PART 1  GENERAL

1.01  SCOPE

D. The Contractor shall furnish and install the medium voltage load interrupter switchgear as specified herein and as shown on the contract drawings.

1.02  RELATED SECTIONS

1.03  REFERENCES

D. The medium voltage load interrupter switchgear and all components shall be designed, manufactured and tested in accordance with the latest applicable standards as follows:

1. ANSI/IEEE C37.20.3
2. ANSI/IEEE C37.20.4
3. ANSI C37.22
4. ANSI C37.57, C37.58
5. NEMA SG5
6. NEMA SG6
7. CSA 22.2 No.31-M89 (5/15 kV ratings only)
8. EEMAC G8-3.3

B. Listing by Underwriters Laboratories (UL) or Canadian Standards Association (CSA) shall be provided for 5 kV or 15 kV class medium voltage load interrupter switchgear.

1.04  SUBMITTALS – FOR REVIEW/APPROVAL

D. The following information shall be submitted to the Engineer:

1. Master drawing index
2. Front view elevation
3. Floor plan
4. Top view
5. Single line
6. Nameplate schedule
7. Component list
8. Conduit entry/exit locations
9. Assembly ratings including:
   a. Short-circuit rating
   b. Voltage
   c. Continuous current
   d. Basic Impulse Level
10. Major component ratings including:
   a. Voltage
   b. Continuous current
   c. Interrupting ratings

11. Cable terminal sizes

C. Where applicable or required by the Engineer the following additional information shall be submitted to the Engineer:
   1. Bus duct connection
   2. Connection details between close-coupled assemblies
   3. Composite floor plan of close-coupled assemblies
   4. Electrical schematic diagram
   5. Key interlock scheme drawing and sequence of operations
   6. Descriptive bulletins
   7. Product data sheets

1.05 SUBMITTALS – FOR CONSTRUCTION

D. The following information shall be submitted for record purposes:
   1. Final as-built drawings and information for items listed in Paragraph 1.04, and shall incorporate all changes made during the manufacturing process
   2. Wiring diagrams
   3. Certified production test reports
   4. Installation information including equipment anchorage provisions
   5. Seismic certification as specified

1.06 QUALIFICATIONS

A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
D. Provide Seismic tested equipment as follows:
   1. The equipment and major components shall be suitable for and certified by actual seismic testing to meet all applicable seismic requirements of the [latest International Building Code (IBC)] [latest California Building Code (CBC) with OSHPD Amendments]. [The equipment shall have OSHPD Special Seismic Certification (OSP) Pre-Approval.]
   2. The Project Structural Engineer will provide site specific ground motion criteria for use by the manufacturer to establish SDS values required.
   3. The IP rating of the equipment shall be 1.5
   4. The Structural Engineer for the Site will evaluate the SDS values published on the [Manufacturer's] [OSHPD] website to ascertain that they are "equal to" or "greater than" those required for the Project Site.
   5. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.
      a. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed civil engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon the above criteria to verify the seismic design of the equipment.
      b. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
      c. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

1.07 REGULATORY REQUIREMENTS

1.08 DELIVERY, STORAGE AND HANDLING
   D. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.
   E. Each switchgear assembly shall be split into shipping groups for handling as indicated on the drawings or per the manufacturer's recommendations. Shipping groups shall be designed to be shipped by truck, rail or ship. Shipping groups shall be bolted to skids. Accessories shall be packaged and shipped separately. Each switchgear shipping group shall be equipped with lifting eyes for handling solely by crane.

1.09 OPERATION AND MAINTENANCE MANUALS
   D. Equipment operation and maintenance manuals shall be provided with each assembly shipped, and shall include instruction leaflets and instruction bulletins for the complete assembly and each major component.

* Note to Spec. Writer – Optional
PART 2 PRODUCTS

2.01 MANUFACTURERS
D. Eaton
E. __ _______
F. __ _______
The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.02 RATINGS
D. Switchgear assembly ratings shall be as follows:
1. Nominal System Voltage • ___ kV three-phase • [three] [four] wire
2. System Grounding • [solid] [low-resistance] [high-resistance] [ungrounded]
3. Main Cross Bus Continuous Current • [None] [600 A] [1200 A]
   [2000 A for 4.76 kV Assemblies only]

Note to Spec. Writer: Fill in data from table below

<table>
<thead>
<tr>
<th>Table 16361A-1</th>
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</thead>
<tbody>
<tr>
<td>Switchgear Assemblies with 600 or 1200 A Main Bus</td>
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<tr>
<td>Maximum</td>
</tr>
<tr>
<td>Design kV</td>
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<tr>
<td></td>
</tr>
<tr>
<td>4.76</td>
</tr>
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<td>4.76</td>
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<tr>
<td>4.76</td>
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* Note to Spec. Writer – Insert data in blanks
* Note to Spec. Writer – Select one
Note to Spec. Writer: Fill in data below from table:

<table>
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<tr>
<th>Table 16361A-2</th>
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<tr>
<td><strong>NON-FUSED SWITCH RATING</strong></td>
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<tr>
<td>Maximum Voltage</td>
</tr>
<tr>
<td>4.76 or 15</td>
</tr>
<tr>
<td>64</td>
</tr>
<tr>
<td>27 600</td>
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<tr>
<td>600</td>
</tr>
<tr>
<td>38 600</td>
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</table>

10. Non-Fused Switch (Continuous and Load Break) ·____ Amperes
11. Non-Fused Momentary withstand ·____ kA Asym RMS
12. Non-Fused Switch Fault close (3 times minimum, for 4.76 & 15 kV)·____ kA Asymmetrical
13. Non-Fused Switch 2-Second Short Circuit Current ·____ kA Sym RMS

Note to Spec. Writer – Insert data in blanks
### Table 16361A-3

FUSED SWITCH RATING

<table>
<thead>
<tr>
<th>Maximum Voltage kV</th>
<th>Fuse Amper e Rating&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Fuse Type</th>
<th>Fuse Interrupting Rating, kA Sym RMS</th>
<th>Fused Switch Fault Close Rating, kA Asym RMS</th>
<th>Fused Switch 2-sec Withstand</th>
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<td>63</td>
<td>101&lt;sup&gt;a&lt;/sup&gt;</td>
<td>NA</td>
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<td>101&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>CLE</td>
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<td>64&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
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<td>150</td>
<td>CLE</td>
<td>63</td>
<td>101&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
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<td>63</td>
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<sup>a</sup> UL and CSA listed integrated rating with an Eaton CLE fuse.

<sup>b</sup> Fuse ampere rating is maximum for the fuse “frame size.” 5 kV ranges: 10-450, and 600-750. 15 kV ranges: 10-300. 27 kV ranges: 0.5-100. 38 kV ranges: 20-80.
<table>
<thead>
<tr>
<th>Maximum Voltage kV</th>
<th>Fuse Ampere Rating(^c)</th>
<th>Fuse Type</th>
<th>Fuse Interrupting Rating, kA Sym RMS</th>
<th>Fused Switch Fault Close Rating, kA Asym RMS</th>
<th>Fused Switch 2- Sec Withstand</th>
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<tr>
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<td>26.8</td>
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</tbody>
</table>

\(^c\) – Fuse ampere rating is maximum for the fuse “frame size.” RBA200 range: 10 to 200, RBA400 range: 0.5-400 for 5 & 15 kV Class, 0.5-300 for 27 & 38 kV Class; RBA800 range: 0.5-720 amperes for 5 & 15 kV Class, 0.5 to 540 for 27 & 38 kV Class.
2.03  5 AND 15 kV CONSTRUCTION

D. The metal-enclosed load interrupter switchgear shall consist of deadfront, completely metal-enclosed vertical sections containing load interrupter switches and fuses (where shown) of the number, rating and type noted on the drawings or specified herein.

E. The following features shall be supplied on every vertical section containing a three-pole, two-position open-closed switch:

1. A minimum 8-inch x 16-inch high-impact viewing window that permits full view of the position of all three switch blades through the closed door. The window shall not be more than 58-inches above the switch pad level to allow ease of inspection.

2. The door shall be interlocked with the switch so that:
   a. The switch must be opened before the door can be opened.
   b. The door must be closed before the switch can be closed.

3. A hinged grounded metal barrier that is bolted closed in front of every switch to prevent inadvertent contact with any live part, yet allows for a full-view inspection of the switch blade position.

4. Provision for padlocking the switch in the open or closed position.

5. Green OPEN, Red CLOSED switch position indicators with the words “Open” and “Closed” in French, Spanish and English.

6. A hinged cover with rustproof quarter turn nylon latches over the switch operating mechanism to discourage casual tampering.

7. The switch shall be removable from the structure as a complete operational component.

F. Vertical section construction shall be of the universal frame type using die-formed and bolted parts. All enclosing covers and doors shall be fabricated from steel with thickness equal to or greater than that specified in ANSI/IEEE C37.20.3. No owner removable hardware for covers or doors shall be thread-forming type. To facilitate installation and maintenance of cables and bus in each vertical section, a split removable top cover and [split removable rear covers with rustproof nylon handles] [padlockable hinged rear door held closed by bolts] shall be provided. A G90 grade galvanized base shall isolate equipment from contact with the concrete pad providing protection from rust. Heavy-duty hot dipped galvanized anchor clips shall be provided to anchor the switchgear to the concrete pad.

G. Each vertical section containing a switch shall have a single, full-length, flanged front door and shall be equipped with two (2) rotary latch-type padlockable handles. Provision shall be made for operating the switch and storing the removable handle without opening the full length door.

H. Each load interrupter switch shall have the following features:

1. Three-pole gang-operated mechanism.

2. Manual quick-make, quick-break over-toggle-type mechanism that does not require the use of a chain or a cable for operation, and utilizes a heavy-duty coil spring to provide opening and closing energy.

* Note to Spec. Writer – Select one
3. The speed of opening and closing the switch shall be independent of the operator, and it shall be impossible to tease the switch into any intermediate position under normal operation.

4. Separate main and break contacts to provide maximum endurance for fault close and load interrupting duty.

5. Insulating barriers between each phase and between the outer phases and the enclosure.

6. A maintenance provision for slow closing the switch to check switch blade engagement and slow opening the switch to check operation of the arc interrupting contacts.

--- OR ---

2.03 27 AND 38 kV CONSTRUCTION

A. The metal-enclosed load interrupter switchgear shall consist of deadfront, completely metal-enclosed vertical sections containing load interrupter switches and fuses (where shown) of the number, rating and type noted on the drawings or specified herein.

B. The following features shall be supplied on every vertical section containing a three-pole, two-position open-closed switch:

   1. A high-impact viewing window that permits full view of the position of all three switch blades through the closed door.

   2. The door shall be interlocked with the switch so that:

      a. The switch must be opened before the door can be opened.

      b. The door must be closed before the switch can be closed.

   3. A hinged grounded metal barrier that is bolted closed in front of every switch to prevent inadvertent contact with any live part, yet allows for a full-view inspection on the switch blade position.

   4. Provision for padlocking the switch in the open or closed position.

   5. Green OPEN, Red CLOSED switch position indicators with the words “Open” and “Closed” in French, Spanish and English.

   6. A hinged cover with over the switch operating mechanism to discourage casual tampering.

C. Vertical section construction shall be of the universal frame type using die-formed and bolted parts. All enclosing covers and doors shall be fabricated from steel whose thickness shall be equal to or greater than those specified in ANSI/IEEE C37.20.3. To facilitate installation and maintenance of cables and bus in each vertical section, a removable top cover and [split removable rear covers with rustproof nylon handles] [hinged rear door latched closed by tamper-resistant padlockable latches] shall be provided.

D. Each vertical section containing a switch shall have a single, full-length, flanged front door and shall be equipped with two (2) rotary latch-type padlockable handles. Provision shall be made for operating the switch and storing the removable handle without opening the full length door.

E. Each load interrupter switch shall have the following features:

* Note to Spec. Writer – Select one
1. Three-pole gang-operated mechanism
2. Manual quick-make, quick-break over-toggle-type mechanism that does not require the use of a chain or a cable for operation, and utilizes a heavy-duty coil spring to provide opening and closing energy
3. The speed of opening and closing the switch shall be independent of the operator, and it shall be impossible to tease the switch into any intermediate position under normal operation
4. Separate main and break contacts to provide maximum endurance for fault close and load interrupting duty
5. Insulating barriers between each phase and between the outer phases and the enclosure
6. A maintenance provision for slow closing the switch to check switch blade engagement and slow opening the switch to check operation of the arc interrupting contacts

2.04 BUS

D. All phase bus conductors shall be [tin-plated copper] [silver-plated copper].
E. Ground bus shall be silver plated copper and be directly fastened to a galvanized metal surface of each vertical section, and be of a size sufficient to carry the rated (2-second) current of the switchgear assembly.
F. A neutral bus shall be provided only when indicated on the drawings. It shall be insulated for 1000 Vac to ground. The current rating of the neutral bus shall be 600 amperes.

2.05 BUS INSULATION SYSTEM

D. All bus shall be supported utilizing a high strength and high creep support providing 10.5-inch of creep distance between phases and ground. The molded fins shall be constructed of high track resistant [aramid nylon] [silicone rubber] [cycloaliphatic epoxy].
E. All standoff insulators on switches and fuse mountings shall be [glass polyester] [cycloaliphatic epoxy] (for 5kV and 15kV class switchgear) [polykeram] [cycloaliphatic epoxy] (for 27 and 38 kV classes).

2.06 WIRING/TERMINATIONS

D. One (1) terminal pad per phase shall be provided for attaching contractor-supplied cable terminal lugs for a maximum of two (2) conductors per phase of the sizes indicated on the drawings. Sufficient space shall be allowed for contractor supplied electrical stress relief termination devices.
E. Small wiring, fuse blocks and terminal blocks within the vertical section shall be furnished as indicated on the drawings. Each control wire shall be labeled with wire markers. Terminal blocks shall be provided for owner’s connections to other apparatus.

* Note to Spec. Writer – Select one
2.07 FUSES
   D. Fault protection shall be provided by fuses with continuous ratings as shown in the contract documents. Any fuse/switch integrated momentary and fault close ratings specified shall have been verified by test and UL and CSA certified.

2.08 UTILITY METERING
   D. Where indicated on the drawings, each utility metering vertical section shall contain provisions for current transformers and voltage transformers as required by the utility. The construction shall conform to the utility company’s metering standards. It shall also conform to the general electrical and construction design of the switchgear specified above.

2.09 OWNER METERING
   D. Where indicated on the drawings, provide [a separate owner metering vertical structure with a front hinged door to provide safe isolated access to meters and all associated terminal and fuse blocks for maintenance, calibration or testing while the gear is energized] [owner metering in the switch structure on a hinged panel to provide safe isolated access to meters and all associated terminal and fuse blocks for maintenance, calibration or testing while the gear is energized].
   E. Provide ring-type current transformers for each meter. Current transformers shall be wired to shorting-type terminal blocks.
   F. Provide voltage transformers including primary fuses and secondary protective devices for metering as shown on the drawings.
   G. Microprocessor-Based Metering System.
      Note to Spec. Writer:
      Select devices as required for Paragraph 2.09 D.
      Refer to Section 16901 for detailed specification for metering.
   H. Web-Enabled Communications
      1. Where indicated on the drawings, provide a separate compartment with a front facing hinged door as a central point of connection for all internally located communicating devices to an external Ethernet network and allow monitoring of the power infrastructure with real-time, web-enabled data.
      2. The compartment shall have a lockable, hinged door with a functional through-the-door RJ45 network access port. Power for the components in the compartment shall be supplied by a pre-wired, bus-connected control transformer in the compartment that is fused and has a disconnecting means.
      3: The included communications components shall be a [Power Xpert Ethernet Switch(es)] [Power Xpert Gateway(s)], which [is] [are] specified in Section 16911 Communication equipment, where indicated on the drawings, shall have the following features:
         a. The communication system network shall be Eaton type PowerXpert Architecture
         b. Each load interrupter switch position (open and closed), where shown, shall be communicated via an addressable relay. This relay shall communicate over the

* Note to Spec. Writer – Optional
****ork. The relay shall monitor an auxiliary switch contact that monitors the primary switch position and shall be rated for the application. Each relay shall have a unique address so that it is possible to “call up” and “read” each load interrupter switch’s position from a host computer.

c. A blown high voltage fuse condition on each set of three (3) fuses shall be monitored by an addressable relay. Any blown fuse operation shall be communicated immediately over the network via the monitoring addressable relay. Each relay shall have a unique address so that it is possible to “call up” and “read” a fuse blown operation for a set of fuses with the communication system.

d. The manufacturer shall wire between all communication capable devices within the switchgear, including electronic meters with the same protocol and wire to a set of easily accessible terminal blocks.

e. Control power for addressable relays shall be 120 volts, 60 Hz available [from a fused control transformer] [from an external source as shown on the drawings].

2.10 ACCESSORIES

D. Supply key interlocks as shown on the drawings.

E. Furnish [station] [distribution] class surge arresters with ratings in accordance with manufacturer’s recommendations.

2.11 MISCELLANEOUS DEVICES

D. Motor operators, where indicated on the drawings, shall have the following features:

1. All motor-operated switches shall consist of a standard manually-operated switch in combination with an electric motor driven linear actuator, which charges the spring. Connection between the linear actuator and switch mechanism shall be by reliable rigid metal-to-metal linkages; not chains or cables. The linear actuator and all associated low voltage wiring shall be located in a low voltage compartment or barriered to separate it from the high voltage.

2. Operating voltage shall be 120 volts, 60 Hz available [from a fused control transformer] [from an external source as shown on the drawings]. The switch shall be capable of manual operation should a loss of control power be encountered.

3. The linear actuator shall be a highly repetitively manufactured item, completely sealed and weather protected, and designed for rugged industrial application. No lubrication or adjustments shall be necessary for its normal operating life. The motor shall be equipped with an automatically reset thermal overload protector.

4. Motor operator shall be easily removable for maintenance purposes.

2.12 ENCLOSURES

* Note to Spec. Writer – Optional
* Note to Spec. Writer – Select one
A. Enclosures shall be constructed per IEEE/ANSI C37.20.3 indoor specifications. (Meets or exceeds NEMA 1.)

B. Each vertical section shall be ventilated at the top and bottom, both front and rear, to allow airflow to provide cooling and to help prevent buildup of moisture within the structure.
   -- "OR --

A. Enclosures shall be constructed per IEEE/ANSI C37.20.3 Outdoor specifications. (Exceeds NEMA 3R.)

B. Each vertical section shall have a sloped weatherproof roof with labyrinth shaped joints. Use of gasket or caulking to make roof joints weatherproof shall not be permitted. All exterior openings shall be screened to prevent the entrance of small animals and barred to inhibit the entrance of snow, sand, etc. A minimum of one (1) 250-watt, 120-volt space heater shall be provided in each vertical section. Power for the space heater(s) shall be furnished as indicated on the drawings.

C. Each vertical section shall be ventilated at the top and bottom, both front and rear, to allow airflow to provide cooling and help prevent buildup of moisture within the structure. The ventilated covers shall be externally removable to allow safe maintenance of the filter media without providing access to live parts.

D. ‘Enclosure shall be Dust Resistant. All ventilated openings shall be filtered to inhibit the ingress of dust. The ventilated covers shall be externally removable to allow safe maintenance of the filter media without providing access to live parts. All external doors and covers shall be gasketed.

2.13 NAMEPLATES

D. A nameplate shall be mounted on the front door of each switch vertical section in accordance with the drawings.

2.14 FINISH

D. Prior to assembly, all enclosing steel shall be thoroughly cleaned and phosphatized. A powder coating shall be applied electrostatically, then fused-on by baking in an oven. The coating is to have a thickness of not less than 1.5 mils. The finish shall have the following properties:

   Impact resistance (ASTM D-2794) 60 direct/60 indirect
   Pencil hardness (ASTM D-3363) H
   Flexibility (ASTM D-522) Pass 1/8-inch mandrel
   Salt spray (ASTM B117-85 [20]) 600 hours
   Color ANSI 61 gray

2.15 SPECIAL SWITCHGEAR CONFIGURATIONS

D. ‘Non-Loadbreak Selector Switches

* Note to Spec. Writer – Select one
* Note to Spec. Writer – Optional
1. For 5 or 15 kV ratings, furnish a two-position non-loadbreak selector switch for the selection of two incoming sources in series with the load break MVS switch where shown on contract drawing. The selector switch shall have the same continuous current rating as the load interrupter switch in the same structure. Interlocking shall be supplied so that the selector switch can only be operated with the load interrupter switch in the open position. Neither the main door nor the load interrupter switch shall be able to be closed without the selector switch being positively locked in one of the two source positions.

E. "Duplex Switchgear Assembly"

1. Furnish, where shown on the drawings, a duplex switchgear assembly configuration consisting of two (2) load interrupter switches with common load side bus to feed one load circuit, which shall be fused or unfused as indicated on the drawings. Key interlocks shall be supplied to prevent paralleling the incoming sources, and to prevent opening the front door of each vertical section containing one of the two switches unless both switches are locked open.

2.16 "AUTOMATIC TRANSFER CONTROL – TWO-SWITCH AUTOMATIC TRANSFER CONTROL WITH COMMON LOAD BUS"

A. Furnish, where shown on the drawings, a switchgear assembly with microprocessor-based automatic transfer control system for two (2) main switches with a common load bus. The system shall consist of the two (2) switches with motor operators as herein specified, and an integrated microprocessor-based automatic transfer control system containing sensing devices, low voltage logic control, and auxiliary equipment, as indicated on the drawings and specified here. The automatic transfer control system, when placed in the "automatic" mode, shall automatically transfer the load bus circuit to the alternate or standby power source upon failure of the preferred normal source.

B. The basic sequence of operation based upon two normally energized sources shall be as follows.

1. Normal operation shall be with the preferred source main switch closed and standby main switch open.

2. Upon detection of an undervoltage to the line side of the preferred main switch and after a field adjustable time delay, that main switch shall open and after an additional field adjustable time delay, the standby switch shall close restoring power to the facility.

3. The system shall return to the normal preferred source in an open transition manner. Upon restoration of voltage to the line side of the preferred main switch and after a field adjustable time delay, the standby main switch shall open and after a field adjustable time delay the preferred main switch shall close.

C. The logic of the transfer shall function via a microprocessor controller equal to Eaton type ATC-600 with the following features.

1. The set points shall be field adjustable without the use of special tools.

2. LED lights shall be included on the controller to show:
   a. Normal Source Available
   b. Standby Source Available

* Note to Spec. Writer – Optional
c. Normal Source Connected

d. Standby Source Connected

e. Load Energized.

2. A digital readout shall display each option as it is functioning. Readouts shall display actual line-to-line voltage, line frequency and timers. When timers are functioning, the microprocessor shall display the timer counting down. All set points shall be re-programmable from the front panel of the controller when it is in the program mode. In addition, the controller shall display date, time and reason of last 16 transfers; Normal source and standby source runtime/available time/connect time; Load Energized time and set points of timers, voltage pickup and dropout set points.

3. The controller shall be equipped with a communications card which will allow it to communicate over the Eaton Power Xpert Architecture. All values and historical data that are displayed locally shall be available via communications.

4. The transfer system shall include the following additional features:

a. A time delay transfer from the normal power source to the standby power source and from the standby power source to the normal source, forcing a neutral position to ensure the load voltage has decayed before reconnecting to the source from which the load is to be fed (0 seconds to 30 minutes)

b. A time delay to override a momentary power outage or voltage fluctuation (0 seconds to 120 seconds)

c. A Form C relay contact that changes state when the power is available on the normal source

d. A Form C relay contact that changes state when the power is available on the standby source

e. Complete interlocking to prevent both switches from closing when the system is in either the manual or automatic mode.

f. A preferred source selection (Source 1 or Source 2, or none).

g. Two (2) sets of three-phase “line side” voltage transformers (open delta for 5 kV or 15 kV) with primary fuses and secondary supplementary protectors to provide both sensing and control power

h. One selector switch with automatic and manual positions

i. One (1) open-close control switch for manual electrical operation of each controlled switch

j. One (1) pushbutton to initiate manual retransfer to preferred source when the IQ Transfer Controller is functioning automatically and programmed to “Hold” after transfer.

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2.16 AUTOMATIC TRANSFER CONTROL – THREE SWITCH AUTOMATIC TRANSFER CONTROL WITH TWO MAINS AND NORMALLY OPEN TIE

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* Note to Spec. Writer – Optional
* Note to Spec. Writer – Select one
* Note to Spec. Writer – Optional
A. Furnish, where shown on the drawings, a switchgear assembly with automatic transfer control system for two (2) mains and normally open tie. The automatic transfer switchgear shall consist of a deadfront, metal-enclosed and integrated assembly including two (2) main switches and one (1) tie switch each being driven by a motor operator hereinafter specified, and an integrated automatic transfer control system containing sensing devices, low voltage logic control and auxiliary equipment, as indicated on the drawings. Operation shall be such that upon loss of voltage to the line side of a main, that main shall open and then the tie shall close.

B. The basic sequence of operation based upon two normally energized sources shall be as follows:

1. Normal operation shall be with the main switches closed and the tie switch open.
2. Upon detection of an undervoltage to the line side of a main switch and after a field adjustable time delay, that main switch shall open and after an additional field adjustable time delay, the tie switch shall close restoring power to the affected portion of the facility.
3. The system shall return to the normal source in an open transition manner. Upon restoration of voltage to the line side of the preferred main and after a field adjustable time delay the tie shall open and after a field adjustable time delay the preferred main switch shall close.

1. The transfer system shall include the following:
   a. Time delays upon loss of voltage to either source. (0 seconds to 120 seconds)
   b. Time delays on detection of return of normal voltage (0 seconds to 120 seconds)
   c. Time delays forcing a neutral position to ensure the load voltage has decayed before reconnecting to the source from which the load is to be fed (0 seconds to 30 minutes)
   d. Complete interlocking to prevent all switches from closing when the system is in the manual mode or automatic mode.
   e. Two (2) sets of three-phase “line side” voltage transformers (open delta for 5 kV or 15 kV) with primary fuses and secondary supplementary protectors to provide both sensing and control power.
   f. Two sets of utility grade microprocessor based 27/47 voltage detection.
   g. One selector switch with automatic and manual positions.
   h. One (1) open-close control switch for manual electrical operation of each controlled main and tie device.

PART 3 EXECUTION
3.01 FACTORY TESTING
D. Standard factory tests shall be performed on the equipment under this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards.

E. Factory tests as outlined above shall be witnessed by the owner’s representative.
   1. The manufacturer shall notify the owner two (2) weeks prior to the date the tests are to be performed
   2. The manufacturer shall include the cost of transportation and lodging for up to three (3) owner’s representatives. The cost of meals and incidental expenses shall be the owner’s responsibility

F. The manufacturer shall provide three (3) certified copies of factory test reports.

3.02 FIELD QUALITY CONTROL
   A. Provide the services of a qualified factory-trained manufacturer’s representative to assist the Contractor in installation and startup of the equipment specified under this section for a period of six (6) working days. The manufacturer’s representative shall provide technical direction and assistance to the Contractor in general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained therein.
   B. The Contractor shall provide three (3) copies of the manufacturer’s field startup report.

3.03 MANUFACTURER’S CERTIFICATION
   A. The Contractor shall provide a qualified factory-trained manufacturer’s representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer’s recommendations.
   B. The Contractor shall provide three (3) copies of the manufacturer’s representative’s certification.

3.04 TRAINING
   D. The Contractor shall provide a training session for up to five (5) owner’s representatives for five (5) normal workdays at a job site location determined by the owner.
   E. The training session shall be conducted by a manufacturer’s qualified representative and consist of instruction on the assembly, switches and major components.

3.05 INSTALLATION
   D. The Contractors shall install all equipment per the manufacturer’s recommendations and the contract drawings.
   E. All necessary hardware to secure the assembly in place shall be provided by the Contractor.

3.06 FIELD ADJUSTMENTS

* Note to Spec. Writer – Optional
* Note to Spec. Writer – Insert data in blanks
3.07 FIELD TESTING