

Ingress protection (IP)

We can perform fully automated and accredited tests for the whole range of IP classifications according to IEC 60529 and NEMA 250.

We provide testing according to:

- Relevant test in the IEC 60068-series
- Relevant test in the IEC 60721-series
- Relevant test in the ETSI 300 019 environmental standards and classification of parameters for equipment functionality in different environments.
- Note: Some countries like Russia requires hygienic testing before export is allowed. Nemko has long experience in helping manufacturers with documenting such requirements for exporting of their products.

Test Standards:

- IEC 60529
- NEMA 250
- IEC 60068-2-18
- IEC 60068-2-68
- IEC 60721-3-x

Ingress of water (IP X1 to IP X8)

- Dripping (vertical rain)
- Spraying
- Splashing
- Jetting
- Powerful jetting
- Immersion

Ingress of foreign solid objects (IP1X to IP 6X)

- ø 50 mm Rigid Sphere
- ø 12.5 mm Finger Probe and solid foreign objects
- ø 2.5 mm Tool Probe and solid foreign objects
- ø 1.0 mm Wire Probe and solid foreign objects
- Dust Protected
- Dust Tight

What are IP codes?

EN 60529 outlines an international classification system for the sealing effectiveness of enclosures for electrical equipment against the intrusion into the equipment from foreign objects (i.e. hands, fingers, tools, dust) and water. This classification system utilizes the letters "IP" ("Ingress Protection") followed by two or three digits.

- A third character is sometimes used to further specify the classification
- An "x" is used to replace one of the digits if there is only one class of protection; i.e. IPX4 which addresses water resistance only

First IP Numeral

The first digit of the IP code indicates the degree that people 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 or 12mm in diameter.
3. Protection from entry by tools or solid foreign objects with a diameter or thickness of 2.5mm.
4. Protection from entry by wires or solid foreign objects with a diameter or thickness of 1.0mm
5. Protection from dust that would interfere with the operation of the equipment.
6. Dust tight.

Second IP Numeral

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

0. No special protection
1. Protection from vertically dripping water.
2. Protection from vertically 15° dripping water.
3. Protection from sprayed water vertically 120°.
4. Protection from sprayed water 360°.
5. Protection from sprayed water projected from hose with 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 deeper than IP67

Additional characters

The standard defines additional letters that can be appended to classify only the level of protection against access to hazardous parts by persons:

A - Back of hand.

B - Finger.

C - Tool.

D - Wire.

Further letters can be appended to provide additional information related to the protection of the device:

H - High voltage device.

M - Device moving during water test.

S - Device standing still during water test.

W - Weather conditions.

The IP Code Symbols

This IP Code Symbols chart illustrates the use of 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 symbolized 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.

Related information

[Vibration testing](#) [1]

[Climatic testing](#) [2]

[Mechanical stress](#) [3]

[Shock testing](#) [4]

[ESD electro static discharge](#) [5]

Links

- [1] <https://www.nemko.com/product-testing/reliability-testing/vibration-testing>
- [2] <https://www.nemko.com/product-testing/reliability-testing/climatic>
- [3] <https://www.nemko.com/product-testing/reliability-testing/mechanical-stress>
- [4] <https://www.nemko.com/product-testing/reliability-testing/shock-testing>
- [5] <https://www.nemko.com/product-testing/reliability-testing/esd-anti-static-characterization>