

MIL-P-82646A(OS)

1 March 1985

SUPERSEDING

See 6.4

## MILITARY 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 Government documents.

2.1.1 Specifications and standards. The following specifications and standards of the issue listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

## STANDARDS

Federal

FED-STD-406	Platics: Methods of Testing
FED-STD-595	Colors

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-286	Propellant, Solid, Sampling, Examination and Testing

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Ordnance Station, Standardization Division (524), Indian Head, Maryland 20640, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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

American Society for Testing and Materials

ASTM D 882-80      Tensile Properties of Thin Plastic Sheeting

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

NATIONAL MOTOR FREIGHT CLASSIFICATION RULES

(Application for copies should be addressed to American Trucking Associations, Attn: Tariff Order Section, 1616 P Street, Washington D.C. 20036.)

UNIFORM FREIGHT CLASSIFICATION RULES

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

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

**2.3 Order of Precedence.** In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

**3. REQUIREMENTS**

**3.1 Qualification.** The film furnished under this specification shall be a product which is qualified for listing on the applicable Qualified Products List (QPL) at the time set for opening of bids (see 4.3 and 6.3).

**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).

**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.) [.025 millimeters (mm)]. The tolerance shall be  $\pm 20$  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 4.7.2:

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

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- 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 4.7.3 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 metre (g/m<sup>2</sup>) 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 4.7.5.
- **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).

**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. 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 or purchase order, 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 supplies and services conform to prescribed requirements.

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

- a. Qualification inspection (see 4.3).
- b. Quality conformance inspection (see 4.5).
- c. Periodic production inspection (see 4.5).

**4.3 Qualification.**

**4.3.1 Qualification sample.** Unless otherwise specified, a qualification inspection sample shall consist of a roll of film 50 yards (yd) (45.7 m) long and 36 in. (91.4 cm) wide upon which qualifications is desired. The sample shall be forwarded to the Commanding Officer, Naval Ordnance Station, Chemical and Physical Analysis Division (303), Indian Head, Maryland 20640. 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 Qualification Inspection"; Manufacturer's name and address; manufacturer's designation; date of manufacture; and "Submitted by (name) (date) for qualification inspection in accordance with the requirements of MIL-P-82646 under authorization (reference authorizing letter)".

**4.3.2 Qualification inspection.** Qualification inspection shall be as specified in Table I. Failure to meet any requirement shall be cause for rejection of the qualification sample. The contractor shall prepare a report giving the result obtained for all inspections and test performed or a certified statement that the qualification sample meets all the qualification requirements of this specification.

TABLE I. Qualification inspection.

Inspection	Requirement paragraph	Method paragraph
Examination	1.2, 3.3, 3.5, 3.6	4.6
Chemical Compatibility	3.4.1	4.7.2
Solvent Compatibility	3.4.2	4.7.3
Electrical Resistivity	3.4.4	4.7.5
Film Tensile Strength, Breaking Strength, and Elongation	3.4.5	4.7.6

**4.3.3 Qualification retest.** Material rejected by the Government testing agency may be retested for qualification (see 6.3.1).

**4.3.4 Retention of qualification.** Retention of qualification products approved for listing on the QPL shall be maintained by periodic verification to determine compliance of the qualified product with the requirements of this specification. Unless otherwise specified by the activity responsible for the QPL, periodic verification shall be by certification and such certification shall be at intervals of not more than 2 years.

**4.4 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).

**4.4.1 Sampling for quality conformance inspection.**

**4.4.1.1 Lot.** A lot shall consist of 50,000 yd<sup>2</sup> (41,800 m<sup>2</sup>) 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.

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**4.4.1.2 Sampling for examination.** Samples for examination shall be selected in accordance with inspection level II, single sampling, normal inspection of MIL-STD-105. Sufficient material shall be selected at random so that the required sample yardage is obtained.

**4.4.1.3 Sampling for tests.** For the purpose of maintaining continuous inspections, test samples shall be taken from material packed for shipment. The lot (4.4.1.1) 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 yd<sup>2</sup> (5.0 m<sup>2</sup>) shall be assigned a number from one to five in order of manufacture.

**4.5 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.

**4.5.1 Periodic production samples.** Periodic production samples shall be selected from plastic film that has passed the quality conformance inspection of 4.4. The sampling plan shall be as specified by the procuring activity (see 6.2).

**4.6 Examinations.** Sample material shall be visually inspected to verify conformance with this specification. The Acceptable Quality Level (AQL) shall be 2.5 percent defective. 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
Cleanliness	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, gets, or fish eyes
Color	Not uniform
Identification	Marking not as specified. Identification sheet missing.

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

**4.6.2 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.

**4.7 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.

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

**4.7.2 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-406, with the following exceptions:

- a. The test apparatus of Method 403.1 of MIL-STD-286 shall be used.

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- 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 (cm<sup>3</sup>) where:

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

E = cm<sup>3</sup> of gas evolved by the plastic-chemical mixture

F = cm<sup>3</sup> of gas evolved by the plastic alone

G = cm<sup>3</sup> of gas evolved by the chemical alone

**4.7.3 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 4.7.6 to determine compliance with 3.4.2.

**4.7.4 Permeability.** The water vapor permeability shall be measured in accordance with Method 7032B of FED-STD-406 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).

**4.7.5 Electrical resistivity.** The electrical resistivity shall be determined in accordance with the following test procedure using the test equipment shown in Figures 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.

**4.7.6 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)
- c. The crosshead speed shall be 2 inches per minute (5.08 cm/minute)

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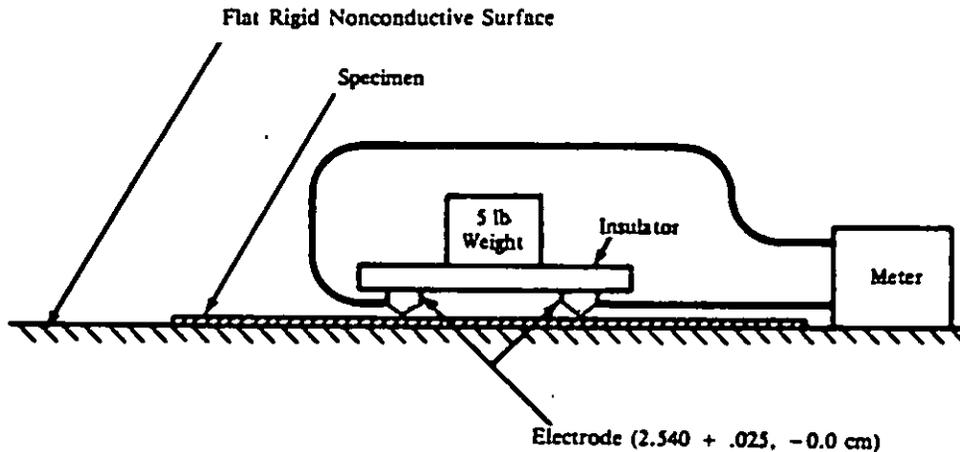


FIGURE 1. Schematic of electrical resistivity measuring arrangement.

## 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 0.64 cm.
3. The electrodes contacting the specimen shall lie in the same plane.
4. The distance between the knives 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.

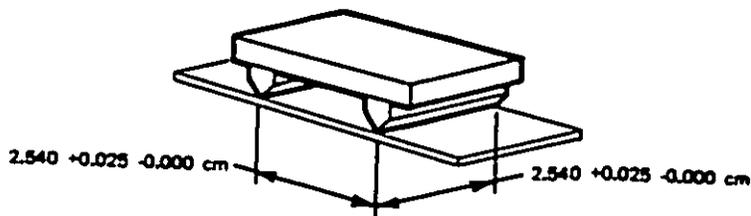


FIGURE 2. Alternate aspect of insulator plate-electrode assembly.

## 5. PACKAGING

**5.1 Packaging.** Unless otherwise specified, the film shall be packaged in accordance with the best commercial practice.

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

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**5.3 Marking.** All individual packages and shipping containers shall 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. NOTES**

- \* **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.

**6.2 Ordering data.**

- \* **6.2.1 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 a test report and/or certificate is required (see 4.4)
  - f. Whether periodic production inspection is required (see 4.5)
  - g. Assigned activity for periodic production inspection (see 4.5)
  - h. Sampling plan for periodic production inspection (see 4.5.1)
  - i. When the water vapor permeability requirement is applicable (see 3.4.3, 4.4, and 4.7.4)
  - j. Levels of packaging and packing required (see 5.1 and 5.2)

- \* **6.2.2 Data requirements.** When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of 27.410-6 of the DoD FAR Supplement are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraphs.

Paragraph no.	Data requirement title	Applicable DID no.	Option
4.4	Test Report	DI-T-3721	-
4.4	Certification Data/Report	UDI-A-23264	-

(Data item descriptions related to this specification, and identified in this section will be approved and listed as such in DoD 5000.19L., Vol.II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

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**6.3 Qualification.** With respect to product requiring qualification, award will be made only for products which are, at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government test for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Sea Systems Command, Department of the Navy, Washington, D.C. 20360; however, information pertaining to qualification of products may be obtained from the Commanding Officer, Naval Ordnance Station, Chemical and Physical Analysis Division (303), Indian Head, Maryland 20640-5000.

**6.3.1** It is to be understood that, upon receipt of the letter of authorization, samples shall be furnished at no cost to the Government and that the manufacturer shall pay the transportation charges to and from the designated point where the tests are to be made. In the case of failure of the sample or samples submitted, consideration will be given to the report of the manufacturer for additional tests only after it has been clearly shown that changes have been made in the product which the Government considers sufficient to warrant additional tests and after a new designation has been given the material by the manufacturer.

- **6.4 Supersession Information.** This document includes the requirements of and supersedes MIL-P-82646(OS), dated 26 March 1976 with Amendment 1 dated 21 June 1977.
- **6.5 Marginal notation.** The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of the document based on the entire content irrespective of the marginal notation and relationship to the last previous issue.

Preparing activity:  
Navy - OS

Project No. 8135-N497

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-P-82646A(OS)		2. DOCUMENT TITLE Plastic Film, Conductive, Heat-Sealable, Flexible	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	

(TO DETACH THIS FORM, CUT ALONG THIS LINE.)