

Sales Engineering Technical Paper Series

NEMA Ratings For Electrical Enclosures

A large source of confusion when dealing with electrical enclosures is the NEMA rating, or how much protection the enclosure offers. The following is a discussion on the definitions of various NEMA ratings, materials and finishes, and available options. Understanding the different ratings will ensure the most cost effective enclosure is selected.

The National Electrical Manufacturers Association, (NEMA), is an organization that has established standards for various electrical components. "NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum)" is a published document that describes the enclosure types, their construction, accessories, and testing methods. Some of the various NEMA ratings described in NEMA 250 are listed below. Each description is followed by unique characteristics and typical applications. This list does not include all of the NEMA enclosure ratings, but it does cover the most frequently used enclosure types for use in non-hazardous locations. (*Installations in services above 1000 volts and/or hazardous locations are beyond the scope of this paper.*)

Commercial

Type 1 – Enclosures for **indoor** use offering a degree of protection to the interior equipment against solid foreign objects (falling dirt). *Non-gasketed, pull and junction boxes.*

Type 3 – Enclosures for **indoor or outdoor** use offering a degree of protection to the interior equipment against solid foreign objects (falling dirt and windblown dust) and water (rain, sleet, snow), and the enclosure will be undamaged by external ice formation. *Gasketed, electrical or telephone pull or junction boxes, termination cabinets.*

Type 3R – Enclosures for **indoor or outdoor** use offering a degree of protection to the interior equipment against solid foreign objects (falling dirt) and water (rain, sleet, snow), and the enclosure will be undamaged by external ice formation. *Non-gasketed, rain hood, electrical or telephone pull boxes, termination cabinets.*

Industrial

Type 4 – Enclosures for **indoor or outdoor** use offering a degree of protection to interior equipment against solid foreign objects (windblown dust) and water (rain, sleet, snow, splashing water, and hose directed water), and the enclosure will be undamaged by external ice formation. *Gasketed, hose down conditions, non-corrosive outdoor environments.*

Type 4X – Enclosures for **indoor or outdoor** use offering a degree of protection to equipment inside the enclosure against solid foreign objects (windblown dust) and water (rain, sleet, snow, splashing water, and hose directed water), providing protection against corrosion, and the enclosure will be

undamaged by external ice formation. *Gasketed, hose down environment, harsh chemical or extreme weather applications, stainless steel, aluminum, non-metallic.*

Type 12 – Enclosures intended for **indoor** use providing a degree of protection to interior equipment against circulating dust, falling dirt, and dripping non-corrosive liquids. *Gasketed, dust-tight, indoor industrial environment.*

Type 13 – Enclosures intended for **indoor** use providing a degree of protection to interior equipment against dust, sprayed water, oil, and non-corrosive coolant. *Gasketed, dust-tight, severe indoor industrial environment.*

FYI: Enclosures with a dual classification, i.e. Type 12/13, satisfy the protection requirements for the stricter of the two ratings, but can meet the customer's pricing requirements of the less-strict unit.

Enclosures must be made of a material or contain a finish that will provide a degree of protection against corrosion. The standard material for indoor or outdoor rated enclosures is carbon steel. Applying a pre-galvanized, painted, or any other equivalent finish will provide the necessary protection for indoor enclosures. However, outdoor units must be hot-dipped galvanized, electrodeposited zinc coated, painted, or a combination. An exception to this is the corrosion resistant NEMA 4X enclosures, which do not require an additional finish.

Another important part of choosing the proper enclosure is the aesthetics. Different styles offer variations in the cover/door attachment, construction, mounting, and penetrations in the unit. For instance, three NEMA Type 12 enclosure styles are shown.



Premier Series



NEMA Style



JIC Style

There are a number of accessories available for the different sizes, styles, and materials of enclosures. Some of these accessories include interior panels, door locking kits, conduit fittings, and climate control products. A very important note is that the accessory must be able to maintain the NEMA rating of the enclosure after installation.

Although there are many factors when selecting the proper electrical enclosure, the primary question should be; what is the required NEMA rating? Knowing this will help you to make the proper decision on style, options, and also make the best economic choice.