

# AERONAUTICAL MATERIAL SPECIFICATIONS

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AMS 3648

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Revised

## POLYTRIFLUOROCHLOROETHYLENE TUBING Unplasticized

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. FORM: Thin wall tubing.

3. APPLICATION: Primarily for electrical insulating sheath at temperatures up to 325 F.

### 4. TECHNICAL REQUIREMENTS:

#### 4.1 General:

4.1.1 Color: Unless otherwise specified, the tubing shall be natural in color ranging from transparent to translucent.

4.2 Properties: The product shall conform to the following requirements; tests shall be conducted on the product supplied and in accordance with listed ASTM methods, insofar as practicable.

4.2.1 Tensile Strength at 77 F $\pm$ 2, psi, min	4500	ASTM D876-54T (See Note 1)
4.2.2 Elongation at 77 F $\pm$ 2, %, min	100	ASTM D876-54T (See Note 1)
4.2.3 Insulation Resistance at 77 F $\pm$ 2 and 500 v DC, megohms per ft, min	$1.0 \times 10^7$	ASTM D876-54T
4.2.4 Penetration at 325 F $\pm$ 2 (Start test at 212 F)	None	ASTM D876-54T
4.2.5 Dielectric Strength at 77 F $\pm$ 2, v per mil, min	See Note 2	ASTM D876-54T
4.2.6 Heat Aging at 325 F $\pm$ 2, (weight loss) %, max	1.0	ASTM D876-54T, Method B
4.2.7 Stress Relief at 325 F $\pm$ 2, (shrinkage) %, max	1.0	ASTM D876-54T
4.2.8 Specific Gravity, min	2.05	ASTM D792-50, Method A
4.2.9 ZST (Zero Strength Time) at 482 F $\pm$ 4, sec, min	100	See 4.2.9.1

4.2.9.1 Procedure: Press a test sheet to a thickness of 0.062 in.  $\pm$  0.003 as follows: About 20 g of polymer granules, powder, or fabricated items are placed in a 3 in. positive pressure compression mold provided with a thermometer well. The mold shall be placed under slight positive pressure between the heated platens of a press until the mold temperature is 212 F. Maximum press pressure shall then be applied for 5 minutes. The preform shall be removed from the mold immediately.

The preform shall be placed on a 0.040 in. thick chromium plated metal plate and covered by a similar plate. Spacers 0.075 in.  $\pm$  0.001 thick shall be placed between the plates at a distance such as not to interfere with the flow of material. The plates shall be placed between the platens of a press, the platens having a temperature of 500 F  $\pm$  10. The platens shall be closed and loaded to follow the rate of melting. The plates shall reach the stops within 3 minutes. Full positive pressure sufficient to provide a sheet of the required thickness shall then be applied for 3 more minutes. Immediately upon completion of the press period, the load shall be removed and the plates and plastic sheet quenched in cold water (maximum 60 F). The 0.062 in. thick sheet shall then be stripped from the metal plates. Specimens shall be cut from this sheet in such a manner that the edge of the sheet is discarded.

Cut at least 2 test strips 2 in. long and 3/16 in. wide from the sheet and notch strips in center (1 in. from end) using a 3/64 in. notching tool. The cross section of the plastic at the notch shall be 0.047 in.  $\pm$  0.001 wide by 0.062 in.  $\pm$  0.003 thick.

Clip one end of the sample into a specimen holder at room temperature and to the other end clip a 7.5 g weight butting the ends of sample against the back of the clip.

The sample assembly shall be inserted into a furnace maintained at 482 F  $\pm$  4 and the average time in seconds for the samples to break shall be recorded as the ZST (Zero Strength Time).

Note 1. Specimen shall be tested at a jaw separation rate of 1.0 in. per minute.

Note 2. The following formula shall be used to calculate the minimum requirement.

$$E = \frac{4500}{\sqrt{t}} \quad \text{Where } t = \text{nominal wall thickness in mils}$$

5. QUALITY: The product shall be uniform in quality and condition, clean, smooth, and free from foreign materials and from imperfections detrimental to fabrication, appearance, or performance of parts.

6. SIZES AND TOLERANCES: Unless otherwise specified, the following sizes are standard and the tolerances apply when measured at 75 - 85 F.

Nominal	Inside Diameter, Inches		Wall Thickness, Inch Tolerance	
	Minimum	Maximum	Nominal	Plus and Minus
0.023	0.020	0.027	0.008	0.002
0.026	0.023	0.030	0.008	0.002
0.028	0.025	0.032	0.008	0.002
0.032	0.029	0.036	0.008	0.002
0.036	0.032	0.040	0.008	0.002
0.040	0.036	0.044	0.008	0.002
0.044	0.040	0.049	0.008	0.002
0.049	0.045	0.054	0.009	0.002
0.056	0.051	0.061	0.009	0.002
0.062	0.057	0.067	0.009	0.002
0.069	0.064	0.074	0.009	0.002
0.077	0.072	0.082	0.009	0.002
0.086	0.081	0.091	0.010	0.002
0.096	0.091	0.101	0.010	0.002
0.107	0.102	0.112	0.010	0.002
0.119	0.114	0.124	0.010	0.002
0.134	0.128	0.141	0.010	0.002
0.151	0.144	0.158	0.011	0.002
0.170	0.162	0.178	0.011	0.002
0.191	0.182	0.198	0.011	0.002
0.214	0.204	0.224	0.011	0.002
0.239	0.229	0.249	0.011	0.002
0.268	0.258	0.278	0.012	0.002
0.300	0.289	0.311	0.012	0.002
0.323	0.313	0.334	0.012	0.002
0.336	0.325	0.347	0.013	0.002
0.387	0.375	0.399	0.015	0.002
0.451	0.438	0.464	0.018	0.003
0.515	0.500	0.530	0.020	0.003
0.643	0.625	0.662	0.025	0.003
0.772	0.750	0.795	0.030	0.004
0.901	0.875	0.927	0.035	0.004
1.030	1.000	1.060	0.035	0.004
1.287	1.250	1.325	0.040	0.005

7. REPORTS:

7.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report stating that the product meets the requirements of this specification. This report shall include the purchase order number, material specification number, form or part number, and quantity.