



Document title:	IP ratings IEC
Capture URL:	https://www.iec.ch/ip-ratings
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Capture timestamp (UTC):	Wed, 17 May 2023 08:15:11 GMT
Capture tool:	10.20.33
Collection server IP:	54.157.181.49
Browser engine:	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.5359.215 Safari/537.36
Operating system:	Windows_NT (Node 16.17.1)
PDF length:	3
Capture ID:	oFSHgL41yHKgHth9FFuTbk
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PDF REFERENCE #: fcbXgqpmDWNxi6Mugyqj3K



IP ratings

The IEC has developed the ingress protection (IP) ratings, which grade the resistance of an enclosure against the intrusion of dust or liquids



IP ratings

Electric and electronic equipment deteriorate or malfunction when water or dust enters the device. The IEC has developed the ingress protection (IP) ratings, which grade the resistance of an enclosure against the intrusion of dust or liquids. The ratings are widely used throughout industry.

In recent years, many consumers have taken an interest in smartphone features that include resilience against liquid and dust. However, it can be difficult to assess the meaning of terms such as waterproof or water-resistant when used for marketing purposes.

IEC 60529 has been developed to rate and grade the resistance of enclosures of electric and electronic devices against the intrusion of dust and liquids. It also rates how easy it is for individuals to access the potentially hazardous parts within the enclosure.

The standard, prepared by IEC Technical Committee 70, uses the IP code to rate the degrees of protection offered by the enclosure of electrical equipment with a rated voltage of a maximum of 72,5 kV. The standard also defines the tests to be performed to verify that the enclosure meets these requirements.

The IP code is composed of two numerals:

The first numeral refers to the protection against solid objects and is rated on a scale from 0 (no protection) to 6 (no ingress of dust).

The second numeral rates the enclosure's protection against liquids and uses a scale from 0 (no protection) to 9 (high-pressure hot water from different angles).

The first edition of IEC 60529 was published in 1976 with the aim of creating a single document to bring together all requirements regarding protection by enclosures. Previously, separate standards had been developed for motors and low-voltage switchgear and controlgear.

The information provided on this webpage is for informational purposes only. For a full description of the IP ratings, including their testing conditions, please refer to IEC 60529.

Water Resistance Explained



CNBC

Are iPhones waterproof? What does any of that actually mean, and most importantly, can you trust your phone in the water?

[Video Detail](#) →



Making electrotechnology work
for you.

Ingress protection (IP) ratings guide

IP ratings are represented by combining the first and second digits of the below columns

1st numeral - solid foreign objects

0	No protection	
1	Protected against solid foreign objects of 50 mm Ø and greater	

2nd numeral - water

0	No protection		-
1	Protected against vertically falling water drops		Vertically falling drops shall have no harmful effects

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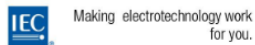
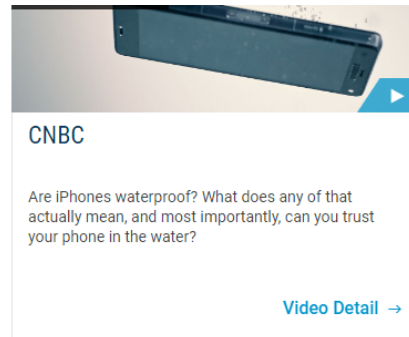
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Ingress protection (IP) ratings guide

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1 st numeral - solid foreign objects			2 nd numeral - water		
0	No protection		0	No protection	
1	Protected against solid foreign objects of 50 mm Ø and greater		1	Protected against vertically falling water drops	Vertically falling drops shall have no harmful effects
2	Protected against solid foreign objects of 12,5 mm Ø and greater		2	Protected against vertically falling water drops when enclosure tilted up to 15°	Vertically falling drops shall have no harmful effects when the enclosure is tilted at any angle up to 15° on either side of the vertical
3	Protected against solid foreign objects of 2,5 mm Ø and greater		3	Protected against spraying water	Water sprayed at an angle up to 60° on either side of the vertical shall have no harmful effects
4	Protected against solid foreign objects of 1,0 mm Ø and greater		4	Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effects
5	Dust-protected		5	Protected against water jets	Water projected in jets against the enclosure from any directions shall have no harmful effects
6	Dust-tight		6	Protected against powerful water jets	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects
Example: + = IP 65 → Protected against water jets → Dust-tight			7	Protected against the effects of temporary immersion in water	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardized conditions of pressure and time
			8	Protected against the effects of continuous immersion in water	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is continuously immersed in water under conditions which shall be agreed between manufacturer and user but which are more severe than for numeral 7
			9	Protected against high pressure and temperature water jets	Water projected at high pressure and high temperature against the enclosure from any direction shall not have harmful effects

Terminology

Electropedia | Abbreviations & acronyms

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CX-2483.00003