Explanation Of NEMA Ratings

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

NEMA 1 General Purpose - Indoors

Type 1 enclosures are intended for general purpose 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 Drip Proof - Indoors

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

NEMA 3 Dust Tight, Rain Tight, & Ice/Sleet resistant - Outdoors

Type 3 enclosures are intended for general purpose 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 Rain Proof & Ice/Sleet Proof - Outdoors

Type 3R enclosures are intended for general purpose 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 3S Dust Tight, Rain Tight, & Ice/Sleet Proof - Outdoors

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

NEMA 4 Water Tight & Dust Tight - Indoors

Type 4 enclosures are intended for general purpose 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 Water Tight, Dust Tight, & Corrosion Resistant - Indoors

Type 4X enclosures are intended for general purpose 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NEMA 5 Superseded by NEMA 12 for Control Apparatus

Type 5 see NEMA 12

NEMA 6 Submersible, Water Tight, Dust Tight, & Ice/Sleet Resistant - Indoors & Outdoors

Type 6 enclosures are intended for general purpose 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 Underwriters Lab Class 1-Groups C&D -Explosion Proof - Indoors

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 8 Underwriters Lab Class 1-Groups C&D -Explosion Proof - Indoors

Type 8 is same as NEMA 7, except the unit is oil-immersed

NEMA 9 Underwriters' Lab Class II - Groups E,F,G - Indoors

Type 9 enclosures are intended for special purpose indoor use in locations classified as hazardous (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 10 Bureau of Mines

NEMA 11 Corrosion Resistant & Drip Proof - Oil Immersed - indoors

NEMA 12 Industrial Use - Dust Tight & Drip Tight - Indoors

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

NEMA 13 Oil Tight & Dust Tight - Indoors

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

This is a cross reference for comparing NEMA and IP enclosure ratings. This comparison is only approximate, and it is the responsibility of the user to verify the enclosure rating necessary for the given application.

NEMA Rating	IP Rating 23	30	32	55	64	65	66	67
1	●							
2		●						
3					●			
4							●	
4X							●	
6								●
12				●		●		
13						●		

Explanation Of IP Ratings

The protection of enclosures against ingress of dirt or against the ingress of water is defined in IEC529 (BSEN60529:1991). Conversely, an enclosure which protects equipment against ingress of particles will also protect a person from potential hazards within that enclosure, and this degree of protection is also defined as a standard.
The degrees of protection are most commonly expressed as “IP” followed by two numbers, e.g. IP65, where the numbers define the degree of protection. The first digit (Foreign Bodies Protection) shows the extent to which the equipment is protected against particles, or to which persons are protected from enclosed hazards. The second digit (Water Protection) indicates the extent of protection against water. The wording in the table is not exactly as used in the standards document, but the particle diameters are accurate.
The first digit in the rating is the protection against contact and foreign bodies. The second digit in the rating is the water protection factor.

1st Index - Foreign Bodies Protection / Solids

	Protection Against Human / Tool Contact	Protection Against Solid Objects / Foreign Bodies
0	No special protection	
1	Back of hand, Fist	Large foreign bodies, diam. >50mm
2	Finger	Medium-sized foreign bodies, diam. >12
3	Tools and wires etc with a thickness >2.5mm	Small foreign bodies, diam. >2.5mm
4	Tools and wires etc with a thickness >1mm	Granular foreign bodies, diam. >1mm
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

2nd Index - Water Protection / Liquids

	Protection Against Water	Protection Against Conditions
0	No special protection	
1	Water dripping or falling vertically	Condensation or light rain
2	Water sprayed at angle up to a 15^{o} degrees from vertical	Light rain with wind
3	Water sprayed any direction up to 60^{o} degrees from vertical	Heavy rainstorm
4	Water spray from any direction (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	Hose down, commercial (ship decks)
7	Temporary immersion, 15cm to 1 meter	Immersion in tank
8	Permanent immersion, under pressure	Titanic recovery vehicle