

## IP and IK Rating

### Ingress Protection (IP) Rating

The IP system is an internationally recognized method to indicate the degree of protection against the ingress of dust, solid objects and moisture into an enclosure. The letters "IP" are followed by two numerals.

The IP rating has been in use in Europe and other countries outside of North America for many years, and has just recently been added to the Canadian Electrical Code (for hazardous locations). They are similar in intent to the NEMA ratings but there is no direct relationship. These ratings are widely used on portions of enclosures and components, as well as complete enclosures. In North America, the common practice has been to use NEMA enclosure ratings for both water and dust resistance. As the name suggests, these standards were originally developed and published by the National Electrical Manufacturer's Association (NEMA) and have been adopted by UL, CSA and other standards bodies in North America. International Standards use the IEC IP ratings instead of the NEMA ratings.

#### First Numeral

Protection of persons against contact with or approach to live parts and against contact with moving parts, other than smooth rotating shafts and the like, inside the enclosure and protection of the equipment against ingress of solid foreign bodies in accordance with IEC 60598-1:2003.

- 0** Not protected
- 1** Protected against solid objects 50 mm in diameter or greater.  
A large surface of the body, such as a hand (no protection against deliberate access).
- 2** Protected against solid objects 12 mm in diameter or greater.  
Fingers or similar objects not exceeding 80mm in length.
- 3** Protected against solid objects 2.5 mm in diameter or greater.  
Tools, wires, etc., of diameter or thickness greater than 2.5 mm.
- 4** Protected against solid objects 1mm in diameter or greater.  
Wires or other similar solid material of thickness greater than 1mm in diameter.
- 5** Dust protected.  
Dust does not enter in sufficient quantity to interfere with satisfactory operation of equipment.
- 6** Dust tight.  
No ingress of dust

#### Second Numeral

The second numeral indicates the degree of protection against the ingress moisture as defined in IEC 60598-1:2003.

- 0** Not protected
- 1** Protected against dripping water.  
Dripping water (vertically falling drops) shall have no harmful effect.
- 2** Protected against dripping water when tilted up to 15°  
vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle up to 15° from its normal position.
- 3** Protected against spraying water.  
Water falling as a spray at any angle up to 60° from the vertical shall have no harmful effect.
- 4** Protected against splashing water.  
Water splashing against the enclosure from any direction shall have no harmful effect.

- 5 Protected against water jets.  
Water projected by a nozzle against enclosure from any direction shall have no harmful effects.
- 6 Protected against heavy seas.  
Water from heavy seas or projected in powerful water jets shall not enter the enclosure in harmful quantities.
- 7 Protected against the effects of temporary immersion.  
Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time.
- 8 Protected against continuous immersion.  
The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer.

**Note:** Normally, this will mean that the equipment is hermetically sealed. However, with certain types of equipment, it can mean that water can enter but only in such a manner that produces no harmful effects.

### **Impact Protection (IK) Rating**

Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts in accordance with IEC 62262:2002 and IEC 60068-2-75:1997.

**IK00** Not protected

**IK01** Protected against 0.14 joules impact.  
Equivalent to impact of 0.25 kg mass dropped from 56 mm above impacted surface.

**IK02** Protected against 0.2 joules impact.  
Equivalent to impact of 0.25 kg mass dropped from 80 mm above impacted surface.

**IK03** Protected against 0.35 joules impact.  
Equivalent to impact of 0.25 kg mass dropped from 140 mm above impacted surface.

**IK04** Protected against 0.5 joules impact.  
Equivalent to impact of 0.25 kg mass dropped from 200 mm above impacted surface.

**IK05** Protected against 0.7 joules impact.  
Equivalent to impact of 0.25 kg mass dropped from 280 mm above impacted surface.

**IK06** Protected against 1 joules impact.  
Equivalent to impact of 0.25 kg mass dropped from 400 mm above impacted surface.

**IK07** Protected against 2 joules impact.  
Equivalent to impact of 0.5 kg mass dropped from 400 mm above impacted surface.

**IK08** Protected against 5 joules impact.  
Equivalent to impact of 1.7 kg mass dropped from 300 mm above impacted surface.

**IK09** Protected against 10 joules impact.  
Equivalent to impact of 5 kg mass dropped from 200 mm above impacted surface.

**IK10** Protected against 20 joules impact.  
Equivalent to impact of 5 kg mass dropped from 400 mm above impacted surface.