

NEMA FAQs: Enclosures

This document answers frequently asked questions regarding NEMA enclosure types. For further information or to submit a question, please contact Program Manager [Kezhen Shen](#) via email, phone (703.841.3288), or fax (703.841.3388).

1. [Where can I find information about the NEMA Type enclosure ratings?](#)
 2. [What are the size specifications for NEMA enclosures?](#)
 3. [Can I buy NEMA enclosures directly from NEMA?](#)
 4. [Where can I download CAD files for NEMA enclosures and/or buy NEMA enclosures?](#)
 5. [Can I get NEMA to test my enclosure or provide a listing or certification?](#)
 6. [Who can test my enclosures for me?](#)
 7. [Can I get labels from NEMA to apply to my enclosures to indicate self-certification?](#)
 8. [Can I put a NEMA logo on my product or literature since I am self-certifying to the NEMA standard?](#)
 9. [Can I self-certify more than one NEMA Type rating on my enclosure?](#)
 10. [Which NEMA Type ratings correspond to environmental descriptions such as "RAINPROOF", "DRIPTIGHT", "DUSTTIGHT", "WET LOCATIONS", etc?](#)
 11. [Is there a cross reference between NEMA Types and IEC 60529 IP degree enclosure ratings?](#)
 12. [Can the testing used to determine an IEC 60529 IP rating be correlated to NEMA 250 dust and water performance testing?](#)
 13. [How do the water test parameters compare between NEMA 250 hose testing and IEC 60529 IP hose testing?](#)
 14. [Why is a Type 4X enclosure required to pass only a 200-hour salt spray test while outdoor enclosures are required to pass a 600-hour salt spray test?](#)
 15. [Is it necessary to field test an enclosure with the fittings in place if that enclosure has openings intended to be closed upon installation, such as for conduit connection?](#)
 16. [I have several enclosures that I want to wall-mount by drilling through the back of the enclosure's electrical cavity and then sealing around the mounting holes with silicon. Is this an acceptable method?](#)
 17. [Are NEMA enclosures rated for arc flash?](#)
 18. [What is the difference between NEMA 250 Type ratings versus UL 50E and CSA-C22.2 No. 94.2 Enclosure Types?](#)
 19. [Can IEC 60529 IP degree enclosure ratings be used in United States electrical installations in place of NEMA 250 Type ratings or UL 50E Enclosure Types?](#)
-
1. **Where can I find information about the NEMA Type enclosure ratings?**

The NEMA website provides a general description of enclosure Types at www.nema.org/prod/be/enclosures/upload/NEMA_Enclosure_Types.pdf. For a complete description of enclosures, including construction, testing, rating and marking requirements, you will need the NEMA 250 standard. It is available for purchase from [IHS](#), [ANSI](#), and [Techstreet](#).

2. What are the size specifications for NEMA enclosures?

There are no standard sizes for NEMA enclosures. The *NEMA 250* standard provides construction, testing, rating and marking requirements, but each manufacturer designs their own enclosures of any size. Furthermore, NEMA Type ratings can and do apply as well to the enclosures of many end-products other than solely cabinets and boxes.

3. Can I buy NEMA enclosures directly from NEMA?

NEMA does not manufacture or sell enclosures.

4. Where can I download CAD files for NEMA enclosures and/or buy NEMA enclosures?

Information about NEMA Member organizations that manufacture enclosures can be found at <https://www.nema.org/Products/Pages/Enclosures.aspx>.

5. Can I get NEMA to test my enclosure or provide a listing or certification?

NEMA standards are voluntary. NEMA is a Standards Development Organization (SDO), but is not a testing laboratory or a Certification Body (CB). Therefore, NEMA neither tests products nor certifies for listing that a product complies with a given NEMA standard or with any other organization's standards. A manufacturer can choose to self-certify that the product meets the enclosure requirements of *NEMA 250* or to seek independent, third-party certification (evaluation and testing) that the product complies with the NEMA standard. This manufacturer's decision is based on the requirements of the marketplace, e.g., a CB listing or mark may be required by a customer or by the Authority Having Jurisdiction (AHJ).

6. Who can test my enclosures for me?

NEMA is not affiliated with Certification Bodies or testing laboratories. To see a listing of testing facilities, go to <https://www.nema.org/Technical/The-ABCs-of-Conformity-Assessment/Pages/Useful-Links-Product-Testing-and-Certification.aspx>.

7. Can I get labels from NEMA to apply to my enclosures to indicate self-certification?

No, NEMA does not provide labeling attesting to self-certification. NEMA is not Certification Body (CB).

8. Can I put a NEMA logo on my product or literature since I am self certifying to the NEMA standard?

No, the NEMA mark is a registered trademark of the National Electrical Manufacturers Association for its trade association services, and for its standards and publications, and it is to be used solely in connection with designating the National Electrical Manufacturers Association as the source of those goods and services. NEMA's registered trademark is not a certification or conformity assessment mark.

Members of NEMA are entitled to use the NEMA Member mark to signify dues-paying membership in NEMA; however, use of the NEMA Member mark must not be in close proximity to marks indicating certification or conformity assessment of specific products.

Everyone is permitted to identify complying self-certified products as "NEMA 4", or "NEMA 3R", etc. to signify a particular classification of product, both on the product and

within literature, but the NEMA registered trademark itself shall not be used in conjunction with that enclosure Type self-declaration.

9. Can I self-certify more than one NEMA Type rating on my enclosure?

Enclosures that meet the requirements for more than one type rating may be designated by a combination of type numbers, the smaller number being given first. The designation may include a combination of indoor, outdoor, hazardous location, and non-hazardous location ratings and any enclosure ratings conditional restrictions (e.g., “NEMA 4X Only When Door Closed”) if they apply.

10. Which NEMA Type ratings correspond to environmental descriptions such as “RAINPROOF”, “DRIPTIGHT”, “DUSTTIGHT”, “WET LOCATIONS”, etc.?

The *NEMA 250* standard cross references some descriptive environmental ratings to enclosure Type ratings. The *NEMA 250* standard is available from IHS, ANSI, and Techstreet. Other cross references can be found in *NFPA 70®*, *National Electrical Code®*.

11. Is there a cross reference between NEMA Types and IEC 60529 IP degree enclosure ratings?

It is not possible to state that an IP degree rating is equivalent to a NEMA Type designation. An IP degree rating only considers protection against ingress of solid foreign objects and ingress of water. The NEMA Types consider these protections but also consider other characteristics such as icing, and corrosion- and lubricant-resistance, and construction details. For this reason, it is possible to say that a NEMA Type rating meets or exceeds an IP degree rating, but it is not possible to state that an IP degree rating is equivalent to a NEMA Type. Furthermore, the enclosure Type ratings of *NEMA 250* standard require that the enclosures are fully installed and ready-for-use, whereas IP degree ratings may apply to partially completed states of installation. Additional information is available from the [NEMA website](#).

12. Can the testing used to determine an IEC 60529 IP rating be correlated to NEMA 250 dust and water performance testing?

The *NEMA 250* standard has correlation tables for this. Acceptance of such test data and the testing methodology by an independent, third-party Certification Body is a certification decision made solely by that CB; NEMA does not accredit or audit CBs. The *NEMA 250* standard is available from [IHS](#), [ANSI](#), and [Techstreet](#).

13. How do the water test parameters compare between NEMA 250 hose testing and IEC 60529 IP hose testing?

See the table below.

Test	Nozzle Diameter		Nozzle Area		Nozzle Pressure		Flow Rate		Fluid Velocity		Force on Plate		Pump power ^[1]		
	(mm)	(in)	(mm ²)	(in ²)	(kPa)	(psi)	(L/min)	(gal/min)	(m/s)	(ft/s)	(N)	(lbf)	(W)		
Type 3	25.40	1.0	506.71	0.785	15.59	2.26	170.0	45.0	5.59	18.38	15.89	3.57	52.0		
IP X5	6.30	0.25	31.17	0.048	22.27	3.23	12.5	3.3	6.68	21.92	1.39	0.31	5.5		
Type 4	25.40	1.0	506.71	0.785	31.06	4.51	240.0	65.0	7.89	26.54	33.15	7.45	146.2		
IP X6	12.50	0.49	122.72	0.190	91.95	13.34	100.0	26.42	13.58	44.55	22.61	5.08	180.3		
	A	B	A	B											
IP X9	1.50	0.75	0.06	0.03	3.53	0.006	2494.25	361.75	15.0	4.0	70.74	230.70	17.73	3.99	733.6

[1] Assumes 85% efficiency

Test	Distance From Sample		Nozzle Direction	Test Duration	Pass Criteria
	(m)	(ft)			
Type 3	3.0 - 3.7	10 - 12	Seams, Joints, Operating Mechanisms	Nozzle shall be moved along each test point at a rate of 0.25 in./sec (6.35 mm/sec)	Ingress Not Allowed
IP X5	2.5 - 3	8.2 - 9.8	All Directions	1 min/m ² of enclosure surface (minimum 3 minutes)	Ingress Allowed ^[4]
Type 4	3.0 - 3.7	10 - 12	Seams, Joints, Operating Mechanisms	Nozzle shall be moved along each test point at a rate of 0.25 in./sec (6.35 mm/sec)	Ingress Not Allowed
IP X6	2.5 - 3	8.2 - 9.8	All Directions	1 min/m ² of enclosure surface (minimum 3 minutes) 30 seconds per position ^[2]	Ingress Allowed ^[4]
IP X9	0.1 ^[2] - 0.2 ^[3]	0.33 - 0.65	0°, 30°, 60°, 90° ^[2] All Directions ^[3]	1 min/m ² of enclosure surface excluding mounting surfaces (minimum 3 minutes) ^[3]	Ingress Allowed ^[4]

[2] For turntable method on small enclosures.

[3] For large enclosures.

[4] Shall not be sufficient to interfere with operation, deposit on insulation parts, reach live parts, or accumulate near cable ends.

14. Why is a Type 4X enclosure required to pass only a 200-hour salt spray test while outdoor enclosures are required to pass a 600-hour salt spray test?

NEMA 250 test requirements state that all outdoor enclosures and concurrently a G90 galvanized sheet steel test specimen are subjected to 600 hours of salt spray and the enclosures are compared to that G90 galvanized sheet steel test specimen.

In accordance with Table 5-1D, after the aforementioned 600-hour salt spray test exposure and comparison, Type 4X enclosures (as well as Type 3RX, 3X, 3SX, and 6P enclosures) and concurrently an American Iron & Steel Institute (AISI) type 304 stainless steel test specimen, are additionally subjected to another 200 hours of salt spray and then these corrosion resistant enclosures are compared to that AISI type 304 stainless steel test specimen.

15. Is it necessary to field test an enclosure with the fittings in place if that enclosure has openings intended to be closed upon installation, such as for conduit connection?

The fittings are to be independently tested to a Type rating equal to or better than the enclosure's Type rating on which they are intended to be installed. The assembly of the enclosure with the fittings installed is not required to be field tested. A field-installed assembly's overall Type rating is always limited by the least severe Type rating of all the components involved ("the weakest link in the chain").

16. I have several enclosures that I want to wall-mount by drilling through the back of the enclosure's electrical cavity and then sealing around the mounting holes with silicon. Is this an acceptable method?

NEMA 250 states that a number of Type-rated enclosures require a mounting means external to the equipment enclosure's electrical cavity unless an intermediate bracket or foot is used. The final installation is always subject to the approval of the AHJ (i.e., the Authority Having Jurisdiction, typically a local electrical inspector).

17. Are NEMA enclosures rated for arc flash?

No, *NEMA 250* does not address arc flash. Arc flash protection requirements are described in *NFPA 70E®*, *Standard for Electrical Safety in the Workplace*. *NFPA 70E®* requires personal protective equipment and clothing if the operator intends to open an electrical enclosure containing voltage greater than 50 Vac. There are no tests specified in either *NEMA 250* or *NFPA 70E®* that rate generically an enclosure's resistance to arc flash energy. Also see *IEEE C37.20.7*, *IEEE Guide for Testing Switchgear Rated Up to 52 kV for Internal Arcing Faults*.

18. What is the difference between NEMA 250 Type ratings versus UL 50E and CSA-C22.2 No. 94.2 Enclosure Types?

NEMA 250 is an ANSI standard used for self-declaration of enclosure Type ratings. Further, *ANSI/NEMA 250* may be used by the Certification Body (CB) at the discretion of the certifier. In addition to covering the requirements for NEMA Type enclosure ratings suitable for non-hazardous (unclassified) locations, i.e., Types 1, 2, 3R, 3RX, 3, 3X, 3S, 3SX, 4, 4X, 5, 12, 12K and 13, *ANSI/NEMA 250* also covers the requirements for Type 7 and 9 enclosure ratings for hazardous (classified) locations. *ANSI/NEMA 250* addresses requirements for field modifications of electrical enclosures and provides a cross-reference annex of which NEMA Type enclosure ratings are capable of meeting or exceeding which *IEC 60529* IP degree enclosure ratings.

ANSI/UL 50E and *CSA-C22.2 No. 94.2* are a single standard bearing two covers, an *ANSI/UL* cover as a U.S. National Standard and a *CSA* cover as a Canadian National Standard, published by Underwriters Laboratories and *CSA* Group as Standards Development Organizations (SDOs) and used for evaluating and listing electrical enclosures by *UL LLC* and *CSA Group* operating as Certification Bodies (CBs). *ANSI/UL 50E* and *CSA-C22.2 No. 94.2* do not address enclosure requirements for hazardous (classified) locations and do not provide any cross-reference as to which Enclosure Type ratings are capable of meeting or exceeding which *IEC 60529* IP degree enclosure ratings.

19. Can IEC 60529 IP degree enclosure ratings be used in United States electrical installations in place of NEMA 250 Type ratings or UL 50E Enclosure Types?

No. *NEC®* Section 110.28 states "IP ratings are not a substitute for Enclosure Type ratings."