

**IEC 62368-1:2018-10**  
**TESTING AND MEASURING EQUIPMENT/ALLOWED SUBCONTRACTING**

IEC 62368-1 test equipment has been identified for use in the sub-grouped below:

**R** = Required to be at Lab

**RA** = Required for **A**mplifiers; in addition to **RB**, required for apparatus with audio amplifiers (audio power > 0,5 Watts)

**RB** = Required **B**asic - test and measurement equipment required for all apparatus **RC** = Required for **C**able distribution system; in addition to **RB**, required for apparatus with connection(s) to a cable distribution system

**ROUT** = Required for equipment intended for installation **O**utdoors

**RSH** = Required for **S**Hredder; in addition to **RB**, required for shredder

**RT** = Required for **T**elecom; in addition to **RB**, required for apparatus with connection(s) to a telecommunication network

**RV** = Required for CRT / Plasma/LCD or other Video equipment in addition to RB required for testing CRT Cathode ray Tubes/ picture tubes, plasma/LCD or other video apparatus

**RWPT** = Required for equipment that functions as a **W**ireless **P**ower **T**ransmitter

**S** = May be **S**ubcontracted

**SP** = **S**pecialized testing facility

**W** = May be **W**itnessed at MTL

Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting	
4.1.4	Equipment Installation (Outdoor), Conditioning	Test chamber: minimum range of -33°C to +40°C.	ROUT	
4.7	Equipment for direct insertion in to mains socket-outlets	Test equipment (see Fig. 11 of IEC 60065)	RB	
4.8	Coin/button cell batteries	30 N ± 1N applied by rigid test finger (Figure V.1); test hook (Figure 20); calliper; timer	RB	
		Crush Test (330 N ± 5N); flat surface measuring 100 mm by 250 mm; timer; air	RB	
		Torque gauges, test hook	RB	
5.2.2.2	Steady- state voltage and current limits	Ampere- and voltmeter suitable for the current and waveform, frequency meter Measuring instruments in according to IEC 60990: 1999 Figure 4 and 5, timer, 2 kΩ resistor	RB	
5.2.2.4	Single pulse limits	Oscilloscope	RB	
5.3.2.	Accessibility to electrical energy sources and safeguards	Test probes V1, V2, V3, V4, V5; T.3, calliper, hipot	RB	
		Voltage supply	Single phase voltage supply systems/variability/adequacy	RB

Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting	
5.4.1.4, 9.2.5, Annex E	Maximum operating temperatures for materials, components and systems	Three phase voltage supply systems	S	
		Temperature (rise)	Temperature recorder (multi-channel)	RB
			Thermocouples	RB
			Winding resistance (normally > 1,0 Ω 2-wire, 4-wire <1,0 Ω ).	RB
		Voltage	Voltmeters (ac/dc)	RB
			High voltage meter (probe)	RB
		Current	Currents (ac/dc)	RB
Loading	Loads (resistive)	RB		
5.4.1.5.3	Thermal cycling test procedure	Annex G 13.6.2 Full draught oven ( $\pm 2^{\circ}\text{C}$ ) Cooling facility ( $0^{\circ}\pm 2\text{ C}$ ) Scratch test device with steel pin	S	
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted	Vicat test B 50 of ISO 306	S	
		Ball pressure test apparatus according to IEC 60695-10-2, Oven at least $125^{\circ}\text{C} \pm 3^{\circ}\text{C}$	RB	
5.4.2, 5.4.3, 5.4.4, Annex X	Clearances, creepage distance, solid insulation	Oscilloscope	RB	
		Dial gauge or calliper	RB	
		Micrometer	RB	
		Pins etc. with different diameters	RB	
		Microscope	RB	
		Impulse test generator circuit 1 of Table D.1. Impulse test generator circuit 2 of Table D.1. impulse test generator circuit 3 of Table D.1	RT S RC	
		Test equipment for tracking index per IEC 60112	S	
		Mandrel (figure 25 to 28), metal foil, equipment suitable for electrical strength test loads Stop watch, weight	S	
		5.4.5.2	Antenna terminal insulation	Insulation resistance meter ( $500\text{V} > 4\text{ M}\Omega$ ), antenna interface test generator circuit 3 of Table D.1; timer, dial gauge or calliper
5.4.8	Humidity conditioning	Chamber RH ( $93 \pm 3\%$ ), ( $20\dots 30$ ) $^{\circ}\text{C}$	RB	
		Chamber RH ( $93 \pm 3\%$ ), ( $40 \pm 2$ ) $^{\circ}\text{C}$	RB	
		Extra large environmental testing chamber	SP	

Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting
		Test Instrument/equipment according to Figure 29 for electric strength (of solid/thin sheet insulation).	S
5.4.10	Safeguards against transient voltages from external circuits	Blunt probe figure V.3; Insulation resistance meter (500V > 2 M $\Omega$ ), electrical strength tests of solid/thin sheet insulation.	RB
5.4.11	Separation between external circuits and earth	Non-inductive resistor 5000 $\Omega$ , Ampere meter	RB
5.4.12	Insulating liquid	Test equipment with relevant voltage and trip current	RB
5.5.2.2	Capacitor discharge	Measuring instrument with input impedance 100M $\Omega$ or more in parallel with an input capacitance of 25pF or less; timer	RB
	Capacitor discharge	See G.16 electric strength tests	
	Resistor	See G.10	
5.5.8	Insulation between the mains and an external circuit consisting of a coaxial cable	See voltage surge test of G.10.4; the impulse test of G.10.5	
5.6.3	Requirements for protective earthing conductors	Calliper, micrometer	RB
5.6.4.1	Resistance of protective conductors and their terminations	High current source with a voltage not exceeding 12 V,	RB
	Determination of the overcurrent protective device and circuit (Annex R)	Source with at least 1500A short circuit	S
5.7	Prospective touch voltage touch current and protective conductor current	Networks in according IEC 60990:1999 figures 4 and 5; ampere meter	RB
5.8	Back feed safeguard in battery backed up supplies	Measuring instrument with input impedance 100M $\Omega$ or more in parallel with an input capacitance of 25pF or less; oscilloscope; timer; calliper	RB
6.2.2	Power source circuit classification	Watt meter, variable resistor load, stop watch	RB

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6.4.8.3.3, Annex S.2	Top openings and top openings properties	Cheesecloth bleached cotton cloth 40g/m <sup>2</sup> ; timer	RB	
8.2	Mechanical energy source classifications	Scale up to 25kg	RB	
8.5.4.3	Equipment having an electromechanical device for destruction of media	Test probe (jointed) of Annex V (figure V.1 and V.2) and wedge probe V.4 Force 45N and 90 N with wedge probe	RB RSH RB	
8.5.5.2.	High pressure lamps	Dark sticky mat, magnified glass with a resolution of 0,1 mm	RB	
8.6.2	Static stability for floor standing equipment	Inclined plane 10° Force 100N	RB	
		Force 250N/ Test tool 800N with a flat surface 12,5cm by 20cm Ruler	RB	
8.6.4	Glass slide test	Glass plate, 10°	RB	
8.6.5	Horizontal force test	Inclined plane 15°	RB	
8.7	Equipment mounted to a wall or ceiling	Several weights, timer Torque gauges	RB	
8.8	Handle strength test method	75mm width, several weights, scale, timer	RB	
8.9	Wheels or casters attachment requirement	Force 20N, stop watch	RB	
8.10	Carts, stands and similar carriers	Force up to 440 N with a circular plan surface Ø 30mm, stop watch,	RB	
8.11	Mounting means for rack mounted equipment	Several weights, timer	RB	
8.12	Telescoping or rod antennas (Annex T.11)	test tool for applying torque up to 0,6Nm, test tool for applying force 20N, stop watch	RA	
9.6.3	Wireless power transmitters	Figure 47 – Steel disc Figure 48 – Aluminium ring Figure 49 – Aluminium foil	RWPT	
10	Radiation	Laser (including laser diodes)	Several special equipment for laser classification (IEC 60825-1, IEC 60825-2, IEC 60825-12)	S

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		Light emitting diodes (LEDs)	Several special equipment for LED classification (IEC 62471:2006)	S
		Image Projector	Several special equipment for image projectors (IEC 62471-5)	S
		X-ray	. Radiation monitor, ionizing chamber type with an effective area of 1 000 mm <sup>2</sup>	S
		Effect of UV radiation on materials (Annex C)	Test equipment according to ISO 178, 179, 180, 527 and 8256 and according ISO 4892 series	S
		Human exposure to UV radiation (Annex C)	Measuring equipment according to IEC 62471	S
		Acoustics	Special equipment for acoustic measurements (EN50332-1, -2 & -3)	S
Annex B.2.5	Input test	Ampere meter suitable for the current and waveform, power meter, voltmeter,	RB	
		Variable loads	RB	
		Signal generator in acc. IEC 60107-1:1997	RV	
Annex B.3.2	Covering of ventilation openings	piece of card with minimum 200 g/m <sup>2</sup> density	RB	
Annex C	UV radiation	Carbon-arc light-exposure test - apparatus described in ISO 4892-4, or equivalent, in accordance with the procedures given in ISO 4892-1 and ISO 4892-4 using a type 1 filter, with water spray.  Xenon-arc light-exposure test - apparatus described in ISO 4892-2:2013, or equivalent, in accordance with the procedures given in ISO 4892-1 and ISO 4892-4 using cycle 1 of method A of Table 3, without water spray.  Tensile strength, ISO 527 Flexural strength, ISO 178 Charpy impact, ISO 179 Izod impact, ISO 180 Tensile impact, ISO 8256	S	
Annex E	Test conditions for equipment contain audit amplifiers	Testing box	RA	
		Signal generator (sinus) 1kHz or alternative Band-pass filter for wide-band noise measurement, pink noise signal generator	RA	

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Annex F.3.10.2	Durability	water/piece of cloth/ timer	RB
Annex F.3.10.3	Durability	Petroleum spirit (85% n-hexane), (CAS# 110-54-3)	RB
Annex G.5.4.5.3 G.5.4.6.3 G.9.3 S.3.1 S.3.2	Alternative test method	Cheesecloth (bleached cotton cloth 40g/m <sup>2</sup> ) Wrapping Tissue (12g/ m <sup>2</sup> – 30g/m <sup>2</sup> )	RB
Annex G.5.3.4	Test for FIW	Test equipment according to IEC 60851-5:2008, IEC 60317-0-7 and IEC 60317-56 Test equipment with relevant voltage and trip current Full draught oven ( $\pm 2^{\circ}\text{C}$ ) Cooling facility ( $0^{\circ}\pm 2\text{ C}$ ) Partial discharge test equipment	S
Annex G.7	Mains supply cords	Test equipment according IEC 60227	S
		Appropriate weights	RB
		Torque meter or equivalent	RB
Annex G.9	IC current limiters	Variable loads Capacitor 470 $\mu\text{F}$ ; resistor 0 $\Omega$ Chamber ( $-30$ to $70 \pm 2$ ) $^{\circ}\text{C}$	S
Annex G.10	Test for resistor serving as safeguard Test sequence	Impulse test generator circuit 1 of Table D.1. Impulse test generator circuit 2 of Table D.1. impulse test generator circuit 3 of Table D.1 Test according to IEC 60068-2-78	S
Annex G.13.6.2	Test method and compliance criteria	Full draught oven ( $\pm 2^{\circ}\text{C}$ )	S
Annex G.13.6.2	Abrasion resistance test	Scratch test device with steel pin	S
Annex G.15	Hydrostatic pressure	Hydrostatic pressure test device	S
	Tubing and fittings compatibility test	Tensile strength test device in acc to ISO 527 series	S
	Vibration test	Vibration generator (0,35mm/10Hz-55Hz-10Hz) IEC 60068-2-6	S
Annex G.16	Discharge function	Chamber RH ( $93 \pm 3$ )%, 20...30 $^{\circ}\text{C}$ , ( $40 \pm 2$ ) $^{\circ}\text{C}$	S
		Impulse test generator (capable of delivering an impulse as specified in Circuit 2 of Table D.1 that can be superimposed at 90 $^{\circ}$ and 270 $^{\circ}$ on the Mains)	S

Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting
Annex H	Criteria for telephone ringing signals	5 000Ω resistor	RT
Annex J	Insulated winding wires for use without interleaved insulation	Test equipment according to IEC 60851-3 and IEC 60851-5	S
Annex M.4.2, M.4.4.4	Charging voltage and current	Oven	S
Annex M.7	Concentration of hydrogen gas	Hydrogen gas analyzer	S
Annex M.8.2	Protection against internal ignition from external spark sources – Spark Test	Equipment according to IEC 60896-21:2005 Sub cl. 6.4	S
Annex P.2	Safeguards against entry of solid foreign objects	Suitable tool (or tools) to simulate a straight metal object, 1 mm in diameter, length up to 13 mm	RB
Annex. P.4	Metallized coatings and adhesives securing parts	Oven	S
Annex R	Limited Short-circuit test	Current generator, 1500 A	S
Annex S	Tests for resistance to heat and fire	Needle flame test apparatus acc. to IEC 60695-11-5:2004	SP
		Distillate fuel oil as described in annex S.3.2	S
		500W flame test apparatus in acc. to IEC 60695-11-20:1999	SP
		Cheesecloth (bleached cotton cloth 40g/m <sup>2</sup> ), wrapping tissue (12g/ m <sup>2</sup> – 30g/m <sup>2</sup> )	RB
Annex T.2 - T.4	Steady force test	10N ± 1N Test finger (figure V1 or V2 unjointed, 30N± 3N) Test tool 100N± 10N with a circular plan surface Ø 30mm Stop watch	RB
Annex T.5	Steady force test, 250 N	Test tool 250N± 10N with a circular plan surface Ø 30mm.	RB
Annex T.6	Enclosure impact test	Ø 50mm/500g± 25g steel ball, ruler	RB
Annex T.7	Drop test	Hard wood 13mm on 18mm ± 2mm plywood, two layers. ruler up to 1000 mm ± 10mm	RB
Annex T.8	Stress relief test	Measuring equipment according to IEC 60695-10-3 or Oven 70K over normal temp.	RB
Annex T.9	Impact Test	steel ball 50mm, approx 500g., Fragmentation test Centre punch and a square of 50 mm side	RB
Annex T.10	Fragmentation test	Centre punch (having a head with a mass of 75 g ± 5 g and a conical tungsten carbide tip with an angle of 60° ± 2°; IEC 60335-2-24:2010/AMD2:2017 Subclause 22)* and a square of 50 mm side	RB

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Annex U	Mechanical strength of CRTs and protection against the effects of implosion	Test equipment acc. IEC 61965 Scale, diamond stylus, cooling liquid, timer	S
Annex V.1.2	Test method 1 – Surfaces and openings tested with jointed test probes	Figure V.1 – Jointed test probe for equipment likely to be accessible to children Figure V.2 – Jointed test probe for equipment not likely to be accessible to children	RB
Annex V.1.3	Test method 2 – Openings tested with straight unjointed test probes	Figure V.1: straight unjointed version of the respective test probe applied with a force of 30 N.	RB
Annex V.1.4	Test method 3 – Plugs, jacks, connectors	Figure V.3 – Blunt probe	RB
Annex V.1.5	Test method 4 – Slot openings	Figure V.4 – Wedge probe	RSH
Annex V.1.6	Test method 5 – Terminals intended to be used by an ordinary person	Force 1 N $\pm$ 0,1N Terminal probe IEC 61032:1997 figure 4	RB
Y.2 (Annex C)	Ultraviolet light conditioning test	Ultraviolet light test apparatus – see annex C.	
Y.3	Resistance to corrosion, water borne contaminants	Salt spray test apparatus according to IEC 60068-2-11 Test chamber according to ISO 3231	S
Y.3.3	Water- sulphur dioxide test	Water - sulphur dioxide test chamber	S
Y.4.3	Tensile strength and elongation tests	Tensile strength test apparatus	S
Y.4.4	Compression test	Cylindrical weight for 69 kPa Air oven Environmental test chamber capable of testing to $-33^{\circ}\text{C}$ 1,35 kg impact hammer apparatus Clear spruce wood pieces	S
Y.4.5	Oil resistance	Oil immersion test equipment per ISO 1817:2015 or ASTM D471-98	S
Y.5	Protection from moisture	IP X4 to X6 water test apparatus	SP
Y.5.3	Water spray test	Water spray test apparatus (alternative to IPX4)	S
Y.5.5	Protection from excessive dust	IP 5X/6X dust test apparatus	SP
Y.6.2	Impact test	Test chamber: minimum range of $-33^{\circ}\text{C}$ to $+40^{\circ}\text{C}$ .	ROUT



Note: The presence of equipment alone does not indicate a satisfactory situation. Assessors must evaluate the equipment design, calibration, uncertainty and documentation to ensure compliance with the directions of the standard. The requirements of ISO/IEC 17025 regarding validation are applicable, as the tests of this standard are not standardised tests.

\*Agreed during the TC 108 IEC TC 108 WG HBSTD hazard-based Meeting 2019 Raleigh

Provisional