

L-P-399B

November 17, 1975

SUPERSEDING

Fed. Spec. L-P-399A

March 13, 1970

FEDERAL SPECIFICATION

PLASTIC MOLDING AND EXTRUSION MATERIAL,

STYRENE-ACRYLONITRILE COPOLYMERS

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

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers rigid unfilled styrene-acrylonitrile copolymer materials for injection molding and extrusion applications.

1.2 Classification.

1.2.1 Types and grades. Styrene-acrylonitrile molding and extrusion material shall be of the following types, grades, and classes as specified (see 6.2):

- Type I - Minimum acrylonitrile content
- Type II - Median acrylonitrile content
- Type III - Maximum acrylonitrile content

Grades and classes for each type shall be as follows:

- Grade 1 - Flow rate 1 to 5 grams per 10 minutes
- Grade 2 - Flow rate above 5 grams but not to exceed 10 grams per 10 minutes
- Grade 3 - Flow rate above 10 grams per 10 minutes
- Class 1 - General purpose
- Class 2 - Electrical quality

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2. APPLICABLE DOCUMENTS

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

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 Shipments (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, D. C. 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, D. C., Atlanta, Chicago, Kansas City, Mo., Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, Washington.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from 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.

American Society for Testing and Materials (ASTM) Standards:

- D 150 - A. C. Loss Characteristics and Dielectric Constant (Permittivity) of Solid Electrical Insulating Materials
- D 618 - Conditioning Plastics and Electrical Insulating Materials for Testing
- D 621 - Deformation of Plastics Under Load
- D 638 - Tensile Properties of Plastics
- D 792 - Specific Gravity and Density of Plastics by Displacement
- D 1013 - Total Nitrogen in Resins and Plastics
- D 1238 - Measuring Flow Rates of Thermoplastics by Extrusion Plastometer
- D 1525 - Vicat Softening Point of Plastics

(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, Inc., Agent:

National Motor Freight Classification

(Application for copies should be addressed to the American Trucking Associations Inc., Tariff Order Section, 1616 P Street, N.W., Washington, D.C. 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, IL 60606.)

3. REQUIREMENTS

3.1 Material. The material shall consist of rigid styrene-acrylonitrile copolymers which may contain nominal amounts of colorants and lubricants.

3.2 Property values. When tested as specified in the applicable procedure of 4.3, the material shall conform to the property values shown in table I. The grade of material shall conform to flow rate range specified in 1.2.1.

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TABLE I. Property values

Property	Value (applicable to all grades and classes, except as noted ^{1/})			
	Type I	Type II	Type III	Type III
Acrylonitrile, percent, min.	23 to 25	above 25 to 27	above 27 to 32	
Specific gravity, 23/23°C	1.065 to 1.085	1.065 to 1.085	1.065 to 1.085	
Tensile strength, p.s.i., min.	9000	9500	9500	
Elongation at break, percent, min.	2.0	2.0	2.0	
Modulus of elasticity, p.s.i., min.	350,000	400,000	400,000	
Vicat softening point, min.				
°C	102	102	102	
°F	216	216	216	
Deformation under load, percent, max.	4	4	4	
Dielectric constant ^{1/} at 1 MHz, max.	3.1	3.1	3.1	
Dissipation factor ^{1/} at 1 MHz, max.	0.013	0.013	0.013	

^{1/} Dielectric constant and dissipation factor requirements applicable to class 2 (electrical quality) material only.

3.3 Form. The material shall be furnished in the form of pellets or granules, as specified (see 6.2, and 6.3).

3.4 Color. The color and transparency or opacity of the material, as determined on plaques molded or extruded from it, shall be as specified by the procuring agency (see 6.2).

3.5 Suitability for use with explosives and chemicals. When suitability for use with a particular explosive or chemical is specified, the material shall be approved by the procuring agency. The suitability shall be verified in a Government laboratory and the method of inspection shall be as specified by the procuring agency (see 6.2 and 6.4).

3.6 Health hazard. The material shall have no adverse effect on the health of personnel when used for its intended purpose. Evidence to this effect shall be subject to review by departmental medical authority (see 6.5).

3.7 Workmanship. The granules or pellets shall be uniform in color within each container and from container to container. The material shall be uniform in form, from container to container, and shall be free from contamination as determined by visual examination.

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, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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.

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, grade and class submitted for delivery at one time.

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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, examined 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 the material. Examination of the material shall be made in accordance with the list 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 the material for defects in appearance and workmanship. The sample unit for this examination, specified in table II, shall be approximately one pound.

TABLE II. Examination of the material for defects in appearance and workmanship

Examine	Defect
Appearance and workmanship	Form or color not uniform
	Form not as specified
	Color not as specified
	Not clean, presence of foreign material or other contamination

4.2.2.1.2 Examination of the preparation for delivery. An examination shall be made in accordance with table III to determine that packaging, packing and marking comply with specified contract 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 preparation for delivery

Examine	Defect
Packing	<p>Not level specified; not in accordance with contract requirements.</p> <p>Any nonconforming component, component missing, damaged or otherwise defective affecting serviceability.</p> <p>Inadequate application of components such as: incomplete closures of case liners; container flaps, loose or inadequate strappings, bulged or distorted containers.</p>
Quantity of material	Less than specified or indicated quantity.
Weight	Gross weight exceeds specified requirements.
Markings	Interior or 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:

<u>Examination paragraph</u>	<u>Inspection level</u>	<u>AQL</u>
4.2.2.1.1	II	2.5
4.2.2.1.2	S-2	2.5

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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 for acceptance or rejection of the lot.

4.2.3 Testing. The material shall be tested for the characteristics listed in table I and 1.2.1 in accordance with the test methods specified herein. The lot size, for the purpose of determining the sample size for testing shall be expressed in units of 200 pounds. The sample unit shall consist of sufficient material to prepare all required specimens. 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.

4.3 Test methods.

4.3.1 Specimen preparation. Unless otherwise specified, specimens for specific gravity, tensile strength, and elongation, Vicat softening point, and deformation under load shall be prepared by injection molding under conditions recommended by the manufacturer. Determination of flow rate and acrylonitrile content shall not require molding of the pellets or granules of material.

4.3.2 Specimen conditioning and testing. No conditioning of material for determination of acrylonitrile content shall be required. For flow rate determination, the granules or pellets shall be spread in a layer one or two granules thick and conditioned in accordance with ASTM D 618 for a minimum of 4 hours at $70^{\circ} \pm 2^{\circ}\text{C}$. ($158^{\circ} \pm 3.6^{\circ}\text{F}$.). Specimens for specific gravity, tensile strength and elongation, and Vicat softening point determinations shall be conditioned in accordance with procedure A of ASTM D 618. Specimens for deformation under load determinations shall be conditioned in accordance with procedure B of ASTM D 618. Testing shall be at $23^{\circ} \pm 2^{\circ}\text{C}$. ($73.4^{\circ} \pm 3.6^{\circ}\text{F}$.) and 50 ± 5 percent relative humidity.

4.3.3 Flow rate. Two determinations shall be made in accordance with ASTM D 1238. Measurements shall be made under condition I, using either procedure A or procedure B.

4.3.4 Acrylonitrile content. Two determinations shall be made in accordance with ASTM D 1013. The sample size for each determination shall be approximately 1 gram of pellets or granules weighed to the nearest 1 milligram. Weight percent of nitrogen is converted to weight percent of acrylonitrile as follows:

Acrylonitrile content, weight percent = 3.787 times percent nitrogen

4.3.5 Specific gravity. Two specimens shall be tested in accordance with either method A or method B of ASTM D 792.

4.3.6 Tensile strength, elongation, and modulus of elasticity. Three specimens shall be tested in accordance with ASTM D 638 using 0.125 inch thick, type I specimens. Testing shall be at speed B.

4.3.7 Vicat softening point. Three specimens shall be tested in accordance with ASTM D 1525, using rate B.

4.3.8 Deformation under load. Three specimens shall be tested in accordance with ASTM D 621 at $70^{\circ} \pm 1^{\circ}\text{C}$. ($158^{\circ} \pm 1.8^{\circ}\text{F}$.), using method A. The load shall be 1000 ± 10 pounds.

4.3.9 Dielectric constant and dissipation factor (applicable to class 2 material only). Three specimens shall be tested in accordance with ASTM D 150, using any electrode system in this test method.

5. PREPARATION FOR DELIVERY

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

5.1.1 Level A. Unless otherwise specified (see 6.2), the material in the quantity specified (see 6.2), 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, containers shall be of uniform shape and size, with minimum cube and tare consistent with the protection required. Containers shall contain identical quantities and shall be closed in accordance with the applicable container specification. Fiber drums shall be furnished with an 0.004 inch thick polyethylene liner properly heat sealed.

5.1.2 Level B. Unless otherwise specified (see 6.2), the material in the quantity specified (see 6.2), shall be 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.

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

5.1.3 Level C. 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 comply with the requirements of the Uniform Freight Classification Rules or National Motor Freight Classification Rules, as applicable to the mode of transportation.

5.2 Marking.

5.2.1 Civil agencies. Shipping containers shall be marked in accordance with Fed. Std. No. 123 (see 6.2).

5.2.2 Military agencies. Containers shall be marked in accordance with MIL-STD-129 (see 6.2).

6. NOTES

6.1 Intended use. Styrene-acrylonitrile plastics are more rigid than polystyrenes and have greater tensile strength, hardness, and chemical resistance. Type II material is intended where the requirements for resistance to chemicals and aging are moderately less than type III. Type I material offers moderately less resistance to chemicals and aging than type II. The improvement in mechanical properties between types I and III is so gradual that repeated tests are required for verification. Differences in resistance to chemicals and aging, between types I and III, are so moderate that they can be detected reliably only by means of long term tests.

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, grade, and class of material required (see 1.2).
- (c) Form, if required (see 3.3).
- (d) Color, and opacity, if required (see 3.4).
- (e) Suitability for use with explosives and chemicals, if required (see 3.5).
- (f) Level of packing required (see 5.1).
- (g) If other containers are required (see 5.1.1 and 5.1.2).
- (h) Quantity in shipping container (see 5.1.1 and 5.1.2).
- (i) Markings required (see 5.2.1 and 5.2.2).

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6.3 Fabricator choice of form. The fabricator of molded parts or extruded shapes is expected to specify the material form best suited to his equipment (see 3.3).

6.4 Suitability for use with explosives. Information concerning suitability of many plastics for use with various explosives and chemicals under various conditions is on file at Picatinny Arsenal, Dover, New Jersey 07801. Procuring activities desiring information on this subject should first contact Picatinny Arsenal to determine whether the information is already available.

6.5 Questions raised regarding toxicity should be referred by the procuring agency to the departmental medical authority. In the case of Army procurement, the Surgeon General will act as advisor to the procuring agency.

MILITARY CUSTODIANS:

Army - MR
Navy - AS
Air Force - 11

Review activities:

Army - EL, MD
Air Force - 84
DSA - GS

User activities:

Army - MI
Navy - AS, OS, MC, YD

Preparing activity:

Army - MR

CIVIL AGENCY INTEREST:

GSA - FSS

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein. Price 35 cents each.

SPECIFICATION ANALYSIS SHEET

Form Approved Budget Bureau No. 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity.

SPECIFICATION L-P-399B, Plastic Molding and Extrusion Material, Styrene-Acrylonitrile
Copolymers

ORGANIZATION**CITY AND STATE****CONTRACT NO.****QUANTITY OF ITEMS PROCURED****DOLLAR AMOUNT**

\$

MATERIAL PROCURED UNDER A☐ **DIRECT GOVERNMENT CONTRACT**☐ **SUBCONTRACT**

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ **YES**☐ **NO**

IF "YES", IN WHAT WAY?

4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)

SUBMITTED BY (Printed or typed name and activity)**DATE**DD FORM 1426
1 APR 63

REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE