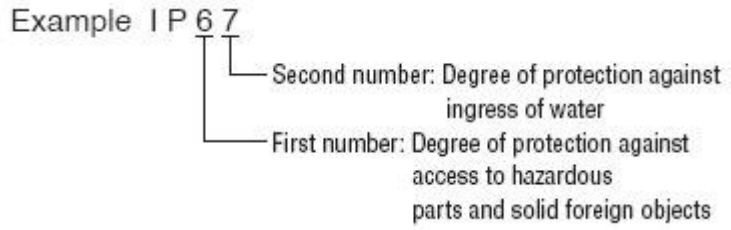
Q: What is the meaning of IP67?

A: IEC60529 and EN60034-5 (=IEC60034-5) classify the dust-resistance and waterproofing into grades. The IP (ingress protection) rating represents the degree of protection for "dust" and water. The first number following the "IP" refers to the degree of protection against access to hazardous parts and solid foreign objects (dust). The second number refers to the degree of protection against the ingress of water. The test methods are shown below.



An "X" is used when one of the two protection classes is not specified in the name (e.g. IPX5 or IP4X)

First Number = Degree of Protection against access to hazardous parts and against solid foreign objects

IP Code	Description	Definition and Test Conditions
IP0X	None	None
IP1X	Protection against approach by hands	Cannot be penetrated by a solid object 1.97 in. (50mm) or more in diameter.
IP2X	Protection against approach by fingers	Cannot be penetrated by a solid object 0.79 in. (12mm) or more in diameter.
IP3X	Protection against tips of tools, etc.	Cannot be penetrated by a solid object 0.09 in. (2.5mm) or more in diameter.
IP4X	Protection against wire, etc.	Cannot be penetrated by a solid object 0.04 in. (1.0mm) or more in diameter.
IP5X	Protection against dust	Cannot be penetrated by dust that could interfere with normal operation.
IP6X	Completely dust-proof design	Cannot be penetrated by dust.

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IP Ratings...

Second Number = Degree of Protection against ingress of water

IP Code	Description	Definition and Test Conditions
IPX0	None	None
IPX1	Protection against water drops falling vertically.	Water drops falling at a rate of 3 to 5 mm/min. from a height of 7.87 in. (200mm) for 10 minutes.
IPX2	Protection against water drops falling vertically over a 15° range.	Water drops falling over a 15° range at a rate of 3 to 5 mm/min. from a height of 7.87 in. (200mm) for 10 minutes.
IPX3	Protection against water drops falling vertically over a 60° range.	Water drops falling over a 60° range at a rate of 3 to 5 mm/min. from a height of 7.87 in. (200mm) for 10 minutes.
IPX4	Protection from spray of water from all directions.	Water sprayed from all directions from a distance of 11.81 in (300mm) to 11.69 in (50mm) at a rate of 10 l/min. for 10 minutes.
IPX5	Protection against jets of water from all directions.	Jets of water sprayed from a distance of 9.84 ft. (3m) from all directions at a rate of 12.5 l/min. at a pressure of 30 kPa for 3 minutes.
IPX6	Protection against strong wave-like jets of water.	Jets of water sprayed from a distance of 9.84 ft. (3m) from all directions at a rate of 100 l/min. at a pressure of 100 kPa for 3 minutes.
IPX7	Usable after immersion in water under fixed conditions.	Immersion to a depth of 3.3 ft. (1m) for 30 minutes.
IPX8	Usable under water.	Determined through cooperation between user and manufacturer.

IP Explanation and Ratings

EN 60529 outlines an international classification system for the sealing effectiveness of enclosures of electrical equipment against the intrusion into the equipment of foreign bodies (i.e. tools, dust, fingers) and moisture. This classification system utilizes the letters "IP" ("Ingress Protection") followed by two or three digits. (A third digit is sometimes used. An "x" is used for one of the digits if there is only one class of protection; i.e. IPX4 which addresses moisture resistance only.)

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Degrees of Protection - First Digit

The first digit of the IP code indicates the degree that persons are protected against contact with moving parts (other than smooth rotating shafts, etc.) and the degree that equipment is protected against solid foreign bodies intruding into an enclosure.

0	No special protection
1	Protection from a large part of the body such as a hand (but no protection from deliberate access); from solid objects greater than 50mm in diameter.
2	Protection against fingers or other object not greater than 80mm in length and 12mm in diameter.
3	Protection from entry by tools, wires, etc., with a diameter of thickness greater than 1.0mm.
4	Protection from entry by solid objects with a diameter or thickness greater than 1.0mm
5	Protection from the amount of dust that would interfere with the operation of the equipment.
6	Dust tight.

Degrees of Protection - Second Digit

The second digit indicates the degree of protection of the equipment inside the enclosure against the harmful entry of various forms of moisture (e.g. dripping, spraying, submersion, etc.)

0	No special protection
1	Protection from dripping water.
2	Protection from vertically dripping water.
3	Protection from sprayed water.
4	Protection from splashed water.
5	Protection from water projected from a nozzle
6	Protection against heavy seas, or powerful jets of water.
7	Protection against immersion.
8	Protection against complete, continuous submersion in water.

Submersion depth and time must be specified by the end-user. The requirement must be more onerous than IP67

The IP Code Symbols

The chart at the right illustrates the use of special symbols in the IP classification system. In the "1st digit" column, not the grid-like symbols net to numbers 5 and 6. In the "2nd digit" column numbers 3-8 are symbolised by teardrop shaped symbols, sometimes enclosed in a box or a triangle, sometimes unenclosed (#7-8). These symbols can be placed on equipment to illustrate the IP protection provided.

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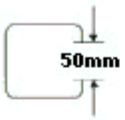
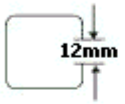
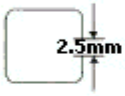
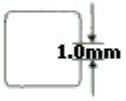
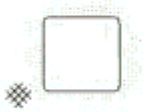
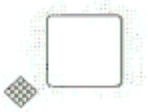
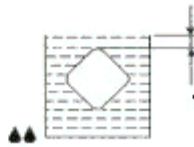
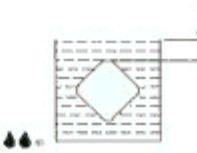
IP54 = IP Letter Code ——— IP
1st Digit ——— 5
2nd Digit ——— 4

1st Digit	Protection from solid objects	2nd Digit	Protection from moisture
0	Non protected	0	Non protected
1	 Protected against solid objects greater than 50mm	1	 Protected against dripping water
2	 Protected against solid objects greater than 12mm	2	 Protected against dripping water when tilted up to 15°
3	 Protected against solid objects greater than 2.5mmØ	3	 Protected against spraying water
4	 Protected against solid objects greater than 1.0mmØ	4	 Protected against splashing water
5	 Dust protected	5	 Protected against water jets
6	 Dust tight	6	 Protected against heavy seas
Note: EN 60529 does not specify sealing effectiveness against the following: mechanical damage of the equipment; the risk of explosions; certain types of moisture conditions, e.g. those that are produced by condensation; corrosive vapours; funus; vermin		7	 Protected against against the effects of immersion
		8	 Protected against submersion **(see note)**

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