

SECTION 26 20 11
ISOLATED POWER SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, connection, and testing of isolated power systems.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS:
Requirements that apply to all sections of Division 26.
- B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES:
Low-voltage conductors.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS:
Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

1.3 QUALITY ASSURANCE

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1. Shop Drawings:

- a. Submit sufficient information to demonstrate compliance with drawings and specifications.
- b. Include electrical ratings, dimensions, weights, mounting details, front view, side view, equipment and device arrangement, main and branch circuit overcurrent protection, wiring diagrams, materials, and connection diagrams.

2. Manuals:

- a. Submit, simultaneously with the shop drawings, complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.
- b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

3. Test Reports:

- a. Two weeks prior to the final inspection, submit field test reports.
- 4. Certifications:
 - a. Certification by the manufacturer that the isolated power systems conform to the requirements of the drawings and specifications.
 - b. Certification by the manufacturer that the isolation transformers have been tested and conform to the leakage current and sound level requirements specified.
 - c. Certification by the Contractor that the isolated power systems have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. National Fire Protection Association (NFPA):
 - 70-11.....National Electrical Code (NEC)
 - 99-12.....Health Care Facilities
- C. Underwriters Laboratories, Inc. (UL):
 - 50-07.....Enclosures for Electrical Equipment
 - 797-07.....Electrical Metallic Tubing-Steel
 - 1022-12.....Line Isolation Monitors
 - 1047-10.....Isolated Power Systems Equipment

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Isolated power systems shall be in accordance with NFPA and UL.
- B. Isolated power systems shall be flush mounted, as shown on the drawings, and include isolated power units (IPUs), power receptacles, grounding receptacles, equipotential ground bus modules with power and grounding receptacles, line isolation monitors and remote line isolation monitors, and related circuitry.
- C. Incorporate the IPUs in factory-assembled units. House the isolation transformer, line isolation monitor, and circuit breaker panelboard in each IPU.
- D. Line isolation monitors shall be in accordance with the following:

1. Shall be capable of detecting any combination of resistive and/or capacitive faults, including balanced, unbalanced, and hybrid faults.
 2. Shall incorporate in each line isolation monitor, or on the front trim of the IPU, a hazard meter or digital display, indicator lights, an audible alarm with a local silencing switch, a test switch, and provisions for transmitting the alarm signals to a remote location. Transmission of the alarm signals to remote locations up to several hundred feet from the monitor shall not unduly increase the leakage current for the system.
- E. Isolation transformers shall be in accordance with the following:
1. Single phase with kVA rating, and primary and secondary voltages as shown on the drawings. These ratings are for continuous duty without the use of cooling fans.
 2. Self-cooled by natural convection, dry, isolated windings, conventional (stacked design) type, with a grounded electrostatic shield between the primary and secondary windings.
 3. Cores shall be grain-oriented silicon steel.
 4. Sound levels shall not exceed the following in accordance with NEMA standards:
 - a. 5 kVA transformers or fewer: 28 dB.
 - b. 7.5 kVA transformers: 32 dB.
 5. Temperature rise shall be limited 80 degrees C above ambient temperature.
 6. Each nameplate shall include the wiring diagram, leakage current, and sound level.
- F. Circuit breaker panels shall be in accordance with the following:
1. Dead-front, with protection for the breaker handles.
 2. Bus bars:
 - a. Shall be copper with silver-plated joints.
 - b. Panel to include ground bus.
 3. Only the handles of the breakers shall be accessible.
 4. Molded Case Circuit Breakers:
 - a. A rugged, integral housing of molded insulating material.
 - b. Silver alloy contacts.
 - c. Arc quenchers and phase barriers for each pole.
 - d. Quick-make, quick-break, operating mechanisms.

- e. A trip element for each pole, a common trip bar for all poles, and molded insulating material handle.
 - f. Electrically and mechanically trip-free.
 - g. Indicating operating handle showing the ON, TRIPPED, and OFF positions.
- G. Power receptacles shall be hospital grade, NEMA 5-20R unless otherwise indicated.
- H. Remote line isolation monitor panel shall be in accordance with the following:
- 1. Monitor all of the isolated power systems as shown on the drawings.
 - 2. Include a set of red and green indicator lights and a audible alarm with a local silencing switch for each of the isolated power systems monitored by the panel. All of the items shall operate in the same manner as the corresponding items at the line isolation monitor for the same isolated power system.
 - 3. Stainless steel or anodized aluminum faceplates.
- I. Clearly identify individual devices on the faceplates of all equipment. Method of identification shall be permanent and shall not be effected by hospital-type cleaning materials.
- J. Use stainless steel for exposed faceplate surfaces of isolated power systems equipment in operating rooms.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install isolated power systems in accordance with the NEC, as shown on the drawings, and as recommended by the manufacturer.
- B. Branch circuits that are energized by the isolated power system shall conform to the following requirements:
- 1. Shall not be grounded, but shall be protected by circuit breakers with one pole for each circuit conductor.
 - 2. Shall comply with applicable paragraphs in specification Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
 - 3. Branch circuits shall be as short as practical to minimize leakage currents.
 - 4. Identical receptacle poles shall be connected to the same isolation transformer terminal.

5. Install the branch circuit wiring in rigid steel conduit or electrical metallic tubing. Do not use wire lubricating compound on branch circuits connected to an isolated power system.
- C. Install a printed schedule of circuits in each IPU after approval by the VA COR. Schedules shall reflect final load descriptions connected to each circuit breaker.

3.2 ACCEPTANCE CHECKS AND TESTS

- A. Once the isolated power systems and all branch circuits and control wiring have been completely installed, furnish factory-certified test equipment and perform the following tests in the presence of the VA COR. An authorized representative of the manufacturer shall perform acceptance checks and tests.
- B. Perform manufacturer's required field tests in accordance with the manufacturer's recommendations. In addition, include the following:
 1. Test to verify that wiring is properly connected and clear of ground faults, shorts, and open circuits.
 2. Test to verify that isolated power systems are operating properly.
 3. Tests:
 - a. Perform a calibration test on each of the micro-ammeters. The tests shall be accurate within 3%.
 - b. With all of the circuit breakers closed and without any equipment plugged into the receptacles, read and record the inherent total leakage current indicated by the micro-ammeter. The leakage currents shall be small enough to indicate that all of the equipment and circuits are satisfactory for proper operation of the equipment.
 - c. With an electrical test, demonstrate that identical poles of power receptacles for each of the isolated power systems are connected to the same terminal of the isolation transformer.
 - d. Demonstrate that either terminal of each of the isolation transformers, when shorted to ground in one of the power receptacles, will activate the line isolation monitor alarm without tripping the circuit breaker.
 - e. Coordinate with the VA COR, and successively connect not fewer than eight pieces of typical medical equipment to the power receptacles for each of the isolated power systems. As each item is connected, read and record the total leakage current. Each of

the readings should be equal to or larger than the preceding reading.

4. When any defects are detected, correct the defects and repeat the tests as requested by the VA COR at no additional cost to the Government.

3.3 FOLLOW-UP VERIFICATION

- A. Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that the isolated power systems are in good operating condition and properly performing the intended function.

3.4 INSTRUCTION

- A. Furnish the services of a factory-trained technician for one 4-hour training period for instructing personnel in the maintenance and operation of the isolated power systems, on the dates requested by the VA COR.

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