

What do they mean?

In the United States and Canada, NEMA, UL, and CSA are the organizations generally recognized. Their ratings are based on similar application descriptions and expected performance. UL and CSA both require the enclosure to be tested in their labs. Both organizations can also send site inspectors to ensure that the manufacturer is conforming to the correct manufacturing methods and material specifications. NEMA does not require testing, and the responsibility is with the manufacturer to ensure the products meet the NEMA ratings.

IP Ratings.

The first number defines the level of protection against penetration of solid objects into the housing.

The second number defines the level of protection against penetration of liquids into the housing.

IP s /

s = solids and l=liquids

Number	Degree of Protection	Number	Degree of Protection
0	No protection against contact or entry of solids.	0	No protection.
1	Protection against accidental contact by hand, but not deliberate contact. Protection against large objects. (greater than 50mm)	1	Protection against drops of condensed water. Condensed water falling on housing shall have no effect.
2	Protection against contact by fingers. Protection against medium-size foreign objects. (greater than 12mm)	2	Protection against drops of liquid. Drops of falling liquid shall have no effect when housing is tilted to 15 degrees from vertical.
3	Protection against contact by tools, wire, etc. Protection against small foreign objects. (greater than 2.5mm)	3	Protection against rain. No harmful effect from rain at angle less than 60 degrees from vertical.
4	Protection against contact by small tools and wires. Protection against small foreign objects. (greater than 1mm)	4	Protection against splashing from any direction.
5	Complete protection against contact with live or moving parts. Protection against harmful deposits of dust.	5	Protection against water jets from any direction.
6	Complete protection of live or moving parts. Protection against penetration of dust.	6	Protection against conditions on ships' decks. Water from heavy seas will not enter.
		7	Protection against immersion in water. Water will not enter under stated conditions of pressure and time.
		8	Protection against indefinite immersion in water under a specified pressure.

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What do they mean?

There are many NEMA ratings available for enclosures. Below, is a brief explanation of each NEMA rating.

NEMA 1

Type 1 enclosures are intended for indoor use primarily to provide a degree of protection against contact with the enclosed equipment or locations where unusual service conditions do not exist.

NEMA 2

Type 2 enclosures are intended for indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.

NEMA 3

Type 3 enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, and sleet; and to be undamaged by the formation of ice on the enclosure.

NEMA 3R

Type 3R enclosures are intended for outdoor use primarily to provide a degree of protection against falling rain; and to be undamaged by the formation of ice on the enclosure.

NEMA 4

Type 4 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose directed water; and to be undamaged by the formation of ice on the enclosure.

NEMA 4X

Type 4X enclosures are intended for indoor and outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water; and to be undamaged by the formation of ice on the enclosure.

NEMA 6

Type 6 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against the entry of water during temporary submersion at a limited depth; and to be undamaged by the formation of ice on the enclosure.

NEMA 7

Type 7 enclosures are for indoor use in locations classified as Class I, Groups A, B, C, or D, as defined in the National Electrical Code.

Type 7 enclosures shall be capable of withstanding the pressures resulting from an internal explosion of specified gases, and contain such an explosion sufficiently that an explosive gas-air mixture existing in the atmosphere surrounding the enclosure will not be ignited. Enclosed heat generating devices shall not cause external surfaces to reach temperatures capable of igniting explosive gas-air mixtures in the surrounding atmosphere. Enclosures shall meet explosion, hydro-static, and temperature design tests.

NEMA 9

Type 9 enclosures are intended for indoor use in locations classified as Class II, Groups E, F, or G, as defined in the National Electrical Code.

Type 9 enclosures shall be capable of preventing the entrance of dust. Enclosed heat generating devices shall not cause external surfaces to reach temperatures capable of igniting or discoloring dust on the enclosure or igniting dust-air mixtures in the surrounding atmosphere. Enclosures shall meet dust penetration and temperature design tests, and aging of gaskets (if used).

NEMA 12

Type 12 enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping noncorrosive liquids.

NEMA 13

Type 13 enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and noncorrosive coolant.