



## TESTING AND MEASURING EQUIPMENT/ALLOWED SUBCONTRACTING

### IEC 61386-21:2002-02, Edition 1

#### Conduit systems for cable management Part 21: Particular requirements – Rigid conduit systems

R=Required by Lab

S=May be subcontracted

3PPS=Three Phase Power Supply required

Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting
7.6	Checking of marking	- Piece of cloth, water, petroleum spirit (Definition: see Note 1 in clause 7 of IEC 61386-1) - Meter	R
8.1 – 8.2	Checking of dimensions	- Gauges for threads (IEC 60423) - Gauges for outside diameters (IEC 60423) - Slide caliper	R
9.3 – 9.4	Construction	- Screwdriver with torque meter - Spanner with torque meter	R
10.2	Compression test	- Meter - Dynamometer with compression force according to Table 4 of IEC 61386-1 minimum, steel support and intermediate steel piece according to Fig. 1 of IEC 61386-1	R



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10.3	Impact test	<ul style="list-style-type: none"> <li>- Meter</li> <li>- Impact test apparatus according to Fig. 2 of IEC 61386-1, pad of closed cell expanded sponge</li> <li>- Mass of hammer (Table 5 of IEC 61386-1)</li> <li>- Refrigerator suitable for lower temperature range (Table 1 of IEC 61386-1)</li> </ul>	R
10.4.101 – 10.4.102 – 10.4.103	Bending test	<ul style="list-style-type: none"> <li>- Meter</li> <li>- Bending apparatus according to Fig. 101 (metallic and composite conduits)</li> <li>- Bending apparatus according to Fig. 103, coiled springs of square section metal wire or other bending aids (non-metallic and composite conduits)</li> <li>- Refrigerator suitable for lower temperature range (Table 1 of IEC 61386-1)</li> <li>- Gauges according to Fig. 102</li> </ul>	R
10.6.102	Collapse test	<ul style="list-style-type: none"> <li>- Arrangement for collapse test according to Fig. 104, Coiled springs of square section metal wire or other bending aids (non-metallic and composite conduits)</li> <li>- Heating cabinet suitable for upper temperature range (Table 2 of IEC 61386-1)</li> <li>- Gauges according to Fig. 102</li> </ul>	R
10.7	Tensile test	<ul style="list-style-type: none"> <li>- Meter</li> <li>- Dynamometer with tensile force according to Table 6 of IEC 61386-1</li> </ul>	R
10.8	Suspended load test	<ul style="list-style-type: none"> <li>- Loads according to Table 7 of IEC 61386-1 (conduit fittings)</li> <li>- Heating cabinet suitable for upper temperature range (Table 2 of IEC 61386-1)</li> </ul>	R



Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting
11.2	Bonding test	<ul style="list-style-type: none"> <li>- Meter</li> <li>- Apparatus deriving a current from an a.c. source having a no-load voltage not exceeding 12 V and equal to 25 A, voltmeter and measuring probe</li> </ul>	R
11.3	Electrical insulating strength and resistance	<ul style="list-style-type: none"> <li>- Meter (conduits)</li> <li>- Sodium chloride (conduits)</li> <li>- Tank (conduits)</li> <li>- Thermometer</li> <li>- Lead spheres with diameter between 1,0 and 1,5 mm, aluminium foil (conduit fittings)</li> <li>- Adjustable high-voltage test equipment (AC – 50 Hz to 60 Hz) up to 2000 V, output current at least 200 mA, not trip when the output current is less than 100 mA (conduits)</li> <li>- DC source of 500V and instruments</li> </ul>	R
12	Resistance to heat	<ul style="list-style-type: none"> <li>- Meter (conduits)</li> <li>- Heating cabinet suitable for upper temperature range (Table 2 of IEC 61386-1)</li> <li>- Test apparatus according to Fig. 8 of IEC 61386-1, steel rod (6,0 ± 0,1) mm in diameter</li> <li>- Mass according to Table 9 of IEC 61386-1</li> <li>- Gauges according to Fig. 102</li> </ul>	R
13.1.3	Spread of fire	<ul style="list-style-type: none"> <li>- Glow-wire test apparatus according to IEC 60695-2-1/1 (conduits fittings)</li> <li>- Meter (conduits)</li> <li>- Burner as specified in IEC 60695-2-4/1</li> <li>- Rectangular metal enclosure according to Fig. 6 with two metal clamps (conduits) approximately 25 mm wide</li> <li>- Steel rods (2,0 ± 0,1) mm, (6,0 ± 0,1) mm, (16,0 ± 0,1) mm in diameter (conduits)</li> </ul>	R



Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting
14.1.1	Resistance to external influences (Degree of protection – Ingress of foreign solid objects)	<p>IP3X: - Rigid steel rod 2,5 mm diameter according to Table 7 of IEC 60529, Dynamometer (Push) range 0 to 3 N <math>\pm</math> 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 <math>\pm</math> 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 <math>\pm</math> 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 <math>\pm</math> 10%</p> <p>IP5X: - Dust chamber according to Table 7 and Fig. 2 of IEC 60529 (Cat. 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 <math>\pm</math> 10%</p> <p>IP6X: - Dust chamber according to Table 7 and Fig. 2 of IEC 60529 (Cat. 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 <math>\pm</math> 10%</p>	R
14.1.2	Resistance to external influences (Degree of protection – Ingress of water)	<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 according to Table 8 and respectively Fig. 4 of IEC 60529, spray 60° from each side of vertical</p> <p>IPX4: - Same as IPX3 equipment, except spray 180° from each side of vertical</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 or suitable equipment</p>	R



Clause	Measurement/testing	Testing / measuring equipment / material needed	Subcontracting
14.2.2.2	Resistance against corrosion - Test for medium protection	<ul style="list-style-type: none"><li>- Piece of wadding, white spirit with a kauri-butanol value <math>35 \pm 5</math>)</li><li>- Potassium ferricyanide <math>[K_3Fe(CN)_6]</math>,</li><li>- Ammonium persulphate <math>[(NH_4)_2S_2O_8]</math>,</li><li>- Suitable wetting agent (e.g. sodium salt of an alkylnaphthaline sulphonic acid)</li><li>- Thermometer</li><li>- Suitable instrument for measurement of dimensions</li></ul>	S
14.2.2.3	Resistance against corrosion - Test for high protection	<ul style="list-style-type: none"><li>- White spirit with a kauri-butanol value <math>35 \pm 5</math>, piece of soft cloth</li><li>- Copper sulphate (<math>CuSO_4 \cdot 5H_2O</math>)</li><li>- Suitable container</li><li>- Hydrochloric acid</li><li>- Thermometer</li></ul>	S

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 Guide 25 regarding validation are applicable, as the tests of this standard are not standardized tests.