

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 01 00 10 – General Instructions.
- .2 Section 01 35 29.06 - Health and Safety Requirements.
- .3 Section 25 05 02 - EMCS:Submittals and Review Process.
- .4 Section 25 05 54 - EMCS: Identification.
- .5 Section 25 90 01 - EMCS: Site Requirements Applications and Systems Sequences of Operation.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/The Instrumentation, Systems and Automation Society (ISA).
 - .1 ANSI/ISA 5.5-1985, Graphic Symbols for Process Displays.
- .2 American National Standards Institute (ANSI)/ Institute of Electrical and Electronics Engineers (IEEE).
 - .1 ANSI/IEEE 260.1-2004, American National Standard Letter Symbols Units of Measurement (SI Units, Customary Inch-Pound Units, and Certain Other Units).
- .3 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-Z234.1-00 (R2006), Metric Practice Guide.

1.3 ACRONYMS AND ABBREVIATIONS

- .1 Acronyms used in EMCS:
 - .1 AEL - Average Effectiveness Level.
 - .2 AI - Analog Input.
 - .3 AIT - Agreement on International Trade.
 - .4 AO - Analog Output.
 - .5 BACnet - Building Automation and Control Network.
 - .6 BC(s) - Building Controller(s).
 - .7 BECC - Building Environmental Control Center.
 - .8 CAD - Computer Aided Design.
 - .9 CDL - Control Description Logic.
 - .10 CDS - Control Design Schematic.
 - .11 COSV - Change of State or Value.
 - .12 CPU - Central Processing Unit.
 - .13 DI - Digital Input.
 - .14 DO - Digital Output.
 - .15 DP - Differential Pressure.

- .16 ECU - Equipment Control Unit.
- .17 EMCS - Energy Monitoring and Control System.
- .18 HVAC - Heating, Ventilation, Air Conditioning.
- .19 IDE - Interface Device Equipment.
- .20 I/O - Input/Output.
- .21 ISA - Industry Standard Architecture.
- .22 LAN - Local Area Network.
- .23 LCU - Local Control Unit.
- .24 MCU - Master Control Unit.
- .25 NAFTA - North American Free Trade Agreement.
- .26 NC - Normally Closed.
- .27 NO - Normally Open.
- .28 OS - Operating System.
- .29 O&M - Operation and Maintenance.
- .30 OWS - Operator Work Station.
- .31 PC - Personal Computer.
- .32 PCI - Peripheral Control Interface.
- .33 PCMCIA - Personal Computer Micro-Card Interface Adapter.
- .34 PID - Proportional, Integral and Derivative.
- .35 RAM - Random Access Memory.
- .36 SP - Static Pressure.
- .37 ROM - Read Only Memory.
- .38 TCU - Terminal Control Unit.
- .39 USB - Universal Serial Bus.
- .40 UPS - Uninterruptible Power Supply.
- .41 VAV - Variable Air Volume.

1.4 DEFINITIONS

- .1 Point: may be logical or physical.
 - .1 Logical points: values calculated by system such as setpoints, totals, counts, derived corrections and may include, but not limited to result of and statements in CDL's.
 - .2 Physical points: inputs or outputs which have hardware wired to controllers which are measuring physical properties, or providing status conditions of contacts or relays which provide interaction with related equipment (stop, start) and valve or damper actuators.
- .2 Point Name: composed of two parts, point identifier and point expansion.
 - .1 Point identifier: comprised of three descriptors, "area" descriptor, "system" descriptor and "point" descriptor, for which database to provide 25 character field for each point identifier. "System" is system that point is located on.
 - .1 Area descriptor: building or part of building where point is located.
 - .2 System descriptor: system that point is located on.

- .3 Point descriptor: physical or logical point description. For point identifier "area", "system" and "point" will be shortforms or acronyms. Database must provide 25 character field for each point identifier.
- .2 Point expansion: comprised of three fields, one for each descriptor. Expanded form of shortform or acronym used in "area", "system" and "point" descriptors is placed into appropriate point expansion field. Database must provide 32 character field for each point expansion.
- .3 Bilingual systems to include additional point identifier expansion fields of equal capacity for each point name for second language.
 - .1 System to support use of numbers and readable characters including blanks, periods or underscores to enhance user readability for each of the above strings.
- .3 Point Object Type: points fall into following object types:
 - .1 AI (analog input).
 - .2 AO (analog output).
 - .3 DI (digital input).
 - .4 DO (digital output).
 - .5 Pulse inputs.
- .4 Symbols and engineering unit abbreviations utilized in displays: to ANSI/ISA 5.5.
 - .1 Printouts: to ANSI/IEEE 260.1.
 - .2 Refer also to Section 25 05 54- EMCS: Identification.

1.5 SYSTEM DESCRIPTION

- .1 Refer to control schematics for system architecture.
- .2 Provide all labour, material, equipment and software that may or may not be specifically referred to herein or on the drawings, that are required to meet the functional intent of these specifications.
- .3 Work covered by sections referred to above consists of modifications to the existing EMCS to monitor new generator equipment and fuel systems. Works includes , but is not limited to, the following:
 - .1 New Building Controllers to support I/O points.
 - .2 Control devices as listed in I/O point summary tables.
 - .3 Data communications equipment necessary to effect EMCS data transmission.
 - .4 Supply and installation of an Ethernet TCP/IP primary communication network, including active components.
 - .5 Integration of third-party control panels including: fuel system control panels (FP-01 and FP-02) and electrical metering equipment.
 - .6 Interfaces required to monitor the generator equipment, as listed in the EMCS I/O points schedule.

-
- .7 Complete electrical installation including conduits, cables, junction boxes, etc. required for control systems, automation and EMCS, as shown on drawings and described in these specifications, as well as all electrical connections required to motor control centers and starters, interlocks for fans, pumps or other controls.
 - .8 Programming and complete database required for DDC controls and the centralized management system, including programming of sequences of operation and graphics (floor plans, systems integrated)
 - .9 Software/Hardware complete with full documentation.
 - .10 Complete operating and maintenance manuals.
 - .11 Training of personnel.
 - .12 Start-up, testing, calibration and technical support during commissioning, full documentation.
 - .13 Wiring interface co-ordination of equipment supplied by others.
 - .14 Miscellaneous work as specified in these sections and as indicated.
- .4 Design Requirements:
- .1 Design and provide conduit and wiring linking elements of system.
 - .2 Supply sufficient programmable controllers of types to meet project requirements. Location of controllers, quantity and points contents as reviewed by Departmental Representative prior to installation.
 - .3 New controllers, to match or exceed current EMCS controller quality and performance standards.
 - .4 New EMCS controllers must be compliant with existing EMCS architecture.
 - .5 Provide emergency power to EMCS components.
 - .6 Metric references: in accordance with CAN/CSA Z234.1.
- .5 Language Operating Requirements:
- .1 Provide English or French operator selectable access codes.
 - .2 Use non-linguistic symbols for displays on graphic terminals wherever possible. Other information to be in English and French.
 - .3 Operating system executive: provide primary hardware-to-software interface specified as part of hardware purchase with associated documentation to be in English or French.
 - .4 System manager software: include in English or French system definition point database, additions, deletions or modifications, control loop statements, use of high level programming languages, report generator utility and other OS utilities used for maintaining optimal operating efficiency.
 - .5 Include, in English and French:
 - .1 Input and output commands and messages from operator-initiated functions and field related changes and alarms as defined in CDL's or assigned limits (i.e. commands relating to day-to-day operating functions and not related to system modifications, additions, or logic re-definements).

- .2 Graphic "display" functions, point commands to turn systems on or off, manually override automatic control of specified hardware points. To be in French and English at specified OWS and to be able to operate one terminal in English and second in French. Point name expansions in both languages.
- .3 Reporting function such as trend log, trend graphics, alarm report logs, energy report logs, maintenance generated logs.

1.6 SUBMITTALS

- .1 Make submittals in accordance with Section 01 00 10 – General Instruction and Section 25 05 02 - EMCS: Submittal and Review Process.
- .2 Quality Control:
 - .1 Provide equipment and material from manufacturer's regular production, CSA certified, manufactured to standard quoted plus additional specified requirements.
 - .2 Where CSA certified equipment is not available submit such equipment to inspection authorities for special inspection and approval before delivery to site.
 - .3 Submit proof of compliance to specified standards with shop drawings and product data in accordance with Section 25 05 02 - EMCS: Submittal and Review Process. Label or listing of specified organization is acceptable evidence.
 - .4 In lieu of such evidence, submit certificate from testing organization, approved by Departmental Representative, certifying that item was tested in accordance with their test methods and that item conforms to their standard/code.
 - .5 For materials whose compliance with organizational standards/codes/specifications is not regulated by organization using its own listing or label as proof of compliance, furnish certificate stating that material complies with applicable referenced standard or specification.
 - .6 Permits and fees: in accordance with general conditions of contract.
 - .7 Submit certificate of acceptance from authority having jurisdiction to Departmental Representative.

1.7 QUALITY ASSURANCE

- .1 Have trained personnel capable of providing instruction, routine maintenance and emergency service on systems,
- .2 Ensure qualified supervisory personnel continuously direct and monitor Work and attend site meetings.
- .3 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.

- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions.
 - .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .3 Separate for reuse and recycling and place in designated containers Metal, Plastic waste in accordance with Waste Management Plan.

1.9 EXISTING CONDITIONS - CONTROL COMPONENTS

- .1 Submit written request for permission to disconnect controls and to obtain equipment downtime before proceeding with Work.
- .2 Assume responsibility for controls to be incorporated into EMCS after written receipt of approval from Departmental Representative.
 - .1 Be responsible for repair costs due to negligence or abuse of equipment.
 - .2 Responsibility for existing devices terminates upon final acceptance of EMCS as approved by Departmental Representative.

1.10 ELECTRICAL INSTALLATION

- .1 EMCS contractor is responsible for the hiring of a qualified and licensed Electrical contractor for the following work:
 - .1 Complete electrical installation including all conduits, cables, junction box, etc. required for EMCS and control systems.
 - .2 120V single phase power source for DDC controls, local control panels, cabinets and transformers provided by this section.
 - .3 Grounding of complete EMCS installation and associated controls

1.11 DESIGNATED CONTRACTOR

- .1 Main EMCS System:
 - .1 Hire the services of VCI Controls or its authorized representative to complete the work related to the EMCS in all EMCS sections.

Part 2 Products

2.1 GENERAL

- .1 The EMCS shall have the capability of interfacing with third party control systems including pumps, air-handling systems, energy metering systems and other control systems provided they comply with open protocols such as ASHRAE BACnet, Echelon Lonworks or Modbus.

2.2 PRIMARY NETWORK

- .1 The EMCS primary network will be provided in conformance with:
 - .1 IEEE Ethernet Standard 802.3
 - .2 ASHRAE BACnet Standard 135-2001, Annex J with support for Internet Protocol (IP) Addressing and common routers.

2.3 EQUIPMENT

- .1 EMCS: There is an existing ALERTON/VCI CONTROLS system presently installed in the building. All materials must be selected to ensure full compatibility with the existing ALERTON/VCI CONTROLS system.

2.4 ADAPTORS

- .1 Provide adaptors between metric and imperial components.

Part 3 Execution

3.1 GENERAL

- .1 All controls shall be installed and adjusted by specialized technicians, regularly employed by the manufacturer or its authorized distributor. All costs related to adjustments form part of this contract.
- .2 All controls components must be easily accessible for maintenance.
- .3 Install all field devices in control cabinets (“Unitized Cabinet” type).

3.2 MANUFACTURER'S RECOMMENDATIONS

- .1 Installation: to manufacturer's recommendations.

3.3 PAINTING

- .1 Painting:
 - .1 Clean and touch up marred or scratched surfaces of factory finished equipment to match original finish.
 - .2 Restore to new condition, finished surfaces too extensively damaged to be primed and touched up to make good.
 - .3 Clean and prime exposed hangers, racks, fastenings, and other support components.

END OF SECTION