

TESTING AND MEASURING EQUIPMENT/ALLOWED SUBCONTRACTING
IEC 60670-1:2015, Edition 2.0
Boxes and enclosures for electrical accessories for household and similar fixed
electrical installations–Part 1: General requirements

“R”	Required
“S”	May be subcontracted, see OD 2012
“SPTL”	Specialized Facility, see IECEE 02-2
“W”	Witness testing in the categories “MED” and “MEAS”
“3PPS”	Three Phase Power Supply required

Clause	Measurement/testing	Testing / measuring equipment / material needed	LISUN Model	Subcontracting
8	Indelibility of marking	Piece of cloth, water, petroleum spirit (Definition see Note 2 in Clause 8)		R
9	Checking of dimensions	Calliper, micrometer, gauges (if standard sheets exist)		R
10	Protection against electric shock	IPXXB; Jointed test finger according to Table 6 and Fig. 1 of IEC 60529, Dynamometer (Push), range 0 to 10 N \pm 10% Test probe 11 according to IEC 61032, Dynamometer (Push), range 0 to 10 N/20 N/75 N Electric contact indicator with a voltage not less than 40V and not more than 50V	SMT-1175	R
11.1	Voltage drop, calculation of resistance in earthing circuit between the earthing terminal and exposed conductive parts of covers or cover-plates	Apparatus deriving a current from an a.c. source having a no-load voltage not exceeding 12 V and equal to (25 ± 1) A, measuring probe		R

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11.2	Test on earthing strap (boxes and enclosures of insulating material classified according to 7.7.2)	Heating cabinet adjustable to min. 90 °C Fig. 3: Test strap Screwdriver or spanner with torque meter (range according to Table 4) Load of 45 N (if a tensile machine is used: jaw separation speed of 10 mm/min) Stop watch		R
12.2.1 12.2.2 12.2.3 12.2.4	Verification of non-removal/removal of lids, covers or cover-plates fixed without screws	Test probe A according to IEC 61032 Load of 10 N, 20 N, 40 N, 80 N and 120 N (Table 2) Sheet of hard material ($1 \pm 0,1$) mm thick Stop watch	SMT-02T10	R
12.1.2.3	Verification of the outline of lids, covers and cover-plates fixed without screws	Fig. 13: Gauge for the verification of the outline of lids, covers or cover-plates		R
12.1.2.4	Verification of grooves, holes and reverse tapers	Fig. 16: Gauge for the verification of grooves, holes and reverse tapers Dynamometer (Push), ($1 \pm 0,2$) N		R
12.3	Size of drain-holes	Slide calliper, or appropriate probe		R
12.4	Insulation surroundings of any metal parts of internal fixing means	Slide calliper Appropriate micrometer		R
12.5 12.6	Inlet openings for conduit entries. Conduit samples of sizes in accordance with IEC 60423 or IEC 60981	Slide calliper Appropriate micrometer		R
12.7 12.8	Test of the cable anchorage (boxes and enclosures classified according to 7.4.2)	Fig. 11: Apparatus for testing the cable anchorage Screwdriver or spanner with torque meter (range according to Table 4) Spanner or suitable tool with torque meter (range according to Table 5) Loads (range according to Table 3) Apparatus for the torque test (range according to Table 3) Stop watch Slide calliper	LNSYJ-1	R
12.9.2	Knock-out retention	6 mm diameter mandrel with a flat end Load (30 ± 1) N Stop watch		R

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12.9.3 12.9.4	Knock-out removal	Refrigerator adjustable to -5 °C/-15 °C/-25 °C Stop watch		R
12.10	Torque test of screw fixing means for covers, accessories, etc.	Slide calliper Screwdriver or spanner with torque meter (range according to Table 4)		R
12.11	Verification of fixing means for boxes and enclosures classified according to 7.7.1	Sheet of plywood (10 ± 1) mm thick, 500 mm wide, 500 mm high (mandatory if the manufacturer's instructions are not specific regarding the type of wall) Lever according to according Fig. 18 Dynamometer (range 0 to 100 N) Stop watch Slide calliper		R
12.13.2	Verification of fixing means for boxes and enclosures classified according to 7.7.2 intended for mounting to a wood structural member of a wall	(45 x 90) mm wood structural member Dynamometer (range 0 to 225 N) Stop watch Movement measurement apparatus		R
12.13.3	Verification of fixing means for boxes and enclosures classified according to 7.7.2 intended for mounting to a wood structural member of a ceiling	(35 x 180) mm wood structural member Dynamometer (range 0 to 225 N) Stop watch Deflection measurement apparatus		R
12.13.4	Verification of fixing means for boxes and enclosures classified according to 7.7.2 intended for mounting to a steel-stud structural member of a wall	Steel-stud structural member according to Fig. 19 Dynamometer (range 0 to 180 N) Stop watch Deflection measurement apparatus		R
12.13.5 12.13.6	Measurement of internal volume of boxes and enclosures classified according to 7.7.2	Flat transparent plate not more than 3,2 mm thick (cover of Fig. 4) Graduated cylinder or measuring flask		R
12.14	Test on cable glands	Metal rods Spanner or suitable tool with torque meter (range according to Table 5) Stop watch		R
12.15 12.16	Test for boxes and enclosures classified according to 7.3.4 and conical spouts as in 7.3.6	Conduits of minimum nominal size according to IEC 60423 or IEC 60981 Dynamometer (range 0 to 20 ± 2 N, 100 ± 2 N) Stop watch		R

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13.1	Ageing test for insulating and composite boxes and enclosures, seals, grommets and replaceable membranes	Cylindrical metal rods Spanner or suitable tool with torque meter (range according to Table 5) Heating cabinet	GW-225	R
13.1	Test applicable to all grommets, replaceable and non-replaceable membranes	Heating cabinet Test probe 11 according to IEC 61032 Dynamometer (Push), range 0 to 30 0/-2 N Stop watch	SMT-1211	R
13.1	Test applicable to grommets and entry membranes in inlet opening of boxes and enclosures classified according to 7.5.2 and 7.5.3	Refrigerator adjustable to -15 °C/-25 °C Stop watch		R

Clause	Measurement/testing	Testing / measuring equipment / material needed	LISUN Model	Subcontracting
13.2	Protection against the ingress of solid objects IP2X to IP6X	<p>Slide calliper</p> <p>Screwdriver or spanner with torque meter (range according to Table 4)</p> <p>Electric contact indicator with a voltage not less than 40 V and not more than 50 V</p> <p>IP2X: Rigid sphere without handle or guard 12,5 mm diameter according to Table 7 of IEC 60529, Dynamometer (Push), range 0 to 30 N \pm 10%</p> <p>Jointed test finger according to Table 6 and Fig. 1 of IEC 60529, Dynamometer (Push), range 0 to 10 N \pm 10%</p> <p>IP3X: Rigid steel rod 2,5 mm diameter according to Table 7 of IEC 60529, Dynamometer (Push), range 0 to 3 N \pm 10%</p> <p>Test rod 2,5 mm diameter 100 mm long according to Table 6 of IEC 60529, Dynamometer (Push), range 0 to 3 N \pm 10%</p> <p>IP4X: Rigid steel wire 1,0 mm diameter according to Table 7 of IEC 60529, Dynamometer (Push) range 0 to 1 N \pm 10%</p> <p>Test wire 1,0 mm diameter 100 mm long according to Table 6 of IEC 60529, Dynamometer (Push), range 0 to 1 N \pm 10%.</p> <p>IP5X: Dust chamber according to Table 7 and Fig. 2 of IEC 60529, Category 2</p> <p>Test wire 1,0 mm diameter, 100 mm long according to Table 6 of IEC 60529, Dynamometer (Push), range 0 to 1 N \pm 10%</p> <p>IP6X: Dust chamber according to Table 7 and Fig. 2 of IEC 60529, Category 1</p> <p>Test wire 1,0 mm diameter 100 mm long according to Table 6 of IEC 60529, Dynamometer (Push), range 0 to 1 N \pm 10%</p>	<p>SMT-02T50</p> <p>SMT-CT3</p> <p>JL-34</p> <p>SC-015</p>	R

Clause	Measurement/testing	Testing / measuring equipment / material needed	LISUN Model	Subcontracting
13.3	Protection against harmful ingress of water IPX1 to IPX8	<p>Slide calliper</p> <p>Screwdriver or spanner with torque meter (range according to Table 4)</p> <p>Test wall according to Fig. 5 (mandatory if the manufacturer's instructions are not specific regarding the type of wall)</p> <p>Absorbent paper (coloured blotting or filter paper)</p> <p>IPX1: Drip box according to Table 8 and Fig. 3a) of IEC 60529</p> <p>IPX2: Drip box according to Table 8 and Fig. 3b) of IEC 60529</p> <p>IPX3: Oscillating tube or spray nozzle according to Table 8 and respectively Fig. 4 or Fig. 5 of IEC 60529, spray 60° from each side of vertical, or spray nozzle with counterbalanced shield in place</p> <p>IPX4: Same as IPX3 equipment, except spray 180° from each side of vertical, or spray nozzle with counterbalance shield removed</p> <p>IPX5: Water jet hose nozzle according to Table 8 and Fig. 6 of IEC 60529, nozzle 6,3 mm diameter</p> <p>IPX6: Same as IPX5, except nozzle 12,5 mm diameter</p> <p>IPX7: Immersion tank suitable for the purpose</p> <p>IPX8: Same as IPX7 equipment, but water level by agreement</p> <p>Voltage test equipment as mentioned under clause 14.3</p>	<p>JL-12</p> <p>JL-34</p> <p>JL-56</p> <p>JL-7</p> <p>JL-8</p>	R
14.1	Humidity treatment	Humidity chamber with relative humidity (91 to 95)% RH, temperature (20 to 30 ±1) °C	GDJS-010A	R
14.2	Insulation resistance	DC source of 500V and instruments, metal foil Stop watch	WB2681A	R
14.3	Electric strength test	Adjustable high voltage test equipment (AC – 50 Hz or 60 Hz) up to 5250 V, output current is at least 200 mA, not trip when the output current is less than 100 mA, metal foil Stop watch	WB2673C	R
15.2	Impact test for non-metallic boxes and enclosures intended for use in cast concrete classified according to 7.2.3.1	Vertical hammer test apparatus according to Fig. 8, or, on larger enclosures, spring hammer according to IEC 60068-2-75 Refrigerator adjustable to (-5 ± 2) °C/(-15 ± 2) °C/(-25 ± 2) °C	<p>DWC-2</p> <p>GDJW-500B</p>	R

Clause	Measurement/testing	Testing / measuring equipment / material needed	LISUN Model	Subcontracting
15.3	Compression test for non-metallic boxes and enclosures intended for use in cast concrete and able to withstand 90 °C during building process classified according to 7.2.3.1 and 7.6.2	Heating cabinet adjustable to $(90 \pm 5)^\circ\text{C}$ Flat hardwood plates Load of (500 ± 5) N Stop watch		R
15.4	Impact test on boxes and enclosures classified according to 7.2.3.2 (7.2.2, 7.2.3.1, 7.5.2, 7.5.3) and parts of boxes and enclosures which are intended to be accessible after the completion of the building process	Impact test apparatus according to Annex D of IEC 60068-2-75 (pendulum hammer), or on larger enclosures, spring hammer according to IEC 60068-2-75 Mounting block made from a 8 mm thick, 175 mm x 175 mm plywood sheet and mounting support with a mass of (10 ± 1) kg Tape measure or suitable measurement rod		R
15.5	Compression test for enclosures made of natural or synthetic rubber or a mixture of both according to 7.1.4	Sheet of plywood thickness (9 ± 1) mm Load of $(50 \div 1000)$ N Stop watch		R
16.1	Ball-pressure test on parts of insulating material necessary to retain current-carrying parts and/or parts of the earthing circuit in position	Ball-pressure test apparatus according to IEC 60695-10-2 (steel ball of 5 mm diameter pressed with a force of $(20 \pm 0,5)$ N) Heating cabinet adjustable to $(125 \pm 2)^\circ\text{C}$ Stop watch Suitable device for measurement of impression	ZBP-T GW-225	R
16.2	Ball-pressure test on insulating parts necessary to retain earthing terminals in position and parts of insulating material not necessary to retain current-carrying parts and/or parts of the earthing circuit in position	Same as under 16.1, but heating cabinet adjustable to $(70 \pm 2)^\circ\text{C}$		R
16.3	Ball-pressure test on parts of insulating material of flush-mounted enclosures classified according to 7.6.2	Same as under 16.2, but heating cabinet adjustable to $(90 \pm 2)^\circ\text{C}$		R
16.3.1 16.3.2	Mechanical strength test at high temperature for boxes and enclosures of insulating materials classified according to 7.7.2	Fig. 20: Rigid crossbar Screwdriver or spanner with torque meter (range according to Table 4) Total load of 180 N (including the rigid crossbar and any associated suspension means) Heating cabinet adjustable to $(80 \pm 2)^\circ\text{C}/(105 \pm 2)^\circ\text{C}$ Stop watch Slide calliper		R

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17	Creepage distances, clearances and distances through sealing compound	See the relevant part of 21 to 24 of IEC 60670 series	CK-1	R
18	Glow-wire test	Glow-wire test apparatus according to IEC 60695-2-10 (test performed according to Clauses 4 to 10 of IEC 60695-2-11), pinewood board and tissue paper Stop watch	ZRS-3H	R
19	Resistance to tracking	Tracking test apparatus according to IEC 60112	TTC-1	R
20	Resistance to corrosion	Suitable degreasing agent, Ammonium chloride Humidity chamber saturated with moisture of 91 % to 95 % Heating cabinet adjustable to $(100 \pm 5) ^\circ\text{C}$ Stop watch	YWX/Q-010	R