



English version



Jacques Jumeau

Technology of components used in heating.

Chapter 8

Mechanical impact resistance (IK)



Mechanical impact resistance (IK)

Mechanical impact resistance

This mechanical impact is identified by the energy needed to qualify a specified resistance level, which is measured in joules (J). Protection class impact resistance was eventually given previously by the third digit of the IP rating. It was dropped during the 3rd edition of IEC60529 (1978), and replaced by an independent marking specified by the EN62262 standard. There is not an exact correspondence of values between the old and new standards.

Although dropped from the 3rd edition of IEC 60529 onwards, and not present in the EN version, older enclosure specifications will sometimes be seen with an optional third IP digit denoting impact resistance. Newer products are likely to be given an IK rating instead.

Analysis of the results of the impact tests:

The tests are carried out as follows:

For plastics:

1 / On test pieces of identical size (60 mm x 60 mm), thickness 3 mm. A single shock is made in the center of the test piece This provides a comparative table of strength of different materials.

2 / The tests are then carried out on the apparatus, on the cover and on the lateral faces. A first shock is produced in the middle of each face. It is then followed by 4 other shocks evenly distributed over the rest of the surface.

The test is considered successful when the plastic is not split or broken. Of course, the apparatus must retain its ability to function and its degree of tightness.

For aluminum or stainless steel cases:

A first shock is produced in the middle of each of the faces of the devices. It is then followed by 4 other shocks evenly distributed over the rest of the tested face.

The test is considered **inconclusive** when the largest deformation measured on the metal at any location of the different impacts is greater than **2mm** Indeed, **although this value is not specified in the standard**, we considered that this permanent deformation would not allow the mounting of accessories.

For accessories:

When the cases are equipped with instruments, it is often the accessory which will be the most fragile part and will determine the classification. If the case is equipped with accessories (handle, indicator light, cover, switch, cable gland, etc.), a test is performed in the center of this accessory and in two orthogonal directions. The glands have varying degrees of resistance because they exist in polyamide plastic and also in metal.

The test is considered successful when this accessory is not broken and retains its function.

IK mechanical impact resistance values upon EN 62262

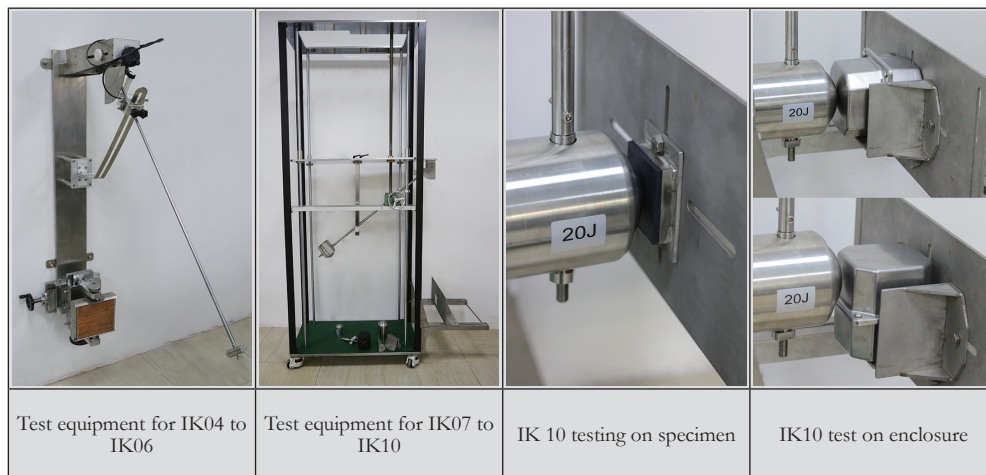
IK number	Impact energy (Joules)	Equivalent drop mass and height
00	Unprotected	No test
01	0.15	200 g dropped from 7.5 cm
02	0.2	200 g dropped from 10 cm
03	0.35	200 g dropped from 17.5 cm
04	0.5	200 g dropped from 25 cm
05	0.7	200 g dropped from 35 cm
06	1	500 g dropped from 20 cm
07	2	500 g dropped from 40 cm
08	5	1.7 kg dropped from 29.5 cm
09	10	5 kg dropped from 20 cm
10	20	5 kg dropped from 40 cm

Mechanical impact resistance (IK)

For information: IP third number mechanical impact resistance (Obsolete)

IP third digit	Impact energy (Joules)	Equivalent drop mass and height
0	Unprotected	No test
1	0.225	150 g dropped from 15 cm
2	0.375	250 g dropped from 15 cm
3	0.5	250 g dropped from 20 cm
5	2	500 g dropped from 40 cm
7	6	1.5 kg dropped from 40 cm
9	20	5.0 kg dropped from 40 cm

IK testing of enclosures in our laboratory



Comparative test results of 60 x 60mm plastic specimens, 3mm thickness


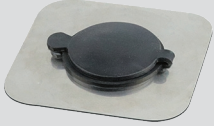
Material	PA66, 25%GF	PC	PVDF	PP
IK	10	10	09	10

Comparative test results of metal specimens of 60 x 60mm, in thicknesses used on enclosures*

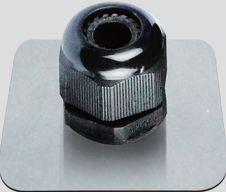



	304 stainless steel			Aluminum		
Thickness	1mm	1.2mm	2mm	1.7mm	2mm	3mm
IK10 impact bump	10.6mm	7.5mm	4.4mm	11.8	9.7	0.45

* the value of the IK10 impact deformation of flat specimens is indicative but is not representative of the deformation of stamped or molded parts, because the shape is then predominant.

IK grade of usual accessories (For information only)

Description	Photos	IK	Description	Photos	IK
Unprotected external knob dia. 40mm		IK09	Internal access soft boot		IK10

Mechanical impact resistance (IK)

Description	Photos	IK	Description	Photos	IK
External knob dia. 50mm inside a protection recess		IK10	Internal access M25 cap in PA6		IK10
Built in pilot light dia 8mm		IK08	M16 cable gland in PA6		IK10
Unprotected dia. 16mm pilot light		IK08	M20 cable gland in PA6		IK10
Dia 16mm pilot light inside a protection recess		IK10	M25 cable gland in PA6		IK10
Unprotected dia. 22mm pilot light		IK08	M16 cable gland in nickel plated brass		IK10
Unprotected toggle switch		<IK04	M20 cable gland in nickel plated brass		IK10
Toggle switch inside recess		IK10	M25 cable gland in nickel plated brass		IK10

Mechanical impact resistance (IK)

Description	Photos	IK	Description	Photos	IK
Unprotected dome switch		IK10	Miniature Cnomo connector, wall mounted part		<IK04
Dome switch inside recess		IK10	Miniature Cnomo connector, assembled with mobile part		<IK04
Miniature M12 connector, wall mounted part		IK08	M21 connector, wall mounted part		IK10
Miniature M12 connector, assembled with mobile part		<IK04	M21 connector, assembled with mobile part		<IK04
External manual reset cap		IK10			