

CODES AND STANDARDS

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UNDERSTANDING NEMA STANDARDS

The National Electrical Manufacturers' Association (NEMA) is the U.S. organization that has set protection standards for electrical enclosures and is the equivalent to European IP ratings. An enclosure is a surrounding case constructed to provide a degree of protection to personnel against incidental contact with the enclosed equipment (i.e. transformer, motorstarter, relay, & pushbutton contacts) and to provide a degree of protection to the enclosed equipment against specified environmental conditions. The following is a brief description of each NEMA type enclosure. NEMA types 1, 4, 7, 9 & 12 are the most common types of enclosures used by industry and are more readily available.

- NEMA 1** **GENERAL PURPOSE:** These enclosures are suitable for general purpose applications indoors where atmospheric conditions are normal. These enclosures are primarily used to prevent accidental contact of personnel with the enclosed equipment. They also serve as protection against falling dust, but are not dust tight.
- NEMA 2** **DRIP-TIGHT:** Drip-tight (indoor) enclosures are similar to Type 1 enclosures, with the addition of drip shields, and are suitable for application where condensation may be severe, such as that encountered in cooling rooms and laundries.
- NEMA 3** **WEATHER RESISTANT:** Type 3 weather resistant enclosures provide protection against "windblown" dust and weather hazards such as rain, sleet, or snow. Type 3R enclosures provide protection against "falling" rain and sleet. Both provide protection against external ice formation. They are suitable for application outdoors on ship docks, construction work, subways, and tunnels or indoors where dripping water is a problem.
- NEMA 4** **WATERTIGHT/DUST TIGHT:** These enclosures are intended for indoor or outdoor use to provide protection against windblown dust and rain, splashing water, and hose directed water from any angle, however, they are not submersible. They are suitable for application in dairies, breweries, etc.
- NEMA 4X** **CORROSION RESISTANT:** These enclosures satisfy the same requirements of Type 4 with the addition of being corrosion resistant. They are typically made of stainless steel or polymer materials and are suitable for food processing plants, dairies, refineries, and other industries where corrosion is prominent.
- NEMA 5** **DUST TIGHT:** These enclosures are intended for use indoors to provide protection against settling non hazardous airborne dust, falling dirt, and dripping of non-corrosive liquids. Suitable for application in cement or steel mills.
- NEMA 6** **SUBMERSIBLE:** Submersible enclosures are suitable for application where the equipment may be subject to submersion, such as quarries, mines, and manholes. Type 6 enclosures are for "temporary" submersion at a limited depth and Type 6P enclosures are for "prolonged" submersion at a limited depth.
- NEMA 7** **HAZARDOUS LOCATIONS (Class I, Groups A, B, C, & D):** Explosion proof enclosures suitable for atmospheres containing flammable gases and vapors such as acetylene, hydrogen (and other manufactured gases), ether, gasoline, naphtha, propane, acetone, ammonia, natural gas, or isoprene.
- NEMA 8** **HAZARDOUS LOCATIONS (Class I, Groups A, B, C, & D):** Protection against flammable gases and vapors provided by oil immersion such as oil circuit breakers.
- NEMA 9** **HAZARDOUS LOCATIONS (Class II, Groups E, F, & G):** Enclosures suitable for atmospheres containing combustible dusts such as metal dust, coal dust, flour and grain dust.
- NEMA 10** **HAZARDOUS LOCATIONS (Bureau of Mines):** Explosion proof enclosures suitable for application in gassy coal mines.
- NEMA 11** **ACID/FUME RESISTANT:** Enclosures intended for use indoors to provide, by oil submersion, a degree of protection against corrosive liquids and gases such as acid. Suitable for application in chemical plants, plating rooms, sewage plants, etc.
- NEMA 12** **DUST TIGHT/DRIPTIGHT:** Industrial enclosures intended for use indoors to provide protection against fibers, flyings, lint, dust, dirt, seepage, dripping and external condensation of non-corrosive liquids.
- NEMA 13** **DUSTTIGHT/OILTIGHT:** Industrial enclosures intended for use indoors to provide protection against lint, dust, seepage, external condensation, and spraying of water, oil, or coolant such as machine tools or other processing machines.