SECTION 26 24 00

Liebert® RXV™

GUIDE SPECIFICATIONS

# GENERAL

## SUMMARY

* + 1. These specifications describe requirements for a small-footprint remote power panel, supplying power to sensitive loads. The panel shall provide distribution, control and monitoring of AC power. It shall include all equipment to properly interface the AC power source with the intended load.

## Definitions

* + 1. RPP: Remote Power Panel
    2. RFI: Radio-Frequency Interference
    3. EMI: Electromagnetic Interference
    4. SPD: Surge Protection Device

## STANDARDS

### The specified system shall be designed, manufactured, tested, and installed in compliance with:

* + - 1. American National Standards Institute (ANSI)
      2. Canadian Standards Association (CSA)
      3. Institute of Electrical and Electronics Engineers (IEEE)
      4. ISO 9001
      5. National Electrical Code (NEC - NFPA 70)
      6. National Electrical Manufacturers Association (NEMA)
      7. National Fire Protection Association (NFPA 75)
      8. Underwriters Laboratories (UL)

### The system shall be UL listed under UL 62638 Standard for Information Technology.

### The system shall comply with latest FCC Part 15 EMI emission limits for Class A computing devices.

### The RPP system safely withstand without misoperation or damage:

* + - 1. Transient voltage surges on the AC power input as defined by standard EN 61000-4-5 for Category B3 locations (industrial and commercial facilities with high surge exposure),
      2. Electrostatic discharges (ESD) up to 8kV at any point on the exterior of the unit as defined by standard EN 61000-4-2
      3. Electromagnetic fields from portable transmitters within 9 ft. (3m) of the unit as defined by standard EN 61000-4-3.

## Submittal DOCUMENTATION requirements

### Furnish documentation associated with this bid proposal and Contract including submittals, shop drawings, O&M manuals, and test reports as follows:

#### Submit documents in portable document format (PDF).

### Provide a Compliance Review of the Specifications, Drawings and Addenda. The Compliance Review is a paragraph-by-paragraph review of the Specifications with the following information: “C”, “D” or “E” marked in the margin of the original Specifications and any subsequent Addenda. “C”, “D”, “E” to be completed for all specs, including reference specs.

#### “C”: Comply with no exceptions.

#### “D”: Comply with deviations. For every deviation, provide a numbered footnote with reasons for the proposed deviation and how the intent of the Specification can be satisfied.

#### “E”: Exception, do not comply. For every exception, provide a numbered footnote with reasons and possible alternatives.

### SUBMITTALS

#### Product Data: For each type of RPP, overcurrent protective device, SPD, accessory, and component indicated, include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

#### Shop Drawings: For each power distribution unit and related equipment, include the following:

##### Dimensioned drawings with elevations, sections, and details.

##### Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

#### Users’ Manual - The manufacturer shall furnish an installation/users’ manual with installation, start-up, operation, and maintenance instructions for the specified system.

## SEISMIC Requirements (OPTIONAL – DELETE IF NOT REQUIRED)

* + 1. The equipment shall be constructed to meet the following seismic design criteria as defined in the applicable building code. The equipment provider shall submit details of the required supports, anchors, and restraints with the associated reactions for installation for the following defined parameters:
       1. Site Coefficients SDS: (up to .325)
       2. Site Structural Occupancy / Risk Category: (I) (II) (II)
       3. Z/H height factor: (1.0)
       4. Importance Factor: (1.5)
       5. Design Category: (A) (B) (C) (D)
    2. Seismic Floor Stand (Optional)
       1. Floor Stand shall be furnished to support, level the unit and to provide bottom cabling access without relying upon a raised floor for support. The height of the floor shall accommodate a range of: (9.75-14.25”) (13.75-18.25”) (17.5-24.5”) (23.5-30.5”) (29.5-36.5”) (35.5-42.5”).
       2. The floor stand shall offer micro-adjustments to maximize height variances within the range specified above.
       3. The seismic floor stand shall include brackets to provide seismic restraint for the RPP as described in Section 13.2.1.2 of ASCE/SEI 7-05. Based on structural analysis by a design professional, the anchoring hardware provides a solution in compliance with the International Building Code (IBC) 2015, Section 1613, ASCE 7-10:2017, and the California Building Code (CBC) 2016.
    3. Seismic Anchor Kit (Optional)
       1. The seismic anchoring kit shall include brackets to provide seismic restraint for the RPP as described in Section 13.2.1.2 of ASCE/SEI 7-05. Based on structural analysis by a design professional, the anchoring hardware provides a solution in compliance with the International Building Code (IBC) 2015, Section 1613, ASCE 7-10:2017, and the California Building Code (CBC) 2016.

## QUALITY ASSURANCE

* + 1. Manufacturer’s Qualifications
       1. The manufacturer shall have a minimum of 40 years’ experience in the design, manufacture and testing of RPP’s.
       2. The quality system for the engineering and manufacturing facility shall be certified to conform to Quality System Standard ISO 9001 for the design and manufacture of power protection systems for computers and other sensitive electronics.
       3. The specified system shall be factory-tested before shipment. Testing shall include but shall not be limited to: Quality Control Checks, “Hi-Pot” Test (per UL requirements) and Metering Calibration Tests.
       4. The manufacturer shall be ISO 9001 certified.

## DELIVERY, STORAGE, AND HANDLING

### Storage Temperatures: -67° to +185°F (-55° to +85°C).

### Store indoors in clean dry space (30-55% relative humidity) with uniform temperature to prevent condensation. Protect from exposure to dirt, fumes, water, corrosive substances, and physical damage.

* + 1. Storage/Transport Altitude: Up to 40,000 ft. (12,200m) above Mean Sea Level.
    2. Handle RPPs per NEMA PB 2.1, NECA 400 and manufacturer’s written instructions. Handle carefully to avoid damage to RPP internal components, enclosure, and finish.

## Environmental Requirements

* + 1. Equipment must be rated for continuous operation under the following conditions, unless otherwise indicated:
       1. Operating Ambient Temperature:
          1. Under normal operation: not to exceed 104 degrees F (40 degrees C)
       2. Operating Altitude above mean sea level:
          1. <3,300 feet (1,000 m) at full capacity rating and at 40C operating temperature
          2. 3,301 - 4,000 feet (1,200 m) at 99.5% capacity rating or reduce operating temperature to 39C
          3. 4,001 – 5,000 feet (1,500 m) at 99.0% capacity or reduce operating temperature to 37.5C
          4. 5,001 – 6,000 feet (1,829 m) at 98.5% capacity or reduce operating temperature to 36C
          5. 6,001 – 6,600 feet (2,000 m) at 98.1% capacity or reduce operating temperature to 34.6C
       3. Operating Relative Humidity: 0% to 95%, non-condensing.
       4. Operating Audible Noise level: Under normal operation noise level shall not exceed 45dBA.

## Spare Parts

* + 1. A list of recommended spare parts shall be supplied at the customer’s request.
  1. WARRANTY
     1. The manufacturer shall provide a warranty against defects in material and workmanship for 12 months after initial startup or 18 months after shipping date, whichever occurs first. (Refer to the Warranty Statement for details.)

# PRODUCT

## MANUFACTURERS

### Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include the following:

#### Liebert (Vertiv)

## ratings / electrical requirements

#### Input / Output Frequency: 60Hz +/-5Hz

#### Input Amperage: (250A) (400A)

#### Input Voltage: (415/240V, 50Hz) (400/230V, 50Hz) (380/220V, 50Hz) (208/120V, 60Hz) (415/240V, 60Hz) (400/230V, 60Hz) (480/277V, 60Hz) volts AC, three-phase, four-wire-plus-ground, solidly wye configuration

#### Maximum Inrush Current: (shall not exceed 10X NFLA) (Low Inrush required, 5X NFLA maximum)

#### RPP System Withstand Rating: Units shall carry a (25kA) (35kA) standard short circuit withstand rating without the use of fuses. Withstand ratings shall be tested and certified; a label shall be applied to the unit clearly identifying this rating as required by the National Electric Code.

## COMPONENTS

### Frame Construction and Enclosure

* + - 1. The frame shall be constructed of galvanized steel to provide a strong substructure. The cabinet shall be a NEMA Type 1 enclosure and meet IP20 requirements. The unit shall have a lockable, removable, hinged door. The unit shall have top and bottom input/output cable trays with a minimum of 84 cable/conduit openings. All service shall be capable of being performed with access to the front. Retrofitting additional power distribution cables shall require access to the front of the unit only. Hinged door shall provide access to the main panelboard circuit breaker and to all output circuit breakers. The color of the exterior door and panels shall be the manufacturer’s standard color, black-gray matte.
      2. The unit shall have removable input and output conduit plates on the top and bottom of the RPP. Pre-punched cable/conduit openings shall be provided for each output panelboard.
      3. All service shall be capable of being performed with access to the front and top only.
         1. A tool shall be required to remove the panels which access the hazardous voltage area of the unit.
      4. The unit shall have lockable, removable, hinged front doors made of sheet metal construction.
         1. A one-point latch with key lock is provided for security. Doors shall provide access to the main input circuit breaker and to all output circuit breakers.
         2. To ensure grounding integrity and for static protection and EMI/RFI shielding, the removable exterior panel with HMI/Display shall be grounded to the frame by way of stranded copper wire.
         3. Doors and side panels shall be manufacturer’s standard color, black-gray matte (ZP-7021). Optional custom painting to match or accent the data processing equipment shall be available.
      5. The unit shall be naturally convection-cooled. No fans for forced-air cooling system shall be used. The convection cooling method shall allow continuous full-load operation without activation of overtemperature circuits. For heat rejection, the RPP shall utilize an inverted conduit plate with solid top and vented sides. The solid top shall prohibit entry of foreign materials.
      6. The cabinet dimensions shall be a maximum of 24 in. wide by 13 in. deep by 78.7 in. high (610 x 328mm x 2000). The weight shall be 225 lb. (102 kg). The Liebert RXV must be back supported by column, Unistrut, or wire cage or two units can be installed back-to-back as a single unit that is a drop-in replacement for a 24 in. x 24 in. (610 x 610mm) raised floor tile.

### Main Input Circuit Breaker

### Input Power Connections

* + - * 1. Copper bus bars for 2-hole lugs shall be provided on the line side terminals of the main input circuit breaker for connection of the input power conductors. A copper ground bus bar shall be provided for connection of a parity-sized insulated ground conductor.

### Single Main Input Breaker

### The specified unit shall be equipped with a main input circuit breaker to provide overcurrent protection and a means for disconnecting all power to the unit. The main input circuit breaker shall be a three-pole molded case circuit breaker sized for 125% of the specified full load input current and rated for 600 VAC. The minimum UL-listed interrupting rating for the main input circuit breaker shall be (35,000 RMS) (65,000 RMS) symmetrical amperes at 480 volts AC.

### (Optional) The main input circuit breaker shall include a 24 VDC shunt trip mechanism to interface with unit controls, EPO button and other remote controls as required by the NEC and local codes.

### No Main Panelboard Circuit Breaker

* + - 1. The RPP shall be protected by an upstream circuit breaker. The breaker shall be UL listed and IEC-rated for use at the system voltage. The RPP shall be supplied with no main panelboard breaker.

### Distribution Panelboards

* + - 1. The system shall utilize one vertically mounted (Square D) (ABB) (Siemens) manufactured distribution panelboard for distribution to the intended loads.
      2. IP-2X Touch-safe Distribution (Optional)
         1. The RPP manufacturer shall provide an Enhanced Finger safe IP-2X IEC 60529 certified NQ panelboard solution manufactured by Square D. Square D’s Enhanced Finger safe panelboards greatly reduces risk when workers attempt to work on an energized panel per OSHA CFR 1910.333(a)(1) guidelines. The panelboard must utilize off-the-shelf branch circuit breakers available locally or via distribution to assure uptime and flexibility onsite.
      3. The panelboard shall be protected with a hinged accent panel which requires a tool for accessing.
      4. The panelboard shall have a rating of (250) (400) amperes, with an interrupting rating of 22kA RMS at 240/120 VAC minimum.
      5. The panelboard shall provide a total of (42) (54) (84) branch circuit breaker positions and (10kAIC) (22kAIC) (35kAIC with [ABB] [Square D] panelboard main breaker) rated branch circuit breakers must be used.
      6. Each panelboard shall include separate isolated neutral and safety ground busbars for the neutral and safety-ground connections to match the number of output circuits. The neutral busbar and wiring shall be sized for at least 1.73 times the panelboard’s full load rating to accommodate high harmonic neutral currents associated with single-phase nonlinear loads.
      7. Each panelboard shall have removable output cable landing plates.

## ACCESSORIES (OPTIONAL COMPONENTS)

* + 1. Emergency Power Off (EPO) (Delete either bullet point 1 or 2)
       1. The local EPO shall include a covered Emergency Power Off (EPO) push button.
          1. Pressing the EPO switch shall immediately shut down the unit by activating the shunt trip of the main input circuit breaker.
          2. As part of the EPO circuit, an interface shall also be provided for connecting one or more normally open or normally closed remote EPO switches to the EPO circuit.
          3. For flexibility in meeting shutdown control schemes, the local EPO (unit shutdown) circuit shall be isolated from the remote EPO (room shutdown) circuit.
          4. The remote EPO circuit shall be designed to allow direct connection of multiple units with single and multiple shutdown control contacts.
       2. A local EPO shall not be included.
          1. An interface shall be provided to connecting one or more Normally Open or Normally Closed remote EPO switches which can be used to remotely shunt trip the main input breaker.

## POWER MONITORING (MAINS and DISTRIBUTION)

### The monitoring system shall monitor the current and voltage of the panelboard main circuit breaker using 9.0” color touchscreen display with bezel. The bezel shall include a power and alarm LED strip and audible alarm speaker. It will display all the power parameters and alarms listed in this section. The display shall be mounted on the exterior of the front door.

#### These measurements are used for reporting the average RMS current, power and other parameters. The monitor will report alarms and status conditions for each circuit breaker.

#### The monitoring system shall detect load loss at the branch breaker without the use of branch circuit aux contacts.

#### The monitoring system shall provide waveform captures on Overcurrent, Overvoltage, and Undervoltage alarms at the main breaker. (optional)

#### The monitoring shall be a customer settable setting to disable the display, power and alarm LED strip and audible alarm speaker.

#### The monitoring system shall be fully configurable from the display, and password protected to prevent unauthorized access.

#### The monitoring system shall monitor and display all the following parameters the panelboard main breaker:

#### Frequency

#### Voltage, Line-to-Line for all three phases

#### Voltage, Line-to-Neutral for all three phases

#### Phase Current

#### Neutral Current

#### Ground Current

#### Current Load for all three phases

#### Real Power (kW)

#### Apparent Power (kVA)

#### Power Factor for all three phases and total

#### Energy

#### Peak Current for all three phases

#### Peak Demand

#### Current Crest Factor (Peak/RMS) for all three phases

#### Current Total Harmonic Distortion (THD) for all three phases

#### Current 3rd, 5th, 7th, & 9th Order Harmonic Distortion Components for all three phases

#### Voltage Total Harmonic Distortion (THD) for all three phases

#### Voltage 3rd, 5th, 7th, & 9th Order Harmonic Distortion Components for all three phases

#### Voltage Total Harmonic Distortion (THD) for all three phases

#### Voltage 3rd, 5th, 7th, & 9th Order Harmonic Distortion Components for all three phases

##### Percent Load

##### Circuit identification and status of each breaker shall be displayed.

#### The display shall monitor and display the following parameters for the panelboard branch breaker:

#### Phase Pole Mapping

#### Phase Current

#### Current Load for all three phases

#### Real Power (kW)

#### Power Factor for all three phases and total

#### Energy

#### Peak Current for all three phases

#### Peak Demand

##### Circuit identification and status of each breaker shall be displayed.

#### The monitoring system shall detect and annunciate by alarm message the following conditions for each panelboard main and panelboard branch breaker:

##### Overvoltage

##### Undervoltage

##### Phase Overcurrent

##### Neutral Overcurrent

##### Ground Overcurrent

##### Frequency Deviation

##### Main Breaker Open (when aux contacts are supplied)

##### Main Breaker Closed (when aux contacts are supplied)

##### Main Breaker Tripped (when bell contacts are supplied)

##### Main Breaker Accessory Error (when aux or bell contacts are supplied)

##### Branch Phase Overcurrent

##### Branch Phase Undercurrent

##### Branch Neutral Undercurrent

##### Branch Load Loss Detected

##### Summary Alarm

#### All alarm thresholds for monitored parameters shall be adjustable by graphical user interface (GUI) and USB port to match site requirements. The factory set points for the alarms shall be as follows:

##### Overvoltage—at least one of the line-to-line voltages exceeds +6% of nominal.

##### Undervoltage—at least one of the line-to-line or line-to-neutral voltages falls below -13% of nominal.

##### Phase Overcurrent Warning—current exceeds 90% of breaker amps.

##### Phase Overcurrent—current exceeds 100% of breaker amps.

##### Neutral Current—current exceeds 95% of breaker amps.

##### Ground Current—current exceeds 5A.

#### Summary Alarm

##### Shall detect and annunciate upon occurrence of any alarm.

#### To facilitate troubleshooting, all alarms shall be stored in non-volatile memory to protect against erasure by a power outage.

#### Alarms shall be manually reset after the alarm condition has been corrected. Alarms can be reset through the Liebert IntelliSlot® card or the display.

## sECTION 2.5 ALTERNATE 1 - power monitoring (Mains only)

### The system shall monitor the current and voltage of the panelboard main circuit breaker using 9.0” color touchscreen display with bezel. The bezel shall include a power and alarm LED strip and audible alarm speaker. It will display all the power parameters and alarms listed in this section. The display shall be mounted on the exterior of the front door.

#### These measurements are used for reporting the average RMS current, power and other parameters. The monitor will report alarms and status conditions for each circuit breaker.

#### The monitoring system shall detect load loss at the branch breaker without the use of branch circuit aux contacts.

#### The monitoring system shall provide waveform captures on Overcurrent, Overvoltage, and Undervoltage alarms at the main breaker. (optional)

#### The monitoring shall be a customer settable setting to disable the display, power and alarm LED strip and audible alarm speaker.

#### The monitoring system shall be fully configurable from the display, and password protected to prevent unauthorized access.

#### The monitoring system shall monitor and display all the following parameters the panelboard main breakers:

#### Frequency

#### Voltage, Line-to-Line for all three phases

#### Voltage, Line-to-Neutral for all three phases

#### Phase Current

#### Neutral Current

#### Ground Current

#### Current Load for all three phases

#### Real Power (kW)

#### Apparent Power (kVA)

#### Power Factor for all three phases and total

#### Energy

#### Peak Current for all three phases

#### Peak Demand

#### Current Crest Factor (Peak/RMS) for all three phases

#### Current Total Harmonic Distortion (THD) for all three phases

#### Current 3rd, 5th, 7th, & 9th Order Harmonic Distortion Components for all three phases

#### Voltage Total Harmonic Distortion (THD) for all three phases

#### Voltage 3rd, 5th, 7th, & 9th Order Harmonic Distortion Components for all three phases

#### Voltage Total Harmonic Distortion (THD) for all three phases

#### Voltage 3rd, 5th, 7th, & 9th Order Harmonic Distortion Components for all three phases

##### Percent Load

##### Circuit identification and status of each breaker shall be displayed.

### All three phases of the three-phase parameters shall be displayed simultaneously. All voltage and current parameters shall be monitored using true RMS measurements for accurate representation of non-sinusoidal waveforms typical of computers and other sensitive loads.

### The monitoring system shall detect and annunciate by audible alarm and alarm message the following conditions:

##### Overvoltage

##### Undervoltage

##### Phase Overcurrent

##### Neutral Overcurrent

##### Ground Overcurrent

##### Frequency Deviation

##### Main Breaker Open (when aux contacts are supplied)

##### Main Breaker Closed (when aux contacts are supplied)

##### Main Breaker Tripped (when bell contacts are supplied)

##### Main Breaker Accessory Error (when aux or bell contacts are supplied)

##### Summary Alarm

### All alarm thresholds for monitored parameters shall be adjustable by graphical user interface (GUI) or USB Port to match site requirements. The factory setpoints for the alarms shall be as follows:

##### Overvoltage—at least one of the line-to-line voltages exceeds +6% of nominal.

##### Undervoltage—at least one of the line-to-line or line-to-neutral voltages falls below -13% of nominal.

##### Phase Overcurrent Warning—current exceeds 90% of breaker amps.

##### Phase Overcurrent—current exceeds 100% of breaker amps.

##### Neutral Current—current exceeds 95% of breaker amps.

##### Ground Current—current exceeds 5A.

#### Frequency Deviation - output frequency exceeds ±0.5Hz of nominal.

### To facilitate troubleshooting, all alarms shall be stored in (non-volatile) memory until reset to protect against erasure by a power outage. Alarms shall be able to be manually reset after the alarm condition has been corrected either at the unit or by way of the central monitoring system.

### Custom Alarm Annunciation

#### The monitoring system shall be capable of providing alarm annunciation for up to two contact closures (two N.O. and two N.C.).

#### A custom alarm message up to 20 characters shall be provided for each contact.

#### Alarm messages shall be programmable by the GUI or USB port to match site requirements.

### Summary Alarm Contact

#### A Form C (1 N.O. and 1 N.C.) Summary Alarm Contact shall be provided for remote alarm status. The contacts shall change state upon occurrence of any alarm and shall rest upon alarm silence.

### Control Panel / Display

#### The RPP shall be provided with a microprocessor-based control panel for operator interface (may also be referred to as user interface, or UI) to configure and monitor the RPP. The control panel shall be located on the front of the unit where it can be operated without opening the hinged front door.

#### A 9.0”, backlit, menu-driven, full-graphics, color touchscreen liquid crystal display shall be used to display system information, metering information, a one-line diagram of the RPP, active events and event history.

#### No mechanical push buttons shall be used to control the interface. Mechanical EPO push buttons are acceptable.

#### Control Panel Logic

##### RPP system logic and control programming shall reside in a microprocessor-based control system with nonvolatile flash memory.

##### System control logic shall utilize high-speed digital signal processors (DSPs). CANbus shall be used to communicate between the logic and the User Interface as well as the options.

##### Switches, contacts and relays shall be used only to signal the logic system as to the status of mechanical devices or to signal user control inputs. Customer external signals shall be isolated from the UPS logic by relays or optical isolation.

### Remote Monitoring Communication

#### Two Liebert IntelliSlot® ports shall be provided to allow communication to remote monitoring systems using Liebert IntelliSlot cards.

##### Equipped RDU101 Cards, for remote communication, can use up to two of the following protocols: HTTP/HTTPS, Vertiv Protocol, Email, SMS, SNMP v1/v2c/v3, BACnet IP and Modbus TCP output. BACnet/MSTP and Modbus/RTU support will require a USB to RS-485 adapter. The adapter is available as an accessory.

###### Note: Two of the 3rd party protocols (SNMP, Modbus or BACnet) may be configured and used simultaneously.

## section 2.4 alternate 2 – no power monitoring

### No Power Monitoring (Delete option 1 or 2)

* + - 1. The system shall be provided with no monitoring options.
      2. The system shall be provided with Emergency Power Off (EPO) circuits only.

1. EXECUTION
   1. PACKAGING AND SHIPPING
      1. The manufacturer shall have tested the packaging to ISTA 3B testing, which will provide adequate packaging to ensure there is no damage to the unit(s) while in transport.
      2. The manufacturer shall provide adequate notice to the contractor of shipping and arrival times.
      3. The contractor shall arrange for receiving and provide storage for any units prior to installation. Unit storage should be provided in accordance with the environmental conditions outlined in this specification.
   2. FACTORY SERVICES
      1. The manufacturer shall provide a certified copy of the factory test report in electronic format.
      2. The owner and/or the owner’s representative shall be permitted to witness the factory test of each unit. The factory shall perform an enhanced certified test report to demonstrate the unit meets the required specifications. A copy of the report will be provided with each unit and in electronic format. Optional pricing shall be provided as part of the bid process.
   3. INSTALLATION (BY OTHERS)
      1. Install RPPs and accessories per NEMA/ANSI standards.
      2. Install the RPPs level on floor as required by manufacturer.
      3. Adjustments:
         1. Set field-adjustable switches and circuit-breaker trip ranges.
         2. Install overcurrent protective devices, transient voltage suppression devices, and instrumentation as required.
      4. The contractor shall provide labor for the installation of the new equipment in accordance with the manufacturer. All rigging for unloading and installation shall be the responsibility of the contractor.
      5. The contractor shall install the equipment as shown on the drawings and ensure all required working clearances are maintained.
   4. FIELD IDENTIFICATION (BY OTHERS)
      1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Section 26 xx xx.
      2. RPP Nameplates: Label each RPP compartment with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.
      3. Provide arc flash potential labeling per NEC, NFPA 70E, and in accordance with Section 26 xx xx, Identification for Electrical Systems.
   5. FIELD TESTING (BY OTHERS)
      1. (Optional)
   6. FACTORY ONSITE SERVICES AND OFFERINGS
      1. Factory-authorized service representative shall perform startup service.
      2. The manufacturer shall directly employ a nationwide service organization of factory-trained field service personnel dedicated to the startup, maintenance and repair of the manufacturer’s power equipment.
      3. The manufacturer shall maintain a national dispatch center 24 hours per day, 365 days per year, to minimize service response time and to maximize availability of qualified service personnel.
   7. FIELD QUALITY CONTROL
      1. The RPP manufacturer shall provide qualified field service technicians for assistance in the installation, startup and site acceptance testing. This work shall include but not be limited to the following:
         1. Instruct and train the contractor on the installation and wiring of the equipment.
         2. Perform a detailed installation inspection of the equipment prior to energizing.
         3. Verify all power wiring connections are proper and tight.
         4. Verify all control, instrumentation, and communications wiring connections are correct and tight.
      2. Manufacturer’s technician shall be present and participate in energizing the equipment.
         1. Assist in startup of monitoring system.
         2. Perform a comprehensive test on the energized unit including:
            1. Checkout of all metering, monitoring, and alarm functions and set points including communications to remote monitoring system.
   8. CLEANING (BY OTHERS)
      1. Upon completion of installation, inspect interior and exterior of RPPs. Vacuum dirt and debris; do not use compressed air to assist in cleaning.