Smart Devices

IP Code

International Protection Marking
Ingress Protection Marking

IP Code

❖ **IP Code**

- International Protection Marking
- Ingress Protection Marking
- Used to classify and rate the degree of protection provided against intrusion of
  - Solid objects, Dust, Accidental Contact
  - Water by Mechanical Casings
  - Electrical Enclosures
- IP code is defined in the international standard IEC 60529

IP Code

❖ IP Code Structure

- IP + Two Digits + Optional letter(s)
- Two digits indicate conformity with the conditions based on solids and liquids
  - First Digit: Solids
  - Second Digit: Liquids

IP Code

❖ IP Code

- First Digit: Solids
  - Level of protection that the enclosure provides against
    - Access to hazardous parts
    - Ingress of solid foreign objects

IP Code

Level	Object size Protected against	Effective against
0	-	No Protection against contact and ingress of objects
1	> 50 mm	Any large surface of the body, such as the back of the hand, but no protection against deliberate contact with a body part
2	> 12.5 mm	Fingers or similar objects
3	> 2.5 mm	Tools, thick wires, etc.
4	> 1 mm	Most wires, screws, etc.
5	Dust protected	Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment; complete protection against contact
6	Dust tight	No ingress of dust; complete protection against contact

IP Code

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- Second Digit: Liquids
  - Protection of the equipment inside the enclosure against harmful ingress of water

IP Code

Level	Protected against	Effective against
0	Not protected	-
1	Dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2	Dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle up to 15° from its normal position
3	Spraying water	Water falling as a spray at any angle up to 60° from the vertical shall have no harmful effect
4	Splashing water	Water splashing against the enclosure from any direction shall have no harmful effect
5	Water Jets	Water projected by a nozzle (6.3 mm) against the enclosure from any direction shall have no harmful effects

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Level	Protected against	Effective against
6	Powerful Water Jets	Water projected by powerful jets (12.5 mm nozzle) against the enclosure from any direction shall have no harmful effects
7	Immersion up to 1 m	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in under water defined conditions of pressure and time (up to 1 m of submersion)
8	Immersion beyond 1 m	The equipment is suitable for continuous immersion in under water conditions which shall be specified by the manufacturer. Normally, this will mean that the equipment is hermetically sealed. However, with certain types of equipment, it can mean that water can enter but only in such a manner that it produces no harmful effects

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- IP code Example *IP*67
- First digit 6
  - Protection against solid objects
  - Dust tight
- Second digit 7
  - Protection against liquid objects
  - Immersion up to 1 m

IP Code

❖ IP Code Examples

- Samsung Galaxy Note8 ➔ IP68 certified
- Samsung Gear S3 ➔ IP68 certified
- Apple iPhone X ➔ IP67 certified
- First digit 6 ➔ Dust tight
- Second digit 7 ➔ Waterproof up to 1 m
- Second digit 8 ➔ Waterproof beyond 1 m

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References

References

- IEC 60529, “degrees of Protection Provided by Enclosures (IP Codes),” Ed. 2.1 (Geneva: International Electrotechnical Commision, 2011)