

AEROSPACE MATERIAL SPECIFICATION



AMS-P-21922

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Plastic Rods and Tubes, Polyethylene

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1. SCOPE:

1.1 Scope:

This specification covers low, medium, and high density polyethylene rods and tubes for general purpose, dielectric, and weather resistant applications.

1.1.1 Coverage: This specification covers polyethylene rods and tubes made from material conforming to L-P-390.

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1.2 Classification:

Polyethylene rods and tubes shall be of the applicable type, class and grade (see 3.1 and 6.2) in accordance with table I, as follows:

Table 1. Types, Classes and Grades of Rods and Tubes

Type	Application	Class	Grade	Color
I	General purpose	L and M	1	Natural and colors, including black
			2	
		H	1	
			2	
			3	
II	Dielectric	L	4	Natural Colors, including black
			5	
			1	
			2	
		M	3	Natural Colors, including black
			4	
		H	1	Natural Colors, including black
			2	
			3	
			4	
III	Weather resistant	L	5	Black (carbon 0.5 $\pm$ 0.1 percent by weight)
			1	
			2	
			3	
		M	4	Black (carbon 2.50 $\pm$ 0.5 percent by weight)
			1	
		H	2	Black (carbon 0.5 $\pm$ 0.1 percent by weight)
			3	

1/ L = low density; M = medium density; and H = high density.

Form A - Rods
Form B - Tubes

2. APPLICABLE DOCUMENTS:

The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

2.1 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

L-P-390	Plastic, Molding and Extrusion Material, Polyethylene and Copolymers (Low, Medium and High Density
PPP-B-585	Boxes, Wood, Wirebound
PPP-B-591	Boxes, Fiberboard, Wood-Cleated
PPP-B-601	Boxes, Wood, Cleated-Plywood
PPP-B-636	Box, Fiberboard

MIL-P-116	Preservation, Method of
MIL-L-10547	Liners, Case, Waterproof

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 Marking for Shipment and Storage

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

D618-61(1971)	Conditioning Plastics and Electrical Insulating Materials for Testing
D1238-70	Measuring Flow Rates of Thermoplastics by Extrusion Plastometer
D1505-68	Density of Plastics by the Density - Gradient Technique

2.3 National Motor Freight Traffic Association, Incorporated, Agent:

Available from American Trucking Association, Inc., Tariff Order Section, 1616 P Street NW, Washington, DC 20036.

National Motor Freight Classification

2.4 Uniform Classification Committee, Agent:

Available from Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.

Uniform Freight Classification

3. REQUIREMENTS:

3.1 Materials:

Unless otherwise specified by the procuring activity (see 6.2), type I material of L-P-390 shall be used for extrusion of rods and tubes.

3.2 Property values:

The rods and tubes shall conform to the property values for density and melt index specified in L-P-390 (see 4.3.2).

3.3 Dimensions and tolerances:

- 3.3.1 Diameter and wall thickness: The diameter of rods shall be the nominal diameter specified by the procuring activity (see 6.2) and tolerances shall be as specified in table II. The outside diameter and wall thickness of tubes shall be as specified by the procuring activity (see 6.2) and tolerances shall be as specified in table III.

Table II. Rod diameter tolerances, including out of roundness

Nominal diameter, $\frac{1}{16}$ inches	Tolerance		Nominal diameter, inches	Tolerance	
	Plus	Minus		Plus	Minus
1/8	0.010	0.010	1-1/4	0.025	0.020
3/16	0.010	0.010	1-1/2	0.025	0.020
1/4	0.010	0.010	2	0.040	0.020
3/8	0.010	0.018	2-1/2	0.048	0.020
1/2	0.010	0.018	3	0.250	0.000
5/8	0.010	0.018	4	0.250	0.000
3/4	0.010	0.018	5	0.250	0.000
7/8	0.010	0.020	6	0.250	0.000
1	0.010	0.020	7	0.250	0.000

1/ Intermediate diameters shall conform to the tolerances of the larger diameters.

Table III. Tolerances for tube diameter and wall thickness

Nominal outside diameter of tubes, inches ^{1/}	Tolerances, plus or minus, inches ^{2/}					
	On outside diameter, inches	On wall thickness, inches ^{3/}				
		1/32	1/16	3/32	1/8	3/16
3/8 ^{4/}	0.0075	0.005	0.006	0.008	0.009	-
1/2	0.010	0.005	0.007	0.009	0.010	0.012
5/8	0.011	0.005	0.007	0.009	0.010	0.012
3/4	0.0125	0.005	0.007	0.010	0.010	0.012
1	0.015	0.006	0.008	0.010	0.010	0.013
1-1/4	0.0175	0.006	0.008	0.010	0.010	0.013
1-1/2	0.020	0.006	0.008	0.010	0.010	0.014
2	0.025	0.006	0.009	0.010	0.011	0.015
2-3/4	0.035	0.006	0.010	0.010	0.012	0.015
2-1/2	0.030	0.006	0.009	0.010	0.012	0.015

^{1/} Intermediate sizes shall conform to the tolerances of the larger size.

^{2/} Tolerances for diameter apply to the average outside diameter as determined by averaging two mutually perpendicular diameters in the same cross sectional plane. Tolerance for wall thickness applies to the maximum and minimum wall thickness measured at any point around the circumference and includes eccentricity.

^{3/} Tolerances for wall thickness greater than 3/16 inch shall be as specified by the procuring activity.

^{4/} Tolerances for tubes smaller than 3/8 inch or larger than 2-3/4 inches outside diameter, shall be as specified by the procuring activity (see 6.2).

3.3.2 Length of rods: Unless otherwise specified by the procuring activity (see 6.2), rods shall be furnished in lengths of 48 or 72 inches depending upon which is more nearly standard for the diameter specified. When both lengths are standard, the longer one shall be preferred. Tolerances for length shall be plus 1.0, minus 0.0 inches for rods 1 inch or less in diameter, and plus 2.0, minus 0.0 inches for rods greater than 1 inch in diameter (see 6.2). Rods shall be supplied in straight lengths.

3.3.3 Length of tubes: Unless otherwise specified by the procuring activity (see 6.2), tubes shall be furnished in straight lengths of 72 plus 1.0, minus 0.0 inches (see 6.2).

3.4 Color:

The color of the rods and tubes shall be as specified by the procuring activity (see 6.2).

3.5 Centerless grinding:

When specified by the procuring activity, rods and tubes shall be extruded oversize and then centerless ground to the outside diameter specified. The rods or tubes shall be held to the outside diameter tolerance and surface finish specified in the contract or purchase order. The wall thickness shall be as specified, plus or minus the acceptable tolerances.

3.6 Certification:

The manufacturer shall present certification that the material used in preparing the rods and tubes conforms to the applicable type, class, and grade of material specified in L-P-390 (see 6.2). The certificate shall state the material designation, color, and type, grade, and class of L-P-390 to which it conforms. The certificate shall be presented prior to, or at the time of delivery of the lot, and shall be signed by a responsible agent of the supplier, and shall be accompanied by evidence of the agent's authority to bind his principal.

3.7 Workmanship:

The rods and tubes shall be free from kinks (see 6.3), blisters, cracks, bubbles, discolorations, craze, surface scratches that form definite indentations, wrinkles, dents, die or heat marks.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for inspection:

Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Inspection of materials and components: In accordance with 4.1 above, the supplier is responsible for insuring that materials and components used were manufactured, tested and inspected in accordance with the requirements of referenced, subsidiary specifications and standards to the extent specified. In the event of conflict, this specification shall govern.

4.2 Sampling for inspection and acceptance:

Sampling for inspection and acceptance shall be performed in accordance with the provisions set forth in MIL-STD-105, except where otherwise indicated. For purposes of sampling, an inspection lot for examination and tests shall consist of all rods of one nominal diameter, or tubes of one nominal outside diameter and wall thickness of the same type, class and grade of material, submitted for delivery at one time.

4.3 Inspection of the rods and tubes:

4.3.1 Examination of the rods and tubes: Examination shall be made in accordance with the classification of defects, inspection levels and acceptable quality levels (AQLs) set forth below. The lot size, for purposes of determining the sample size in accordance with MIL-STD-105, shall be expressed in units of packages of plastic rods or tubes as applicable, for examination in 4.3.1.1, 4.3.1.2, 4.3.1.3 and in units of shipping containers for examination under 4.3.1.4.

4.3.1.1 Examination of the rods and tubes for defects in color, centerless grinding, and workmanship: The sample unit for this examination, specified in table IV, shall be one rod or one tube, as applicable. Not more than five sample units shall be taken from any one package of rods or tubes.

TABLE IV. Examination for defects in color, centerless grinding, and workmanship

Examine	Defect
Color and Centerless grinding	Color improper Centerless grinding improper
Workmanship	Not free from kinks, blisters, cracks, bubbles, discolorations, craze, surface scratches forming indentations, wrinkles, dents, die or heat marks

4.3.1.2 Examination of the rods and tubes for dimensional defects: The sample unit for this examination, specified in table V, shall be one rod or tube, as applicable.

Table V. Examination for Dimensional defects

Examine	Defect
Diameter of rods	Nominal diameter improper or varies more than tolerances specified in table II
Outside diameter and wall thickness of tubes	Improper outside diameter or wall thickness. Tolerances not within that specified in table III.
Length of rods	Improper length Not within tolerances specified for length of rods.
Length of tubes	Improper length Not within tolerances specified for length of tubes.

4.3.1.3 Examination of the rods and tubes for defects in the count for package: The sample unit for this examination, specified in table VI shall be one package.

Table VI. Examination for defects in the count for package

Examine	Defect
Rods and tubes	Average count per package less than specified.

- 4.3.1.4 Examination of preparation for delivery requirements: An examination shall be made in accordance with table VII to determine that packaging, packing and marking comply with the requirements of Section 5. The sample unit for this examination shall be one shipping container, fully packed, selected just prior to the closing operation. Shipping containers fully prepared for delivery shall be examined for closure defects.

TABLE VII. Examination of preparation for delivery

Examine	Defect
Packaging	Not level specified; not in accordance with contract requirements.
	Rods or tubes not unit wrapped and packaged as specified.
	Packaging material not as specified; closures not accomplished by specified or required methods or materials.
Packing	Not level specified; not in accordance with contract requirements.
	Any nonconforming component; component missing, damaged or otherwise defective affecting serviceability.
	Container not as specified; closures not accomplished by specified or required methods of materials.
	Inadequate application of components, such as: incomplete closures of case liners or container flaps, loose or inadequate strappings, bulged or distorted containers, improper taping or inadequate stapling.
Count	Less than specified or indicated quantity of packages per shipping container.
Weight	Gross or net weight exceeds specified requirements.
Markings	Interior or exterior markings (as applicable) omitted, illegible, incorrect, incomplete, of improper size, location, sequence, method of application, or not in accordance with contract requirements.

- 4.3.1.5 Inspection Levels and acceptable quality levels (AQLs) for examinations: The inspection levels for determining the sample size and the acceptable quality levels (AQLs) expressed in defects per 100 units, shall be as follows: