

# 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.

Source :

<http://electrical-engineering-portal.com/6-simple-rules-to-ensure-substation-safety>