

L-P-1183B
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SUPERSEDING
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July 23, 1971

FEDERAL SPECIFICATION

PLASTIC MOLDING MATERIAL, ACRYLONITRILE- BUTADIENE-STYRENE (ABS), RIGID

This specification was approved by the Commissioner,
Federal Supply Service, General Services Administra-
tion, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers acrylonitrile-butadiene-styrene rigid thermoplastic materials suitable for injection or compression molding, calendering, and extrusion.

1.2 Classification.

1.2.1 Types. The acrylonitrile-butadiene-styrene materials shall be of the following types, as specified (see 6.1 and 6.2).

- Type I - Lowest impact strength, high tensile stress at yield point.
- Type II - Higher impact and lower tensile stress at yield point than type I.
- Type III - Highest tensile stress at yield point.
- Type IV - Highest deflection temperature under load
- Type V - Higher impact strength than types I, II, III, and IV, and lowest tensile stress at yield point.
- Type VI - Highest impact strength, intermediate tensile stress at yield point.

2. APPLICABLE DOCUMENTS

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

PSC 9330

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Federal Specifications:

PPP-D-723 - Drums, Fiber.

PPP-D-729 - Drums, Shipping and Storage, Steel, 55-gallon

Federal Standards:

Fed. Std. No. 123 - Marking for Shipment (Civil Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO., Fort Worth, Denver, San Francisco, Los Angeles and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from the established distribution points in their agencies.)

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129 - Marking for Shipment and Storage.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

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American Society for Testing and Materials (ASTM) Standards:

- D 256 - Impact Resistance of Plastics and Electrical Insulating Materials.
- D 618 - Conditioning Plastics and Electrical Insulating Materials for Testing.
- D 638 - Tensile Properties of Plastics
- D 648 - Deflection Temperature of Plastics Under Flexural Load.
- D 792 - Specific Gravity and Density of Plastics by Displacement.
- D 1013 - Total Nitrogen in Resins and Plastics.
- D 1130 - Injection Molding of Specimens of Thermoplastic Materials.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

National Motor Freight Traffic Association, Incorporated, Agent:

National Motor Freight Classification

(Application for copies should be addressed to the American Trucking Trucking Associations, Inc., Traffic Department, 1616 P Street, N. W., Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, Illinois 60606).

3. REQUIREMENTS

3.1 Material. The material shall consist of polymers or blends of polymers produced from the monomers acrylonitrile, butadiene, and styrene, and shall consist of a minimum of 13 percent acrylonitrile, 5 percent butadiene, and 15 percent styrene. A maximum of 10 percent of other monomeric or polymeric components and other necessary compounding ingredients may be present.

3.2 Property values. The material shall conform to the property values specified in table I, when tested in accordance with the applicable procedure of 4.3.

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TABLE I. Property values

Property	Values					
	Types					
	I	II	III	IV	V	VI
Impact strength, Izod, ft.-lb. per inch of notch, min.						
At $23^{\circ} \pm 2^{\circ}\text{C.}$ ($73.4^{\circ} \pm 3.6^{\circ}\text{F.}$)	1.2	3	2.5	1.5	5	6.5
At $-40^{\circ} \pm 2^{\circ}\text{C.}$ ($-40^{\circ} \pm 3.6^{\circ}\text{F.}$)	-	-	-	-	1	1.5
Tensile stress at yield point, p.s.i., min.	5,500	4,000	7,200	6,600	2,700	4,500
Deflection temperature under load ^{1/} (264 p.s.i. fiber stress), min.						
°C.	88	85	96	105	77	85
°F.	190	185	205	221	171	185
Specific gravity,						
Min.	1.0	1.0	1.0	1.0	1.0	1.0
Max.	1.2	1.2	1.2	1.2	1.2	1.2
Acrylonitrile content, min.	All types 13 percent by weight					

^{1/} Applies to annealed specimens (see 4.3.2)

3.3 Color. The color, with tolerances, shall be as specified by the procuring agency. Color shall be determined either on molded specimens or on unprocessed material, as specified by the procuring agency (see 6.2).

3.4 Form. When specified by the procuring agency, the form (powder, granules or pellets) and uniformity of granulations shall be as required (see 6.2).

3.5 Workmanship. The material shall be clean, free from contamination, and uniform in appearance, as determined by visual examination.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor 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 that supplies and services conform to prescribed requirements.

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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 material of the same type, form and color submitted for delivery at one time.

4.2.1 Inspection of materials and components. In accordance with 4.1, the supplier is responsible for insuring that materials and components used were manufactured, inspected, and tested in accordance with the requirements of this specification and, to the extent specified, of all referenced specifications and standards. In the event of conflict this specification shall govern. A supplier's certificate of compliance with 3.1 shall be furnished.

4.2.2 Inspection of material.

4.2.2.1 Examination of material. Examination of material shall be made in accordance with the classification of defects, inspection levels and acceptable quality levels (AQLs) set forth below. The lot size, for purpose of determining the sample size in accordance with MIL-STD-105, shall be expressed in units of 100 pounds for examination in 4.2.2.1.1, and in units of shipping containers for examination in 4.2.2.1.2.

4.2.2.1.1 Examination of material for defects in color, form appearance and workmanship. The sample unit for this examination, specified in table II shall be approximately one pound.

TABLE II. Examination for defects in color, form, appearance and workmanship

Examine	Defect
Color	Color ^{1/} not as specified. Color not uniform.
Form	Form ^{1/} not as specified. Form not uniform.
Appearance and workmanship	Not clean, not free of contamination. Not uniform in appearance.

^{1/} When specified by the procuring agency (see 3.3 and 3.4).

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4.2.2.1.2 Examination of packaging. An examination shall be made in accordance with table III to determine that packing and marking comply with section 5 requirements. 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 III. Examination of packaging

Examine	Defects
Packing	<p>Not level specified; not in accordance with contract requirements.</p> <p>Nonconforming component, component missing, damaged or otherwise defective affecting serviceability.</p> <p>Inadequate application of components such as incomplete closures of polyethylene liners.</p>
Quantity of material	Less than specified or indicated quantity.
Weight	Gross weight exceeds specified requirements.
Markings	Exterior markings omitted, illegible, incorrect, incomplete, of improper size, location, sequence, method of application, or not in accordance with contract requirements.

4.2.2.1.3 Inspection levels and acceptable quality levels (AQLs) for examinations. The inspection levels for determining the sample size and the acceptable quality level (AQL) expressed as defects per 100 units shall be as follows:

Examination	Inspection level	AQL
4.2.2.1.1	II	2.5
4.2.2.1.2	S-2	2.5

4.2.2.2 Classification of tests. All tests under this specification shall be classified as lot acceptance tests. Lot acceptance tests shall be made on each lot of material and, in conjunction with the above examination, shall be the basis of acceptance or rejection of the lot.

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4.2.3 Testing. The material shall be tested for the applicable characteristics listed in table I in accordance with the test methods specified, for each lot submitted for inspection. When color is to be determined on a molded specimen, the method specified by the procuring activity (see 6.2) shall be used. The lot size for the purpose of determining sample size for testing (see MIL-STD-105) shall be expressed in units of 22.6 kg (50 pounds) of material. The sample unit shall consist of sufficient material to prepare all specimens required for testing. The inspection level shall be S-1 with an acceptance number of 0. The results for each test shall be the averaged results of the specimens, unless only one specimen or determination is specified for testing.

4.3 Test methods.

4.3.1 Specimen preparation. Test specimens shall be prepared by injection molding in accordance with the general principles covered in ASTM D 1130 and under specific conditions recommended by the manufacturer.

4.3.2 Specimen conditioning. Conditioning specimens and material for all tests except that for determining deflection temperature under load shall be in accordance with procedure A of ASTM D 618 except that the minimum conditioning time shall be 24 hours. Specimens for determining deflection temperature under load shall be annealed for 16 to 16-1/2 hours at 85°C (185°F) with the exception of type IV material which shall be annealed at 95°C (203°F).

4.3.3 Specimen testing. Specimens shall be tested at $23^{\circ} \pm 2^{\circ}\text{C}$ ($73.4^{\circ} \pm 3.6^{\circ}\text{F}$) and 50 ± 5 percent relative humidity, except where otherwise specified in the applicable test method.

4.3.4 Impact strength. Six specimens (three dead end and three gate end) shall be tested in accordance with method A of ASTM D 256 at $23^{\circ} \pm 2^{\circ}\text{C}$ ($73.4^{\circ} \pm 3.6^{\circ}\text{F}$). For types V and VI material only, an additional set of six specimens shall be tested at $-40^{\circ} \pm 2^{\circ}\text{C}$ ($-40^{\circ} \pm 3.6^{\circ}\text{F}$) and in accordance with ASTM D 256. All specimens shall be 0.125 ± 0.015 inch thick and shall consist of a single piece and not a composite of thinner sections.

4.3.5 Tensile stress at yield point. Three specimens shall be tested in accordance with ASTM D 638 using testing speed B. Specimens shall conform to type I of figure 1 of ASTM D 638.

4.3.6 Deflection temperature under load. Two specimens annealed in accordance with 4.3.2 shall be tested in accordance with ASTM D 648. Specimens shall be 1/4 inch thick and the fiber stress shall be 264 psi $\pm 2\frac{1}{2}$ percent as specified in paragraph 6.1 of ASTM D 648.

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4.3.7 Specific gravity. Testing shall be in accordance with ASTM D 792 using either method A-1 or A-2. Either two specimens or two pieces from specimens used for tensile stress or impact strength testing shall be used for the test.

4.3.8 Acrylonitrile content. Approximately one gram of material (see 3.4) shall be weighed to the nearest one milligram. Testing shall be in accordance with ASTM D 1013. The weight percent of nitrogen shall be converted to weight percent acrylonitrile as follows: Acrylonitrile content, weight percent = 3.787 times percent nitrogen.

5. PACKAGING

5.1 Packing. Packing shall be level A, B, or commercial, as specified (see 6.2).

5.1.1 Level A. Unless otherwise specified, the material shall be packed in one of the following types of containers:

- a. Fiber drums conforming to PPP-D-723, type II, grade A, or type III, grade A in quantities of 200 pounds maximum.
- b. Metal drums conforming to PPP-D-729, type III or type IV, in quantities of 400 pounds maximum.

Insofar as practical, drums shall be of uniform shape and size with minimum cube and tare consistent with the protection required. Drums shall contain identical quantities and shall be closed in accordance with the applicable container specification. Fiber drums shall be furnished with a 0.004 inch thick polyethylene liner properly heat sealed.

5.1.2 Level B. Unless otherwise specified, the material shall be packed in one of the following types of containers:

- a. Fiber drums conforming to PPP-D-723, type I, grade A in quantities of 200 pounds maximum.
- b. Metal drums conforming to PPP-D-729, type III or type IV, in quantities of 400 pounds, maximum.

Insofar as practical, drums shall be of uniform shape and size with minimum cube and tare consistent with the protection required. Drums shall contain identical quantities and shall be closed in accordance with the applicable container specification. Fiber drums shall be furnished with a 0.004 inch thick polyethylene liner properly heat sealed.

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5.1.3 Commercial. Packing shall be in accordance with commercial practice adequate to ensure acceptance and delivery by the carrier for the mode of transportation employed. Containers shall be in accordance with Uniform Freight Classification Rules or National Motor Freight Classification Rules, as applicable.

5.2 Marking.

5.2.1 Civil agencies. Shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.2.2 Military requirements. Shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The rigid acrylonitrile-butadiene-styrene plastic material is intended for processing into extruded profiles and extruded sheet. It is also intended for injection molding into protective and decorative housings and functional parts. These materials offer a combination of high rigidity, good impact strength, toughness, and hardness. The relative impact strength, tensile stress at yield point, or deflection temperature under load is indicated by the appropriate type of material (see 1.2).

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- a. Title, number, and date of this specification.
- b. Type of material required (see 1.2).
- c. Color required, with tolerances and method of determination, including whether determination shall be made on unprocessed material or molded specimens (see 3.3).
- d. Form and uniformity required, when so specified (see 3.4).
- e. Level of packing required (see 5.1).
- f. Type of container desired (see 5.1.1 and 5.1.2)
- g. Quantity of material per shipping container (see 5.1.1 and 5.1.2).
- h. Special marking, if required (see 5.2.1 and 5.2.2).

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