

INCH-POUND

MIL-DTL-82646B (OS)
30 October 2008
SUPERSEDING
MIL-P-82646A (OS)
01 March 1985

DETAIL SPECIFICATION

PLASTIC FILM, CONDUCTIVE. HEAT-SEALABLE. FLEXIBLE

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers a flexible, heat-sealable, conductive plastic film to be used in sheet form as a protective wrapper or as material of construction for plastic bags.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-286 Propellants, Solid: Sampling, Examination and Testing

(Copies of these documents are available online at <http://assist.daps.dla.mil/> or from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

Comments, suggestions, or questions on this document should be addressed to DEPARTMENT OF THE NAVY, Indian Head Division, NSWC, Code E11G3, Document Control, 4072 North Jackson Road, Suite 106, Indian Head, MD 20640-5115 OFFICIAL BUSINESS, or emailed to amanda.penn@navy.mil. Since contact information can change, you may want to verify the currency of this information using the ASSIST Online database at <http://assist.daps.dla.mil>.

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2.2.2 Other Government documents, drawings, and publications. This section is not applicable to this document.

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR QUALITY (ASQ)

ANSI/ASQ Z1.4 Sampling Procedures and Tables for Inspection by Attributes

(Copies of ANSI/ASQ Z1.4 are available online at <http://www.asq.org/> or ASQ Distribution Center, 5131 S. Third Street, Milwaukee, Wisconsin 53207-6028.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting

ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials

(Copies of these documents are available online at <http://www.astm.org/> or from the American Society for Testing and Materials Customer Service, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample (see 6.3) shall be subjected to first article inspection in accordance with 4.2. A first article inspection shall be required if :

- a. There has been more than 12 months since production of the latest accepted lot,
- b. There has been a relocation of the production facility,
- c. There has been a major change in personnel or procedures, or
- d. There has been a change in the source of supplies for the materials used in the manufacture of the plastic film.

3.2 Materials. The film shall be made from such material and by such a process as to assure compliance with the requirements of this specification.

3.3 Forms. The film shall be furnished in the form of flat cut sheets or in rolls, as specified. Materials in roll form shall be either single thickness or lay flat tubing, as specified by the procuring activity (see 6.2).

3.3.1 Length and width. Length, width and tolerances of rolls and sheets shall be as specified by the procuring activity (see 6.2).

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3.3.2 Thickness. The film thickness shall be as specified by the procuring activity (see 6.2) and shall be specified in increments of 0.0010 inch (in.) (0.025 millimeters (mm)). The tolerance shall be ± 20 percent of the specified thickness.

3.4 Chemical and physical properties.

3.4.1 Chemical compatibility. The plastic film shall be compatible with each of the following materials when tested in accordance with 4.6.2:

- a. A mixture consisting of 75 percent nitroglycerin solvent, 1 to 2 percent 2-nitrodiphenylamine, and 24 percent nominal triacetin.
- b. Ammonium perchlorate
- c. HMX

3.4.2 Solvent compatibility. The plastic film shall be capable of meeting 75 percent of each mechanical property value specified in 3.4.5 and shall reveal no adverse visual defects after treatment in accordance with 4.6.3 with any of the following solvents:

- a. 75 percent nitroglycerin solvent as in 3.4.1 (a)
- b. Acetone
- c. Diethyl ether

3.4.3 Permeability. When specified in the contract (see 6.2), the water vapor permeability shall not exceed 9.3 grams per square meter (g/m) per 24 hours for 0.0040 in. (0.1000 mm) thick film material.

3.4.4 Electrical resistivity. The electrical resistivity shall not exceed 30,000 ohms per square inch as determined in accordance with 4.6.5.

3.4.5 Tensile strength, breaking strength and elongation. The film tensile strength shall be at least 1,900 psi in the machine direction and 1,700 psi in the transverse direction. The film elongation shall be at least 200 percent in the machine direction and 180 percent in the transverse direction.

3.5 Identification.

3.5.1 Material. The film shall be marked to show the manufacturer's designation, the date of manufacture (month and year), the specification number, and the notation "seal other side", if applicable. The identification shall appear in continuous rows of constantly recurring symbols in the machine direction from one end of the sheet to the other. Symbols shall be of a clearly legible contrasting color with that of the material and shall be not less than 0.10 in. (2.5 mm) nor more than 0.50 in. (12.7 mm) high. The symbols shall be applied by suitable means using marking fluid that is not deleterious to the film. The marking fluid used shall be as conductive as, or more conductive than, the basic material. The marking shall not be obliterated by normal handling or the action of water.

3.5.2 Identification sheet. An identification sheet shall accompany each roll or bundle and shall contain specification number, manufacturer's name, manufacturer's designation, lot number, and date of manufacture (month and year).

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3.6 Workmanship. The film shall be uniformly constructed and free from pinholes, tears, cuts, sharp creases, or other imperfections which might impair the usefulness of the film. The color is optional but it must be uniform and not mottled.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.2)
- b. Quality conformance inspection (see 4.3)
- c. Periodic production inspection (see 4.4).

4.2 First article.

4.2.1 First article sample. Unless otherwise specified, a first article sample shall consist of a roll of film 50 yards (yd) (45.7 m) long and 36 in. (91.4 cm) wide upon which first article testing is desired. The sample shall be tested by the manufacturer or forwarded to a testing facility as directed by the procuring activity (see 6.2). If the sample is to be forwarded to a testing facility, the sample shall be plainly identified by a securely attached durable tag marked with the following: "Plastic Film, Conductive, Heat-Sealable, Flexible, For Ordnance Use. Sample for First Article Test"; Manufacturer's name and address; manufacturer's designation; date of manufacture; and "Submitted by (name) (date) for first article test in accordance with the requirements of MIL-DTL-82646 under authorization (reference authorizing letter)".

4.2.2 First article testing. First article testing shall be as specified in Table I. Failure to meet any requirement shall be cause for rejection of the first article sample. The contractor shall prepare a report giving the result obtained for all inspections and tests performed or a certified statement that the first article sample meets all the first article requirements of this specification.

TABLE I. First article inspection.

Inspection	Requirement paragraph	Method paragraph
Examination	3.2, 3.3, 3.5, 3.6	4.5
Chemical compatibility	3.4.1	4.6.2
Solvent compatibility	3.4.2	4.6.3
Electrical resistivity	3.4.4	4.6.5
Film tensile strength, breaking strength and elongation	3.4.5	4.6.6

4.2.3 First article retest. Material rejected by the Government testing agency may be retested for first article acceptance (see 6.3.1).

4.2.4 Retention of first article approval. Retention of first article approval for products shall be maintained by periodic verification to determine compliance of the first article product with the requirements of this specification. Unless otherwise specified by the procuring activity, periodic verification shall be by certification and such certification shall be at intervals of not more than 2 years.

4.3 Quality conformance inspection. The material shall be subjected to all the following inspections and tests for acceptance. When specified in the contract (see 6.2), the contractor shall prepare a report giving the results obtained for all inspections and tests performed and a certified statement that the lot meets all the requirements of this specification (see 6.2.2).

4.3.1 Sampling for quality conformance inspection.

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4.3.1.1 Lot. A lot shall consist of 50,000 yd² (41,800 m²) of material or less, manufactured by the same process, from the same components, by one manufacturer, at one plant and offered for delivery at one time.

4.3.1.2 Sampling for examination. Samples for examination shall be selected in accordance with inspection level II, single sampling, normal inspection of ASQ Z1.4. Sufficient material shall be selected at random so that the required sample yardage is obtained.

4.3.1.3 Sampling for tests. For the purpose of maintaining continuous inspections, test samples shall be taken from material packed for shipment. The lot (4.3.1.1) shall be divided into five equal segments. Five sample rolls shall be drawn from the lot for test, one from each of the five equal segments. Each test sample consisting of 6.0 yd² (5.0 m²) shall be assigned a number from one to five in order of manufacture.

4.4 Periodic production inspection. When specified in the contract or order (see 6.2), periodic production samples shall be forwarded to an activity specified by the procuring activity (see 6.2) for periodic production inspection.

4.4.1 Periodic production samples. Periodic production samples shall be selected from plastic film that has passed the quality conformance inspection of 4.3. The sampling plan shall be as specified by the procuring activity (see 6.2).

4.5 Examinations. Sample material shall be visually inspected to verify conformance with this specification. Defect classification shall be in accordance with Table II.

TABLE II. Types of defects.

Examination	Defects
Form	Rolled or flat cut not as specified, lay flat dimensions or film thickness not as specified
Cleanness	Not clean
Workmanship	Embrittlement or any hole, tear, cuts, chafed spot, or other defect that would impair usefulness of film
Construction	Not uniform; pinholes, cracks, blisters, scratches, mottling, folds, foreign matters, gels, or fish eyes
Color	Not uniform
Identification	Marking not as specified. Identification sheet missing.

4.5.1 Examination for roll or package defects. The lot size for this examination shall be expressed in units or packages of sheets.

4.5.2 Examination for appearance and workmanship. The lot size for this examination shall be expressed in units of square yards of film. Defects shall be scored only once for each occurrence within a square yard.

4.6 Tests. Film samples shall be subjected to the following tests. Failure of any sample to pass any test shall be cause for rejection of the lot.

4.6.1 Test condition. Prior to testing, film samples shall be conditioned for 24 hours minimum in a moving atmosphere having a relative humidity of 50 ± 5 percent and a temperature of 21° to 24.5 °C (70° to 76 °F).

4.6.2 Chemical compatibility. The film shall be tested for compatibility with the chemicals listed in 3.4.1. The test procedure shall be in accordance with Method 7081 of FED-STD-206, with the following exceptions:

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- a. The test apparatus of Method 403.1 of MIL-STD-286 shall be used.
- b. The composite specimen shall consist of 1.0 gram (g) of dried plastic and 1.0 g of dried chemical.
- c. The individual (control) specimens shall consist of 2.0 g of dried plastic and 2.0 g of dried chemical, respectively.

The plastic shall be considered compatible if the measured compatibility is not greater than 5 cubic centimeters (cm³) where:

$$\text{Compatibility} = E - \frac{(F + G)}{2}$$

Where:

- E = cm³ of gas evolved by the plastic-chemical mixture
- F = cm³ of gas evolved, by the plastic alone
- G = cm³ of gas evolved by the chemical alone

4.6.3 Solvent compatibility. Film samples shall be immersed in the solvents (a separate specimen for each solvent) specified in 3.4.2 for 7 days at 24° ± 3°C (75° ± 5 °F). Visual examination after treatment shall reveal no adverse defects. The treated film shall be tested in accordance with 4.6.6 to determine compliance with 3.4.2.

4.6.4 Permeability. The water vapor permeability shall be measured in accordance with ASTM E 96 or an equivalent test approved by the procuring activity. The test chamber or room shall be maintained at 35° ± 1°C (95° ± 2 °F) and 95 ± 3 percent relative humidity and shall be provided with a means of maintaining a current of air flowing at a rate of 500 ± 25 feet per minute (2.54 ± 0.13 meters per second).

4.6.5 Electrical resistivity. The electrical resistivity shall be determined in accordance with the following test procedure using the test equipment shown in Figure 1 and 2. The film specimens shall be a minimum of 25 cm long by 2.54 + 0.0. - 0.025 cm wide.

Test procedure:

- a. Place the electrode assembly on top of the specimen with the polished electrode edges resting on the specimen, and the electrodes perpendicular to the long sides of the specimen.
- b. Place a 5-pound weight on top of the electrode-insulator assembly.
- c. Measure resistance at random locations along the film specimen.
- d. Record a minimum of five determinations, their average, and the standard deviation for each specimen.

4.6.6 Film tensile strength, breaking strength and elongation. The film shall be tested as received in accordance with ASTM D 882 with the following exceptions:

- a. The width of each specimen shall be 1 inch (2.54 cm)
- b. The initial jaw separation shall be 2 inches (5.08 cm)

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c. The crosshead speed shall be 2 inches per minute (5.08 cm/minute)

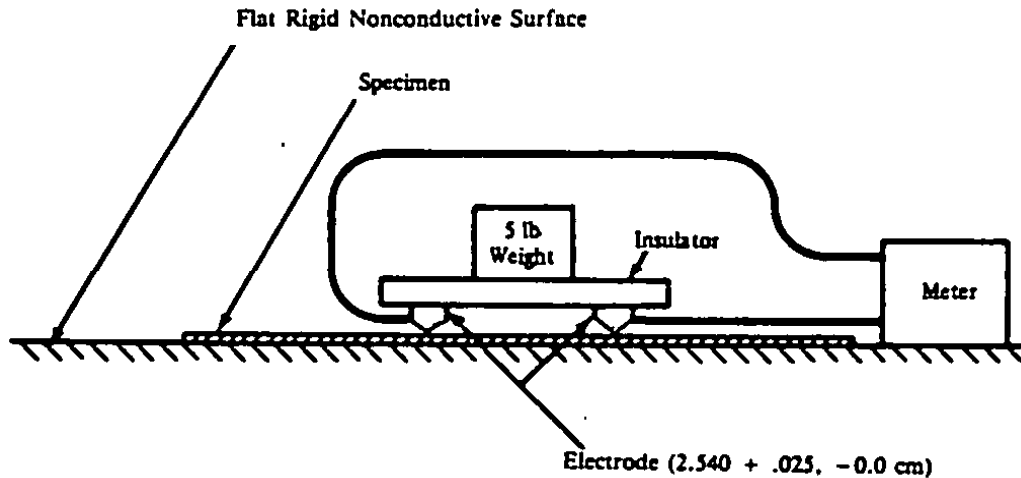


FIGURE I. Schematic of electrical resistivity measuring arrangement.

NOTES:

1. The electrodes shall be metallic with the edges touching the specimen ground flat, polished and clean.
2. The electrodes shall be permanently attached to an insulator, having a minimum thickness of 0.60 cm.
3. The electrodes contacting the specimen shall lie in the same plane.
4. The distance between the knife edge of the electrodes shall be $2.540 + .025, -0.0$ cm.
5. A Simpson Model No. 260 volt-ohm-milliammeter or equivalent shall be used.

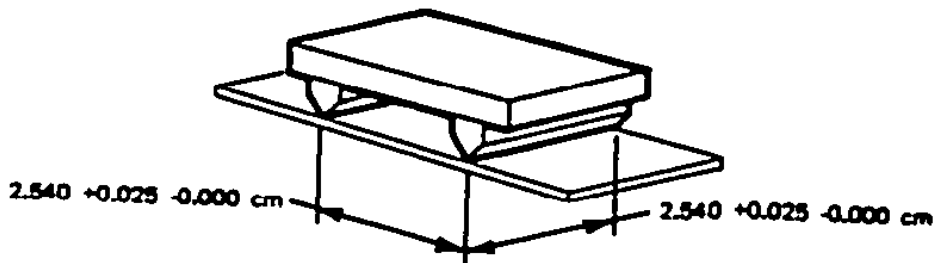


FIGURE 2. Alternate aspect of insulator plate-electrode assembly.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DOD personnel or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

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6.1 Intended use. Conductive plastic film in accordance with this specification is intended to be used for the protection and handling of special ordnance material, propellants and explosives, where conductive properties, protection from solids contamination, resistance to nitroglycerin, and water proofing characteristics are of paramount importance. The film is used in sheet form or as a material of construction for bags. The film was developed for military use and has no commercial application.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification
- b. Whether flat cut sheets, rolls of sheeting, or rolls of tubing are required (see 3.3)
- c. Length, width, and tolerance required (specify whether width is measured in the machine or transverse direction) (see 3.3.1)
- d. Thickness required (see 3.3.2)
- e. Whether first article inspection is required and, if so, specify the test activity (see 3.1 and 4.2)
- f. Whether a test report and/or certificate is required (see 4.3)
- g. Whether periodic production inspection is required (see 4.4)
- h. Assigned activity for periodic production inspection (see 4.4)
- i. Sampling plan for periodic production inspection (see 4.4.1)
- j. When the water vapor permeability requirement is applicable (see 3.4.3, 4.3, and 4.6.4)
- k. Levels of packaging and packing required (see 5.1 and 6.4)

6.2.1 Quality conformance sampling. An AQL of 2.5% defective has been used successfully for quality conformance sampling. The contracting activity is cautioned that any deviation for this ANSI/ASQC Z1.4 selection should be warranted and verified statistically.

6.2.2 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The specific acquisition should be reviewed to ensure that only essential data are requested/provided. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

Paragraph no.	Data requirement title.
4.3	Test Report
4.3	Certification Data/Report

6.3 First Article. When a first article inspection is required, the contracting officer should provide specific guidance to offeror(s) whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, or a standard production item from the contractor's current inventory. The contracting officer should also include specific instructions in acquisition documents of the first articles. Invitation(s) for bid(s) should provide that the

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U.S. Government reserves the right to waive the requirements for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the U. S. Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior U.S. Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4. Packaging.

6.4.1 Packaging. Unless otherwise specified, the film should be packaged in accordance with the best commercial practice.

6.4.2 Packing. Unless otherwise specified, packing should be commercial. The packaged film should be packed in exterior shipping containers in a manner that will insure safe transportation at the lowest rate. Containers should conform to Uniform Freight Classification Rules or to National Motor Freight Classification Rules.

6.4.3 Marking. All individual packages and shipping containers should be marked in accordance with MIL-STD-129 and with the following: Federal Stock Number or other identification number as specified in the contract or order, contract or order number, lot number, size-nominal net linear yardage of roll dimensions or dimensions of cut sheets (net lineal yardage-yardage of usable material in rolls), date of manufacture (month, year), and the statement "KEEP COOL AND .DRY".

6.5 Previous Sources of Supply. The manufacturer's listed below were previously approved sources. The procuring activity is cautioned that these manufacturer's listed below may no longer produce a product that meets the requirements of this specification.

GOVERNMENT DESIGNATION	MANUFACTURER'S DESIGNATION	MANUFACTURER'S NAME AND ADDRESS
None	GPCB1400	Gemini Plastic Enterprises, Inc. 3574 Fruitland Avenue Maywood, Ca. 90270
None	Microductive	Microplas Industries, Inc. 4945 Winters Chapel Rd. Atlanta, Ga. 30340
None	Starstat Black Conductive	Startex Corp. P.O. Box 720 8235 220th St. West Lakeville, Minnesota
None	Contrim R	Crystal X Corp. Second and Pine St. Darby, PA. 19023
None	Blac-Stat	Maine Poly Inc. Route 202 P.O. Box 8 Greene, Maine 04236

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None	Velostat Electrical Conductive Film	3M/Static & Electro- Magnetic Control Div. P.O. Box 2963 Austin, TX. 78769-2963 PLANT LOCATION 3M 279 Billerica Road Chelmsford, Ma. 01824
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6.6 Subject term (key word) listing.

Special ordnance material
Propellants
Explosives

6.7 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:
Navy – OS

Preparing Activity:
Navy - OS
(Project. 8135-2009-001)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil/>.