

IP Protection Classification

Introduction

IEC publication 529 'Classification Of Degrees Of Protection Provided By Enclosures' provides a system for specifying the enclosures of electrical equipment on the basis of the degree of protection provided by the enclosure. IEC529 does not specify degrees of protection against mechanical damage of equipment, risk of explosions, or conditions such as moisture, corrosive vapours, fungus or vermin.

NEMA Standards Publication 250 does test for environmental conditions such as corrosion, rust, icing, oil and coolants. For this reason, and because the tests and evaluations for other characteristics are not identical, the IEC Enclosure Classification Designations cannot be exactly equated with NEMA Enclosure Type Numbers.

However, the following sections detail the full IEC IP numbering scheme and the NEMA numbering system and its nearest IP equivalent.

IP Rating

The first characteristic numeral indicates the protection of persons against contact with live or moving parts inside the enclosure and protection of equipment against ingress of solid foreign bodies. Protection against contact with moving parts inside the enclosure is limited to contact with moving parts inside the enclosure which might cause danger to persons.

1st No	Degree Of Protection
0	No protection of persons against contact with live or moving parts inside the enclosure. No protection of equipment against ingress of solid foreign bodies.
1	Protection against accidental or inadvertent contact with live or moving parts inside the enclosure by a large surface of the human body, for example a hand, but not protections against deliberate access to such parts. Protection against ingress of large solid foreign bodies with a diameter greater than 50mm.
2	Protection against contact with live or moving parts inside the enclosure by fingers Protection against ingress of medium size solid foreign bodies with a diameter greater than 12mm.
3	Protection against contact with live or moving parts inside the enclosure by tools, wires or such objects of thickness greater than 2.5mm. Protection against ingress of small solid foreign bodies with a diameter greater than 2.5mm.
4	Protection against contact with live or moving parts inside the enclosure by tools, wires or such objects of thickness greater than 1mm. Protection against ingress of small solid foreign bodies with a diameter greater than 1mm.
5	Complete protection against contact with live or moving parts inside the enclosure. Protection against harmful deposits of dust. The ingress of dust is not totally prevented, but dust cannot enter in an amount sufficient to interfere with satisfactory operation of the equipment enclosed.
6	Complete protection against contact with live or moving parts inside the enclosure. Protection against ingress of dust.

The second characteristic numeral indicates the protection of equipment against ingress of liquid.

2nd No	Degree Of Protection
0	No protection.
1	Protection against drops of condensed water. Drops of condensed water falling vertically on the enclosure shall have no harmful effect.
2	Protection against drops of liquid. Drops of falling liquid shall have no harmful effect when the enclosure is tilted at any angle up to 15 degrees from the vertical.
3	Protection against rain. Water falling in rain at an angle equal to or smaller than 60 degrees with respect to the vertical, shall have no harmful effect.
4	Protection against splashing. Liquid splashed from any direction shall have no harmful effect.
5	Protection against water-jets. Water projected by a nozzle from any direction under stated conditions shall have no harmful effect.
6	Protection against flood conditions on ships' decks (deck watertight equipment). Water from heavy seas shall not enter the enclosures under prescribed conditions.
7	Protection against immersion in water. It must not be possible for water to enter the enclosure under stated conditions of pressure and time.
8	Protection against indefinite immersion (submersion) in water under specified pressure. It must not be possible for water to enter the enclosure.

No indication is given of the protection of equipment against mechanical damage.

It is recommended in IEC 144 that the characteristic letters and numerals be marked on the enclosure.

NEMA Classifications

NEMA Number	IP Equivalent
1	IP10
2	IP11
3	IP54
3R	IP14
3S	IP54
4 & 4X	IP56
5	IP52
6 & 6P	IP67
12 & 12K	IP52
13	IP54



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