



059: Low Voltage, Outdoors

Why this is important

Safety errors with low voltage equipment can be just as lethal as safety errors with any other equipment. Low voltage does not mean harmless voltage.

Definitions

Low voltage: The definition varies, depending on the frame of reference. The NEC does not define it. For power distribution on the load side, low voltage is generally 600V or less. For control systems on the load side, low voltage is 50V or below.

Bonding: The permanent joining of metallic parts to form an electrically conductive path that ensures electrical continuity and the capacity to conduct safely any current likely to be imposed.

Grounded: Connected to earth or to some conducting body that serves in place of the earth. An item is not effectively grounded simply just because it is attached to a driven rod. It must be grounded in reference to the source, typically the main grounding electrode at the service entrance. You can accomplish this by bonding all ground references so these all reference that single point.

Energy facts

When two items of different electrical potential come in contact, current flows to equalize the potential. Everyone is familiar with static electricity and the shocks you receive when touching grounded items in your home.

Earth ground is relative, not absolute. Drive two ground rods 1000 feet apart and place a volt-meter across them and you will likely measure a voltage potential. It could be hundreds of volts. The resistance of the earth between them is likely on the order of billions of ohms.

A properly designed grounding system will have all “made grounds” connected together to prevent the flow of current between them by eliminating the voltage potential. This is why you must ensure all driven rods are connected with a bonding conductor, and the ground ring is connected to the water service, building steel and all other made grounds.

A problem

Connecting grounding systems together in large complexes may not be feasible. An oil refinery or paper mill may cover several square miles. It is difficult to have a single ground reference in these types of facilities.

Because of this, control wiring and electrical sources may be at different ground potentials.

Protecting yourself

Working in energized equipment is never a one-person job.

Use insulated tools and PPE when working in energized panels.

You need to wear your safety glasses, even outdoors. Electrical hazards don't disappear just because you went outdoors.

Discussion leader duties for this session:

Be prepared to discuss Kirchoff's Law (parallel circuits) and Ohm's Law (series circuits).

What this Safety Talk covers:

Safety considerations for outdoor low voltage systems.

Discussion notes :

