



TESTING AND MEASURING EQUIPMENT/ALLOWED SUBCONTRACTING

IEC 61439-5:2014, Edition 2.0 Low-voltage switchgear and controlgear assemblies – Part 5: Assemblies for power distribution in public networks

“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	Subcontracting
10.2.2	Resistance to corrosion	Climatic chamber according to IEC 60068-2-30 (damp heat cycling test at +40 °C) Test chamber according to IEC 60068-2-11 (salt mist at +45 °C)	S
10.2.3.1	Thermal stability	Climatic chamber according to IEC 60068-2-2 (dry heat test at +70 °C)	R
10.2.3.2	Resistance to abnormal heat and fire due to internal electric effects	Glow-wire test apparatus according to IEC 60695-2-11	S
10.2.3.101	Dry heat test	Climatic chamber of appropriate size according to IEC 60068-2-2 (dry heat test at +100 °C)	S
10.2.3.102	Verification of category of flammability	Conditioning chamber Air-circulating oven (test method B) Laboratory fume hood/chamber 50 W laboratory burner according to IEC 60695-11-4	R
10.2.4	Resistance to ultra-violet (UV) radiation	Test chamber according to ISO 4892-2	S

Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting
10.2.5	Lifting	Crane or similar lifting equipment, Weights	S
10.2.101.2	Verification of resistance to static load	Weights (load 8500 N/m ²) Force gauge (pull 1200 N) Suitable test assembly according to fig. 104	S
10.2.101.3	Verification of resistance to shock load	Sandbag (15 kg) to fig. 105 Suitable test assembly according to fig. 102a and 102b	S
10.2.101.4	Verification of resistance to torsional stress	Force gauge (pull 2 x 1000 N) Suitable test assembly according to fig. 106a and 106b	S
10.2.101.5.1	Verification of impact force withstand (at normal climate)	Impact apparatus (steel ball 2 kg mass) Cooling chamber (-25 °C) of appropriate size	S
10.2.101.5.2	Verification of impact force withstand (at arctic climate)	Cooling chamber (-50 °C) of appropriate size AC High-voltage source (0 – 4 kV) Voltmeter (4 kV) Force gauge (press 1500 N) Impact apparatus (steel ball 15 kg mass)	S
10.2.101.6	Verification of mechanical strength of doors	Force gauge (pull 50 N and 450 N) Suitable test assembly according to fig. 107	S
10.2.101.7	Verification of resistance to axial load of metal inserts in synthetic material	Force gauge (pull 800 N)	S
10.2.101.8	Verification of resistance to mechanical shock impacts induced by sharp edged objects	Impact apparatus with steel striker (5 kg mass) according to fig. 108 Cooling chamber (-25 °C) of appropriate size	S
10.2.101.9	Test of mechanical strength of base intended to be embedded in the ground	Force gauge (press 4000 N) Suitable test assembly according to fig. 109	S
10.2.7	Marking	Test apparatus for chemo-mechanical hand-abrasion or Cloth, Water, Petroleum spirit	R

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10.3	Degree of protection of enclosures	Sphere 50 mm diameter, Jointed test finger, Test rod 2,5 mm diameter, Test wire 1,0 mm diameter, Sphere 12,5 mm diameter	R
		Dust chamber, Drip box. Drip box 15°, Oscillating tube/spray ± 60° or spray nozzle/spray ± 60°, Oscillating tube/spray ± 180°, Water jet hose nozzle - nozzle 6,3 mm diameter, Water jet hose nozzle - nozzle 12,5 mm diameter, Immersion tank	S
10.4	Clearances	Sliding gauge	R
10.4	Creepage distances	Sliding gauge	R
10.5.2	Effective earth continuity between the exposed conductive parts of the assembly and the protective circuit	Resistance measuring instrument with a driving current of at least 10 A (a.c. or d.c.).	R
10.5.3	Short-circuit withstand strength of the protective circuit	Short-circuit withstand testing up to 10kA (testing with OCPDs) Measuring devices for voltage, current, cos φ, time, I ² t-values	R
		Short time withstand testing in general and short circuit withstand testing above 10kA (testing with OCPDs)	S
10.9.2	Power-frequency withstand voltage	AC High-voltage source (0 - min. 3,5 kV), Voltmeter (min. 3,5 kV)	R
10.9.3	Impulse withstand voltage	Impulse voltage generator (1,2/50 μs), Oscilloscope, High voltage probe	R
10.10	Verification of temperature rise	Load resistors, Temperature acquisition unit, Current/voltage source	R
10.11	Short-circuit withstand strength	Short-circuit withstand testing up to 10kA (testing with OCPDs) Measuring devices for voltage, current, cos φ, time, I ² t-values	R 3PPS

Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting
		Short time withstand testing in general and short circuit withstand testing above 10kA (testing with OCPDs)	S
10.12	EMC – Immunity		S
	Electrostatic discharge immunity test	ESD generator, VCP, HCP, reference ground plane	
	Radiated radio-frequency electromagnetic field immunity test	Signal generator, RF power amplifier, Function generator, Biconical antenna and logperiodic antenna or Bilog antenna, Horn antenna, Millivoltmeter (or Power Meter with Power Sensor), Isotropic Field Probe, Directional coupler, Semi-Anechoic chamber, Controller (PC)	
	Electrical fast transient/burst immunity test	Burst Generator, Coupling/Decoupling Network, Capacitive Clamp, 33 nF capacitor for direct injection, reference ground plane	
	Surge immunity test	Surge Generator, Coupling/Decoupling Network, reference ground plane	

Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting
	Conducted radio-frequency immunity test	Signal generator, RF power amplifier, Coupling/decoupling continuous network, Attenuator, Power meter with Power Sensor, EM clamp, Ferrite decoupling network, Sinusoidal generator, Current clamp, 100 Ω to 50 Ω adaptor and direct injection device	
	Immunity to power-frequency magnetic fields	Test Generator, Square Coil, Magnetic Field Tester, Helmholz Coil, Magnetic Field Probe	
	Immunity to voltage dips and interruptions	Test generator, oscilloscope	
10.12	EMC - Emission		S
	Radiated disturbances	Biconical Antenna and logperiodic antenna or Bilog antenna, Test Receiver or Spectrum analyzer + Preselector + QP adapter, Semi- anechoic chamber, Open area test site	
10.13	Mechanical operation	None	---