

STANDARD PANEL GROUNDING PROCEDURES
TO BE FOLLOWED AT INSTALLATION

SCOPE

THIS DRAWING WILL DOCUMENT PROCEDURES WHICH ARE TO BE FOLLOWED BY CUSTOMER'S CONTRACTOR WHEN INSTALLING INDUSTRIAL DRIVE AND MOTOR SYSTEMS

IN ORDER TO UNDERSTAND THE REASONS FOR MANY OF THE PRACTICES THAT ARE RECOMMENDED, IT IS HELPFUL TO SEGREGATE THESE PRACTICES INTO TWO CATEGORIES AS FOLLOWS:

1) THOSE GENERALLY REFERRED TO AS EQUIPMENT GROUNDING PRACTICES WHOSE PURPOSES ARE:

- TO PROTECT AGAINST THE RISK OF ELECTRICAL SHOCK OR BURN.
- TO PROTECT THE EQUIPMENT FROM FIRE OR OTHER DAMAGE DUE TO GROUND FAULTS OR LIGHTNING STRIKES.

THESE PRACTICES WOULD TYPICALLY BE FOLLOWED BY THE CONTRACTOR IN COMPLIANCE WITH NEC OR OTHER CODE REQUIREMENTS.

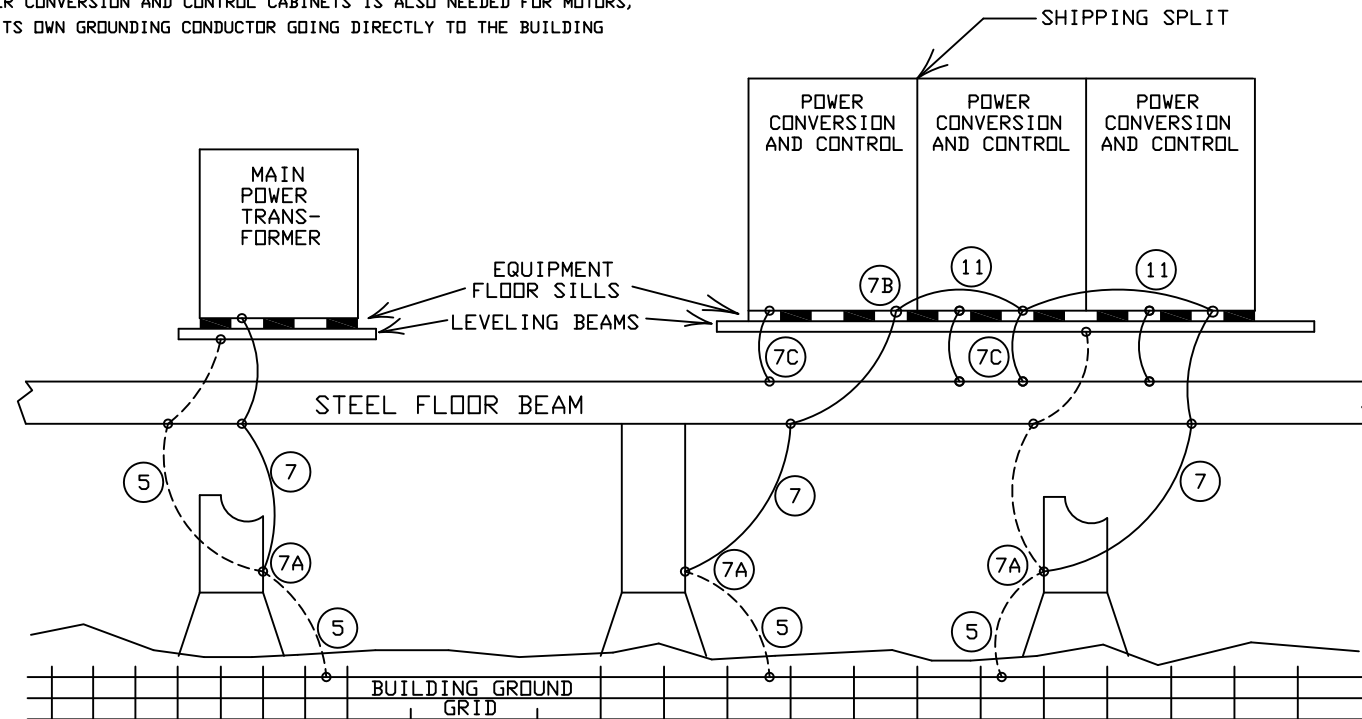
2) THOSE PRACTICES WHICH MAKE THE EQUIPMENT IMMUNE TO ELECTRICAL NOISE ORIGINATING WITHIN OR OUTSIDE THE EQUIPMENT. THESE COMPLEMENT THE EQUIPMENT GROUNDING AND LEVEL WIRING PRACTICES IN PROVIDING NOISE IMMUNITY.

EQUIPMENT GROUNDING

- 1) ALL METAL BUILDING STRUCTURES SUCH AS COLUMNS, FLOOR BEAMS, ETC. SHOULD BE GROUNDED BY AN INTERCONNECTING HEAVY GROUND CABLE (5) IN ACCORDANCE WITH RECOMMENDED BUILDING PRACTICES AND LOCAL CODES.
- 2) ALL ELECTRICAL JOINTS AND CONNECTIONS TO THE BUILDING STRUCTURES SHOULD BE BRAZED OR EXOTHERMIC WELDED TO ASSURE THAT THE REQUIRED GOOD ELECTRICAL AND MECHANICAL PROPERTIES DO NOT DETERIORATE WITH THE PASSAGE OF TIME.
- 3) ALL PANELS SHOULD BE GROUNDED AT LEAST ONE POINT USING A HEAVY SAFETY CABLE (7). PANELS GREATER THAN 15 FT LONG SHOULD BE GROUNDED AT BOTH ENDS. THE GROUND CABLE NEEDS TO BE AT LEAST 1/0 AWG FOR MECHANICAL REASONS AND NEED NOT BE GREATER THAN 500 MCM. THIS CABLE IS USUALLY NON-INSULATED.
- 4) THE SAFETY GROUND CABLE (7) SHOULD BE BRAZED OR EXOTHERMIC WELDED (7A) TO A BUILDING STEEL STRUCTURE THAT IS CLOSEST TO THE PANEL, PREFERABLY WITHIN 25 FT.
- 5) THE EQUIPMENT END (7B) SHOULD BE BOLTED OR BRAZED TO A GROUND TERMINATION POINT ON THE PANEL.
- 6) THE EQUIPMENT GROUNDING TERMINAL IS A COPPER GROUND BUS OR STUB BUS BONDED TO THE PANEL ENCLOSURE USING BRAZING OR BOLTING IN SUCH MANNER THAT THE CONDUCTING PATH HAS A RESISTANCE OF 0.1 OHMS OR LESS.
- 7) THE GROUNDING CONDUCTORS MUST BE CAPABLE OF HANDLING ANTICIPATED GROUND FAULT CURRENTS.
- 8) THERE SHOULD BE A JUMPER CABLE (11) ACROSS THE GROUND BUS FLOOR SILL BETWEEN ANY SHIPPING SPLITS AND SIZED THE SAME AS THE SAFETY GROUND UNLESS OTHERWISE SPECIFIED.
- 9) THE PROTECTIVE GROUNDING DESCRIBED ABOVE FOR POWER CONVERSION AND CONTROL CABINETS IS ALSO NEEDED FOR MOTORS, TRANSFORMERS AND REACTORS. EACH OF THESE SHOULD HAVE ITS OWN GROUNDING CONDUCTOR GOING DIRECTLY TO THE BUILDING GROUND GRID.

GROUNDING PROCEDURES NEEDED TO ENSURE ELECTRICAL NOISE IMMUNITY

- 1) LEVELING BEAMS, STEEL MESH, GALVANIZED FLOOR, DECKING, ETC. SHOULD BE INSTALLED PRIOR TO PLACING THE EQUIPMENT. THESE SHOULD BE CONNECTED TO THE BUILDING GROUND SYSTEM USING A BRAZING OR EXOTHERMIC WELDING PROCESS.
- 2) GROUNDING LEVELING BEAMS ARE NOT AN ABSOLUTE NECESSITY FOR SATISFACTORY OPERATION. ON NEW CONSTRUCTION SUCH BEAMS CAN BE PROVIDED WITH LITTLE DIFFICULTY. FOR EXISTING CONSTRUCTION IT USUALLY WILL BE MORE DIFFICULT, IN WHICH CASE THE LEVELING BEAMS MAY BE DISPENSED WITH, PROVIDED OTHER GROUNDED STRUCTURES SUCH AS COLUMNS AND FLOOR BEAMS ARE WITHIN 10 FEET OF THE EQUIPMENT.
- 3) AFTER SETTING THE CONTROL PANELS IN PLACE, THE PERIPHERY OF THE CONTROL PANELS SHOULD BE SPOT WELDED TO THE STEEL CHANNELS APPROXIMATELY EVERY 18 INCHES. THIS CREATES A VERY GOOD HIGH FREQUENCY GROUND PLANE. CARE SHOULD BE TAKEN TO AVOID ELECTRONIC COMPONENT DAMAGE DURING THE WELDING PROCESS BY KEEPING THE WELDED RETURN PATH AS CLOSE AS POSSIBLE TO THE WORK POSITION. THAT IS, THE RETURN PATH SHOULD ALWAYS BE WITHIN 3 FEET OF THE ELECTRODE.
- 4) IF LEVELING BEAMS ARE NOT INSTALLED, A NUMBER OF GROUNDING CABLES (7C) SHOULD BE RUN FROM THE GROUND LUGS PROVIDED ON THE PANEL TO THE NEAREST GROUNDED COLUMN OR FLOOR BEAM, OR WIRE FLOOR MESH, ETC. THIS WILL PROVIDE THE NECESSARY HIGH FREQUENCY GROUND PLANE.



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