

MIL-T-24634(SH)
25 July 1984

MILITARY SPECIFICATION

TREADS, COMPOUND-FILLED, FOR INCLINED LADDERS

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers full treads and cap treads which have slip-resistant compound-filled dovetail grooves in extruded aluminum bases.

1.2 Classification. Treads shall be of the following types, as specified (see 6.2.1):

- Type I - Full tread with end plates.
- Type IA - Full tread without end plates.
- Type II - Cap tread.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

SPECIFICATIONS

FEDERAL

- QQ-A-200/8 - Aluminum Alloy 6061, Bar, Rod, Shapes, Tube and Wire, Extruded.
- SS-W-110 - Water-Repellent, Colorless, Silicon Resin Base.
- PPP-B-601 - Boxes, Wood, Cleated Plywood.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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- MIL-P-116 - Preservation, Methods of.
- MIL-L-10547 - Liners, Case, and Sheet, Overwrap; Water-Vapor-proof or Waterproof, Flexible.

STANDARDS

FEDERAL

- FED-STD-123 - Marking for Shipment (Civil Agencies).
- FED-STD-501 - Federal Test Method Standard Floor Coverings, Resilient, Nontextile: Sampling and Testing.

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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-278 - Fabrication Welding and Inspection, and Casting Inspection and Repair for Machinery, Piping and Pressure Vessels in Ships of United States Navy.
- MIL-STD-1186 - Cushioning, Anchoring, Bracing, Blocking and Waterproofing; with Appropriate Test Methods.
- MIL-STD-2151 - Inclined Ladder Tread Test Methods and Equipment for Wear, Slip-Resistance and Impact.

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

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT
National Motor Freight Classification

(Application for copies should be addressed to the National Motor Freight Traffic Association, Inc., ATA TRAFFIC Dept., 1616 "P" Street, NW, Washington, DC 20036.)

UNIFORM CLASSIFICATION COMMITTEE AGENT

Uniform Freight Classification Ratings, Rules and Regulations

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

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

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

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3. REQUIREMENTS

3.1 First article. When specified (see 6.2.1), tread samples shall be subjected to first article inspection (see 4.3 and 6.3).

3.2 Material.

3.2.1 Bases. Extruded aluminum bases and end plates shall conform to Alloy 6061-T6 in accordance with QQ-A-200/8.

3.2.2 Filler. The filler material shall an inorganic binder and abrasive grain composite formulated to comply with the physical appearance and performance as specified herein. Abrasive grain shall be 100 percent virgin grain aluminum oxide (Al_2O_3) with a mohs scale hardness rating of 9. The grain quantity and size grading shall be selected to achieve the highest concentration of abrasive grain consistent with the specified requirements for impact, wear and slip-resistance. The filler shall be worked to provide a uniform, flattened surface which extends above the surface of the extrusion by a distance of 0.047 inch. The filler shall not overlap the groove edge by more than 0.031 inch. Exposed aluminum shall be cleaned of all extraneous filler material and the filler edges shall have a straight and uniform appearance.

3.3 Design and construction. Treads shall be of the design, construction and physical dimensions as shown on figures 1 through 8. The type, width and length shall be as specified (see 6.2.1).

3.3.1 Tolerances. Tolerances on dimensions as shown on figures 1 through 8 shall be as follows:

- (a) Overall length: Plus or minus 0.063 inch.
- (b) Bolt hole diameters: Plus or minus 0.016 inch.
- (c) Bolt hold spacing end plates: Plus or minus 0.031 inch.
- (d) Groove width: Plus or minus 0.016 inch.
- (e) Groove spacing: Plus or minus 0.031 inch.
- (f) Extrusion thickness: Plus 0.010, minus 0.005 inch.
- (g) Radii: Plus or minus 0.010 inch.
- (h) Angles: Plus or minus 1 degree, 0 minute.
- (i) Squareness of end plates: Plus or minus 0 degree, 30 minutes.
- (j) Height of filler above extrusion: Plus or minus 0.016 inch.

3.3.2 Color. The binding agent used in the filler shall be pigmented black. Aluminum shall remain self-colored.

3.3.3 Sealing. After fabrication, treads shall be given two coats of clear sealer to seal the filler and grooves against the intrusion of moisture. The sealer shall comply with the performance requirements as specified in SS-W-110. When tested as specified in 4.6.4, treads shall not exhibit any signs of deterioration, cracking or separation from the base extrusion.

3.3.4 Welding. Welding of end plates shall be in accordance with MIL-STD-278 and as shown on figure 1. Welding shall be from the underside of the tread and all excessive weld spatter shall be removed. End plates shall be smooth flat and square (see 3.3.1) and the edges shall be flush with the outside surfaces of the tread extrusion.

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3.4 Performance.3.4.1 Strength.

3.4.1.1 Type I deflection. When tested in accordance with 4.6.1.1, deflection shall not exceed 0.10 inch and there shall be no permanent deformation.

3.4.1.2 Type I local strength. After testing in accordance with 4.6.1.2 there shall be no signs of permanent deformation or visual damage.

3.4.2 Slip-resistant properties. When tested as specified in 4.6.2, the slip-resistance factor measured after 50,000 strokes shall be not less than the following values: 1.50 in the dry condition, 1.25 in the wet condition, and 1.00 in the oily condition. Maximum differential between initial (before wear testing) and final slip-resistance factor for each condition shall not exceed 0.75.

3.4.3 Resistance to wear. Wear shall not exceed 0.010 inch after the first 10,000 strokes of the wear pads in accordance with MIL-STD-2151. Total additional wear, resulting from strokes of 20,001 through 50,000, shall not exceed 0.008 inch. Testing for wear resistance shall be as specified in 4.6.3.

3.4.4 Resistance to impact. When tested as specified in 4.6.5, the tread shall not exhibit deterioration or loss of the filler material deeper than 0.150 inch, cracks between impact points or projecting more than 0.50 inch away from the centers of impact, loosening or separation from the aluminum extrusion, nor shall any other area of the tread, not previously subjected to impact testing, show any signs of deterioration as a result of the test.

3.4.5 Fire resistance. When tested as specified in 4.6.6 the tread specimen filler shall not exhibit destruction or deterioration, with the exception of color change. The combustion plus ignition time shall not exceed 4.0 minutes. The density of smoke shall be light.

3.5 Labeling. Each tread shall be stenciled on the underside with the following:

- (a) Manufacturer's name.
- (b) Manufacturer's address.
- (c) Year and month of manufacture.
- (d) National stock number (if applicable).
- (e) Type of tread and number of this specification.

4. QUALITY ASSURANCE PROVISIONS

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

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4.2 Classification of inspection. The inspection requirements for tread samples and filler material specimens cut from a tread sample shall be classified as follows:

- (a) First article inspection (see 4.3).
- (b) Quality conformance inspection (see 4.4).

4.3 First article inspection. First article inspection shall be performed when required (see 3.1). This inspection shall include the examination of 4.5 and tests of 4.6. The contractor shall prepare a test report in accordance with the data ordering document included in the contract or order (see 6.2.2).

4.3.1 First article test specimens. The number of test specimens required for each test shall be as specified in table 1. The tread selected for preparation of the fire test specimen (see 4.6.6) shall also be used for examination of dimensions, shape and tolerance of the extrusion (see 3.3 and 4.5).

TABLE 1. Specimen and test requirements.

Performance characteristic	No. of specimens	Requirement paragraph	Test paragraph
Strength (type I and IA only)	1	3.4.1	4.6.1
Slip-resistance		3.4.2	4.6.2
Wear-resistance		3.4.3	4.6.3
Moisture and temperature resistance	1	3.3.3	4.6.4
Impact resistance		3.4.4	4.6.5
Fire resistance	1	3.4.5	4.6.6

4.4 Quality conformance inspection. Quality conformance inspection shall be performed on the treads selected in accordance with 4.4.2. This inspection shall be as specified in the examination of 4.5, tests of 4.6.4, 4.6.5 and 4.6.6, and the inspection of 4.7.

4.4.1 Inspection lot. Treads of the same type and width offered to the Government at one time shall be considered a lot for the purpose of inspection.

4.4.2 Sampling. Random samples of treads shall be selected from each lot in accordance with MIL-STD-105.

4.4.2.1 Sampling for examination. Examination of treads shall be based on inspection level II, and an acceptance quality level (AQL) of 1.5 for major defects per hundred treads and 4.0 for minor defects per hundred treads.

4.4.2.2 Sampling for tests. Sampling for tests shall consist of two sample groups, Group A and Group B. Group A shall be based on inspection level S-1, AQL 1.5 percent defective and shall be tested in accordance with 4.6.4 and 4.6.5. Group B shall be based on inspection level S-1, AQL 1.5 percent defective and shall be tested in accordance with 4.6.6 and the dimensional examination of 4.5.

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4.5 Examination. Each sample selected, as specified in 4.4.2.1, shall be examined for defects specified in table II. Dimensions and tolerance examination of the extrusion shall be conducted only on the specimen prepared for fire testing (see 4.4.2.2 and 4.6.6).

TABLE II. Classification of defects.

Construction	Requirements	Classification
Base	Material not as specified. Type not as specified. Length or width not as specified. Dimensions or shape of extrusion (see 4.3.2) not as specified or within tolerance. Mounting holes location and size not as specified. Welding not as specified. Outside surfaces not free of corrosion, scratches, roughness, blemishes, dirt or other extraneous material.	Major Major Major Major Major Major Minor
Filler	Material not as specified. Cracks, loose material or inclusions of foreign material. Color not as specified or nonuniform. Sealant not as specified. Height and overlap not as specified. Nonuniform surface or edges.	Major Major Minor Minor Minor Minor
Marking	Missing or incomplete.	Minor

4.6 Tests.4.6.1 Strength tests.

4.6.1.1 Deflection test. A type I or type IA tread specimen of the longest length ordered shall be bolted to or supported by rigid end supports. A 300-pound concentrated load shall be applied to the center of the tread, distributed over an area 3-1/2 inches wide by the width of the tread. After 10 minutes the deflection at the center of the tread shall be measured. After removal of the load the tread shall be inspected for permanent deformation.

4.6.1.2 Local load test. The type I or type IA tread specimen which was tested in 4.6.1.1 shall be tested by the application of a 200-pound load concentrated on a 1/2-inch square area. The load shall be applied at six different locations and held for 1 minute each. Each location shall be inspected for permanent deformation or visual damage after removal of the loads.

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4.6.2 Slip-resistant properties (slip-resistance factor). The slip-resistance factor shall be determined for the tread sample selected as specified in 3.1 using methods and equipment in accordance with proposed MIL-STD-2151. The initial slip-resistance factor shall be measured before the wear test specified in 4.6.3 and the final slip-resistance factor measured after 50,000 strokes. Measurements shall be made three times for each of the dry, wet, and oily conditions and the average for each condition shall be recorded (see 3.4.2).

4.6.3 Resistance to wear. Maximum average wear shall be determined for a tread sample using methods and equipment in accordance with MIL-STD-2151. Wear measurements shall be taken before testing and after the 10,000, 20,000 and 50,000 stroke intervals. Maximum average wear shall be determined for these intervals using the methods as specified in MIL-STD-2151.

4.6.4 Resistance to moisture and alternating temperature extremes. The sample tread shall be subjected to five cycles of immersion, cooling and heating as follows:

- (a) Immerse the tread in room temperature tap water for a minimum period of 48 hours for the initial cycle. This period may be reduced to overnight for cycles two through five.
- (b) Drain the tread for 1 to 2 minutes then place in 0 ± 5 degrees Fahrenheit ($^{\circ}\text{F}$) atmosphere for a minimum period of $4 \text{ hours} \pm 5$ minutes.
- (c) Remove and allow the tread to remain in room temperature atmosphere for 30 to 45 minutes then place in $120 \pm 5^{\circ}\text{F}$ atmosphere for a minimum of 1 hour. Remove and allow the tread to return to room temperature before repeating step (a).

4.6.5 Resistance to impact. The tread sample which has been tested in accordance with 4.6.4 shall be mounted and tested for impact resistance in accordance with MIL-STD-2151. The ball shall be dropped from a height of 60 inches onto the tread in two separate patterns. The first pattern shall consist of nine impact points as shown on figure 9. The impacts shall be made in the order shown. The second pattern shall consist of three impact points centered on a filler strip and located near the longitudinal and transverse center of the top tread surface. The three points shall be separated each by 1 inch along the strip. Impact on the center point shall be made last.

4.6.6 Fire resistance. One tread specimen shall be tested in accordance with FED-STD-501, method 6411. The tread specimen shall be cut from a complete tread. The specimen shall be a minimum of 12 inches long and wide enough to contain at least four grooves filled with the filler compound. The specimen shall be placed in the center of the specimen holder with the grooves oriented in the direction of the length of the hood. Combustion plus ignition time, length of char and density of smoke shall be observed.

4.7 Inspection of packaging. Sample packages and packs, and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

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5. PACKAGING

(The preparation for delivery requirements specified herein apply only for direct Government acquisition. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.4.)

5.1 Packaging. Packaging shall be level A or C as specified (see 6.2.1).

5.1.1 Level A. The treads shall be packaged in accordance with method III of MIL-P-116.

5.1.2 Level C. The treads shall be packaged in accordance with the contractors standard practice.

5.2 Packing. Packing shall be level A, B or C, as specified (see 6.2.1).

5.2.1 Level A. The treads shall be packed in snug-fitted, wood-cleated plywood or nailed wood boxes conforming to PPP-B-601 (overseas type). Containers shall be lined with a waterproof case liner conforming to MIL-L-10547, and sealed in accordance with the appendix thereto. The treads shall be cushioned and braced in accordance with MIL-STD-1186. Flat steel strapping shall be used. The gross weight shall not exceed 200 pounds.

5.2.2 Level B. The treads shall be packed as specified for level A, except that boxes shall be domestic type or class as applicable, and treads shall be cushioned and braced to prevent movement during shipment.

5.2.3 Level C. The treads shall be packaged in accordance with normal commercial practice and packed to ensure acceptance by common carrier and provide product protection against loss and damage during multiple shipments, handling and storage. The shipping container shall be in compliance with National Motor Freight Classification and Uniform Freight Classification.

5.3 Marking. In addition to special marking required in the contract or order (see 6.2.1), the shipping containers shall be marked in accordance with FED-STD-123 or MIL-STD-129, as applicable.

6. NOTES

6.1 Intended use. Compound-filled treads are intended for, but not limited to, all inclined ladders on board ships, including fixed and feathering tread accommodation ladders.

6.1.1 Type I, full tread, figures 1 through 4. Full treads come complete with end plates drilled with standard spaced holes, unless otherwise ordered, for mounting on new inclined ladders or for the replacement of old treads. They are suitable for both interior and exterior applications. The treads may also be used for fixed or feathering tread accommodation ladders. For feathering, treads shall be ordered without end plates. Treads shall not be installed in machinery spaces of U.S. Navy ships or other applications where the use of steel treads are required for resistance to fire damage.

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6.1.2 Type II, cap tread figures 3 and 4. Cap treads do not have end plates but are drilled for mounting, without modification, over existing worn treads which are no more than 3/8 inch wider than the nominal size. Cap treads may also be used for new installations when installed over steel channel sub-bases as in U.S. Navy ship machinery spaces, or aluminum channel sub-bases. They are suitable for both interior and exterior applications if adequate precautions are taken for the treatment of faying surfaces of dissimilar metals.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type (see 1.2 and 3.3).
- (c) First article approval, if required (see 3.1).
- (d) Length and width (see 3.3). Cap treads, type II, must be ordered 1 inch shorter than the treads being capped.
- (e) With or without holes (see 3.3).
- (f) Hole locations for replacement treads (see 3.3).
- (g) Level of packaging and packing (see 5.1 and 5.2).
- (h) Special marking (see 5.3).
- (i) Quantity.

6.2.2 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of FAR 52.227-7031 are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraph.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
4.3	First article inspection report	DI-T-4902	----

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L., Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4 or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

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6.3 First article inspection. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection as 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.

6.4 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

Preparing activity:
Navy - SH
(Project 2090-N081)

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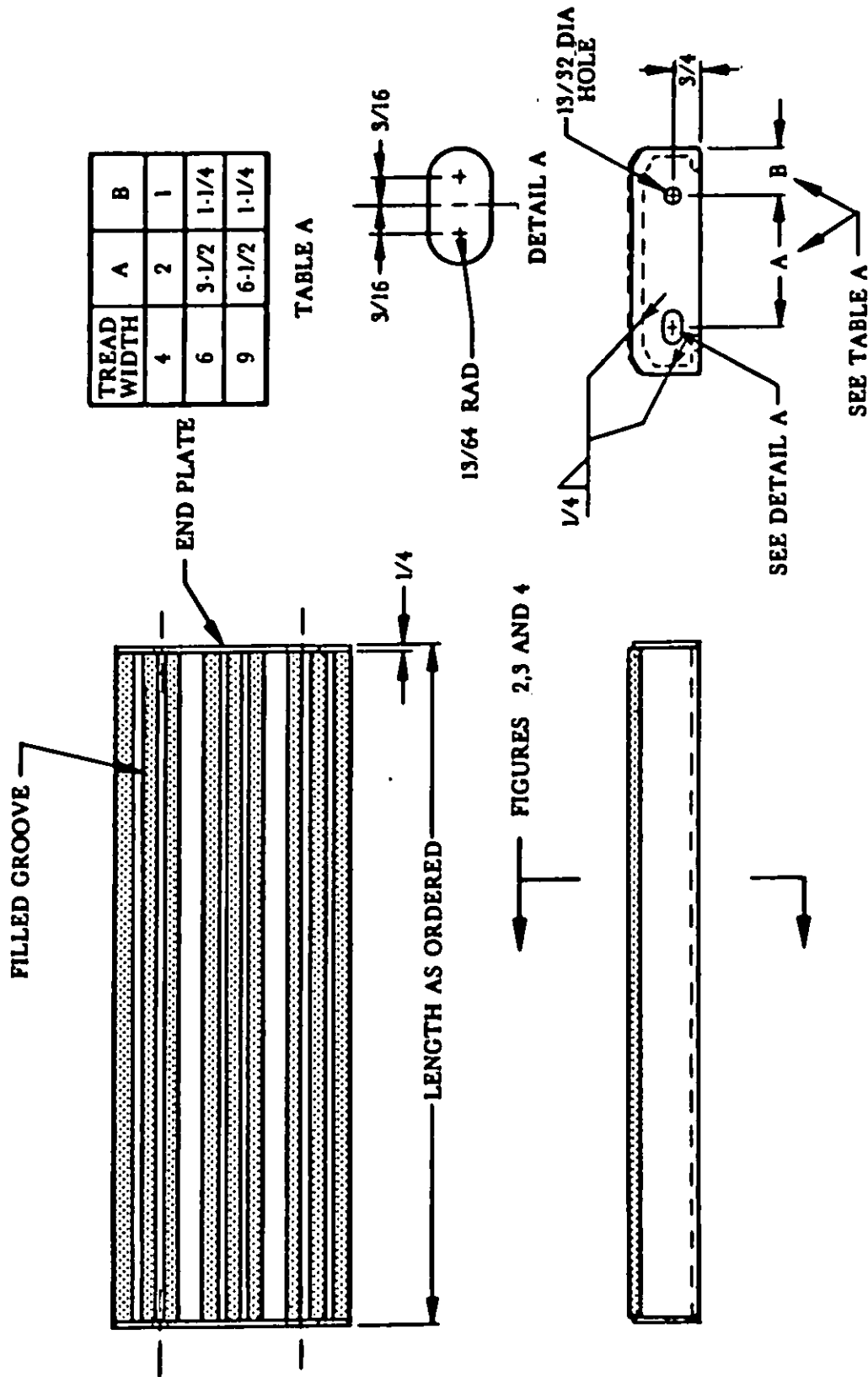
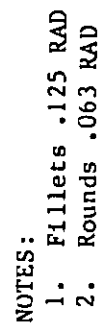


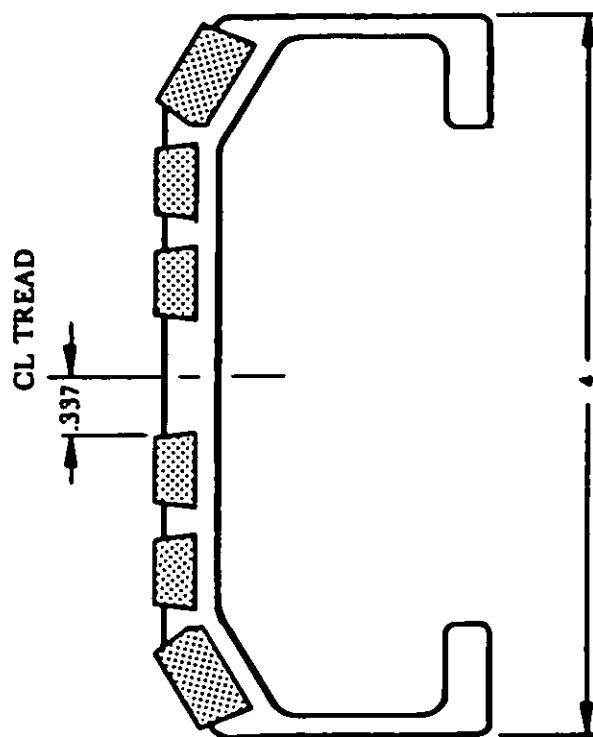
FIGURE 1. Type I and Type IA full thread.



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FIGURE 2. Type I and type IA full tread, 6-inch size.

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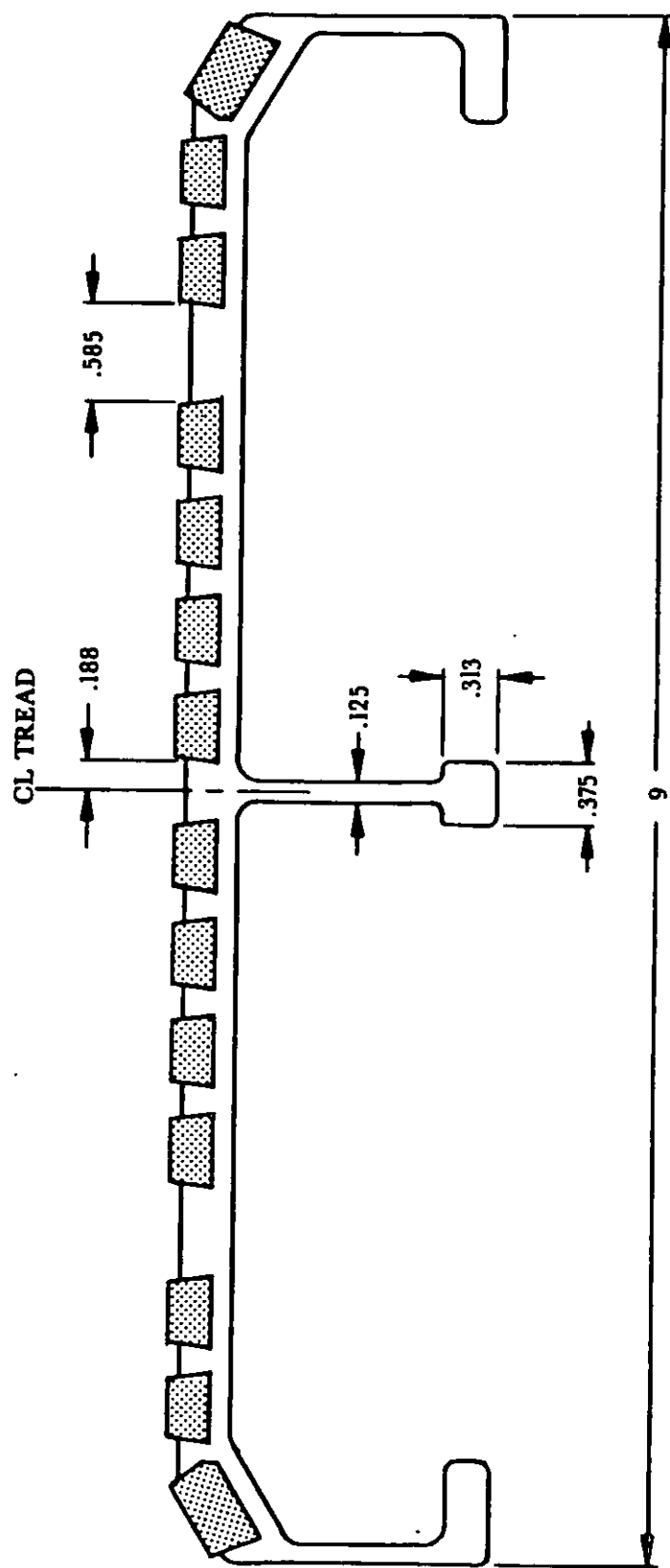
NOTE:

1. For information not shown see figure 2.

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FIGURE 3. Type I and type IA full tread, 4-inch size.

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NOTE:

1. For information not shown see figure 2.

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FIGURE 4. Type I and type IA full thread, 9-inch size.

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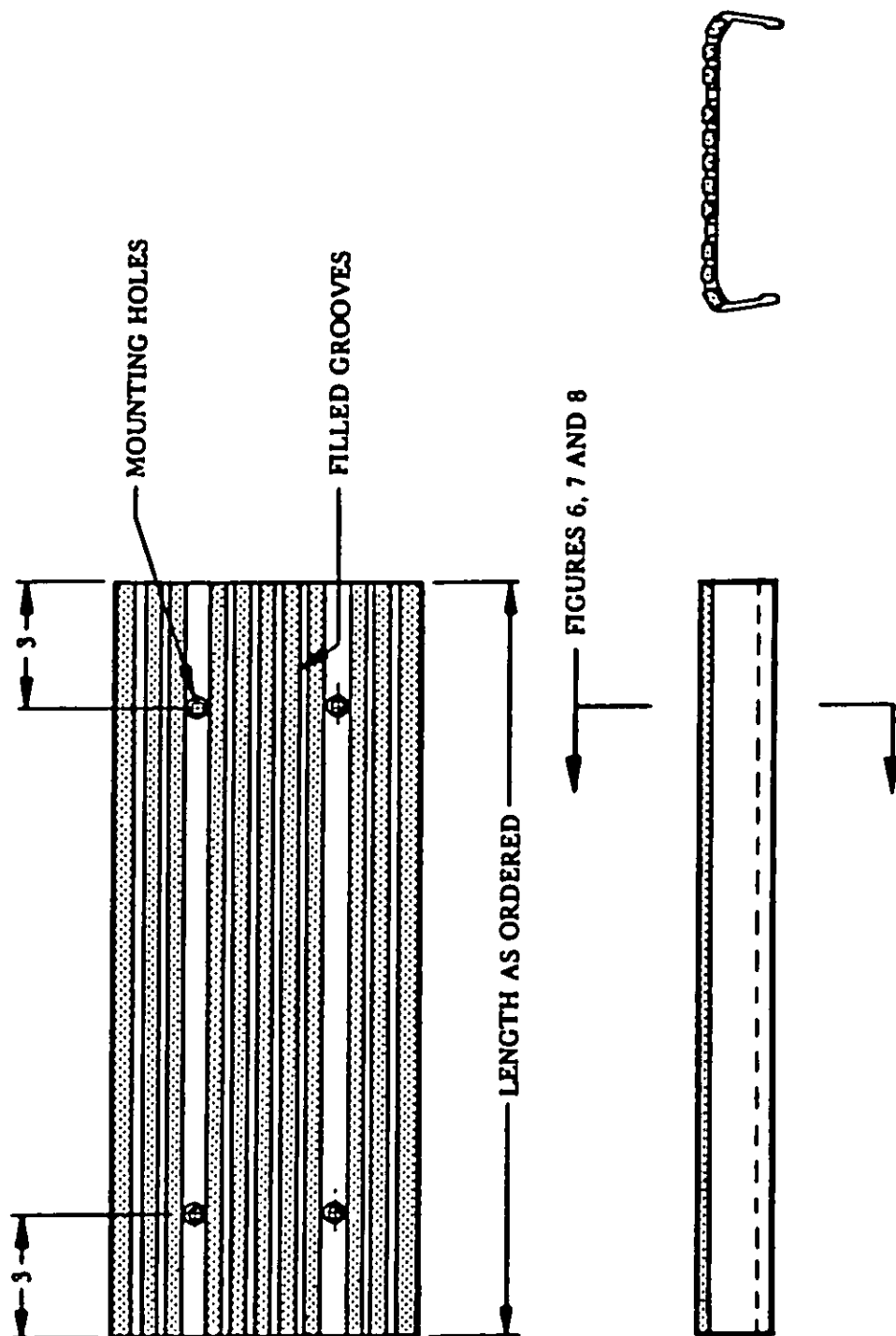
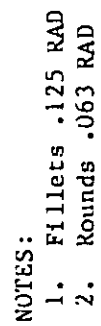


FIGURE 5. Type II cap tread.

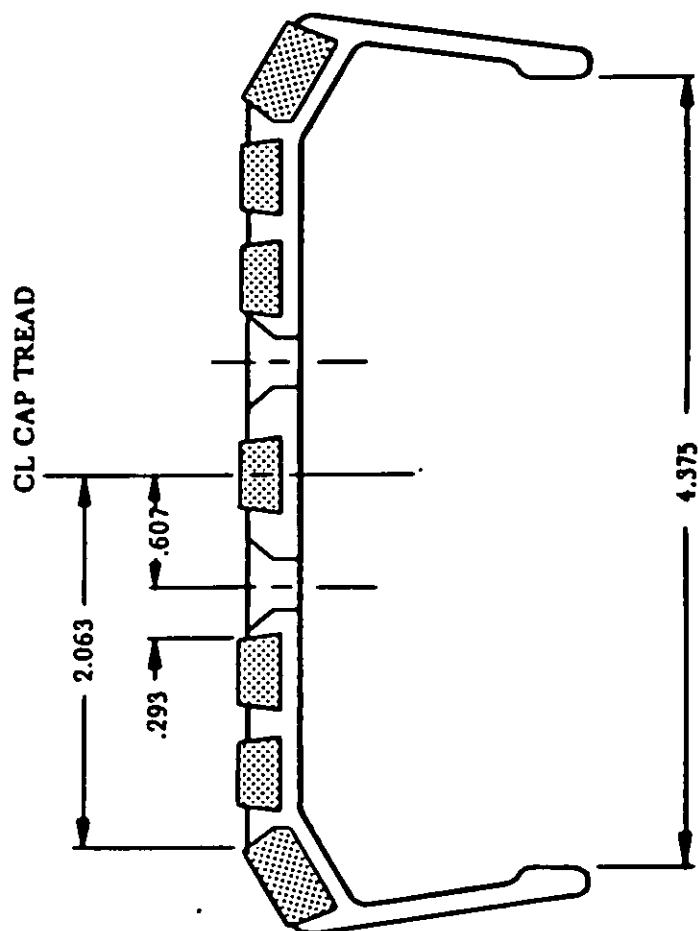
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FIGURE 6. Type II cap tread, 6-inch size.

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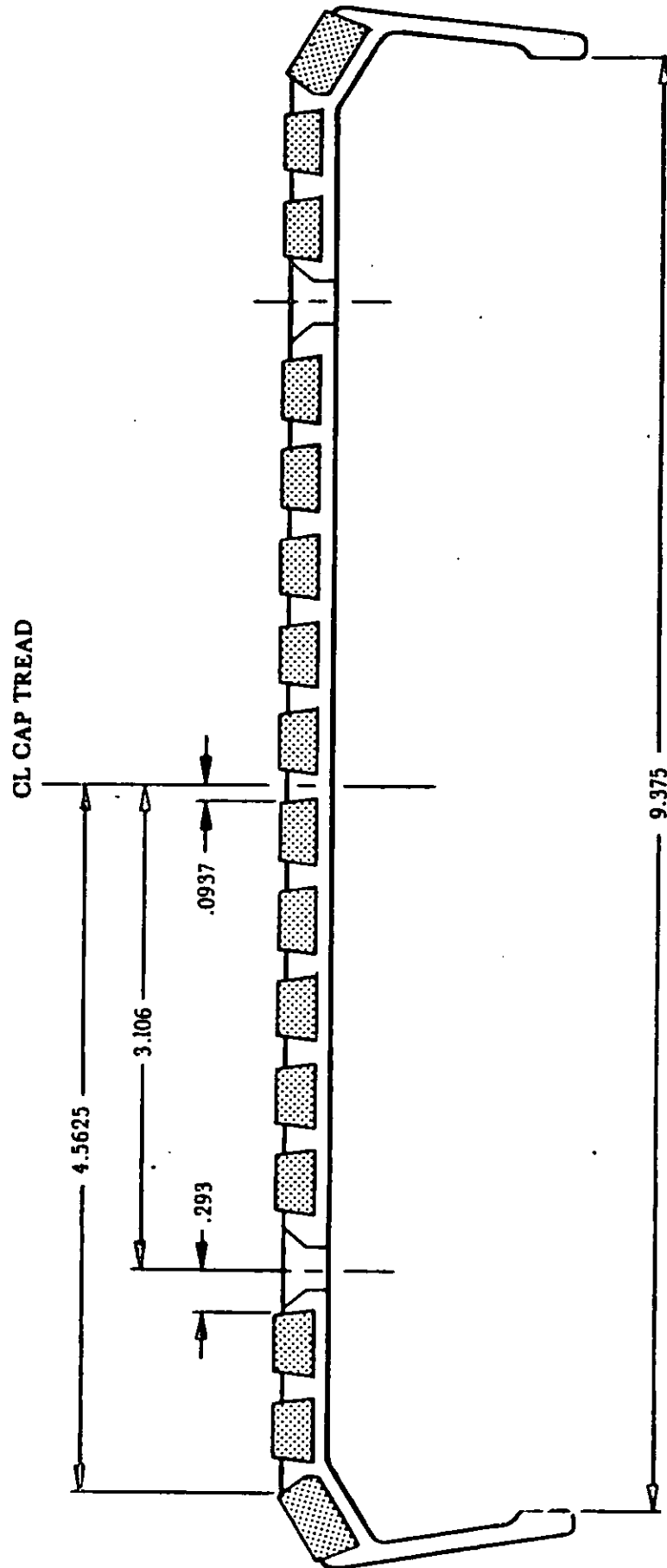
NOTE:

1. For information not shown see figure 6.

FIGURE 7. Type II cap tread, 4-inch size.

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NOTE:

1. For information not shown see figure 6.

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FIGURE 8. Type II cap tread, 9-inch size.

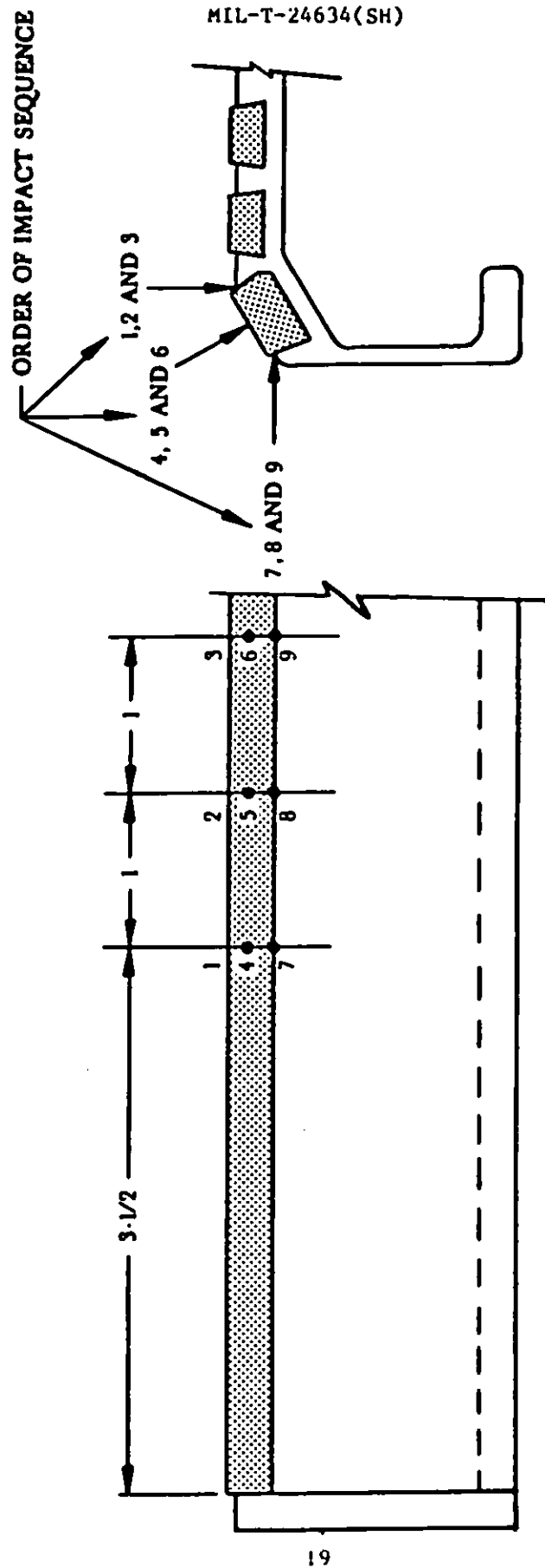


FIGURE 9. Impact test points.

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NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification 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.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)*

1. DOCUMENT NUMBER MIL-T-24634(SH)		2. DOCUMENT TITLE Treads, Compound-Filled, For Inclined Ladders	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
		<input type="checkbox"/> USER	
		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	