SECTION 15900 - HVAC INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. THIS SECTION INCLUDES CONTROL EQUIPMENT FOR HVAC SYSTEMS AND COMPONENTS, INCLUDING CONTROL COMPONENTS.

1.02 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH CONTROL DEVICE INDICATED.

1. DDC PANELS
2. THERMOSTATS
3. HUMIDITY SENSORS
4. TEMPERATURE SENSORS
5. CURRENT SENSORS

A. SHOP DRAWINGS:

1. DDC SYSTEM HARDWARE: WIRING DIAGRAMS, SCHEMATIC FLOOR PLANS, AND SCHEMATIC CONTROL DIAGRAMS.
2. DDC SYSTEM SOFTWARE: SCHEMATIC DIAGRAMS, WRITTEN DESCRIPTIONS, AND POINTS LIST.

1.03 CLOSEOUT SUBMITTALS

A. OPERATION AND MAINTENANCE DATA.

B. SOFTWARE LICENSES

C. TRAINING CERTIFICATES

1.04 QUALITY ASSURANCE

A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. IN OTHER PART 2 ARTICLES WHERE TITLES BELOW INTRODUCE LISTS, THE FOLLOWING REQUIREMENTS APPLY TO PRODUCT SELECTION:

1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE MANUFACTURERS SPECIFIED.

2.02 CONTROL SYSTEM

A. MANUFACTURERS:

1. AUTOMATIC LOGIC
2. JOHNSON METASYS
3. TRANE TRACE SUMMIT
4. TAC I/A
5. SIEMENS APOGEE

B. CONTROL SYSTEM SHALL CONSIST OF SENSORS, INDICATORS, ACTUATORS, FINAL CONTROL ELEMENTS, INTERFACE EQUIPMENT, OTHER APPARATUS, AND ACCESSORIES TO CONTROL MECHANICAL SYSTEMS. WIRELESS SYSTEMS ARE NOT ALLOWED.

C. CONTROL SYSTEM SHALL CONSIST OF SENSORS, INDICATORS, INTERFACE EQUIPMENT, OTHER APPARATUS, ACCESSORIES, AND SOFTWARE CONNECTED TO DISTRIBUTED CONTROLLERS OPERATING IN MULTIUSER, MULTITASKING ENVIRONMENT AND PROGRAMMED TO CONTROL MECHANICAL SYSTEMS. A WEB BASED OPERATOR WORKSTATION PERMITS INTERFACE WITH THE NETWORK VIA DYNAMIC COLOR GRAPHICS WITH EACH MECHANICAL SYSTEM, BUILDING FLOOR PLAN, AND CONTROL DEVICE DEPICTED BY POINT-AND-CLICK GRAPHICS.

2.03 DDC EQUIPMENT

A. OPERATOR WORKSTATION: DDC SYSTEM SHALL BE ACCESSIBLE FROM A WEB BASED WORK STATION.

B. DDC PANELS: MODULAR, COMPRISING PROCESSOR BOARD WITH PROGRAMMABLE, NONVOLATILE, RANDOM-ACCESS MEMORY; LOCAL OPERATOR ACCESS AND DISPLAY PANEL; INTEGRAL INTERFACE EQUIPMENT; AND BACKUP POWER SOURCE.

1. SOFTWARE SHALL BE WEB BASED.
2. PROTOCOL SHALL BE BACNET OR LON WITH IP.
3. PANEL SHALL HAVE USB OR CAT-5 PORT FOR CONNECTION TO LAPTOP COMPUTER.
4. PANEL SHALL HAVE BATTERY BACK-UP OR SEPARATE UPS.
5. STAND-ALONE MODE CONTROL FUNCTIONS OPERATE REGARDLESS OF NETWORK STATUS. FUNCTIONS INCLUDE THE FOLLOWING:

    a. GLOBAL COMMUNICATIONS.
    b. DISCRETE/DIGITAL, ANALOG, AND PULSE I/O.
    c. MONITORING, CONTROLLING, OR ADDRESSING DATA POINTS.
    d. SOFTWARE APPLICATIONS, SCHEDULING, AND ALARM PROCESSING.
    e. TESTING AND DEVELOPING CONTROL ALGORITHMS WITHOUT DISRUPTING FIELD HARDWARE AND CONTROLLED ENVIRONMENT.

6. LOCAL OPERATOR INTERFACE PROVIDES FOR DOWNLOAD FROM OR UPLOAD TO OPERATOR WORKSTATION.

C. POWER SUPPLIES: TRANSFORMERS WITH CURRENT-LIMITING TYPE OR OVERCURRENT PROTECTION. DC POWER SUPPLY SHALL MATCH OUTPUT CURRENT AND VOLTAGE REQUIREMENTS WITH THE FOLLOWING:

1. BUILT-IN OVERVOLTAGE AND OVERCURRENT PROTECTION AND BE ABLE TO WITHSTAND 150 PERCENT OVERLOAD FOR AT LEAST 3 SECONDS WITHOUT FAILURE.

2.04 ELECTRONIC SENSORS

A. DESCRIPTION: VIBRATION AND CORROSION RESISTANT; FOR WALL OR DUCT MOUNTING AS REQUIRED.

B. THERMISTOR TEMPERATURE SENSORS AND TRANSMITTERS:

1. ACCURACY: PLUS OR MINUS 0.5 DEG F AT CALIBRATION POINT.
2. INSERTION ELEMENTS IN DUCTS: SINGLE POINT, 8 INCHES LONG; USE WHERE NOT AFFECTED BY TEMPERATURE STRATIFICATION OR WHERE DUCTS ARE SMALLER THAN 9 SQ. FT.
3. OUTSIDE-AIR SENSORS: WATERTIGHT INLET FITTING, SHIELDED FROM DIRECT SUNLIGHT.

C. HUMIDITY SENSORS: BULK POLYMER SENSOR ELEMENT.

1. ACCURACY: 5 PERCENT FULL RANGE WITH LINEAR OUTPUT.
2. ROOM SENSOR RANGE: 20 TO 80 PERCENT RELATIVE HUMIDITY.
3. OUTSIDE-AIR SENSOR: 20 TO 80 PERCENT RELATIVE HUMIDITY RANGE WITH MOUNTING ENCLOSURE, SUITABLE FOR OPERATION AT OUTDOOR TEMPERATURES OF 32 TO 120 DEG F.

2.05 STATUS SENSORS

A. STATUS INPUTS FOR ELECTRIC MOTORS: COMPLY WITH ISA 50.00.01, CURRENT-SENSING FIXED- OR SPLIT-CORE TRANSFORMERS WITH SELF-POWERED TRANSMITTER, ADJUSTABLE AND SUITABLE FOR 175 PERCENT OF RATED MOTOR CURRENT.

2.06 SPACE THERMOSTATS / HUMIDITY SENSORS

A. PROVIDE INTEGRAL SPACE THERMOSTATS WITH HUMIDITY SENSOR AND TIMED OVER RIDE BUTTON.

B. PROVIDE INSTANT OVERRIDE OF SET POINT FOR TIMED PERIOD OF 1 HOUR.

C. THERMOSTAT SHALL HAVE DIGITAL DISPLAY OF SPACE TEMPERATURE / SET POINT.

2.07 CONTROL CABLE AND WIRING

A. ALL CONTROLS WIRING SHALL BE IN CONDUIT OR CABLE TRAYS. WIRELESS SYSTEMS ARE NOT ALLOWED.

PART 3 - EXECUTION

3.01 INSTALLATION

A. VERIFY LOCATION OF THERMOSTATS, HUMIDISTATS, AND OTHER EXPOSED CONTROL SENSORS WITH DRAWINGS AND ROOM DETAILS BEFORE INSTALLATION.

B. INSTALL LABELS AND NAMEPLATES TO IDENTIFY CONTROL COMPONENTS ACCORDING TO DIVISION 15 REQUIREMENTS.

3.02 WIRING AND CONNECTION INSTALLATION

A. THE DDC SYSTEM CONTRACTOR SHALL PROVIDE AND INSTALL ALL CONDUIT AND WIRING FOR DDC SYSTEMS IN ACCORDANCE WITH NFPA 70 THE NATIONAL ELECTRICAL CODE AND ELECTRICAL SPECIFICATION SECTIONS 16010 AND 16051. ALL CONTROLS WIRING SHALL BE IN CONDUIT OR CABLE TRAYS. THE DDC SYSTEM CONTRACTOR SHALL PROVIDE CONDUIT CONNECTORS, CABLE TRAY CONNECTORS, ETC. AS REQUIRED TO INSTALL A COMPLETE CONDUIT SYSTEM FROM EACH SENSOR DEVICE OR DDC CONTROL POINT.

3.03 FIELD QUALITY CONTROL

B. PERFORM THE FOLLOWING FIELD TESTS AND INSPECTIONS AND PREPARE TEST REPORTS:

1. OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER UNIT OPERATION. REMOVE AND REPLACE MALFUNCTIONING UNITS AND RETEST.
2. TEST AND ADJUST CONTROLS AND SAFETIES.
3. TEST CALIBRATION OF CONTROLLERS BY DISCONNECTING INPUT SENSORS AND STIMULATING OPERATION WITH COMPATIBLE SIGNAL GENERATOR.
4. TEST EACH POINT THROUGH ITS FULL OPERATING RANGE TO VERIFY THAT SAFETY AND OPERATING CONTROL SET POINTS ARE AS REQUIRED.
5. TEST EACH CONTROL LOOP TO VERIFY STABLE MODE OF OPERATION AND COMPLIANCE WITH SEQUENCE OF OPERATION.
6. TEST EACH SYSTEM FOR COMPLIANCE WITH SEQUENCE OF OPERATION.
7. TEST SOFTWARE AND HARDWARE INTERLOCKS.

3.04 TRAINING

C. PROVIDE OPERATOR TRAINING FOR 3 OF THE OWNERS PERSONNEL TO CONSIST OF 24 HOURS CLASSROOM TRAINING OVER 3-DAYS. TRAINING SHALL BE PROVIDED AT A FACILITY WITHIN 60 MILES OF THE PROJECT SITE. TRAINING SHALL BE BY A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE. THE OWNER'S MAINTENANCE PERSONNEL SHALL BE ABLE TO ADJUST, OPERATE, AND MAINTAIN HVAC INSTRUMENTATION AND CONTROLS AT THE CONCLUSION OF TRAINING.

END OF SECTION 15900