

L-P-1041A

June 6, 1973

SUPERSEDING

Fed. Spec. L-P-1041

May 1, 1967

FEDERAL SPECIFICATION

PLASTIC MOLDING AND EXTRUSION MATERIAL,
VINYLIDENE CHLORIDE-VINYL CHLORIDE COPOLYMER

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 thermoplastic molding and extrusion compounds consisting of copolymers of vinylidene chloride and vinyl chloride.

1.2 Classification. The vinylidene chloride copolymers shall be of the following types and forms as specified (see 6.1 and 6.2).

Type I - General purposes.

Forms (see 6.3)

Powder

Pellets

Type II - Electrical grade.

Forms (see 6.3)

Powder

Pellets

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:

FSC 9330, 5970

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Federal Specifications:

PPP-D-723 - Drums, Fiber.

PPP-D-729 - Drums, Shipping and Storage, Steel, 55-Gallon.

Federal Standard:

Fed. Std. No. 123 - Marking for Domestic Shipment (Civilian 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 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.

American Society for Testing and Materials (ASTM) Standards:

- D 149-64 (1970) - Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulating Materials at Commercial Power Frequencies.
- D 150-70 - A-C Loss Characteristics and Dielectric Constant (Permittivity) of Solid Electrical Insulating Materials.
- D 256-72a - Impact Resistance of Plastics and Electrical Insulating Materials.
- D 257-66 - Electrical Resistance of Insulating Materials.
- D 374-68 - Thickness of Solid Electrical Insulation.
- D 568-68 - Flammability of Plastics 0.127 cm (0.050 in.) and Under in Thickness.
- D 569-59 (1971) - Measuring the Flow Properties of Thermoplastic Molding Materials.
- D 570-63 (1972) - Water Absorption of Plastics.
- D 638-71a - Tensile Properties of Plastics.
- D 648-72 - Deflection Temperature of Plastics Under Load.
- D 729-57 (1965) - Vinylidene Chloride Molding Compounds.
- D 792-66 (1970) - Specific Gravity and Density of Plastics by Displacement.

(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 Associations, Inc., Tariff Order Section, 1616 P Street, N. W. Washington, D. C. 20036).

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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 be a copolymer of vinylidene chloride and vinyl chloride in which the minimum vinylidene chloride content shall be 85 ± 7 percent. The vinylidene chloride copolymer materials shall be suitable for compression, injection, and extrusion molding, and may contain suitable plasticizers, stabilizers, dyes, and pigments.

3.2 Property values for material before processing. The vinylidene chloride copolymer material in powder or pellet form (see 6.3) shall conform to the requirement in table I when tested in accordance with the applicable procedure of 4.3.

TABLE I. Property value for material in powder or pellet form

Property	Types I and II
Viscosity of 2 percent solution in orthodichlorobenzene at $120^\circ \pm 0.5^\circ$ C. ($248^\circ \pm 9^\circ$ F.), centipoises, minimum.	0.96

3.3 Property values for molded test specimens. Vinylidene chloride copolymer test specimens prepared and tested in accordance with the applicable procedure of 4.3 shall conform to the requirements of table II for type I material, and tables II and III for type II material.

TABLE II. Property values, excluding electrical, for molded test specimens

Property	Types I and II
Flow temperature, °C. (°F.)	
Minimum	120° C. (248° F.)
Maximum	140° C. (284° F.)
Specific gravity, 23/23° C. (73.4/73.4°F.)	
Minimum	1.68
Maximum	1.75
Tensile strength, pounds per square inch (psi) minimum	3000
Deflection temperature at 264 psi fiber stress, minimum	55° C. (131° F.)
Water absorption (24 hrs immersion) weight gain plus soluble matter loss, percent maximum	0.1
Flammability	self extinguishing
Impact strength (Izod) ft-lb per inch of notch, minimum:	
at 23° ± 1° C. (73.4° ± 1.8° F.)	0.5
Weight loss on heating (72 hours at 82° ± 1° C. (180° ± 1.8° F.)), percent, maximum	2.0

TABLE III. Electrical property values for molded test specimens

Property	Type II
Dielectric strength, volts per mil, minimum:	
short-time test	350
step-by-step test	300
Dielectric constant, maximum:	
at 1 KHz	4.7
at 1 MHz	3.5
Dissipation factor, maximum:	
at 1 KHz	0.06
at 1 MHz	0.065
Volume resistivity, ohm-centimeters, minimum	10 ¹⁴

3.4 Form. The form shall be powder (see 6.3 for typical sieve analysis). If a special sieve analysis is required, it shall be as specified by the procuring agency (see 6.2).

3.5 Color. The color shall be as specified by the procuring agency. (see 6.2).

3.6 Uniformity. The material shall be uniform in appearance, as determined by visual inspection.

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3.7 Workmanship. The material shall be clean and contain no foreign material.

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 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, submitted for delivery at one time.

4.2.1 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, or, if none, in accordance with this specification. In the event of conflict this specification will 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 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 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 examination specified in table IV, shall be approximately one pound.

TABLE IV. 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.

4.2.2.1.2 Examination of the preparation for delivery requirements.
An examination shall be made in accordance with table V to determine that packaging, 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 V. Examination of the preparation for delivery

Examine	Defects
Packing	Not level specified; not in accordance with contract requirements. Any nonconforming component, component missing, damaged or otherwise defective affecting serviceability. Inadequate application of components such as: incomplete closures of case liners; container flaps, loose or inadequate strappings, bulged or distorted containers.
Quantity of material	Less than specified or indicated quantity.
Weight	Gross weight exceeds specified requirements.
Markings	Interior or exterior markings omitted, illegible, incorrect, incomplete 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 paragraph	Inspection level	AQL
4.2.2.1.1	II	2.5
4.2.2.1.2	S--2	2.5

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4.2.3 Testing. The material shall be tested for the characteristics listed in tables I, II and III, as applicable, in accordance with the test methods specified herein for each lot submitted for inspection. The lot size, for the purpose of determining sample size for testing, shall be expressed in units of 300 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, unless only one specimen is required for testing.

4.3 Test methods.

4.3.1 Preparation of specimens. Test specimens shall be molded by injection under conditions specified by the manufacturer.

4.3.2 Test conditions. Unless otherwise specified, all tests shall be performed in a standard laboratory atmosphere of $23^{\circ} \pm 2^{\circ}$ C. ($73.4^{\circ} \pm 3.6^{\circ}$ F.) on specimens which have been conditioned for a minimum of 48 hours at these conditions. Humidity control is not specified since test specimens of vinylidene chloride are not sufficiently sensitive to humidity to affect test results, except for weight loss on heating determinations (see 4.3.11), and electrical tests specified in table III.

4.3.3 Viscosity of 2 percent solution. The method and number of determinations shall be identical with that specified in ASTM D 729-57 (1965) for viscosity of 2 percent solution. The determination shall be made on material in the form supplied prior to processing (see 3.2).

4.3.4 Flow temperature. Three specimens shall be tested in accordance with ASTM D 569-59 (1971), using procedure A.

4.3.5 Specific gravity. One specimen shall be tested in accordance with method A of ASTM D 792-66 (1970).

4.3.6 Tensile strength. Three specimens shall be tested in accordance with ASTM D 638-71a, using testing speed B. Dimensions of each specimen shall conform to type I of figure 1 of ASTM D 638-68.

4.3.7 Deflection temperature. Three specimens shall be tested in accordance with ASTM D 648-72, using a fiber stress of 264 pounds per square inch.

4.3.8 Water absorption. Three specimens shall be tested in accordance with ASTM D 570-63 (1972), using the 24-hour period for immersion.

4.3.9 Flammability. One specimen shall be tested in accordance with ASTM D 568-68.

4.3.10 Impact test. Three specimens shall be tested in accordance with ASTM D 256-72a. The dimensions for all specimens shall be 1/8 by 1/2 by 2-1/2 inches and shall be within the tolerance limits specified in ASTM D 256-72a. The dimensions shall be reported with the impact test results.

4.3.11 Weight loss on heating. Three specimens, each 3 by 1/8 inch, shall be tested after conditioning for a minimum period of 48 hours over anhydrous calcium chloride at $23^{\circ} \pm 1^{\circ}$ C. ($73.4^{\circ} \pm 1.8^{\circ}$ F.). The specimens shall then be weighed and then placed in a circulating air oven for 72 hours at $82^{\circ} \pm 1^{\circ}$ C. ($180^{\circ} \pm 1.8^{\circ}$ F.). The specimens shall be supported flatwise on a screen in the oven. Upon removal from the oven, the specimens shall be cooled in a desiccator over anhydrous calcium chloride at $23^{\circ} \pm 1^{\circ}$ C. ($73.4^{\circ} \pm 1.8^{\circ}$ F.). The specimens shall then be weighed and the percentage weight loss on heating shall be calculated on the basis of the weight after the 48-hour conditioning period.

4.3.12 Dielectric strength (for type II materials only). Three specimens each $1/8 \pm 0.0125$ inches in thickness shall be tested in accordance with ASTM D 149-64 (1970), using the short time-test. Three additional specimens of the same size shall be tested in accordance with ASTM D 149-64 (1970), using the step-by-step test.

4.3.13 Dielectric constant and dissipation factor (for type II materials only). Five specimens, each of a convenient thickness measured in accordance with ASTM D 374-68, shall be tested in accordance with ASTM D 150-70. Vacuum plated metal electrodes shall be used.

4.3.14 Volume resistivity (for type II materials only). Three specimens shall be tested in accordance with ASTM D 257-66.

5. PREPARATION FOR DELIVERY

5.1 Application. The requirements of section 5 apply only to purchase by or direct shipment to the Government.

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

5.2.1 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.

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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.

5.2.2 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.

5.2.3 Level C. Packing shall be in accordance with commercial practice adequate to insure 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.

5.3 Marking.

5.3.1 Civil agencies. In addition to any special marking specified in the contract or order, shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.3.2 Military agencies. In addition to any special marking specified in the contract or order, containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. Vinylidene chloride copolymers have outstanding low moisture-vapor transmission properties and lack odor and taste. Compatibility with many other film forming materials have made these copolymers an excellent formulating tool. Type II materials are intended for general purpose electrical applications at lower frequencies, when coupled with a need for the characteristic non-electrical properties of these copolymers.

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) Special powder sieve analysis, if required (see 3.4).
- (d) Color required (see 3.5).
- (e) Selection of applicable level of packing required (see 5.2).

6.3 Vinylidene chloride copolymer materials are generally supplied in powder form conforming to the following sieve analysis:

Powder:

retained on a No. 18 (1000 micron) sieve --Not over 1 percent

6.4 Electrical properties. The electrical properties specified herein are basic properties of the copolymer molecules. Accordingly, these properties should remain constant when there is conformance to the property values specified in table II.

6.5 International standardization agreement. Certain provisions of this specification are the subject of international standardization agreement ABC-NAVY-STD-17C. When amendment, revision, or cancellation of this specification is proposed which will affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required.

MILITARY CUSTODIANS:

Army - MR
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Review activities:

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Preparing activity:

Army - MR
Civil Agency Coordinating

Activities:
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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. Priced 15 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-1041A, Plastic Molding and Extrusion Material, Vinylidene Chloride-Vinyl Chloride Copolymer		
ORGANIZATION		CITY AND STATE
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT \$
MATERIAL PROCURED UNDER A		
<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> 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?		
<input type="checkbox"/> YES <input type="checkbox"/> 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)		
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