



GROUNDING SYSTEM DIAGRAM
SCALE: NONE

KEYED NOTES (CONTINUED)

- 11 USE THE "MAIN GROUNDING ELECTRODE GROUND BAR" INSTEAD OF BUILDING STRUCTURAL STEEL IF THE FIRST OVERCURRENT DEVICE FOR THE SEPARATELY DERIVED SYSTEM IS WITHIN 50 FEET OF THE "MAIN GROUNDING ELECTRODE GROUND BAR".
- 12 IF THE BUILDING STRUCTURE IS NOT STRUCTURAL STEEL, INSTALL "MAIN GROUNDING ELECTRODE GROUND BAR EXTENSIONS" AT AN ACCESSIBLE AND VISIBLE LOCATION ADJACENT TO SEPARATELY DERIVED SYSTEMS THAT ARE MORE THAN 50 FEET FROM THE MAIN GROUNDING ELECTRODE GROUND BAR".
- 13 INSTALL A COPPER GROUNDING BAR IN EACH TELECOMMUNICATIONS ROOM. CONNECT TO THE "MAIN GROUNDING ELECTRODE GROUND BAR" USING 600V INSULATED 4/0 AWG COPPER CABLE AND COMPRESSION SPADE LUGS.
- 14 INSTALL GROUND (NEUTRAL) CONDUCTOR THAT IS NOT LESS THAN THE PHASE CONDUCTOR AMPACITY, IF HIGH-HARMONICS ARE PRESENT MAKE NEUTRAL AMPACITY 200% OF THE PHASE CONDUCTOR.
- 15 INSTALL BONDING CONDUCTOR THAT IS SIZED BASED ON NEC TABLE 250.66 USING THE SERVICE OR SEPARATELY-DERIVED SYSTEM PHASE CONDUCTOR SIZE.
- 16 INSTALL IRREVERSIBLE COMPRESSION CONNECTOR WITH TAMPER-PROOF HARDWARE OR INSTALL EXOTHERMIC WELD.
- 17 BOND TO METAL PIPING SYSTEMS IN THE AREA SERVED BY THE SEPARATELY DERIVED SYSTEM.
- 18 INSTALL BONDING JUMPER THAT IS SIZED BASED ON NEC TABLE 250.66 USING THE LARGEST SERVICE OR SEPARATELY DERIVED SYSTEM PHASE CONDUCTOR.

GENERAL NOTES

- 1. SEE STANDARD DRAWING ST-05010-2 FOR ISOLATED GROUND SYSTEM.
- 2. CONDUCTOR SIZES SHOWN ARE MINIMUM AND MAY BE LARGER THAN THE MINIMUM SIZES REQUIRED BY NEC.
- 3. INSTALL GROUNDING CONNECTIONS TO BUILDING STRUCTURE AND WATER PIPES AT LOCATIONS THAT ARE VISIBLE AND ACCESSIBLE FOR INSPECTION, MAINTENANCE, AND TESTING.
- 4. INSTALL AN INSULATED THROAT GROUNDING BUSHING ON EACH METALLIC SERVICE ENTRANCE CONDUIT. BOND TO GROUND BUS USING CONDUCTOR THAT IS SIZED BASED ON NEC TABLE 250.66 USING THE SERVICE PHASE CONDUCTOR SIZE.
- 5. INSTALL AN INSULATED THROAT GROUNDING BUSHING ON EACH METALLIC FEEDER CONDUIT. BOND TO GROUND BUS USING CONDUCTOR THAT IS SIZED BASED ON NEC TABLE 250.122 USING THE FEEDER CIRCUIT OVERCURRENT DEVICE SIZE OR THE SEPARATELY DERIVED SYSTEM OVERCURRENT DEVICE SIZE.
- 6. BOND HOT AND COLD WATER PIPING SYSTEMS.

DESIGNER:
EXIT GROUNDING SYSTEM DIAGRAM TO BE PROJECT-SPECIFIC. SHOW CONDUCTOR SIZES AND EQUIPMENT DESIGNATIONS AND INCLUDE EQUIPMENT SUCH AS GENERATORS, TRANSFER SWITCHES AND UPS IN GROUNDING DIAGRAM.

DRAWING DEVELOPED FOR ML-3/ML-4 PROJECTS. FOR ML-1/ML-2, ADDITIONAL REQUIREMENTS AND QA REVIEWS ARE REQUIRED. DESIGN THIS WORK WHEN REFERRED INTO A DRAWING PACKAGE.

KEYED NOTES

- 1 INSTALL GROUND (NEUTRAL) CONDUCTOR SAME SIZE AS THE LARGEST PHASE CONDUCTOR IF THE LINE-TO-NEUTRAL LOAD EXCEEDS 5% OF THE CONNECTED LOAD. IF NEUTRAL LOAD IS SMALLER, INSTALL THE NEC MINIMUM GROUND CONDUCTOR.
 - 2 INSTALL GROUNDING ELECTRODE CONDUCTOR, SIZED BASED ON NEC TABLE 250.66 USING THE SERVICE PHASE CONDUCTOR SIZE, BUT NOT SMALLER THAN 4 AWG.
 - 3 INSTALL EQUIPMENT GROUNDING CONDUCTOR SIZED BASED ON NEC TABLE 250.122 USING THE FEEDER OVERCURRENT DEVICE SIZE.
 - 4 BOND TO GAS PIPE ON THE BUILDING SIDE OF THE GAS METER.
 - 5 INSTALL GROUNDING ELECTRODE CONDUCTOR THAT IS SIZED BASED ON NEC TABLE 250.66 USING THE SEPARATELY DERIVED SYSTEM PHASE CONDUCTOR SIZE.
 - 6 INSTALL A CONCRETE-ENCASED MAIN GROUNDING ELECTRODE IN THE BUILDING FOUNDATION AROUND THE ENTIRE PERIMETER OF THE BUILDING. LOCATE ELECTRODE IN THE BOTTOM ONE-THIRD OF THE FOUNDATION WITH AT LEAST 3 INCHES OF CONCRETE COVER. USE EITHER OF THE FOLLOWING MATERIALS FOR THE ELECTRODE:
BARE COPPER CABLE NOT SMALLER THAN THE GROUNDING ELECTRODE CONDUCTOR REQUIRED BY THE NEC AND NOT SMALLER THAN 4 AWG.
BARE OR GALVANIZED REBARS THAT ARE MADE ELECTRICALLY CONTINUOUS USING COPPER JUMPERS NOT SMALLER THAN THE NEC REQUIRED GROUNDING ELECTRODE CONDUCTOR AND NOT SMALLER THAN 4 AWG. USE REINFORCING BARS NOT SMALLER THAN THE FOLLOWING BASED ON THE TOTAL LENGTH OF THE INTERCONNECTED AND PARALLELED REBARS:
- | TOTAL LENGTH | MINIMUM REBAR SIZE |
|--------------|--------------------|
| 112 FT | 1 3/8" (#11 BAR) |
| 150 FT | 1" (#8 BAR) |
| 192 FT | 3/4" (#6 BAR) |
| 223 FT | 5/8" (#5 BAR) |
| 266 FT | 1/2" (#4 BAR) |
- 7 BOND EACH PERIMETER STRUCTURAL STEEL COLUMN TO THE CONCRETE-ENCASED MAIN GROUNDING ELECTRODE. USE COMPRESSION CONNECTORS THAT MEET IEEE 837 REQUIREMENTS OR USE EXOTHERMIC WELDS.
 - 8 INSTALL A "MAIN GROUND ELECTRODE GROUND BAR" FOR SINGLE POINT GROUNDING. LOCATE AT AN ACCESSIBLE AND VISIBLE POINT NEAR THE SERVICE ENTRANCE EQUIPMENT. MAKE CONNECTIONS TO THE GROUND BAR USING TWO-HOLE COMPRESSION SPADE LUGS THAT MEET IEEE 837 REQUIREMENTS. LABEL EACH CONNECTION TO THE GROUND BAR.
 - 9 LIGHTNING PROTECTION GROUNDING COUNTERPOISE - 4/0 AWG COPPER.
 - 10 THE LIGHTNING PROTECTION SYSTEM GROUNDING COUNTERPOISE TO THE MAIN GROUND ELECTRODE GROUND BAR. USE 4/0 AWG COPPER CABLE WITH 600 VOLT INSULATION. AT THE UNDERGROUND CONNECTION USE A COMPRESSION CONNECTOR THAT MEETS IEEE 837 REQUIREMENTS OR USE AN EXOTHERMIC WELD.

NO	DATE	CLASS	REV	ADD	DESCRIPTION	DESIGNED	CHECKED	DATE
2	7-12-06				NEW TITLE BLOCK, UPDATED INSTRUCTIONS, UPDATED AND REFERENCED, CLARIFIED BONDING	LT	DP	DP
1	11-15-05				NEW GROUNDING, CORRECTED LABELS, UPDATED IEC REF., REPLACES ST-7000	DP	DP	DP

ENGINEERING STANDARDS PROGRAM									
ENGINEERING STANDARDS MANUAL									
GROUNDING SYSTEM DIAGRAM									
BLDG				TA-	DATE	11-09-01			
SUBMITTED	DAVID W. FOWELL			APPROVED FOR RELEASE	TOM CRUCH				
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CHAPTER 7					ST-D5010-1				
					2				

NOT FOR CONSTRUCTION