

Classifications and Principal Characteristics of Electrical and Electronics Equipment's (Precautions for Safety and Protection against Electric Shock)

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I. INTRODUCTION:

Most of the electrical and electronic equipment's intended to connect to an external power source at an operating voltages not exceeding AC 400 V rms) and 250 V (rms) between phase and earth used by general public in homes, offices, workshops, schools, farms and all medial applications are being classified in to four categories namely;

- **Class O Equipment**
- **Class I Equipment**
- **Class II Equipment**
- **Class III Equipment**

This classification is intended for low voltage electrical and electronic equipment connected to an external power supply with regard to protection against electric shock in the event of an insulation failure.

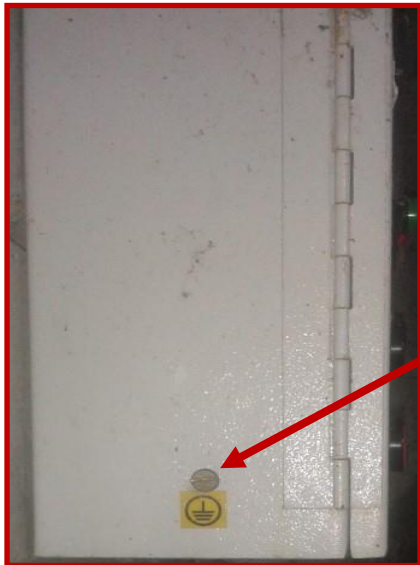
II. CLASSIFICATIONS OF EQUIPMENT:

A. Class O Equipment:

- Any equipment in which protection against electric shock only relies upon the basic insulation (Insulation applied to live parts).
- No connection to accessible conductive parts to the protective conductor (i.e., no external earthing provided to the equipment) and the protection is solely depends on the basic insulation only.
- Due to this uncertainty; this class of equipment's are not being used in any application.

B. Class I Equipment:

- Any equipment in which protection against electric shock does not rely lies on basic insulation and also;
- Provision of additional safety precaution by connecting conductive parts to the protective (earthing) conductor.



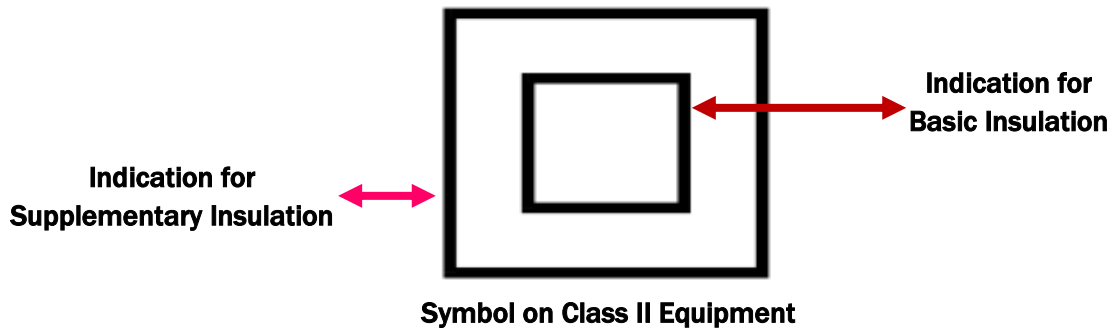
Class I Equipment
Symbol on Panel Board



Symbol on Class I Equipment

C. Class II Equipment:

- An equipment in which protection against electric shock does not rely on basic insulation only, but also provided with additional safety protection such as double insulation or reinforced insulation.
- For these type of equipment's, protective earthing may not be required or reliance upon their installation conditions.



Class II Equipment Symbol on i) Mobile Charger and ii) Induction Stove

D. Class III Equipment:

- An equipment in which protection against electric shock relies on supply at Safety Extra-Low Voltage (SELV) and in which voltages higher than those of SELV are not generated.
- Class III equipment's should not be provided with protective earthing system.



Symbol on Class III Equipment

(Note: SELV – A voltage which does not exceed **50 V AC (rms)** between conductors or between a conductor and earth as per IS: 9409-1980 and **50 V AC or 120 V DC** as per IS: 732-2019).

III. SUMMARY TABLE:

	Class 0	Class I	Class II	Class III
Principal Characteristics	Protection rely on basic insulation only	Protection rely on basic insulation (+)	Protection rely on basic insulation (+)	Operating on safety Extra-Low Voltage
Safety Precaution for earthing	No protective earthing	Protective earthing	Supplementary Insulation	Protective earthing free
Examples	Not in use	Motors, Starters, Panel board	Mobile, laptop chargers, Induction stove	Medical equipment's designed to operate at low voltage

(The above classification has to done according to IS: 9409 – 1980 Reaffirmed 2017)



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