

IP RATING SYSTEM

- IP stands for Ingress Protection
- The rating's first digit, i.e. the "5" in IP56, relates to the ingress protection against dust (5 means dust protected, as in the table below)
The second digit relates to the ingress protection against water (6 means protected against heavy water jets; see the table below)

IP First Digit - Protection Against Solids

| Level | Protection Against Human/Tool Contact | Protection Against Solid Objects (Foreign Bodies) |
|-------|--|---|
| 0 | No special protection | |
| 1 | Back of hand, Fist | Large foreign bodies, >50mm diameter |
| 2 | Finger | Medium-sized foreign bodies, >12 diameter |
| 3 | Tools, thick wires, etc. | Small foreign bodies, >2.5mm diameter |
| 4 | Thin wires, screws, etc. | Granular foreign bodies, >1mm diameter |
| 5 | Complete protection, (limited ingress permitted) | Dust protected; dust deposits are permitted, but their volume must not affect the function of the unit. |
| 6 | Complete protection | Dust-proof |

IP Second Digit - Protection Against Liquids

| Level | Protection Against Water | Protection From Condition |
|-------|--|---------------------------|
| 0 | No special protection | |
| 1 | Water dripping/falling vertically | Condensation/Light rain |
| 2 | Water sprayed at an angle (up to 15° from vertical) | Light rain with wind |
| 3 | Spray water (any direction up to 60° from vertical) | Heavy rainstorm |
| 4 | Splashing/spray water from all directions (limited ingress permitted) | Splashing |
| 5 | Low pressure water jets from all directions (limited ingress permitted) | Hose down, residential |
| 6 | High pressure water jets from all directions (limited ingress permitted) | Hose down, commercial |
| 7 | Submersible (temporary) 15 cm to 1M | Immersion in tank |
| 8 | Permanent Submersion, under pressure over 1 M depth | For use underwater |



IP vs NEMA Ratings

NEMA defines standards for various grades of enclosures. Each is rated to protect against designated environmental conditions such as water, dust, etc. The following is a description of the NEMA ratings, and their approximate IP-rating equivalents.

| NEMA Rating | Definition | Approx. IP Equiv. |
|-------------|---|-------------------|
| 1 | General-purpose. Protects against dust, light, and indirect splashing but is not dust-tight; primarily prevents contact with live parts; used indoors and under normal atmospheric conditions. | IP10 |
| 2 | Drip-tight. Similar to Type 1 but with addition of drip shields; used where condensation may be severe (as in cooling and laundry rooms). | IP11 |
| 3 and 3S | Weather-resistant. Protects against weather hazards such as rain and sleet; used outdoors on ship docks, in construction work, and in tunnels and subways. | IP54 |
| 3R | Intended for outdoor use. Provides a degree of protection against falling rain and ice formation. Meets rod entry, rain, external icing, and rust-resistance design tests. | IP14 |
| 4 and 4X | Watertight (weatherproof). Must exclude at least 65 GPM of water from 1-in. nozzle delivered from a distance not less than 10 ft. for 5 min. Used outdoors on ship docks, in dairies, and in breweries. | IP56 |
| 5 | Dust-tight Provided with gaskets or equivalent to exclude dust; used in steel mills and cement plants. | IP52 |
| 6 and 6P | Submersible. Design depends on specified conditions of pressure and time; submersible in water or oil; used in quarries, mines and manholes. | IP67 |

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|--------------------|--|--------------------------|
| 7 | Hazardous. For indoor use in Class I, Groups A, B, C, and D environments as defined in the NEC. | -- |
| 8 | Hazardous. For indoor and outdoor use in locations classified at Class I, Groups A, B, C, and D as defined in the NEC. | -- |
| NEMA Rating | Definition | Approx. IP Equiv. |
| 9 | Hazardous. For indoor and outdoor use in locations classified as Class II, Groups E, F, or G as defined in the NEC. | -- |
| 10 | MSHA. Meets the requirements of the Mine Safety and Health Administration, 30 CFR Part 18 (1978). | -- |
| 11 | General-purpose. Protects against the corrosive effects of liquids and gases. Meets drip and corrosion-resistance tests. | -- |
| 12 and 12K | General-purpose. Intended for outdoor use, provides some protection against dust, falling dirt, and dripping noncorrosive liquids. Meets drip, dust, and rust resistance tests. | IP52 |
| 13 | General-purpose. Primarily used to provide protection against dust, spraying of water and noncorrosive coolants. Meets oil exclusion and rust resistance design tests. | IP54 |