

## **SPECIFICATION RW-2525**

Document Number 108-121025

### **TMS - CCUV SLEEVING**

#### **1. SCOPE**

This Quality Assurance Specification establishes the quality standard for a flexible, flame retarded sleeving specifically designed as UV protection for cable identification markers.

The sleeving is suitable for use in wire harness systems requiring high fluid resistance to the effects of nuclear, biological and chemical agent exposure and decontamination as defined in RT-700.

#### **2. REVISION HISTORY**

<b>Revision Number</b>	<b>Description of change</b>	<b>Date</b>	<b>Incorporated By</b>
1	Replaces RW 2027 rev 3	March 2000	-
2	Format & update	February 2014	M Priddle

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### 3. APPLICABLE DOCUMENTS

ASTM D2671: 1	Standard Methods of Testing Heat-Shrinkable Sleeving for Electrical Use.
ASTM G21	Standard Recommended Practice for determining resistance of Synthetic Polymeric Materials to Fungi.
AMS-DTL-23053	General Specification for Insulating Sleeving, Electrical, Heat Shrinkable.
Mil-H-5606	Hydraulic Fluids, Petroleum Base, Aircraft, Missile and Ordnance.
Mil-T-5624	Turbine Fuel, Aviation, Grades JP-4 and JP-5.
Mil-L-7808	Lubricating Oil Aircraft Turbine Engine, Synthetic Base.
Mil-A-8243	Anti-icing and Deicing- Defrosting Fluid.
Mil-L-23699	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base.
O-S-1926	Sodium Chloride, Technical.
RT-700 (TE)	Harness System Chemical Agent Exposure & Decontamination.

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

### 3.. REQUIREMENTS

- 3.1** The sleeving shall be homogeneous and essentially free from pinholes, flaws, bubbles, cracks, seams, defects and inclusions. Color shall be clear.

### 3.2 Dimensions

Size	Inside Diameter As Supplied (min) mm	Length As Supplied (min) mm	Inside Diameter After Recovery (max) mm	Wall Thickness After recovery (nom) mm
1	3.2	65	1.6	0.25
2	4.8	65	2.4	0.25
3	6.4	65	3.2	0.30
4	9.5	65	4.8	0.30
5	12.7	65	6.4	0.30
6	19.0	65	9.5	0.43
7	25.4	65	12.7	0.48
8	38.0	65	19.0	0.51
9	6.4	32	3.2	0.30
10	12.7	32	6.4	0.30
11	25.4	32	12.7	0.48
12	9.5	32	4.8	0.30
13	19.0	32	9.5	0.43
14	38.0	32	19.0	0.51

### 3.2 Dimensions (continued)

Size	Inside Diameter As Supplied (min) MM	Length As Supplied (min) MM	Inside Diameter After Recovery (max) MM	Wall Thickness After recovery (nom) MM
15	3.2	76	1.6	0.25
16	4.8	76	2.4	0.25
17	6.4	76	3.2	0.30
18	9.5	76	4.8	0.30
19	12.7	76	6.4	0.30
20	19.0	76	9.5	0.43
21	25.4	76	12.7	0.48
22	38.0	76	19.0	0.51

### 3.3 Test Requirements

The sleeving shall meet all the requirements contained in Table 1.

## 4. TEST METHODS

### 4.1 Preparation of Test Specimen

Unless otherwise specified, tests shall be carried out on specimens of sleeving recovered by conditioning in an oven at 200°C for 3 minutes and allowed to cool to ambient temperature. Condition the test specimens for 3 hours at  $23 \pm 3^\circ\text{C}$  and  $50 \pm 5$  percent humidity prior to all testing.

### 4.2 Dimensions and Longitudinal Change

The test method shall be as specified in ASTM D2671. The length and inside diameter of three 150 mm long specimens of expanded sleeving shall be measured. The specimens shall be recovered 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.

### 4.3 Tensile Strength and Ultimate Elongation

The test method shall be as specified in ASTM D2671. 25.4 mm bench marks and an initial jaw separation of 25.4 mm shall be used. Rate of jaw separation shall be  $50 \pm 5$  mm per minute. The test shall be carried out at a temperature of  $23 \pm 2^\circ\text{C}$ .

### 4.4 Specific Gravity

The test method shall be as specified in ASTM D2671.

### 4.5 Heat Shock

The test method shall be as specified in ASTM D2671.  
The specimens shall be conditioned as specified in Table 1

**TEST METHODS (continued)****4.6 Heat Ageing**

The test method shall be as specified in ASTM D2671. Five tensile test specimens shall be prepared as in Clause 4.1. The specimens shall be conditioned in an oven as specified in Table 1 and tested for ultimate elongation according to Clause 4.3.

**4.7 Low Temperature Flexibility**

For tubing of expanded diameter less than 6mm cut three tubular specimens 300 mm long from the tubing. For tubing of expanded diameter greater than 6mm cut three strip specimens 6mm wide and 300 mm long from the expanded tubing. The specimens shall be recovered on to mandrels according to Clause 4.1 and conditioned as specified in Table 1. The mandrel diameter shall be 10 times the specimen thickness  $\pm$  10 percent. For tubular specimens, the specimen thickness shall be equivalent to the outside diameter. Without removing the specimens from the cold chamber wrap the specimens 360° around the mandrel in approximately 2 seconds. Disregard any side cracking, cause by flattening of the specimens on the mandrel.

**4.8 Clarity Stability**

The test methods shall be as specified in MIL-I-23053. The specimens shall be conditioned in an oven as specified in Table 1 and visually examined for legibility of print through the tubing wall.

**4.9 Flammability**

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

**4.10 Electric Strength**

The test method shall be as specified in ASTM D2671. The specimens shall be recovered on the metal mandrels for 10 minutes at  $+ 175 \pm 2^{\circ}\text{C}$  or until the tubing has completely shrunk on the mandrels.

**4.11 Copper Contact Corrosion**

The test method shall be as specified in ASTM D2671 Procedure B. The specimens shall be conditioned as specified in Table 1 and the copper mandrel visually examined.

**4.12 Copper Mirror Corrosion**

The test method shall be as specified in ASTM D2671 Procedure A. The specimens shall be conditioned as specified in Table 1 and the mirrors shall be visually examined.

**4.13 Fungus Resistance**

The test method shall be as specified in ASTM G21 and a rating made.

**TEST METHODS (continued)****4.14 Water Absorption**

The test method shall be as specified in ASTM D2671.

**4.15 Fluids Resistance**

The test method shall be as specified in ASTM D2671. The test specimens shall be prepared as in Clause 4.1 and immersed in one of the fluids specified in Table 1. They are removed lightly wiped and air dried at  $23 \pm 2^{\circ}\text{C}$ . The tensile strength and ultimate elongation shall be tested according to Clause 4.3. The test shall be repeated on the remaining specified fluids.

**5. Sampling**

Testing frequency shall be Production Routine and Qualification.  
Production Routine Tests shall be carried out on every batch of sleeving and shall consist of Dimensions and Longitudinal Change.  
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, color 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 3.1
Dimensions	ASTM 2671	As Per Clause 3.2
Longitudinal Change	ASTM 2671	0 to 0 -10%
Tensile Strength	ASTM 2671	24.1 MPa minimum
Ultimate Elongation	ASTM 2671	300% minimum
Specific Gravity	ASTM 2671	1.9 maximum
Heat Shock 4h ± 15m at 250° ± 3°C	ASTM 2671	No Dripping, Flowing or Cracking
Heat Ageing 336h ± 2h at 225± 3°C Ultimate Elongation	ASTM 2671	100% minimum
Low Temperature Flexibility 4h at -55 ± 2°C	ASTM 2671	No Cracking
Clarity Stability	AMS-DTL-23053	Marking legible through tubing wall.
Flammability	ASTM D2671 Procedure C	Self-extinguishing within 60s, 25% maximum flag burn.
Electric Strength	ASTM 2671	400 V/mm minimum
Copper Contact Corrosion 16h ± 15m at 160± 2°C	ASTM D2671 Procedure B	No pitting or blackening of copper.
Copper Mirror Corrosion 16h ± 15m at 160 ± 2°C	ASTM D2671 Procedure A	Non Corrosive
Fungus Resistance	ASTM G21	Rating of O
Fluid Resistance 24h ± 2h immersion at 50 ± 3°C (i) JP-4 Fuel (Mil-T-5624) (ii) Hydraulic Fluid (Mil-H-5606) (iii) Lubricating Oil (Mil-L-23699) (iv) Lubricating Oil (Mil-L-7808) (v) 5%Na CL (O-S-1926) (vi) De-icing Fluid (Mil-A-8243) (vii) Water	ASTM D2671	
Tensile Strength	ASTM D2671	13.8 MPa minimum
Ultimate Elongation	ASTM D2671	250% minimum