

**SECTION 26 21 00****LOW-VOLTAGE ELECTRICAL FEEDER ENTRANCE****PART 1 - DESIGN DIRECTIVES****1.1 SECTION INCLUDES**

- A. Campus buildings' electrical feeder entrances below 1000 V.
  - 1. Electrical feeder design requirements
  - 2. Architectural requirements
  - 3. Energizing requirements
  - 4. Ancillary items

**1.2 DESIGN CRITERIA**

- A. Most buildings on Dartmouth campus receive electric power from the college owned medium voltage distribution system.
  - 1. "Service" Conductors Entering Buildings: For code compliance purposes are considered feeders not service entrances.
    - a. Rules Governing Conductors and Main Disconnects: NEC Article 225.
- B. Planning for Feeders to Buildings: Coordinate with FOM-Engineering early in design process.
  - 1. Instances of Low-Voltage Electrical Feeder Entrances to Campus Buildings:
    - a. Buildings fed from other buildings.
    - b. Buildings fed from exterior pad-mounted transformers.
    - c. Buildings' emergency/stand-by systems fed from generators or distribution equipment located outside or in other buildings.
- C. Buildings on or off Campus Fed Directly from Local Electric Utility:
  - 1. Conductors, Grounding and Main Disconnects: Follow NEC rules and local utilities standards for service entrances.
- D. Dartmouth and Town of Hanover interpretation of NEC:
  - 1. Where NEC refers to - "... installations under single management, where documented safe switching procedures are established and maintained for disconnection, and where the installation is monitored by qualified individuals..." the Town of Hanover and Dartmouth College agree this is not applicable to Dartmouth's operations.

**1.3 CONSTRUCTION DOCUMENT REQUIREMENTS**

- A. Design Documents: Complete grounding system details. Include sizes of conductors and location of main system bonding jumper.

**1.4 ARCHITECTURAL REQUIREMENTS**

- A. Main Electric Rooms: Painted walls and sealed floors.
- B. Main Electric Room Doors: Locking panic hardware. Keying shall be 7Mead/Mech.

**1.5 DEFINITIONS, ABBREVIATIONS**

- A. NEC - National Electrical Code, latest edition adopted by New Hampshire.

**1.6 RELATED SECTIONS**

- A. Section 26 24 13 - Switchgear, Switchboards, Panelboards and Circuit Breakers.
- B. Section 26 32 00 - Emergency and Standby Systems.
- C. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- D. Section 26 16 00 - Electric Metering.
- E. Project Close-Out Docs.
- F. FOM Turnover Procedure - contact FOM Director of Operations for turnover procedures.

**PART 2 - PRODUCTS****2.1 Not Applicable****PART 3 - EXECUTION****3.1 LOW VOLTAGE DISCONNECTS, FEEDERS, GROUNDING (LESS THAN 1000 V)**

- A. Disconnect Locations: Located “nearest the point of entrance of the conductors” per NEC.
  - 1. Clarification: Within approximately 10 feet of conductor length.
- B. Main Building Disconnects: Circuit breakers.
  - 1. Main Breakers 400 A and Above: LSIG electronic trip units.
- C. Feeders:
  - 1. Underground Feeders: Installed in non-metallic conduit (see Section 26 05 43 - Underground Ducts and Raceways).
  - 2. Feeders from Other Buildings: Contain an equipment grounding conductor per NEC.
  - 3. Feeder Main Disconnect Ground Bus: Bonded to building grounding electrode system per NEC.
  - 4. Feeders Directly from Exterior Transformers via Non-Metallic Conduit:
    - a. Must not contain an equipment grounding conductor.
    - b. Grounded Conductor: Bonded to grounding electrode at building and at transformer.

**D. Grounding and System Bonding Jumper:**

1. Buildings Supplied by Feeder with Overcurrent Device, from Another Building or Structure:
  - a. Feeder is to contain ungrounded, grounded and equipment grounding conductors.
  - b. System Bonding Jumper: Located per NEC 250.32.
  - c. Grounding Electrode System: Bonded and connected at the feeder entrance main disconnect per NEC.
2. Buildings Supplied by Outside Pad-Mounted Transformer (separately derived system) without an Overcurrent Device, on campus medium voltage distribution system.
  - a. Feeder: Contain ungrounded and grounded conductors only.
  - b. System Bonding Jumper: Per NEC 250.30(A)(1) exception No. 2.
  - c. Grounding Electrode System: Bonded and connected at feeder entrance main disconnect per NEC.
3. Buildings Supplied by Feeder from Outside Generator (separately derived system) and with overcurrent device.
  - a. Feeder: Contain ungrounded, grounded and equipment grounding conductors.
  - b. System Bonding Jumper: Located as described per NEC.
  - c. Automatic Transfer Switches: 4-Pole (grounded bus must be switched).
  - d. Grounding Electrode System: Bonded and connected at feeder entrance main disconnect per NEC.

**3.2 ELECTRICAL ENERGIZING REQUIREMENTS OF LOW VOLTAGE ELECTRICAL EQUIPMENT**

- A. Prior to energizing low voltage equipment, complete the following:
1. Planning Meeting: Schedule prior to energizing.
  2. Short Circuit, Coordination Study and Arc Flash Hazard Analysis: Submitted and approved by DC-FOM Engineering and engineer of record.
  3. Main Breakers (800 A and above): Tested by secondary injection test.
    - a. Test Reports: Deliver to DC-FOM Engineering and project commissioning agent.
  4. Main Circuit Breaker Startup Reports: If required.
    - a. Deliver to DC-FOM Engineering and project commissioning agent.
  5. Protective Device Settings: Adjust per the coordination study.
  6. Switchboards and Panelboards: Must be free of dust and dirt. Wipe cleaned with lint-free rags.
  7. Electric Room: All work other than electrical trades work must be complete.
    - a. Doors with Locking Panic Hardware: Must be installed.

- 1) Lock Cores shall be installed by FOM-Lockshop: 7Mead/Mech (with pass-key for Contractor).
  - 2) Door Signage: Installed by FOM-EL Shop.
- b. Ventilation fans and ductwork complete
  - c. Wall and ceilings sealed and painted.
  - d. Floors sealed.
  - e. Firestopping completed.
  - f. Fire-Protection: Sprinkler system completed.
  - g. Electric Rooms: Clean as in dust and dirt free.
- 1) Floors and Surfaces: HEPA vacuumed, protecting electrical equipment from fine dust.
  - 2) Seal and protect electric rooms from dust and dirt entry.
  - 3) Cleanliness Acceptance: By FOM-EL Shop.
8. AHJ Approval for Energizing: Provided in writing to FOM-Engineering.
9. Energized Electrical Equipment: Maintain dust free until turnover to Dartmouth FOM.
  - a. If Electrical Equipment Becomes Contaminated with Dust or Dirt After Energizing:
    - 1) Equipment will need to be cleaned again.
    - 2) Cleanliness Acceptance: By FOM-EL Shop.

### 3.3 FINAL TURNOVER

- A. Signage and Labelling: Complete and affixed to electrical equipment.
- B. Arc Flash labels: Affixed.
- C. Meters: Operating and configured correctly.
  1. IP Addresses: Set. Meters and gateways must be communicating over IP network.
  2. Meter Labels Including IP Addresses: Provided by FOM-EL Shop.
  3. FOM-Engineering: Follow-up with configuration of meters to energy and power monitoring software.
- D. Training: Provided to FOM-EL Shop and FOM-Engineering.
  1. Offer Training in Two Sessions: Scheduled with approval of FOM with a minimum two weeks of notice.
- E. Final Review and Acceptance of Installation:
  1. By FOM-Engineering, Commissioning Agent, and Engineer of Record.
  2. Written Report: Provide to FOM-Engineering, and for files.
- F. Electrical Equipment: Dust free from dust until turnover to Dartmouth FOM.
  1. Cleanliness Acceptance: By FOM-EL Shop. The FOM-EL Shop will provide written acceptance to FOM-Engineering for inclusion in final acceptance.

- G. As-Builts and O&Ms: Turned over to FOM Project Close-Out Manager after review and acceptance by FOM-Engineering.
- H. Turnover: Contact FOM Director of Operations for turnover procedures.

END OF SECTION