

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 - Common Works Results - Electrical.
- .2 Section 26 09 23.01 - Metering And Switchboard Instruments.
- .3 Section 26 22 19 - Control and Signal Transformers.
- .4 Section 26 28 13.01 - Fuses - Low Voltage.
- .5 Section 26 28 16.01 - Air Circuit Breakers.
- .6 Section 26 28 16.02 - Moulded Case Circuit Breakers.
- .7 Section 26 28 20 - Ground Fault Circuit Interrupters - Class A.
- .8 Section 26 43 13 - Surge Protective Devices.

1.2 REFERENCES

- .1 CSA International.
 - .1 C22.2 No. 244-05 (R2010) - Switchboards (Tri-National standard, with UL 891 and ANCE NMX-J-118/2).
- .2 National Electrical Manufacturers Association (NEMA).
 - .1 NEMA PB-2 (2011), Deadfront Distribution Switchboards.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Québec, Canada.
 - .2 Indicate on drawings:
 - .1 Floor anchoring method and foundation template.
 - .2 Dimensioned cable entry and exit locations.
 - .3 Dimensioned position and size of bus.
 - .4 Overall length, height and depth of complete switchboard.
 - .5 Dimensioned layout of internal and front panel mounted components.
 - .6 Single line and schematic diagram.
 - .7 Nameplate schedule.

- .8 Component list.
 - .9 Assembly ratings including:
 - .1 Short-circuit rating.
 - .2 Voltage.
 - .3 Continuous current.
 - .10 Major component ratings including:
 - .1 Voltage.
 - .2 Continuous current.
 - .3 Interrupting ratings.
 - .11 Cable terminal sizes.
 - .12 Busway connection.
 - .13 Key interlock scheme drawing and sequence of operations.
- .4 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
- .1 Instructions: submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for low voltage switchgear and components for incorporation into manual.
- .3 The following information shall be submitted:
 - .1 Final as-built drawings.
 - .2 Wiring diagrams.
 - .3 Certified factory test reports.
 - .4 Installation information.
 - .5 Seismic certification and equipment anchorage details as specified.

1.5 EXTRA STOCK MATERIALS

- .1 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Include:
 - .1 3 fuses for each type above 600 A.
 - .2 6 fuses for each type up to and including 600 A.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect switchboard from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.8 ACCEPTABLE PRODUCTS AND MATERIALS

- .1 Where a particular brand name is stipulated, see Instructions to Bidders for procedure for requesting approval of substitute materials and products.

Part 2 Products

2.1 SWITCHBOARDS

- .1 Switchboards to CAN/CSA C22.2 No. 244-05.

2.2 CONSTRUCTION

- .1 Modular construction with the required number of self-supported vertical sections, bolted together to form a rigid assembly, floor mounted, dead front, for indoor installation, NEMA 1 type enclosure, sprinkler proof.
 - .1 All sections of the switchboard shall be rear aligned.
 - .2 Front and rear access.
 - .3 Removable side and rear panels.
 - .4 Height: 2,286 mm, unless indicated otherwise.
- .2 Switchboard frame: die formed 12 gauge steel with reinforced corner gussets. Frame shall be rigidly bolted to support cover plates, bus bars and installed devices during shipment and installation.
- .3 Distribution sections shall be compartmented to provide a front device compartment and a rear feeder cable compartment, with a full length vertical barrier between the two compartments.
 - .1 Provide a rear compartment vertical insulating barrier between the cable compartment and the main bus to protect against inadvertent contact with main or vertical bus bars.
- .4 Ventilating louvres: vermin, insect proof with easily replaceable fibre glass filters.
- .5 Steel channel sills for base mounting in single length common to multi-section switchboard.
- .6 The assembly shall be provided with adequate lifting means.

- .7 Provide hinged doors over metering compartments and individually mounted device compartments.

2.3 BUSBARS

- .1 Three phase and neutral busbars, continuous current rating as indicated, bare, self-cooled, extending full width of multi-section switchboard, suitably supported on insulators.
- .2 Main connections between bus and major switching components to have continuous current rating to match major switching components.
- .3 Busbars and main connections: 99.30 % minimum conductivity copper.
- .4 Allow for extension of bus on both sides of unit without need for further drilling or preparation in field.
- .5 Silver surfaced or tin plated joints, secured with non-corrosive bolts and Belleville washers.
- .6 Identify phases of busbars by suitable marking.
- .7 Busbar connectors, when switchboard shipped in more than one section.

2.4 GROUNDING

- .1 Copper ground bus not smaller than 50 mm x 6 mm extending full width of multi-section switchboard and situated at bottom.
- .2 Lugs at each end for size 4/0 AWG grounding cable.

2.5 GROUND FAULT UNIT

- .1 Ground fault units to Section 26 28 20 - Ground Fault Circuit Interrupters - Class A.

2.6 AIR CIRCUIT BREAKERS

- .1 Air circuit breakers to section 26 28 16.01 - Air Circuit Breakers.

2.7 MOULDED-CASE CIRCUIT BREAKERS

- .1 Moulded-case circuit breakers to section 26 28 16.02 - Moulded Case Circuit Breakers.

2.8 INSTRUMENTS

- .1 Measuring instruments to section 26 09 23.01 - Metering and Switchboard Instruments.

2.9 INSTRUMENT TRANSFORMERS

- .1 Instrument transformers to section 26 22 19 - Control and Signal Transformers.

2.10 POWER SUPPLY AUTHORITY METERING

- .1 Arrange with authority having jurisdiction for supply of mounting accessories and devices as follows:
 - .1 3 potential transformers.

- .2 3 current transformers.
- .2 Separate enclosure and metal raceway for exclusive use of power supply authority metering.
 - .1 NEMA 1 enclosure, dimensions : 750 mm x 750 mm x 250 mm.
 - .2 EMT metallic conduit: 41 mm diameter.
- 2.11 SURGE PROTECTIVE DEVICES**
 - .1 SPD : to Section 26 43 13 - Surge Protective Devices.
- 2.12 W-S-P3N1 SWITCHBOARD**
 - .1 Main incoming section to contain:
 - .1 Air circuit breaker, withdrawable, sized as indicated.
 - .2 Digital metering system to Section 26 09 23.01 - Metering and Switchboard Instruments.
 - .3 Separate compartment for electrical power supply authority metering, provided with hinged door and a locking device allowing to take a seal.
 - .2 Distribution sections to contain:
 - .1 Moulded case circuit breakers, sized as indicated.
 - .2 Copper bus, from main section to distribution sections including vertical bussing.
- 2.13 FINISHES**
 - .1 Apply finishes in accordance with Section 26 05 00 - Common Work Results for Electrical.
 - .1 Section exteriors gray.
 - .2 Section interiors white.
- 2.14 EQUIPMENT IDENTIFICATION**
 - .1 Identify equipment in accordance with Section 26 05 00 - Common Work Results for Electrical.
 - .2 Nameplates:
 - .1 White plate, black letters, size 7.
 - .2 Complete switchgear labelled: voltage, system configuration and main bus ampacity.
 - .3 Main section labelled: "Main Breaker".
 - .4 Distribution units labelled: "Feeder No.1", "Feeder No.2".
- 2.15 ACCEPTABLE PRODUCTS**
 - .1 Pow-R-Line Series of Eaton.
 - .2 Sentron Series of Siemens.

- .3 QED Series of Schneider Electric.
- .4 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.16 POWER MONITORING SYSTEM

- .1 Description:
 - .1 Power monitoring system, including:
 - .1 TCP/IP bridge to allow connection of circuit breakers solid state trip units and digital instruments, voltage and current reading, and data conversion to IP protocol;
 - .2 Workstation, connected to the network;
 - .3 Workstation uninterruptible power supply unit;
 - .4 A power monitoring software with a licence for 5 years.
 - .2 Ethernet Gateway:
 - .1 Ethernet gateway installed in W-S-P3N1 switchboard, and connected to circuit breakers solid state trip units and digital instruments, as indicated.
 - .2 Wiring: 2 twisted pairs, as needed.
 - .3 Workstation: industrial type PC to be installed in main electrical room, as indicated.
 - .1 No moving parts, no processor fan or rotating hard disk drive.
 - .2 Processeur : Core 2 CPU;
 - .3 RAM 8 GB;
 - .4 Solid state drive (SSD), 128 GB minimum;
 - .5 DVD player;
 - .6 2 Ethernet ports 10/100 Mbit;
 - .7 2 USB ports;
 - .8 VGA DB15 connector;
 - .9 Power supply: 9 to 35 VDC;
 - .10 Operating temperature: -10°C to +50°C;
 - .11 Operating system: Windows 7 (64 bits);
 - .12 Database server: Microsoft SQL or other;
 - .13 Color screen IPS backlit, LED, 24 inches;
 - .14 Keyboard;
 - .15 Mouse;
 - .16 Workstation desk and a reporter type chair with rollers.
 - .4 Power Monitoring Software:
 - .1 The system shall be designed to monitor and manage energy consumption. The software shall monitor state and alarm, and read electrical data from metering devices, sensors, and other intelligent electric devices, as indicated.

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- .2 The software shall be a standard product offering with no custom programming required.
 - .3 The software shall be able to automatically generate reports, graphics, dashboards, to show alarms in real time and perform power quality analysis.
 - .4 Key features shall include:
 - .1 Real-time data acquisition to database, for metering devices and circuit breakers, as indicated.
 - .2 Data and events archiving and storage on non-volatile memory.
 - .3 Provide additional 30% points to this Contract. Related licence to be included.
 - .4 Access to measurement data using only a web browser (Explorer, Firefox, Chrome) on the same network.
 - .5 Power quality analysis (including harmonics, waveforms, transients and voltage and current sinusoids).
 - .6 Bilingual system with possibility of choice of language (English or French).
 - .7 Power quality compliance reporting for international Standards.
 - .8 The generation of consumer reports, applications, alarms, and power quality.
 - .9 Interactive historical data display and trending.
 - .10 Interactive alarm analysis with standard views.
 - .11 Power factor monitoring.
 - .12 The ability to import meter signals of any brand.
 - .13 The ability to install the software as dedicated server, distributed, or virtual mode.
 - .14 Access to data through multiple user security levels.
 - .15 Access to the software by Web user and webmasters multilevel security and access.
 - .5 Integration with meters and circuit breakers.
 - .1 The software shall allow the integration of energy measurement equipment for this project. The software shall communicate with each device using the Modbus protocol or other, using Ethernet, RS-485 serial.
 - .2 Breakers and meters and other measuring equipment shall be connected to Ethernet gateways to make data available equipment for the software that will be connected to the Ethernet network.
 - .6 Real-time data:
 - .1 The software shall allow users to easily access data in real-time mode.
 - .7 Energy dashboard:
 - .1 The software shall have the ability to display custom web dashboards. These dashboards will facilitate access to different information. The Customer may use as a personalized home page dashboard allowing him

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- to see different graphics, photos, Web pages external to view video camera, etc.
- .2 Dashboards shall provide an interactive display and historical data trends. The objective of the dashboard is to provide access to energy management data and views.
 - .3 Dashboards can be configured with several gadgets to show the following views:
 - .1 Power consumption (kW and kVA);
 - .2 Energy cost;
 - .3 Trends;
 - .4 Comparison of energy at different times;
 - .5 Energy savings.
 - .8 Graphical Diagrams:
 - .1 The software shall be provided with several charts providing the ability to view graphical representations of power monitoring system. Diagrams shall indicate all the parameters that are available from the measurement equipment, including all measured values, the state of distribution equipment (breaker on-off), alarm status, data on energy, position of the device and /or the status, data log, and capture of waveform.
 - .9 Tables:
 - .1 The software shall provide the ability to generate real-time data tables by selecting some meters, some values, and get a spreadsheet showing the data in real-time.
 - .10 Alarms:
 - .1 An alarm table shall allow visualize events in the power system, such as alarms from meters, alarms configured in software and the disruption of the quality of power.
 - .2 Alarm table shall also allow to disable alarms ("Acknowledge") and generate reports as well as to send an email or text message after activating an alarm automatically.
 - .3 Optional: software shall be able to export alarms in real-time to other software.
 - .11 Reports:
 - .1 The software shall provide a reporting tool to display historical data. The software shall include a list of different preconfigured reports that the user can use:
 - .1 Energy cost report.
 - .2 Load profile report.
 - .3 Power quality report.
 - .4 Hourly use report.

- .2 Reports can be generated on demand or be automatically generated according to a schedule made by the user. Report formats shall be HTML type PDF, TIFF, Excel, or XML.
- .12 Data storage and data sharing:
 - .1 The software shall be installed on the new provided workstation.
- .13 Acceptable products:
 - .1 StruxureWare Power Monitoring of Schneider-Electric.
 - .2 WinPM Net of Siemens.
 - .3 PowerNet of Eaton.
 - .4 Replacement materials or products: approved by addendum according to Instructions to bidders.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for switchboard installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

- .1 Locate switchboard assembly as indicated and bolt to concrete base on floor.
- .2 Connect main secondary power supply to main breaker.
- .3 Connect load side of breakers in distribution cubicles to distribution feeders.
- .4 Check factory made connections for mechanical security and electrical continuity.
- .5 Run one grounding conductor 4/0 AWG bare copper in 27 mm conduit from ground bus to ground.
- .6 Install devices supplied by electrical power distributor in their dedicated compartment.
- .7 Check and adjust trip unit settings against co-ordination study to ensure proper working and protection of components.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by low voltage switchgear installation.

3.5 ACTIVITIES ON WORK COMPLETION

- .1 Demonstration and Training.
 - .1 Conduct a full demonstration of the energy monitoring system.
 - .2 Provide necessary training to familiarize the operating and maintenance personnel with the operation of the system and software.
 - .1 Training to be 8 hours.
 - .3 Provide service technician during the period and at intervals necessary to make the installation operational and to familiarize operating personnel familiar with all aspects of maintenance and operation of the equipment and software.
- .2 Customer Support Service:
 - .1 Manufacturer shall provide support services during the first year providing access to online help for additions or changes in addition to providing new versions of software licenses free of charge during this period.

END OF SECTION