ENTERTAINMENT ELECTRICAL SAFETY ASSOCIATION

Bonding Of Electrical Equipment In The Entertainment Industry

What is the difference between bonding and grounding?

Bonding: a connection of all non-current carrying metal parts of any equipment in or near the distribution system with a common (green) conductor. This provides a path for fault current back to the source to reduce the risk of shock.

Grounding: a (low impedance) connection to earth obtained by a grounding electrode(s). Sufficiently sized to carry any potential fault current and allows overcurrent devices to function correctly.
See EESA document “Grounding Of Generators In The Entertainment Industry” for additional information.

The purpose of grounding a generator in a remote location is to eliminate step/touch potentials (establish an equi-potential plane). In an existing building or urban environment, the equi-potential plane has already been established because all system/service and equipment should already be bonded together and all system/service neutrals bonded to ground. In a rural setting, you are setting up the only equi-potential plane.

Why do I have to bond?

To eliminate any potential voltage differences between metal surfaces and reduce the risk of electrical shock.

What is required to be bonded?

All cord connected utilization equipment must be approved and (unless double insulated) will be bonded as a requirement of the approval.
All metallic parts of any adjacent equipment that is in or near the distribution system. i.e., stages, scaffolding, lifts, fencing, etc.
Note: All bond connections shall be metal to metal. Remove paint if required.

Examples of metal surfaces to be bonded:



Mobile Stage frame bonded



Lift bonded



Stage bond

When is a bond conductor used?
All distribution wiring must include a bond conductor. In multi-conductor cable the bond conductor must be an integral part of the cable. In single conductor cable sets the bond conductor must run with the line conductors.

What methods of bonding adjacent equipment are acceptable?
Acceptable connectors (examples below) and correctly sized bond conductors.

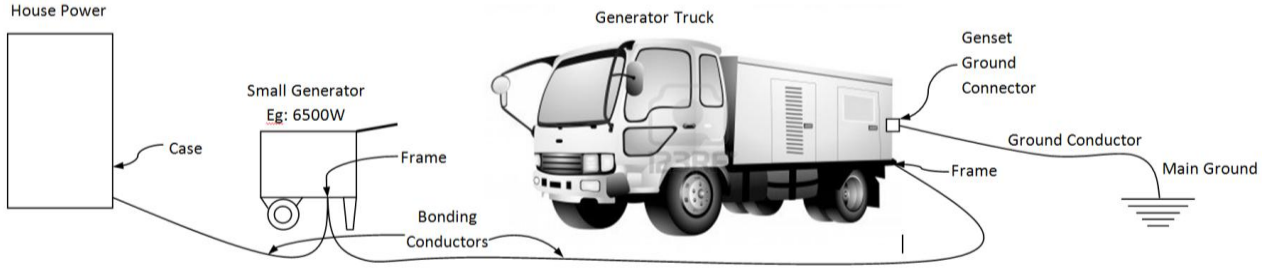





Bond conductor size table:

Ampacity of Overcurrent Protection	Size of Copper Bonding Conductor AWG
100 or less	4
101 to 200	2
201 to 300	2/0
301 and above	4/0

I have multiple electrical systems. When do I need to bond them?
When multiple electrical systems are in proximity to each other and do not share the same ground electrode they shall be bonded together. Multiple systems could include systems supplied by multiple generators (regardless of size) or combinations of generator and utility sources.



Note: To reduce chances of electrical shock **all** metal surfaces in the proximity of any electrical systems must be considered when bonding. The **primary concern** is the path of single conductor cables near metal surfaces and the bonding of these metal surfaces. Any metal surfaces having electrical wires passing through, over or on them must be bonded. Think about it.....

What if I have other questions?
If you have further questions, visit the EESA website (www.eesa.tech), consult SPEC-003, the Ontario Electrical Safety Code Section 10 or call your ESA inspector.