



## SECTION 26 05 26 - GROUNDING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) as appropriate, apply to the Work specified in this Section.
- B. Refer to all Electrical portions of the specifications, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

#### 1.2 GENERAL

- A. Contractor shall provide grounding of service equipment, transformers, non-current carrying conductive surfaces of equipment, cable tray, metallic raceways, fencing, metal buildings, structures and other equipment as specified herein and as shown on the drawings.

#### 1.3 SCOPE

- A. The equipment shall be grounded as shown on the plans and as specified herein. All metal structures and equipment, including fences, shall be connected to the systems ground grid. Ground conductors must be as short and straight as possible, protected from mechanical injury and, if practicable, without splice or joint.
- B. Provide and install 1" C with insulated 3/0 C.U. service grounding conductor from grounding electrode(s) to telephone service backboard and to each and every tele/data/CATV closet.
- C. Provide and install ERICO No. TMGBA24L33PT Tamper Resistant Copper Bus Bar Kit or approved equivalent, at each telephone service backboard, data backboard, CATV backboard in the MDF Room and IDF Rooms. Terminate 3/0 C.U. conductor to each bus bar. Refer to details.

### PART 2 - PRODUCTS

#### 2.1 CONDUCTORS

- A. Main grounding conductors shall be bare, soft drawn, stranded, single conductor copper wire, and generally sized as follows:
  - 1. Ground grid cable: #3/0 AWG
  - 2. Equipment and structures to grid conductor: #3/0 AWG
  - 3. Fence grid conductor: #3/0 AWG
  - 4. Fence-to-fence post conductor: #2 AWG (Stranded)
  - 5. Fence post to grid conductor: #2 AWG (Stranded)

#### 2.2 CONNECTORS

- A. All connectors shall be of the exothermically welded type.

## 2.3 GROUND RODS

- A. Ground electrodes shall be copper-clad steel rods nominal 3/4 inch in diameter and ten feet (10') long.

## 2.4 EXOTHERMIC WELD PROCESS

- A. All wire-to-wire exothermic welds shall be the parallel type. Wire-to-wire rod connections shall be "T" type. To establish a basis of design for quality and type, the following is a partial list of approved Cadweld type connections. Approved equivalent connectors by other manufacturers may be utilized.

Connections	Cadweld Type
Parallel cable-to-cable	PG
Cable to ground rod	GR, FT, NT or NX
Cable to steel	VN
Cable to lug	LA
Cable to rebar	Consult factory (similar to RR)

## PART 3 - EXECUTION

### 3.1 EXPOSED NON-CURRENT-CARRYING METAL PARTS

- A. Ground connections to equipment or devices shall be made as close to the current-carrying parts as possible; that is, to the main frame rather than supporting structures, bases or shields. Grounding connections shall be made only to surfaces that are clean and dry. Steel surfaces shall be ground or filed to remove all scale, rust, grease and dirt. Copper and galvanized steel shall be cleaned to remove oxide before making welds or connections. Code size ground conductors shall be run in all conduits containing circuits protected by overcurrent devices; then properly terminated.
- B. All raceways, cable racks, cable trays, conduits, armored or shielded cable or cables with ground and all exposed non-current carrying metal parts shall be grounded. Such items shall be bonded together and permanently grounded to the equipment ground bus. Conduits shall be connected by the grounding bushings or clamps to ground bus. Flexible "jumpers" shall be provided around all raceway expansion joints. Bonding straps for steel conduit shall be copper. Jumper connections shall be provided to effectively ground all sections of rigid conduit connected into plastic pipe. No metallic conduit shall be left ungrounded. In conduit systems interrupted by junction or switch boxes where locknuts and bushings are used to secure the conduit in the box, the sections of conduit and box must be bonded together using grounding bushings.
- C. Any conduits entering low voltage (600 volts or below) equipment through sheet metal enclosure and effectively grounded to enclosure by hub need not be otherwise bonded. Both ends of ground buses in switchboards, etc., shall be separately connected to the main ground bus to form two (2) separate paths to ground.
- D. All metal buildings shall be grounded by separate grounding conductor and ground rods. Fencing (existing and new) shall be grounded as specified herein and as shown on the drawings. Where exposed to physical damage, the ground wires shall be suitably protected with PVC conduit enclosures. Cables below grade shall be laid with a reasonable amount of slack to reduce the possibility of breakage.

### 3.2 EXOTHERMIC WELD PROCESS

- A. The grounding grid shall be installed and connected as specified herein and as shown on the drawings using an exothermic weld process (Cadweld or other approved manufacturer). Where bolted connections are required, brass/bronze 2-hole pads exothermically welded to the grounding conductor shall be used.
- B. All exothermic weld grounding connections shall be made using exothermic welded Cadweld (or other approved manufacturer) connections, tools and materials.
- C. Unless noted otherwise, all copper-to-copper or copper-to-steel splices and terminating specified shall be made with exothermic welds.
- D. Steel surfaces shall be ground or filed to remove the galvanizing coating and the surface cleaned and dried thoroughly prior to making the welds. All welds shall be repainted with an approved galvanized paint after the welds are made.
- E. Copper surfaces shall be sanded to remove oxides and the surface cleaned and dried thoroughly prior to making the welds. All welds shall be painted with an approved anti-oxide manufactured by T&B or Burndy (or other approved manufacturer) to prevent corrosion.
- F. Brass/bronze split bolts shall be used to connect the fence grounding conductors where shown on the drawings.
- G. Where bolted connections are specified, brass/bronze 2-hole pads shall be utilized except for equipment manufactured neutral and ground busses. The equipment to be grounded shall be cleaned of all paint, dirt, and rust prior to making the bolted connection. All bolts, nuts, washers, and lock washers shall be stainless steel. All such connections shall be coated with an approved anti-oxide compound. Only one (1) 2-hole pad shall be terminated on one (1) set of bolts, nuts and washers.
- H. Where approved in writing by the Engineer, brass/bronze pipe ground clamps or 2 set screw 2-hole pads may be used for special conditions.
- I. Where grounding conductors or PVC conduits penetrate walls, floors, etc., these openings and conduits shall be sealed with Dow Corning No. 2001 Silicone RTV (or other prior approved manufacturer) after installation is complete.
- J. Provide gradual bends for all grounding grid cables wherever possible. Sharp bends will not be permitted. The minimum being radius should be 8 inches.
- K. The Contractor shall notify the Architect/Engineer when the buried grounding grid is completed for inspection by the Engineer prior to backfilling. Notification should be no less than 24 hours prior to scheduling the backfill of trenches.
- L. The Contractor shall test the grounding grid resistance and continuity. The testing shall be performed after all underground and above ground connections have been made. Refer to "Acceptance Testing" specification section for additional requirements.

### 3.3 ELECTRICAL SERVICE ENTRANCE

- A. Grounding conductor shall be installed from one (1) ground rod to the next and then looped back to the service equipment. Both ends of the grounding conductor loop shall be properly terminated on the service equipment's neutral bus. Provide all required lugs to accomplish this. Properly bond to ground bus per NEC requirements.

- B. Ground rods shall be spaced a minimum of 6'0" from each other.
- C. Extend grounding conductor to all metallic water piping, building steel, concrete reinforcing steel, all other building steel for adjacent buildings services from main electrical service and properly terminate. Refer to details for additional requirements.
- D. Grounding conductor shall be installed using 1" schedule 80 PVC conduit.
- E. Prior to pouring of slab(s) and prior to covering grounding grid, contractor shall take digital photographs of all ground rods, terminations, conductors and overall photo and shall submit to engineer prior to requesting substantial completion.
- F. Provide and install hand-hole (inspection well) with bolt-down removable cover at all ground rods to allow visual inspection of the terminations of the grounding conductors to the grounding electrode(s). Refer to details for additional requirements.

END OF SECTION 26 05 26