Technical data
Degrees of protection provided by enclosures (IP Code)

Degrees of protection according to IEC 60 529

IP □ □ □

Degree of protection of electrical equipment
Electrical equipment must be protected for safety reasons from external influences and conditions. Enclosures provide the protection of electrical equipment against access to hazardous parts and against solid foreign objects, as well as dust, humidity and water.
The international standard IEC 60 529, the german standard *DIN EN 60 529 / VDE 0470 Part 1 September 2000* with the title "Degrees of protection provided by enclosures (IP Code)", form the basis for the determination and designation of the degree of protection.
The degree of protection provided by an enclosure is proven by means of standardized testing methods.
The becoming "aged" of test samples before carrying out the actual type tests are part of the standardized testing methods.
Ageing is made by an more-active increased thermal treatment.

The marking system consists of the code letters **IP** and two following characteristic numerals.

Example:
IP 6 7
Code letters
(**I**nternational **P**rotection)

1st characteristic numeral: Protection against foreign solid objects and direct contact

Meaning for the protection of equipment against ingress of solid foreign objects and of persons against access to hazardous parts with (non-protected) back of hand, finger, tool or wire.

	Protection against ingress of solid foreign objects ...	Protection against access to hazardous parts with ...	Definition
IP 0X	non-protected	non-protected	
IP 1X	solid foreign objects ≥ 50 mm Ø	the back of a hand	The access probe, sphere of 50 mm Ø, shall have adequate clearance from hazardous parts. The object probe, sphere of 50 mm Ø, shall not fully penetrate.
IP 2X	solid foreign objects ≥ 12.5 mm Ø	a finger	The jointed test finger, 12 mm Ø, 80 mm length, shall have adequate clearance from hazardous parts. The object probe, sphere of 12.5 mm Ø shall not fully penetrate.
IP 3X	solid foreign objects ≥ 2.5 mm Ø	a tool ≥ 2.5 mm Ø	The object probe / access probe of 2.5 mm Ø shall not penetrate at all.
IP 4X	solid foreign objects ≥ 1.0 mm Ø	a wire ≥ 1 mm Ø	The object probe / access probe of 1.0 mm Ø shall not penetrate at all.
IP 5X	dust-protected	with any auxiliary equipment (wire)	Ingress of dust is not totally prevented, but dust shall not penetrate in a quantity to interfere with satisfactory operation of the apparatus or to impair safety. The access probe of 1.0 mm Ø, shall not penetrate.
IP 6X	dust-tight	contact with any auxiliary equipment (wire)	No ingress of dust. The access probe of 1.0 mm Ø shall not penetrate at all.

Additonal letter

Additional letter where the actual protection against access to hazardous parts is higher than that indicated by the 1st characteristic numeral (e.g. IP 20C)

	Short form: Protection against access with ...	Definition
	A	the back of the hand	The access probe, sphere of 50 mm Ø, shall have adequate clearance from hazardous parts.
	B	a finger	The jointed test finger of 12 mm Ø, 80 mm length, shall have adequate clearance from hazardous parts.
	C	a tool ≥ 2.5 mm Ø	The access probe of 2.5 mm Ø, 100 mm length, shall have adequate clearance from hazardous parts.
	D	a wire ≥ 1 mm Ø	The access probe of 1.0 mm Ø, 100 mm length, shall have adequate clearance from hazardous parts.

2nd characteristic numeral: Protection against ingress of water with harmful effects

	IP X0	IP X1	IP X2	IP X3	IP X4	IP X5	IP X6	IP X7	
Brief description	non-protected	Protected from vertically falling water drops	Protected against vertically falling water drops when enclosure is tilted up to 15°	Protected against spraying water	Protected against splashing water	Protected against water jets	Protected against powerful water jets	Protected against the effects of temporary immersion in water	
Definition		Vertically falling drops shall have no harmful effects	Vertically falling drops shall have no harmful effects when the enclosrue is tilted at any angle up to 15° on either side of the vertical	Water sprayed at an angle up to 60° on either side of the vertical shall have no harmful effects	Water splashes against the enclosure from any direction shall have no harmful effects	Water projected in jets against the enclosure from any direction shall have no harmful effects	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects	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	
Short form		vertically dripping water	dripping water (15° tilted)	spraying water	splashing water	jetting water	powerful jetting water	temporary immersion	Short form
Symbol									Symbol
IP 20									
IP 30		**IP 31**							
IP 40		**IP 41**	**IP 42**	**IP 43**	**IP 44**				
					IP 54	**IP 55**			
						IP 65	**IP 66**	**IP 67**	

Meaning of the first characteristic numeral
The first characteristic numeral indicates, to what extent the enclosure provides protection for persons against the access to (affecting of) hazardous parts. This protection is reached, when the penetration into an enclosure of a part of the body or a foreign object, which is held by a person, is prevented or limited. At the same time the enclosure provides protection of equipment against the penetration of solid foreign objects. This is the reason for having two descriptions and two definitions to each first characteristic numeral.
Meaning of the second characteristic numeral
The second characteristic numeral indicates the protection of the enclosure against ingress of water with harmful effects on the electrical equipment.
Additional letters to the IP Code
The IP Code can be still extended by additional letters. Additional letters indicate the degree of protection against access to hazardous parts. Additonal letters follow the two characteristic numerals. Additional letters are only used, - if the actual protection against access to hazardous parts is higher than by the first characteristic numeral indicated; or - if only the protection against access to hazardous parts is indicated and the degree of protection against solid foreign objects is not considered. The first characteristic numeral being then replaced by an X. An enclosure shall only be designated with a stated degree of protection indicated by the additional letter if the enclosure also complies with all lower degrees of protection.

Classification of the impact strength by the IK Code
The European standard for enclosures EN 50298:98 includes also the IK Code for impact strength. With the DIN EN 50102 (VDE 0470 part of 100) "Degrees of protection by enclosures for electrical operational funds (equipment) against outside mechanical loads (IK Code)", is defined with the identification letters IK. This standard regulates the methods for the description of the protection of enclosures against outside mechanical loads. This indicates the degree of protection, which is provided by an enclosure against a mechanical load (demand energy in joules). HENSEL tests its enclosures and enclosure systems additionally also according to this standard.

IK Code: Demand energy value [W] in joules.

IK Code	IK01	IK02	IK03	IK04	IK05	IK06	IK07	IK08	IK09	IK10
[W] in J	0.14	0.2	0.35	0.5	0.7	1	2	5	10	20