

Grounding – Part 1

- ☐ **Equipment grounding** is the connection of earth ground to non-current-carrying conductive materials.
 - ☐ For example – connection of ground to conduit, cable trays, junction boxes, enclosures, motor frames etc..
 - ☐ Equipment grounding limits and stabilizes voltage to ground on equipment.
 - ☐ Bonding creates equipotential plane ensuring all metallic components are at same potential-ground.
- ☐ **System grounding** is the connection of earth ground to neutral point of current-carrying conductors.
 - ☐ For example – connection of ground to neutral point of a circuit, transformer etc.
 - ☐ Connection can be either solidly or with a current limiting device (will be discussed in detail later on).

Benefits of proper system grounding

- ☐ Reduces magnitude of transient over-voltages.
- ☐ Simplifies ground fault location
- ☐ Improves system and equipment fault protection
- ☐ Reduces maintenance time and expense
- ☐ Personnel safety
- ☐ Lightning protection

Physiological Effects of Electricity



STUDY FOR FE

What happens when electrical current passes through the body?

- ☐ Threshold of perception for a 70kg human exposed to 1s - 3s ~ 1 mA
- ☐ Let go current ~ 6 mA
- ☐ Respiratory paralysis ~ 22 mA
- ☐ Ventricular Fibrillation ~ 75 – 400 mA
- ☐ Sustained Myocardial contraction ~ 1 A – 6 A
- ☐ Burns ~ 10 A

Body current limit

According to IEEE® Standard 80 – 2000 “Guide for Safety in AC Substation Grounding”, permissible body current depends on body weight and depends on duration of current exposure.

Persons weighing 50kg (110 lb)

$$I_B = \frac{0.116}{\sqrt{t_s}}$$

Persons weighing 70kg (155 lb)

$$I_B = \frac{0.157}{\sqrt{t_s}}$$