

# Technical Reference

## NEMA Type Designations

### Environmental ratings for enclosures based on "NEMA" Type designations

#### "NEMA" Types From UL50 & UL508

Enclosure Type Designation	Intended Use and Description
1	Indoor use primarily to provide a degree of protection against limited amounts of falling dirt.
2	Indoor use primarily to provide a degree of protection against limited amounts of falling dirt and water.
3	Outdoor use primarily to provide a degree of protection against rain, sleet, wind blown dust and damage from external ice formation.
3R	Outdoor use primarily to provide a degree of protection against rain, sleet, and damage from external ice formation.
3S	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.
4	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.
4X	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 external ice formation.
5	Indoor use primarily to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids.
6	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, and the entry of water during occasional temporary submersion at a limited depth and damage from external ice formation.
6P	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.
7	Indoor use in locations classified as Class I, Division 1, Groups A, B, C or D hazardous locations as defined in the National Electric Code (NFPA 70) (Commonly referred to as explosion-proof).
8	Indoor or outdoor use in locations classified as Class I, Division 2, Groups A, B, C or D hazardous locations as defined in the National Electric Code (NFPA 70) (commonly referred to as oil immersed).
9	Indoor use in locations classified as Class II, Division 1, Groups E, F and G hazardous locations as defined in the National Electric Code (NFPA 70) (commonly referred to as dust-ignition proof).
10	Intended to meet the applicable requirements of the Mine Safety and Health Administration (MSHA).
12 and 12K	Indoor use primarily to provide a degree of protection against circulating dust, falling dirt, and dripping noncorrosive liquids.
13	Indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and noncorrosive coolant.

a.) ANSI/UL50, Enclosures for Electrical Equipment for Types 1, 2, 3, 3R, 3S, 4, 4X, 5, 6, 6P, 12, 12K and 13.

b.) ANSI/UL698, Industrial Control Equipment for Use in Hazardous (Classified) Locations and other related standards for Types 7, 8 and 9.

c.) ANSI/NEMA250, Enclosures for Electrical Equipment (1000 Volts Maximum) for Types 1, 2, 3, 3R, 3S, 4, 4X, 5, 6, 6P, 7, 8, 9, 12, 12K and 13.

### Comparison of "NEMA" Type and "IP" Code designations

#### Conversion of "NEMA" Type to "IP" Code designations\*

Type Number	IP Designation
1	IP10
2	IP11
3	IP54
3R	IP54
3S	IP54
4 and 4X	IP56
5	IP52
6 and 6P	IP67
12 and 12K	IP52
13	IP54

\*Table cannot be used to convert "IP" Codes to "NEMA" Types. See NEMA 250 for additional details.

# Technical Reference

## IP Rating System

**TABLE 1** - CHARACTERISTICS DEFINED BY THE IEC Per Standard 60529

			Second Digit - Protection against the penetration of liquids								
			IP_0	IP_1	IP_2	IP_3	IP_4	IP_5	IP_6	IP_7	IP_8
Non protected											
First Digit - Protection against persons - touching and ingress of solid foreign objects											
IP 0_		Without protection	IP 00								
IP 1_		Protection against touching with the hand and solid objects greater than 50mm dia.	IP 10	IP 11	IP 12						
IP 2_		Protection against touching with the finger and solid objects greater than 12mm dia.	IP 20	IP 21	IP 22	IP 23					
IP 3_		Protection against touching with tools, wires, etc. more than 2.5mm thick and solid objects greater than 2.5mm dia.	IP 30	IP 31	IP 32	IP 33	IP 34				
IP 4_		Protection against touching with tools, wires, etc. more than 1mm thick and solid objects greater than 1mm dia.	IP 40	IP 41	IP 42	IP 43	IP 44				
IP 5_		Unlimited protection against contact with live parts and damaging deposits of dust	IP 50				IP 54	IP 55			
IP 6_		Unlimited protection against contact with live parts and any penetration of dust	IP 60					IP 65	IP 66	IP 67	IP 68

In some countries a third digit (for mechanical security) is added.