SECTION 262733 - POWER DISTRIBUTION UNITS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
   * + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
      1. SUMMARY
         1. Section includes freestanding, prepackaged power distribution units for transforming, conditioning, and distributing electrical power.
      2. DEFINITIONS

Retain terms that remain after this Section has been edited for a project.

* + - * 1. EPO: Emergency power-off.
        2. SPD: Surge protection device.
      1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Product Data: For each type of product.

Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for power distribution units.

Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

* + - * 1. Shop Drawings:

Include plans, elevations, sections, and [**mounting**] [**attachment**] details.

Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

Include diagrams for power, signal, and control wiring.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.

Coordinate "Qualification Data" paragraph below and as may be supplemented in "Quality Assurance" Article.

* + - * 1. Qualification Data: For [**manufacturer**] [**testing agency**].

Retain "Seismic Qualification Certificates" paragraph below if required by seismic criteria applicable to Project. Coordinate with Section 260548.16 "Seismic Controls for Electrical Systems." See ASCE/SEI 7 for certification requirements for equipment and components.

* + - * 1. Seismic Qualification Certificates: For power distribution units, accessories, and components, from manufacturer.

Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

Retain "Product Certificates" paragraph below to require submittal of product certificates from manufacturers.

* + - * 1. Product Certificates: For each type of power distribution unit, signed by product manufacturer.
        2. Source quality-control reports.

For each factory test of power distribution units.

Retain "Field quality-control reports" paragraph below if Contractor is responsible for field quality-control testing and inspecting.

* + - * 1. Field quality-control reports.
      1. CLOSEOUT SUBMITTALS
         1. Operation and Maintenance Data: For power distribution units to include in emergency, operation, and maintenance manuals.
      2. QUALITY ASSURANCE
         1. Manufacturer Qualifications: A qualified manufacturer. Maintain a service center capable of providing training, parts, and emergency on-site repairs in less than [**eight hours'**] <**Insert time period**> maximum response time.

Retain "Testing Agency Qualifications" paragraph below if Contractor selects testing agency or if Contractor is required to provide services of a qualified testing agency in "Field Quality Control" Article.

* + - * 1. Testing Agency Qualifications: Member company of NETA or an NRTL.

Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

* + - * 1. Equipment Qualifications For Products Other Than Those Specified:

At the time of submission provide written notice to the Director of the intent to propose an “or equal” for products other than those specified. Make the “or equal” submission in a timely manner to allow the Director sufficient time to review the proposed product, perform inspections and witness test demonstrations.

If products other than those specified are proposed for use furnish the name, address, and telephone numbers of at least 5 comparable installations that can prove the proposed products have performed satisfactorily for 3 years. Certify in writing that the Director’s Representative of the 5 comparable installations will allow inspection of their installation by the Director's Representative and the Company Field Advisor.

Make arrangements with the Director’s Representative of 2 installations (selected by the Director) for inspection of the installations by the Director's Representative. Also obtain the services of the Company Field Advisor for the proposed products to be present. Notify the Director a minimum of 3 weeks prior to the availability of the installations for the inspection, and provide at least one alternative date for each inspection.

Only references from the actual Director or Director’s Representative representative (Security Supervisor, Maintenance Supervisor, etc.) will be accepted. References from dealers, system installers or others, who are not the actual Director’s Representative of the proposed products, are not acceptable.

Verify the accuracy of all references submitted prior to submission and certify in writing that the accuracy of the information has been confirmed.

The product manufacturer shall have test facilities available that can demonstrate that the proposed products meet the contract requirements.

Make arrangements with the test facility for the Director's Representative to witness test demonstrations. Also obtain the services of the Company Field Advisor for the proposed product to be present at the test facility. Notify the Director a minimum of 3 weeks prior to the availability of the test facility, and provide at least one alternative date for the testing.

Provide written certification from the manufacturer that the proposed products are compatible for use with all other equipment proposed for use for this system and meet all contract requirements.

* + - * 1. Source Quality Control: The Company producing the system shall have test facilities available which can demonstrate that the proposed system meets contract requirements.

Edit number of hours to suit.

* + - * 1. Company Field Advisor: Secure the services of a Company Field Advisor for a minimum of 24 working hours for the following:

Render advice regarding installation and final adjustment of the system.

Witness final system test and then certify with a sworn affidavit that the system is installed in accordance with the contract documents and is operating properly.

Edit number of sessions and hours to suit.

Train facility personnel on the operation and maintenance of the system (minimum of two 4 hour sessions).

Explain available service programs to facility supervisory personnel for their consideration.

* + - * 1. Service Availability: A fully equipped service organization capable of guaranteeing response time within 24 hours to service calls shall be available to service the completed Work.
      1. DELIVERY, STORAGE, AND HANDLING
         1. Deliver equipment in fully enclosed vehicles after specified environmental conditions have been permanently established in spaces where equipment is to be placed.
         2. Store equipment in spaces with environments controlled within manufacturer's ambient temperature and humidity tolerances for non-operating equipment.
      2. FIELD CONDITIONS
         1. Environmental Conditions: Units shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage or degradation of operating capability.

Revise requirements in subparagraphs below to suit conditions at equipment installation location; include unusual service conditions.

Storage Temperature Range: Minus 67 to plus 185 deg F.

Operating Temperature Range: 32 to 104 deg F.

Relative Humidity Range: 0 to 95 percent, noncondensing.

Altitude: Sea level to [**3600 feet**] <**Insert dimension**> above sea level.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. MANUFACTURERS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=11170) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[ABB, Electrification Products Division](http://www.specagent.com/Lookup?uid=123457141339).

[Eaton](http://www.specagent.com/Lookup?uid=123457141338).

[Square D; Schneider Electric USA](http://www.specagent.com/Lookup?uid=123457141337).

Or equal.

* + - * 1. Source Limitations: Obtain power distribution unit and associated components specified in this Section from a single manufacturer with responsibility for entire power distribution unit installation.
      1. MANUFACTURED UNITS

Casters in "Description" paragraph below are usually limited to units with a rating of 250 A or less. Verify with manufacturers and consider the effect of casters on the supporting floor before retaining requirement for casters.

* + - * 1. Description: Integrated and coordinated assembly of power-line-conditioning and distribution components packaged in a single cabinet or modular assembly of cabinets[**each with full-swivel casters mounted to bottom frame**]. Include the following components:

Input-power, circuit-breaker section.

Isolation transformer.

SPD system.

Output panelboard(s).

Alarm, monitoring, and control system.

* + - * 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
        2. Comply with NFPA 70.

Retain first paragraph below for projects in seismic areas.

* + - * 1. Constructed to withstand seismic forces specified in Section 260548.16 "Seismic Controls for Electrical Systems."
        2. Wiring Access: [**Top**] [**and**] [**Bottom**] wiring access.
        3. Unit Capacity Rating: Carry indicated rms kilovolt-ampere load continuously without affecting the normal operation of the circuit breakers, monitoring system, or unit controls and without exceeding rated insulation temperature for the following input voltage and load current:

Input Voltage: Within rated input-voltage tolerance band of unit.

Load Current: Minimum of 3.0 crest factor and 85 percent total harmonic distortion.

* + - 1. INPUT-POWER, CIRCUIT-BREAKER SECTION

Coordinate this article with Drawings.

* + - * 1. Description: Three-pole, [**shunt-tripped,**]thermal-magnetic-type circuit breaker, rated for indicated interrupting capacity and 125 percent of input current of unit at 100 percent rated load at unit capacity rating.

Retain "Dual-Input Units" subparagraph below if dual-input section is required.

Dual-Input Units:

Two input circuit breakers arranged to provide transfer between two input-voltage sources.

Controls and interfaces to allow selecting either open- or closed-transition transfer between two input-voltage sources.

Use a 120-V permissive signal from both upstream voltage sources to indicate acceptable conditions for closed-transition transfer.

Open second circuit breaker automatically after closed-transition transfer is completed.

* + - * 1. Static Transfer Switch: Three-pole, double-throw; solid-state, automatic transfer switch.
      1. ISOLATION TRANSFORMER SECTION
         1. Description: Dry-type, electrostatically shielded, three-phase, common-core, convection-air-cooled isolation transformer.

Retain option in first subparagraph below if transformer will supply nonlinear load; designate K-factor on Drawings. Coordinate with Drawings.

Comply with UL 1561[**including requirements for nonsinusoidal load-current-handling capability defined by designated K-factor**].

Cores: Electrical grade, non-aging silicon steel with high permeability and low hysteresis losses, one leg per phase.

Coil Material and Insulation: [**Aluminum**] [**Copper**] windings, 220 deg C insulation class.

Temperature Rise: Designed for [**80**] [**115**] [**150**] deg C rise above 40 deg C ambient.

Output Impedance: 3.5 plus or minus 0.5 percent.

Regulation: 2 to 4 percent maximum, at full-resistive load; 5 percent maximum, at rated nonlinear load.

Taps: Six full-capacity compensation taps at 2.5 percent increments; two above and four below nominal voltage.

Retain option in "Full-Load Efficiency" subparagraph below if transformer is K-factor rated.

Full-Load Efficiency: Minimum 96 percent at rated[**nonlinear**] load.

Magnetic-Field Strength External to Transformer Enclosure: Less than 0.1 gauss at 450 mm.

Retain "K-Factor Rating" subparagraph below for transformers that will supply significant nonsinusoidal load current. Show transformer K-factor on Drawings or in schedule. See the Evaluations for discussion of K-factors.

K-Factor Rating: Transformers indicated to be K-factor rated shall comply with UL 1561 requirements for nonsinusoidal load current-handling capability to the degree defined by designated K-factor.

Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor.

Indicate value of K-factor on transformer nameplate.

Unit shall meet requirements of NEMA TP 1 when tested according to NEMA TP 2 with a K-factor equal to one.

Electrostatic Shielding: Independently shield each winding with a full-width, [**single**] [**double**], copper, electrostatic shield arranged to minimize interwinding capacitance.

Coil leads and terminal trips shall be arranged to minimize capacitive coupling between input and output connections.

Shield Terminal: Separate, and marked "Shield" for grounding connection. Shield shall be connected to the reference ground point for the distribution panels.

Capacitance: Limit capacitance between primary and secondary windings to a maximum of 33 picofarads over a frequency range of 20 Hz to 1 MHz.

Common-Mode Noise Attenuation: 120 dB minimum, 0.5 to 1.5 kHz; minus 65 dB minimum, 1.5 to 100 kHz.

Normal-Mode Noise Attenuation: 52 dB minimum, 1.5 to 10 kHz.

Second options in "Neutral Rating" subparagraph below is usually standard for K-factor rated isolation transformers and should be retained if the transformers are K-rated other than 1.0. This enables the transformer to better accommodate harmonic currents. See the Evaluations for discussion of harmonics.

Neutral Rating: [**1.732 times**] [**200 percent of**] the system full-load ampere rating.

Shipping Restraints: Paint or otherwise color code bolts, wedges, blocks, and other restraints that are to be removed after installation and before energizing. Use fluorescent colors that are easily identifiable inside the transformer enclosure.

* + - 1. SPD SYSTEM

Coordinate this article with Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."

* + - * 1. Description: Integrated SPD system, complying with Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits," to protect unit panelboard, and having the following features:

Disconnect Device: Manual, three-pole, fused disconnect switch to de-energize SPD system while permitting power distribution units to continue operation. Fuses are rated at 200-kA interrupting capacity.

Nonlinear Loading: System shall accommodate rated-load current with a minimum 3.0 crest factor and 85 percent total harmonic distortion.

* + - 1. OUTPUT PANELBOARDS
         1. Description: Panelboards complying with Section 262416 "Panelboards" except for mounting provisions. Mount [**single**] [**double**] panelboards on power distribution unit behind flush doors. Include the following features:

Construction: [**30**] [**42**] pole, [**208 V**] [**240 V**], three phase; capable of accepting branch circuit breakers rated to 100 A.

Panelboard Rating: [**225 A**] <**Insert value**>, with main circuit breaker.

Double-sized neutral option in "Panelboard Phase, Neutral, and Ground Buses" subparagraph below is usually available, although it may be at a higher cost.

Panelboard Phase, Neutral, and Ground Buses: Copper, with neutral bus at least [**1.732**] [**two**] times the nominal phase bus rating.

Retain "Isolated Ground Bus" subparagraph below to suit Project.

Isolated Ground Bus: Copper, adequate for branch-circuit equipment ground conductors; insulated from supports.

Branch Circuit Breakers: [**Bolt**] [**Plug**] on.

Cable Racks: Removable and arranged for supporting and routing cables for panelboard entrance.

Access Panels: Arranged so additional branch-circuit wiring can be installed and connected in the future.

* + - 1. POWER DISTRIBUTION UNIT CONTROLS
         1. Include the following control features:

EPO switch integral with power distribution unit.

Retain first subparagraph below if a remote EPO switch is shown on the Drawings.

Power-off input terminals for connection to remote EPO switch.

Retain first subparagraph below if automatic shutdown of unit on alarm is required.

Shutdown with automatic unit disconnection for the following alarm conditions:

Note that some manufacturers discourage use of coil temperature sensors used to initiate a shutdown to eliminate possibility of a shutdown caused by a faulty sensor.

High temperature in transformer coil.

High or low input or output voltage.

Phase loss.

Ground fault.

Reverse-phase rotation.

Alarm Contacts: Electrically isolated, Form C (one normally open and one normally closed), summary alarm; contact set shall change state if any monitored function goes into alarm mode.

Auxiliary Control Outputs: <**Insert control function outputs**>.

* + - 1. MONITORING, STATUS, AND ALARM ANNUNCIATION

Coordinate this article with Drawings and with remote indication and control provisions.

* + - * 1. Description: Microprocessor-based monitoring, status, and alarm annunciation panel mounted flush in front of power distribution unit to provide status display and failure-indicating interface for the following:

Power Monitoring:

Input Voltage: Line to line, rms.

Output Voltage: Line to line, rms.

Output Voltage: Line to neutral, rms.

Output current.

Status Indication: Unit on.

Alarm Annunciation:

High temperature in transformer coil.

High and low input voltage.

High and low output voltage.

Phase loss.

Ground fault.

Frequency.

Phase rotation.

SPD module failure.

Audible Alarm and Silencing Switch: Alarm sounds when alarm indication occurs. Silencing switch shall silence audible alarm but leave visual indication active until alarm condition is corrected.

* + - 1. SOUND LEVEL

NEMA ST 20 has been rescinded, but its sound-level requirements are still recognized as benchmarks for maximum sound levels. Sound levels less than NEMA ST 20 are not standard and may increase cost and delivery time or may simply result in a larger size transformer with kVA derated. Low-sound-level options are 3 dB, 5 dB, and 8 dB below those in NEMA ST 20. NEMA ST 20 sound levels are as follows: Up to 9 kVA at 40 dBA; 30 to 50 kVA at 45 dBA; 51 to 150 kVA at 50 dBA; 151 to 300 kVA at 55 dBA; 301 to 500 kVA at 60 dBA; 501 to 700 kVA at 62 dBA; 701 to 1000 kVA at 64 dBA; and 1001 to 1500 kVA at 65 dBA. See the Evaluations for discussion of sound generated by transformers.

Retain one of two "General" paragraphs below to specify sound-level requirements; retain "Low-Sound-Level Requirements" subparagraph below with "General" paragraph retained.

* + - * 1. General: Fully assembled products comply with minimum sound-level requirements in NEMA ST 20 for transformers of corresponding ratings when factory tested according to IEEE C57.12.91.
        2. General: Fully assembled products have a minimum of 3 dB less than the maximum sound levels prescribed for transformers of corresponding ratings when factory tested according to IEEE C57.12.91.

Consider whether low-sound-level requirements are necessary since many computer rooms are not usually occupied.

Low-Sound-Level Requirements: Maximum sound levels when factory tested according to IEEE C57.12.91, as follows:

9 kVA and Less: <**Insert dBA**>.

30 to 50 kVA: <**Insert dBA**>.

51 to 150 kVA: <**Insert dBA**>.

151 to 300 kVA: <**Insert dBA**>.

301 to 500 kVA: <**Insert dBA**>.

501 to 750 kVA: <**Insert dBA**>.

751 to 1000 kVA: <**Insert dBA**>.

1001 to 1500 kVA: <**Insert dBA**>.

* + - * 1. Mount transformer on rubber isolation pads.
      1. ENCLOSURE REQUIREMENTS
         1. A single, freestanding, galvanized steel, NEMA Type 1 enclosure. Opening of an exterior door shall not provide access to any live parts. Panels and covers that expose hazardous voltages shall require tools to remove.
         2. Access from front, top, and side only for all installation, operations, and normal maintenance, including infrared scanning of bus and breakers. All normal operating controls and instrumentation shall be located on the front of the enclosure.
         3. Arrange enclosure to allow lifting and moving via forklift.
      2. FINISHES
         1. Manufacturer's standard finish over corrosion-resistant pretreatment and primer.
      3. SOURCE QUALITY CONTROL

Retain "Factory Tests" paragraph below for factory-assembled power distribution units. Factory tests are an added cost option and may not be available from some manufacturers. Verify requirement with Owner.

* + - * 1. Factory Tests: Design and routine tests shall comply with referenced standards.

Retain "Factory Sound-Level Tests" paragraph below if lower-than-standard sound level is critical.

* + - * 1. Factory Sound-Level Tests: Conduct sound-level tests on equipment. Comply with IEEE C57.12.91 and NEMA ST 20.

1. EXECUTION
   * + 1. INSTALLATION
          1. Arrange power distribution units to provide adequate access to equipment and circulation of cooling air. Locate transformers away from corners and not parallel to adjacent wall surface.

Revise first paragraph below for power distribution unit support coordination. Retain first option for unit mounted on concrete base. Retain second option if power distribution unit is located in room with access flooring systems.

* + - * 1. Coordinate size and location of [**concrete bases**] [**access flooring support**] with actual power distribution unit provided.
        2. Equipment Mounting:

Retain first subparagraph below to require equipment to be installed on cast-in-place concrete equipment bases.

Install power distribution units on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

Retain first subparagraph below for projects in seismic areas; retain second for projects not in seismic areas. Indicate seismic-control device type on Drawings.

Comply with requirements for vibration isolation and seismic control devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."

Supports shall penetrate and be independent of the access flooring.

* + - * 1. Identify equipment and install warning signs according to Section 260553 "Identification for Electrical Systems."

Revise paragraph below to specify coordination with other parties involved in finalizing electronic equipment arrangement and installation.

* + - * 1. Coordinate layout and installation of power distribution units with Director’s Representative's equipment.

Meet jointly with electronic equipment representatives and Director’s Representative's representatives to exchange information and agree on details of equipment arrangements and installation interfaces.

Record agreements reached in meetings and distribute record to other participants.

Adjust arrangements and locations of power distribution units to accommodate and optimize arrangement and space requirements of equipment.

* + - 1. CONNECTIONS
         1. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

Separately Derived Systems: Make grounding connections to grounding electrodes as indicated; comply with NFPA 70.

* + - * 1. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
        2. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
        3. Install flexible connections at conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.
      1. FIELD QUALITY CONTROL

Retain "Testing Agency," "Manufacturer's Field Service," and "Perform the following tests and inspections" paragraphs below to identify who shall perform tests and inspections. If retaining second option in "Testing Agency" paragraph or if retaining "Manufacturer's Field Service" or "Perform the following tests and inspections" paragraph, retain "Field quality-control reports" paragraph in "Informational Submittals" Article.

* + - * 1. Testing Agency: [**Director’s Representative will engage**] [**Engage**] a qualified testing agency to perform tests and inspections.

Retain "Manufacturer's Field Service" paragraph below to require a factory-authorized service representative to perform tests and inspections.

* + - * 1. Manufacturer's Field Service: Engage a Company Service Advisor to test and inspect components, assemblies, and equipment installations, including connections.

Retain "Perform the following tests and inspections" paragraph below to require Contractor to perform tests and inspections.

* + - * 1. Perform the following tests and inspections[**with the assistance of a Company Service Advisor**]:

Tests referenced in first subparagraph below are from NETA Acceptance Testing Specification and include inspection procedures to verify proper installation. They also include tests and measurements of circuit breakers and transformers. Tests include verification of circuit-breaker trip ranges by means of current-injection, insulation-resistance, and turns-ratio tests of transformers and similar items. Cost of extensive testing may not be warranted for some projects. Revise subparagraph to suit Project.

Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification for circuit breakers, molded case; and for transformers, dry type, air cooled, low voltage. Certify compliance with test parameters.

Perform functional tests of power distribution units throughout their operating ranges. Test each monitoring, status, and alarm function.

* + - * 1. Remove malfunctioning units, replace with new units, and retest as specified above.
        2. Infrared Scanning: Two months after Substantial Completion, perform an infrared scan of conductor and bus connections.

Use an infrared-scanning device designed to measure temperature or to detect significant deviations from normal values. Provide documentation of device calibration.

Perform two follow-up infrared scans of main breaker, transformer, and panelboards, one at 4 months and the other at 11 months after Substantial Completion.

Prepare a certified report identifying connections checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.

* + - * 1. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

See Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

* + - * 1. Power distribution unit will be considered defective if it does not pass tests and inspections.
        2. Prepare test and inspection reports.
      1. STARTUP SERVICE
         1. [**Engage a Company Service Advisor** **to perform**] [**Perform**] startup service.

Verify that power distribution units are installed and connected according to the Contract Documents.

Verify that electrical wiring installation complies with manufacturer's submittal and with written installation requirements in other electrical Sections.

Complete installation and startup checks according to manufacturer's written instructions.

* + - 1. ADJUSTING
         1. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
         2. Adjust power distribution units to provide optimal voltage to equipment served throughout normal operating cycle of loads served. Record input and output voltages and adjustment settings, and incorporate into test results.
      2. CLEANING
         1. Vacuum dirt and debris; do not use compressed air to assist in cleaning.
      3. DEMONSTRATION
         1. [**Engage a Company Service Advisor** **to train**] [**Train**] Director’s Representative's maintenance personnel to adjust, operate, and maintain power distribution units.

END OF SECTION 262733