6 Simple Rules to Ensure Substation Safety

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Importance of safety protection

Another extremely important substation engineering aspect is associated with safety protection. It is fair to say that safety is always a No. 1 priority in substation design, operation and maintenance.

Unlike the case where a higher reliability required a larger investment, we can't put a price tag on safety since there is no such thing like working conditions being more or less safe. It should always be 100% safe to work at or visit the substation.

There are numerous laws, rules, codes, etc. governing safety requirements; of the most important being “IEEE Standard C2-2012. 2012 National Electrical Safety Code®” (NESC®)

The main mission of all these regulations is safeguarding of personnel from hazards arising from the installation, maintenance or operation of substation equipment.

Safety standards contain requirements for:

- Enclosure of electrical equipment
- Rooms and spaces
- Illumination
- Floors, floor openings, passageways, stairs
- Exits
- **Installation of equipment:**
  - Protective grounding
  - Guarding live parts
  - Working space above electrical equipment
- Specific rules for installation of all typical substation equipment

All these measures are based on common sense and the goal to provide a **safe environment for substation personnel.**

### 6 rules to provide substation safety

#### Rule no. 1 (clearance)

*Enough clearance* from energized parts should be provided to avoid accidental contact with them. If that can’t be met, live parts should be guarded or enclosed.

#### Rule no. 2 (minimum height)

*A minimum height from the ground* to any ungrounded part of an electrical installation should be 8'-6", so a person staying on the ground can’t touch a substation element or its part which may become energized accidentally. For example, the bottom of a post insulator supporting an energized bus does not normally have any potential.

However, if *bus flashover to the ground over insulator occurs*, touching the bottom of the insulator may become unsafe. That’s why an *8'-6" distance* from the bottom of insulator to the ground should be provided.

#### Rule no. 3 (illumination...)

There should be sufficient illumination for personnel to clearly see their surroundings and perform any work safely. Required illumination levels are specified in **NESC® [1]**.

#### Rule no. 4 (passageways...)

All *passageways and stairs* should be wide enough for personnel to navigate them safely, adequate railing should be provided, and floor openings should have guard rails.

#### Rule no. 5 (evacuation routes)

Exits should be *clearly marked* and evacuation routes should be *free from obstructions*. Depending on the function of the building *(for example, control house)*, it may require several exits to avoid personnel being trapped
during equipment fault, fire, etc.

**Rule no. 6 (grounding, as always)**

All substation metallic structures, fences, and equipment tanks should be connected to a station ground grid which should be designed to ensure that step and touch potential values are lower than the ones stipulated in the applicable standards.

*Reference: Fundamentals of Modern Electrical Substations; Part 3: Electrical Substation Engineering Aspects by Boris Shvartsberg, Ph.D., P.E., P.M.P.*