



TECHNICAL NOTE

IP testing – ingress of water and dust

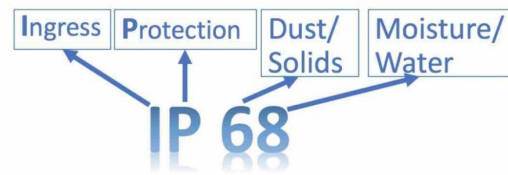
Many products are exposed to all kinds of environmental conditions. These conditions affect the intrusion of solids/dust and water into a product. How well is your product designed to resist water and solids/ dusts?

Ingress Protection rating

The type and degree of ingress protection that an enclosure possesses is described by the Ingress Protection (IP) rating. Standardized tests are applied to obtain an IP rating. The ratings come in two sets: One is for solid bodies (foreign objects and dust) (the first number after ‘IP’), and the other is for liquids (such as water) (the second number after ‘IP’).

Testing & test plan support

Eurofins Materials Science Netherlands B.V. offers water and dust tests on all kinds of products conform the IEC 60529 standard. Customer specific test plans can be defined of which IP testing might be part of. The testing process is a 2-step procedure.



The first step is the exposure of the device to either solids/dust or water, using a standardized protocol. The second step is the functional test. The latter can either be an optical inspection or a more dedicated functional test, either performed at our IP test facility or at the customer site.

Dust testing

Dust testing is often required for medical devices and consumer electronics. Openings in enclosures - such as fans and vents - can attract dust. As a result, dust can accumulate inside the device and create product lifetime and safety issues which, in the worst case, might cause dust explosions. Other types of products that require dust testing are military products and mining and construction equipment.

The standard ratings for ingress by dust and how to interpret them:

IP5X	Dust protected	This is tested by inspection to ensure any dust that enters would not interfere with the part's functionality.
IP6X	Dust tight	This rating implies there can be no ingress of dust at all.

The following ratings are valid for ingress by water:

IPX0	The item is not protected at all against ingress by water.
IPX1	The item is protected against vertically falling water droplets, meaning any droplets that fall on the item will not result in damage or interrupted functioning of components.
IPX2	This rating extends IPX1 by ensuring protection against falling water droplets at an angle up to 15 degrees from vertical.
IPX3	The item is safe from ingress of sprayed water up to an angle of 60 degrees from vertical impact. The spray can come in an oscillating pattern with a flow rate that depends on the item tested.
IPX4	This rating extends IPX3 to include protection against ingress from splashing water from all directions. It is tested by exposing an item to an oscillating spray for a minimum of 10 minutes. An item passes when there is limited ingress with no harmful effects.

IPX5	The item is protected against ingress from low-pressure water jets directed from any angle if there is limited ingress with no harmful effects.
IPX6	This rating extends IPX5. The water pressure in this test can reach 1 bar.
IPX7	This rating goes further than IPX6 and indicates protection from temporary immersion in water. The rating is given after immersing an item in 1 meter of water for 30 minutes with no harmful effects.
IPX8	This rating extends the IPX7 rating for immersion in water to a greater depth and to longer periods of time. The conditions of the immersion are agreed upon between the manufacturer and the testing facility.

