MIL-B-131H
17 February 1987
SUPERSEDING
MIL-B-131G
6 December 1982
MIL-B-81916(AS)
13 February 1973

MILITARY SPECIFICATION

BARRIER MATERIALS, WATERVAPORPROOF, GREASEPROOF, FLEXIBLE, HEAT-SEALABLE

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification establishes the requirements for heat-sealable, greaseproof flexible barrier material having low water vapor transmission characteristics for use in packaging by the military services (see 6.1).

1.2 Classification. Barrier materials shall be of the following types and classes, as specified (see 6.1 and 6.2).

Type I - Non-flame resistant
- Class 1 - Plastic, non-woven backing
- Class 2 - Kraft backing (limited use)
- Class 3 - Scrim (woven fabric) backing

Type II - Flame resistant

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards and handbooks. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Systems Engineering and Standardization Department (Code 93), Naval Air Engineering Center, Lakehurst, NJ 08733, 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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SPECIFICATIONS

Federal

TT-S-735	Standard Test Fluids, Hydrocarbon
PPP-B-585	Boxes, Wood, Wirebound
PPP-B-601	Boxes, Wood, Cleated-Plywood
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	Boxes, Shipping, Fiberboard
PPP-B-640	Boxes, Fiberboard, Corrugated, Triple-Wall
PPP-D-723	Drums, Fiber
PPP-F-320	Fiberboard, Corrugated and Solid, Sheet Stock (Container Grade) and Cut Shapes
PPP-T-60	Tape, Packaging, Waterproof
PPP-T-76	Tape, Packaging, Paper (for Carton Sealing)
PPP-T-97	Tape, Pressure Sensitive Adhesive, Filament Reinforced

Military

MIL-S-4461	Sealing Machines, Heat, Hot Jaw and Continuous
MIL-L-10547	Liners, Case, and Sheet, Overwrap, Watervapor-proof or Waterproof, Flexible

STANDARDS

Federal

FED-STD-101	Test Procedures for Packaging Materials
FED-STD-191	Textile Test Methods
FED-STD-376	Preferred Metric Units for General Use by the Federal Government
FED-STD-595	Colors
FED-STD-751	Stitches, Seams and Stitchings

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STANDARDS (Continued)

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-147	Palletized Unit Loads for 40" x 48" Pallets

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

American Society for Testing and Materials

ASTM D 568-77	Rate of Burning and/or Extent and Time of Burning of Flexible Plastics in a Vertical Position
ASTM D 3951	Standard Practice for Commercial Packaging

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

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. The barrier materials furnished under this specification shall be products which are qualified for listing on the applicable Qualified Products List at the time set for opening of bids (see 4.2 and 6.4).

3.2 Material. Barrier materials shall be made from such materials and by such processes as to insure compliance with this specification.

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3.3 Construction. Barrier materials shall be constructed of one or more plies in any manner which will insure compliance with the performance requirements of this specification and which will be suitable for the purpose intended. Butting of component materials or the finished product is not permitted except in the direction perpendicular to the rolling direction. When a butt weld is made on the finished product or any ply thereof, the areas shall be plainly externally flagged to prevent use of that portion of the roll. Cloth backing splices shall not be counted as splices if the butting is accomplished by use of stitch Type 501, seam Type SSa-1 of FED-STD-751, not less than 1/2 inch in width having eight stitches per inch, using cotton thread of not less than 40/3 count.

3.3.1 Splices. No roll shall contain more than 3 splices (4 pieces) and no piece shall be less than 45 yards in length. Splices within rolls shall be evenly and neatly made, the entire width of the roll material, and shall not come apart during unwinding of the roll. Rolls containing splices shall be flagged at both ends of each splice with colored markers to indicate splices within the roll. Barrier material in flat cut sheets shall contain no splices.

3.4 Form. The barrier material shall be furnished in rolls or flat cut sheets as specified in the contract or delivery order (see 6.2).

3.4.1 Rolls. When rolls are specified, the average length shall be not less than 200 yards. The length of any individual roll shall be not less than 195 yards. Unless otherwise specified, the width of roll material shall be 36 inches, plus 1/4 inch and minus 1/8 inch. The roll material shall be uniformly and smoothly wound on nonreturnable fiber cores with a minimum inside diameter of 3 inches, with a plus tolerance of 1/8 inch. The length of the core shall be equal to the width of the roll material, with a plus tolerance of 1/8 inch. The core shall be of sufficient rigidity to prevent distortion of the roll under normal use and shipment conditions. Each roll shall be suitably restrained to prevent unwinding.

3.4.2 Sheets. When flat cut sheets are specified, the length and width shall be as specified by the acquiring activity. Unless otherwise specified, length and width tolerances for cut sheets shall be plus 1/4 inch and minus 1/8 inch. Flat cut sheets shall be evenly and uniformly stacked.

3.5 Sealing. Barrier materials shall be capable of being heat-sealed under conditions recommended by the manufacturer. These sealing conditions shall be such as are considered reasonable for production line sealing operations with respect to commonly available sealing equipment and commercially practical fabrication time. The material shall exhibit no delamination at the heat-sealed area when sealed under the manufacturer's recommended conditions (see 4.5).

3.6 Identification of material. The material under contract or order shall be marked with specification number, type, class, manufacturer's name, manufacturer's designation, month and year of manufacture and lot number. The letters and figures shall be clear, legible and a minimum of one-eighth of an inch high. The markings shall be made using a water-resistant ink and shall

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appear on the backing surface of the material. The complete markings shall be continuous lengthwise with a maximum of two inches between groups of markings. A complete group of markings shall appear once in each 18 inches of width of the roll. The color of the markings for Type I material shall approximate the lusterless red which conforms to Color No. 31136 of FED-STD-595. The Type II material shall be marked with two groups of markings in block form and in the machine direction. The first group shall contain all the markings specified for the Type I material with the exclusion of material class. The other group shall identify the protective quality of the material as follows: For Type II - FLAME RESISTANT. These letters shall be a minimum of one-half inch high. The two groups of markings shall be printed sequentially, complete and continuous lengthwise with a space of approximately one inch between groups. A complete group of markings shall appear once in each six inches of width of the roll and flat cut. The color of the markings for Type II material shall approximate the lusterless green which conforms to Color No. 34108 of FED-STD-595. Each roll or package (flat cuts) of barrier material shall include a tag secured to the core of rolls or sheet inserted in the package of sheets with the sealing conditions as furnished by the manufacturer to be used as a guide by users for satisfactory heat-sealing on Rotary, Band and Jaw type sealing equipment. The tag or sheet shall be visible upon opening the unit package.

3.7 Physical properties. The physical properties of the barrier materials shall conform to the requirements specified in Table I, when tested as described in 4.6.

3.8 Toxicity. The Type II material shall have no adverse effect on the health of personnel when used for its intended purpose.

3.9 Workmanship. Barrier material shall be manufactured in a manner to provide uniform construction, free from holes, tears, cuts, sharp creases, wrinkles or other imperfections which might impair its usefulness for the purpose intended. This requirement shall not be construed to mean that if light can be seen through the material that it is not usable. A check to determine whether holes (liquid leakers) extend through the material can be accomplished by exposing the suspect area to a water-dye solution and examining for penetration through the material. The barrier material shall be trimmed of any selvage and the finished product shall conform to the levels of quality established herein.

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.

4.1.1 Responsibility for compliance. All items must meet all requirements of Sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality

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TABLE I. Physical properties.

Property	Type I		Type II	Paragraph Reference
	Class 1 and 3	Class 2		
Seam Strength				4.6.2
As Received Material sealed and tested:				
At room temperature (Separation-Inches)	None	None	None	
At 100°F and at 160°F (Separation-Inches)	1/4 (Max)	1/4 (Max)	1/4 (Max)	
Sealed before aging at 160°F for 12 days and tested:				
At room temperature (Separation-Inches)	None	None	None	
At 100°F and at 160°F (Separation-Inches)	1/4 (Max)	1/4 (Max)	1/4 (Max)	
Sealed after aging at 160°F for 12 days and tested:				
At room temperature (Separation-Inches)	None	None	None	
At 100°F and at 160°F (Separation-Inches)	1/4 (Max)	1/4 (Max)	1/4 (Max)	
Seam Fabrication	No leakage at double seam junction	Not required	No leakage at double seam junction	4.6.3
Water Vapor Transmission Rate (WVTR) after room temperature flexing:				
As received (Gms/100 sq. in./24 hrs.)	0.02 (Max)	0.02 (Max)	0.02 (Max)	
Aged (Gms/100 sq. in./24 hrs.)	0.02 (Max)	0.02 (Max)	0.02 (Max)	
WVTR after low temperature flexing:				
As received (Gms/100 sq. in./24 hrs.)	0.03 (Max)	Not required	0.02 (Max)	
Breaking Strength (Grab Method)				
As received (weakest direction)(lbs./inch)	50 (Min)	25 (Min)	50 (Min)	4.6.1
After aging (weakest direction)(lbs./inch)	50 (Min)	25 (Min)	50 (Min)	
Puncture Resistance:	Class 1 15 lbs (Min) Class 3 10 lbs (Min)	6 lbs (Min)	10 lbs (Min)	4.6.1
Flame Resistance	No requirement	No requirement	Non-burning or when specimen ignites is self-extinguishing in 2 seconds (max)	4.6.1
Aging Resistance	No delamination as defined in paragraph 4.6.4.1			4.6.4
Blocking Resistance	No blocking, delamination or rupture			4.6.1
Resistance to Curl	Shall not curl in excess of 5% or curl back upon itself			4.6.1
Contact Corrosivity	No corrosion			4.6.1
Oil Resistance	No leakage, swelling, delamination or embrittlement			4.6.1
Water Resistance	No delamination			4.6.1
Water Resistance of Marking	Markings on back of sheet shall be clear and legible			4.6.1

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program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

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

a. Qualification inspection (see 4.2). The qualification inspection tests of the barrier material shall consist of all the tests of this specification.

b. Quality conformance inspection (see 4.3). The quality conformance inspection tests shall consist of tests listed in Table II and the examinations described in 4.3.4.

TABLE II. Quality conformance tests.

Property	Property Reference
Seam Strength (room temperature only)	
As received	4.6.2.2
Aged before sealing	4.6.2.4
Seam Fabrication (excluding Type I, Class 2)	4.6.3
Water Vapor Transmission Rate (as received only)	4.6.1
Breaking Strength (as received only)	4.6.1
Puncture Resistance	4.6.1
Blocking Resistance	4.6.1
Resistance to Curl	4.6.1
Oil Resistance	4.6.1
Water Resistance of Marking	4.6.1
Flame Resistance (Type II only)	4.6.1

4.2 Qualification inspection.

4.2.1 Qualification sample. Qualification test samples shall consist of a roll of barrier material approximately 50 yards long and 36 inches wide. Samples shall be accompanied by a certified test report showing results of manufacturer's tests, and a brief description of the components or raw materials used in the manufacture of the barrier material. Information shall

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be furnished, including plant address(es), of the plant(s) in which the barrier material is, or will be, manufactured. If more than one address is listed, a certificate of equivalence of other plants to the plant in which the sample was manufactured must be furnished. The samples shall be forwarded to the Naval Air Development Center, Warminster, PA 18974, Attention: Aircraft and Crew Systems Technology Directorate (Code 60613). Samples shall be plainly identified by securely attached durable tags marked with the following information:

Sample for Qualification Inspection

BARRIER MATERIAL, WATERVAPORPROOF, GREASEPROOF,
FLEXIBLE, HEAT-SEALABLE
Manufacturer's Name
Manufacturer's Code No.
Type _____
Class _____
Date of manufacture (month and year)
Submitted by (name) (date) for qualification
inspection in accordance with requirements
of MIL-B-131H under authorization (reference
authorizing letter)

4.2.2 Retention of qualification. The retention of qualification of products approved for listing on the Qualified Products List (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 Qualified Products List, periodic verification shall be by certification and such certification shall be at intervals of not more than two years.

4.2.3 Retest. Material rejected by the Government testing agency according to the requirements of this specification shall not be retested for qualification at the request of the manufacturer unless evidence is furnished that changes have been made in the material or sealing process to correct the defect.

4.3 Quality conformance inspection. The contractor shall furnish all samples. Unless otherwise specified, the contractor shall be responsible for accomplishing the required tests listed in Table II. Check tests may be performed at the discretion of the inspection activity at a Government laboratory for information and correlation purposes. Quality conformance testing will be performed at a designated laboratory when results of check tests so warrant. The contractor shall furnish test reports showing quantitative results for all quality conformance tests required by this specification for each lot of material. Any function specified herein for accomplishment by the Government will be interpreted to mean function to be accomplished either by or under the supervision of the Government.

4.3.1 Sampling for quality conformance inspection. Sampling for inspection shall be performed in accordance with the provisions set forth in MIL-STD-105, except where otherwise indicated.

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4.3.2 Quality conformance inspection lot. For purposes of sampling, an inspection lot for examinations and tests shall consist of all material of the same class made by the same process from the same components by one manufacturer and submitted for delivery at one time.

4.3.3 Inspection of the end item.

4.3.3.1 Examination of the end item. Examination of the end item shall be in accordance with the classification of defects at the inspection levels and acceptable quality levels (AQLs) set forth below. For purpose of determining the sample size in accordance with MIL-STD-105, the lot size shall be expressed in units of rolls or packages of sheets, as applicable, for examinations under 4.3.3.1.1 through 4.3.3.1.4 inclusive, and in units of shipping containers for examination under 4.3.3.1.5.

4.3.3.1.1 Examination of the end item for defects in appearance, construction and workmanship. For examination of defects within rolls, the sample unit of product shall be two yards full width of roll. For examination of sheets, the sample unit shall be two sheets randomly selected from a package. No more than five sample units, randomly selected, shall be drawn from any one roll or package of sheets, as applicable. Both sides of the material shall be examined. Defects of each type shall be scored only once for each occurrence within each linear yard for rolls and once per sheet.

Examine	Defect
Form	Not roll or flat cut, as specified. Incorrect type or class of material.
Appearance	Surfaces not clean; presence of any foreign matter, dirt, sand, grit or oil spots. (Note: Defects do not apply to outer convolution of roll.)
Workmanship	Blister, crack, cut, hole, tear, sharp crease or wrinkle, chafed spot of scuff mark. (Note: Defects to not apply to outer convolution of roll.) Evidence of delamination or embrittlement. Edges not clean cut; ragged, crushed or uneven edges.
Construction	Not uniform; layer or section missing, any selvage.
Identification markings	Illegible, incorrect, incomplete or omitted. Do not appear on backing surface of material; not continuous lengthwise. Do not appear once in each 18 inches of width of roll (Type I). Do not conform to height specified in paragraph 3.6; color not lusterless red (Type I) or lusterless green (Type II), as specified. Not in machine direction (Type II).

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Examine	Defect
	Parallel rows over 6 inches apart (Type II).
	Longitudinal spacing between groups of markings greater than 1 inch (Type II).

4.3.3.1.2 Examination of the end item for defects in general construction. The sample unit for this examination shall be one roll or one package of sheets, as applicable.

Examine	Defect
Assembly of sheets	Not evenly and uniformly stacked; sheet containing manufacturer's instructions for sealing conditions of material not visible upon opening package.
	Adjacent sheets stick together to the extent that separation causes tearing or injury to any surface.
	Splice within sheet.
Assembly of roll	Not suitably restrained to prevent unwinding.
	Material not wound uniformly and smoothly on roll causing soft or uneven edges, or telescoping of roll.
	Material not wound on a substantial rigid fiber core; core broken, collapsed, crushed or mutilated.
Unwinding of roll (check both sides)	When unwound, material sticks together to the extent that unrolling causes tearing or injury to any surface.
	Material wound unevenly causing wrinkles, sharp creases or folds within roll.
	Roll not continuous; more than 3 splices (4 pieces) in roll or more than 1 splice in any 50 consecutive yards.
	Splice(s) not evenly and neatly made; does not cover entire width of material; comes apart during unwinding of roll.
	Manufacturer's instructions for sealing conditions of the material not securely attached to core of roll.

4.3.3.1.3 Examination of the end item for dimensional defects. The sample unit for this examination shall be one roll or one package of sheets, as applicable.

Examine	Defect
Sheets	Length or width varies by more than minus 1/8 inch or plus 1/4 inch from dimensions specified.

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Examine	Defect
Rolls:	
Width	Varies by more than minus 1/8 inch or plus 1/4 inch from width specified.
Core	Length less than width of roll material, or greater by more than plus 1/8 inch.
	Inside diameter less than 3 inches or greater than 3-1/8 inches.
Identification markings	Lettering less than 1/8 inch in height.
	More than 2 inches distance between lengthwise group of markings (Type I).

4.3.3.1.4 Examination of the end item for length per roll or count per package. The sample unit for this examination shall be one roll or one package of sheets, as applicable.

Examine	Defect
Rolls	Average length per roll less than specified.
	Length of any individual roll less than 195 yards.
Sheets	Average count of sheets per unit package less than specified or indicated quantity.

4.3.3.1.5 Examination of packaging. An examination shall be made to determine that packaging complies with the requirements of Section 5 of this specification. The sample unit 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.

Examine	Defect
Preservation (as applicable)	Not level specified; not in accordance with contract requirements.
	Flat sheets not unit packaged and wrapped as specified; fiberboard pad(s) omitted from top or bottom of stack, or not of size sufficient to protect sheets; strapping or ties not applied in manner specified.
	Material not as specified; closures not accomplished by specified or required methods or materials.
Packing (as applicable)	Not level specified; not in accordance with contract requirements.
	Rolls not packed in fiber drums, as specified.
	Arrangement or number of rolls or unit packages of sheets per container not in accordance with requirements.
	Container material not as specified; closures not accomplished by specified or required methods or materials.

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Examine	Defect
Markings	Interior or exterior markings (as applicable) illegible, incorrect, omitted or not in accordance with requirements. Precautionary markings omitted or not as specified (see 5.3).
Weight	Weight exceeds requirements of container specification.

4.3.3.1.6 Inspection levels and acceptable quality levels (AQLs) for examination. The inspection levels for determining the sample size, and the acceptable quality levels (AQLs) expressed in defects per 100 units, shall be as follows:

Examination paragraph 1/	Inspection level	AQLs
4.3.3.1.1	I	6.5
4.3.3.1.2	S-4	10
4.3.3.1.3	S-4	10
4.3.3.1.4 2/	S-4	10
4.3.3.1.5	S-4	10

1/ The same rolls, sheets or packages of sheets (as applicable) of the specified class of material shall be used for examination under 4.3.3.1.1 through 4.3.3.1.4 inclusive. The yardage or sheets used for examinations under 4.3.3.1.1 and the rolls, sheets or packages of sheets used for examinations under 4.3.3.1.3 and 4.3.3.1.4, shall be within the rolls or packages of sheets randomly selected under 4.3.3.1.2.

2/ For average length, acceptance number zero.

4.3.4 Quality conformance testing. Quality conformance testing of the end item shall be performed for the applicable characteristics specified in Table II for each lot presented for examination for each type and class of material. For purposes of sampling, a lot shall consist of all rolls or packages offered for inspection at one time. The sample unit for testing rolls shall be one piece, full width of roll and of sufficient length to provide 3 square yards of material. For cut sheets the sample unit shall be 3 square yards randomly selected throughout the lot. No more than one sample unit shall be drawn from any one roll or package. The sample size shall be as indicated in the table below. Test results shall include the individual values utilized in expressing the final results. The lot shall be unacceptable if one or more sample units fail to meet any requirement specified.

Lot size (rolls or packages)	Sample size	Accept	Reject
0-50	2	0	1
51-500	3	0	1
501-35,000	5	0	1
35,001 and over	8	0	1

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4.4 Test conditions. In general, the physical tests contained in this specification shall be made under the controlled atmospheric conditions stated below. Waiver of this requirement may be permitted where proper conditioning facilities are not available for control testing. However, for referee purposes, the specified tests shall be made upon the material in the specified atmospheric condition. For the purposes of this specification, material in specified atmospheric condition is defined as material which is in moisture equilibrium with an atmosphere having a relative humidity of 50 ± 5 percent and a temperature ranging from 70 to 76°F. Material shall be considered in equilibrium after exposure to the above conditions for a minimum of 24 hours.

4.5 Sealing instructions for qualification and quality conformance testing.

a. All seals for test purposes shall be a minimum of 1/2 inch wide and shall be effected on a jaw-type heat-sealer conforming to MIL-S-4461, Type I Class B, or Type II Class A Styles 1, 2, 3 or 4 utilizing the sealing conditions recommended by the manufacturer. The upper sealing conditions reasonable for production line sealing operations with respect to commonly available sealing equipment and commercially practical fabrication time are a temperature setting of 525°F, a 3 second dwell time and a pressure of 60 pounds per square inch (see 6.3).

b. In the securing of the three 1 inch seam strength specimens from their respective samples (see 4.6.2.2.1) care should be taken that the specimens are not removed:

(1) From points in the sealed sample where seal overlapping has occurred.

(2) From points in the sealed sample which were within 1 inch of either end of the sealer jaw during the sealing operation.

4.6 Test methods.

4.6.1 The tests indicated below shall be conducted in accordance with the identified methods of FED-STD-101 (unless otherwise specified).

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Tests	FED-STD-101 Method No.	Special Requirements or Exceptions Notes
Water Vapor Transmission Rate (room temperature)		
Flexing procedure (as received and aged)	2017	1/
Transmission Rate Procedure	3030 Procedure A(1)	
Water Vapor Transmission Rate (low temperature) (excluding Type I, Class 2)		
Flexing procedure (as received only)	2017	2/
Transmission Rate Procedure	3030 Procedure A(1)	
Breaking Strength (Grab Method)	See Note 3/	3/
Puncture Resistance	2065	4/
Resistance to Blocking	3003 Procedure D	
Resistance to Curl	2015	5/
Contact Corrosivity	3005	6/
Oil Resistance	3015	7/
Water Resistance	3028 Procedure F	8/
Water Resistance of Marking	3027	9/

Tests	ASTM Designation	Special Requirements or Exceptions Notes
Flame Resistance	D568-77	10/

NOTES

1/ Full stroke shall be used for flexing all materials except Type I, Class 2. Short stroke (3-1/4 inches) shall be used for Class 2 materials only. As received and aged specimens for Type II shall be flexed in accordance with Method 2017 prior to conducting the WVTR test.

2/ Conduct tests as in Method 2017 except that only as received specimens shall be tested. Prior to flexing, test specimens shall be conditioned for at least 30 minutes at -20° ± 2°F and the flexing operation shall be conducted at -20° ± 2°F.

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3/ Test method is from FED-STD-191 (Method 5100). Tests shall be conducted and the average breaking strength reported on five specimens in the machine and on five specimens in the cross direction on both unaged and aged specimens. Aged material shall be material which has been exposed to an atmosphere of 80 to 85 percent R.H. and 160 + 2°F for 72 consecutive hours. Aging shall be accomplished on a large sheet of material. Individual test specimens shall then be cut from the aged sheet.

4/ Test shall be run on five specimens. Material under test shall have heat sealable face in contact with the probe. The average value for the five specimens tested shall meet the requirement as listed in Table I.

5/ Three specimens shall be tested. Test shall be conducted at 73° ± 3.5°F and 50 ± 5 percent R.H. only. Specimens shall not be suspended, but shall be placed on a horizontal surface.

6/ If corrosion is evident in the blank area the test shall be repeated with a new test panel. Corrosion in the intermediate area, shall not invalidate the test nor be cause for rejection. The barrier material shall be evaluated individually and results reported on each material in triplicate.

7/ Both oil conforming to TT-S-735, Type VI and a di-2-ethylhexyl sebacate synthetic oil (Plexol 201) shall be used. Type II materials shall be tested using only oil conforming to TT-S-735, Type VI.

8/ Use distilled water. Delamination shall be defined as ply separation at any one given point extending more than 1/2 inch from the edge, with an edge length separation greater than one inch.

9/ Three specimens shall be tested, each one containing a complete set of markings.

10/ Clamp the specimen, without gauge marks, vertically on a "U" shaped holder (see 6.6) so that the specimen is held rigid on three sides with the bottom end exposed to flame. Five specimens shall be tested and results shall be reported numerically to the nearest 0.2 second.

4.6.2 Seam strength.

4.6.2.1 Seam strength sampling. Six by twelve inch samples for this test shall be selected from the test material as shown in Figure 1.

4.6.2.2 Seam strength (as received).

4.6.2.2.1 Preparation of test specimen. The six sections for this test shall be folded in half with the crease parallel to the long axis. The open or unfolded length shall be heat-sealed. The heat-seal areas shall be defined by a line drawn on the back of the specimen while the specimen is in the sealer. The line shall be drawn along the sealer jaw with a sharp No. 2B graphite pencil. The folded length shall be cut to a depth of 1/2 inch. From

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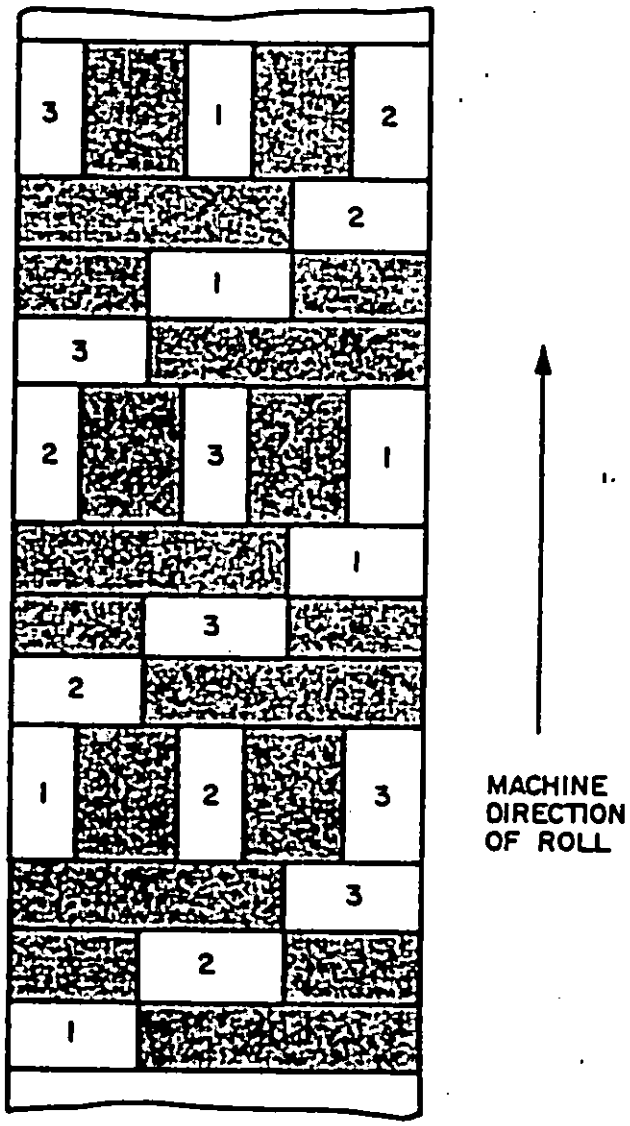

KEY

1 - 6 inch by 12 inch sample for "As Received" testing
2 - 6 inch by 12 inch sample for "Sealed before Aging" testing
3 - 6 inch by 12 inch sample for "Sealed after Aging" testing

FIGURE 1. Sampling method for seam strength test.

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each of the six sections, three adjacent 1 inch wide specimens shall be cut perpendicular to the seam (see 4.5). One of the specimens from each section shall be used for test at room temperature, one from each section for test at 100°F, and the remaining one from each section for test at 160°F. After heat sealing and prior to the application of the specified weights, the specimens in all cases shall be exposed for one hour to the atmospheric conditions specified in 4.4.

4.6.2.2.2 Test at room temperature. The six 1 inch wide specimens selected for this test (see 4.6.2.2.1) shall be opened and one end of each specimen shall be clamped so that the other end of the specimen hangs freely. A 3-1/2 pound weight shall then be gently attached to the free end of the specimen so as not to impact load the seal. The weight shall be allowed to act for 5 minutes, whereupon the weight shall be removed and the specimen examined for separation of the heat-seal faces. Any evidence of delamination of one ply away from the other in the heat-seal area shall be cause for rejection. The evaluation shall be limited to heat-seal area defined in 4.6.2.2.1.

4.6.2.2.3 Test at 100°F. The six 1 inch wide specimens selected for this test (see 4.6.2.2.1) shall be tested as for room temperature except that specimens shall be clamped in a forced draft circulating air oven maintained at 100 ± 2°F with a weight of 2 pounds acting on the free end of the specimen for 1 hour. The rate of air circulation shall be held to the minimum required to maintain uniform temperature throughout the oven. In no case shall the rate of air circulation be such as to cause any movement of the weighted specimens. The weights shall be attached after the specimens and test clamp fixtures have been placed in the oven and shall be removed prior to taking the specimen from the oven in order to avoid excessive loading due to swaying action. After one hour the weight shall be removed and the specimen examined for separation of the heat faces. Any evidence of delamination of one ply away from the other in the heat-seal area defined in 4.6.2.2.1 shall be cause for rejection.

4.6.2.2.4 Test at 160°F. The six 1 inch wide specimens selected for this test (see 4.6.2.2.1) shall be tested as for those at 100°F except that the weight shall be 10 ounces, and the temperature in the forced draft circulating air oven shall be 160 ± 2°F. The rate of air circulation shall be held to the minimum required to maintain uniform temperature throughout the oven. In no case shall the rate of air circulation be such as to cause any movement of the weighted specimens.

4.6.2.3 Seam strength (sealed before aging).

4.6.2.3.1 Test specimens. The section for this test shall be folded in half with the crease parallel to the long axis. The open or unfolded length shall be heat-sealed by clamping in the sealer and simultaneously drawing a sharp penciled line on the backing along the edge of the sealer jaw. This line will define the actual seam separation. The folded length of the test section shall then be cut off 1/2 inch from end. After heat-sealing, the samples shall be aged in a circulating air oven maintained at 160 ± 2°F for 12 consecutive days (288 hours). After aging, 1 inch wide specimens, as described in 4.6.2.2.1, shall be cut from the sections for test at room temperature, 100°F, and 160°F.

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4.6.2.3.2 Test at room temperature. The six 1 inch specimens selected for this test (see 4.6.2.3.1) shall be tested as specified in 4.6.2.2.2.

4.6.2.3.3 Test at 100°F. The six 1 inch wide specimens selected for this test (see 4.6.2.3.1) shall be tested as specified in 4.6.2.2.3.

4.6.2.3.4 Test at 160°F. The six 1 inch wide specimens selected for this test (see 4.6.2.3.1) shall be tested as specified in 4.6.2.2.4.

4.6.2.4 Seam strength (sealed after aging).

4.6.2.4.1 Test specimens. The sections for this test, in the flat unsealed condition as taken from the sample roll shall be aged in a circulating air oven maintained at 160 ± 2°F for 12 consecutive days (288 hours). After removal from the oven the unsealed sections shall be allowed to come to room temperature. Test specimens shall then be obtained as described in 4.6.2.2.1.

4.6.2.4.2 Test at room temperature. The six 1 inch wide specimens selected for this test (see 4.6.2.4.1) shall be tested as specified in 4.6.2.2.2.

4.6.2.4.3 Test at 100°F. The six 1 inch wide specimens selected for this test (see 4.6.2.4.1) shall be tested as specified in 4.6.2.2.3.

4.6.2.4.4 Test at 160°F. The six inch specimens selected for this test (see 4.6.2.4.1) shall be tested as specified in 4.6.2.2.4.

4.6.3 Seam fabrication (excluding Type I, Class 2).

4.6.3.1 Preparation of test specimens. Four pouches sealed in accordance with the manufacturer's recommended sealing conditions shall be fabricated from the barrier material. Each pouch shall be prepared by cutting four specimens, two 2-1/2 by 5-1/2 inches and two 5-1/2 inches by 5-1/2 inches. The pouch shall be fabricated by sealing in conformance with Figure 2. The butt seals projecting at 1/2 inch seams perpendicular to the faces shall be made prior to sealing the bottom. The butt seams shall be folded flat at the point of juncture with the bottom seams before the bottom seals are made.

4.6.3.2 Procedure. A water solution containing 1 percent Aerosol O.T. (Dioctyl Sodium Sulfosuccinate) or equivalent and sufficient dye to produce a distinct color shall be poured into each sealed pouch to a level of two inches above the top of the bottom seam. The pouch shall then be suspended vertically. After a period of 15 minutes at room temperature the pouches shall be examined for dye leakage at all seams and especially at the double seam junctions, i.e., the points where the vertical seams intersect the bottom seam at points other than at the corners of the pouch.

4.6.4 Aging resistance. Three specimens, 36 by 6 inches, but from across the roll of material, at points at least 1 yard apart shall be used for this test.

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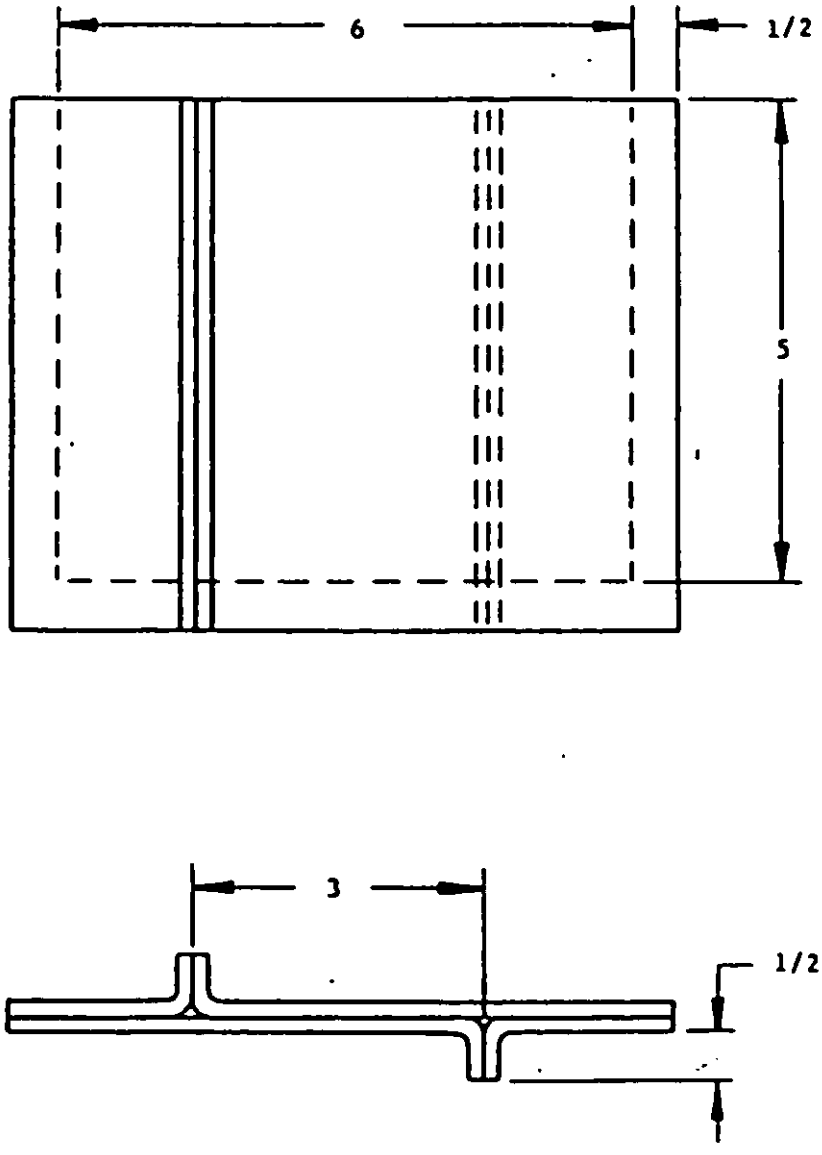

DIMENSIONS IN INCHES

FIGURE 2. Pouch for seam fabrication test.

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4.6.4.1 Procedure. The specimens shall be subjected to the following aging cycle:

8 hours in a humidity chamber of 100 ± 2°F and 90 to 95 percent relative humidity.

16 hours in a circulating air oven at 160 ± 2°F.

The aging cycle shall be repeated on every weekday, Monday through Friday. The specimens shall remain in the circulating air oven maintained at the conditions described above on Saturday, Sunday and holidays, except that holidays shall not exceed a total of two days over the entire aging period. The aging procedure shall continue for fourteen consecutive days. The specimens shall be folded loosely, hung, rolled loosely or laid flat in the test chamber during the aging period. At the conclusion of the aging period the specimens shall be returned to room temperature and examined, particularly at all edges, for delamination brought about by the aging exposure. No supplemental attempt to delaminate the material, such as prying or picking at the plies, shall be carried out. For purposes of this test, delamination shall be defined as ply separation at any one given point extending in more than 1/2 inch from the edge with an edge length separation greater than 1 inch.

5. PACKAGING

5.1 Preservation. The levels of preservation shall be level A or commercial, as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Rolls. Each roll, wound on a core as required in Section 3, requires no additional preservation.

5.1.1.2 Flat cuts. Bundles of flat cuts shall be placed in fiberboard boxes conforming to PPP-B-636, weather resistant class. In lieu of closure and waterproofing requirements in the Appendix of PPP-B-636, closure and waterproofing of weather resistant boxes shall be accomplished by sealing all seams, corners and manufacturer's joint with waterproof tape, 2 inches minimum width, conforming to PPP-T-60, Class 1 or PPP-T-76. Banding (reinforcement requirements) shall be applied in accordance with the Appendix to PPP-B-636, using nonmetallic or tape banding only.

5.1.1.3 Alternate method for flat cuts. When specified (6.2) flat cuts of material shall be packaged in bundles having a maximum weight of 50 pounds and shall be sandwiched between two fiberboard pads conforming to PPP-F-320, weather resistant class. Bundles shall be tied or otherwise secured with flat steel bands, plastic strapping, fiber-twine, or rope, two in each direction, of such strength to assure safe arrival of the bundle. The fiberboard pads shall be of a size commensurate with the size of the flat cuts so as to prevent damage to the barrier material during the bundling operation, particularly on the edges.

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5.1.2 Commercial. Rolls and flat cuts shall be preserved in accordance with ASTM D 3951. Unit pack weight limits may be exceeded when the rolls exceed the specified weight limit.

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

5.2.1 Level A.

5.2.1.1 Rolls. Each roll of material, packaged as specified in 5.1 shall be packed in a fiber drum conforming to PPP-D-723, Type III, Grade D. Drum closure shall be sealed with three-inch wide waterproof pressure sensitive tape conforming to PPP-T-60 or PPP-T-76. Unless otherwise specified, all drums shall be overpacked in wirebound wood, cleated plywood, or nailed wood boxes conforming to PPP-B-585, Class 3; PPP-B-601, Overseas Type with Type II Class 2 plywood; or PPP-B-621, Class 2, respectively (see 6.2).

5.2.1.2 Flat cuts. Flat cuts preserved in weather resistant fiberboard boxes (5.1.1.2) or bundled (5.1.1.3), shall be packed directly in wirebound wood, cleated plywood, or nailed wood boxes conforming to PPP-B-585, Class 3; PPP-B-601, Overseas Type with Type II, Class 2 plywood or PPP-B-621, Class 2. When wirebound wood, cleated plywood, or nailed wood boxes are used for sandwiched bundles, they shall be lined with a waterproof case liner conforming to MIL-L-10547 and sealed in accordance with the appendix thereto.

5.2.1.3 Unit loads. When specified, fiber drums and boxes shall be palletized in accordance with MIL-STD-147, Type XIII and Type I, respectively.

5.2.2 Level B.

5.2.2.1 Rolls. Each roll of material shall be packed as specified for level A in 5.2.1.1, except that drums shall conform to PPP-D-723, Type II, Grade D; closure shall be sealed with three-inch wide reinforced tape conforming to PPP-T-97 or equivalent, and shipping containers shall conform to PPP-B-585; Class 2; PPP-B-601, Domestic Type with Type III, Class I plywood; or PPP-B-621, Class 2.

5.2.2.2 Flat cuts. Bundles of flat cuts, preserved in weather resistant fiberboard boxes, will require no further packing.

5.2.2.2.1 Alternate method for flat cuts. When specified, bundles of flat cuts shall be packed as specified for level A in 5.2.1.2, except that shipping containers shall conform to PPP-B-585, Class 2; PPP-B-601, Overseas Type with Type III, Class I plywood; PPP-B-621, Class 2; PPP-B-636, Grade V3C; or PPP-B-640, Class 2, Style E.

5.2.2.3 Unit loads. When specified, fiber drums and boxes shall be palletized in accordance with MIL-STD-147, Type XIII and Type I, respectively.

5.2.3 Commercial. Rolls and flat cuts shall be packed in accordance with ASTM D 3951. Unit pack weight limits may be exceeded when rolls exceed the specified weight limit.

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5.3 Marking. All individual packages and shipping containers shall be marked for shipment in accordance with MIL-STD-129 and as follows:

Stock No.
BARRIER MATERIAL, WATERVAPORPROOF, GREASEPROOF, FLEXIBLE, HEAT-SEALABLE
Specification MIL-B-131H
Type _____
Class _____
Size - Nominal net lineal yardage of roll or dimensions of flat cuts (Net lineal yardage is the number of yards of usable material in the roll)
Contract or order number
Name and address of manufacturer
Month and year of manufacture
Lot number

5.3.1 Precautionary marking. The following marking shall appear on at least one side and, wherever practicable, on two sides of each drum or box in letters not less than 3/4 inch in height:

"Keep Cool and Dry"

6. NOTES

6.1 Intended use.

6.1.1 Use. The material covered by this specification is intended for use in general packaging of military parts and equipment for storage and shipment where the use of a watervaporproof, greaseproof, heat-sealable, flexible barrier is required.

6.1.2 Type I. Non-flame resistant.

6.1.2.1 Class 1. Class 1 material with plastic non-woven backing is intended to be used in all packaging applications where heat-sealable, flexible, watervaporproof, greaseproof, barrier materials are required.

6.1.2.2 Class 2. Class 2 material with kraft backing is suitable for use for packages where the combined weight inside the barrier does not exceed 10 pounds. For all practical purposes, Class 2 material should be limited to use in bags whose inside length plus width does not exceed 42 inches. Class 2 materials should not be used in floating bag applications, in packaging operations under low temperature conditions (below 32°F) where fabrication or manipulation of the material is required, or where a double seam junction is fabricated. To prevent cracking and pin holing, packages fabricated from this material should not be handled at temperatures below 32°F.

6.1.2.3 Class 3. Class 3 material is intended for use similar to Class 1 material except that a scrim (woven fabric) backing is required.

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6.1.3 Type II. Flame resistant.

6.1.3.1 Type II material is intended for use in general packaging of military parts and equipment for storage and shipment where the use of a watervaporproof, heat-sealable, flame resistant, flexible barrier is required. Flame resistant barrier materials are intended to reduce the risks and hazards of fire aboard Navy ships and to improve fleet readiness by reducing losses due to fire destruction in compliance with the Navy Passive Fire Protection Program.

6.2 Ordering data. Requests, requisitions, schedules, and contracts or orders should specify the following:

a. Title, number and date of this specification.

b. Class of barrier material (see 1.2).

c. Quantity.

d. Form (rolls or flat cut) and size required (see 3.4).

e. Levels of preservation and packing required (see 5.1 and 5.2).

f. Alternate method of packaging for flat cuts if desired (see 5.1.1.3).

g. Overpacking of rolls, if desired (5.2.1.1).

h. Palletization, if desired (5.2.1.3 and 5.2.2.3).

6.3 Heat-seal equipment. In the interest of standardization and for ease of manipulation, all seals for test under this specification should be effected on a jaw-type heat-sealer. This, however, should not be construed as an indication of Governmental preference in regard to sealing equipment.

6.3.1 It is not intended that the operating temperature of heat-sealing equipment be limited to 525°F or less. While equipment may be operated at temperatures exceeding 525°F to accomplish a satisfactory seal, the barrier material must also be capable of being heat-sealed at temperatures of 525°F or less.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in the Qualified Products List 131 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Air Systems Command, Department of the Navy, Washington, DC 20360; however, information pertaining to qualification of products may be obtained from the Naval Air Development Center, Warminster, PA 18974, marked Attention: Aircraft and Crew Systems Technology Directorate (Code 60613).

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6.4.1 It is understood, after receipt of the letter of authorization, that samples shall be furnished at no cost to the Government, and that the manufacturer will pay all transportation charges to and from the point where the tests are made. In case of failure of the sample or samples submitted, consideration will be given to the request 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.. The cost of retests will be borne by the manufacturer.

6.4.2 It is to be understood that barrier material supplied under contract shall be identical in every respect to the samples tested and found satisfactory. Any unapproved changes from the qualification sample shall constitute cause for rejection of material submitted and for removal from the list of qualified products. However, it is to be noted that acceptability under this specification is based primarily on the performance characteristics of the barrier material, and since there is no color requirement, it is not mandatory that the color of the visible surfaces of the material supplied under contract be the same as the samples tested and accepted by the qualifying activity..

6.5 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

6.6 The "U" shaped specimen holder (see 4.6.1, Note 10), shall be similar to the specimen holder described in Method 5903.1 of Federal Test Method Standard 191, Figure 5903C except that the inside dimension of the specimen holder shall be 3/4 inch.

6.7 Metric conversion factors. The following conversion factors are referenced in FED-STD-376.

6.7.1 Temperature. To convert Fahrenheit (°F) to Celsius (°C) use the following formula:

$$\text{Temperature °C} = \frac{(\text{Temperature °F} - 32)}{1.8}$$

6.7.2 Pressure. To convert pounds per square inch (lb/in^2) to kilopascals (kPa), multiply by 6.895.

6.7.3 Weight.

a. To convert ounces (oz) to kilograms (kgs), multiply by 0.02834.

b. To convert pounds (lbs) to kilograms (kgs), multiply by 0.4536.

6.7.4 Length.

a. To convert inches (in.) to millimeters (mm), multiply by 25.4.

b. To convert yards (yd) to meters (m), multiply by 0.9144.

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6.7.5 Area. To convert inches squared (in^2) to millimeters squared (mm^2) multiply by 645.16.

6.8 Subject term (key word) listing.

Barrier Material
Flame Resistant
Flexible
Greaseproof
Heat-Sealable
Waterproof
Watervaporproof

Custodians:
Army - GL
Navy - AS
Air Force - 69

Review activities:
Navy - SH, SA, YD, OS
Army - AT, EA, CR, MI, ME
Air Force - 84, 99
DLA - ES

User activities:
Army - SM
Navy - MC
DLA - SS

Preparing activity:
Navy - AS
(Project No. 8135-0596)

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

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER: MIL-B-131H

2. DOCUMENT TITLE: BARRIER MATERIALS, WATERVAPORPROOF, GREASEPROOF, FLEXIBLE, HEAT-SEALABLE

3a. NAME OF SUBMITTING ORGANIZATION

b. ADDRESS *(Street, City, State, ZIP Code)*

4. TYPE OF ORGANIZATION *(Mark one)*

- ☐ VENDOR
- ☐ USER
- ☐ MANUFACTURER
- ☐ 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)*

DD FORM 82 MAR 1426 PREVIOUS EDITION IS OBSOLETE.

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