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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 3648A

Issued 7-1-57
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Superseding AMS 3648

POLYCHLOROTRIFLUOROETHYLENE TUBING
Unplasticized

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of April 14, 1986. By this action subject specification number and title will be deleted from the active specification index of Aerospace Material Specifications.

This specification is under the jurisdiction of AMS Committee "C P".

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

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AMS 3648A
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Issued 7-1-57
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POLYCHLOROTRIFLUOROETHYLENE TUBING
Unplasticized

1. SCOPE:

1.1 Form: This specification covers polychlorotrifluoroethylene in the form of thin wall tubing.

1.2 Application: Primarily for electrical and electronic applications requiring a chemically-inert tubing of the fluorocarbon family, having high dielectric strength and volume resistivity and being free from pinholes and electrical flaws, for use up to 165°C (370°F).

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D374 - Thickness of Solid Electrical Insulation
ASTM D618 - Conditioning Plastics and Electrical Insulating Materials for Testing
ASTM D792 - Specific Gravity and Density of Plastics by Displacement
ASTM D876 - Testing Nonrigid Vinyl Chloride Polymer Tubing
ASTM D1430 - Polychlorotrifluoroethylene (PCTFE) Plastics

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

Ø 3.1 Material: Shall be manufactured from virgin, unplasticized, polymer of polychlorotrifluoroethylene.

3.2 Color: Shall be natural (unpigmented) and may vary from transparent to translucent.

Printed in U.S.A.

3.3 Properties: Tubing shall conform to the following requirements; tests shall be performed on the tubing supplied and in accordance with specified test methods, insofar as practicable:

3.3.1 Ø	Tensile Strength at 23°C ± 1 (73°F ± 2), min	4500 psi (31.0 MPa)	4.5.1
3.3.2 Ø	Elongation at 23°C ± 1 (73°F ± 2), min	100%	4.5.1
3.3.3 Ø	Insulation Resistance at 23° C ± 1 (73°F ± 2) and 500 V DC, min	1.0×10^7 megohm per ft (3.05×10^7 megohm/m)	ASTM D876
3.3.4	Penetration at 165°C ± 1 (329°F ± 2) (Start test at 100°C (212°F)	None	ASTM D876
3.3.5 Ø	Dielectric Strength at 23°C ± 1 (73°F ± 2), min	As calculated from equation in 4.5.2	4.5.2
3.3.6	Heat Resistance (weight loss) at 165°C ± 1 (329°F ± 2), max	1.0%	ASTM D876, Method B
3.3.7	Stress Relief (shrinkage) at 165°C ± 1 (329°F ± 2), max	1.0%	ASTM D876
3.3.8	Specific Gravity, min	2.05	ASTM D792, Method A
3.3.9 Ø	Zero Strength Time at 250°C ± 2 (482°F ± 4), min	100 sec	ASTM D1430

3.4 Quality: Tubing 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.

3.5 Sizes and Tolerances: Unless otherwise specified, the following sizes are standard and the following tolerances apply; measurements shall be made at 20° - 30° C (68° - 86° F) in accordance with ASTM D374, Method C:

TABLE I

Inside Diameter, Inches			Wall Thickness, Inch	
Nominal	Minimum	Maximum	Nominal	Tolerance, 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

TABLE I (SI)

Inside Diameter, Millimetres			Wall Thickness, Millimetres	
Nominal	Minimum	Maximum	Nominal	Tolerance, plus and minus
0.58	0.51	0.69	0.20	0.05
0.66	0.58	0.76	0.20	0.05
0.71	0.64	0.81	0.20	0.05
0.81	0.74	0.91	0.20	0.05
0.91	0.81	1.02	0.20	0.05
1.02	0.91	1.12	0.20	0.05
1.12	1.02	1.24	0.20	0.05
1.24	1.14	1.37	0.23	0.05
1.42	1.30	1.55	0.23	0.05
1.57	1.45	1.70	0.23	0.05
1.75	1.63	1.88	0.23	0.05
1.96	1.83	2.08	0.23	0.05
2.18	2.06	2.31	0.25	0.05
2.44	2.31	2.57	0.25	0.05
2.72	2.59	2.84	0.25	0.05
3.02	2.90	3.15	0.25	0.05
3.40	3.25	3.58	0.25	0.05
3.84	3.66	4.01	0.28	0.05
4.32	4.11	4.52	0.28	0.05
4.85	4.62	5.03	0.28	0.05
5.44	5.18	5.69	0.28	0.05
6.07	5.82	6.32	0.28	0.05
6.81	6.55	7.06	0.30	0.05
7.62	7.34	7.90	0.30	0.05
8.20	7.95	8.48	0.30	0.05
8.53	8.26	8.81	0.33	0.05
9.83	9.52	10.13	0.38	0.05
11.46	11.13	11.79	0.46	0.08
13.08	12.70	13.46	0.51	0.08
16.33	15.88	16.81	0.64	0.08
19.61	19.05	20.19	0.76	0.10
22.89	22.22	23.55	0.89	0.10
26.16	25.40	26.92	0.89	0.10
32.69	31.75	33.66	1.02	0.13

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of tubing shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the tubing conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to tensile strength (3.3.1), elongation (3.3.2), dielectric strength (3.3.5), specific gravity (3.3.8), zero strength time (3.3.9), and tolerance (3.5) requirements are classified as acceptance tests.

4.2.2 Qualification Tests: Tests to determine conformance to all technical requirements of this specification are classified as qualification tests.