

MIL-C-47258(MI)

26 July 1974

SUPERSEDING

MIS-18839

6 May 1968

MILITARY SPECIFICATION

COMPOUND, DIPPING, PLASTIC, PLASTISOL

This specification is approved for use by all departments and agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers one type of plastisol dipping compound consisting of polyvinyl chloride dispersed in suitable liquid plasticizers, with fungicide, stabilizer, pigments and fillers added.

2. APPLICABLE DOCUMENTS

2.1 Government documents. The following documents, of the issue in effect on the date of invitations for bids, form a part of the specification to the extent specified herein:

SPECIFICATIONS

Federal

TT-P-143

Paint, Varnish, Lacquer,
and Related Materials;
Packaging, Packing, and
Marking of

FSC 9330

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STANDARDS

Federal

FED-STD-406	Plastic, Methods of Testing
FED-STD-601	Rubber, Sampling and Testing

Military

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-810	Environmental Test Methods for Aerospace and Ground Equipment

(Copies of specifications, standards, publications and drawings, required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Preproduction sample. Unless otherwise specified, the plastisol material (see 4.2 and 6.2) furnished under this specification shall be a product which has passed the preproduction tests specified herein.

3.2 Color. Unless otherwise specified by the procuring activity (see 6.2), the color of the plastisol shall be black.

3.3 Physical properties. The physical properties of the plastisol, when prepared as specified in 4.4.1, shall be as specified herein.

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Table I
Physical properties

Property	Required value
Hardness, Shore durometer A	60 \pm 5
Tear strength, pounds per square inch (p.s.i.)	not less than (n.l.t.) 1000
Tensile strength (p.s.i.)	n.l.t. 1500
Elongation, percent	n.l.t. 400
Volatile loss, percent, average	not greater than (n.g.t.) 2.0
Blocking, maximum	very slight
Brittleness at $-48^{\circ} \pm 2^{\circ}\text{C}$ ($-55^{\circ} \pm 4^{\circ}\text{F}$)	meet the requirements of FED-STD-406 with exceptions noted herein
Volume resistivity, ohm - inches, average	n.l.t. 2.3×10^9
Dielectric strength, volts per 0.001 inch average	n.l.t. 135
Fungus resistance - amount % mold growth, maximum	trace (see 6.5)

3.3.1 Heat stability. Specimens prepared as specified in 4.4.1.1 shall not increase in hardness by more than five Shore A durometer units after being heated for 2 hours at 177 degrees plus or minus 2 degrees Celsius (C) (350 degrees plus or minus 4 degrees Fahrenheit (F)).

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3.3.2 Flammability. Specimens prepared as specified in 4.4.1.1 shall sustain combustion for not longer than 30 seconds and not more than 2 inches of the specimen shall be melted or charred.

3.3.3 Resistance to accelerated weathering. Specimens prepared as specified in 4.4.1.1 shall meet the brittleness requirement specified in Table I after being exposed to accelerated weathering.

3.3.4 Cold bend. Specimens prepared as specified in 4.4.1.1 shall not crack after being bent over a 1/8 inch mandrel at minus 54 degrees plus or minus 2 degrees C. (minus 65 degrees plus or minus 4 degrees F).

3.3.5 Shelf life. Specimens prepared as specified in 4.4.1.1 from the dispersed plastisol (see 6.3) that has been stored in separate closed containers for 3 months at 32 degrees plus or minus 3 degrees C. (90 degrees plus or minus 5 degrees F) shall conform to the hardness value specified in Table I.

3.4 Instruction sheet. The preproduction sample and each production lot of plastisol shall be accomplished by an instruction sheet giving the following information:

- a. Title, number, and date of this specification.
- b. Material.
- c. Color number.
- d. Recommended storage conditions.
- e. Estimated shelf life under recommended conditions.
- f. Other information considered useful by the manufacturer, or specified by the procuring activity.

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3.5 Workmanship. The material shall show no segregation due to insufficient mixing of the ingredients, shall be uniform in color and consistency, and shall be free from all visible foreign matter.

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.

4.2 Preproduction sample. Unless otherwise specified (see 3.1 and 6.2), a sample of the material (see 4.3.2.1) which is representative of and has been manufactured under the same conditions as that proposed for subsequent production lots shall be submitted for Government approval and shall be subjected to all examinations and tests specified herein. Unless otherwise specified the Government will perform the examinations and tests for preproduction testing at the contractors facility. Preproduction samples which do not meet all the requirements of this specification will be rejected and returned to the contractor. Subsequent quantities will not be considered for acceptance until approval of the preproduction sample has been obtained.

4.3 Inspection provisions.

4.3.1 Lot. A lot shall consist of all plastisol material of the same supplier's designation that has been produced under like conditions in one unchanged process by one manufacturer, and presented for inspection at one time.

4.3.2 Sampling.

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4.3.2.1 For preproduction testing. Samples for preproduction testing (see 4.2) shall be taken from a quantity of n.l.t. 2 gallons, provided by the manufacturer in sealed containers.

4.3.2.2 For acceptance testing.

4.3.2.2.1 For visual examination. Sampling for visual examination shall be conducted in accordance with MIL-STD-105.

4.3.2.2.2 Acceptance testing. Samples for acceptance testing shall be taken from a quantity of n.l.t. 1 gallon, provided by the manufacturer in sealed containers and selected at random from each lot.

4.3.3 Examination.

4.3.3.1 Visual examination. Visual examination of the samples specified in 4.3.2.2.1 shall be conducted to determine compliance with the requirements specified in 3.2 and 3.5, and preparation for delivery specified in Section 5.

4.3.3.2 Acceptance tests. Acceptance testing of the samples specified in 4.3.2.2.2, to determine compliance with the following characteristics, shall be conducted in accordance with their corresponding test paragraphs:

<u>Characteristic</u>	<u>Test</u>
Hardness (see Table I)	4.4.2.1
Tensile strength and elongation (see Table I)	4.4.2.3
Blocking (see Table I)	4.4.2.5
Heat stability (see 3.3.1)	4.4.2.10

4.3.3.3 Preproduction testing. Preproduction testing of the samples specified in 4.3.2.1, to determine compliance with the following characteristics, shall be

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conducted on test specimens taken from the sample, after the sample has successfully passed the visual examination specified in 4.3.3.1, and acceptance tests specified in 4.3.3.2 in accordance with their corresponding test paragraphs:

<u>Characteristics</u>	<u>Test</u>
Tear strength (see Table I	4.4.2.2
Volatile loss (see Table I)	4.4.2.4
Brittleness (see Table I)	4.4.2.6
Volume resistivity (see Table I)	4.4.2.7
Dielectric strength (see Table I)	4.4.2.8
Fungus resistance (see Table I)	4.4.2.9
Resistance to accelerated weathering (see 3.3.3)	4.4.2.11
Flammability (see 3.3.2)	4.4.2.12
Cold bend (see 3.3.4)	4.4.2.13
Shelf life (see 3.3.5)	4.4.2.14

4.3.4 Inspection equipment. In examining the contractors inspection equipment, the Government inspector will determine whether the contractor has available and utilizes correctly, gaging, measuring, and test equipment of required accuracy and precision, and that the instruments are of a proper type and range to make measurements within the required accuracy. The contractor shall have available a set of master gages, standards, and appropriate instruments to conduct regularly scheduled calibrations of his inspection equipment. Records of such calibrations shall be maintained by the contractor and made available for Government review.

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The calibration of gages, standards, and instruments will be checked periodically by authorized Government personnel.

4.4 Test procedures.

4.4.1 Preparation of specimens.

4.4.1.1 Molding and cutting of sheets.

4.4.1.1.1 Molding of sheets. A slight excess of the dispersed plastisol shall be placed in a steel mold having a horizontal cavity 6 inches square by a depth sufficient to produce a specimen having the required thickness. (Brittleness temperature and flammability specimens shall be 0.075 plus or minus 0.010 inch thick while all other specimens shall be 0.125 plus or minus 0.010 inch thick.). A flat cover shall be placed over the plastisol and pressed down with sufficient force to squeeze out the excess material. The assembly shall be heated to 177 degrees plus or minus 2 degrees C (350 plus or minus 4 degrees F.), held at that temperature for 15 minutes, and cooled to below 38 degrees C. (100 degrees F.). The mold shall be opened and the fused plastisol (see 6.4) sheet shall be removed and conditioned for at least 24 hours at 23 degrees plus or minus 1 degree C. (74 degrees plus or minus 2 degrees F.) and 50 plus or minus 2 percent relative humidity.

If gas bubbles are noted on the underside of the sheet, the sheet shall be discarded and another made as follows: the new sheet shall be sufficiently fused to permit it to be handled. The mold shall be opened, the sheet turned over, and the new top coated with fresh dispersed plastisol. The assembly shall be given the complete fusing and conditioning cycles described above.

4.4.1.1.2 Cutting of specimens. Specimens shall be die cut from the sheet by the method referenced in the applicable test procedure. If a method is not specified, the specimens shall be cut with a knife or scissors.

4.4.2 Tests.

4.4.2.1 Hardness. Three specimens, taken from a 0.125 inch thick molded sheet as specified in 4.4.1.1,

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shall be prepared and tested in accordance with FED-STD-601, Methods 3021 and 3025, using the Shore A durometer. Satisfactory completion of the test shall determine compliance with the requirement specified in Table I.

4.4.2.2 Tear strength. Three or more specimens, taken from a 0.125 inch thick molded sheet as specified in 4.4.1.1, shall be prepared and tested in accordance with FED-STD-601, Method 4211, using die C. Satisfactory completion of the test shall determine compliance with the requirement specified in Table I.

4.4.2.3 Tensile strength and elongation. Six specimens, taken from a 0.125 inch thick molded sheet as specified in 4.4.1.1, shall be prepared and tested in accordance with FED-STD-601, Method 4111. Satisfactory completion of the tests shall determine compliance with the requirement specified in Table I.

4.4.2.4 Volatile loss. Three specimens, taken from a 0.125 inch thick molded sheet as specified in 4.4.1.1, shall be prepared and tested in accordance with FED-STD-406, Method 6081. Satisfactory completion of the tests shall determine compliance with the requirements specified in Table I.

4.4.2.5 Blocking. Three specimens, taken from a 0.125 inch thick molded sheet as specified in 4.4.1.1, shall be prepared and tested in accordance with FED-STD-406, Method 1131. A pressure of 1 pound per square inch and a temperature of 70 degrees plus or minus 1 degree C. (158 degrees plus or minus 2 degrees F.) shall be used. Satisfactory completion of the tests shall determine compliance with the requirement specified in Table I.

4.4.2.6 Brittleness. Ten specimens, taken from a 0.075 inch thick, molded sheet as specified in 4.4.1.1, shall be prepared and tested in accordance with FED-STD-406, Method 2051. The rectangular specimen configuration shall be used, except that testing shall be at a temperature of minus 48 degrees plus or minus 1 degrees C. (minus 55 degrees plus or minus 2 degrees F.). None of the ten specimens shall break upon impact. Satisfactory completion of the tests shall determine compliance with the requirement specified in Table I.

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4.4.2.7 Volume resistivity. Five specimens, 4 inches in diameter, taken from a 0.125 inch thick molded sheet as specified in 4.4.1.1, shall be prepared and tested in accordance with FED-STD-406, Method 4041. The average value of volume resistivity shall be reported. Satisfactory completion of the tests shall determine compliance with the requirement specified in Table I.

4.4.2.8 Dielectric strength. Five specimens, 4 inches in diameter, taken from a 0.125 inch thick molded sheet as specified in 4.4.1.1, shall be prepared and tested in accordance with FED-STD-406, Method 4031. The average value of dielectric strength shall be reported. Satisfactory completion of the tests shall determine compliance with the requirement specified in Table I.

4.4.2.9 Fungus resistance. Four specimens, 2 inches by 2 inches, taken from a 0.125 inch thick molded sheet as specified in 4.4.1.1, shall be prepared and subjected to fungus resistance testing in accordance with MIL-STD-810, Method 508, Procedure 1, except that the test shall be limited to 14 days. Satisfactory completion of the tests shall determine compliance with the requirement specified in Table I.

4.4.2.10 Heat stability. Three specimens, taken from a 0.125 inch thick molded sheet as specified in 4.4.1.1, shall be prepared and tested for durometer hardness as specified in 4.4.2.1. The specimens shall then be heated for 2 hours at 177 degrees plus or minus 2 degrees C. (350 degrees plus or minus 4 degrees F), conditioned for 24 hours at 23 degrees plus or minus 1 degree C. (74 degrees plus or minus 2 degrees F). and 50 plus or minus 2 percent relative humidity, and tested for durometer hardness as specified in 4.4.2.1. The hardness value determined subsequent to heating shall be compared with that determined on the same specimen prior to heating. The change in hardness shall be computed. Satisfactory completion of the tests shall determine compliance with the requirement specified in 3.3.1.

4.4.2.11 Resistance to accelerated weathering. Ten specimens, 2 inches by 6 inches, taken from a 0.125 inch thick molded sheet as specified in 4.4.1.1, shall be

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prepared and tested for a period of 240 hours as specified in FED-STD-406, Method 6022. The specimens shall then be conditioned for 24 hours at 23 degrees plus or minus 1 degree C. (74 degrees plus or minus 2 degrees F.) and 50 plus or minus 2 percent relative humidity, die cut into brittleness temperature specimens, and tested as specified in 4.4.2.6. Satisfactory completion of the test shall determine compliance with the requirement specified in 3.3.3.

4.4.2.12 Flammability. A specimen, taken from a 0.075 inch thick molded sheet as specified in 4.4.1.1, shall be prepared and tested as specified in FED-STD-406, Method 2022, using the Fusee method of ignition. Three 6 inch lengths shall be joined by stapling or other means to provide the required length. Satisfactory completion of the tests shall determine compliance with the requirements specified in 3.3.2.

4.4.2.13 Cold bend. Three specimens, 2 inches by 6 inches, taken from a 0.125 inch thick molded sheet as specified in 4.4.1.1, shall be conditioned for 24 hours at minus 54 degrees plus or minus 2 degrees C (minus 65 degrees plus or minus 4 degrees F.). After conditioning, and while still in the chamber at the specified conditioning temperature, the specimens shall be bent over a 1/8 inch diameter mandrel without opening the chamber. The mandrel shall be rotated until at least three turns of the specimen are wound onto it. The mandrel shall then be rotated in the opposite direction until at least three turns of the specimen are again wound onto it. The coiled specimen shall be removed from the mandrel and stabilized to room temperature. Satisfactory completion of the tests shall determine compliance with the requirement specified in 3.3.4.

4.4.2.14 Shelf life. This dispersed plastisol, after storage for 3 months at 32 degrees plus or minus 3 degrees C. (90 degrees plus or minus 5 degrees F.) shall be molded into a 0.125 inch thick sheet as specified in 4.4.1.1. Specimens shall be prepared and tested as specified in 4.4.2.1. Satisfactory completion of the tests shall determine compliance with the requirement specified in 3.3.5.

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5. PREPARATION FOR DELIVERY

5.1 Packaging (see 6.2).

5.1.1 Levels A and C. Unless otherwise specified in the contract or purchase order, plastisol shall be packaged Level A or Level C (see 6.2) in 1-gallon pails, 5-gallon pails or drums, or 55-gallon drums in accordance with TT-P-143.

5.2 Packing (see 6.2).

5.2.1 Levels A, B, and C. Plastisol shall be packed Level A, Level B, or Level C (see 6.2), in accordance with the requirements of TT-P-143. The gross weight shall not exceed 200 pounds unless the weight of a single item exceeds the above prescribed weight limit.

5.3 Marking. Interior packages and exterior containers shall be marked in accordance with MIL-STD-129 and shall include the date of manufacture (month and year). Appropriate toxicity and/or flammability precautions (if required) shall be noted on the packages.

6. NOTES

6.1 Intended use. Plastisol conforming to this specification is intended to be used to fabricate objects by dipping; thus providing protection against corrosion, abrasion, and low voltage electrical shock, in addition to a smooth, non-abrasive surface to be used in contact with the skin.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Color (see 3.2).
- c. Methods of sampling and inspection if other than specified (see 4.3).
- d. Applicable levels of packaging and packing (see 5.1 and 5.2).

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- e. Whether a qualification sample is required (see 3.1 and 4.2).

6.3 Definitions.

6.3.1 Dispersed plastisol. A dispersed plastisol is a colloidal dispersion of a synthetic resin (in this case polyvinyl chloride) in a plasticizer (an essentially non-volatile, high boiling organic liquid). Pigments and fillers may be incorporated to color, adjust viscosity, or otherwise modify the dispersion properties.

6.3.2 Fused plastisol. A fused plastisol is a tough rubber-like, thermoplastic solid made by heat treating a dispersed plastisol.

6.3.3 Trace of fungus growth. Traces of growth may be defined as scattered, sparse fungus growth observed on less than 10 percent of the surface area under test. (Continuous cobwebby growth, extending over most of the surface of the specimen, even though not necessarily obscuring the specimen, should be rated as light growth; 10 to 30 percent of the surface being affected.)

6.4 Supersession data. This specification includes the requirements of Missile Interim Specification MIS-18839, dated 6 May 1968.

Custodian:
Army-MI

Preparing Activity:
Army-MI
Project No. 9330-A652

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL		OMB Approval No. 22-R255
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1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING. B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES		
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