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SUPERSEDING
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FEDERAL SPECIFICATION

PLASTIC SHEET: TRACING, GLAZED AND MATTE FINISH

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers plastic material in sheet or roll form with a glazed or matte finish of such a quality to make it acceptable for use in tracing of drawings, the rendering of original drawings, as overlay sheets, and for other similar purposes requiring strength and durability.

1.2 Classification.

1.2.1 Types and classes. Plastic sheet, tracing, covered by this specification shall be of the following types and classes as specified in the contract or purchase order (see 6.2):

Type I	-	Matte drafting surface, glazed back.
Type II	-	Both sides matte finish.
Type III	-	Both sides glazed.
Class 1	-	Material with strength, durability, and dimensional stability.
Class 2	-	Material with strength and durability.

1.2.2 Forms. Plastic sheet, tracing, covered by this specification shall be furnished in sheets or rolls and in the thicknesses as specified in the contract or purchase order (see 6.2).

1.2.3 Sizes (dimensions). (see 3.3 and 6.2).

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

Federal Specifications:

TT-I-528	-	Ink, Drawing, Waterproof, Black.
PPP-T-60	-	Tape, Packaging, Waterproof.

Federal Standard:

Fed. Std. No. 123 - Marking for Shipment (Civil Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Philadelphia, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Houston, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Standard:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

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

American National Standards Institute (ANSI) Standard:

PH1.32 - Methods for Determining the Dimensional Change Characteristics of Photographic Films and Papers.

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

American Society for Testing and Materials (ASTM) Standard:

D 882 - Tests for 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.)

Technical Association of the Pulp and Paper Industry (TAPPI) Test Method:

T 425 - Opacity of Paper.

(Application for copies should be addressed to the Technical Association of the Pulp and Paper Industry, One Dunwoody Park, Atlanta, GA 30341.)

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., Traffic Department, 1616 P Street, N.W., Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

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

3. REQUIREMENTS

3.1 Material. The rolls and sheets shall be made from plastic compounds. When specified in the contract or purchase order, the plastic sheets and rolls shall have an anti-static property (see 6.2).

3.2 Title block (sheet form only). When specified in the contract or purchase order, the sheet shall be furnished with a title block. The location, format, and wording of the title block shall be as specified (see 6.2).

procurement functions should be obtained

3.3 Dimensions. The length and width of the sheets, and width of the rolls, shall be selected from among the common commercial sizes listed in Table I. Rolls shall be furnished in lengths of 18 or 45 meters (20 or 50 yds), or multiples thereof, as specified in the contract or purchase order. The thickness of the base material, excluding coating, shall be from 0.05 to 0.178 mm (0.002 to 0.007 inch) plus or minus 20 percent of the specified thickness (see 6.2).

3.3.1 Sheet sizes. Sheets of plastic shall be cut square on four sides and shall be cut to the sizes specified. The dimensions shall not vary more than ± 1.6 mm (± 1/16 inch) for sizes up to 30.5 x 45.7 cm (12 x 18 inches) inclusive. Sheets larger than 30.5 x 45.7 cm shall not vary more than ± 2.4 mm (± 3/32 inch).

3.3.2 Roll sizes. Rolls shall be wound at even tension on hollow cores, the inside diameters of which shall be not less than 25.4 mm (one inch) nor more than 76.2 mm (3 inches) unless otherwise specified in the contract or purchase order. Tolerance on roll widths shall be plus 9.5 mm (plus 3/8 inch), minus 0 mm (minus 0 inch). Tolerance on the roll length shall be plus 46 cm (18 inches), minus 0 mm (minus 0 inch).

3.3.2.1 Splices in rolls. Rolls of plastic furnished by the manufacturer in lengths of 18 meters (20 yards) may contain one splice but neither length of the plastic material shall be less than 3.6 meters (4 yards). Rolls in lengths of 45 meters (50 yards) may contain two splices, but no piece shall be less than 3.6 meters (4 yards) in length. At least 0.45 meter (1/2 yard) of material shall be added to the roll for each splice. All splices shall be overlapping, or open, and shall be flagged at one side of the roll with projecting colored markers.

TABLE I. Common commercial sizes

Sheet sizes		Roll widths	
Inches	Millimeters	Inches	Millimeters
8 x 10 1/2	203.2 x 266.7	24	609.6
8 1/2 x 11	215.9 x 279.4	27	685.8
8 1/2 x 14	215.9 x 355.6	30	762.0
9 x 12	228.6 x 304.8	36	914.4
11 x 17	279.4 x 431.8	42	1066.8
12 x 18	304.8 x 457.2	54	1371.6
17 x 22	431.8 x 558.8		
18 x 24	457.2 x 609.6		
22 x 32	558.8 x 812.8		
22 x 34	558.8 x 863.6		
23 x 25	584.2 x 635.0		
24 x 30	609.6 x 762.0		
24 x 36	609.6 x 914.4		
28 x 40	711.2 x 1016.0		
30 x 42	762.0 x 1066.8		
34 x 44	863.6 x 1117.6		

3.4 Tensile strength. The tensile strength of the material shall be not less than 103.4 MPa (15,000 pounds per square inch) in the lengthwise direction when tested as specified in 4.4.1.

3.5 Finish. Type I sheets or rolls shall be furnished with a matte finish surface and a glazed back. Type II sheets or rolls shall be furnished with both sides matte finished. Type III sheets or rolls shall be furnished with both sides glazed.

3.6 Opacity. The opacity of the material shall not exceed 40 percent for both sides matte, 35 percent for one side matte, and 15 percent for glazed sheet when tested as specified in 4.4.2.

3.6.1 Opacity after heat aging. The opacity of the heat-aged material shall not increase more than 5 percent or increase printing time on a diazo or blueprint machine by more than 20 percent from the original unaged value when tested as specified in 4.4.2.1.

3.6.2 Opacity after ultraviolet aging. When tested as specified in 4.4.2.2, exposure of the material to ultraviolet radiation shall not increase opacity more than 5 percent or its printing time on a diazo or blueprint machine by more than 20 percent.

3.7 Dimensional stability (class 1 only). Class 1, type I, II, or III material shall meet the dimensional stability requirements as follows:

3.7.1 Thermal coefficient of expansion. Class 1 material shall have a thermal coefficient of expansion not exceeding 0.0020% for each degree Celsius change of temperature in the range from 23° to 49° (0.0011% for each degree Fahrenheit change of temperature in the range from 73.4° to 120°F) when tested as specified in 4.4.3.1.

3.7.2 Hygroscopic coefficient of expansion. Class 1 material shall have a hygroscopic coefficient of expansion not exceeding 0.0020% for each percent change in relative humidity in the range from 20 to 90 percent relative humidity at temperature of 23° ± 1.1°C (73.4° ± 2°F) when tested as specified in 4.4.3.1.

3.7.3 Thermal change. The residual change of the class 1 material shall not exceed 0.11 percent at 82.2° ± 1.1°C (180° ± 2°F) when tested as specified in 4.4.3.2.

3.7.4 Hygroscopic change. The residual change of the class 1 material at 90 percent relative humidity shall not exceed 0.07 percent when tested as specified in 4.4.3.3.

3.8 Coating adhesion (matte finish). Material furnished with a coating shall meet the coating adhesion test specified in 4.4.4.

3.9 Water immersion. The material shall not deteriorate after immersion in water for 5 minutes and then dried. Coated material shall pass the coating adhesion test specified in 4.4.4 after immersion (see 4.4.5).

3.10 Pencil-take (matte finish only). When the matte surface of the sheet is tested as specified in 4.4.6, a 3H pencil lead and a plastic lead of equal hardness, sharpened to a 0.025-mm (0.010-inch) diameter conical point, shall produce lines which are continuous and unbroken.

3.11 Pencil erasing. Pencil lines drawn on the sheet shall be capable of being erased with a grit-free eraser without leaving reproducible ghost lines. There shall be no noticeable loss of pencil-take after three erasures are performed on the same area. Erasures shall not cause the matte finish to burnish or gloss such as to provide reflective qualities detrimental to photographic (microfilm, etc.) reproductions (see 4.4.7).

3.12 Ink test. Ink lines drawn on the material shall not be removed when tested as specified in 4.4.8.

3.13 Ink erasing. Ink lines prepared as specified in 4.4.9 shall be capable of being erased with a water-moistened grit-free eraser without removing the matte finish on the plastic sheet (see 4.4.9).

3.14 Typing and erasing. Typing on the plastic sheet with a standard commercial carbon ribbon shall result in distinct characters which shall be capable of being erased without leaving reproducible ghost lines when tested as specified in 4.4.10.

3.15 Curl. The curl of the finished material shall not be greater than 12mm (1/2 inch) when the material is tested as specified in 4.4.11.

3.16 Flatness. The flatness factor of the finished material shall not be greater than 0.01 when the material is tested as specified in 4.4.12.

3.17 Workmanship. The material shall be free from holes, cracks, scratches, and other defects which might affect its appearance or serviceability. The working surface shall show no broken areas, pinholes, and any other irregularities which would make the surface unsatisfactory for the intended use.

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 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 that supplies and services conform to prescribed requirements.

4.2 Sampling for inspection and acceptance. Sampling for inspection and acceptance shall be performed in accordance with the provisions set forth in MIL-STD-105, except where otherwise indicated herein.

4.3 Inspection.

4.3.1 Examination procedures. Examinations shall be made in accordance with the classification of defects, inspection levels, and acceptable quality levels (AQLs) set forth below. The lot size, for purposes of determining the sample size in accordance with MIL-STD-105, shall be expressed in units of shipping containers for examination in 4.3.1.1 and in units of packages of plastic sheets or rolls of plastic sheet material, as applicable, for examination in paragraphs 4.3.1.2 through 4.3.1.4.

4.3.1.1 Examination of preparation for delivery. An examination shall be made in accordance with table II to determine that the packing and marking comply with the requirements of section 5. The sample unit for this examination shall be one shipping container, fully packed and marked, selected just prior to the closing operation. Shipping containers fully prepared for delivery shall be examined for closure defects. Samples shall be selected in accordance with inspection level S-2, and the AQL shall be 4.0 percent defective.

TABLE II. Examination of preparation for delivery

Examine	Defect
Packing	Not level specified; not in accordance with contract requirements.
	Any nonconforming component, component missing, damaged, or otherwise defective, affecting serviceability.
	Container not as specified; closures not accomplished by specified or required methods or materials.
	Inadequate application of components such as incomplete closures of caseliners, container flaps, loose or inadequate strappings, bulged or distorted containers.
Count	Less than specified or indicated quantity of packages or rolls per shipping container.
Weight	Gross weight exceeds specified requirements.
Marking	Omitted, illegible, incorrect, incomplete, or not in accordance with contract requirements.

4.3.1.2 Examination of the unit package for defects in assembly. Examination shall be made in accordance with Table III to determine that packaging and marking comply with the requirements of paragraphs 3.3.2, 3.3.2.1 and section 5. The sample unit for the examination shall be one package of sheets or one roll of plastic material, as applicable. Samples shall be selected in accordance with inspection level S-2, and the AQL shall be 4.0 percent defective.

TABLE III. Examination of the unit package for defects in assembly

Examine	Defect
Packaging	Not level specified; not in accordance with contract requirements.
	Sheets or rolls (as applicable) not unit wrapped and packaged as specified.
	Packaging material not as specified; closures not accomplished by specified or required methods or materials.
Marking	Omitted, illegible, incorrect, incomplete, or not in accordance with contract requirements.
Assembly of sheets	Average count per package less than specified.
	Not evenly stacked.
Assembly of roll	Not suitably restrained to prevent unwinding.
	Not wound evenly and tightly on roll, causing uneven edges or telescoping of the roll.
	More than permitted number of cuts; flags at cuts missing or not as specified.
	Not wound on specified core.
	Core cracked, broken, mutilated, or collapsed.

4.3.1.3 Examination of the unit package for defects in appearance, construction, and workmanship. Examination shall be made in accordance with Table IV to determine that the overall workmanship complies with section 3. The sample unit for the examination shall be one package of sheets or one roll of plastic material, as applicable. Sample units shall be selected in accordance with inspection level II, and the AQL shall be 2.5 percent defective.

TABLE IV. Examination of the unit package for defects in appearance, construction, and workmanship

Examine	Defect
Form	Not in rolls or flat square-cut sheets as specified.
Appearance	Not clean, presence of any imbedded particles, dirt, grit, or other foreign matter; any visible additions to plastic.
	Not uniform in finish or opacity in accordance with contract requirements.
Construction and workmanship	Any cracks, scratches, bubbles, warpage, toolmarks, or other defects that would affect serviceability or appearance.
	Any cut, puncture, sharp crease, wrinkle, tear, or hole.
	Edges not clean cut; ragged, crushed, or uneven edges.
	Surfaces not matte finished or glazed as specified.
	Any discoloration, or spot larger than 1.6mm (1/16 inch) in greatest dimension.
	Blocking during unwinding of roll.
Title block (when required)	Missing or not as specified.

4.3.1.4 Examination of the unit package for dimensional defects. The sample unit for the examination specified in table V shall be one package of sheets or one complete roll, as applicable. Samples shall be selected in accordance with inspection level S-2, and the AQL shall be 2.5 percent defective.

Table V. Examination of the unit package for dimensional defects

Examine	Defect
SHEETS: Up to 30.5 x 45.7 cm (12 x 18 inches)	Varies by more than ± 1.6mm (± 1/16 inch) from length and width specified.
Larger than 30.5 x 45.7 cm (12 x 18 inches)	Varies by more than ± 2.4mm (± 3/32 inch) from length and width specified.
ROLLS: Width	Varies by more than + 9.5 mm (+ 3/8 inch) or minus zero mm (inch) from width specified.
Length	Not in accordance with 3.3.2 or 3.3.2.1; average length per roll less than specified.
Thickness	Not within specified tolerances (3.3).

4.3.2 Testing of the end item. The end item shall be tested for the applicable characteristics as indicated in table VI from each lot presented for examination. The sample unit shall be 2 meters (7 linear feet), full width of roll, if in rolls; or 10 sheets, as applicable. Three sample units, each drawn from a different shipping container, shall be tested with no evidence of failure to meet the specified requirements.

4.4 Test methods. A separate sheet of plastic from each sample unit shall be used for the tests performed in 4.4.1 through 4.4.3.3. For type II material, each side of the sample shall be tested, where applicable.

TABLE VI. Instructions for testing (sample unit)

Characteristic	Specification reference: Requirement	Specification reference: Test method	Number determinations per sample unit	Results reported as: Pass or Fail 1/	Results reported as: Numerically to Nearest 2/
Tensile strength	3.4	4.4.1	Avg. of 10	-	M PA
Opacity:					
As received	3.6	4.4.2	Avg. of 5	-	Percent
After heat aging	3.6.1	4.4.2.1	Avg. of 5	-	Percent
After ultraviolet aging	3.6.2	4.4.2.2	Avg. of 5	-	Percent
Dimensional stability (class 1, types I, II, and III):	3.7				
Thermal coefficient of expansion	3.7.1	4.4.3.1	Avg. of 5*	-	0.0020% per °C
Hygroscopic coefficient of expansion	3.7.2	4.4.3.1	Avg. of 5*	-	0.0020% per %RH
Thermal change	3.7.3	4.4.3.2	Avg. of 5*	-	0.01 percent
Hygroscopic change	3.7.4	4.4.3.3	Avg. of 5*	-	0.01 percent
Coating adhesion	3.8	4.4.4	1	X	-
Water immersion	3.9	4.4.5	1	X	-
Pencil-take	3.10	4.4.6	1	X	-
Pencil erasing	3.11	4.4.7	1	X	-
Ink test	3.12	4.4.8	1	X	-
Ink erasing	3.13	4.4.9	1	X	-
Typing and erasing	3.14	4.4.10	1	X	-
Curl	3.15	4.4.11	2	X	-
Flatness	3.16	4.4.12	2	-	0.001 Factor

* in each direction

NOTE: 1/ If failure is indicated, report description of failure.
2/ Test reports shall include all values on which results are based.

4.4.1 Tensile strength. Determine the tensile strength in accordance with ASTM D 882.

4.4.2 Opacity test. Determine the opacity in accordance with TAPPI Test Method T 425.

4.4.2.1 Opacity after heat aging. Place the specimens in an air-circulating oven held at 100° ± 1.1°C (212° ± 2°F) for 10 hours. After cooling, subject the specimens to the opacity test described in 4.4.2. Make prints from the aged specimens to determine any change in printing time.

4.4.2.2 Opacity after ultraviolet aging. Expose the specimens to the radiation from a glass enclosed 6500-watt xenon arc lamp such as a Weather-O-Meter 600 WRC-123, or its equivalent, for 10 hours. After cooling, subject the specimens to the opacity test described in 4.4.2. Make prints from the radiated specimens to determine any change in printing time.

4.4.3 Dimensional stability.

4.4.3.1 Thermal and hygroscopic coefficients of expansion. The thermal coefficient and the hygroscopic coefficient shall be determined in accordance with ANSI Standard PH1.32, sections 7 and 6 respectively. For each test cut five samples, approximately 3.5 by 30 cm (1.4 by 12 inches) in each of the two principal directions of the material, i.e., the machine and cross directions. Measure the samples by the ANSI Standard section 3.3, preferably Method A (pin gage procedure) although Methods B or C may be used. Determine the thermal coefficient of expansion in the range of 23° to 49°C (73.4° to 120°F) at a relative humidity of 50 ± 2 percent; and determine the hygroscopic coefficient of expansion in the range of 20 to 90 percent RH at 23° ± 1.1°C (73.4° ± 2°F).

For class 1:

Thermal coeff. of expansion 1/	Hygroscopic coeff. of expansion 2/	Thermal change	Hygroscopic change
0.0020%	0.0020%	± 0.11%	± 0.07%

1/ per degree C - maximum.
2/ per percent RH - maximum.

4.4.3.2 Thermal change. Cut five samples approximately 3.5 by 30 cm (1.4 by 12 inches) in each of the two principal directions of the material. Pre-condition the samples at 23° ± 1.1°C (73.4° ± 2°F) and 50 ± 2 percent relative humidity for 24 hours. At the end of the conditioning period (24 hours), measure the samples (preferably by method A, ANSI Standard PH1.32). Place the samples for one hour in a circulating air oven heated to 82.2° ± 1.1°C (180° ± 2°F). At the end of the oven-exposure period, allow the specimens to cool for 24 hours to the original conditioning temperature and relative humidity. Re-measure and average the dimensional change values obtained for each length and width direction (also known as machine and cross directions). The percent change is calculated as follows:

$$\text{Thermal change, percent} = \frac{D_o - D_f}{D_o} \times 100$$

D_o = Original length (or width) of test sample.
D_f = Final length (or width) of test sample.

4.4.3.3 Hygroscopic change. Use the samples from the hygroscopic coefficient test in 4.4.3.1. Return the samples to the original conditions at 23° ± 1.1°C (73.4° ± 2°F) and 20 ± 2 percent relative humidity for 24 hours. Measure the samples, preferably by method A, of ANSI Standard PH1.32. Average the dimensional change values obtained for each length and width direction. The percent hygroscopic change is calculated as follows:

$$\text{Hygroscopic change, percent} = \frac{D_o - D_f}{D_o} \times 100$$

D_o = Original length (or width) of test sample.
D_f = Final length (or width) of test sample.

4.4.4 Coating adhesion (types I and II). Place a 1/2 by 2-inch strip of transparent pressure-sensitive tape, conforming to PPP-T-60, on the coated side of a specimen and press firmly. Grasp the end of the tape and pull away sharply at a 90° angle to the sheet. Any release or removal of the coating layer by the tape snall be cause for rejection.

4.4.5 Water immersion (all types). Immerse the specimen in distilled water for 5 minutes; then remove, dry, and examine the specimen for any deterioration or loss of coating. Subject the coated material to the adhesion test described in 4.4.4.

4.4.6 Pencil-take (types I and II). Sharpen the lead of a 3H pencil to a 0.25mm (0.010-inch) diameter conical point, such as in standard drafting procedures, and draw ten (10) lines not less than five (5) inches in length on the matte surface. The sample will then be examined to determine that the pencil lines are visually continuous, i.e., not broken. Repeat this procedure with a plastic lead of the same hardness.

4.4.7 Pencil erasing (types I and II). Using a 3H pencil, draw five (5) parallel lines on the matte surface of the sheet and erase with a grit-free eraser. Repeat this procedure twice in the same area, drawing lines first at right angles to the original lines and then at 45-degree angles to the original lines. After each procedure, erase the lines and examine for loss of pencil-take and for changes in surface appearance. Repeat the entire procedure, but on a different test area, using a plastic lead of the same hardness.

4.4.8 Ink test (types I and II). Draw ten (10) lines not exceeding 0.4mm (1/64 inch) in width on the matte surface of the plastic sheet with a ruling pen or capillary-type pen filled with ink conforming to TT-I-528. The lines shall not show skipping, feathering, or spreading after drying for 15 minutes. Fifteen minutes after the lines have been drawn, firmly place a 13-mm (1/2-inch) wide strip of transparent pressure-sensitive tape (conforming to PPP-T-60) at right angles over the line; with a sharp tug pull away the tape in a direction of 90° from the sheet. The tape shall separate from the surfaces without removing the drawn lines, and there shall be no noticeable loss in density of the ink lines at the spot where the tape shall have been applied.

4.4.9 Ink erasing (types I and II). Prepare another sample as specified in 4.4.8 but omit the tape test; after 15 minutes, erase the ink lines using a water-moistened grit-free eraser. Examine the erased area for change in finish. Repeat the procedure two more times, first drawing the lines at right angles and then in the same area at 45-degree angles to the lines originally drawn; wait 15 minutes before erasing each set of lines. The erased areas shall show no smudging, feathering, or reproducible ghost after erasure. The erasures shall not cause the matte surface to burnish or gloss so as to provide reflective qualities detrimental to photographic reproductions.

4.4.10 Typing and erasing (types I and II). Type a line of letters and numbers on the matte surface of the plastic sheet using a black carbon ribbon. Remove the typed characters with a moistened grit-free eraser, then subject the sheet to printing on a blueprint or whiteprint machine and examine the print for reproducibility of erased lettering.

4.4.11 Curl test (type I only). Place two sheets, 21.6 by 28 cm (8 1/2 by 11 inches), selected at random, on a flat surface, one with matte side up and the other with matte side down. Allow sheets to remain at 23° ± 1.1°C (73.4° ± 2°F) and 50% RH for 72 hours. At the end of this time, measure in millimeters and record the greatest lift from the flat surface of any part of either sheet.

4.4.12 Flatness test (all types). Randomly select two sheets of each type, 21.6 by 28 cm (8 1/2 by 11 inches) and place on a flat surface. For type I material one sheet should be matte side up and the other, matte side down. For type II and III materials, identify the surfaces as Sides 1 and 2 and place one sheet with Side 1 up and the other sheet with Side 2 up. Smooth out each sheet by hand and hold down the four corners with weights of not more than 1.8 kg (4 pounds) each and which cover not more than ten sq cm (3 sq in) of the area of the sheet. Measure, to the nearest 0.25mm (0.01 inch) the maximum departure of the surface of the sheet in contact with the flat surface. Determine the flatness factor by dividing the departure thus measured by the length of the sheet.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be Level A or Commercial, as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Sheets. Sheets of the same size shall be packaged flat, faced top and bottom with a sheet of paperboard or chipboard of commercial quality and grade, 50 sheets per package, wrapped in 50-pound kraft paper, ends of wrap neatly folded and secured by adhesive or tape.

5.1.1.2 Rolls. Each roll, after forming on the specified inside-diameter core, shall be completely wrapped in 50-pound kraft paper, ends neatly folded and secured by application of 50-pound kraft paper caps or disks over the folded ends, secured by a suitable adhesive, or wrapped in a water-vapor barrier bag and securely closed.

5.1.2 Commercial. The sheets and rolls shall be packaged in unit containers normally used in commercial practice.

5.2 Packing. Packing shall be Level A or Commercial, as specified (see 6.2).

5.2.1 Level A.

5.2.1.1 Sheets. Four packages of 50 sheets, packaged as specified in 5.1, shall be packed in a fiberboard box made from weather-resistant fiberboard with a bursting test strength of not less than 275 lbs per square inch. The box flaps shall be secured with water-resistant adhesive applied to not less than 75 percent of the surface area of contact between the flaps; or with 3-inch-wide waterproof tape applied to the full length of the seams and extending over the ends not less than 3 inches. Alternatively, wirebound, cleated plywood or nailed wood boxes shall be acceptable shipping containers when lined with a waterproof barrier material. The barrier material shall be sealed at the edges with waterproof tape or adhesive.

5.2.1.2 Rolls. The rolls, packaged as specified in 5.1, shall be packed in fiber drums having side walls with a minimum bursting strength of 600 lbs per square inch. The top and bottom heads shall be made of minimum 0.160-inch-thick fiberboard having a minimum bursting strength of 400 lbs per square inch, or minimum 0.120-inch-thick fiberboard having a minimum bursting strength of 800 lbs per square inch. Alternatively, the top and bottom heads shall be made of minimum 28-gage steel, minimum 1/2-inch-thick solid wood, or minimum 3/10-inch-thick plywood. The fiber drums shall be furnished with 0.004-inch-minimum-thickness polyethylene liners. The liner shall be closed by tying or heat-sealing to form a vaporproof barrier. The fiber drum shall be securely closed to prevent accidental opening.

5.2.2 Commercial. The sheets and rolls shall be packed in shipping containers to insure safe delivery at destination and to provide for safe redistribution by the initial receiving activity; containers shall be acceptable for transport by common carrier under National Motor Freight Classification or Uniform Freight Classification.

5.3 Unitization. (Applicable to full rail car and truck load shipments only.) The sheets and rolls shall be unitized for shipment in accordance with normal commercial practice. The unitized load shall not exceed 2,500 lbs. in weight, 63 inches in height, 56 inches in length, and 45 inches in width.

5.4 Marking. Packages, shipping containers, and unitized loads (when applicable) shall be marked in accordance with Fed. Std. No. 123.

6. NOTES

6.1 Intended use. Plastic rolls and sheets covered by this specification are intended for use in tracing and drawings, the development of original drawings, and for other purposes requiring tracing material or clear film for paste-ups and overlay material.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

(a) Title, number, and date of this specification.
(b) Type, class, and form required (see 1.2.1 and 1.2.2).
(c) Anti-static property, if required (see 3.1).
(d) Whether sheet is required with a title block (see 3.2).
(e) Dimensions of sheets or rolls (see 3.3).
(f) Inside diameter of hollow core, if other than as specified in 3.3.2.
(g) Applicable levels of packaging and packing required (see 5.1 and 5.2).

MILITARY INTEREST:

The DOD has waived coordination of this document until further notice.

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