

Stray Voltage: A voltage resulting from the normal delivery and/or use of electricity (usually smaller than 10 volts) that may be present between two conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals. Stray voltage is caused by primary and/or secondary return current, and power system induced currents, as these currents flow through the impedance of the intended return pathway, its parallel conductive pathways, and conductive loops in close proximity to the power system. Stray voltage is not related to power system faults, and is generally not considered hazardous. (See also Contact Voltage)

Note: "Conductive surfaces" as used in this definition are intended to include the earth and/or extensions of the earth such as concrete sidewalks and metal floor drains.

Discussion:

A voltage resulting from the normal delivery and/or use of electricity...

For the most part, there appears to be general agreement that the voltages that fall into this category (i.e. "stray voltages") are a normal consequence of the delivery and use of electricity. Certainly there are locations where these voltages reach higher than desirable levels because of issues related to maintenance, system operation, code violation, etc., but the voltages will be present, at some level, even if we have used the best maintenance practices, ensured code compliance, and did everything else possible to minimize it. It's extremely important that the people who read the proposed guide, and use these definitions, understand that these voltages must be present at some level wherever and whenever we use electricity. Indicating that the voltages are the result of "the normal delivery and use of electricity" accomplishes this objective, and at the same time ties us to frequencies related to "normal" system operation. Measurement instrumentation, measurement protocol, human and animal sensitivity, reduction strategies, etc. are issues that should be covered in the proposed guide.

(Usually smaller than 10 volts)

This is simply a statement that describes the range of voltages you would expect to encounter. If you measure 68 volts you've probably got something other than stray voltage and more caution is advised. Identifying this typical range of voltage in the definition is consistent with historical interpretations of stray voltage, and reinforces the idea that exposure to these voltages may be a nuisance, but would not likely cause harm.

...that may be present between two conductive surfaces that can be simultaneously contacted....

We can measure voltage from a swimming pool ladder to a ground rod at the neighbor's house 300 ft away, but no person or animal can be exposed to this voltage. Use of these words would require that the **possibility of exposure** exist before it is called stray voltage. A person or animal must be capable of making contact with two conductive surfaces allowing the voltage present to push current through the impedance of their body in order for there to be an exposure. The instruments we use to measure the voltage, the impedance we use in the measurement circuit to determine the degree of exposure (e.g. whether or not it is perceptible to the average person or cow), and the measurements we make to determine sources etc. are all topics that should be covered in the guide.

....by members of the general public and/or their animals.

This is not about inaccessible substation touch and step potentials, or the voltages an electrician may encounter inside a sealed metal cabinet; it's about the possibility of the general public and/or their animals unknowingly becoming part of an electrical circuit.

Stray voltage is caused by primary and/or secondary return current, and power system induced currents, as these currents flow through the impedance of the intended return pathway, its parallel conductive pathways, and/or conductive loops in close proximity to the power system.

The voltage we are trying to define is the result of current flow related to the normal delivery and use of electricity. The currents and pathways described cover most, if not all, transmission, distribution, and secondary sources. This is true for any system configuration (e.g. grounded, ungrounded, single wire earth return, etc.).

Stray voltage is not related to power system faults, and is generally not considered hazardous. (See also Contact Voltage)

This statement is added to distinguish the nuisance of stray voltage exposure from the potential hazard of contact voltage exposure.

Note: "Conductive surfaces" as used in this definition are intended to include the earth and/or extensions of the earth such as concrete sidewalks and metal floor drains.

This note is added to provide clarification that stray voltage can exist between any conductive surface and the earth, or between two points on the earth.