

## Overview on enclosures environmental protection ratings: comparison between UL, NEMA and IEC.

The scope of this whitepaper is to briefly explain the differences between UL, NEMA and IEC Environmental protection ratings of enclosures and enclosures accessories.

*Underwriter Laboratories® (UL)* is an independent product safety certification organization that tests product and writes standards.

*The International Electrotechnical Commission (IEC)* is the world's leading organization that prepares and publishes International Standards for all electrical, electronic and related technologies — collectively known as electrotechnology.

*National Electrical Manufacturer's Association (NEMA)* promotes the competitiveness of the US electrical product industry through the development of standards, advocacy in federal and state legislatures and executive agencies, and the collection and analysis of economic data.

Below are the common aspects about environmental Type rating and IP ratings:

- the degree of protection to persons against incidental contact with hazardous part inside the enclosure;
- the degree of protection of the enclosures against the ingress of solid objects or dust;
- the degree of protection of the enclosures against water.

Additional requirements of Type vs IP ratings are:

- construction requirements;
- door and cover securement;
- corrosion resistance;
- effects of icing;
- gasket aging and oil resistance;
- coolant effects

Electrical enclosures tested with IP ratings are not tested with the additional Type rating requirements, while UL Type ratings are based on and are very similar to NEMA Type ratings, the IEC IP ratings cannot be compared.



Although a one-way relationship exists between Type ratings and IP ratings, if the type rating is defined, then we can deduce the IP rating by the table below.

**CONVERSION OF NEMA ENCLOSURE TYPE RATINGS TO IEC 60529 ENCLOSURE CLASSIFICATION DESIGNATIONS (IP)**  
(CANNOT BE USED TO CONVERT IEC CLASSIFICATION DESIGNATIONS TO NEMA TYPE RATINGS)

IP First Character	NEMA Enclosure Type														IP Second Character
	1	2	3	3R	3S	4	4X	5	6	6P	12	12K	13		
IP0															IP_0
IP1															IP_1
IP2															IP_2
IP3															IP_3
IP4															IP_4
IP5															IP_5
IP6															IP_6
															IP_7
															IP_8
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	

A = A shaded block in the "A" column indicates that the NEMA Enclosure Type exceeds the requirements for the respective IEC 60529 IP First Character Designation. The IP First Character Designation is the protection against access to hazardous parts and solid foreign objects.  
B = A shaded block in the "B" column indicates that the NEMA Enclosure Type exceeds the requirements for the respective IEC 60529 IP Second Character Designation. The IP Second Character Designation is the protection against the ingress of water.

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Fandis filter fans are tested and carry both Type and IP ratings.

A distinction must be made between the NEMA Type rating and the UL Type rating: the NEMA type rating is defined by an institution that makes standards but does not test or inspect products, while UL type rating is defined by a laboratory that issues certifications. Like IEC, NEMA Type rating is a self-certification process. The customer either conducts testing in-house or utilizes a third-party testing facility. On the other hand, UL performs the test and certifies the products, guarantee the mark surveillance and has follow-up service procedures. The table below explain the differences between the UL and NEMA type ratings reference standards and test method performed, in the case of Type 12 and 3R.

NEMA		UL	
NEMA 250 std.		UL 50 std.	UL 50E std.
definition	test	definition	test
NEMA Type 12	Drip Test Spray Test	UL Type 12	Atomized-water test Spray Test
NEMA Type 3R	Rain test	UL Type 3R	Rain test

Fandis filter fans are UL Type 12 or 3R certified, not NEMA Type 12 or 3R

Fandis tested the environmental type rating during the UL certification of the filter fans. Since UL does not recognize NEMA 250, they apply UL 50E, we do not show a "NEMA Type 3R" designation on our filter fans, but "Type 3R" near the UL mark on the product label, i.e. UL Type 3R.

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Please contact your local Fandis sales office for any questions you might have on Fandis' line of products.