

AEROSPACE MATERIAL SPECIFICATIONS

AMS 3629

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

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Revised

POLYVINYL CHLORIDE TUBING, EXTRUDED, HIGH TEMPERATURE Electrical Insulation

1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. **FORM:** Non-rigid, thin wall, transparent tubing.
3. **APPLICATION:** Primarily for sleeving on wire or for bus bar insulation, particularly where clarity is desired, for use at operating temperatures up to 220 F.
4. **TECHNICAL REQUIREMENTS:**
 - 4.1 **General:**
 - 4.1.1 **Composition:** Shall be polyvinyl chloride or its co-polymers. Material shall be free from mercury compounds.
 - 4.1.2 **Color and Condition:** Unless otherwise specified, colorless transparent tubing shall be furnished. Tubing shall be sufficiently transparent to allow relatively undistorted visibility through two thicknesses produced by pressing the tubing flat upon itself. Typewritten letters shall be legible when viewed through these two thicknesses pressed onto the paper.
 - 4.1.3 **Weathering:** When specified, the product shall have weather resistance acceptable to the purchaser as determined by a procedure agreed upon by purchaser and vendor.
 - 4.1.4 **Corrosion:** The product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service. Discoloration of metal shall not be considered objectionable.
 - 4.2 **Properties:** Unless otherwise specified, the product shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with listed ASTM methods, insofar as practicable.
 - 4.2.1 **As Received:**

4.2.1.1 Tensile Strength, psi, min	2,000	ASTM D876-60T
4.2.1.2 Elongation, %	250 - 450	ASTM D876-60T
4.2.1.3 Flammability, time to cease burning, sec, max	15	ASTM D876-60T
4.2.1.4 Dielectric Strength (short time test), Under 0.020 in. thick, v per mil, min	750	
0.020 in. thick and over, v, min	15,000	

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4.2.2	<u>Processing Oil Resistance:</u> (Immediate Deteriorated Properties)		ASTM D471-59T Medium: ASTM Oil No. 3 Temperature: 212 F \pm 2 Time: 8 hr
4.2.2.1	Shrinkage, Lengthwise, %, max	10	See Note 1
4.2.2.2	Bend, 180 deg around 0.25 in. diameter at approximately 60 deg per sec at room temperature	No cracking	
4.2.2.3	Decomposition	None	
4.2.2.4	Surface Tackiness	None	
4.2.3	<u>Moisture Resistance:</u> (Immediate Deteriorated Properties)		
4.2.3.1	Water Absorption, change in weight, %, max	1.5	ASTM D570-59aT Medium: Distilled Water Temperature: 70 - 85 F Time: 24 hr
4.2.3.2	Dielectric Strength Change, %, max (See Note 2)	15	ASTM D876-60T Medium: Air at 90 - 100% Relative Humidity Temperature: 70 - 85 F Time: 96 hr
4.2.3.3	Plasticizer Exudation	None	Note 3
4.2.4	<u>Dry Heat Resistance:</u>		ASTM D573-53 Temperature: 265 F \pm 2
4.2.4.1	Shrinkage, Lengthwise, %, max	10	Time: 2 hr, See Note 1
4.2.4.2	Surface Tackiness	None	Time: 2 hr
4.2.4.3	Loss of Transparency	Negligible	Time: 2 hr Determined by visual comparison with unaged material
4.2.4.4	Ultimate Elongation, % change, max	35	Time: 400 hr
4.2.5	<u>Softening Temperature:</u> deg Fahr, min	185	ASTM D876-60T
4.2.6	<u>Low Temperature Flexibility:</u>	Pass	Note 4
4.2.7	<u>Mildew Resistance:</u>	Pass	Note 5
4.2.8	<u>Corrosion:</u>	Pass	Note 6

- Note 1. Specimen shall be 6 in. long and may be split if desired.
- Note 2. Routine testing not required.
- Note 3. Place a specimen on the shelf of a desiccator containing water in lower section. With the cover removed, place the desiccator in an air oven of the type described in ASTM D573-53 at 210 F. Allow the desiccator to come to temperature and then cover. After 48 hr, remove the desiccator from the oven and allow it to remain at room temperature for 1 hour. The specimen shall be free of any exudation or greasy film.
- Note 4. Three specimens, each approximately 18 in. long, shall be conditioned at $-13 \text{ F} \pm 2$ for 4 hours. A fixed steel mandrel, selected in accordance with Table 1, shall be conditioned at this temperature. Upon the completion of this conditioning, and at this same temperature, the specimens shall be rapidly wrapped about the mandrel for not less than 3 complete turns. The speed of wrapping shall be approximately 2 sec per turn (360 deg). The tubing shall remain flexible and free from cracks.

Table 1
Mandrel Dimensions

Nominal ID, Inches	Diameter of Mandrel, Inch
0.166 and under	5/16
Over 0.166 to 0.294, incl	3/8
Over 0.294 to 7/8, incl	7/16
Over 7/8 to 2 1/2, incl	7/8

- Note 5. A mixed suspension prepared from viable cultures and containing a suitable wetting agent shall be sprayed over the test specimens supported on a non-nutrient agar medium. The test organisms shall be *Aspergillus niger*, *Aspergillus flavus*, and *Trichoderma T-1*. A suitable control, such as untreated cotton twine, shall also be included. At the end of 2 weeks' incubation at 82 - 86 F, specimens shall show no scattered, sparse surface growth nor mycelial bridges between specimen and agar. The controls shall show abundant growth.
- Note 6. Corrosion: Clamp shut one end of a 2 1/2 in. length of 3/8 in. ID tubing and dust the inside with copper powder CP (electrolytic dust). Place the specimens on the shelf of a desiccator containing water in the lower section. With the cover removed, place the desiccator in an air oven of the type described in ASTM D573-53 at a temperature of 210 F. Allow the desiccator to come to temperature and then cover. At the end of 48 hr, split the tubing and inspect the sample for corrosion under 5 - 7 power magnification. The tubing shall show no green discoloration, nor shall the copper show any green corrosion deposits.

5. SIZES AND TOLERANCES: Unless otherwise specified, the following sizes are standard and the tolerances apply at 70 - 85 F:

Size No.	Nominal ID Inches (See Note 8)	ID, Inches		Nominal Wall Thickness Inch	Wall Thickness Tolerance, Inch Plus and Minus
		Min	Max		
24	0.022	0.020	0.027	0.012	0.002
22	0.028	0.025	0.032	0.012	0.002
20	0.034	0.032	0.039	0.016	0.003
18	0.042	0.040	0.049	0.016	0.003
16	0.053	0.051	0.061	0.016	0.003
14	0.066	0.064	0.072	0.016	0.003
12	0.085	0.081	0.089	0.016	0.003
11	0.095	0.091	0.101	0.016	0.003
10	0.106	0.102	0.112	0.016	0.003
9	0.118	0.114	0.124	0.020	0.003
8	0.133	0.129	0.141	0.020	0.003
7	0.148	0.144	0.158	0.020	0.003
6	0.166	0.162	0.178	0.020	0.003
5	0.186	0.182	0.198	0.020	0.003
4	0.208	0.204	0.224	0.020	0.003
3	0.234	0.229	0.249	0.020	0.003
2	0.263	0.258	0.278	0.020	0.003
1	0.294	0.289	0.311	0.020	0.003
5/16	0.321	0.3125	0.334	0.025	0.003
0	0.330	0.325	0.347	0.025	0.003
3/8	0.387	0.375	0.399	0.025	0.003
7/16	0.451	0.438	0.462	0.025	0.003
1/2	0.515	0.500	0.524	0.025	0.003
5/8	0.643	0.625	0.655	0.030	0.003
3/4	0.772	0.750	0.786	0.035	0.005
7/8	0.901	0.875	0.911	0.035	0.005
1	1.030	1.000	1.036	0.035	0.005
1-1/4	1.287	1.250	1.290	0.040	0.005

Note 8. For intermediate nominal ID, use the tolerance for the next larger size.

6. 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.
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 conforms to the requirements of this specification. This report shall include the purchase order number, material specification number, vendor's compound number, form, size or part number, and quantity.