



The IP code is frequently used to specify the degree of sealing for an apparatus but often is not well understood. The code has been adopted in many countries, in various national standards, but in most cases stems from **IEC 529: Degrees of Protection Provided by Enclosures (IP Code)**. PT use the IP Code to specify the degree of sealing for the load cells that they manufacture. Most are IP67 or IP68, but some are IP65 and this discussion will be limited to these degrees of protection.

The standards generally start with a scope, object and definitions, followed by an explanation of the code characteristic numerals and tests for each degree of protection.

The object of the standard is;

Definitions for degrees of protection provided by enclosures of electrical equipment as regards;

Protection of persons against access to hazardous parts,

Protection of the equipment inside the enclosure against ingress of solid objects,

Protection of the equipment inside the enclosure against harmful effects due to water ingress.

Designations for these degrees.

Requirements for each designations.

Tests to verify that the enclosure meets the requirements.

It is noted that measures to protect both the enclosure and the internal equipment against external influences or conditions such as;

-mechanical impacts

-corrosion

-corrosive solvents

-fungus

-vermin

-solar radiation

-icing

-moisture (e.g. Produced by condensation)

-explosive atmospheres

and the protection against hazardous moving parts external to the enclosure are matters for the relevant product standard. They are **not** a part of the IP standard.

The designation of the code as used by PT are for the letters IP (International Protection), the first numeral 6 and the second numeral 5, 7 or 8. The additional optional and optional supplementary letters are not used.

IP6X

The first numeral 6 indicates that the enclosure is dust tight and protects against access to hazardous parts with a wire. No dust ingress is allowed and an access probe of diameter 1 mm shall not penetrate the enclosure (the equipment and exact method of performing these tests is defined).

IPX5

Second numeral 5 is protection against water jets. Water is projected against the enclosure from any direction, tests being performed to project the stream of water from all practicable directions. The jet exits from a 6.3 mm nozzle with a flow of 12.5 l/min. (equating to a nozzle velocity of 6.7 m/s). The core of the substantial stream should be a circle of approximately 40 mm diameter at 2.5 m. The test duration is 1 minute per square metre of enclosure, with a minimum of 3 minutes and the enclosure should be a distance of 2.5 to 3 m from the nozzle during the test.



IPX6

Second numeral 6 is protection against powerful water jets. Water is projected against the enclosure from any direction, tests being performed to project the stream of water from all practicable directions. The jet exits from a 6.3 mm nozzle with a flow of 100 l/ min. (equivalent to a nozzle velocity of 13.5 m/s). The core of the substantial stream should be a circle of approximately 120 mm diameter at 2.5 m. The test duration is 1 minute per square metre of enclosure, with a minimum of 3 minutes and the enclosure should be a distance of 2.5 to 3 m from the nozzle during the test.

IPX7

Second numeral 7 is protection against the effects of temporary immersion. The enclosure is immersed in fresh water such that the lowest point of an enclosure with a height less than 850 mm is located 1 m below the surface and the highest point of an enclosure with height equal to or greater than 850 mm is located 150 mm below the surface. The test duration is a minimum of 30 minutes and the water temperature must not differ from the enclosure temperature by more than 5 degrees K.

IPX8

Second numeral 8 is protection against the effects of continuous immersion. The enclosure is continuously immersed in fresh water under conditions agreed between manufacturer and user but which are more severe than for numeral 7 and shall take into consideration that the enclosure will be continuously immersed in actual use. PT specify an immersion depth of 1.5 m and an immersion time of 300 hours for second numeral 8.

Notes to the second numeral indicate that it indicates protection against the harmful effects of the ingress of water and that the tests for the second characteristic numeral are performed with **fresh** water, the actual protection may not be satisfactory if cleaning operations with high pressure and/or solvents are used. Up to and including second numeral 6 the designation implies compliance with any one of the lower numerals. An enclosure with second numeral 7 or 8 only is considered unsuitable for exposure to water jets (second numeral 5 or 6) and need not comply with those requirements unless it is dual coded (i.e. IP65/IP68).

This implies that the IP rating does not apply when wash down solutions (anything other than fresh water) are used or if wash down is performed with a water blaster or high pressure hose. Enclosures that can be immersed (7,8) cannot necessarily be hosed directly (5,6).

Acceptance conditions for the tests are such that if any water has entered, it shall not;

- be sufficient to interfere with correct operation or impair safety,
- deposit on insulation parts where it may lead to tracking,
- reach live parts not designed to operate when wet,
- accumulate near the cable end or enter the cable if any.

Of special note is the reference to protection against fresh water only, no chemicals or high pressure water jets. Where chemicals are present or high pressure jets are used it is often possible to protect the load cell to prevent contact. Where there is concern about the possibility of use outside the IP standard please contact your nearest PT representative or contact PT directly.