Degrees of protection according to IEC 60 529

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)". The 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.

The degree of protection provided by an enclosure is proven by means of standardized testing methods. The being "aged" of test samples before carrying out the actual type tests are part of the standardized testing methods. Aged 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 X

Code letters: (International Protection)

Degrees of protection provided by enclosures (IP Code)

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...

Short form: Protection against access with...

Protection against ingress of solid foreign objects: Protection against access to hazardous parts with... Non-protected

Protection against ingress against verti- cal dripping water when the housing is tilted up to 15°

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)

Protection against ingress of water with harmful effects

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 IP X9

Protection for occasional cleaning procedures, not direct spraying of the equipment (spray- ing water)

Protection for operational processes, not direct spraying of the equipment (powerful water jets)

Protection against the effects of temporary immersion in water

Protection against cleaning processes (direct jet) and high water temperatures

Additional letters to the IP Code

The IP Code can still be extended by additional letters. Additional letters indicate the degree of protection against access to hazardous parts. Additional 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.

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.

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

Protection against ingress of solid foreign objects → Protection against access to hazardous parts with... Non-protected

Protection against ingress against vertical dripping water when the housing is tilted up to 15°

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)

Protection against ingress of water with harmful effects

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

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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.

Degrees of protection provided by enclosures (IP Code)
Technical data
Recommendation for outdoor installations, humid and wet areas and locations

Requirements of German standard DIN VDE 0100 Part 737
for compliance with IP degree of protection

1. Requirement
Protection against ingress of water for all electrical equipment (devices) with the appropriate encapsulation (2nd characteristic numeral)

Note for outdoor installation:

Protected outdoors
Electrical equipment has to be protected from precipitation (like rain, snow or hail) as well as from direct sunlight.

Non-protected outdoors
Electrical equipment can be exposed to precipitation or direct sunlight. With both assembly sites the climatic effects on the installed equipment must be observed, for example, high or low ambient temperatures or condensation.

1.2. Minimum requirements for electrical equipment, that must withstand higher environmental stresses:

degree of protection IP X 4
with non-direct jets of water within occasional cleaning procedures, e.g. agriculture

degree of protection IP X 5
with non-direct jets of water within operational cleaning procedures, e.g. carwash

degree of protection IP X 5
and additional consultation with the manufacturer:

with direct jets of water within occasional cleaning procedures of enclosures, e.g. butcher’s shop

Country-specific requirements have to be observed!

2. Requirement of German Standard DIN VDE 0100 Part 737

4.1 Electrical equipment must be selected taking into account the external influences to which they may be exposed. Proper operation and the effectiveness of the required degrees of protection must be assured.

Note: Data from the manufacturer!