RW-3044

Raychem brand Instalite ZH150 Sleeving

SCOPE

This Quality Assurance Specification establishes the quality standard for Heat shrinkable Sleeving manufactured from halogen free, light weight, cross-linked, electrically-insulating, flame retarded, flexible material. The dimensions of this sleeving shrinks to a pre-determined size on the application of heat in excess of 175˚C (347˚F).

Temperature range -75ºC to 150ºC

Approved Signatories*

TE Connectivity Electronics : **Approved electronically via DMTec**

1. REVISION HISTORY

Revision Number	Change Request	Date	Incorporated By
1		August 2016	Sreeni Kurup
2	Update heat shock requirements	February 2020	Sreeni Kurup

2. REQUIREMENTS

2.1. Composition, Appearance and Colour

The sleeving shall be fabricated from irradiated, thermally-stabilised, Halogen free, lightweight compound. It shall be homogeneous and essentially free from flaws, defects, pinholes, bubbles, seams, cracks or inclusions that could affect the performance.
The sleeving shall be black, unless otherwise specified.

2.2. Dimensions

Dimensions shall be as specified in Table 1

2.3. Test Requirements

The sleeving shall meet the requirements specified in Table 2.

3. TEST METHODS

3.1. The test methods shall in accordance with IEC 60684-2, unless otherwise specified. Refer to this specification for details of test conditioning where IEC 60684-3 is specified in IEC 60684-2.

3.2. Preparation of Test Specimens

Unless otherwise specified, tests shall be carried out on specimens of sleeving recovered by conditioning in a fan assisted air circulating oven at 200 ± 5°C for 4 ± 1 minutes and allowed to cool in air to ambient temperature. No pre-conditioning period is required prior to testing. Unless otherwise specified, all tests shall be made under standard ambient conditions according to IEC Publication 212. In cases of dispute the tests shall be carried out at a temperature of 23 ± 2°C and at 50 ± 5% relative humidity.

4. RELATED STANDARDS & issue

IEC 60684-2: 2011	Flexible insulating sleeving Part 2: Methods of test
IEC 60212: 2010	Standard Conditions for Use Prior to and During Testing of Solid Electrical Insulating Materials

Subsequent amendments to, or revisions of, any of the above publications apply to this standard only when incorporated in it by updating or revision.

5. SAMPLING

"Tests shall be carried out on a sample taken at random from each batch of finished sleeving. A batch of sleeving is defined as that quantity of sleeving extruded at any one time. Testing frequency shall be Production Routine, 10th batch or Qualification. Production Routine tests consisting of Visual Examination, Dimensions and Longitudinal Change shall be carried out on every batch of sleeving. 10th batch tests shall consist of Tensile Strength, Ultimate Elongation, Secant Modulus at 2% Strain, Density and *Heat Shock. Qualification tests shall be carried out to the requirements of the Design Authority.

6. PACKAGING

Packaging shall be in accordance with good commercial practice. Each package shall bear an identification label showing quantity, part number and batch number. Additional information shall be supplied as specified in the contract or order.

Table 1 Dimensions

Size	Inside Diameter as supplied (min) mm. [in.]	Inside Diameter after recovery (max) mm. [in.]	Wall Thickness after recovery mm. [in.]	Mass per unit length Max- g/m
3,0/1,5	3,0 [0.118]	1,5 [0.059]	0,70 ±0,10 [0.028 ± 0.004]	4.6
5,0/2,5	5,0 [0.197]	2,5 [0.098]	0,75 ± 0,15 [0.030 ± 0.006]	9.8
8,0/4,0	8,0 [0.315]	4,0 [0.157]	0,80 ± 0,15 [0.031 ± 0.006]	14.3
12,0/6,0	12,0 [0.472]	6,0 [0.236]	0,90 ± 0,15 [0.035 ± 0.006]	22.9
18,0/9,0	18,0 [0.709]	9,0 [0.354]	1,00 ± 0,20 [0.039 ± 0.008]	35
24,0/12,0	24,0 [0.945]	12,0 [0.472]	1,10 ± 0,20 [0.043 ± 0.008]	55.69
40,0/20,0	40,0 [1.575]	20,0 [0.789]	1,30 ± 0,25 [0.051 ± 0.009]	103.5
50,0/30,0	50,0 [1.969]	30,0 [1.181]	1,50 ± 0,30 [0.059 ± 0.012]	176

TABLE 2 Test Requirements

Test	Test Method IEC 60684-2 clause or sub-clause	Test Requirements
Visual Examination		As per Clause 2.1
Dimensions	3	As per Table 1
Longitudinal Change	9	0 to -10 % maximum
Tensile Strength	19.2 and 19.3	12 MPa minimum (*1740 psi*)
Ultimate Elongation	19.2 and 19.3	350 % minimum
Secant Modulus at 2% Strain	19.5	10 - 35 MPa (*1450 – 5076* psi)
Specific Gravity	4	1.20 maximum
Heat Shock (4h ± 15m at 215 (*420 °F*) ± 5°C) - Tensile Strength - Ultimate Elongation *Heat Shock (4h ± 15m at 225 (*437 °F*) ± 5°C)	6 19.2 and 19.3 19.2 and 19.3	 8 MPa minimum (*1160 psi*) 200% minimum No dripping, cracking or flowing
Heat Ageing (168h ± 2h at 160 (*320 °F*) ± 3°C) - Tensile Strength - Ultimate Elongation	39 19.2 and 19.3 19.2 and 19.3	 8 MPa minimum (*1160 psi*) 200% minimum
Bending at low temperature (4h ± 15m at –75 (*-100 °F*) ± 2°C)	8	No cracking For strips, the mandrel shall be between 20 and 22 times the wall thickness. Full section sleeving is tested unfilled and the mandrel shall be between 20 and 22 times the outer diameter
Flame propagation - time of burning - length burned	26 Method C	 30 seconds maximum 75 mm (*3 inch*) maximum
Breakdown voltage	21	Table 3
Volume Resistivity at room temperature Volume Resistivity after damp heat	23	10^9 Ω·cm minimum 10^9 Ω·cm minimum

TABLE 2 Test Requirements (Cont'd)

* For Routine Batch Test (RBR) only

Copper Mirror Corrosion (16h ± 30m at 150 (*302 °F*) ± 3°C)	33	No corrosion of mirrors
Water Absorption (24 ± 2h immersion at 23 (*75 °F*) ± 2°C)	40	2 % maximum
Resistance to mould growth - Tensile Strength - Ultimate Elongation	-	Test in accordance with ISO 846 Method B 56 days exposure 12 MPa minimum (1740 psi) 350 % minimum
Shelf Life	-	The dimensions shall be as specified in Table 1 after conditioning. Condition the sleeving for 60 months at ambient temperature prior to testing. Interim measurements are to be made every 12 months
Oxygen Index - At ambient temperature - At elevated temperature	27 27.1 27.2	 30 minimum 250˚C minimum
Smoke Index	43	70 maximum
Toxicity Index	44	5 maximum per 100 grams
Acid gas generation	46 46.2	pH minimum 3.5 pH maximum 10.5 µS/mm maximum 30µS/mm maximum

Test Fluid	Test Method. IEC 60684-2 clause or sub-clause	Temperature °C (°F)	Time (Hours)	Test Requirements
Fluid Resistance	36			
• Aviation gasoline (ISO 1817 Liquid B)		40 ± 2 (*104 ±5*)	24 ± 2	
• Aviation kerosene (ISO 1817 liquid F)		70 ± 2 (*149 ±5*)	24 ± 2	
• Hydraulic fluid, phosphate base (ISO 1817 liquid 103)		23 ± 2 (*75 ±5*)	24 ± 2	
• Hydraulic fluid, silicone base (S1714)		70 ± 2 (*149 ±5*)	24 ± 2	
• Hydraulic fluid, mineral base (H520)		50 ± 2 (*122 ±5*)	24 ± 2	
• Lubricating oil, synthetic base (ISO 1817 liquid 101)		100 ± 3 (*212 ±5*)	24 ± 2	
• Lubricating oil mineral base (ISO 1817 Oil No 2)		50 ± 2 (*122 ±5*)	24 ± 2	
• Lubricating oil, mineral base (O-1176)		70 ± 2 (*149 ±5*)	24 ± 2	
• Lubricating oil, mineral base (O-142)		50 ± 2 (*122 ±5*)	24 ± 2	
• AMS 1476 Sullage (5%)		23 ± 2 (*75 ±5*)	24 ± 2	
• Cleaning fluid, isopropyl alcohol		23 ± 2 (*75 ±5*)	24 ± 2	
• Cleaning fluid, Propanol 25%, white spirit 75%		23 ± 2 (*75 ±5*)	24 ± 2	
• Cleaning fluid, methylethylketone		23 ± 2 (*75 ±5*)	24 ± 2	
• Runway de-icer, inhibited potassium acetate in water,50%		23 ± 2 (*75 ±5*)	24 ± 2	
• Aircraft de-icer, ethylene glycol 80%, water 20%		23 ± 2 (*75 ±5*)	24 ± 2	
- Tensile Strength				8 MPa minimum (*1160psi minimum*)
- Ultimate Elongation				200 % minimum

In line with a policy of continual product development, TE Connectivity reserves the right to make changes in construction, materials and dimensions without further notice. You are advised, therefore, to contact TE Connectivity Electronics, should it be necessary to ensure that this document is the latest issue.

Table 3 – Requirements for breakdown voltage

The breakdown voltage shall be determined by any of the methods described in 21.2, 21.3 or 21.4 of IEC 60684-2. The central value shall comply with the minimum value in Table 3.

The rate of application of the voltage shall be 500 V/s.

Nominal recovered wall thickness [a] mm	**Breakdown voltage Min.** kV
0,50	7,0
0,60	9,0
0,65	9,7
0,70	10,5
0,75	11,2
0,80	12,0
0,85	12,7
0,90	13,5
1,00	15,0
1,10	16,5
1,15	17,2
1,20	18,0
1,25	18,7
1,30	19,5
1,40	21,0
1,45	21,7
1,50	22,5

[a] For non-standard wall thicknesses, the electric strength shall be at least that of the next smaller standard wall thickness. For wall thicknesses smaller than 0,50 mm, the electric strength shall be at least 14,0 kV/mm.