

INCH-POUND

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DETAIL SPECIFICATION

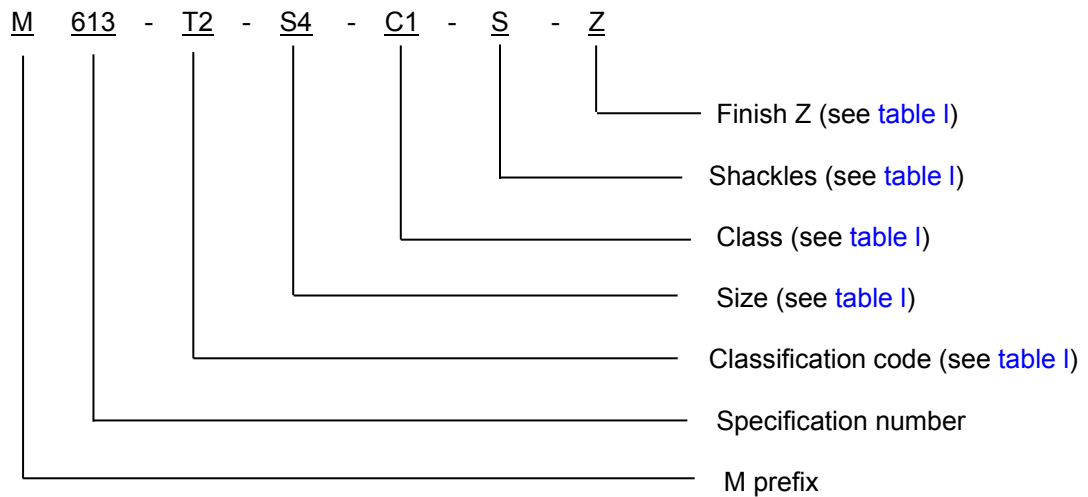
GRAPNELS, MARINE, TRIP WIRE, AND CRASH TRUCK

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

1. SCOPE

1.1 Scope. This specification covers marine, trip wire and crash truck grapnels.

1.2 Classification and Part or Identifying Number (PIN). Grapnels are to be of the following types, sizes and classes, as specified:



Beneficial comments, recommendations, additions, deletions, clarifications, etc., and any data that may improve this document should be sent to: DLA Land and Maritime, ATTN: VAI, P.O. Box 3990, Columbus OH 43218-3990, or email fluidflow@dla.mil. Since contact information can change you may want to verify the currency of the address information using the ASSIST Online database at <https://assist.dla.mil/>.

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1.2.1 Classification coding. The classification codes are as specified in table I.

TABLE I. Classification codes.

Codes	Types	Size	Class	Shackles	Finish
T1	Type I - Heavy marine				
S1		Size 1 - 450 pounds (4 prong)			
S2		Size 2 - 225 pounds (5 prong)			
S3		Size 3 - 170 pounds (3 prong)			
T2	Type II - Light marine				
S4		Size 1 - 100 pounds (5 prong)			
C1			Class 1 - Wrought iron or mild steel		
C2			Class 2 - Nonmagnetic.		
S5		Size 2 - 50 pounds (5 prong)			
S6		Size 3 - 15 pounds (5 prong)			
C3			Class 1 - Wrought iron or mild steel		
C4			Class 2 - Nonmagnetic		
S7		Size 4 - 4 pounds (5 prong)			
C5			Class 1 - Wrought iron or mild steel		
C6			Class 2 - Nonmagnetic		
S8		Size 5 - 2 pounds (3 prong)			
T3	Type III - Trip wire				
S9		Size 1 - 26 ounces (3 prong)			
T4	Type IV - Crash truck				
S10		Size 1 - 5 pounds (4 prong)			
S11		Size 2 - 11 pounds (3 prong)			
S				Shackles, Blank if not	
Z					(Z) Zinc or (V) Varnish

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2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract

FEDERAL SPECIFICATIONS

- | | | |
|----------|---|--|
| FF-T-276 | - | Thimbles, Rope |
| RR-C-271 | - | Chains and Attachments, Carbon and Alloy Steel |
| RR-W-410 | - | Wire Rope and Strand |

DEPARTMENT OF DEFENSE SPECIFICATIONS

- | | | |
|---------------|---|---|
| MIL-P-21035 | - | Paint High Zinc Dust Content, Galvanizing Repair (metric) |
| MIL-S-22698 | - | Steel Plate, Shapes And Bars, Weldable Ordinary Strength And Higher Strength: Structural |
| MIL-S-24093 | - | Steel Forgings, Carbon and Alloy Heat Treated |
| MIL-C-24707/4 | - | Castings, Ferrous, Austenitic Manganese (Hadfield Manganese), (Low Magnetic Permeability and/or Wear Resistant) |

DEPARTMENT OF DEFENSE STANDARDS

- | | | |
|-------------|---|--|
| MIL-STD-129 | - | Military Marking for Shipment and Storage |
| MIL-STD-130 | - | Identification Marking of U.S. Military Property |

(Copies of these documents are available online at <http://quicksearch.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

ASTM INTERNATIONAL

- | | | |
|-----------------|---|---|
| ASTM A27/A27M | - | Standard Specification for Steel Castings, Carbon, for General Application |
| ASTM A108 | - | Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished |
| ASTM A128/A128M | - | Standard Specification for Steel Castings, Austenitic Manganese |
| ASTM A148/A148M | - | Standard Specification for Steel Castings, High Strength, for Structural Purposes |
| ASTM A153/A153M | - | Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware |
| ASTM A276 | - | Standard Specification for Stainless Steel Bars and Shapes |

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- ASTM A967/A967M - Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
- ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- ASTM D1729 - Standard Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials
- ASTM D3359 - Standard Test Methods for Measuring Adhesion by Tape Test

(Copies of these documents are available online at <http://www.astm.org> or from the ASTM International, P.O. Box C700, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

AMERICAN WELDING SOCIETY

- AWS A5.1/A5.1M - Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding - 14th Edition
- AWS A5.9/A5.9M - Specification for Bare Stainless Steel Welding Electrodes and Rods - 8th Edition

(Copies of these documents are available on line at <http://www.aws.org/w/a/> from American Welding Society, 8669 Doral Boulevard, Suite 130, Doral, Florida 33166, and 800-443-9353, <http://awsnow.org/index.php/employees/general/>

SAE INTERNATIONAL

- SAE-AMS2700 - Passivation of Corrosion Resistant Steels
- SAE-AMS6346 - Steel, Chrome-Molybdenum (4130) Bars and Reforging Stock (Aircraft Quality)
- SAE-AMS6348 - Steel, Bars 0.95Cr - 0.20Mo (0.28 to 0.33C) (SAE 4130) Normalized - UNS G41300
- SAE-AMS6349 - Steel Bars 0.95Cr - 0.20Mo (0.38 to 0.43C) (SAE 4140) Normalized - UNS G41400
- SAE-AMS6350 - Steel Sheet, Strip, and Plate 0.95Cr - 0.20Mo (0.28 - 0.33C) (SAE 4130) - UNS G41300
- SAE-AMS6370 - Steel, Bars, Forgings, and Rings 0.95Cr - 0.20Mo (0.28 - 0.33C) (SAE 4130) - UNS G41300
- SAE-AMS6382 - Steel, Bars, Forgings, and Rings 0.95Cr - 0.20Mo (0.38 - 0.43C) (SAE 4140) Annealed - UNS G41400
- SAE-AMS6528 - Steel, Bars 0.95Cr - 0.20Mo (0.28 - 0.33C) (SAE 4130) Special Aircraft Quality Cleanliness Normalized - UNS G41300

(Copies of these documents are available on line at www.sae.org from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, and Tel: 877-606-7323 [inside USA and Canada] or 724-776-4970 [outside USA], email at CustomerService@sae.org.)

3. REQUIREMENTS

3.1 First article. When specified (see 6.1), samples shall be subjected to first article inspection in accordance with 4.4.

3.1.1 Certification. Certification if used must be done with procuring activity approval.

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3.2 Materials. Materials shall be as identified herein or as approved by the acquiring activity. Acceptance or approval of any constituent material shall not be construed as a guarantee of acceptance of the finished product.

3.2.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.2.2 Hazardous substances. The use of hazardous substances, toxic chemicals, or ozone depleting chemicals shall be avoided, whenever feasible.

3.2.3 Other materials. Materials not otherwise specified shall be in accordance with applicable specifications and to the requirements specified herein. All materials that are not specifically described shall be of the highest quality and suitable for the purpose intended.

3.3 Construction.

3.3.1 Type I, heavy marine. Type I grapnels shall be made of steel conforming to ASTM A27/A27M and ASTM A148/A148M grapnels shall be in accordance with [table II](#) and figures [1](#), [2](#), and [3](#) for sizes 1, 2, and 3, respectively. When specified the grapnel may be furnished without shackles. The eye for the tripping line shall be of forged steel conforming to MIL-S-22698 or SAE-AMS6350 and shall be welded to the base of the shank. Shackles shall conform to type IV, class 1 of RR-C-271.

TABLE II. Type 1 grapnels.

Size	Number of prongs	Nominal weight	Size of shackle
		Pounds (kg)	Inches (mm)
1	4	450 (204)	1-3.8 (35)
2	5	225(102)	1 (25)
3	3	170(77)	1(25)

3.3.2 Type II, light marine. Sizes 1, 2, 3 and 4 grapnels shall have five prongs equally spaced around the shank and size 5 grapnel shall have 3 prongs equally spaced around the shank. Class 1 grapnels shall be made of steel as specified in MIL-S-24093 or SAE-AMS6349 or SAE-AMS6346, or SAE-AMS6348, or SAE-AMS5349, SAE-AMS6370, or SAE-AMS6382 or SAE-AMS6528 where minimum tensile strength is 120,000 psi. Except to use MIL-S-24093, class A, when minimum yield strength must be 140,000 psi.

3.3.2.1 Nonmagnetic grapnels. Class 2 grapnels shall be made of nonmagnetic material conforming in accordance with MIL-C-24707/4 or ASTM A128/A128M grade A type A (rough ground or pickled), or type B (galvanized) or ASTM A276, type 316.

3.3.3 Sizes 1 and 2. The nominal weight of size 1 grapnels shall be 100 pounds (45kgs), and size 2 grapnels shall be 50 pounds (23kgs). The grapnels shall be constructed in accordance with [figure 4](#). The eye shall be fitted with a thimble capable of accommodating a rope of the circumference as specified in [table III](#). Thimble shall be in accordance with type I of FF-T-276. The eye for the tripping line shall be welded to the base of the shank.

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TABLE III. Circumference of rope for thimble sizes 1 and 2.

Size	Circumference of rope for thimble Inches (mm)
1	6 (152)
2	4.5 (114)

3.3.4 Sizes 3 and 4. The nominal weight of size 3 grapnel shall be 15 pounds (6.8 kgs), (weight without chain), and of size 4 grapnels shall be 4 pounds (1.8kgs) (weight without chain). The grapnels shall be constructed in accordance with [figure 4](#). Six feet (1.8m) of 1/4 inch (.25 in/6.4mm) chain shall be attached to each grapnel by means of a pear-shaped connecting link. Chain shall be welded steel, proof coil chain in accordance with type I, grade C, class 4 of RR-C-271. A second pear-shaped connecting link shall be attached to the other end of the chain. Both pear-shaped links shall be fabricated from 11/32 inch (.34in/8.6mm) diameter bar stock, and shall be closed by welding; zinc coating shall be done after welding. A thimble capable of accommodating a rope of the circumference as specified in table IV shall be fitted to the second pear-shaped link. The thimble shall be in accordance with type I of FF-T-276.

TABLE IV. Circumference of rope for thimble sizes 3 and 4.

Size	Circumference of rope for thimble inches (mm)
3	3 (76)
4	1.5 (38)

3.3.5 Size 5. The nominal weight of size 5 grapnel shall be 2 pounds (.9kgs). The size 5 grapnel shall be made of steel conforming to ASTM A108. The dimensions and details of construction shall be as shown on [figure 5](#). Welding, as indicated on [figure 5](#), shall be accomplished with electrodes in accordance with AWS A5.1/A5.1M.

3.3.6 Nonmagnetic chain links and thimbles. Nonmagnetic 1/4 inch (.25in/152mm) chain and pear-shaped connecting links shall be made in accordance with MIL-C-24707/4 or ASTM A128/A128M grade A type A (rough ground or pickled), or type B (galvanized) or ASTM A276, type 316. Nonmagnetic thimbles shall be made in accordance with MIL-C-24707/4 or ASTM A128/A128M grade A type A (rough ground or pickled), or type B (galvanized) or ASTM A276, type 316. Welding for stainless steel parts, shall be accomplished with electrodes in accordance with AWS A5.9/A5.9M.

3.3.7 Welding. Welding for steel shall be accomplished with electrodes in accordance with AWS A5.1/A5.1M. Welding for stainless steel parts, shall be accomplished with electrodes in accordance with AWS A5.9/A5.9M.

3.3.8 Type III, trip wire.

3.3.8.1 Size 1. Trip wire grapnels shall be made of steel conforming to MIL-S-22698 Grapnels shall have three prongs and be of a nominal weight of 26 ounces. The dimensions and assembly details shall be as shown on [figure 6](#).

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3.3.9 Type IV, crash truck.

3.3.9.1 Size 1. Type IV, size 1 grapnels shall be made of material conforming to ASTM A108. Grapnels shall have four prongs and be of a nominal weight of 5 pounds (2.3kgs). The dimensions and construction details shall be as shown on [figure 7](#). Each grapnel shall be fitted with a 60-foot (152mm), 5/16-inch diameter (.31in/7.9mm) 7 by 19 steel wire rope in accordance with RR-W-410. A 3/4-inch (.75in/19mm) drop forged, steel, reversed eye hook shall be attached to the other end of the cable. Thimbles shall be used in securing the cable to the grapnel and to the hook. Thimbles shall be in accordance with type III of FF-T-276. The cable connections to the hook shall be made with an eye splice or by the use of two 5/16 inch (.31in/7.9mm) wire rope clips. The eye splice, if used, shall be wormed and served.

3.3.9.2 Size 2. Type IV, size 2 grapnels shall be made of steel conforming to ASTM A108. Grapnels shall have three prongs and be of a nominal weight of 11 pounds (5kgs). The dimensions and construction details shall be as shown on [figure 8](#). Each grapnel shall be fitted with a 60-foot (152mm), 1/2 inch diameter ((152mm), (.5in/12.7mm), 8 by 19 plow steel, preformed, fiber core wire rope in accordance with RR-W-410, type I, class 4, except that the rope shall be galvanized. A cast or forged steel ring conforming to the dimensions shown on [figure 8](#) shall be attached to the other end of the wire rope. Thimbles shall be used in securing the wire rope to the grapnel and in securing the ring to the wire rope. Thimbles shall be in accordance with type III of FF-T-276. The wire rope connections to the grapnel and to the ring shall be made with a minimum of two 1/2 inch (.5in/12.7mm) wire rope clips to each connection.

3.4 Tolerances.

3.4.1 Dimensions. The tolerances and dimensions specified in [table V](#) will be permitted, provided that any combination of tolerances and dimensions used shall not result in a grapnel that exceeds the weight tolerances (see [3.4.2](#)).

TABLE V. Dimension tolerances.

Dimensions		Tolerance
Inches (mm)		Inch (mm)
Up to 1	(up to 25)	.06 (1.6)
1-.13 to 2	(29 to 51)	.13 (3.2)
2-.13 to 6	(54 to 152)	.25 (6.4)
6-.13 to 12	(156 to 305)	.38 (9.7)
Over 12	(over 305)	.50 (.13)

3.4.2 Weight. For type I, all sizes, and type II, sizes 1 and 2 grapnels, a tolerance in weight of not more than 4 percent nor less than 2 percent of the nominal weight will be permitted. For type II, sizes 3, 4, and 5, type III, and type IV grapnels, a tolerance in weight of not more than 10 percent nor less than 5 percent of the nominal weight will be permitted.

3.5 Finish. All grapnels, except as otherwise specified in [3.5.1](#) and [3.5.2](#) shall be completely and evenly coated with galvanized hot dip process as specified in ASTM A153/A153M. All chains, rings, clips, thimbles and hooks shall be galvanized as specified in ASTM B633 or ASTM A153/A153M. Pear links and other attaching links and rings may be cold galvanized per MIL-P-21035 after welding. The coating shall be adherent, uniform, smooth, and free from uncoated spots or injurious lumps, pits, blisters, acid and black spots, dross and flux.

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3.5.1 Stainless steel finish. Stainless steel parts shall be passivated as specified in SAE-AMS2700, type 6 or 7, or ASTM A967/A967M.

3.5.2 Zinc and galvanized coatings. Types I and II grapnels and all attachments shall be zinc coated in accordance with ASTM A153/A153M except that for nonmagnetic grapnels in accordance with MIL-C-24707/4 or ASTM A128/A128M grade A type A (rough ground or pickled), or type B (galvanized), the grapnels shall be painted with asphalt varnish as follows:

3.5.3 Asphalt varnish.

3.5.3.1 Asphalt color. The color shall match color number 17038 of as specified in ASTM D1729.

3.5.3.2 Asphalt flexibility. The varnish shall bend over 1/8 inch mandrel without cracking or flaking.

3.5.3.3 Asphalt adhesion. When tape is pulled from the scored film, no more than 5 percent (rating 48) of the film shall be removed from the panel as specified in ASTM D3359, method B.

3.5.3.4 Asphalt water resistance. The varnish shall withstand immersion in distilled water for 18 hours at 25° C without blistering, whitening or softening.

3.5.3.5 Asphalt varnish not recommended for sunlight use. The varnish is not recommended for use in direct sunlight.

3.6 Type III grapnels and attachments. Type III grapnels and attachments, when specified to be galvanized and type IV grapnels and attachments shall be zinc coated in accordance with ASTM B633, type VI, Fe/Zn 25.

3.7 Marking. Each grapnel shall be legibly and permanently marked with the letters "U.S." and either the name, initials, or brand mark of the manufacturer in accordance with MIL-STD-130. If brand mark is used, it shall be of such known character that the source of manufacture may be readily determined. In addition, the actual weight of each type I grapnel shall be impress-stamped on the shank.

3.7.1 Special marking. Special marking shall be required by the contract or order. Type II, light marine grapnels shall be marked TS120 to indicate minimum tensile strength is 120,000 psi and YS140 when minimum yield strength is 140,000 psi, see 3.3.1.

3.7.2 Marking nonmagnetic grapnels. Nonmagnetic grapnels shall be permanently marked with the letters "N-M".

3.7.3 Container marking. In addition to any special marking required by the contract or order, containers shall be marked in accordance with MIL-STD-129. The item name is "Grapnels, Marine, Trip Wire, and Crash Truck".

3.8 Workmanship. The workmanship shall be first class in every respect. The grapnels and all attachments shall be properly shaped and shall be free from fins, cracks, flaws, or other imperfections that may impair serviceability. Zinc coating shall be adherent and shall cover all surfaces.

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4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.5).

4.1.1 Certification. Certification may be done as an option to testing by using the government's trusted suppliers and with the procuring activity approval. The contractor shall certify that the product offered meets the requirements of this document and manufactured to industry standards, and quality assurance practices, and is the same as the product offered for sale in the commercial marketplace. The government reserves the right to require proof of such conformance prior to first delivery and thereafter as may be otherwise provided for under the provisions of the contract.

4.1.2 Responsibility for compliance. All items shall meet all requirements of sections 3, 4, or 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 accept defective material.

4.1.3 Lot records. Manufacturers shall keep lot records for 3 years minimum. Manufacturers shall monitor for compliance to the prescribed procedures, and observe that satisfactory manufacturing conditions and records on lots are maintained for these assemblies. The records, including as a minimum, an attributes summary of all quality conformance inspections conducted on each lot, shall be available to review by customers at all times.

4.2 First article inspection. First article inspection shall consist of the examinations and inspections as specified in 4.6 and performed on samples as specified in 4.4. Tests results shall be submitted as prescribed by the acquiring activity.

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in the applicable test method referenced in the test procedures.

4.4 Sampling.

4.4.1 Lot. All grappels not exceeding 1,000 of the same type and size presented at one time shall be considered a lot for purpose of acceptance inspection.

4.4.2 Sampling for. A random sample of grappels shall be selected in accordance with [table V](#) from each lot of material offered for conformance and first article testing.

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TABLE V. Sampling numbers for lots sizes.

Number of grapnels in lot	Number of grapnels in sample
Under 8	5
9 to 25	7
26 to 65	10
66 to 110	15
111 to 300	25
301 to 500	35
501 to 800	50
801 and over	75

4.5 Conformance inspection.

4.5.1 Visual and dimensional examination. Each of the sample grapnels selected in accordance with 4.4.2 shall be visually and dimensionally examined to verify compliance with this specification. Examination shall be conducted as specified in [table VI](#). Any grapnel in the sample containing one or more visual or dimensional defects shall not be offered for delivery and if the number of defective grapnels in any sample exceeds the acceptance number for that sample, this shall be cause for rejection of the lot represented by the sample.

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TABLE VI. Types of defects.

No.	Defects
1	Type and size not as specified.
2	Material not as specified; evidence of laps, seams, pipes, flaws, cracks, scale, fins, porosity, hard spots or nonmetallic inclusions and segregations.
3	Welding when applicable, nonconforming; surface not smooth, evidence of incomplete fusion, nonmetallic inclusions or cracks.
4	Grapnel construction and fabrication not as specified, prong point damaged or nonconforming, number of prongs not as required, dimensions not within required limits.
5	Eye for trip wire when applicable, not as specified, missing, damaged or not secured to base as required.
6	Shackle and pin when required, missing, damaged or inoperable, type and class not as specified (type I only).
7	Thimble for eye at head missing or damaged, type and size not as specified (type II only).
8	Chain missing, damaged or not secured as required, type and grade not as specified, connecting links missing, damaged or nonconforming (type II sizes 3 and 4 only).
9	Thimble (as applicable) at chain end missing or damaged, type and size not as specified.
10	Wire rope missing, damaged or not attached as specified, type, size and length not as required, not coated to prevent corrosion when specified (type IV only).
11	Thimbles to secure wire rope ends not type and size as specified (type IV only)
12	Eye splices for rope thimbles not wormed and served as required, when applicable (type IV size 1 only).
13	Wire rope clips when applicable, not size specified, damaged, not located and secured as required (type IV only).
14	Eye hook at free end of rope, missing, damaged or nonconforming; material, type and size not as specified (type IV size 1 only).
15	Ring at free end of rope missing, damaged or nonconforming; material and dimensions not as specified (type IV size 2 only).
16	Grapnel and all attachments (except type III when not specified) not coated to prevent corrosions, coating nonconforming, not adherent, smooth or uniform, not free from uncoated spots, injurious lumps, pits, blisters, acid and black spots, dross and flux.
17	Eye hook at free end of rope, missing, damaged or nonconforming; material, type and size not as specified (type IV size 1 only).
18	Ring at free end of rope missing, damaged or nonconforming; material and dimensions not as specified (type IV size 2 only).
19	Grapnel and all attachments (except type III when not specified) not coated to prevent corrosions, coating nonconforming, not adherent, smooth or uniform, not free from uncoated spots, injurious lumps, pits, blisters, acid and black spots, dross and flux.
20	Marking "U.S.", manufacturer's identification, (weight, type I only) missing, incorrect, illegible or not permanent.
21	Marking for Nonmagnetic grapnels not permanently marked with the letters "N-M".
22	Varnish color not as specified in 3.5.3.2 .

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4.6 First Article Inspection.

4.6.1 Weight. The Weight shall be as specified in this specification for type.

4.6.2 Chemical analysis. Chemical analysis shall be as specified in this specification for type.

4.6.3 Physical properties. Physical properties shall be as specified in this specification for type.

4.6.4. Zinc-coating. Zinc coating shall be as specified in this specification for type.

4.6.5 Varnish coating. Varnish coating shall be as specified in this specification for type.

4.7 Possible test failures. Possible test failures are defined as follows:

- a. Chemical analysis:
 - (1) Chemical composition not as specified for type.
- b. Physical properties:
 - (1) Tensile strength less than minimum value for type.
 - (2) Elongation less than minimum requirement for type.
 - (3) Evidence of cracks or fracture when bent cold as required.
- c. Weight:
 - (1) Not within specified limits.
- d. Tests for zinc-coating (hot-dip or electro-deposited as applicable):
 - (1) Coating nonconforming; thickness less than allowable minimum; nonadherent, evidence of coat flaking off or separation from basis metal; evidence of corrosion when tested (when applicable).
- e. Varnish:
 - (1) Varnish not having proper color as specified in [3.5.3.1](#).
 - (2) Varnish not flexible as specified in [3.5.3.2](#).
 - (3) Varnish not adhering as specified in [3.5.3.3](#).
 - (4) Varnish not resistant to water as specified in [3.5.3.4](#).

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see [6.2](#)). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

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6. NOTES

6.1 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. PIN (see 1.2).
- c. Whether or not type I grapnels may be furnished without shackles (see 3.3.1).
- d. Whether or not type III grapnels are to be zinc coated (see 3.3.8).
- e. For type II, light marine, specify if minimum tensile strength is 120,000 psi or minimum yield strength is 140,000 psi (see 3.3.2).
- f. Packaging and packing (see 5.1).
- g. First Article (see 6.2)

6.2 First article. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first article samples. Invitations 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. Government can also use certification in lieu of First Article for trusted suppliers.

6.3 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmental Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals and additional information is available on their website <http://www.epa.gov/osw/hazard/wastemin/priority.htm>. Use of these materials should be minimized or eliminated unless needed to meet the requirements specified herein (see section 3).

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

6.5 Subject term (keyword) listing.

Heavy marine
Light marine
Nonmagnetic

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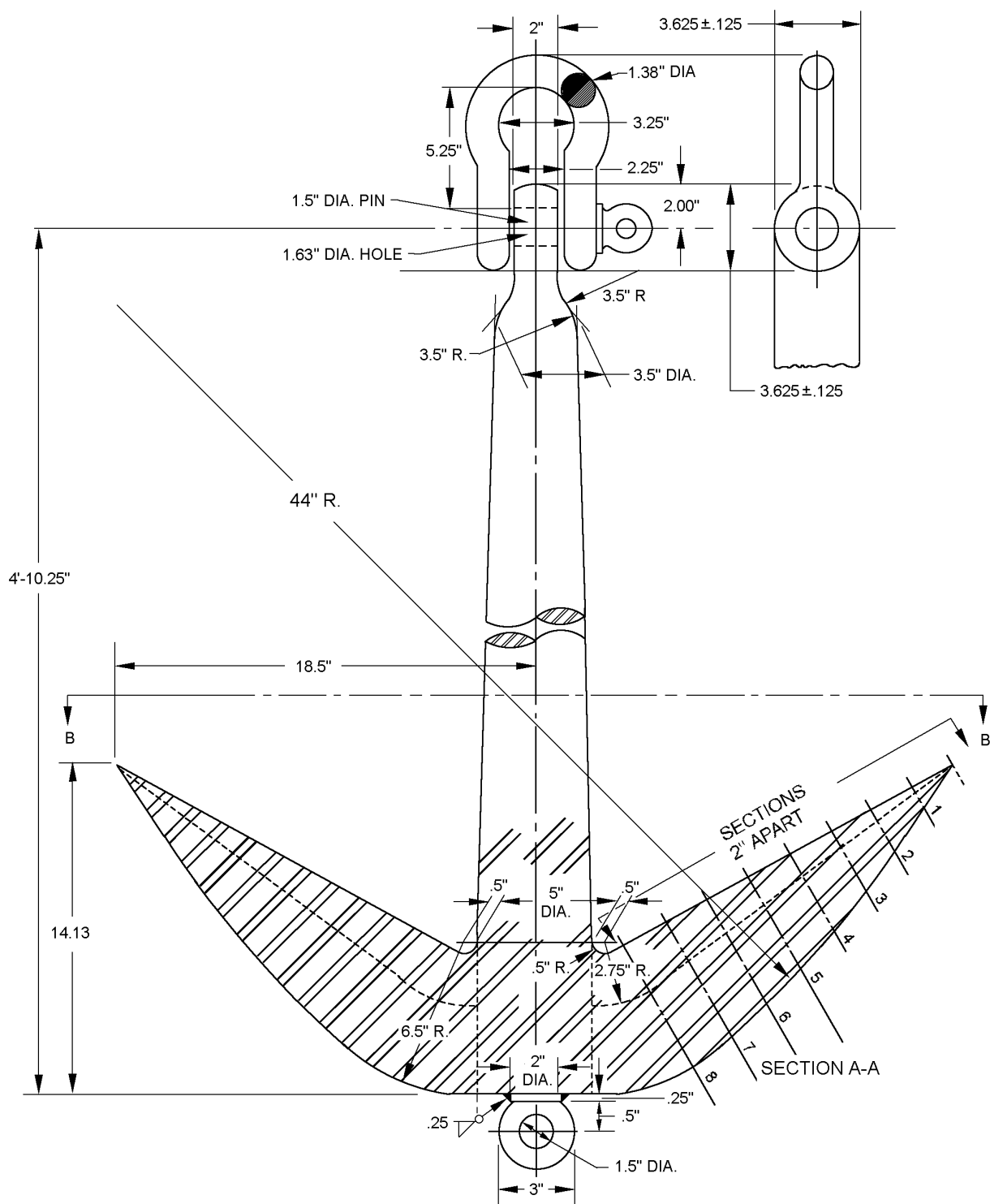


FIGURE 1. Type I, size 1, grapnel.

MIL-DTL-613D

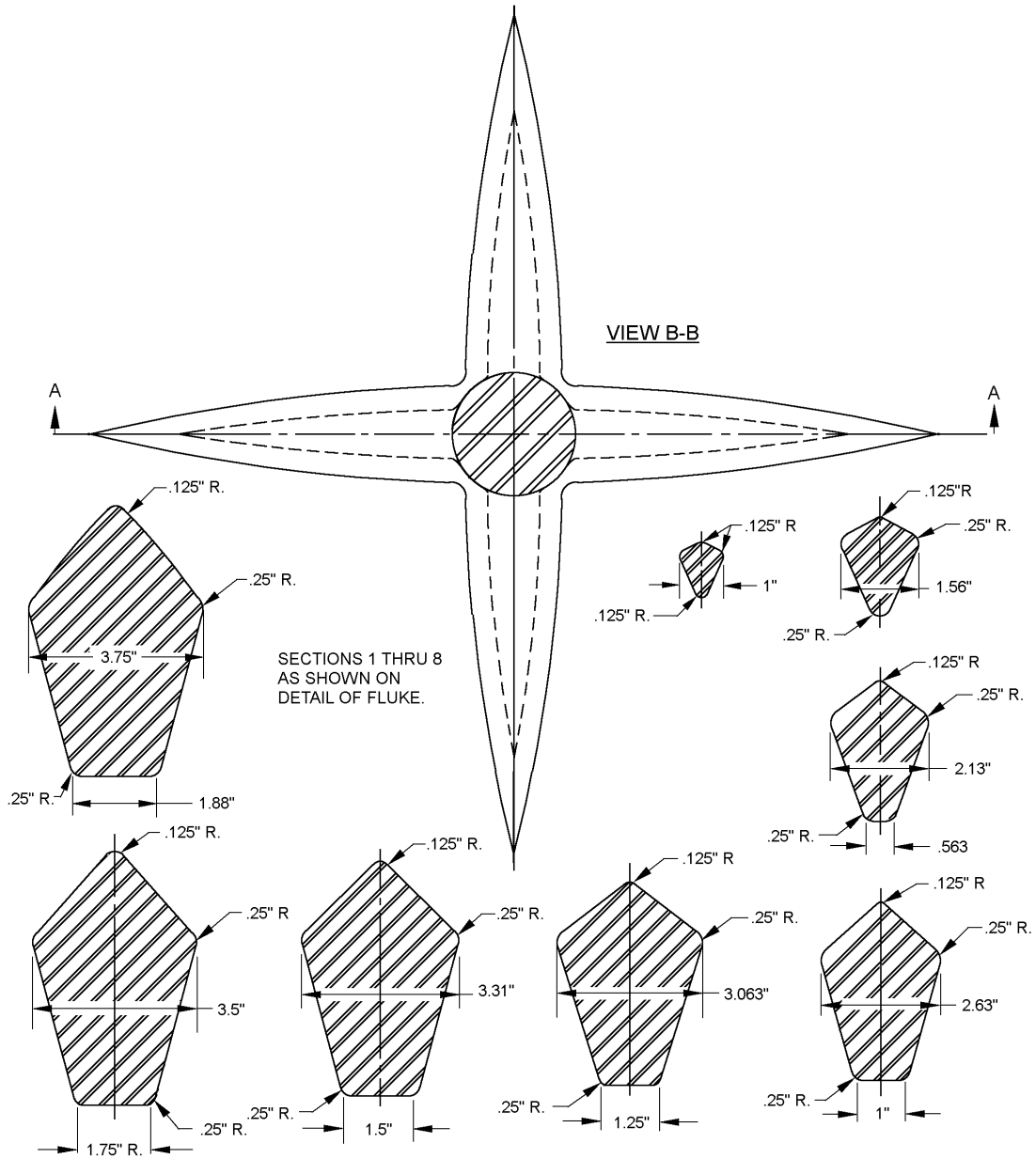


FIGURE 1. Type I, size 1, grapnel – Continued.

MIL-DTL-613D

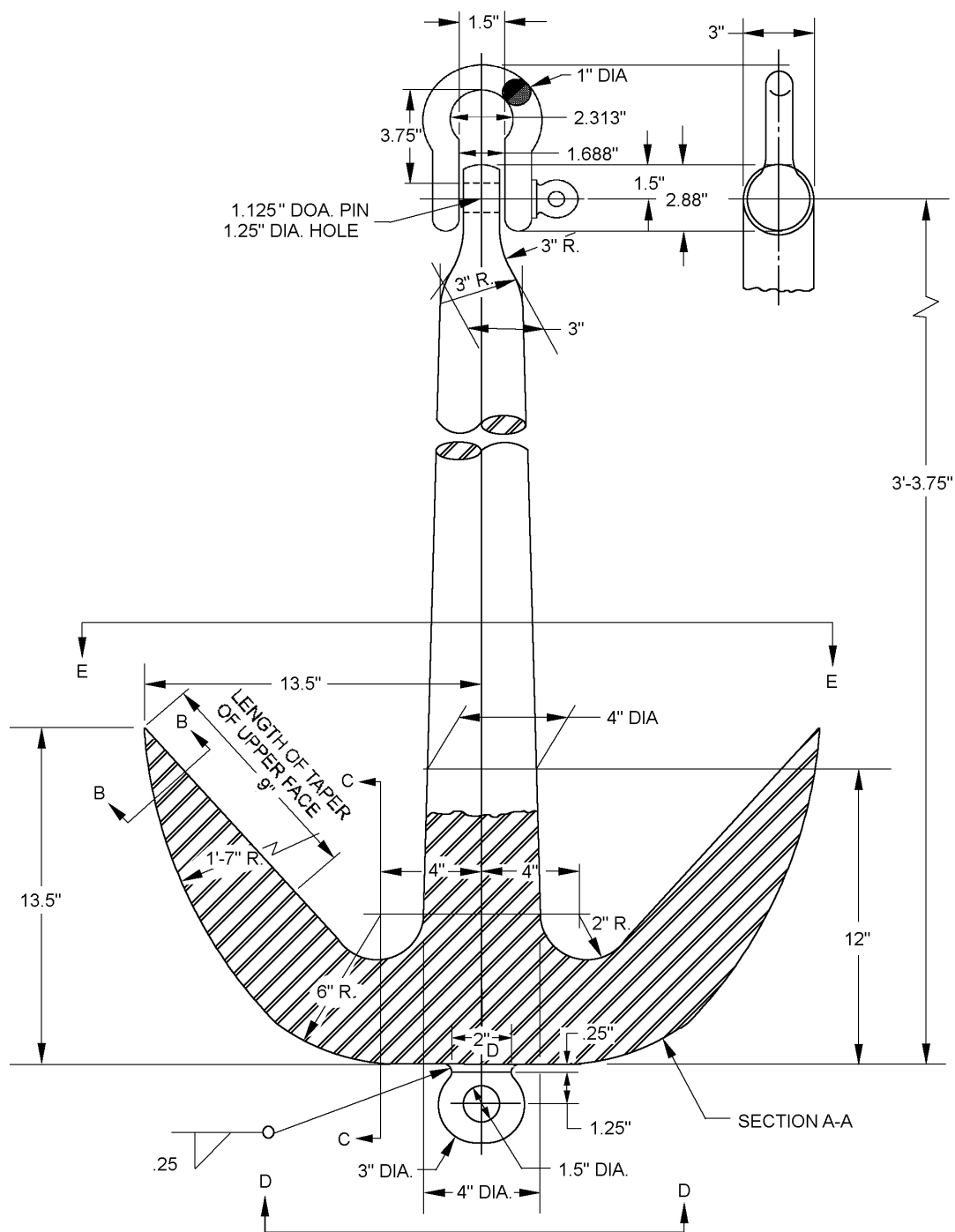


FIGURE 2. Type I, size 2, grapnel.

MIL-DTL-613D

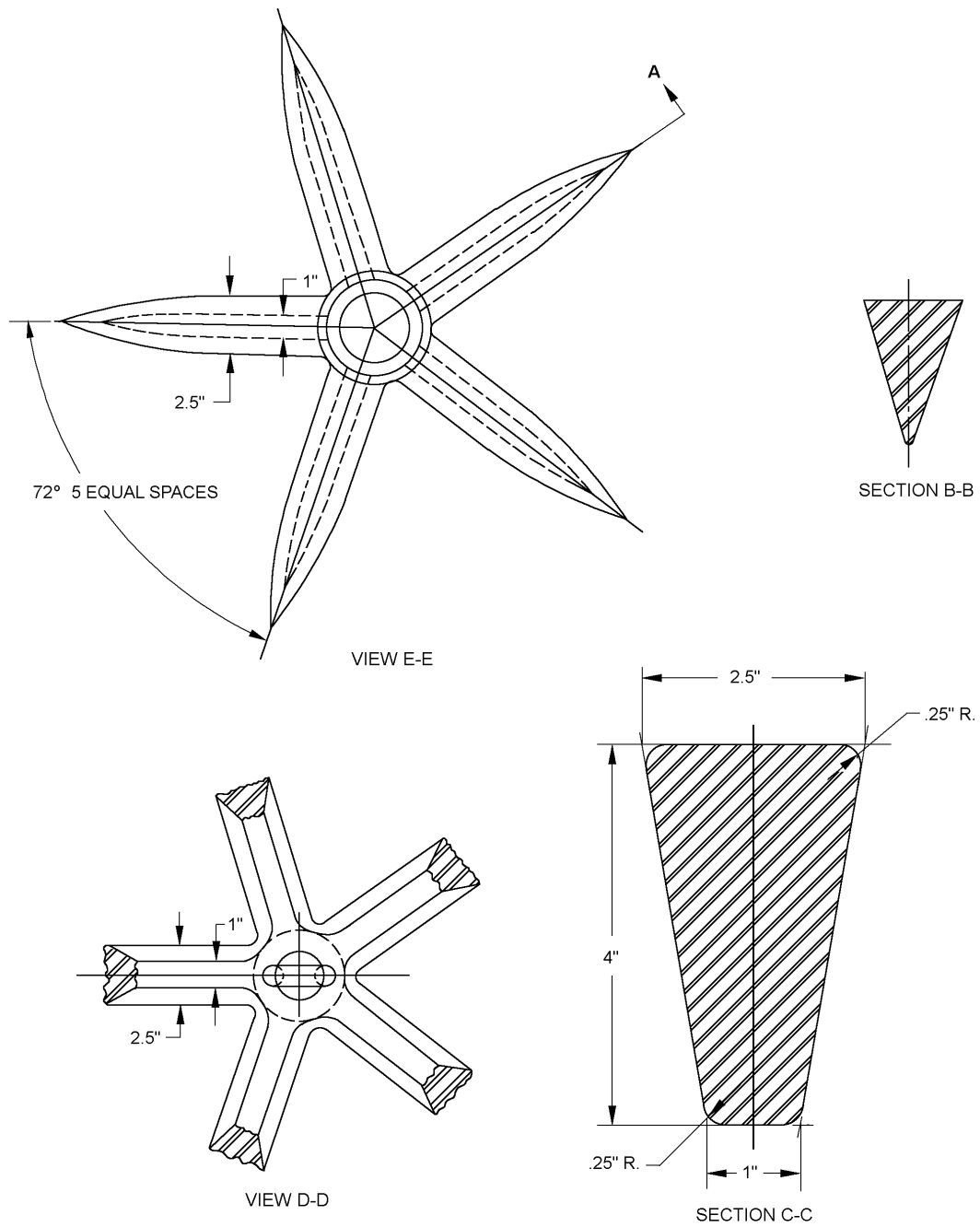


FIGURE 2. Type I, size 2, grapnel - Continued.

MIL-DTL-613D

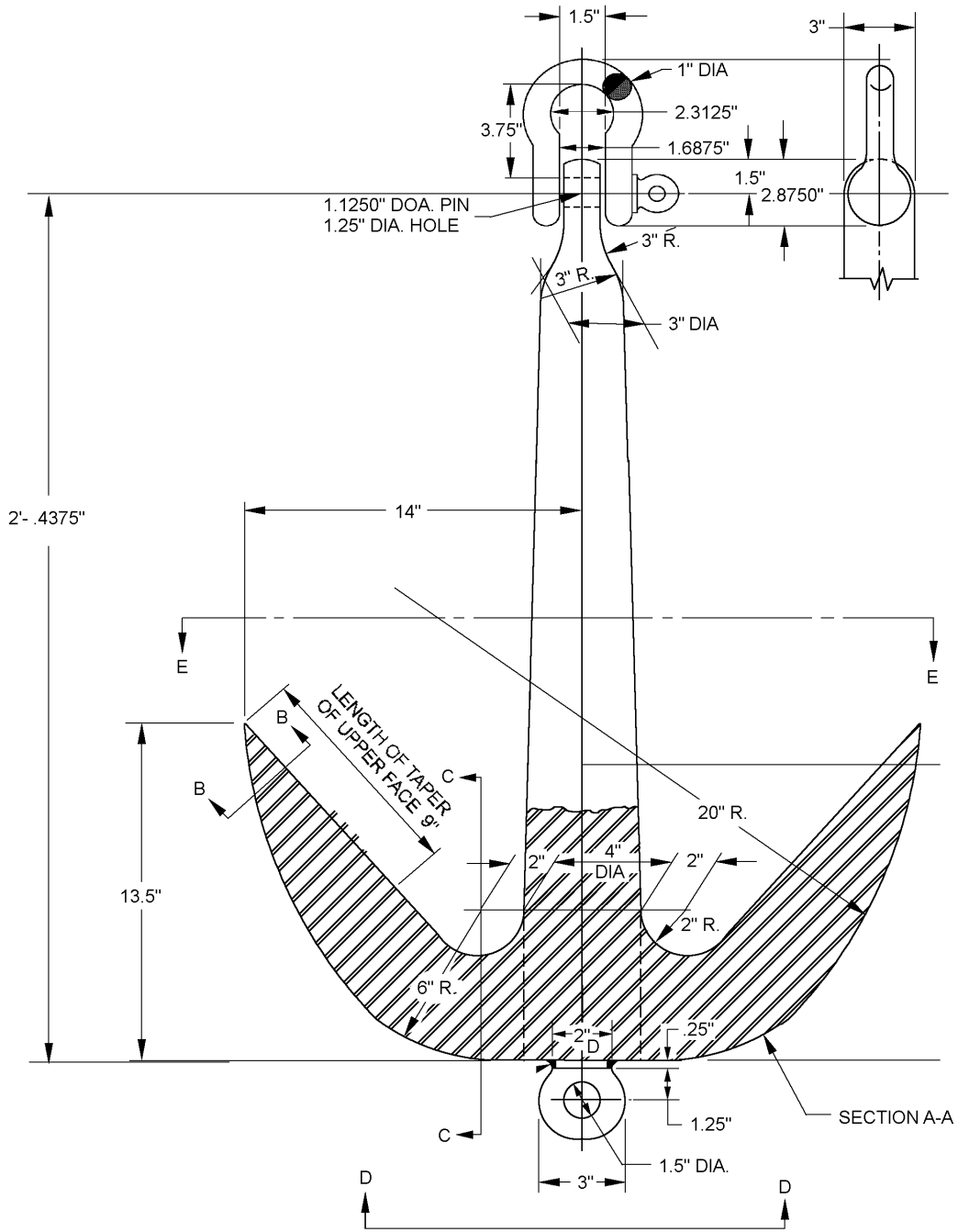


FIGURE 3. Type I, size 3, grapnel.

MIL-DTL-613D

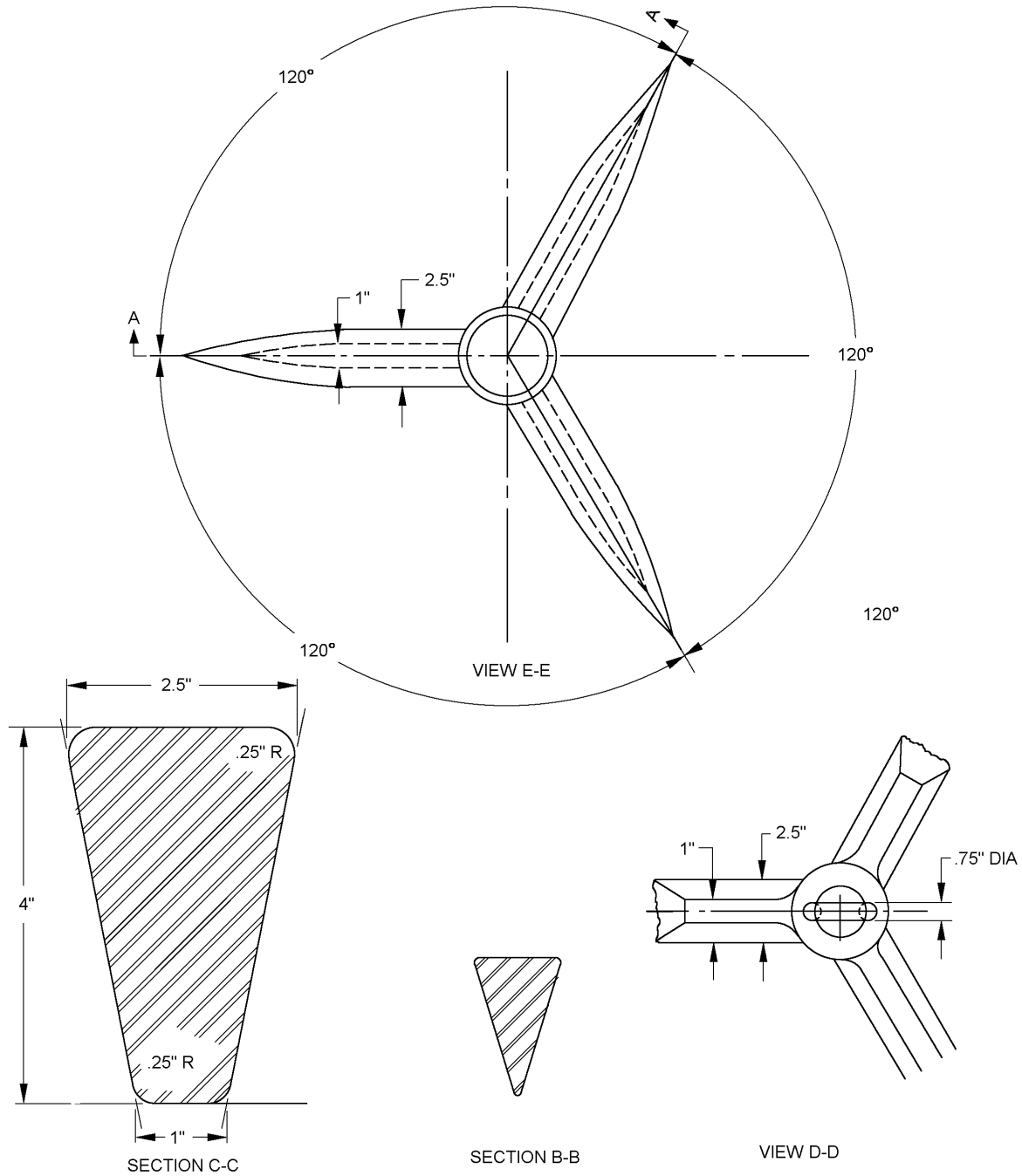
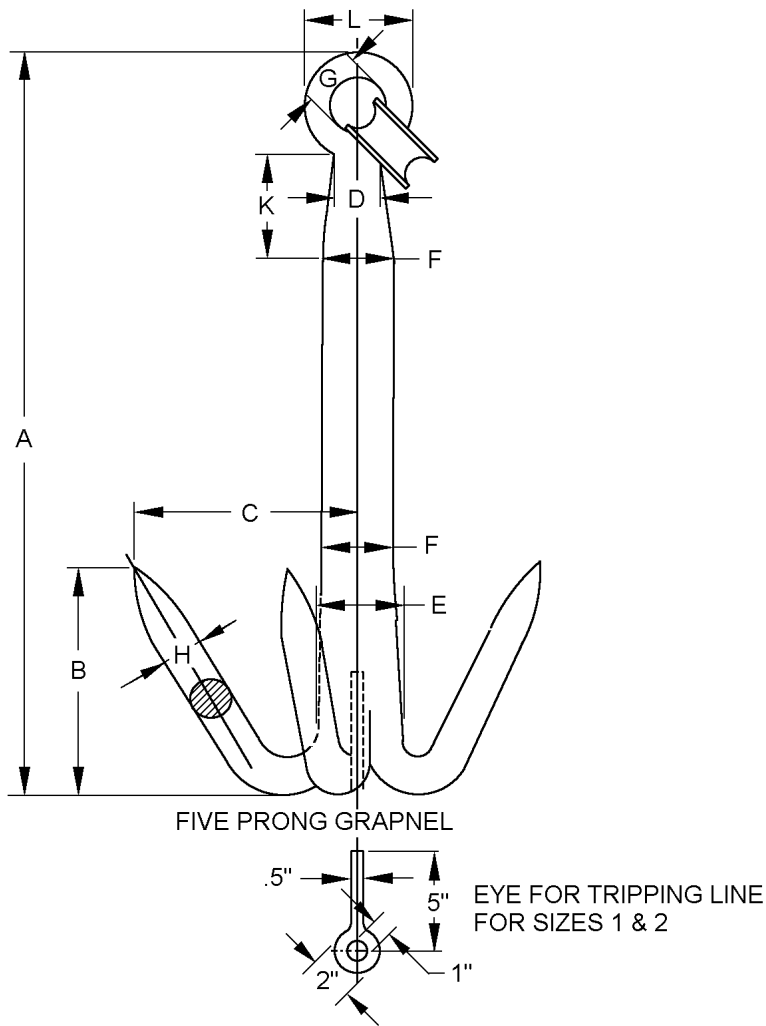


FIGURE 3. Type I, size 3, grapnel - Continued.

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Size	A	B	C	D	E
	in (mm)	in (mm)	in (mm)	in (mm)	+ .375/-0.00 in (mm)
1	36 (914)	11(279)	11(279)	2(51)	3.25(83)
2	30 (762)	8.5(216)	8.5(216)	2.5(64)	2.5(64)
3	19 (483)	6(152)	6(152)	1.13(29)	1.88(48)
4	12 (385)	3.5(89)	3.5(89)	1.88(48)	1.13(39)

Size	F	G	H	K	L
	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)
1	3.25(83)	2.5(64)	1.63(41)	7(178)	5(127)
2	2.5(64)	1.88(48)	1.25(32)	5.5(140)	3.75(95)
3	1.63(41)	1.25(32)	.88(22)	5.5(140)	2.5(64)
4	1(25)	1.75(44)	.63(16)	2.75(70)	1.75(44)

FIGURE 4. Type II, sizes 1,2,3 and 4 grapnels.

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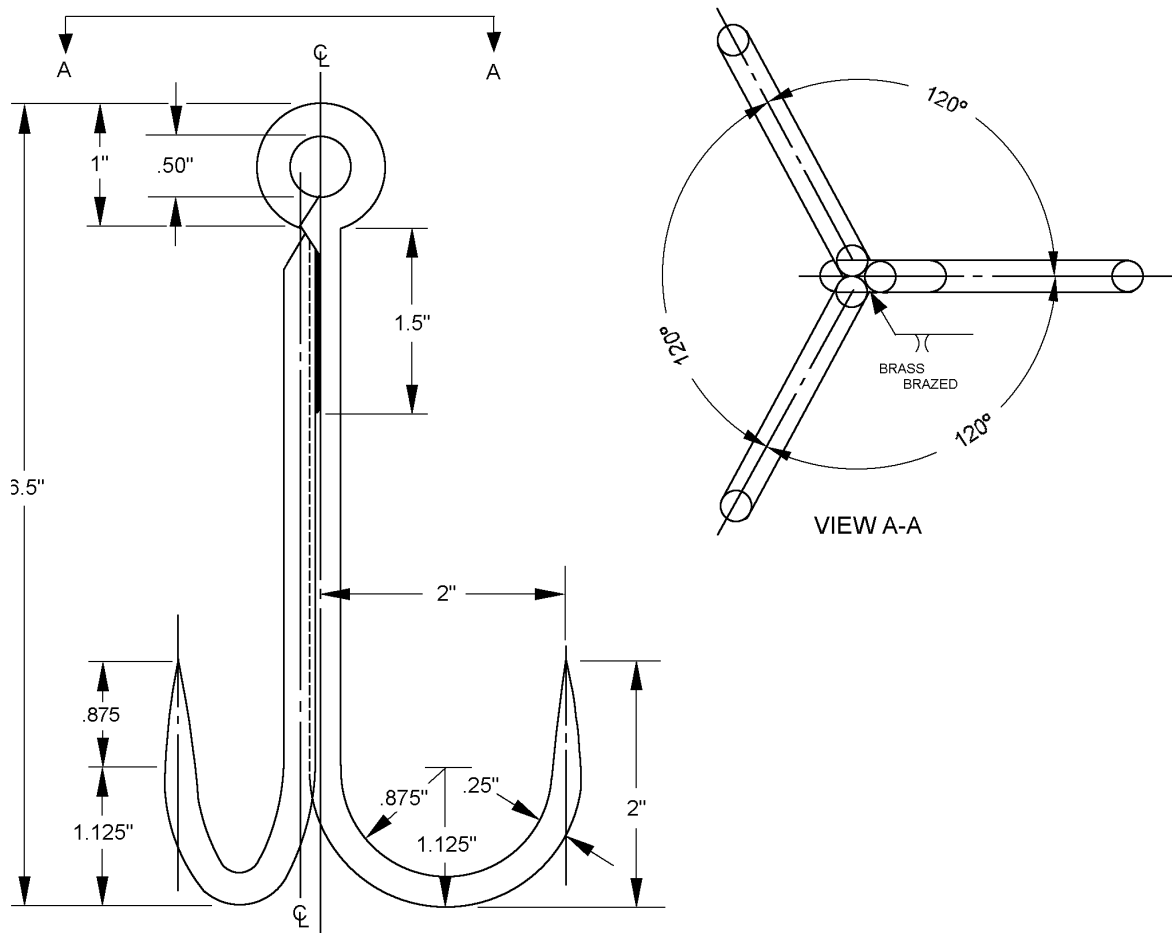


FIGURE 5. Type II, size 5, grapnel.

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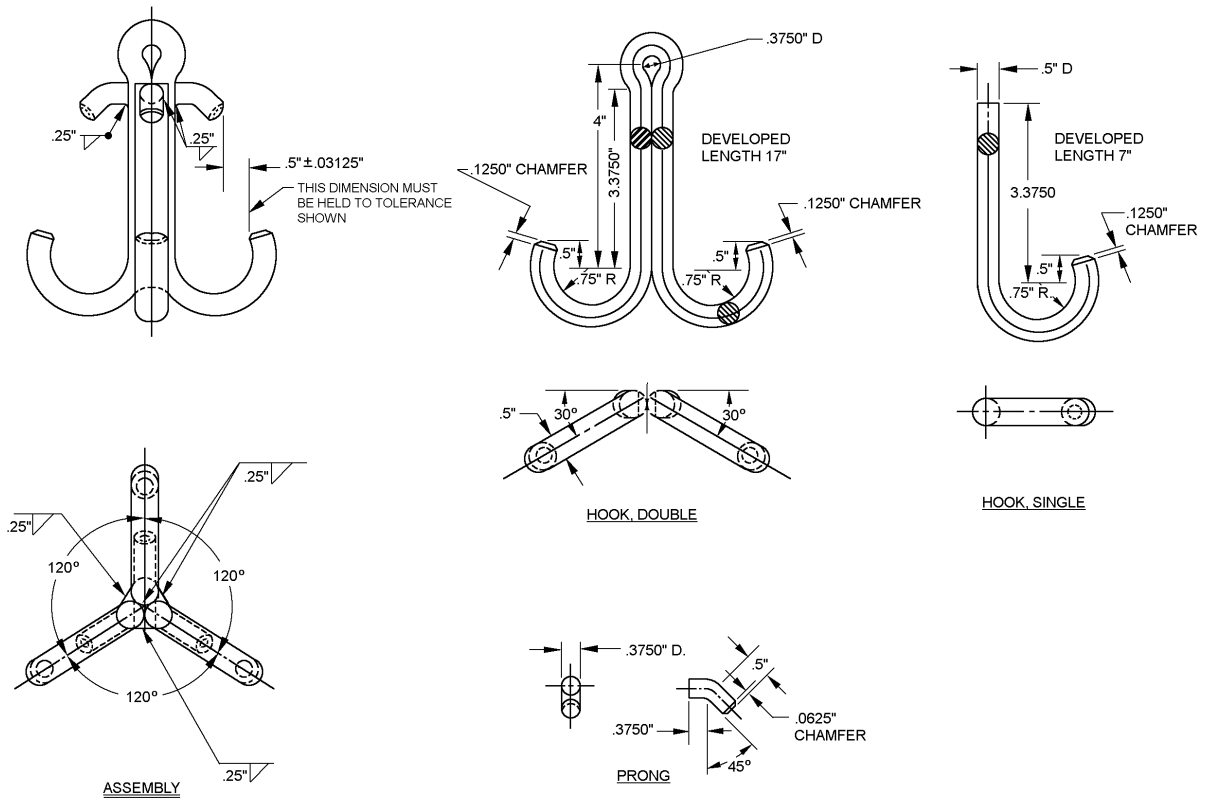


FIGURE 7. Type IV, size 1, grapnel.

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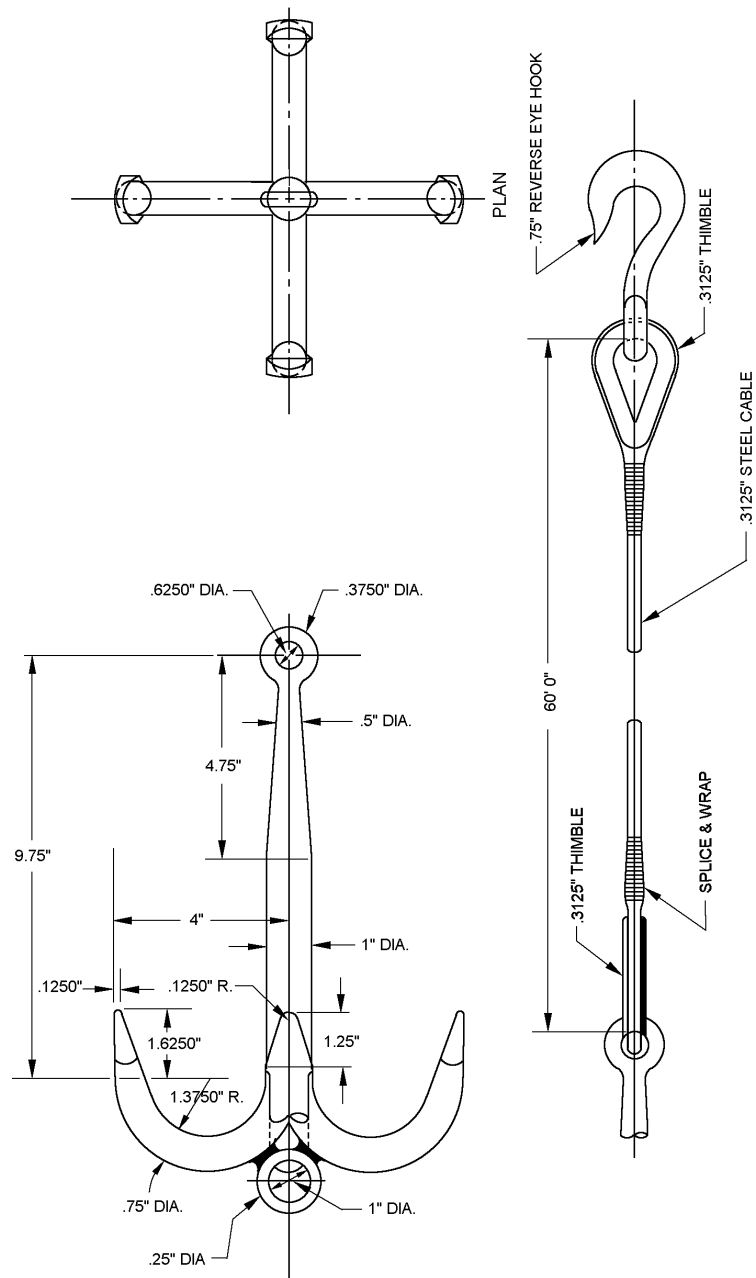


FIGURE 8. Type IV, size 2, grapnel.

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CONCLUDING MATERIAL

Custodians:

Army - MI
Navy - SH
Air Force - 99
DLA - CC

Preparing activity:
DLA - CC

Project 2040-2014-003

Review activities:

Army - AV
Navy - SA, YD
Air Force - 71

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil/>.