

# NEMA Ratings & IP Cross-Reference

This table provides a guide for converting from NEMA Enclosure Type Numbers to IP Ratings. The NEMA Types meet or exceed the test requirements for the associated European Classifications; for this reason the table should not be used to convert “from IP Rating to NEMA” and the “NEMA to IP Rating” should be verified by test.

NEMA Type	Intended Use and Description	NEMA Ratings and IP Cross-Reference
1	Indoor use primarily to provide a degree of protection against contact with the enclosed equipment and against a limited amount of falling dirt.	NEMA 1 meets or exceeds IP10
2	Indoor use to provide a degree of protection against a limited amount of falling water and dirt.	NEMA 2 meets or exceeds IP11
3	Intended for outdoor use primarily to provide a degree of protection against rain, sleet, windblown dust, and damage from external ice formation.	NEMA 3 meets or exceeds IP54
3R	Intended for outdoor use primarily to provide a degree of protection against rain, sleet, and damage from external ice formation.	NEMA 3R meets or exceeds IP14
3S	Intended for outdoor use primarily to provide a degree of protection against rain, sleet, windblown dust, and to provide for operation of external mechanisms when ice laden.	NEMA 3S meets or exceeds IP54
4	Intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water, and damage from external ice formation.	NEMA 4 meets or exceeds IP56
4X	Intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water, and damage from ice formation.	NEMA 4X meets or exceeds IP56
6	Intended for indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during occasional temporary submersion at a limited depth, and damage from external ice formation.	NEMA 6 meets or exceeds IP67
6P	Intended for indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during prolonged submersion at a limited depth, and damage from external ice formation.	NEMA 6P meets or exceeds IP67
12	Intended for indoor use primarily to provide a degree of protection against circulating dust, falling dirt, and dripping non-corrosive liquids.	NEMA 12 meets or exceeds IP52
12K	Type 12 with knockouts.	NEMA 12K meets or exceeds IP52

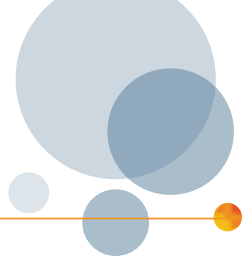
## Wire Size Cross Reference

AWG	mm <sup>2</sup>
14	2.1
12	3.3
10	5.3
8	8.4
6	13.3
4	21.2
3	26.7
2	33.6
1	42.4
1/0	53.5
2/0	67.4
3/0	85.0
4/0	107.2

kcmil/mcm	mm <sup>2</sup>
250	127
300	152
350	177
400	203
500	253
600	304
700	355
750	380
800	405
900	456
1000	507
1250	633
1500	760
1750	887
2000	1014

# Degrees of Protection

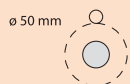

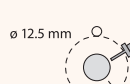







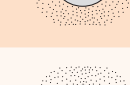


## (IP Codes According to IEC 60529 Standard)



The degrees of protection are defined by two numbers and sometimes by an additional letter.

For example: IP 55 or IP xx B (x indicates: any value).

The numbers and additional letters are defined below:

First Number Protection Against Solid Body Penetration			Second Number Protection Against Liquid Penetration			Additional Letter <sup>(2)</sup>	Degree of Protection Brief Description
IP	Tests		IP	Tests			
0		No protection	0		No protection		
1		Protected against solid bodies greater than 50 mm	1		Protected against water drops falling vertically (condensation)	A	Protected against access with back of hand
2 <sup>(1)</sup>		Protected against solid bodies greater than 12 mm	2		Protected against water drops falling up to 15° from the vertical	B	Protected against access with finger
3		Protected against solid bodies greater than 2.5 mm	3		Protected against water showers up to 60° from the vertical	C	Protected against access with tool
4		Protected against solid bodies greater than 1 mm	4		Protected against water splashes from any direction	D	Protected against access with wire
5		Protected against dust (excluding damaging deposits)	5		Protected against water jets from any hosed direction		
6		Total protection against dust	6		Protected against water splashes comparable to heavy seas		
			7		Protected against total immersion		

Note:

(1) This is established by 2 tests:

- non penetration of a sphere with the diameter of 12.5 mm
- non accessibility of a test probe with a diameter of 12 mm.

(2) This additional letter only defines the access to dangerous components

Example: A device has an aperture allowing access with a finger. This will not be classified as IP 2x. However, if the components which are accessible with a finger are not dangerous (electric shock, burns, etc.), the device will be classified as xx B.