

SAE The Engineering Society
For Advancing Mobility
Land Sea Air and Space®
INTERNATIONAL

400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE

AMS 3630E

Issued 1 NOV 1944
Revised 1 OCT 1992

Superseding AMS 3630D

Submitted for recognition as an American National Standard

PLASTIC EXTRUSIONS, FLEXIBLE Polyvinyl Chloride

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of July, 1992. It is recommended, therefore, that this specification not be specified for new designs.

This cover sheet should be attached to revision "D" of the subject specification.

"NONCURRENT" refers to those materials which have previously been widely used and which may be required on some existing designs in the future. The Aerospace Materials Division, however, does not recommend these as standard materials for future use in new designs. Each of these "NONCURRENT" specifications is available from SAE upon request.

PREPARED UNDER THE JURISDICTION OF AMS COMMITTEE "CP".

SAE Technical Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.



400 COMMONWEALTH DRIVE WARRENDALE PA 15096

AEROSPACE
MATERIAL
SPECIFICATION**AMS 3630D**
Superseding AMS 3630CIssued 11-1-44
Revised 10-1-84PLASTIC EXTRUSIONS, FLEXIBLE
Polyvinyl Chloride1. SCOPE:

1.1 Form: This specification covers a polyvinyl chloride (PVC) plastic in the form of extruded tubing, cord, tape, and shapes.

1.2 Application: Primarily as sleeving on wire or as bus bar insulation, particularly where transparency of the sleeve is desired.

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

2.1 SAE Publications: Available from SAE, 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 D149 - Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

ASTM D471 - Rubber Property - Effect of Liquids

ASTM D570 - Water Absorption of Plastics

ASTM D573 - Rubber - Deterioration in an Air Oven

ASTM D746 - Brittleness Temperature of Plastics and Elastomers by Impact

ASTM D876 - Testing Nonrigid Vinyl Chloride Polymer Tubing Used for Electrical Insulation

ASTM G21 - Determining Resistance of Synthetic Polymeric Materials to Fungi

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

SAE Technical Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

AMS documents are protected under United States and international copyright laws. Reproduction of these documents by any means is strictly prohibited without the written consent of the publisher.

AMS 3630D**2.3.1 Military Standards:**

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

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be polyvinyl chloride (PVC) or one of its co-polymers and shall contain no mercury compounds.

3.2 Color: Colorless and transparent, unless otherwise specified. Colored transparent, translucent, or opaque material shall be furnished only when specified.

3.2.1 Material shall be considered colorless if the color identification of the wire inside the tubing is clearly legible and shall be considered transparent if other identification marking on the wire inside the tube is clearly legible.

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

3.3.1 Tensile Strength, min 1,800 psi ASTM D876
(12.5 MPa)

3.3.2 Elongation, min 300% ASTM D876

3.3.3 Water Absorption (24 hr immersion), change in weight, max 1.5% ASTM D570

3.3.4 Flammability, time to cease burning, max (See 8.2) 15 sec 4.5.1

3.3.5 Dielectric Strength (short time test) ASTM D876 (tubing)
ASTM D149 (other forms)

Under 0.020 in. (0.50 mm) thick, min 750 v per mil
(29,525 v/mm)
0.020 in. (0.50 mm) thick and over, min 15,000 v per mil
(590,550 v/mm)

3.3.6 Fungus Resistance: Rating of 1 or less ASTM G21

3.3.7 Petroleum Hydraulic Oil Resistance: ASTM D471
(Immediate Deteriorated Properties) Medium:

3.3.7.1 Shrinkage, Lengthwise, max 10%

ASTM Oil No. 3
Temperature: 100°C + 1
(212°F + 2)
Time: 8 hr + 0.25

AMS 3630D

- 3.3.7.2 Bend, 180 deg around 0.25 in. (6.25 mm) dia at approximately 60 deg per sec at room temperature No cracking 4.5.2
- 3.3.7.3 Decomposition None
- 3.3.7.4 Surface Tackiness None
- 3.3.8 Dry Heat Resistance: ASTM D573
- 3.3.8.1 Shrinkage, Lengthwise, max 10% Temperature: $120^{\circ}\text{C} \pm 1$
($250^{\circ}\text{F} \pm 2$)
- 3.3.8.2 Bend, 180 deg around 0.25 in. (6.25 mm) dia at approximately 60 deg per sec at room temperature No cracking Time: 2 hr 4.5.2
- 3.3.8.3 Surface Tackiness None
- 3.3.8.4 Loss of Transparency Negligible
- 3.3.9 Low-Temperature Brittleness: 4.5.3
- 3.3.9.1 At $-40^{\circ}\text{C} \pm 1$ ($-40^{\circ}\text{F} \pm 2$), as received Pass
- 3.3.9.2 At $-18^{\circ}\text{C} \pm 1$ ($-10^{\circ}\text{F} \pm 2$), after oven aging in accordance with ASTM D573 for 70 hr at $100^{\circ}\text{C} \pm 1$ ($212^{\circ}\text{F} \pm 2$) Pass
- 3.3.10 Weathering: When specified, extrusions shall have weather resistance acceptable to purchaser, determined by a procedure agreed upon by purchaser and vendor.
- 3.3.11 Corrosion: Extrusions shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service, determined by a procedure agreed upon by purchaser and vendor. Discoloration of metal shall not be considered objectionable.
- 3.4 Quality: Extrusions, as received by purchaser, shall be uniform in quality and condition, clean, and free from foreign materials and from imperfections detrimental to usage of the extrusions.
- 3.5 Tolerances:

AMS 3630D

3.5.1 Tubing: Shall conform to Table I; for intermediate nominal ID, use the tolerance for the next larger size:

TABLE I

Nominal ID Inches	ID, Inches		Nominal Wall Thickness Inch	Wall Thickness Tolerance, Inch Plus and Minus
	min	max		
0.022	0.020	0.027	0.012	0.002
0.027	0.025	0.032	0.012	0.002
0.034	0.032	0.039	0.016	0.003
0.042	0.040	0.049	0.016	0.003
0.053	0.051	0.061	0.016	0.003
0.066	0.064	0.072	0.016	0.003
0.085	0.081	0.089	0.016	0.003
0.095	0.091	0.101	0.016	0.003
0.106	0.102	0.112	0.016	0.003
0.118	0.114	0.124	0.020	0.003
0.133	0.129	0.141	0.020	0.003
0.148	0.144	0.158	0.020	0.003
0.166	0.162	0.178	0.020	0.003
0.186	0.182	0.198	0.020	0.003
0.208	0.204	0.224	0.020	0.003
0.234	0.229	0.249	0.020	0.003
0.263	0.258	0.278	0.020	0.003
0.294	0.289	0.311	0.020	0.003
0.330	0.325	0.347	0.020	0.003
5/16	0.3125	0.334	0.025	0.003
3/8	0.375	0.399	0.025	0.003
7/16	0.438	0.462	0.025	0.003
1/2	0.500	0.524	0.025	0.003
5/8	0.625	0.655	0.030	0.003
3/4	0.750	0.786	0.035	0.005
7/8	0.875	0.911	0.035	0.005
1	1.000	1.036	0.035	0.005
1-1/4	1.250	1.290	0.040	0.005
1-1/2	1.500	1.550	0.045	0.006
1-3/4	1.750	1.812	0.055	0.008
2	2.000	2.070	0.060	0.010
2-1/4	2.250	2.330	0.065	0.010
2-1/2	2.500	2.590	0.070	0.010

AMS 3630DTABLE I (SI)

Nominal ID, Millimetres	ID, Millimetres		Nominal Wall Thickness Millimetres	Wall Thickness Tolerance, Millimetre Plus and Minus
	min	max		
0.55	0.50	0.68	0.30	0.05
0.68	0.63	0.51	0.30	0.05
0.85	0.81	0.99	0.40	0.07
1.05	1.01	1.24	0.40	0.07
1.32	1.29	1.54	0.40	0.07
1.65	1.62	1.82	0.40	0.07
2.12	2.05	2.26	0.40	0.07
2.38	2.31	2.56	0.40	0.07
2.65	2.56	2.84	0.40	0.07
2.95	2.89	3.15	0.50	0.07
3.32	3.27	3.58	0.50	0.07
3.70	3.65	4.01	0.50	0.07
4.15	4.11	4.52	0.50	0.07
4.65	4.62	5.02	0.50	0.07
5.20	5.18	5.69	0.50	0.07
5.85	5.81	6.32	0.50	0.07
6.58	6.55	7.06	0.50	0.07
7.35	7.34	7.89	0.50	0.07
8.25	8.25	8.81	0.50	0.07
7.94	7.93	8.48	0.62	0.07
9.52	9.52	10.13	0.62	0.07
11.11	11.12	11.73	0.62	0.07
12.70	12.70	13.31	0.62	0.07
15.88	15.87	16.63	0.75	0.07
19.05	19.05	19.96	0.88	0.12
22.72	22.22	23.13	0.88	0.12
25.40	25.40	26.31	0.88	0.12
31.75	31.75	32.76	1.00	0.12
38.10	38.10	39.37	1.12	0.15
44.45	44.45	46.02	1.38	0.20
50.80	50.80	52.57	1.50	0.25
57.15	57.15	59.18	1.62	0.25
63.50	63.50	65.78	1.75	0.25

AMS 3630D

3.5.2 Tape: Shall conform to Tables II and III.

3.5.2.1 Width:

TABLE II

Nominal Width Inches	Tolerance, Inch Plus and Minus
Up to 0.500, incl	0.016
Over 0.500 to 0.625, incl	0.020
Over 0.625 to 0.750, incl	0.025
Over 0.750 to 1.000, incl	0.032
Over 1.000 to 1.250, incl	0.040
Over 1.250 to 2.000, incl	0.064

TABLE II (SI)

Nominal Width Millimetres	Tolerance, Millimetres Plus and Minus
Up to 12.50, incl	0.40
Over 12.50 to 15.62, incl	0.50
Over 15.62 to 18.75, incl	0.62
Over 18.75 to 25.00, incl	0.80
Over 25.00 to 31.25, incl	1.00
Over 31.25 to 50.00, incl	1.60

3.5.2.2 Thickness:

TABLE III

Nominal Thickness Millimetre	Tolerance, Inch Plus and Minus
Up to 0.019, incl	0.005
Over 0.019 to 0.031, incl	0.008
Over 0.031	0.010

TABLE III (SI)

Nominal Thickness Millimetre	Tolerance, Millimetre Plus and Minus
Up to 0.48, incl	0.12
Over 0.48 to 0.78, incl	0.20
Over 0.78	0.25

AMS 3630D

3.5.3 Cord: Shall conform to Table IV.

TABLE IV

Nominal Dimension Inch	Tolerance, Inch Plus and Minus
Up to 0.156, incl	0.005
Over 0.156 to 0.188, incl	0.008
Over 0.188	0.010

TABLE IV (SI)

Nominal Dimension Millimetres	Tolerance, Millimetre Plus and Minus
Up to 3.90, incl	0.12
Over 3.90 to 4.70, incl	0.20
Over 4.70	0.25

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of extrusions shall supply all samples for vendor's tests 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 sample and to perform any confirmatory testing deemed necessary to ensure that the extrusions conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for tensile strength (3.3.1), elongation (3.3.2), dielectric strength (3.3.5), loss of transparency (3.3.8.4), and tolerances (3.5) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed prior to or on the initial shipment of extrusions to a purchaser, when a change in material or processing, or both, requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be as follows: