IEC 60065 8th ED. TESTING AND MEASURING EQUIPMENT/ALLOWED SUBCONTRACTING

R = **R**equired to be at Lab

IEC 60065 test equipment has been identified for use in the sub-grouped below:
- 'RB' = 'Required Basic'; test and measurement equipment required for all apparatus.
- 'RA' = 'Required for audio'; in addition to 'RB', required for testing apparatus with audio amplifiers (audio power >0,5 W)
- 'RV' = 'Required for video'; in addition to 'RB', required for testing apparatus equipped with picture tubes or plasma/LCD
- 'RT' = 'Required for telecom'; in addition to 'RB', required for testing apparatus with connection(s) to a telecommunication network.
- 'RC' = 'Required for antenna'; in addition to 'RB', required for testing apparatus with antenna terminals for connection to external (outdoor) antenna's.

S = May be **S**ubcontracted
SP = **SP**ecialized testing facility

Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting
4.2.2	Normal operating conditions	Audio Amplifiers: Signal generator (sinus)	
		Pink noise generator	
		Band-pass filter for wide-band noise measurement, Annex C	
		monitor/television receiver: Colour generator	
		Video pattern according to IEC 60107-1:1997	
4.2.12	Supply apparatus for general use	Test power supply according to table 2	
4.3.11	Fault condition	Piece of card 200g/m² density	
		Angle measuring instrument	
5.	Marking (indelible)	Petroleum spirit or n-hexane/water/piece of cloth	
6.1	Ionizing radiation	Ionization meter	
6.2	Laser radiation	Several special equipment for laser classification according IEC 60825-1:2007	
6.3	**Light emitting diodes (LEDs)**	Several special equipment for LED classification(IEC 62471)	

7	Heating under normal operating conditions	single phase voltage supply system/variability/adequacy	
		Three phase voltage supply system	
	Temperature (rise)	Temperature recorder (multi-channel)	
		Thermocouples	
		Winding resistance (normally > 1,0 Ω 2-wire, 4-wire <1,0 Ω).	
	Preparation to normal use	Testing box (see clause 4.1.4)	
		Oscilloscope	
	Loading	Loads (resistive)	
	Voltage	Voltmeters (ac/dc)	
		High voltage meter (probe)	
	Current	Currents (ac/dc) ammeters	
	Softening temperature	Softening temperature testing equipment (see ISO 306:1987 / penetration 0,1 mm/thrust 10 N)	
8.3	Hygroscopic materials	Climatic chamber (40 ± 2)° C, relative humidity 90% to 95%	GDJS-015B
8.13	External forces, windows etc	Test tool for applying 20 N	
8.14	External forces, covers	Test tool for applying 50 N	
8.15	Internal forces	Test tool for applying 2 N	
8.17	Endurance test for wound components	Heating cabinet, vibration generator, Voltage generator with adequate voltage and frequency	
8.21	Mandrel test	Test equipment as described in IEC 61558	
9	Electric shock	Measuring circuit and instrument (15 Hz to 1 Mhz and DC respectively) for touch current according to Annex D	
	Discharge	Discharge meter/calculation	
9.1.1.2	Accessibility	Test finger (Test probe B of IEC 61032) Small finger probes (Test probes 18 and 19 of IEC 61032) Test pin (Test probe 13 of IEC 61032),	SMT-PB SMT-1819 SMT-1213C
9.1.3	Openings in the enclosure	Test Pin (Diameter 4mm, length 100mm)	SMT-4001C
9.1.4	Terminals	Straight test probe (Test probe D of IEC 61032)	SMT-1204
9.1.5	Pre-set controls	Test probe C of IEC 61032	SMT-1203
9.1.6	Withdrawal of MAINS plug	Measuring instrument with input impedance 100MΩ±5 MΩ in parallel with an input capacitance of 25pF or less.	
9.1.7	Resistance to external forces	Rigid test finger (Test probe 11 of IEC 61032)	SMT-1150
		Test hook (Fig. 4, 180mm by 5mm by 8mm)	

		Test tool [(250 ± 10)N and (100 ± 10)N with plane surface 30mm diameter)	
10.2	Surge Test	Test generator acc. To Fig. 5a	
10.3	Humidity treatment	Humidity Chamber (20 to 30)°C ±2°C; (93±3)% RH Tropical: (40 ± 2)°C; (93 ± 3)% RH	GDJS-015B
		Extra large environmental testing chamber	
10.4	Insulation resistance	Insulation resistance meter (2 MΩ /4 MΩ 500 V dc)	WB2681A
	Dielectric strength	Voltage (up to 4 240 V ac peak sinus 50Hz,	
Note 1	Dielectric Strength for sheet material	Test Instrument according Figure 6	
11.2.7	Printed boards	Timer,	
12.1.3	Vibration (apparatus/transformers)	Vibration generator (0,35mm/10Hz-55Hz-10Hz) / (1,2mm/55 ± 5Hz)	LVD-100KG
12.1.4	Impact test to • enclosure	Spring hammer (0,5 J, acc. IEC 60068-2-75) steel ball (50 ± 1)mm, approx 500g.	IK01-06
12.1.5	Drop test	Hard wood 13mm on 19mm to 20mm plywood, two layers	DT-60KG
12.2 12.6 16.5 17.1 17.7	Torque • Rod antennas • fixings, knobs etc • screw terminals • strain relief of flexible cord • screws • cover fixing device	 • test tool for applying torque up to 1 Nm • • test tool for applying torque up to 2,5 Nm (2/3 of? Table 20) • test tool for applying torque up to 0,25 Nm? • test tool for applying torque up to 2,5 Nm? (table 20) • test tool for applying torque up to 1 Nm?	
12.1.6	Stress relief test	Circulating air oven70°c and above	
12.3	Remote Controls	Tumbling Barrel acc. To IEC 60068-2-31	LS-DDT1-B
12.2/12.4/12.6.1 16.5/19.2/19.3/19.6	Pull/push	1N, 2N, 20N, 25N, 50N, 40N, 100 N	
12.5	Antenna plug tests	Test plug (fig. 8)	
12.7	Coin and button cell batteries	Dial gauge or calliper (vernier, dial or electronic) Weight measuring upto 7 kg steel ball (50 ± 1)mm, approx 500g. ruler force gauge 330N +- 5 N; 30N +- 1N, 20 N 102mm by 250mm	

		Stop watch Probe 11 of IEC 61032 Test hook fig. 4	
13	Clearances and Creepage distances	Dial gauge or calliper (vernier, dial or electronic) Micrometer Pins with different diameters Optical comparator	CK-1
13.3.4	Transient voltages	Test generator according Annex K (1.2 /50 us and 10/700 us)	SUG335
13.4	Creepage distances	Test equipment for tracking index	CK-1
13.6 13.7	Jointed Insulation Enclosed and sealed parts	Full draught oven (± 2ºC) Cooling facility (0º C)	
14.2	Resistors	Discharge Test. Surge Test Apparatus acc. Fig 5a Measurement Device for resistance. Test according to IEC 60068-2-78	GDJS-015B
14.3	Capacitors and RC-units	Test according to IEC 60384-1, sub clause 4.38 and IEC 60384-14)	
14.6	Protective devices	Oven up to temperature measured in apparatus Dielectric Strength Test Equipment Insulation Resistance Test Equipment (Double the working voltage, >2MΩ)	
14.6.4	PTC Thermistor	Test equipment according IEC 60695-11-10	HVR-LS
14.7	Switches	Endurance Test for Switches	GDJS-015B
15.2	Resistance of safety earth connection	25 A / < 12V < 0,1 Ω	WB2678A
15.4	Device forming part of the mains plug	Test apparatus according Figure 11. Hard wood 13mm on 19mm to 20mm plywood, two layers Torque Test Pull force test (Appropriate weights and oven (70± 2)° C)	
16	External Flexible Cord	Test equipment according IEC 60227-2, sub clause 3.1	WDT-B42
16.5	Strain relief	Appropriate weights or test equipment	
17	Electrical connections and mechanical fixings	Torque gauges	
18	Mechanical strength of picture tubes and protection against effects of implosion	Climatic Chambers: Damp heat Change of temperature Liquid nitrogen Steel ball (Diameter 40 to 41 mm, Hardness R62)	GDJS-015B

		Scale	
19.1	Stability and mechanical hazards	Inclined plane 10° Scale Angle measuring instrument 15° Force gauge	
19.7	Wall or ceiling mounting means	Weights 880N Stop watch Force gauge 50 N Angle measuring instrument 90 degress	
20. Annex G	Resistance to fire	Test equipment according IEC 60695-11-10 and IEC 60695-11-5	ZRS-3H ZY-3 HVR-LS
20.1.3	Pre-conditioning of printed circuit boards	Oven to 125 ± 2 C° Desiccator, anhydrous calcium chloride	GW-500
Annex A A.10.2.1	Splash treatment	Test equipment according IEC 60529 Subclause 14.2.4a)	
Annex B 9.1.1	Accessibility of TNV-Circuits	Test Probe. According IEC 62151 Figure 3	
Annex H	Insulating winding wires	Test equipment according to IEC 60851-3,IEC 60851-5 and IEC 60851-6	

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.

IEC 60065 equipment have been sub-grouped into:

1)Apparatus with audio amplifiers (audio power > 0,5 Watts).(Called RA)
2)Apparatus with picture tubes or plasma/LCD(Called RV)
3)Apparatus with connection(s) to a telecommunication network (Called RT)
4)Apparatus with antenna terminals for connection to external (outdoor) antenna's (Called RC)
5)Apparatus with protection against splashing water (Test according ANNEX A needed)
6)Other apparatus with none of the features mentioned under 1) to 5) will at least need RB