



RW 2202 Revision 3

TUGA-SBF SLEEVING

SCOPE

This Quality Assurance Specification establishes the quality standard for a heat-shrinkable, non-flame-retarded, polyolefin based automobile seat belt sleeving

Approved Signatories*

*** This document is electronically reviewed and approved by Tyco Electronics UK Approvers therefore no signatures will appear.**

1. REVISION HISTORY

Revision Number	Change Request	Date	Incorporated By
0	Formerly RK6035/4 Revn 1		
1	CRF T1020	27 August 1997	C. Woosnam
	CR98-DM-0034	2 March 1998	L. Abrams
2	CR09-DM-038	3 June 2009	C. Diss
3	Via DMTEC	6 March 2014	C. Diss

2. REQUIREMENTS**2.1 Composition, Appearance and Colour**

The sleeving shall be homogeneous and essentially free from pinholes, flaws, bubbles, cracks, seams, defects and inclusions

2.2 Dimensions

Dimensions shall be as specified in the relevant SCD

2.3 Test Requirements

The test requirements shall be as specified in Table 1.

3. TEST METHODS**3.1 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 $150 \pm 5^\circ\text{C}$ for 6 ± 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 $23 \pm 2^\circ\text{C}$ and at $50 \pm 5\%$ relative humidity.

3.2 Dimensions and Longitudinal Change

The test method shall be as specified in ASTM D2671. The length and inside diameter of three 150mm long specimens of expanded sleeving shall be measured. The specimens shall be recovered in a fan assisted air circulating oven and the length and inside diameter of each shall be measured. The longitudinal change shall be expressed as a percentage of the original length. The minimum and maximum recovered wall thickness shall be determined.

3.3 Tensile Strength and Ultimate Elongation

The test method shall be as specified in ISO 37. Initial jaw separation shall be 50 mm and rate of jaw separation shall be 100 ± 10 mm per minute. The test shall be carried out at a temperature of $23 \pm 2^\circ\text{C}$.

TEST METHODS (Cont'd)**3.4 Specific Gravity**

The test method shall be as specified in Method A of ISO 1183.

3.5 Heat Shock

The test method shall be as specified in ASTM D2671.

The specimens shall be conditioned in a fan assisted air circulating oven as specified in Table 1.

3.6 Heat Ageing

The test method shall be as specified in ISO 188.

Five tensile test specimens prepared as in Clause 3.3 shall be conditioned in a fan assisted air circulating oven as specified in Table 1. After conditioning the specimens shall be removed from the oven, allowed to cool naturally to room temperature and tested for Ultimate Elongation according to clause 3.3.

3.7 Low Temperature Flexibility

The test method shall be as specified in Procedure C of ASTM D2671.

Mandrel diameter shall be 20 x specimen thickness \pm 10%.

The specimens and mandrels shall be conditioned as specified in Table 1.

3.8 Flammability

The test method shall be as specified in MVSS 302.

3.9 Water Absorption

The test method shall be as specified in Method 1 of ISO 62.

Three tubular specimens 50mm long shall be cut from the sleeving.

3.10 Fluid Resistance

The test method shall be as specified in ISO 1817.

Five tensile test specimens prepared as in Clause 3.3. shall be completely immersed in each of the fluids for the times and temperatures specified in Table 1. The volume of the fluid shall not be less than 20 times that of the specimen. After immersion, lightly wipe the specimens and allow to air dry at $23 \pm 2^\circ\text{C}$ for $1\text{h} \pm 15\text{m}$. The Tensile Strength and Ultimate Elongation of each specimen shall be tested according to Clause 3.3. The test shall be repeated on the remaining specified fluids.

4. RELATED STANDARDS & issue

ASTM D2671-07	Standard Test Methods for Heat-Shrinkable Tubing for Electrical Use
IEC 60212: 1971	Standard Conditions for Use Prior to and During Testing of Solid Electrical Insulating Materials
ISO 37: 2008	Rubber, vulcanized or thermoplastic - Determination of Tensile Stress-Strain Properties
ISO 62: 1999	Determination of Water Absorption
ISO 188: 2007	Rubber, vulcanized - Accelerated Ageing or Heat Resistance Tests.
ISO 1183-1: 2004	Plastics - Methods For Determining The Density Of Non-Cellular Plastics - Part 1: Immersion Method, Liquid Pyknometer Method And Titration Method
ISO 1817: 2005	Rubber, vulcanized - Determination of the effect of liquids
MVSS 302: 1975	Flammability of Materials - Passenger Cars, Multiple Passenger Vehicles, Trucks and Buses (Docket N. 3-3;Notice 4)

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 or Qualification. Production Routine tests consisting of Visual Examination, Dimensions, and Longitudinal Change shall be carried out on every batch of sleeving. 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 material quantity, description, size, colour and batch number. Additional information shall be supplied as specified in the contract or order.

TABLE 1 Test Requirements

Test	Test Method	Test Requirements
Visual Examination	-	As per Clause 2.1
Dimensions	ASTM D2671	As per relevant SCD
Longitudinal Change	ASTM D2671	0 to -10 %
Tensile Strength	ISO 37	10 MPa minimum
Ultimate Elongation	ISO 37	250% minimum
Specific Gravity	ISO 1183	1.1 maximum
Heat Shock (4h ± 15m at 200 ± 5°C)	ASTM D2671	No dripping, cracking or flowing
Heat Ageing (168 ± 2h at 120 ± 3°C)	ISO 188	
- Ultimate Elongation	ISO 37	200% minimum
Low Temperature Flexibility (4h ± 15m at -55 ± 2°C)	ASTM D2671	No cracking
Burning Rate	MVSS 302	100mm/minute maximum
Water Absorption (24 ± 2h immersion at 23 ± 2°C)	ISO 62	0.5% maximum
Fluid Resistance (24 ± 2h immersion 23 ± 2°C)	ISO 1817	
• Gasoline Fuel to ISO 1817 Test liquid B		
• Engine Oil to SAE 20W/50		
• Hydraulic Fluid to SAE J1703		
- Tensile Strength	ISO 37	7 MPa minimum
- Ultimate Elongation		200% minimum

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