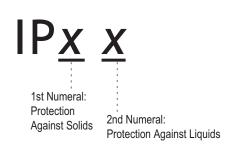


## Training Note: IP and NEMA Enclosure Ratings

**Purpose:** IP and NEMA enclosure ratings determine how well the enclosures of electronic components resist the infiltration of dust and moisture.



## Examples:

IP67: Dust-tight; Immersion up to 1 meter

IP69K: Dust-tight; High-temperature,

high-pressure spray

Level	1st Numeral: Protection against Solids	2nd Numeral: Protection against Liquids				
0	Non-protected	Non-protected				
1	Objects greater than 50 mm	Dripping water				
2	Objects greater than 12 mm	Dripping water on enclosure tilted up to 15 degrees				
3	Objects greater than 2.5 mm	Spraying water up to 60 degrees from both sides				
4	Objects greater than 1.0 mm	Splashing water from all sides				
5	Dust-protected	Water jets				
6	Dust-tight	Heavy seas				
7		Immersion				
8		Submersion				
9K*		High-temperature, high-pressure spray (per DIN 40050-9)				

<sup>\*</sup> Currently not part of the harmonized IEC standard 60529, which describes the IP ratings for enclosures.

## **NEMA Enclosure Ratings for Nonhazardous Locations**

National Electrical Manufacturers Association classification system for electrical component enclosure protection against a variety of environmental conditions described below.

Enclosure Rating													
Protection Against:	1 indoor	2 indoor	3 outdoor	3S outdoor	4 indoor/ outdoor	4X indoor/ outdoor	6 indoor/ outdoor	6P indoor/ outdoor	12 indoor	13 indoor	PW12 indoor/ outdoor		
Accidental bodily contact	NEMA 1	NEMA 2	NEMA 3	NEMA 3S	NEMA 4	NEMA 4X	NEMA 6	NEMA 6P	NEMA 12	NEMA 13			
Falling dirt	NEMA 1	NEMA 2	NEMA 3	NEMA 3S	NEMA 4	NEMA 4X	NEMA 6	NEMA 6P	NEMA 12	NEMA 13			
Dust, lint, non-volatile fibers			NEMA 3	NEMA 3S	NEMA 4	NEMA 4X	NEMA 6	NEMA 6P	NEMA 12	NEMA 13			
Windblown dust			NEMA 3	NEMA 3S	NEMA 4	NEMA 4X	NEMA 6	NEMA 6P					
Falling liquid, light splash		NEMA 2	NEMA 3	NEMA 3S	NEMA 4	NEMA 4X	NEMA 6	NEMA 6P	NEMA 12	NEMA 13			
Hosedown, heavy splash					NEMA 4	NEMA 4X	NEMA 6	NEMA 6P					
High-pressure, high-temperature spray											PW12		
Exposure to cleaning, sanitizing chemicals											PW12		
Rain, snow, sleet			NEMA 3	NEMA 3S			NEMA 6	NEMA 6P					
Ice buildup				NEMA 3S									
Oil or coolant seepage									NEMA 12	NEMA 13			
Oil, coolant spray or splash										NEMA 13			
Occasional submersion							NEMA 6	NEMA 6P					
Prolonged submersion								NEMA 6P					
Corrosive agents						NEMA 4X		NEMA 6P					
IEC Equivalent*	IP10	IP11	IP54	IP54	IP56	IP56	IP67	IP67	IP52	IP54	IP69K*		

<sup>\*</sup> IEC equivalents listed here are general approximations. For example, the PW12 rating is less rigorous than the IP69K rating.

