONTROL

GENERAL EXHAUST FANS SHALL RUN CONTINUOSLY DURING THE OCCUPIED PERIOD, AS DETERMINED BY THE ROOFTOP UNIT OCCUPIED/ UNOCCUPIED SCHEDULE INWHICH IT IS LOCATED. PROVIDE DDC START/ STOP CONTROL AND STATUS WITH ALARM UPON FAN FAILURE AS SENSED BY DUCT MOUNTED PRESSURE SENSOR OR MOTOR CURRENT TRANSFORMER. WERE EXHAUST IS TO BE UTILIZED TO PROVIDE ROOM COOLING PROVIDE ROOM SPACE TEMPERATURE SENSOR WERE NOTED ON PLAN DRAWINGS. FOR FUME HOOD EXHAUST FAN PROVIDE WIRING FROM HOOD MOUNTED SWITCH. INCLUDE ALL EXHAUST FANS IN GRAPHICS PACKAGE WITH STATUS CLEARLY INDICATED.

BUILDING AUTOMATION SYSTEM DIRECT DIGITAL CONTROL POINTS LIST

BELOW IS A POINT SCHEDULE LIST. HOWEVER IT IS NOT INTENDED TO HEREBY LIMIT THE NUMBER OF REQUIRED POINTS. TEMPERATURE CONTROL CONTRACTOR SHALL PROVIDE ADDITIONAL POINTS AS REQUIRED FOR A COMPLETE INSTALLATION.

ROOFTOP UNITS:	
BACNET INTERFACE	MULTIPLE
ROOFTOP UNIT ENABLE	DO
ROOFTOP UNIT STATUS	DI
ROOFTOP UNIT ALARM	DI
OCCUPIED/ UNOCCUPIED SIGNAL	DO
SUPPLY AIR TEMPERATURE	DI
RETURN AIR TEMPERATURE	DI
SUPPLY DUCT AIR PRESSURE	AI/AO
OUTDOOR AIR TEMPERATURE	AI
CALL FOR HEAT	DO
CONDENSATE OVERFLOW SENSOR (KELE LD-1)	DI

AIR HANDLING UNIT & CONDENSING UNIT:	
SUPPLY FAN ENABLE	DO
SUPPLY FAN STATUS	DI
OUTDOOR AIR DAMPER	DO
SPACE THERMOSTAT	AI
SUMMIT HUMIDITY SENSOR	AI
SUPPLY AIR TEMPERATURE	DI
HOT WATER CONTROL VALVE	AO
CALL FOR COOLING	DO
CONDENSING UNIT ENABLE	DO
CONDENSING UNIT STATUS	DI

EXHAUST FANS:	
FAN ENABLE	DO
FAN STATUS	DI
SPACE THERMOSTAT (WHERE SHOWN)	AI

UNIT HEATERS:	
FAN ENABLE	DO
FAN STATUS	DI
SPACE THERMOSTAT	AI

CONVECTORS & RADIANT CEILING PANELS:	
HOT WATER CONTROL VALVE	AO
SPACE THERMOSTAT	AI

VAV BOXES:	
PRESSURE SENSOR	AI
DAMPER CONTROLLER	AO
HOT WATER CONTROL VALVE	AO
SPACE THERMOSTAT	AI

SMOKE CONTROL DAMPERS:	
DAMPER ENABLE	DO
DAMPER STATUS	DI

REVISIONS	MARK	ISSUED DATE	DESCRIPTION

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MECHANICAL
CONTROLS &
SMOKE EXHAUST
SYSTEM