

INCH- POUND

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 SUPERSEDING
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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 Scope. 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 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

A-A-55057	- Panels, Wood/Wood Based; Construction and Decorative.
L-P-378	- Plastic Sheet and Strip, Thin Gauge, Polyolefin.
FF-N-105	- Nails, Brads, Staples and Spikes, Wire, Cut and Wrought.
TT-P-19	- Paint, Latex, (Acrylic Emulsion, Exterior Wood and Masonry).
TT-P-96	- Paint, Latex Base, for Exterior Surfaces (White and Tints).
PPP-B-601	- Boxes, Wood, Cleated Plywood.
PPP-B-1055	- Barrier Material, Waterproofed, Flexible.
PPP-T-60	- Tape, Packaging, Waterproof.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US ARMY BELVOIR RDE CTR, ATTN SATBE TSE, 10101 GRIDLEY RD STE 104, FT BELVOIR VA 22060-5818 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 5680

AMSC N/A

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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- MIL-W-5044 - Walkway Compound, Nonslip, and Walkway Matting, Nonslip.
- MIL-T-5624 - Turbine Fuel, Aviation, Grades JP-4 and JP-5.

STANDARDS

FEDERAL

- FED-STD-191 - Textile Test Methods.
- FED-STD-595 - Colors Used in Government Procurement.

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- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-130 - Identification Marking of US Military Property.
- MIL-STD-731 - Quality of Wood Members for Containers and Pallets.
- MIL-STD-889 - Dissimilar Metals.
- MIL-STD-1472 - Human Engineering, Design Criteria for Military Systems, Equipment and Facilities.

(Unless otherwise indicated, copies of federal and military specifications and standards are available from: STDZN DCMNT ORDER DESK, BLDG 4D, 700 ROBBINS AVE, PHILADELPHIA PA 19111-5094.)

2.1.2 Other Government publications. The following other Government publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those in effect on the date of the solicitation.

U.S. DEPARTMENT OF COMMERCE COMMERCIAL STANDARD

- PS-1 - Softwood Plywood - Construction and Industrial.

(Application for copies should be addressed to: SUPT OF DCMNTS, GVT PRINTG OFC, WASHINGTON DC 20402.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- HPMA HP - Hardwood and Decorative Plywood.

(Application for copies should be addressed to: AMERCN NATL STANDS INST, 1430 BROADWAY, NEW YORK NY 10018.)

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 903	- Peel or Stripping Strength of Adhesive Bonds.
D 1117	- Standard Methods of Testing Non-Woven Fabrics.
D 1682	- Breaking Load and Elongation of Textile Fabrics.
D 3950	- Strapping, Nonmetallic.
D 3953	- Strapping, Flat Steel and Seals.
D 4675	- Selection and Use of Flat Strapping Materials.

(Application for copies should be addressed to: AMERCN SCTY & MTRLS, 1916 RACE STRET, PHILADELPHIA PA 19103.)

(Non-Government standards and other publications are normally available from the organizations that prepare or 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 document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 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. Unless otherwise specified (see 6.2) a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.3.

3.2.1 Base nylon fabric. In addition to the first article membrane, the base nylon fabric shall be furnished and tested prior to the time the first article membrane is furnished. The basic nylon fabric shall be identical to the fabric used to fabricate the first article membrane. Tests shall be those specified in section 4 and shall be subject to surveillance and approval by the Government.

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

3.3.1 Material deterioration prevention and control. The membrane shall be fabricated from compatible materials, inherently corrosion resistant or treated to provide protection against the various forms of corrosion and deterioration that may be encountered in any of the applicable operating and storage environments to which the membrane may be exposed.

3.3.1.1 Dissimilar metals. Dissimilar metals shall not be used in intimate contact with each other unless protected against galvanic corrosion. Dissimilar metals and methods of protection are defined and detailed in MIL-STD-889.

3.3.2 Recovered materials. For the purpose of this requirement, recovered materials are those materials which have been collected from solid waste and reprocessed to become a source of raw materials, as distinguished from virgin raw materials. The components, pieces and parts incorporated in the membrane may be newly fabricated from recovered materials to the maximum extent practicable, provided the membrane produced meets all other requirements of this specification. Used, rebuilt or remanufactured components, pieces and parts shall not be incorporated in the membrane.

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3.3.3 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 adeipmide). The fabric shall be pure finish, scoured and heat set, and contain no residual sizing or other chemicals, used to augment weaving, but which may inhibit adhesion of the coating. When tested as specified in 4.5.2, the physical and mechanical properties of the base fabric shall conform to table I.

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	492
Yarns per inch,	-	23
Warp	-	22
fill	-	350
Breaking strength (grab), warp and fill; pounds.	-	60
Tear strength, warp and fill; pounds.	-	25
Elongation, warp and fill; percent.	40	

3.3.4 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 traverse joints. Types I, II, and III membrane dimensions shall be as specified in table II.

TABLE II. Membrane dimensions.

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

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 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.

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TABLE III. Physical and mechanical properties of coated laminate.

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

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 9.50 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. Maximum movement of the joint 0.10-inch.
Shear strength of joint	X	X	
Dead load shear resistance	-	X	

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.

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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
I	18	8
II	11	2
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-595, color as specified (see 6.2).

3.5.2.1 Nonskid surfacing. Nonskid surfacing material shall provide a dry factor of sliding friction of 0.90 or higher and a watered factor of 0.80 or higher. 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 appendix A for recommended nonskid material and method of application.

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TABLE VI. Nonskid surfacing thickness, dot diameter and spacing.

Dimensions	Maximum	Minimum
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

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 packaging.

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-19 or TT-P-96, type II, and color no. 37875 conforming to FED-STD-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 packaging.

3.5.2.3 Edge stripe. Edge stripes shall be 12 inches \pm 1-inch wide. The near edge of each stripe shall be 16 feet \pm 1.50-inches from the centerline of the type I to type II membrane, (see figure 2).

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 .125-inch wide white lines. Two lines shall be located on each end and extend the full 66 or 42 feet 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 .125-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 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-96; letters and numerals shall be not less than 2 inches tall:

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National Stock Number
Nomenclature
Contract Number
Manufacturing Code Identification
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. Marking shall be in accordance with 5.5 of MIL-STD-1472.

3.7 Workmanship. The finished types I, II and III membranes 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 contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order and unless disapproved by the Government, the contractor's own facilities or any other, suitable for the performance of the inspection requirements specified herein, may be used. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure 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 program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements; however, this 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 Component and material inspection. The contractor is responsible for ensuring that the components and materials used are manufactured, examined, and tested in accordance with referenced specifications and standards, as applicable.

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

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).
- c. Inspection of packaging (see 4.6).

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4.3 First article inspection.

4.3.1 Examination. The first article 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 article base fabric, coated laminated 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 and tests shall be in accordance with MIL-STD-105. Sample size shall be determined by using MIL-STD-105, table I and table IIa. A lot shall be accepted when 0 defects are found and rejected when 1 or more defects are found.

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. Presence of one or more defects shall be cause for rejection.

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 no 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.

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TABLE VII. Examination schedule.

First Article or Quality Conformance			Examination	Requirement Paragraph
Membrane Types				
I	II	III		
X	X	X	101. Material not as specified.	3.3
X	X	X	102. Materials are not resistant to corrosion or deterioration or treated to be made resistant to corrosion or deterioration for the applicable storage and operating environment as specified.	3.3.1
X	X	X	103. Dissimilar metals as specified in MIL-STD-889 are not effectively insulated from each other as specified.	3.3.1.1
X	X	X	104. Used, rebuilt or remanufactured components, pieces, or parts incorporated in the membrane.	3.3.2
X	X	X	105. Dimensions not as specified.	3.4
X	X	X	106. Membrane not fabricated as a lamination.	3.4.1
X	X	X	107. Synthetic rubber coating of the laminate and plies not as specified.	3.4.1
X	X	-	108. Lap joint width not as specified.	3.4.2
X	X	-	109. Longitudinal and transverse joints exceed quantity specified.	3.4.2.1
X	X	-	110. Holes, tears, scuffs or abrasions in center 36 X 53 feet area.	3.4.3.1
X	X	-	111. Patches exceed size and number specified.	3.4.3.1
X	X	-	112. Patches in the center 36 X 53 feet area.	3.4.3.1
X	X	-	113. Patch overlap not as specified.	3.4.3.1
-	-	X	114. Holes, cuts, tears, patches, scuffs or any joints in type III membrane.	3.4.3.2
X	X	-	115. Thickness, diameter, and spacing of nonskid surfacing dots not as specified.	3.5.2.1.2
X	X	-	116. Nonskid surfacing improperly cured.	3.5.2.1.1
X	X	X	117. Striping and marking missing or not as specified.	3.5.2.2
X	X	X	118. Identification and special marking missing or not as specified.	3.6
X	X	X	119. Workmanship not as specified.	3.7
X	X	-	120. Skid resistance not as specified.	3.5.2.1

4.5.2 Tests. The tests shall be in accordance with table VIII or as otherwise specified.

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TABLE VIII. Test schedule.

First Article or Quality Conformance			Test	Test Method of FED-STD-191	Test Paragraph
Nylon Base Fabric	Coated Laminate	Types I & II Membrane			
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	ASTM D 1682	4.5.3.2
-	-	-	(warp & fill)	Modified Grab	
-	X	-	Elongation (warp & fill)	ASTM D 1682	4.5.3.2
-	-	-		Modified Grab	
-	X	-	Tear strength (warp & fill)	ASTM D 1117 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 plies	5950	4.5.3.2
-	X	-	Fuel resistance	Appendix A	4.5.3.6
-	-	X	Dry joint shearing strength	ASTM D 1682	4.5.3.3.3
-	-	X	Wet joint shearing strength	ASTM D 1682	4.5.3.3.4
-	-	X	Dry joint peel strength	ASTM D 903	4.5.3.3.1
-	-	X	Wet joint peel strength	ASTM D 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
-	-	X	Skid resistance	MIL-W-5044	4.5.3.8

- 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 weighing 20 pounds shall be used.
- 3/ Exception to the test method: The test specimen shall be conditioned for 4 hours at -40 °F. A steel roller, 4 inches in diameter and weighing 20 pounds, 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-STD-191. Nonconformance to the mechanical and physical properties specified in table I shall constitute failure of the test.

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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-STD-191 and the American Society for Testing and Materials. Breaking strength and elongation shall be determined by ASTM D 1682, modified grab method. The tear strength shall be determined by the trapezoid tearing load of woven fabrics method of ASTM D 1117. Nonconformance of the average of the values obtained from the tests to be 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 ± 2 °F at a relative humidity of 50 percent ± 5 percent. Peel strength test procedure shall be in accordance with ASTM D 903 and recorded in pounds per inch. Joint shear strength shall be in accordance with ASTM D 1682, 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.

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 ± 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 ± 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-STD-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.

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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 test method 1 of appendix A. Nonconformance of 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 $\pm .02$ -inch, and there shall be not less than 4 inches of coated laminate on each side of the joint. Subject the specimen to a constant (dead load) tension of 50 pounds at 180 ± 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.

4.5.3.8 Skid resistance of non-skid surfacing. Three samples of non-skid surfacing-treated membrane shall be tested in accordance with 4.6.9 of MIL-W-5044 for dry factor of sliding friction and three additional samples for wet factor of sliding friction; only rubber-skinned test block assemblies shall be used. The friction factors for each test run and the mean dry and wet factors shall be calculated in accordance with 4.6.9. A mean dry factor of sliding friction less than 0.90 or a mean watered factor of sliding friction less than 0.80 shall constitute failure of the test.

4.6 Inspection of packaging.

4.6.1 First article inspection.

4.6.1.1 Examination. The first article 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.

4.6.2.3 Examination. Samples selected in accordance with 4.6.2.2 shall be examined for the following defects. Presence of one or more defects shall be cause for rejection.

121. Types I and II membranes not preserved as specified (see 5.2.1 and 5.2.2).
122. Cemented seams not dusted with mica or talc (see 5.2.1 and 5.2.2).
123. Types I and II membrane not pleated as required (see 5.2.1 and 5.2.2).
124. Types I and II membrane ends not sealed as specified (see 5.2.1 and 5.2.2).
125. Strapping and tape not as specified for types I and II membranes (see 5.3.1 and figure 4).
126. Type III membrane not rolled and preserved as specified (see 5.3.2).
127. Core for type III membrane not as specified (see 5.2.3).
128. Shipping containers not as specified for types I, II and III membranes.
129. Marking illegible, incorrect or incomplete (see 5.4).

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5. PACKAGING

5.1 First article. The contractor shall furnish a first article pack for examination and test to provide, prior to starting production packaging, that the applied preservation, packing, and marking comply with the packaging requirements of this specification (see 6.4). Examination tests shall be those specified herein.

5.2 Preservation (see 6.5).

5.2.1 Type I, runway membrane, 66 by 53 feet. Areas 30 inches, ± 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 joints. 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. The 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 43 inches ± 2 inches wide in the direction that parallels the 53 feet dimension. The pleated runway shall be accordion pleated in pleats 83 inches ± 2.75 inches wide in the direction that parallels the 66 feet dimension to form a compact 43 inches ± 2 inches by 83 inches ± 2.75 inches bundle. The double pleated bundle shall then be restrained with two lengthwise and two girthwise straps conforming to ASTM D 3950, type II, .625-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, 43 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 $\pm .25$ inches, with a .50 inches $\pm .063$ -inch wall thickness. The roll shall be secured with four strips of tape conforming to PPP-T-60, class 1, 2 inches wide. The tape strips shall be of 12 inches long, with approximately 6 inches on each side of the end of the membrane and shall be 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 contractor.

5.3 Packing (see 6.5).

5.3.1 Type I and type II membranes. The types I and II membrane 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 quantities of 10 rolls, two tiers of five laid flat. Strapping shall be in accordance with ASTM D 3953, type 1 or 2, zinc coated, size as applicable and ASTM D 4675.

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

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6. NOTES

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

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

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- c. Type of airfield surfacing membrane required (see 1.2).
- d. When a first article is not required (see 3.2).
- e. Base nylon fabric furnished (see 3.2.1).
- f. Color required (see 3.5.2).
- g. Level of preservation and packaging (see 5.4).

6.3 First article. When a first article inspection is required, the item(s) should be a production model. The first article should consist of one or more units. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of the first article test results and disposition of the first articles. Invitation for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4 First article pack. Any changes or deviation of production packs from the approved first article will be subject to the approval of the contracting officer. Approval of the first article will not relieve the contractor of his obligation to preserve, pack and mark the membranes in accordance with this specification.

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

6.6 Subject term (key word) listing.

Airfield runway
 Airfield surface material
 Airfield taxiway
 Nylon fabric
 Runway membrane
 Runway surface material
 Synthetic rubber
 Taxiway membrane
 Taxiway surface material

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

Custodians:

Army - ME
Navy - YD
Air Force - 99

Preparing activity:

Army - ME

Project 5680-0196

Review activity:

Air Force - 84

User activities:

Army - AV
Navy - MC

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APPENDIX A

MEMBRANE, HEAVY DUTY, AIRFIELD SURFACING

10. SCOPE

10.1 Scope. The materials and test methods contained within this appendix are to ensure that heavy duty membranes acquired under this specification conform to the requirements set forth. This appendix is a mandatory part of this specification. The information contained herein is intended for compliance.

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APPENDIX A

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 fabricated, types I and II membranes 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 IX.

TABLE IX. Template dimensions.

Template designation	Gauge 1/	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.

1/ Galvanized sheet gauge.

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.

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APPENDIX A

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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APPENDIX A

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

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

3.3.2 Test the specimens in accordance with ASTM D 1682 (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 .625-inch \pm .125, \pm 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 D 1682). 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.

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.

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APPENDIX B

MEMBRANE, HEAVY DUTY, AIRFIELD SURFACING

10. SCOPE

10.1 Scope. The recommended method of application of nonskid surfacing contained within this appendix are to ensure that heavy duty membranes acquired under this specification conform to the requirements set forth. This appendix is a mandatory part of this specification. The information contained herein is intended for compliance.

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APPENDIX B

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 are used, the viscosity and weight of nonskid compound or components shall be as specified in table X. The minimum weight of the components of the nonskid compound is that required for a 5.25 gallon container.

TABLE X. Viscosity and weight of nonskid components.

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

$\frac{1}{2}$ Centipoises, determined with a model LVT Brookfield Viscometer.

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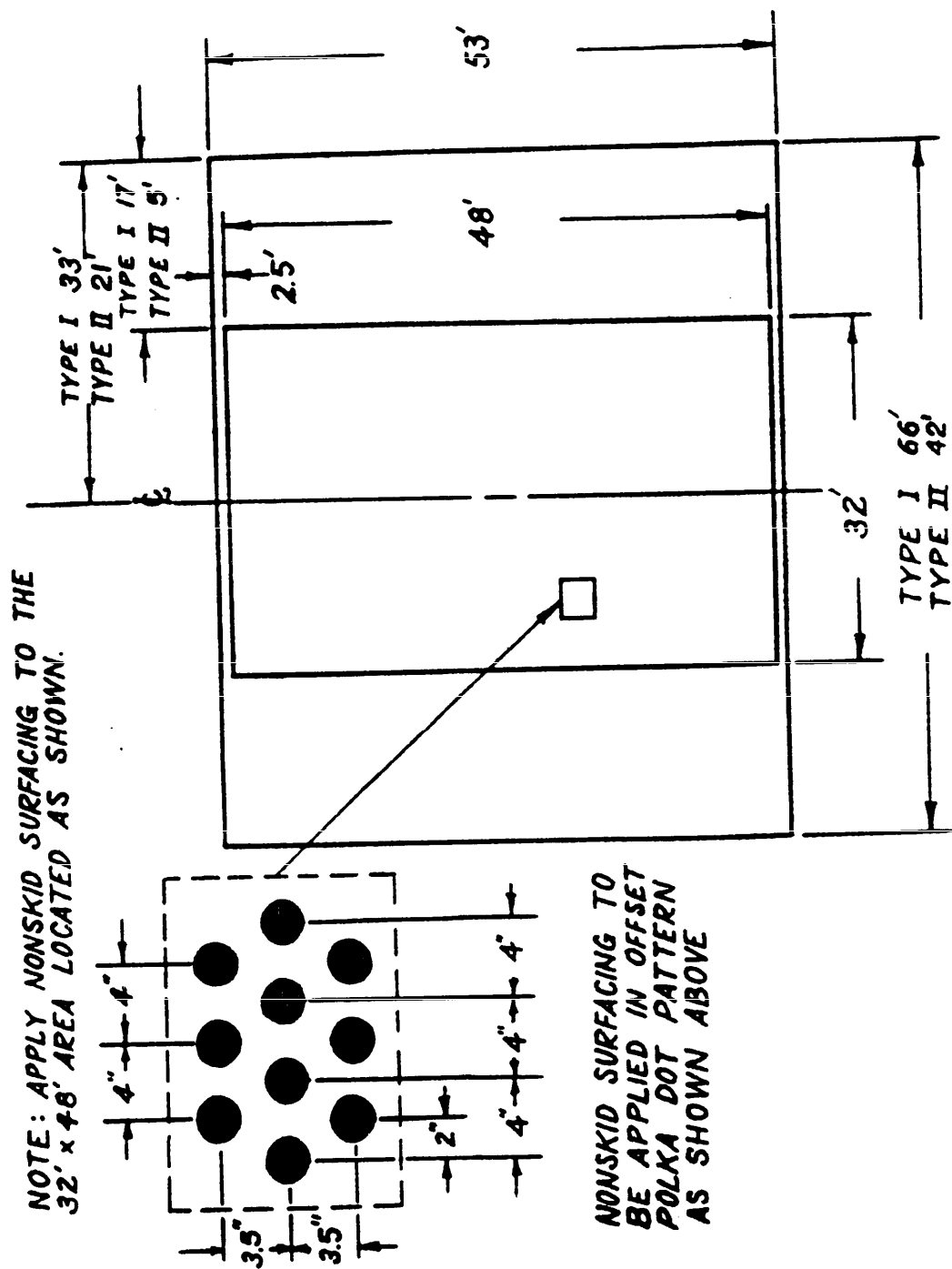
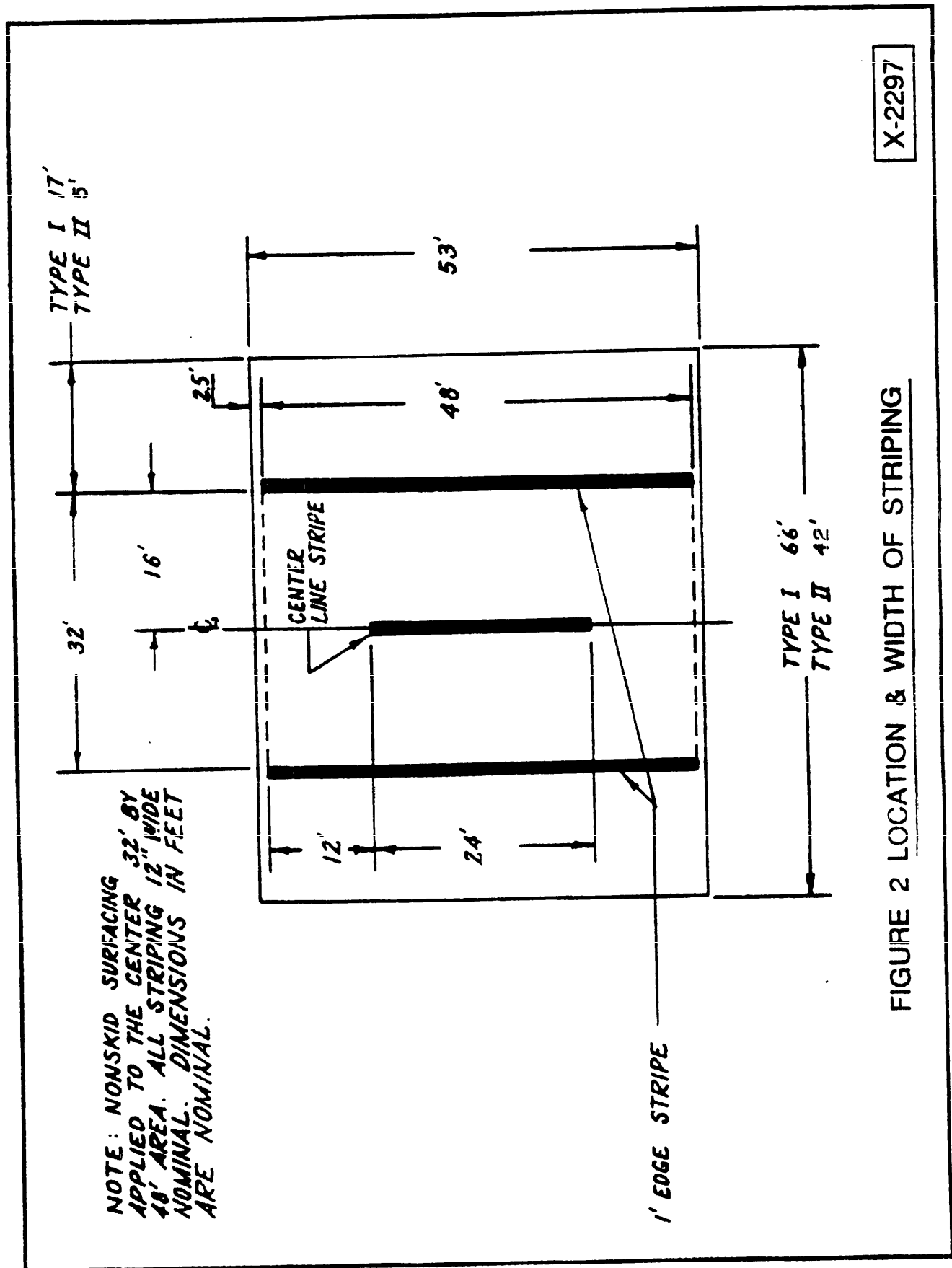


FIGURE 1 LOCATION OF NONSKID TREATED AREA

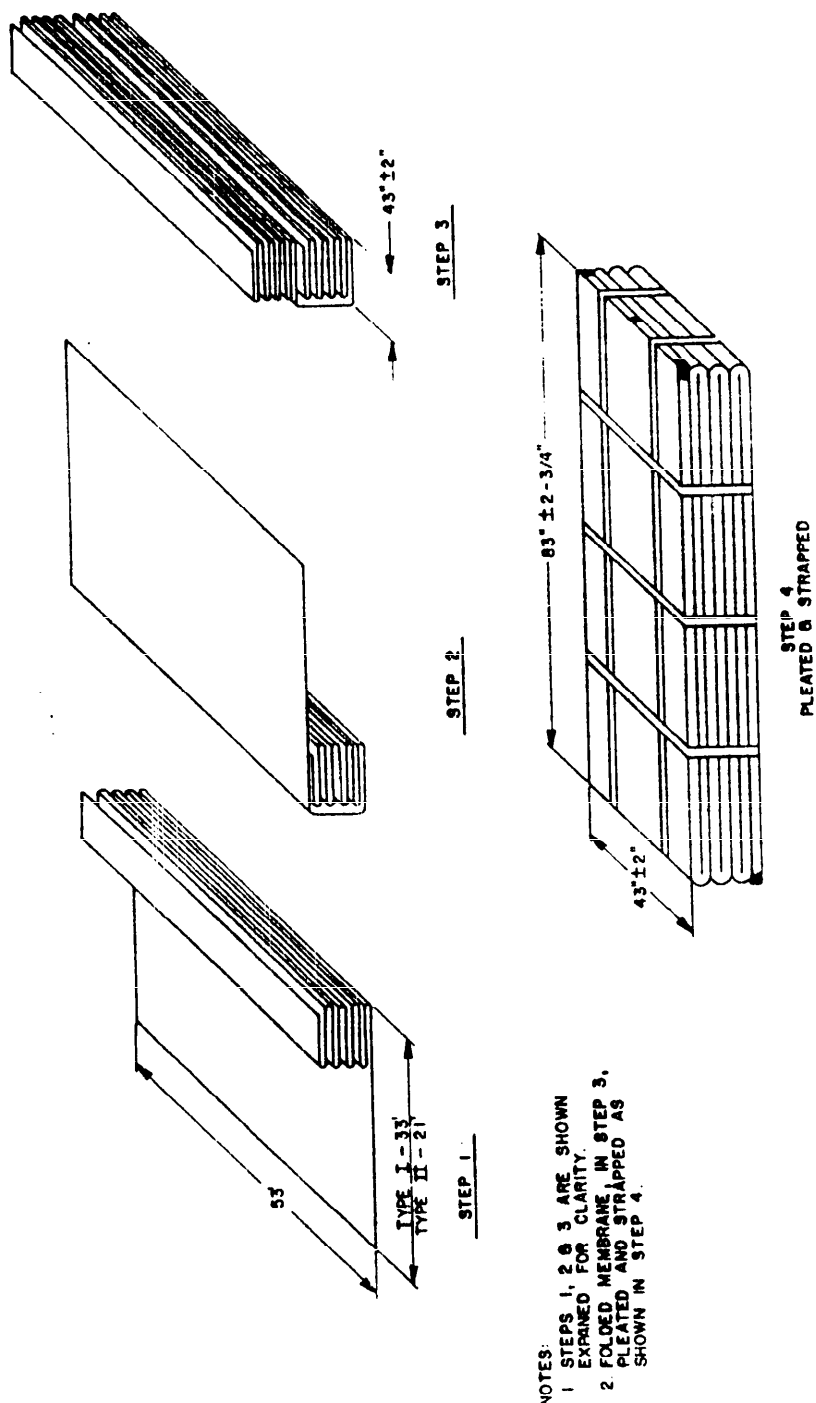
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FIGURE 2 LOCATION & WIDTH OF STRIPING

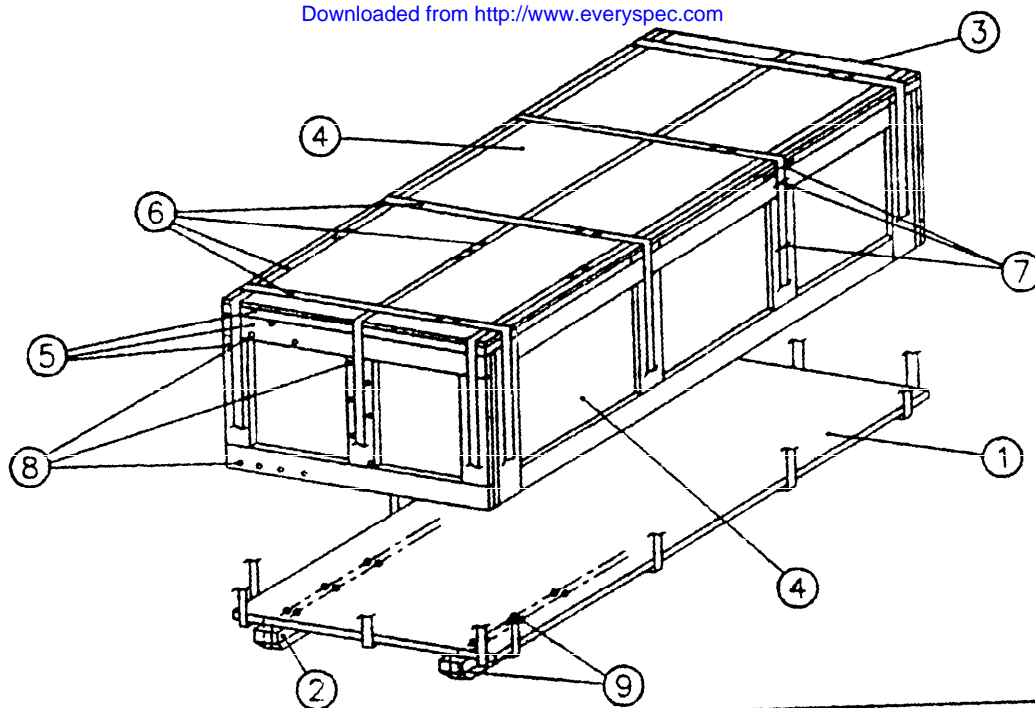
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NOTES:
 1 STEPS 1, 2 & 3 ARE SHOWN
 EXPANDED FOR CLARITY.
 2 FOLDED MEMBRANE IN STEP 3,
 PLEATED AND STRAPPED AS
 SHOWN IN STEP 4.

Figure 3. PLEATING OF THE TYPE I OR II MEMBRANE

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FIND NO.	QTY	NOMENCLATURE
1	1	BASE PLYWOOD A-A-55057; CONFORMING TO ANSI/HPMA HP TYPE I, GRADE 3-4 OR PS-1, STD SHEATHING WITH EXTERIOR GLUE; .75-INCH THICKNESS
2	2	SKID LUMBER MIL-STD-731 CL II 3 X 4 NOM. SIZE (2 X 4 + 1 X 4 RUBBING STRIP ACCEPTABLE) BEVEL LOWER .75-INCH ON 45 DEGREES.
3	1	CAP CONFORMING TO PPP-B-601 OVERSEAS TYPE, STYLE A WITH EXCEPTIONS DESCRIBED BELOW, AND NOTES.
4	5	ALL PLYWOOD PANELS A-A-55057; CONFORMING TO PS-51, TYPE I GRADE 3-4 OR PS-1, STD SHEATHING WITH EXTERIOR GLUE; .375-INCH THICKNESS.
5	25	ALL CLEATS ON END PANELS, SIDES, AND TOP TO BE NOM. 1 X 4.
6	6	STRAPPING ASTM D 3953, CL B (COLD-ROLLED, HEAT TREATED) .75" X .031"
7	AR	STAPLES, .875-INCH CROWN WIDTH, .75-INCH LONG, GALVANIZED STEEL.
8	AR	7d(MIN) CEMENT COATED COOLERS OR SINKERS, (FF-N-105 TYPE II STYLE 7 OR 8).
9	AR	8d CEMENT COATED COOLERS OR SINKERS-SEE NOTE 5 BELOW.

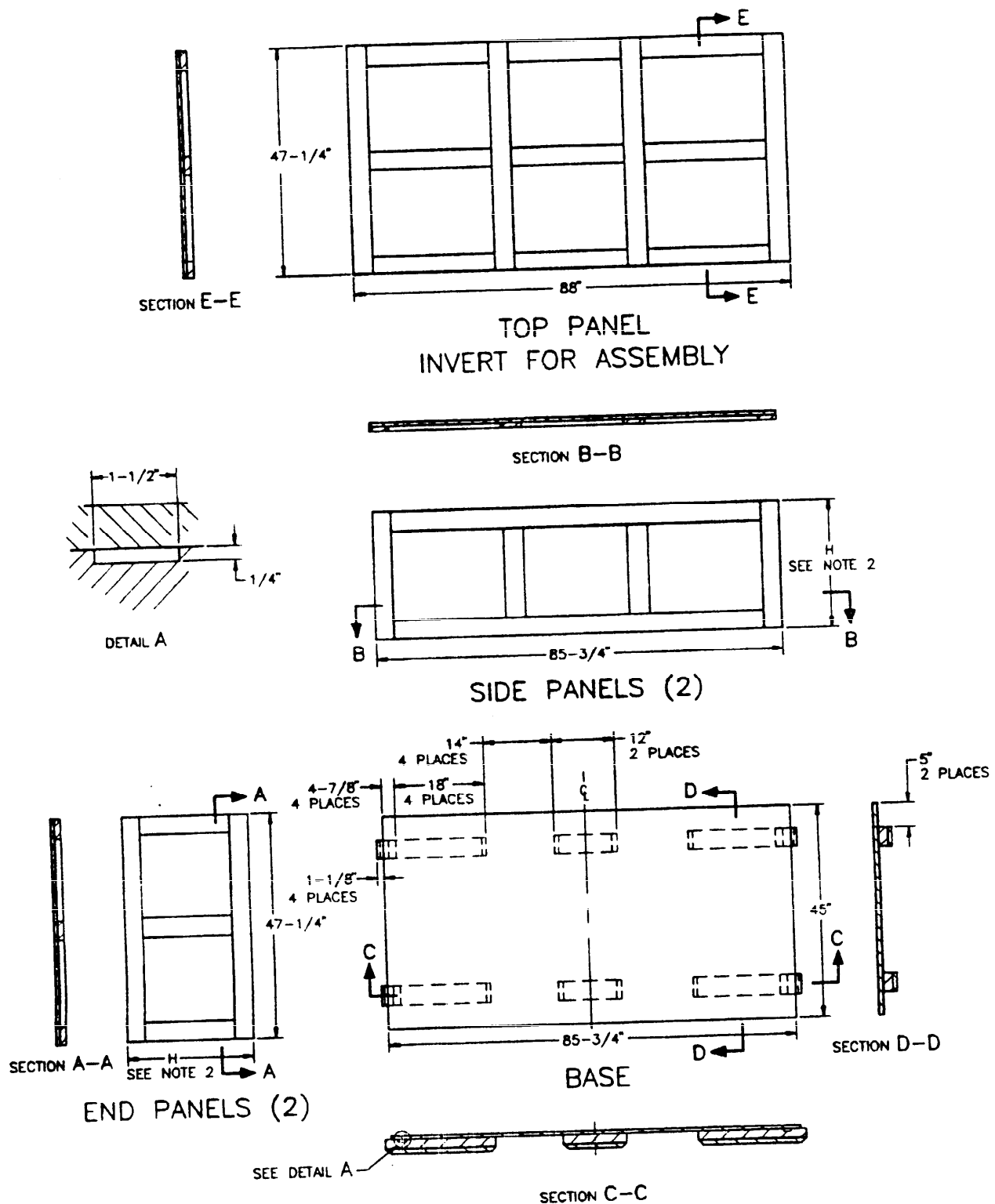
NOTES:

- 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 35 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 .125-INCH. IF SKIDS ARE MADE OF TWO PIECE CONSTRUCTION, SECURE BEVELED RUBBING STRIP TO NOM. 2 X 4 SKID WITH 8d 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 4a. MEMBRANE SURFACING LEVEL A PACK

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Figure 4b. MEMBRANE SURFACING LEVEL A PACK

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INSPECT AREA
MARKED ☐
15 PLACES

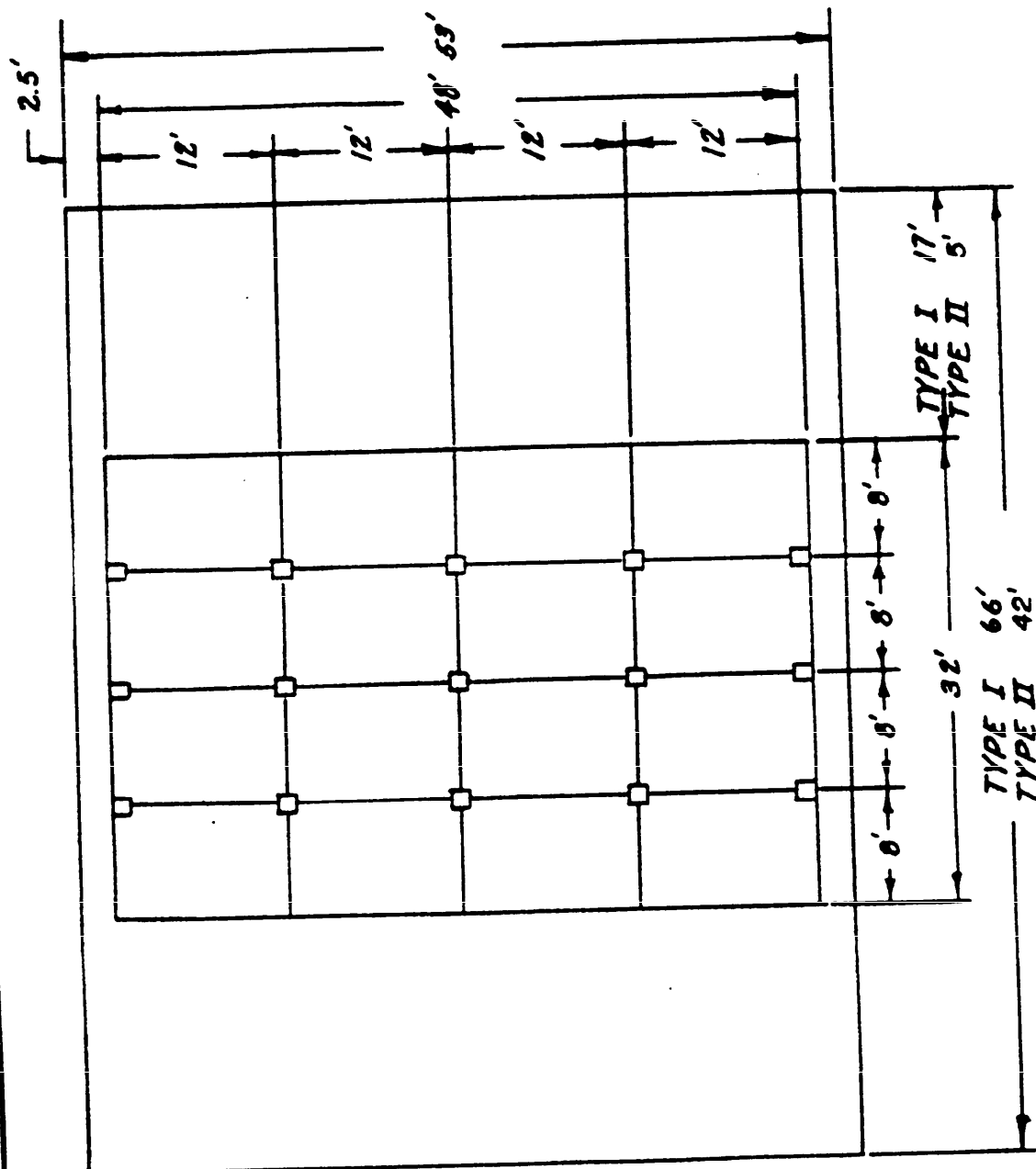


FIGURE 5 INSPECTION OF NONSKID SURFACING

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. Submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-M-52769A	2. DOCUMENT DATE (YYMMDD) 931018
3. DOCUMENT TITLE Membrane, Surfacing: Airfield, Heavy Duty		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		

5. SON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (if applicable) (2) DSN	7. DATE SUBMITTED

8. PREPARING ACTIVITY

a. NAME Carolyn B. Johnson	b. TELEPHONE (Include Area Code) (1) Commercial (703) 704-3468 (2) DSN 654-3468
c. ADDRESS (Include Zip Code) ARMY BELVOIR RDE CTR ATTN SATBE TSE 10101 GRIDLEY RD STE 104 FT BELVOIR VA 22060-5818	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: DEFNS QLT & STDZM OFC 5203 LEESBURG PIKE STE 1403 FLS CHURCH VA 22041-3466 Telephone (703) 756-2340 DSN 289-2340

