



<p>TEST REPORT IEC 60670-1 + IEC 60670-24</p> <p>Boxes and enclosures for electrical accessories for household and similar fixed electrical installations</p> <p>Part 24: Particular requirements for enclosures for housing protective devices and other power dissipating electrical equipment</p>	
<p>Report Number..... :</p> <p>Date of issue</p> <p>Revision..... :</p> <p>Total number of pages</p>	<p>TR_NUOVA_60670-24_3704 3708 3712 3718 3724 3736 3504 3508 3512 3518 3524 3536 3804 3808 3812 3818 3824 3836 3604 3608 3612 3618 3624 3636 20211021.docx</p> <p>21102021</p> <p>00</p> <p>31</p>
<p>Name of Testing Laboratory preparing the Report</p> <p>Address</p>	<p>FAMATEL LABORATORY</p> <p>Avda. El Pla, 11. Lliçà de Vall (Barcelona)</p>
<p>Test specification:</p> <p>Standard</p> <p>Non-standard test method..... :</p>	
<p>IEC 60670-24:2011 to be used in conjunction with IEC60670-1:2002, AMD1:2011</p> <p>N/A</p>	
<p>Test item description</p> <p>Trade Mark.....</p> <p>Manufacturer</p> <p>Model/Type reference.....</p> <p>Sample Nr</p> <p>Ratings.....</p>	<p>Enclosure for switchgear for domestic applications</p> <p>FAMATEL</p> <p>FAMATEL</p> <p>3704 3708 3712 3718 3724 3736 3504 3508 3512 3518 3524 3536 3804 3808 3812 3818 3824 3836 3604 3608 3612 3618 3624 3636</p> <p>3704 3708 3712 3718 3724 3736 3504 3508 3512 3518 3524 3536 3804 3808 3812 3818 3824 3836 3604 3608 3612 3618 3624 3636</p> <p>IP40, IK07</p>
<p>Summary of testing:</p>	
<p>Tests performed (name of test and test clause):</p> <p>Full Tests</p>	<p>Testing location:</p> <p>FAMATEL LABORATORY</p> <p>Lliçà de Vall (Barcelona)</p>



TECHNICAL EXPEDIENT
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Test item particulars		
7.1	Nature of material	<input checked="" type="checkbox"/> 7.1.1 Insulating <input type="checkbox"/> 7.1.2 Metallic <input type="checkbox"/> 7.1.3 Composite
7.2	Method of installation	<input type="checkbox"/> 7.2.1 Flush, semi-flush or embedded in: <input checked="" type="checkbox"/> 7.2.1.1 Non combustible walls, ceilings or floors <input type="checkbox"/> 7.2.1.2 Combustible walls, ceilings or floors <input type="checkbox"/> 7.2.1.3 Hollow walls, hollow ceilings, hollow floors or furniture <input checked="" type="checkbox"/> 7.2.2 Surface mounting on: <input checked="" type="checkbox"/> 7.2.2.1 Non combustible walls, ceilings, floors or furniture <input type="checkbox"/> 7.2.2.2 Combustible walls, ceilings, floors or furniture <input type="checkbox"/> 7.2.3 Placement: <input checked="" type="checkbox"/> 7.2.3.1 Suitable for installation into concrete during the casting process (see 7.6) <input type="checkbox"/> 7.2.3.2 Suitable for all types of installation except into concrete
7.3	Type(s) of inlets (outlets)	<input type="checkbox"/> 7.3.1 With inlets for sheathed cables for fixed installations <input type="checkbox"/> 7.3.2 With inlets for flexible cables <input type="checkbox"/> 7.3.3 With inlets for plain or corrugated conduits <input type="checkbox"/> 7.3.4 With inlets for threaded conduits <input type="checkbox"/> 7.3.5 With inlets for other types of conductors/cables or conduits <input type="checkbox"/> 7.3.6 With spouts (hub) <input checked="" type="checkbox"/> 7.3.7 Without inlets. Inlet openings are made during installation
7.4	Clamping means	<input type="checkbox"/> 7.4.1 With cable retention <input type="checkbox"/> 7.4.2 With cable anchorage <input type="checkbox"/> 7.4.3 With clamping means for flexible conduit <input checked="" type="checkbox"/> 7.4.4 Without clamping means
7.5	Minimum and maximum temperatures during installation	<input type="checkbox"/> 7.5.1 -5 °C to +60 °C <input type="checkbox"/> 7.5.2 -15 °C to +60 °C <input checked="" type="checkbox"/> 7.5.3 -25 °C to +60 °C
7.6	Maximum temperature during the casting process	<input checked="" type="checkbox"/> 7.6.1 +60 °C <input type="checkbox"/> 7.6.2 +90 °C
7.7	Boxes and enclosures for hollow walls and the like according to 7.2.1.3	<input type="checkbox"/> 7.7.1 Class Ha <input type="checkbox"/> 7.7.3 degree of protection of the part mounted in the hollow wall: <input type="checkbox"/> 7.7.3.2 >IP2X
7.8	Provision for fixing accessories to boxes	<input type="checkbox"/> 7.8.1 Boxes supplied with screws <input checked="" type="checkbox"/> 7.8.2 Boxes intended to receive screws <input type="checkbox"/> 7.8.3 Boxes intended to receive claws <input type="checkbox"/> 7.8.4 Boxes intended to receive other means
7.101	Empty enclosure	<input checked="" type="checkbox"/> 7.101.1 GP enclosure <input type="checkbox"/> 7.101.2 PD enclosure

Made by: I.Pacheco

Approved by: D.Casas

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7.102	Basic enclosure	<input type="checkbox"/> 7.102.1 GP enclosure <input type="checkbox"/> 7.102.2 PD enclosure
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Operating temperature range	-25 °C / + 40 °C
Storage/ Installation temperature range	-25°C / + 70°
Type of material	Insulating / metallic / combination of insulating and metallic
Material	ABS (Base & lid) / PC or ABS (window)
Rated insulation voltage (if applicable)	1000Vac / 1500Vdc
Flammability category	ABS → Hb, PC→ V-2
Method of fixing	floor standing / wall mounting / flush mounting / pole mounting
Intended location	Outdoor / Indoor
Degree of protection	IP 40 / IK08
Dimensions (Large x width x height)	(See data sheet) mm
Weight	(See data sheet) g
Colour	RAL 9003 and color fumé
General product information:	

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Possible test case verdicts: - test case does not apply to the test object..... : N/A - test object does meet the requirement : P (Pass) - test object does not meet the requirement..... : F (Fail) - Remark about result of verdict..... : OBS (Observation)
Testing Date of receipt of test item : 19/09/2021 Date (s) of performance of tests..... : 19/09/2021 to 21/10/2021
General remarks: "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.

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REVISIÓN / Re-view	FECHA / Date	Nº MUESTRA / SAMPLES No	COMENTARIOS / Comments
Rev00	21/10/2021	10	Inicio ensayos

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<u>OBSERVACIONES E INCUMPLIMIENTOS /COMMENTS AND FAILS:</u>
Not detected any fail.

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Expediente /Expedient:

8	MARKING		
8.1	Enclosures shall be marked with:		
	a) name, trade mark or identification mark of the manufacturer or the responsible vendor		P
	b) IP > 3X and/or IP > X0	IP40	
	The IP code, if applicable, shall be marked on the outside of the enclosure so as to be easily discernible when the enclosure is mounted and wired as for normal use.	Mark in the window	P
	The visibility of the marking is also allowed after opening the door or the lid if a minimum degree of IP20 is maintained after opening.		N/A
	c) symbol for total insulation, if applicable		P
	d) type designation, reference number or catalogue number	External label	P
	e) letter N for terminals intended exclusively for the neutral conductor		N/A
	f) symbol for earthing terminals for the connection of the protective conductor 		N/A
	Markings of neutral terminals and earthing terminals not placed on screws, or any other easily removable parts		
	g) rated voltage	1000 Vac / 1500Vdc	P
	h) rated current (enclosures 7.101.2 and 7.102.2)....	63A	P
	i) standard reference number	60670-24	P
	j) maximum temperature during the building process if 90 °C		N/A
	k) information concerning the openings that can be made during installation for enclosures without inlets (7.3.7)		N/A
	l) maximum capability to dissipate power (Pde) for GP enclosures (7.101.1 and 7.102.1)	-	P
	m) usability for hollow wall installation (7.7)		N/A
	n) corresponding dimension sheet		N/A
	p) for enclosures classified according to:		N/A
	- "GP" (7.101.1 and 7.102.1)		P
	- "PD" (7.101.2 and 7.102.2)		NA

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8.2	Marking is durable and easily legible		P
	Rubbing test 15 s with water and 15 s with petroleum spirit		P
	After the test: marking still legible		P
8.101	Required data for instruction sheet and/or documentation		
	provide appropriate instructions regarding the means to be used to obtain the intended degree of protection	---	N/A
	give information concerning the verification of the electrical continuity of the protective circuit	---	N/A
	give to the installer the necessary instructions:		—
	- manufacturer includes in the documentation accompanying the enclosure the necessary instructions for installation and how to integrate accessories (7.101.1 and 7.102.1)	---	P
	- manufacturer includes in the documentation accompanying the enclosure the necessary instructions for installation according to the appropriate mounting environment (7.101.2 and 7.102.2)	---	P

9	DIMENSIONS		
	Boxes and enclosures comply with the appropriate standard sheets, if any		NA

10	PROTECTION AGAINST ELECTRIC SHOCK		
	Boxes and enclosures assembled, equipped and installed as for normal use in accordance with the manufacturer's instructions: live parts are not accessible.		P

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	<p>Enclosures, tested with test probe 11 according to IEC 61032 applied for 1 min with a force of 20 N</p>		P
	<p>In addition, enclosures according to 7.1.1 and 7.1.3, tested with test probe 11 according to IEC 61032 applied for 1 min with a force of 75 N to all places except membranes or like, at (35 ± 2) °C.</p>		P
10.101	<p>Enclosures are tested completed with the necessary means and the window opening(s), if any, completely filled up with blank inserts delivered by the manufacturer and/or samples of products as declared by the manufacturer</p>		P
	<p>Enclosures have ≥ IPXXC, when mounted and installed as for normal use</p>	<p>Test with all modules installed inside the samples</p>	P
	<p>Enclosures with total insulation when mounted and installed as for normal used:</p>		
	<p>a) completely enclose the installed equipment in insulating material</p>		P
	<p>b) at no point are pierced by conducting parts</p>		P
	<p>c) do not have conductive parts (plates, cover-plates or frames) connected to the protective circuit</p>		P
	<p>If doors or covers can be opened without the use of a key or tool they shall be left open during the test.</p>		

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	Enclosures, tested with test probe C according to IEC 61032 applied for 1 min with a force of 3 N		P
	Additional test at (35 ± 2) °C with test probe C according to IEC 61032 on enclosures according to 7.1.1 and 7.1.3 with parts of thermoplastic or elastomeric material applied to:		
	- all places except membranes or the like, where yielding of insulating material could impair the safety, with a force of 3 N		P
	- knock-outs with a force of 3 N		N/A

11	PROVISION FOR EARTHING		
11.1	Boxes and enclosures with exposed conductive parts:		NA
	- provided with an earthing means of low resistance	Without exposed conductive ports	NA
	- have provision for the fitting of such an earthing means	Without exposed conductive ports	NA
	Earthing means or provision for fitting, located so that:		
	- means is readily accessible, and	Without exposed conductive ports	NA
	- removal of an accessory, not disturb the continuity of earthing circuit, and	Without exposed conductive ports	NA
	- means is not part of removable cover.....	Without exposed conductive ports	NA
	Exposed conductive parts of covers or cover-plates are connected through a low resistance connection to the earthing means	Without exposed conductive ports	NA
	Resistance ≤ 0,05 Ω (Ω)	Without exposed conductive ports	NA
11.2	Boxes and enclosures of insulating material classified according to 7.7.2 (Class Hb)		N/A
11.3	Boxes and enclosures with removable sides according to 7.1.2		NA
	Constructed so that the electrical bond between separable parts includes at least one threaded screw connection	Enclosure according to 7.1.1 insulating material	NA
11.4	Earthing terminal threads		NA
	Threads of earthing terminal are not stripped		NA
	Test:Tight and loose screws 5 times with torque according to Table 4		NA



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	<p align="center">Table 4 – Tightening torques for the verification of the mechanical strength of screws</p> <table border="1"> <thead> <tr> <th rowspan="2">Nominal diameter of screw thread mm</th> <th colspan="4">Torque for metallic and non-metallic screws Nm</th> </tr> <tr> <th>I</th> <th>II</th> <th>III</th> <th>IV</th> </tr> </thead> <tbody> <tr> <td>Up to and including 2,8</td> <td>0,20</td> <td>0,40</td> <td>0,40</td> <td>0,70</td> </tr> <tr> <td>Over 2,8 up to and including 3,0</td> <td>0,25</td> <td>0,50</td> <td>0,50</td> <td>0,90</td> </tr> <tr> <td>Over 3,0 up to and including 3,2</td> <td>0,30</td> <td>0,60</td> <td>0,60</td> <td>1,10</td> </tr> <tr> <td>Over 3,2 up to and including 3,6</td> <td>0,40</td> <td>0,80</td> <td>0,80</td> <td>1,40</td> </tr> <tr> <td>Over 3,6 up to and including 4,1</td> <td>0,70</td> <td>1,20</td> <td>1,20</td> <td>1,80</td> </tr> <tr> <td>Over 4,1 up to and including 4,7</td> <td>0,80</td> <td>1,80</td> <td>1,80</td> <td>2,30</td> </tr> <tr> <td>Over 4,7 up to and including 5,3</td> <td>0,80</td> <td>2,00</td> <td>2,00</td> <td>4,00</td> </tr> <tr> <td>Over 5,3 up to and including 6,0</td> <td>1,20</td> <td>2,50</td> <td>3,00</td> <td>4,40</td> </tr> <tr> <td>Over 6,0 up to and including 8,0</td> <td>2,50</td> <td>3,50</td> <td>6,00</td> <td>4,70</td> </tr> <tr> <td>Over 8,0</td> <td>3,00^a</td> <td>4,00</td> <td>10,00</td> <td>5,00</td> </tr> </tbody> </table> <p>^a Or to be specified by the manufacturer.</p> <p><i>Column I applies to screws which cannot be tightened by means of a screwdriver with a blade wider than the nominal diameter of the thread of the screw.</i></p> <p><i>Column II applies to other screws which are tightened by means of a screwdriver.</i></p> <p><i>Column III applies to screws and nuts which are tightened by means other than a screwdriver.</i></p> <p><i>Column IV applies to screws which are tightened by means of a square blade screwdriver.</i></p>	Nominal diameter of screw thread mm	Torque for metallic and non-metallic screws Nm				I	II	III	IV	Up to and including 2,8	0,20	0,40	0,40	0,70	Over 2,8 up to and including 3,0	0,25	0,50	0,50	0,90	Over 3,0 up to and including 3,2	0,30	0,60	0,60	1,10	Over 3,2 up to and including 3,6	0,40	0,80	0,80	1,40	Over 3,6 up to and including 4,1	0,70	1,20	1,20	1,80	Over 4,1 up to and including 4,7	0,80	1,80	1,80	2,30	Over 4,7 up to and including 5,3	0,80	2,00	2,00	4,00	Over 5,3 up to and including 6,0	1,20	2,50	3,00	4,40	Over 6,0 up to and including 8,0	2,50	3,50	6,00	4,70	Over 8,0	3,00 ^a	4,00	10,00	5,00		
Nominal diameter of screw thread mm	Torque for metallic and non-metallic screws Nm																																																													
	I	II	III	IV																																																										
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Over 4,1 up to and including 4,7	0,80	1,80	1,80	2,30																																																										
Over 4,7 up to and including 5,3	0,80	2,00	2,00	4,00																																																										
Over 5,3 up to and including 6,0	1,20	2,50	3,00	4,40																																																										
Over 6,0 up to and including 8,0	2,50	3,50	6,00	4,70																																																										
Over 8,0	3,00 ^a	4,00	10,00	5,00																																																										
	During the test: no damage such as impairing the further	See appended table 11.4	N/A																																																											
11.101	Except for enclosures intended to be used for total insulation, all exposed conductive parts of the enclosure are connected separately or in groups to the protective circuit terminals.	Total Insulation	N/A																																																											
	A current of 10 A a.c. or d.c. is passed between each exposed conductive part and the terminal for the external protective conductor.		N/A																																																											
	Resistance $\leq 0,05 \Omega (\Omega)$		N/A																																																											
12	CONSTRUCTION																																																													
	Boxes and enclosures, constructed without sharp edges		P																																																											
	The inner and outer surfaces of a box or cover have the following characteristics:		P																																																											
	- not subject to peeling, scaling or flaking, and		P																																																											
	- smooth and free from blisters, crack and other defects		P																																																											
12.1	Lids, covers or cover-plates or part of them		P																																																											
	Lids, covers or cover-plates or parts of them, which are intended to ensure protection against electric shock:		P																																																											
	- are held in place effectively		P																																																											



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	- are removable only by the use of a tool and/or a key		P
12.2	Drain holes		NA
	Surface and semi-flush mounting enclosures having IPX1 to IPX6 allow the opening of a drain hole ≥ 5 mm in diameter (mm \varnothing) or 20 mm ² in area (mm ²) with a width or length ≥ 3 mm (mm)..... :		NA
	Drain holes: effective		NA
12.3	Mounting of enclosures		P
	Enclosures have provisions for their suitable attachment according to the method of installation (7.2)		P
	Conductive parts of fixing means inside the box or enclosure are surrounded by insulation which projects above the top of the fixing means by an amount of ≥ 10 % of the maximum width of the cavity for the fixing means (mm)		N/A
12.4	Boxes and enclosures with inlets for flexible cables		N/A
	In inlets (outlets) provided in boxes and enclosures classified according to 7.3.2 the flexible cables can be easily introduced, and		N/A
	- no damage the flexible cable where it enter, or		N/A
	- enclosure impairing its further use		N/A
12.5	Boxes and enclosures with inlets for applications other than flexible cables		
	Inlet openings classified according to 7.3 other than 7.3.2, if any, allow the introduction of:	Classified as 7.3.5	N/A
	- a conduit or a suitable fitting, and/or		P
	- the protective covering of the cable		N/A
	Inlet opening for conduit entries:		N/A
	- capable of accepting either conduits of sizes, or a combination of sizes, according to IEC 60423 and/or IEC 60981		N/A
	- same requirement in at least two inlet openings if there are more than one		N/A
12.6	Boxes and enclosures with a cable anchorage(s)		
	In boxes and enclosures classified according to 7.4.2 the connection of the conductors of the flexible cable are relieved from strain		N/A
	Clear how relief from strain and prevention of twisting is intended to be effected		N/A
	Cable anchorages are:		N/A
	- suitable for the different types of flexible cable		N/A

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	- at least one part of it is integral with, or permanently fixed to, one of the component parts of the box		N/A
	- of insulating material or provided with an insulating lining fixed to the metal parts		N/A
	Test of effectiveness of the cable anchorage:		N/A
	- external dimensions of flexible cable (mm) :	NA	---
	- clamping screws tightened with a torque equal to 2/3 of that specified in Table 4 (Nm) :	NA	---
	- glands tightened with a torque equal to that specified in Table 5 :	NA	---
	It is not possible to push the flexible cable into the specimen by more than 1 mm with a force specified in Table 3 (N) :		N/A
	Pull force as specified in Table 3 applied 50 times for 1 s (N) :	NA	---
	Torque as specified in Table 3 applied for (15 ± 1) s (Nm) :	NA	---
	After the test: displacement ≤ 2 mm (mm)..... :		N/A
	Cable anchorage: no damage		N/A
12.7	Boxes and enclosures with cable retention means		N/A
	Cable retention means of boxes and enclosures classified according to 7.4.1 retain the cable in place		N/A
	Boxes and enclosures according to 7.5.2 or 7.5.3, tested at (-15 ± 2) °C and (-15 ± 2) °C respectively		N/A
	Test with cables as declared by the manufacturer, fitted according to the manufacturer's instructions and loaded with an axial force of (20 ± 1) N applied for 1 min:		N/A
	Type of cable/maximum nominal cross-sectional area (mm ²) :	---	---
	After the test: displacement ≤ 3 mm (mm)..... :		N/A
	Type of cable/minimum nominal cross-sectional area (mm ²) :		---
	After the test: displacement ≤ 3 mm (mm)..... :		N/A
12.8	Knock-out inlets (outlets) intended to be removed by mechanical impact		N/A
12.8.1	General		
	It is possible to remove knock-out by mechanical impact without damaging the box		N/A
	Chips or burrs are not accepted in knock-out for cables		N/A

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	Chips and burrs are disregarded in knock-out for conduits and/or for use with a grommet or a membrane		N/A
	In order to close an open knock-out in a box or an enclosure according 7.1.2 a blanking-plug used without a locknut:		N/A
	- not become dislodged, and	Classified acc. To 7.1.1 insulating	N/A
	- its effectiveness not be impaired, and	Classified acc. To 7.1.1 insulating	N/A
	- it fulfil all requirements for knock-outs	Classified acc. To 7.1.1 insulating	N/A
12.8.2	Knock-out retention		
	Boxes and enclosures having knock-outs, accessible after installation by means of a 6 mm diameter mandrel with a flat end that:		N/A
	- not provide access to live parts, a force of (30 ± 1) N applied for (15 ± 1) s		N/A
	- provide direct access to live parts, a force of (40 ± 1) N applied for (60 ± 1) s		N/A
	Box with multi-stage knock-outs, the force applied to the smallest		N/A
	During the test: knock-out remains in place		N/A
	Degree of protection unchanged 1 h after the test		N/A
12.8.3	Knock-out removal		N/A
	Removal test of knock-outs with a tool as stated by the manufacturer, without conditioning:		N/A
	During the test: no displacement of a larger stage of multi-stage knock-outs when a smaller stage is removed		N/A
	After the test: no sharp edges, box and enclosure is not damaged		N/A
	Removal test of knock-outs with a tool as stated by the manufacturer, immediately following a conditioning at the minimum temperature specified according to 7.5 for $5 \text{ h} \pm 10 \text{ min}$ (boxes and enclosures according to 7.1.1 or 7.1.3)		N/A
	Test temperature (°C)		—
	During the test: no displacement of a larger stage of multi-stage knock-outs when a smaller stage is removed		N/A
	After the test: no sharp edges, box and enclosure is not damaged		N/A
12.8.4	Flat surfaces surrounding knock-outs		N/A
	Knock-outs located in flat surface		N/A
	Projections or identification are prohibited		N/A

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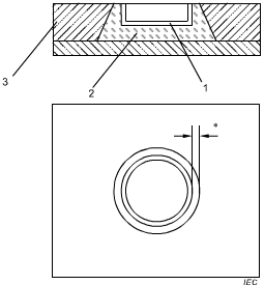
12.9	Screw fixings																																																													
	Fixing means effected by screws withstand mechanical stresses		P																																																											
	Screw or other fixing means made from insulating material without standardized thread are tested according to the manufacturer's instruction		P																																																											
	Thread-forming or thread-cutting screws used only if supplied together with one of the pieces in which they are intended to be inserted		P																																																											
	Verification of the mechanical strength of screws: Test: Tight and loose fixing screws -10 times for metal screws in engagement with insulating material -5 times other cases	See app ended table 12.9	P																																																											
Table 4 – Tightening torques for the verification of the mechanical strength of screws																																																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Nominal diameter of screw thread mm</th> <th colspan="4" style="text-align: center;">Torque for metallic and non-metallic screws Nm</th> </tr> <tr> <th style="text-align: center;">I</th> <th style="text-align: center;">II</th> <th style="text-align: center;">III</th> <th style="text-align: center;">IV</th> </tr> </thead> <tbody> <tr> <td>Up to and including 2,8</td> <td style="text-align: center;">0,20</td> <td style="text-align: center;">0,40</td> <td style="text-align: center;">0,40</td> <td style="text-align: center;">0,70</td> </tr> <tr> <td>Over 2,8 up to and including 3,0</td> <td style="text-align: center;">0,25</td> <td style="text-align: center;">0,50</td> <td style="text-align: center;">0,50</td> <td style="text-align: center;">0,90</td> </tr> <tr> <td>Over 3,0 up to and including 3,2</td> <td style="text-align: center;">0,30</td> <td style="text-align: center;">0,60</td> <td style="text-align: center;">0,60</td> <td style="text-align: center;">1,10</td> </tr> <tr> <td>Over 3,2 up to and including 3,6</td> <td style="text-align: center;">0,40</td> <td style="text-align: center;">0,80</td> <td style="text-align: center;">0,80</td> <td style="text-align: center;">1,40</td> </tr> <tr> <td>Over 3,6 up to and including 4,1</td> <td style="text-align: center;">0,70</td> <td style="text-align: center;">1,20</td> <td style="text-align: center;">1,20</td> <td style="text-align: center;">1,80</td> </tr> <tr> <td>Over 4,1 up to and including 4,7</td> <td style="text-align: center;">0,80</td> <td style="text-align: center;">1,80</td> <td style="text-align: center;">1,80</td> <td style="text-align: center;">2,30</td> </tr> <tr> <td>Over 4,7 up to and including 5,3</td> <td style="text-align: center;">0,80</td> <td style="text-align: center;">2,00</td> <td style="text-align: center;">2,00</td> <td style="text-align: center;">4,00</td> </tr> <tr> <td>Over 5,3 up to and including 6,0</td> <td style="text-align: center;">1,20</td> <td style="text-align: center;">2,50</td> <td style="text-align: center;">3,00</td> <td style="text-align: center;">4,40</td> </tr> <tr> <td>Over 6,0 up to and including 8,0</td> <td style="text-align: center;">2,50</td> <td style="text-align: center;">3,50</td> <td style="text-align: center;">6,00</td> <td style="text-align: center;">4,70</td> </tr> <tr> <td>Over 8,0</td> <td style="text-align: center;">3,00^a</td> <td style="text-align: center;">4,00</td> <td style="text-align: center;">10,00</td> <td style="text-align: center;">5,00</td> </tr> </tbody> </table>				Nominal diameter of screw thread mm	Torque for metallic and non-metallic screws Nm				I	II	III	IV	Up to and including 2,8	0,20	0,40	0,40	0,70	Over 2,8 up to and including 3,0	0,25	0,50	0,50	0,90	Over 3,0 up to and including 3,2	0,30	0,60	0,60	1,10	Over 3,2 up to and including 3,6	0,40	0,80	0,80	1,40	Over 3,6 up to and including 4,1	0,70	1,20	1,20	1,80	Over 4,1 up to and including 4,7	0,80	1,80	1,80	2,30	Over 4,7 up to and including 5,3	0,80	2,00	2,00	4,00	Over 5,3 up to and including 6,0	1,20	2,50	3,00	4,40	Over 6,0 up to and including 8,0	2,50	3,50	6,00	4,70	Over 8,0	3,00 ^a	4,00	10,00	5,00
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^a Or to be specified by the manufacturer.																																																														
<i>Column I applies to screws which cannot be tightened by means of a screwdriver with a blade wider than the nominal diameter of the thread of the screw.</i>																																																														
<i>Column II applies to other screws which are tightened by means of a screwdriver.</i>																																																														
<i>Column III applies to screws and nuts which are tightened by means other than a screwdriver.</i>																																																														
<i>Column IV applies to screws which are tightened by means of a square blade screwdriver.</i>																																																														

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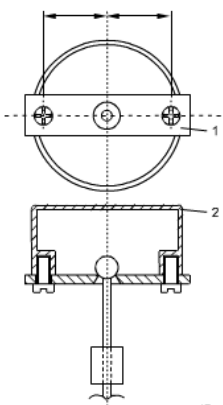
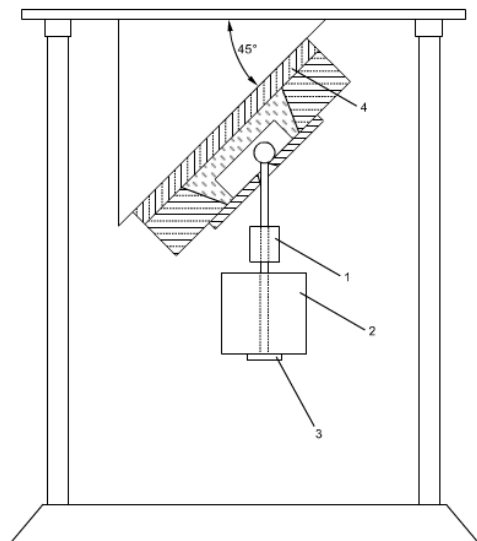
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12.10	TABLE: Threaded part torque test					
Threaded part identification	Diameter of thread (mm)	Table 4 Column number (I, II, III or IV)	Applied torque Table 4 (Nm)	Times (5/10)	No damage	
Fixation lid screw	3,79	II	1,2	5	P	
Din Rail fixation screw	3,70	II	1,2	5	P	
Supplementary information:						
12.11	Fixing of boxes and enclosures classified according to 7.2.1.1 and 7.2.1.2					
	Fixing means provided for flush type boxes and enclosures other than for hollow walls					P
	Screws not supplied with box or enclosures can be provided according to the manufacturer's instruction					P
	Screws, additional mechanical supports or design features, are considered adequate fixing means					P
	Test shall be performed on those boxes with internal volume < 400cm ³ (See 12.15)					P
	the block (Figure 22) is filled by the following material : <div style="text-align: center;">  </div>					P
	Key 1 specimen 2 plaster 3 block of wood <small>* The gap between the main external profile of the box and the internal profile of the recess in the mounting block shall be at least 20 mm, and for parts which project from the main profile never less than 10 mm.</small>					

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	<p>auxiliary device described in Figure 23 is mounted on the specimen and the screw are tightened with a torque equal to 2/3 of that specified in table 4 :</p>  <p>Key 1 auxiliary device 2 specimen</p>		P
	<p>After the test, according to Figure Z3, displacement of the specimen from the mounting block $\leq 0,5$ mm:</p>  <p>Key 1 supplementary weight (SW) 2 principal weight (PW) 3 carrier (C) 4 mounting plate (A)</p> <p>Figure 14 – Example of test apparatus for the test</p>		P
12.12	Boxes and enclosures classified according to 7.7.1 (Class Ha)		
	Enclosures for hollow walls classified according to 7.7.1 provide suitable means for fixing the enclosure to hollow walls.		N/A
12.13	Boxes and enclosures classified according to 7.7.2 (Class Hb)		
12.14	Cable gland entry		N/A

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	Torque test: glands provided with a metal rod tightened and loosened 10 times with a torque specified in Table 5 for 1 min ± 5 s		N/A
	- diameter of test rod (mm) : ---		---
	- type of material (metal / insulating) : ---		---
	- torque (Nm) : ---		---
	After the test: no damage	Without cable glands	N/A
12.15	Boxes and enclosures with inlets (outlets) for conduits or spouts (hubs)		N/A
	Boxes and enclosures classified according to 7.3.4 and conical spouts as in 7.3.6 withstand the tests of 12.14.1, 12.14.2 and 12.14.3		N/A
	Boxes and enclosures classified according to 7.4.3 withstand the tests of 12.14.1 and 12.14.2		N/A
12.15.1	Enclosures with inlet spout for conduits: a minimum size piece of conduit pressed for 1 min ± 5 s with a force of (100 ± 2) N		N/A
	During the test: inlet spout prevents further entry of the conduit into the box		N/A
12.15.2	Pull-out test after the test according to 12.14.1: conduit with the minimum size corresponding to the insert opening loaded for 1 min with a tensile force of (20 ± 2) N		N/A
	During the test: conduit not come loose from the inlet spout of the enclosure		N/A
12.15.3	Resistance to bending strain of an inlet spout: piece of conduit inserted into the inlet spout with a compressible force of (100 ± 2) N and loaded with a bending moment of 3 Nm for 1 min in six different directions with an interval of (60 ± 2) °		N/A
	During the test: inlet spout not come loose or damaged and conduit stays within the inlet spout		N/A
12.16	Internal volume of boxes and enclosures		
	Declared internal volume of the box or enclosure and each partitioned section of a box or enclosure, raised cover and box extension is measured	See table 12.15	P
	The volume of a side pocket provided to increase the volume of a box or enclosure is calculated using a depth-of-pocket not more than the smallest dimension of the opening into that side pocket		N/A
	Difference in the volume of water in the measuring cylinder measured before and after the filling of the box, enclosure or raised cover indicates the volume of the box :		P

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12.15	TABLE: Internal volume		
Reference	Net Weight of water[Kg]	Volume in cm3	
	5,350	5350	
Supplementary information:			
12.101	Enclosures for hollow walls have provisions for retention means for cables or means to use a separate retention device or devices		P
12.102	Enclosures have enough space to allow mounting and connection of the accessories (fully equipped) as declared by the manufacturer, in safe way		P

13	RESISTANCE TO AGEING, PROTECTION AGAINST INGRESS OF SOLID OBJECTS AND AGAINST HARMFUL INGRESS OF WATER		
13.1	Resistance to ageing		P
13.1.1	Specimens of insulating and composite boxes and enclosures, glands, grommets and replaceable membranes placed in a heating cabinet at (70 ± 2) °C for (168 + 4) h and then kept at room temperature for (96 + 4) h		P
	Glands tightened with a torque equal to 2/3 of the torque applied during the test of 12.13 (Nm)		—
	Greater torque value stated by the manufacturer, if any (Nm)		—
	After the test: no harmful deformation or similar damage		P
13.1.2	Grommets, blanking-plug and entry membranes in inlet openings and protecting membranes are reliably fixed and are not displaced by the mechanical and thermal stresses occurring in normal use	No grommets or blanking.plug intended for this boxes	N/A
	Specimens that have been subjected to the treatment specified in 13.1.1 placed in a heating cabinet at (40 ± 2) °C for 2 h ± 15 min		N/A
	Immediately after this period the tip of test probe 11 of IEC 61032 is applied for (5 ± 1) s with a force of (30 -2) N. During the tests: grommets, blanking-plug and/or membranes not deformed to such an extent that live parts of any included accessory become accessible	No grommets or blanking.plug intended for this boxes.	N/A
	Grommets, blanking-plug and/or membranes likely to be subjected to an axial pull: axial pull of (30 -2) N applied for (5 ± 1) s. During the tests: grommets, blanking-plug and/or membranes not deformed to such an extent that live parts of any included accessory become accessible	No grommets or blanking.plug intended for this boxes	N/A

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	Test repeated on same enclosures fitted with grommets, blanking-plug and/or membranes not subjected to any treatment	No grommets or blanking.plug intended for this boxes	N/A
	After the test: no harmful deformation, cracks or similar damage	No grommets or blanking.plug intended for this boxes	N/A
13.1.3	Grommets and entry membranes in inlet openings of boxes and enclosures classified according to 7.5.2 and 7.5.3: introduction of the cables and conduit permitted when the ambient temperature is low	No grommets or blanking.plug intended for this boxes	N/A
	Test on enclosures fitted with grommets, blanking-plug and/or membranes not subjected to any ageing treatment kept for 2 h in a refrigerator		N/A
	Test temperature (°C) : ---		—
	Immediately after conditioning: it is possible to pierce any blind grommets, blanking-plug and entry membranes and to introduce cables and conduit of the maximum diameter intended	No grommets or blanking.plug intended for this boxes	N/A
	After the test: no harmful deformation, cracks or similar damage	No grommets or blanking.plug intended for this boxes	N/A
13.2	Protection against the ingress of solid foreign objects		P
	Enclosures provide a degree of protection of at least IP3X against the ingress of solid foreign objects in accordance with their declared IP code with the lid closed, if any.	IP4X	P
	In the case of an enclosure with a door or a lid which can be opened without the use of a tool during normal use, a minimum degree of IP20 is maintained after opening the door or the lid.		P
	Enclosures mounted as in normal use with screwed glands or grommets fitted with cables as declared by the manufacturer:		N/A
	- type of cable, smallest cross-sectional area (mm²)..... :		—
	- type of cable, largest cross-sectional area (mm²)..... :		—
	Enclosures mounted as in normal use with screwed glands or grommets fitted with conduits as declared by the manufacturer:		N/A
	- smallest diameter or dimensions (mm) : NA		—
	- largest diameter or dimensions (mm) : NA		—
	Fixing screws of the cover or cover-plate tightened with a torque equal to 2/3 of the value of Table 4 used for the test of 12.9 (Nm)..... :		—
	Greater torque value stated by the manufacturer, if the relevant information is provided (Nm) : NA	NA	—
	- IP5X: test performed as specified in IEC 60529 category 2 with the drain holes, if any, not opened	IP40	N/A

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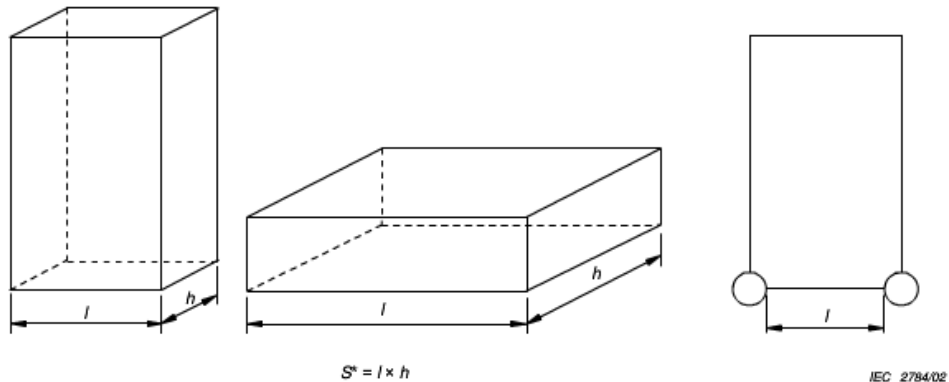
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	- IP≤4X: test probe does not pass through any opening other than drain holes		P
	- IP≤4X: test probe applied on drain holes does not touch live parts within the enclosure		N/A
	- IP5X: dust does not cover the whole inner surface	IP40	N/A
	- IP6X: there is no dust inside the box or enclosure	IP40	P
13.3	Protection against harmful ingress of water		
13.3.1	Enclosures with IP>X0 provide a degree of protection against harmful ingress of water in accordance with the declared IP code	IP40	N/A
	Enclosure dimensions: reference surface S (m ²) / perimeter (m).....		—

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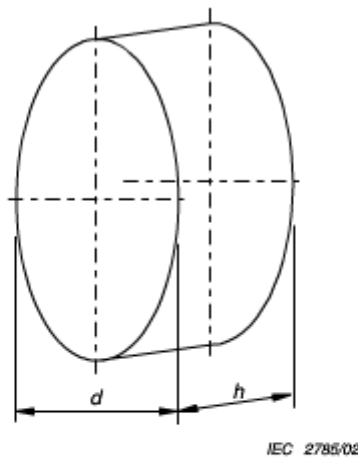
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Key
h Depth
l Internal width

* For a rectangular box placed horizontally, the surface S to take into account is the smallest one.

Figure 6a – Reference surface for square boxes and enclosures



Key
h Internal depth
d Smallest diameter

Figure 6b – Reference surface for round boxes and enclosures

Figure 6 – Reference surfaces for boxes and enclosures

The reference surface S to be chosen for verification is calculated as follows:

- for square and rectangular boxes and enclosures, the surface to take into account is the smallest interior width (*l*) multiplied by the depth (*h*) (see Figure 6a);
- for round boxes and enclosures, the surface to take into account is the interior depth (*h*) of the box or enclosure multiplied by the smallest diameter (*d*) divided by 4 (see Figure 6b).

Appropriate test performed on surface, flush or semi-flush enclosures as specified in IEC 60529 under the following conditions:

N/A

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	- dimension $S \leq 0,04 \text{ m}^2$ or perimeter $\leq 0,8 \text{ m}$ according to 13.3.2 and 13.3.3	IP40	N/A
	- dimension $S > 0,04 \text{ m}^2$ and perimeter $> 0,8 \text{ m}$ according to 13.3.2 and 13.3.4	IP40	N/A
	Enclosures with screwed glands or grommets fitted with cables as declared by the manufacturer:		N/A
	- type of cable, smallest cross-sectional area (mm ²)..... : NA		—
	- type of cable, largest cross-sectional area (mm ²) : NA		—
	Enclosures with screwed glands or grommets fitted with conduits as declared by the manufacturer:		N/A
	- smallest diameter or dimensions (mm) : NA		—
	- largest diameter or dimensions (mm) : NA		—
	Fixing screws of the cover or cover-plate tightened with a torque equal to 2/3 of the value of Table 4 used for the test of 12.9 (Nm)..... : 0,8Nm		N/A
13.3.2	Surface-mounting enclosures mounted as for normal use	IP40	NA
	Flush type and semi-flush type enclosures fixed in a test wall:		N/A
	- according to the manufacturer's instructions	IP40	N/A
	- according to Figure 5	IP40	N/A
	Enclosures fitted with cables having conductors of the largest and smallest cross-sectional area as declared by the manufacturer..... : NA		—
	IPX3 and IPX4 enclosures: use of oscillating tube (Figure 4) or spray nozzle according to IEC 60529 (Figure 5)..... : Figure 5		N/A
13.3.3	Immediately after the test no more than 0,2 ml x S (cm ²) water in the enclosure (ml) : No water inside sample	0,2 x S = 0,2 x 26980 = 53,96 ml	N/A
	Specimens withstand an electric strength test specified in 14.3 started within 5 min of the completion of IP test	IP40	NA
13.3.4	Immediately after the test: indicator paper still dry	IP40	NA

14	INSULATION RESISTANCE AND ELECTRIC STRENGTH		
14.1	Insulation resistance and electric strength of enclosures classified according to 7.1.1 and 7.1.3 is adequate		P
	Specimens placed in a humidity cabinet containing air with relative humidity between 91 % and 95 % and air temperature between 20 °C and 30 °C for:		P
	- 2 days (48 h) for enclosures classified IPX0		NA

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	- 7 days (168 h) for enclosures classified IP>X0		P
	After this treatment: no damage		P
14.2	Insulation resistance measured 1 min after application of 500 V d.c.. Between: <ul style="list-style-type: none"> the body (Accessible metal parts, metal foil in contact with the outer surface of insulating accessible external parts) and a metal foil in contact with the internal surface 	See appended table 14.2	P

14.2	TABLE: Insulation resistance		
	Test voltage applied between:	Measured (MΩ)	Required (MΩ)
	• the body and a metal foil in contact with the internal surface	>10MΩ	5MΩ
	Supplementary information:		

14.3	Electric strength: a.c. test voltage applied for 1 min	See appended table 14.3	
	Test voltage is taken from Table 6	Rated insulation voltage 1000Vac / 1500Vdc So Test voltage 3500V	P

	Table 6 – Test voltage for electric strength test		P												
	<table border="1"> <thead> <tr> <th>Rated insulation voltage V</th> <th>Test voltage V</th> </tr> </thead> <tbody> <tr> <td>≤130</td> <td>1 250</td> </tr> <tr> <td>>130 and ≤250</td> <td>2 000</td> </tr> <tr> <td>>250 and ≤450</td> <td>2 500</td> </tr> <tr> <td>>450 and ≤750</td> <td>3 000</td> </tr> <tr> <td>>750</td> <td>3 500</td> </tr> </tbody> </table>	Rated insulation voltage V	Test voltage V	≤130	1 250	>130 and ≤250	2 000	>250 and ≤450	2 500	>450 and ≤750	3 000	>750	3 500		
Rated insulation voltage V	Test voltage V														
≤130	1 250														
>130 and ≤250	2 000														
>250 and ≤450	2 500														
>450 and ≤750	3 000														
>750	3 500														

	For enclosures having class II protection, the test voltage according to Tables 6 is multiplied by 1,5.	3500*1,5=5250V	P
	Between: <ul style="list-style-type: none"> The body and a metal foil in contact with the internal surface 	No flashover and not breakdown occurred during the test	P

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14.3	TABLE: Electric strength		
Test voltage applied between:		Test voltage (V)	Flashover / breakdown (Yes/No)
• the body and a metal foil in contact with the internal surface		5,2kV	P
Supplementary information:			

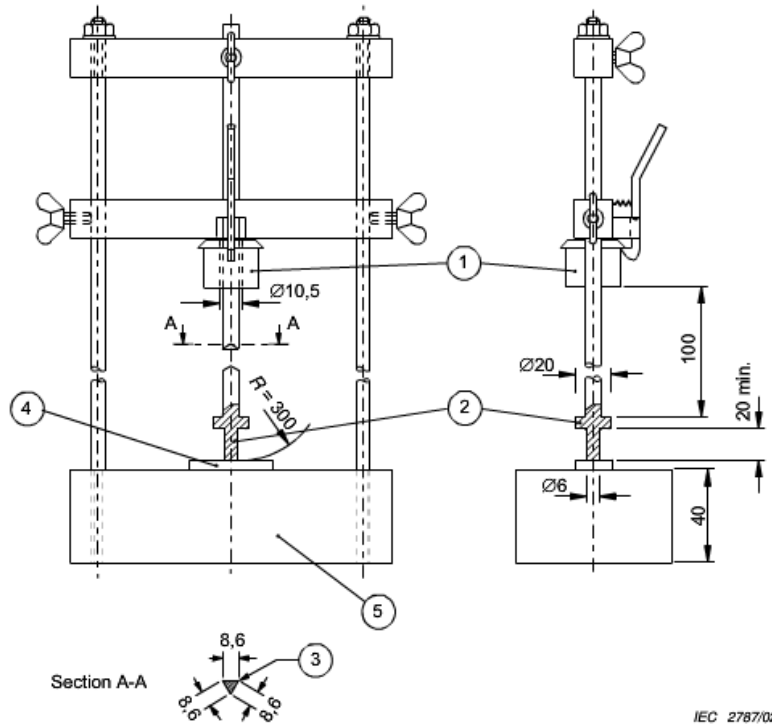
15	MECHANICAL STRENGTH		
	Boxes and enclosures have adequate mechanical strength		
15.1	Impact test at low temperature		P

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Non-metallic boxes and enclosures for use in cast concrete according to 7.3.2.1: impact test with a vertical hammer test apparatus (Figure 8) placed together with the specimens for 2 h ± 15 min in a refrigerator at:



Key

- 1 Falling weight (100 ± 1) g
- 2 Steel intermediate piece 100 g
- 3 Slightly rounded edges
- 4 Specimen
- 5 Steel support (10 ± 1) kg

Dimensions in millimetres

Figure 8 – Apparatus for impact test at low temperature (see 15.1)

	- (-5 ± 2) °C for boxes and enclosures classified according to 7.5.1		NA
	- (-15 ± 2) °C for boxes and enclosures classified according to 7.5.2		NA
	- (-25 ± 2) °C for boxes and enclosures classified according to 7.5.3		P
	Specimens subjected to 5 blows with a mass of 1 kg falling from a height of 100 mm: no damage		P
15.2	Compression test		P
	The boxes and enclosures are placed in a heating cabinet for 60 min at a temperature of 90°C		P

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	After the test: no deformation or damage		P
15.3	Impact test for boxes and enclosures		P
	Specimens subjected to blows by means of an impact test apparatus as described in IEC 60068-2-75 (test EHA) with equivalent mass of 250 g	See appended table 15. Tested according IEC62262 (IK08) > IEC 60068-2-75 (test EHA) (250g)	P
	Boxes classified according to 7.5.2 and 7.5.3 performed at the following temperature:		P
	- (-15 ± 2) °C for boxes classified according to 7.5.2		NA
	- (-25 ± 2) °C for boxes classified according to 7.5.3	IK08	P
	After the test: no damage		P
15.101	PD enclosure provide a degree of protection against external mechanical impact in accordance with their declared IK code	IK08	P

15.3	TABLE: Impact test		
Part of enclosure	Total number of blows per part	Height of fall	Comments
On the base	5	IK08=300mm with a mass of 1,7Kg	P
On the window	5	IK08=300mm with a mass of 1,7Kg	P
On back area	5	IK08=300mm with a mass of 1,7Kg	P
On wholes area	5	IK08=300mm with a mass of 1,7Kg	P
Supplementary information:			

16	RESISTANCE TO HEAT		
16.1	Part of insulating material necessary to retain current-carryng parts		P
	Parts of insulating material necessary to retain current-carryng parts and/or parts of the earthing circuit in position: ball-pressure test according to IEC 60695-10-2 at (125 ± 2) °C for (60 +5) min	See appended table 16.1-16.2	NA
16.2	Part of insulating material not necessary to retain current-carryng parts		

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	Parts of insulating material not necessary to retain current-carrying parts and/or parts of the earthing circuit in position, even though in contact with them, and parts necessary to retain earthing terminals in position: ball-pressure test according to 16.1 but at $(70 \pm 2) ^\circ\text{C}$	See appended table 16.1-16.2	P
	Parts of insulating material of flush-mounted enclosures classified according to 7.6.2: ball-pressure test according to 16.1 but at $(90 \pm 2) ^\circ\text{C}$	See appended table 16.1-16.2. Classified as 7.6.1	NA
16.3	Boxes and enclosures of insulating materials classified according to 7.7.2		N/A

16.1 - 16.2	TABLE: Ball pressure test of insulating materials		
Allowed impression diameter (mm): $\leq 2 \text{ mm}$			—
Part under test	Test temperature ($^\circ\text{C}$)	Diameter of impression (mm)	
On the lid	$70 \pm 2^\circ\text{C}$	1,05 mm	
At the base	$70 \pm 2^\circ\text{C}$	0,95 mm	
On the window	$70 \pm 2^\circ\text{C}$	0,91 mm	
Supplementary information:			

17	CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH SEALING COMPOUND										
	Creepage distances, clearances and distances through sealing compound no less than the values shown in table 101	See appended table 17	P								
	Table 101 – Creepage distances, clearances and distances through sealing compound <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="width: 50%;">Rated voltage V</th> <th style="width: 50%;">Creepage distance, clearance and distance through sealing compound mm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">130</td> <td style="text-align: center;">1,5</td> </tr> <tr> <td style="text-align: center;">>130 and ≤ 250</td> <td style="text-align: center;">3,0</td> </tr> <tr> <td style="text-align: center;">>250 and ≤ 400</td> <td style="text-align: center;">4,0</td> </tr> </tbody> </table>		Rated voltage V	Creepage distance, clearance and distance through sealing compound mm	130	1,5	>130 and ≤ 250	3,0	>250 and ≤ 400	4,0	P
Rated voltage V	Creepage distance, clearance and distance through sealing compound mm										
130	1,5										
>130 and ≤ 250	3,0										
>250 and ≤ 400	4,0										

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17	TABLE: Creepage distances, clearances and distances through sealing compound						
	Rated voltage (V)						—
	Creepage distance dcr, clearance cl and distance through sealing compound dtsc at/of:	Required Cl. d. (mm)	Mesured Cl. d. (mm)	Required Cr. d. (mm)	Mesured Cr. d. (mm)	Required D. t. s. c. (mm)	Mesured D. t. s. c. (mm)
	Active parts and mounting surface	≥ 4	>20	≥ 4	>20	≥4	>20
	Supplementary information: Considered active parts from general modular devices						

18	RESISTANCE OF INSULATING MATERIAL TO ABNORMAL HEAT AND TO FIRE						
	Glow-wire test according to Clauses 4 to 10 if IEC 60695-2-11			See appended table			P
	Preconditioning of the samples:						
	Storage at 15-35°C / RH 35-45 % for 24h						
	– 960 °C for parts necessary to retain current-carrying parts in position;			See attachment Table			NA
	– 850 °C for enclosures intended for mounting in hollow walls;			See attachment Table			NA
	– 650 °C for all other parts, including parts necessary to retain the protective conductor.			See attachment Table			P
	– flames and glowing extinguish within 30 s						P
	no burning of tissue paper						P

18	TABLE: Glow-Wire test					
	Part under test	Material designation	Test temperature (°C)	Visible flame and sustained glowing (Y/N)	Flames and glowing extinction time (s)	Ignition of the tissue paper (Yes/No)
	Base & Lid	ABS	650°C	NO	---	NO
	Door	Polycarbonate/Polyamide	650°C	NO	---	NO

Supplementary information:

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Clause	Test - Requirement.	Result	Verdict

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19	RESISTANCE TO TRACKING		
	Parts of insulating material retaining live parts in position of boxes and enclosures having IP>X0: PTI 175, 50 drops, solution A of IEC 60112	Verification by data sheet	P
20	RESISTANCE TO CORROSION		
	Test made after having removed all grease by immersion in a degreasing agent for (10 ± 1) min, (10 ± 1) min in a 10 % solution of ammonium chloride, (10 ± 1) min in a box containing air saturated with moisture and (10 ± 1) min at (100 ± 5) °C		P
21	ELECTROMAGNETIC COMPATIBILITY (EMC)		NA
	No tests necessary	---	—