

MIL-M-52769
27 December 1973

MILITARY SPECIFICATION

MEMBRANE, SURFACING: AIRFIELD, HEAVY DUTY

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

1. SCOPE

1.1 This specification covers three types of heavy duty membranes for airfield surfacing.

1.2 Classification. The membrane shall be of the following types as specified (see 6.2):

Type I - Runway membrane (66 feet wide by 53 feet long).

Type II - Taxiway membrane (42 feet wide by 53 feet long).

Type III - Splicing membrane (3 feet wide by 66 feet long).

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Federal

- | | |
|------------|--|
| L-P-378 | - Plastic Sheet and Strip, Thin Gauge, Polyolefin. |
| FF-N-105 | - Nails, Brads, Staples and Spikes: Wire, Cut and Wrought. |
| NN-P-530 | - Plywood, Flat Panel. |
| QQ-S-781 | - Strapping, Steel, Flat and Seals. |
| TT-P-55 | - Paint, Polyvinyl Acetate Emulsion, Exterior. |
| PPP-B-601 | - Boxes, Wood, Cleated-Plywood. |
| PPP-B-1055 | - Barrier Material, Waterproofed, Flexible. |

FSC 5680

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PPP-S-760
PPP-T-60

- Strapping, Nonmetallic, (and Connectors).
- Tape: Packaging, Waterproof.

Military

MIL-T-5624

- Turbine Fuel, Aviation, Grades JP-4 and JP-5.

STANDARDS

Federal

FED. TEST METHOD
STD. No. 191
FED. STD. No. 595

- Textile Test Methods.
- Colors.

Military

MIL-STD-105

MIL-STD-129
MIL-STD-130

MIL-STD-731

- Sampling Procedures and Tables for Inspection by Attributes.
- Marking for Shipment and Storage.
- Identification Marking of US Military Property.
- Quality of Wood Members for Containers and Pallets.

(Copies of specifications and standards required by suppliers 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 otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

- D903 - Peel or Stripping Strength of Adhesive Bonds.
- D1682 - Breaking Load and Elongation of Textile Fabrics.
- D2263 - Testing Automotive Fabrics.

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

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U. S. DEPARTMENT OF COMMERCE COMMERCIAL STANDARD

PS-51 - Hardwood Plywood.

PS-1 - Softwood Plywood - Construction and Industrial.

(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

3. REQUIREMENTS

3.1 Description. The heavy duty membrane shall be joined and bonded panels or strips of a 4-ply, nylon fabric-synthetic rubber laminate.

3.2 First article (first-produced membrane). The supplier shall furnish one or more membranes for examination and testing within the time frame specified (see 6.2), to prove that his production methods will produce membranes that comply with the requirements of this specification. Examination and tests shall be as specified in section 4, and shall be subject to surveillance and approval by the Government (see 6.3).

3.2.1 Base nylon fabric. In addition to the first-produced membrane, the basic nylon fabric shall be furnished and tested within the time frame specified (see 6.2), prior to the time the first-produced membrane is furnished. The basic nylon fabric shall be identical to the fabric used to fabricate the first-produced membrane. Tests shall be those specified in section 4 and shall be subject to surveillance and approval by the Government.

3.3 Material. Material shall be as specified herein. Materials not specified shall be selected by the supplier and shall be subject to all provisions of this specification.

3.3.1 Nylon base fabric. Nylon base fabric shall be a plain weave, single-ply, fabric woven from an 840 denier continuous filament high tenacity and improved heat and light resistant nylon yarn (polyamide of polyhexamethylene adipamide). When tested as specified in 4.5.2, the physical and mechanical properties of the base fabric shall conform to table I.

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Table I. Physical and Mechanical Properties
of Nylon Base Fabric

Property	Maximum	Minimum
Weight per square yard; ounces	5.5	5.1
Melting point, yarns; ° F.	492	472
Yarns per inch		
Warp	-	23
Fill	-	22
Breaking strength (grab), warp and fill; pounds	-	350
Tear strength, warp and fill; pounds	-	60
Elongation, warp and fill; percent	40	25

3.3.2 Synthetic rubber coating. Synthetic rubber coating shall be a compounded chloroprene synthetic rubber.

3.4 Membrane fabrication. Each type of membrane shall be fabricated from a 4-ply coated laminate. Type I and II membranes shall be fabricated by joining run widths of the coated laminate into the panel dimensions specified herein. Type III membrane shall be fabricated from a single run width and shall not have longitudinal or transverse joints. Types I, II, and III membrane dimensions shall be as specified in table II.

Table II. Membrane Dimensions

Membrane	Width (feet)		Length (feet)	
	Minimum	Maximum	Minimum	Maximum
Type I	65.75	66.25	52.75	53.25
Type II	41.75	42.25	52.75	53.25
Type III	2.98	3.02	66.00	67.00

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3.4.1 Coated laminate. Coated laminate shall be fabricated by impregnating and coating the nylon base fabric with synthetic rubber and bonding the impregnated and coated base fabric (ply) with synthetic rubber into a 4-ply laminate. Impregnated and coated nylon base fabric plies shall be bonded between plies with 8 to 10 ounces per square yard of synthetic rubber. Exterior faces of the laminate shall be coated with not less than 12 ounces per square yard of synthetic rubber. The synthetic rubber coating shall contain no ingredient deleterious to nylon and shall be applied to the base fabric to thoroughly impregnate the fabric, bond the four plies completely, and evenly coat the outer surfaces of the laminate. The finish color of the coated laminate shall be black. When tested as specified in 4.5.2, the physical and mechanical properties of the coated laminate shall be as specified in table III.

Table III. Physical and Mechanical Properties
of Coated Laminate

Property	Maximum	Minimum
Weight per square yard; ounces.	80.0	68.0
Breaking strength; pounds.		
Warp direction.	-	600
Fill direction.	-	500
Elongation, warp and fill; percent.	25	15
Tear strength, warp and fill; pounds.		
Warp direction.	-	200
Fill direction.	-	170
Temperature, high (4 hours at 125° F.)	No blocking or tackiness.	
Temperature, low (4 hours at -40° F.)	No cracking and flaking of coating. No leakage of coated fabric.	
Hydrostatic pressure resistance for 10 minutes at a 20-in. head.	No leakage.	
Flame resistance.		
After flame time, seconds.	5	-
Length of char, inches.	2	-
Adhesion of coating, pound per inch.	-	14
Adhesion of coating, between plies, pounds per inch.	-	14
Fuel resistance.		90% of breaking strength in both warp and fill directions.

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3.4.2 Joints. All joints in types I and II membranes shall be vulcanized or adhesive bonded lap-joints. The width of the joints shall be not less than 9 inches and not more than 9-1/2 inches. When tested as specified in 4.5.3, the joint peel strength, shear strength, and dead load shear resistance shall conform to the values specified in table IV.

Table IV. Peel and Shear Strength of Joints

Test	Test Condition		Minimum
	Wet	Dry	
Peel strength of joint	X	X	14 lbs/inch Failure of laminated material without separation of bonded joint.
Shear strength of joint	X	X	
Dead load shear resistance	-	X	Maximum movement of the joint 0.10-inch.

3.4.2.1 Types I and II membrane. Longitudinal joints in types I and II membranes shall be constructed parallel to the 53-foot dimension, and the maximum number of longitudinal joints shall be as specified in table V. Transverse joints shall not be constructed in a 36-foot wide by 53-foot long (longitudinal) area located symmetrically about the longitudinal centerline. Transverse joints shall be limited to one joint in any one continuous 53-foot run of laminate width between longitudinal joints. Transverse joints shall be perpendicular to longitudinal joints and shall be spaced not less than 15 feet apart.

3.4.2.2 Type III membrane. Type III membranes shall not contain longitudinal or transverse joints (see table V).

Table V. Number of Longitudinal and Transverse Joints Permitted

Membrane Type	Maximum Number of Longitudinal Joints Permitted	Maximum Number of Transverse Joints Permitted
Type I	18	8
Type II	11	2
Type III	0	0

3.4.3 Patches.

3.4.3.1 Types I and II. Patches shall not be permitted in a 36-foot wide by 53-foot long (longitudinal) area located symmetrically about the longitudinal centerline. The remaining area may be patched; however, there shall be not more than four patches on any one membrane. The area of the patch shall not exceed 576 square inches, and the patch overlap shall be not less than 6 inches. The peel and shear strength of patches shall be as specified for joints in table IV. Holes, cuts, and tears shall be patched on both sides of the membrane. Scuffs and abrasions shall be patched on the damaged side only.

3.4.3.2 Type III. Patching of type III membranes shall not be permitted.

3.5 Cleaning, painting, and nonskid surfacing.

3.5.1 Cleaning. Areas of the membrane which are to be coated with nonskid surfacing or painted shall be clean, dry, and free from dirt, oil, excess rubber, and adhesive and other foreign substances that may be detrimental to the coating system. Cleaning of the membrane shall be accomplished using solvents which are nondetrimental to the synthetic rubber or the coating system.

3.5.2 Painting. Color numbers shall conform to FED. STD. No. 595, color as specified (see 6.2).

3.5.2.1 Nonskid surfacing. Nonskid surfacing shall be applied in a polka dot pattern to the area of types I and II membranes as shown in figure 1. The dots shall be placed in a staggered pattern, and the diameter of each dot and spacing shall be as shown in table VI. See 6.6 and Appendix A for recommended nonskid material and method of application.

Table VI. Nonskid Surfacing Thickness, Dot Diameter and Spacing

<u>Dimensions</u>	<u>Maximum</u>	<u>Minimum</u>
Thickness of nonskid; inches	0.045	0.025
Diameter of polka dot; inches	2.25	2.00
Center to center of adjacent polka dots; inches; transverse	4.00	3.75
Center to center of adjacent polka dots; inches; longitudinal	3.50	3.25

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3.5.2.1.1 Curing nonskid surfacing. Nonskid surfacing shall be cured for not less than 72 hours at an ambient temperature of not less than 55° F. prior to preparation for delivery.

3.5.2.1.2 Thickness, diameter, and spacing of nonskid surfacing. When tested as specified in 4.5.3.4 and 4.5.3.5, the thickness, diameter, and spacing of nonskid surfacing shall conform to the dimensions specified in table VI.

3.5.2.2 Striping and marking. Edge and centerline striping and marking of each type I and type II membrane and marking for type III membrane shall be as specified herein. Paint for striping shall conform to TT-P-55, type II, color number 37875 conforming to FED. STD. No. 595 and shall be applied after the nonskid surfacing has cured. The paint shall dry not less than 1 hour at an ambient temperature of not less than 55° F. prior to preparation for delivery.

3.5.2.3 Edge stripe. Edge stripes shall be 12 inches plus or minus 1 inch wide. The near edge of each stripe shall be 16 feet plus or minus 1-1/2 inches from the centerline of the type I or type II membrane.

3.5.2.4 Centerline stripe. The centerline stripe shall be painted on the type I and type II membrane as shown in figure 2.

3.5.2.5 Marking.

3.5.2.5.1 Marking for type I and type II membrane. Each type I and type II membrane shall be marked with white waterproof ink on the nonskid-treated side with 1/8-inch wide white lines. Two lines shall be located on each end and extend the full 66 or 42 foot width and shall be located 12 inches and 24 inches from the end of the membrane. The marking shall be placed on the membrane prior to covering the ends with protective paper.

3.5.2.5.2 Marking for type III membrane. Each type III membrane shall be marked with a 1/8-inch wide white line along the longitudinal centerline of the membrane and extending the entire length. The marking shall be done with waterproof ink and the marking shall be exposed on the outside of the rolled membrane.

3.6 Identification and special marking. Each membrane shall be identified in accordance with MIL-STD-130. The following shall be stenciled on the top of the membrane 4 feet from one end with white paint conforming to TT-P-55; letters and numerals shall be not less than 2 inches tall:

Federal Stock Number
Nomenclature
Contract Number
Mfg Code Ident.
US

3.6.1 Special marking. Types I and II membranes shall have special marking applied to the protective paper. The nonskid side shall be marked "TOP", and the other side shall be marked "BOTTOM". Arrows and numerals shall be placed on the top side of the paper to indicate the direction of the dimensions. All numerals and letters shall be not less than 4 inches high. The marking shall be placed on the paper with waterproof ink and shall appear on the uppermost horizontal surfaces of the folded membrane.

3.7 Workmanship. The finished types I, II, and III membrane shall be free of bubbles, wrinkles, excess adhesive, holes, tears, and surface cracks. Except for the longitudinal joints, the allowed transverse joints, and patches, the membranes shall be free of laps, laminations, or foreign material inclusions. The finished membrane surfaces shall be free from oil, grease, dirt, and other foreign material and shall show no evidence of tackiness.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Component and material inspection. The supplier is responsible for insuring that components and materials used are manufactured, examined, and tested in accordance with referenced specifications and standards.

4.2 Classification of inspection. Inspection shall be classified as follows:

- (a) First-produced inspection (see 4.3).
- (b) Quality conformance inspection (see 4.4).
- (c) Inspection of preparation for delivery (see 4.6).

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4.3 First-produced membrane inspection.

4.3.1 Examination. The first-produced membrane shall be examined for the defects marked "X" in the applicable column of table VII. Presence of one or more defects shall be cause for rejection.

4.3.2 Tests. The first-produced base fabric, coated laminate and membrane shall be subjected to the tests marked "X" in the applicable column of table VIII. Failure of any test shall be cause for rejection.

4.4 Quality conformance inspection.

4.4.1 Lot size. A lot shall consist of 50, or major fraction thereof, of each type of membrane presented at the same time for inspection.

4.4.1.1 Sampling. Sampling for examination shall be in accordance with MIL-STD-105.

4.4.1.2 Examination. Samples selected in accordance with 4.4.1.1, shall be examined for the defects marked "X" in the applicable column of table VII. AQL shall be 2.5 percent defective.

4.4.2 Tests.

4.4.2.1 Sampling. Sampling for tests shall be from randomly selected nylon base fabric, coated laminate and pieces of production membrane from a production lot of 5,000 square yards or fraction thereof. The amount of material taken shall be as follows:

- (a) Nylon base fabric: 3 feet long and full mill width.
- (b) Coated laminate: 5 yards long and full run width.
- (c) Membrane joint: 4 yards long total. The joint may be discontinuous, but the length of each sample shall be not less than 14 inches with not less than 15 inches of material on each side of the joint.
- (d) Nonskid treated area: 2 yards long by full run width.

4.4.2.2 Samples. Samples selected in accordance with 4.4.2.1 shall be subjected to the tests marked "X" in the applicable column of table VIII. Failure of any test shall be cause for rejection.

4.5 Inspection schedule.

4.5.1 Examination. Examination shall be in accordance with table VII.

Table VII. Examination Schedule

First-Produced Quality Conformance Type			Examination	Requirement Paragraph
I	II	III		
X	X	X	101. Materials not as specified.	3.3
X	X	X	102. Dimensions not as specified.	3.4
X	X	X	103. Membrane not fabricated as a lamination.	3.4.1
X	X	X	104. Synthetic rubber coating of the laminate and plys not as specified.	3.4.1
X	X	-	105. Lap joint width not as specified.	3.4.2
X	X	-	106. Longitudinal and transverse joints exceed quantity specified.	3.4.2.1
X	X	-	107. Holes, tears, scuffs or abrasions in center 36 X 53 ft. area.	3.4.3.1
X	X	-	108. Patches exceed size and number specified.	3.4.3.1
X	X	-	109. Patches in the center 36 X 53 ft. area.	3.4.3.1
X	X	-	110. Patch overlap not as specified.	3.4.3.1
-	-	X	111. Holes, cuts, tears, patches, scuffs or any joints in type III membrane.	3.4.3.2
X	X	-	112. Thickness, diameter, and spacing of nonskid surfacing dots not as specified.	3.5.2.1.2
X	X	-	113. Nonskid surfacing improperly cured.	3.5.2.1.1
X	X	X	114. Striping and marking missing or not as specified.	3.5.2.2
X	X	X	115. Identification and special marking missing or not as specified.	3.6
X	X	X	116. Workmanship not as specified.	3.7

4.5.2 Tests. The tests shall be in accordance with table VIII.

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Table VIII. Test Schedule

First-Produced Quality Conformance			Test	Test Method	Test Paragraph
Nylon Base Fabric	Coated Laminate	Types I & II Membrane		of FED. TEST METHOD STD. No. 191	
1	2	3	4	5	6
X	-	-	Weight.	5041	4.5.3.1
X	-	-	Melting point.	1534	4.5.3.1
X	-	-	Yarn count (warp & fill).	5050	4.5.3.1
X	-	-	Breaking strength.	5100	4.5.3.1
X	-	-	Tear strength.	5134	4.5.3.1
X	-	-	Elongation.	5100	4.5.3.1
-	X	-	Weight.	5041	4.5.3.1
-	X	-	Breaking strength (warp & fill).	ASTM D1682	4.5.3.1
-	X	-	Elongation (warp & fill).	Modified Grab ASTM D1682	4.5.3.2
-	X	-	Tear strength (warp & fill).	Modified Grab ASTM D2263 ^{1/}	4.5.3.2
-	X	-	High temperature.	5872 ^{2/}	4.5.3.2
-	X	-	Low temperature.	5874 ^{3/}	4.5.3.2
-	X	-	Hydrostatic pressure.	5516 ^{4/}	4.5.3.2
-	X	-	Adhesion of coating.	5970	4.5.3.2
-	X	-	Adhesion of plys.	5950	4.5.3.2
-	X	-	Fuel resistance.	Appendix A	4.5.3.6
-	-	X	Dry joint shearing strength.	ASTM D1682	4.5.3.3.3
-	-	X	Wet joint shearing strength.	ASTM D1682	4.5.3.3.4
-	-	X	Dry joint peel strength.	ASTM 903	4.5.3.3.1
-	-	X	Wet joint peel strength.	ASTM 903	4.5.3.3.2
-	-	X	Thickness of nonskid surfacing	5030	4.5.3.4
-	-	X	Diameter and spacing of nonskid surfacing dots.	Appendix A	4.5.3.5
-	-	X	Dead load shear		4.5.3.7

- 1/ In calculating tear strength for each specimen, the average of the 5 highest peak loads of resistance shall be used.
- 2/ Exception to the test method: The test specimen shall be conditioned for 4 hours at 125° F. and a 20-lb weight shall be used.
- 3/ Exception to the test method: The test specimen shall be conditioned for 4 hours at -40° F. A steel roller having a 4-inch diameter weighing 20-lb shall be used.
- 4/ The water height shall be 20 inches, and the exposure time shall be 10 minutes.

4.5.3 Tests.

4.5.3.1 Nylon base fabric. Samples of nylon base fabric shall be subjected to the tests specified in table VIII. Test methods shall be in accordance with FED. TEST METHOD STD. No. 191. Nonconformance to the mechanical and physical properties specified in table I shall constitute failure of the test.

4.5.3.2 Coated laminate. Samples of coated laminate shall be subjected to the tests specified in table VIII. Test methods shall be in accordance with FED. TEST METHOD STD. No. 191 and the American Society for Testing and Materials. Breaking strength and elongation shall be determined by ASTM D1682, modified grab method. The tear strength shall be determined by the Trapezoid Tearing Load of Woven Fabrics method of ASTM D2263. Nonconformance of the average of the values obtained from the tests to the mechanical and physical properties specified in table III shall constitute failure of the test.

4.5.3.3 Peel and shear strength of fabricated joints. Fabricated joints and patches shall be tested as specified herein. Three specimens shall be tested for each dry and each wet joint peel and joint shear strength test. The joint specimens shall be fabricated from production membrane using the same production method, and the specimens shall be aged not less than 7 days prior to testing. Peel strength specimens shall be 1 inch wide and not less than 12 inches long, and shear strength specimens shall be 4 inches wide and not less than 24 inches long. Each specimen shall be conditioned prior to testing for not less than 24 hours at 75° F. plus or minus 2° F. at a relative humidity of 50 percent plus or minus 5 percent. Peel strength test procedure shall be in accordance with ASTM D903 and recorded in pounds per inch. Joint shear strength shall be in accordance with ASTM D1682, Modified Grab Test. The average value of the peel strengths recorded during the three dry and three wet tests shall conform to the value specified in table IV except that no test value shall be less than the minimum value specified. Nonconformance of the average value obtained for each dry and wet peel test specified in table IV shall constitute failure of the peel strength test. Separation of the bonded joint before failure of the coated laminate shall constitute failure of the shear test.

4.5.3.3.1 Dry joint peel strength. After conditioning specified in 4.5.3.3, the three specimens shall be tested at the same condition of temperature and humidity.

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4.5.3.3.2 Wet joint peel strength. After conditioning specified in 4.5.3.3, the three specimens shall be immersed in distilled water for not less than 48 hours. Water temperature shall be maintained at 72° F. plus or minus 2° F. Test specimens may be blotted dry prior to testing.

4.5.3.3.3 Dry joint shearing strength. After conditioning as specified in 4.5.3.3, the three specimens shall be tested at the same condition of temperature and humidity.

4.5.3.3.4 Wet joint shearing strength. After conditioning specified in 4.5.3.3, the three specimens shall be immersed in distilled water for not less than 48 hours. Water temperature shall be maintained at 72° F. plus or minus 2° F. Test specimens may be blotted dry prior to testing.

4.5.3.4 Thickness of nonskid surfacing. Five specimens 12 inches by 12 inches shall be taken from a nonskid-treated area of membrane. Each specimen shall have one nonskid polka dot pattern in its center. The thickness shall be determined in accordance with FED. TEST METHOD STD. No. 191, method 5030, or in accordance with Test Method 1 of Appendix A. Five random thickness determinations shall be made of the nonskid-treated areas of each specimen, and five random thicknesses shall be made of the untreated areas of each specimen. The difference between the thickness of the nonskid-treated area and the thickness of the untreated area is the thickness of the nonskid surfacing. Nonconformance of the average of the five nonskid thickness measurements of each specimen to the values specified in table VI shall constitute failure of the test.

4.5.3.5 Diameter and spacing of nonskid surfacing polka dots. Diameter and spacing of dots shall be determined by measuring or as specified in Appendix A. Nonconformance to the diameters and spacing specified in table VI shall constitute failure of the test.

4.5.3.6 Fuel resistance. The fuel resistance shall be determined in accordance with Test Method 2 of Appendix A. Average breaking strength of less than 90 percent of the unconditioned membrane breaking strength shall constitute failure of this test.

4.5.3.7 Dead load shear resistance. The dead load shear resistance of the membrane joints shall be determined as specified herein. The test specimen shall consist of two sections joined together in the same manner as the production membrane. The sample shall be 1.0 inch wide plus or minus .02 inch, and there shall be not less than 2 inches of coated

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laminate on each side of the joint. Subject the specimen to a constant (dead load) tension of 50 pounds at 180° F. plus or minus 5° F. At the end of 46 hours the specimen shall be examined for slippage or separation while still under tension. Nonconformance to 3.4.2 shall constitute failure of the test.

4.6 Inspection of preparation for delivery.

4.6.1 Preproduction pack inspection.

4.6.1.1 Examination. The preproduction pack shall be examined for the defects specified in 4.6.2.3. Presence of one or more defects shall be cause for rejection.

4.6.2 Quality conformance inspection of pack.

4.6.2.1 Unit of product. For the purpose of inspection, a completely processed membrane prepared for shipment shall be considered a unit of product.

4.6.2.2 Sampling. Sampling for examination shall be in accordance with MIL-STD-105, inspection level S-2.

4.6.2.3 Examination. Samples selected in accordance with 4.6.2.2 shall be examined for the following defects. AQL shall be 4.0 percent defective.

- 117. Materials, methods and containers not as specified. Each incorrect material, method or container shall be considered one defect.
- 118. Cemented seams not dusted with mica or talc.
- 119. Types I and II membranes not pleated as required.
- 120. Types I and II membrane ends not sealed as specified.
- 121. Strapping and tape not as specified.
- 122. Type III membrane not rolled as specified.
- 123. Core for type III membrane not as specified.
- 124. Marking illegible, incorrect or incomplete.

5. PREPARATION FOR DELIVERY

5.1 Preproduction pack. The supplier shall furnish a preproduction pack for examination and test within the time frame specified (see 6.2) to prove, prior to starting production packaging and packing, that the applied preservation, packaging, packing and marking comply with the preparation for delivery requirements of this specification (see 6.4). Examination and tests shall be those specified herein.

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5.2 Preservation and packaging.

5.2.1 Type I, runway membrane 66 feet by 53 feet. Areas 30 inches, plus or minus 1 inch wide on both sides of each end of the membrane for the full width of the membrane (66 feet) shall be cleaned of all dirt, powders, curing compounds and other foreign materials that constitute a hindrance to the construction of adhesive joint. The cleaned areas shall be covered with paper conforming to PPP-B-1055, class E-1. The paper shall be sealed to the membrane at all edges with tape conforming to PPP-T-60, class 1. All seams on both sides of the membrane shall be dusted with pulverized mica or talc to cover any adhesive protruding from the seam and thereby prevent sticking of the membrane when pleated and secured for shipment. After dusting, the membrane shall be accordion pleated in pleats 43 inches plus or minus 2 inches wide in the direction that parallels the 53 foot dimension. The pleated runway membrane shall be accordion pleated in pleats 83 inches plus or minus 2-3/4 inches wide in the direction that parallels the 66 foot dimension to form a compact 43 inches plus or minus 2 inches by 83 inches plus or minus 2-3/4 inches bundle. The double pleated bundle shall then be restrained with two lengthwise and three girthwise straps conforming to PPP-S-760, type II, 5/8 inch by 0.030 inch and secured with a metal sealed joint or buckle type seal to form a compact bundle of minimum cube (see figure 3).

5.2.2 Type II, taxiway membrane, 42 by 53 feet. The membrane shall be cleaned, covered, folded, pleated and strapped as specified in 5.2.1.

5.2.3 Type III, splicing membrane, 3 by 66 feet. The membrane shall be cleaned of all dirt, powders, curing compounds and other foreign materials. The membrane shall be compactly and uniformly rolled, with the white line on the outside of the roll, on to a fiber or plastic composition core. The core shall have an inside diameter of 3 inches plus or minus 1/4 inches, with 1/2 inch plus or minus 1/16 inch wall thickness. The roll shall be secured with four strips of tape conforming to PPP-T-60, type IV, 1 inch minimum width. The tape strips shall be of 12 inch length, with approximately 6 inches on each side of the end of the membrane, and uniformly spaced over the width of the roll. Each roll of membrane, prepared as above, shall be encased in a close-fitting flat tube made from tubing of an appropriate size in accordance with requirements of L-P-378, type I, class 1, grade and finish optional, 4 mil thickness polyethylene. The open ends of the tubing shall be closed by heat sealing or with a plastic twist-tie, at the option of the supplier.

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5.3 Packing.

5.3.1 Type I and type II membranes. The type I and type II membranes preserved and packaged as specified in 5.2, shall be packed in a container as shown in figure 4.

5.3.2 Membrane splicing roll. The membrane splicing roll, preserved and packaged as specified in 5.2 shall be packed in a nailed wood cleated-plywood box conforming to PPP-B-601, overseas type, style I in quantities of 10 rolls, two tiers of five laid flat. Strapping shall be zinc coated.

5.4 Marking. Shipping containers shall be marked in accordance with MIL-STD-129. For purposes of the preservation and packing level marking, level A/A shall be used (see 6.5).

6. NOTES

6.1 Intended use. Heavy duty membrane airfield surfacing is intended for use as temporary, waterproof airfield surfacing material. The membrane is a component part of an airfield surfacing set covered by SC5680-97-CL-E05.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type of airfield surfacing membrane required (see 1.2).
- (c) Time frame required for submission of the first-produced item and number required (see 3.2).
- (d) Time frame required for submission of the basic nylon fabric (see 3.2.1).
- (e) Nonskid color required (see 3.5.2).
- (f) Time frame required for submission of the preproduction pack (see 5.1).

6.3 First-produced membrane. Any changes or deviations of production membrane from the approved first-produced membrane during production will be subject to the approval of the contracting officer. Approval of the first-produced membrane will not relieve the supplier of his obligation to furnish membranes conforming to this specification.

6.4 Preproduction pack. Any changes or deviations of production packs from the approved preproduction pack will be subject to the approval of the contracting officer. Approval of the preproduction pack will not relieve the supplier of his obligation to preserve, package, pack and mark the membranes in accordance with this specification.

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6.5 Packaging and packing. The nature of these items is such that only a single level of preservation, packaging, and packing is required. This A/A level represents both the maximum and minimum acceptable level of protection.

6.6 Nonskid surfacing materials. The nonskid surfacing materials listed herein when procured from the vendor listed herein are approved for application on the membrane, heavy duty, airfield surfacing. Prior to using a substitute item, approval of the item should be obtained from the Commanding Officer, U. S. Army Mobility Equipment Research, and Development Center, ATTN: STSFB-MG, Fort Belvoir, VA. 22060.

- (a) Fuller Nonskid Compound 201 consisting of 514-G-38 compound and 75-C-408 catalyst, W. P. Fuller Paint Company, 4115 West Artesia Avenue, Fullerton, California.
- (b) Nonskid Compound consisting of 850-22-AH compound and 850-23-AH curing agent, Reliance Universal Inc., 4070 East Washington Boulevard, Los Angeles, California.
- (c) PML812-M-1 Epoxit Nonskid, Palmer Products Inc., Worchester, Pennsylvania.

Custodians:

Army - ME
Navy - YD
Air Force - 84

Preparing activity:

Army - ME
Project No. 5680-0048

Review activities:

Army - CE, MD

User activities:

Army - AV
Navy - MC

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APPENDIX A

FOR

MEMBRANE, HEAVY DUTY, AIRFIELD SURFACING

Scope. The materials, test methods, and recommended method of application of nonskid surfacing contained within this appendix are to insure that heavy duty membranes procured under this specification conform to the requirements set forth.

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TEST METHOD No. 1

DIAMETER AND THICKNESS OF NONSKID SURFACING

1. SCOPE

1.1 This test is intended for determining the diameter and thickness of the nonskid surfacing applied to the heavy duty membrane surfacing.

2. TEST SPECIMEN

2.1 The test specimen shall be a fabricated, type I and type II membrane and the areas to be measured shall be as specified in figure 5.

3. NUMBER OF DETERMINATIONS

3.1 See figure 5.

4. APPARATUS

4.1 Single hole galvanized sheet metal templates shall be round and conform to the dimensions specified in table A-I.

Table A-I. Template Dimensions

Template Designation	Gage*	Thickness (in.)	Inside Diameter (in.) $\pm .010$	Outside Diameter (in.) $\pm .12$	Remarks
A	19	0.0456	2.00	5.00	Used to determine if the diameter of a polka dot is less than specified.
B	19	0.0456	2.25	5.00	Used to determine if the diameter and thickness of a polka dot is greater than specified.
C	25	0.0247	2.25	5.00	Used to determine if the thickness of a polka dot is less than specified.

* Galvanized sheet gage.

5. PROCEDURE

5.1 Measure all whole "polka dot" in a 1 foot square area at each location shown in figure 5 with the templates.

5.1.1 Place the templates A and B over the dots. If the diameter is equal to or greater than the diameter of template A and equal to or less than the diameter of template B the diameter of the dot is acceptable.

5.1.2 Place template C over the dot and rub a metal straight edge over the dot. If the straight edge does not come in contact with the dot the nonskid surfacing is too thin.

5.1.3 Place template B over the dot and rub a metal straight edge over the dot making sure that the straight edge is in contact with the template. If the straight edge comes in contact with the nonskid surfacing, the nonskid surfacing is too thick.

6. FAILURE CRITERIA

6.1 Failure of more than 10 percent of the polka dots to conform to the dimensions specified in table VI shall constitute failure of this test.

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RECOMMENDED METHOD OF APPLICATION OF NONSKID SURFACING

1. SCOPE

1.1 The method of application of nonskid surfacing and the equipment listed herein is recommended for the successful application of nonskid surfacing to the membrane.

2. METHOD OF APPLICATION

2.1 Nonskid surfacing may be applied to the membrane using a template and paint spray gun or other apparatus to produce a uniform coverage of nonskid surfacing.

3. EQUIPMENT

3.1 Nonskid surfacing may be applied with a Binks 30-gallon standard pressure fluid tank with agitator and bottom outlet assembly, or equal. A Binks model 7E2 rear closure spray gun with a 46 X 190 nozzle setup provides uniform coverage. A fluid pressure of 15 psi in the tank and 45 psi air pressure at the spray gun nozzle has been used successfully to provide uniform texture.

4. When compounds or components suggested in 6.6 are used, the viscosity and weight of nonskid compound or components shall be as specified in table A-II. The minimum weight of the components of the nonskid compound is that required for a 5-1/4-gallon container.

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Table A-II. Viscosity and Weight of Nonskid Components

Compound or Component	Component	Viscosity*		Spindle No.	Rev. Min.	Temp. °F. ± 5° F.	Min Weight
		Min.	Max.				
Fuller 201 Converter	75-C-408	800	1,200	2	12	75	4 lb
	514-G-38	8,000	12,000	4	12	"	56 lb
Reliance Universal Curing Agent	820-23-AH	400	800	2	12	"	4 lb
	820-22-AH	3,000	7,000	4	12	"	52 lb
Palmer Products Inc.	Accelerator	3,500	3,900	2	6	"	8 lb
	Basic Compound	2,000	6,000	4	12	"	52 lb

* Centipoises, determined with a model LVT Brookfield Viscometer.

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TEST METHOD No. 2

FUEL RESISTANCE OF MEMBRANE SURFACING

1. SCOPE

1.1 This test determines the resistance of membrane surfacing to the effects of aromatic and nonaromatic hydrocarbon fuels.

2. TEST SAMPLE AND SPECIMENS

2.1 A test sample shall be an 8- by 24-inch section of finished membrane surfacing. Three test specimens shall be cut from the 8- by 24-inch test sample of membrane after it has been conditioned as specified herein. The test specimens shall be nominally 4 inches by 8 inches.

3. APPARATUS AND METHOD

3.1 A two-piece acrylic plastic container as shown in figure 6, and 12 "C" clamps.

3.2 Testing equipment consisting of the following:

- (a) Straining mechanism.
- (b) Clamps for holding the specimen.
- (c) Load and elongation mechanism.

3.3 Method.

3.3.1 Condition one 8- by 24-inch sample in fuel conforming to MIL-T-5624, grade JP-4.

3.3.2 Test the specimens in accordance with ASTM D1682 (modified grab method).

4. PROCEDURE

4.1 Place the sample membrane between the top and bottom of the apparatus shown in figure 6, and place the "C" clamps around the container to prevent leakage. Fill the container with the test medium to a depth of 5/8 inch plus 1/8 minus 0 inch. Allow the sample to stand 24 hours. Cut the three specimens from the samples and subject the specimens to the modified grab test (ASTM D1682). Conditioned specimens will be placed in the jaws of the machine in such a manner that the area in contact with the machine jaws shall be void of the medium.

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5. FAILURE CRITERIA

5.1 The average breaking strength of the three conditioned specimens shall be not less than 90 percent of the breaking strength of the unconditioned membrane warp and fill.

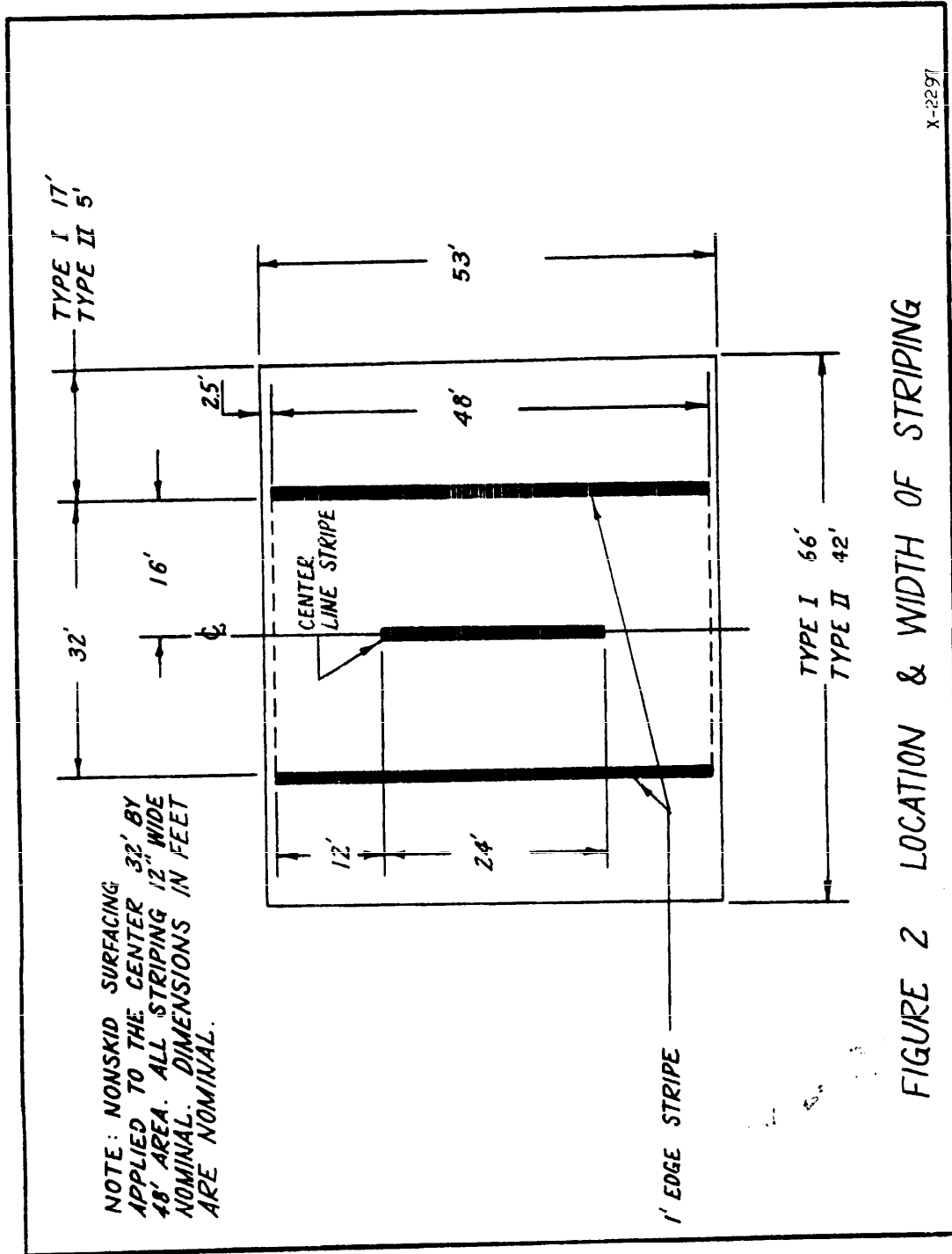


FIGURE 2 LOCATION & WIDTH OF STRIPING

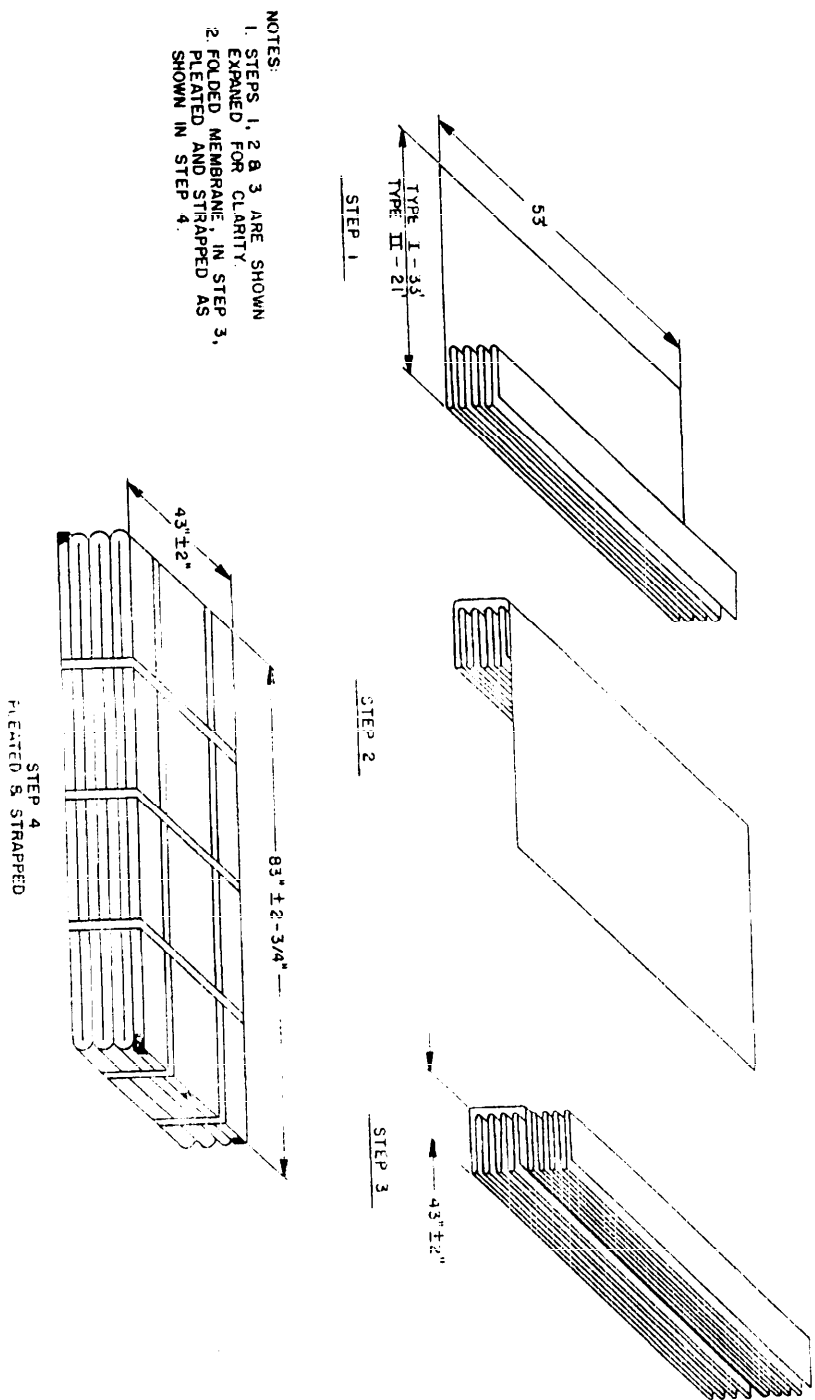
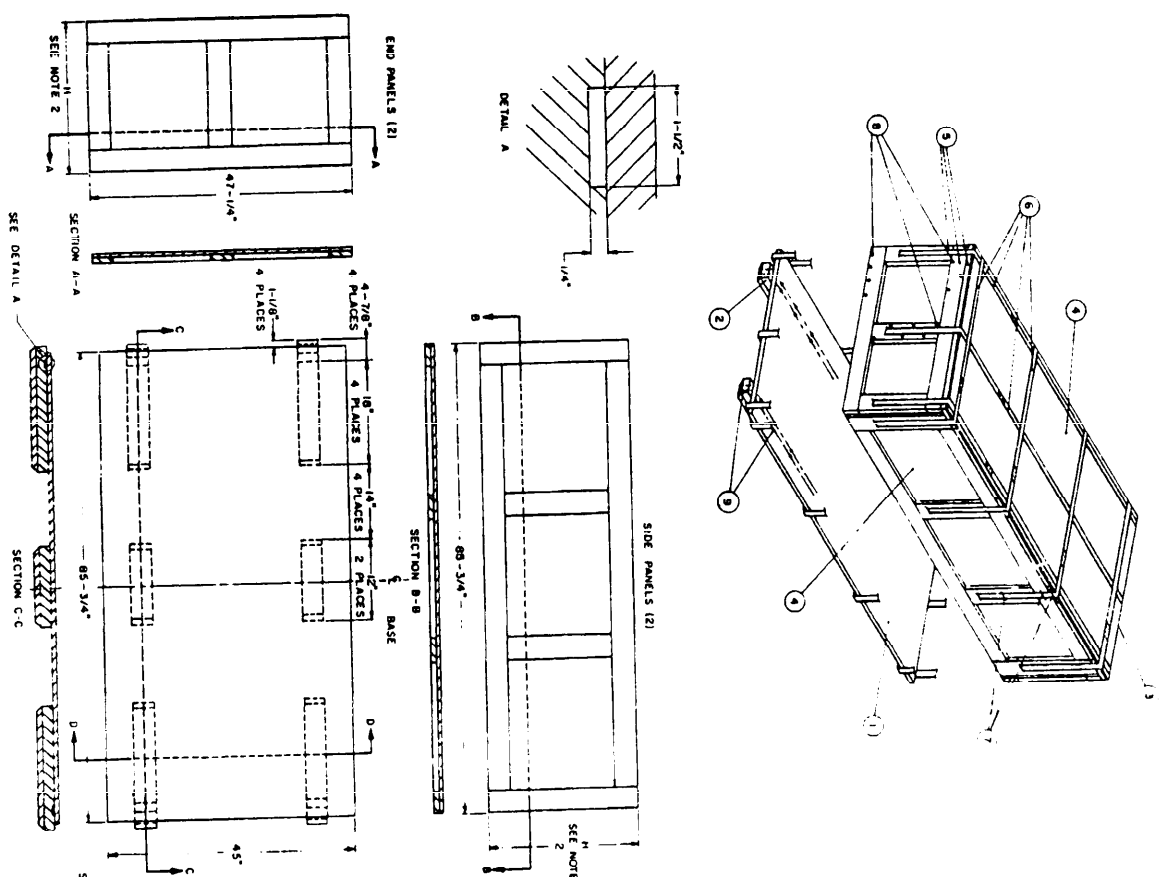


Figure 3. PLEATING OF THE TYPE I OR II MEMBRANE

X-2286



FINI NO	QTY	NOMENCLATURE
1		BASE PLYWOOD NN-P-530, GROUPS A OR B, CONFORMING TO PS-51
2		TYPE I, GRADE 3-4 OR PS-1, STD SHEATHING WITH EXTERIOR GLUE, 3/4 INCH THICKNESS
3		SKID LUMBER ML-STD-731 CL II 3 X 4 NOM SIZE (2 X 4 PLUS 1 X 4 RUBBERING STRIP ACCEPTABLE) BEVEL LOWER 3/4 INCH ON 45° CAP CONFORMING TO PPP-B-601 OVERSEAS TYPE, STYLE A WITH EXCEPTONS DESCRIBED BELOW, AND NOTES
4		ALL PLYWOOD PANELS NN-P-530, GROUPS A OR B, CONFORMING TO PS-51, TYPE I GRADE 3-4 OR PS-1, STD SHEATHING WITH EXTERIOR GLUE, 3/8 INCH THICKNESS
5	25	ALL CLEATS ON END PANELS, SIDES, AND TOP TO BE NOM. 1 X 4 STRAPPING OO-S-781 TYPE I OR IX, CL B (COLD-ROLLED, HEAT TREATED) 3/4 X 0.031
6		AR STAPLES, 7/8" CROWN WIDTH, 3/4" LONG, GALVANIZED STEEL
7		AR (70(MIN)) CEMENT COATED COOLERS OR SINKERS, (FF-N-105 TYPE II STYLE 7 OR 8)
8		AR 84 CEMENT COATED COOLERS OR SINKERS-SEE NOTE 5 BELOW
9		AR 84 CEMENT COATED COOLERS OR SINKERS-SEE NOTE 5 BELOW

- NOTES
- CONSTRUCTION OF PANELS IN ACCORDANCE WITH REQUIREMENTS OF PPP-B-601, EXCEPT FOR CLEATS IN TOP PANEL
 - HEIGHT TO BE DEPENDENT UPON MEMBRANE CONTAINED
 - CONTAINER FOR TYPE I WILL APPROXIMATE 36 INCHES IN HEIGHT I.D., CONTAINER FOR TYPE II WILL APPROXIMATE 30 INCHES IN HEIGHT I.D.
 - NET WT OF CONTENTS (NOMINAL) TYPE I 1950 LBS, TYPE II 1600 LBS
 - NAILING OF BASE TO SKIDS, CEMENT COATED COOLERS OR SINKERS OF SUFFICIENT LENGTH TO ALLOW CLINCH OF MIN 1/8 INCH IF SKIDS ARE MADE OF TWO PIECE CONSTRUCT SECURE BEVELLED RUBBERING STRIP TO NOM. 2 X 4 SKID WITH 84 CEMENT COATED COOLERS OR SINKERS
 - TOP PANEL SECURED IN PLACE WITH CLEATS ON INSIDE
 - STRAPPING SHALL BE DRAWN TO MAXIMUM PERMISSIBLE TENSION FOR ALL BANDS
 - STRAPPING SHALL BE CENTERED ON 1 X 4 CLEATS

Figure 4. MEMBRANE SURFACING LEVEL A PACK.

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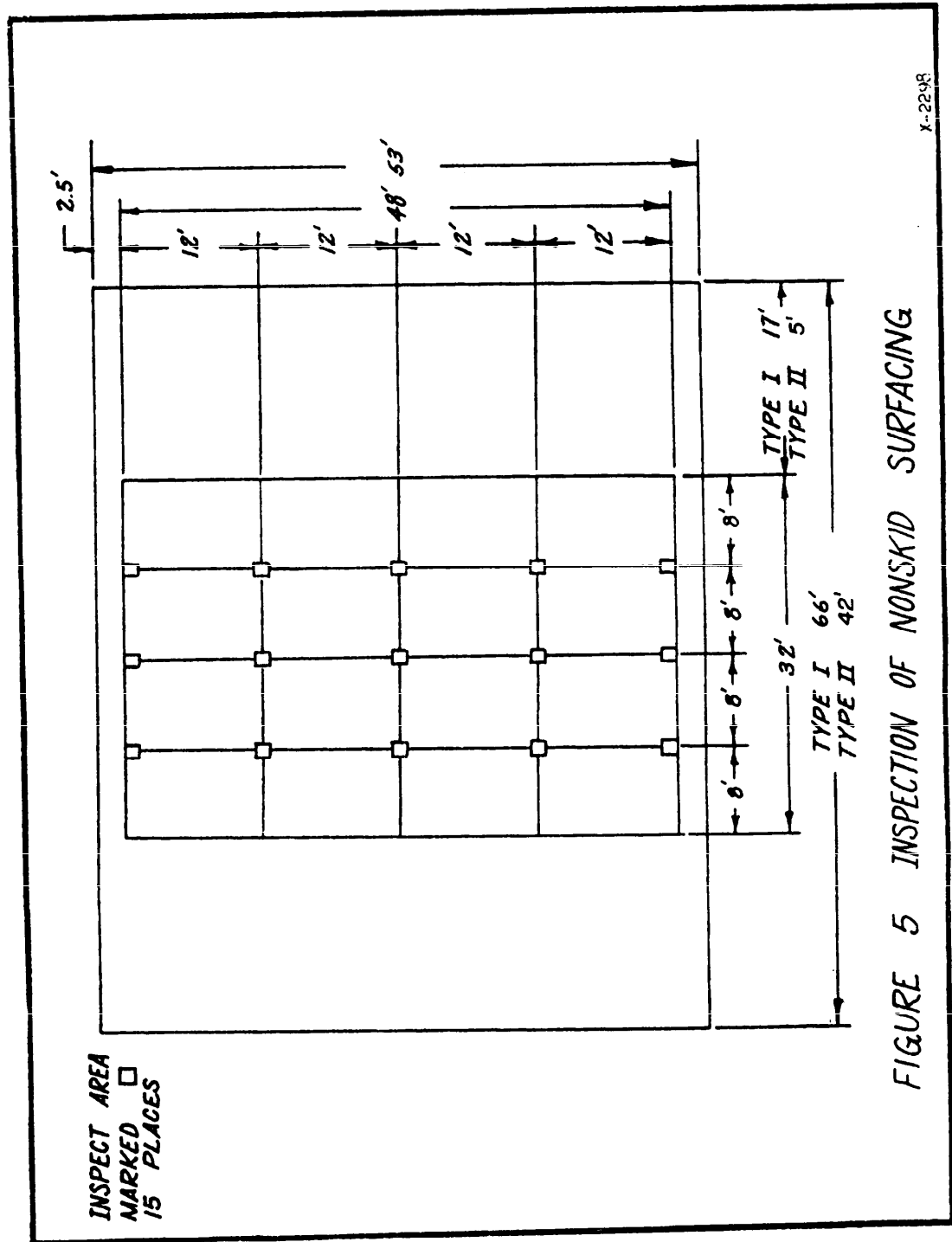
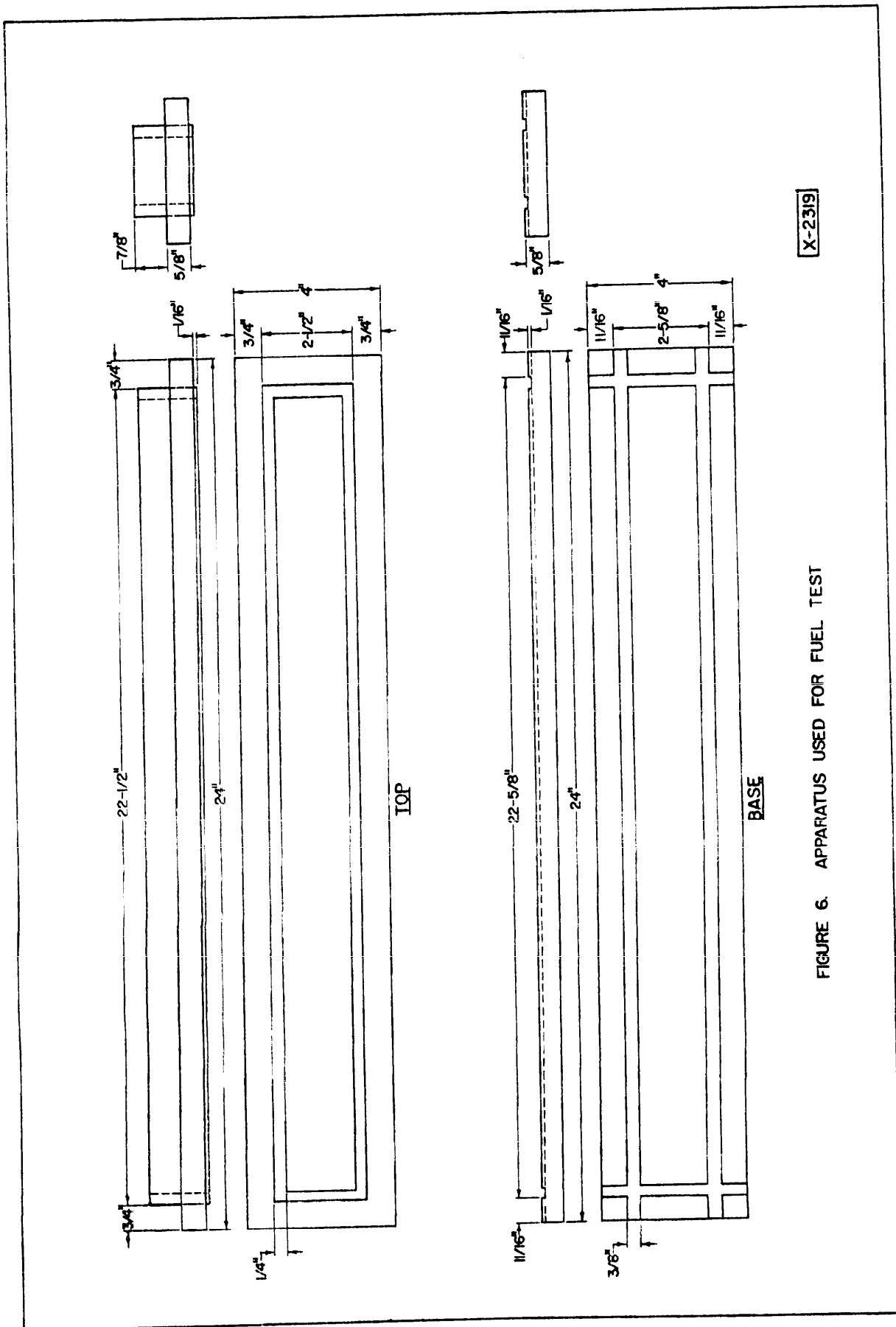


FIGURE 5 INSPECTION OF NONSKID SURFACING

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X-2319

FIGURE 6. APPARATUS USED FOR FUEL TEST

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL		Form Approved Budget Bureau No. 22-R255
<p>INSTRUCTIONS: This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.</p>		
SPECIFICATION <u>MIL-M-52769</u> MEMBRANE, SURFACING: AIRFIELD, HEAVY DUTY		
ORGANIZATION		
CITY AND STATE		CONTRACT NUMBER
MATERIAL PROCURED UNDER A <input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO (If "yes", in what way?)		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.)		
SUBMITTED BY (Printed or typed name and activity - Optional)		DATE

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