

INCH-POUND  
MIL-W-19460C(SH)  
7 November 1990  
SUPERSEDING  
MIL-W-19460B(SHIPS)  
8 November 1965  
(See 6.5)

## MILITARY SPECIFICATION

### WIRE ROPE ASSEMBLIES, SINGLE LEG, GRAPNEL AND BUOY TYPE

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 grapnel and buoy rope assemblies.

1.2 Classification. Grapnel and buoy ropes shall be furnished in the size designations shown in table I (see 6.2).

TABLE I. Rope size designations.

Rope	Size designation	Strands	Wires per strand	Approximate diameter (inches)
Grapnel	9 by 5	5	9	2-3/8
	9 by 4	4	9	2-3/32
	8 by 3	3	8	1-5/8
	7 by 3	3	7	1-1/2
	6 by 3	3	6	1-3/8
Buoy	4 by 3	3	4	1-1/8
	3 by 3	3	3	7/8

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 20362-5101 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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## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 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

T-R-650 - Rope, Yarn and Twine, Bast Fiber.

## STANDARDS

## FEDERAL

FED-STD-191 - Federal Standard for Textile Test Methods.

## MILITARY

MIL-STD-163 - Steel Mill Products Prepared for Shipment and Storage.

MIL-STD-271 - Requirements for Nondestructive Testing Methods.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, BLDG. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

- A 27 - Standard Specification for Steel Castings, Carbon, for General Application. (DoD adopted)
- A 153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware. (DoD adopted)
- B 633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel. (DoD adopted)
- E 8 - Standard Test Methods of Tension Testing of Metallic Materials. (DoD adopted)
- E 446 - Standard Reference Radiographs for Steel Castings up to 2 in. (51 mm) in thickness. (DoD adopted)

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(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, 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 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.2.1.

3.2 General. Grapnel and buoy ropes shall be compound stranded, each strand containing full diameter, high tensile, zinc coated steel wires, with each wire separately covered with manila (*Musa Textilis*) yarn of a thickness as specified (see 3.3.5).

3.2.1 Length of ropes. The grapnel and buoy ropes shall be furnished in single lengths of 600 feet (100 fathoms), 1200 feet (200 fathoms), and 3000 feet (500 fathoms), plus the amount required for the rope breaking test, unless otherwise specified (see 6.2), without splices, welds, or joints of any kind.

3.2.2 End fittings. Each length of grapnel and buoy rope shall be fitted, at each end, with an end link-thimble assembly, as shown on figures 1, 2, 3, 4 and 5. Both the link and thimble shall be zinc coated. The fittings shall be spliced into the rope by a loop or eye splice. The splice shall have at least three tucks with the whole strand, and two with half the wires cut from each strand, and laid under and over against the lay of the rope. The splice shall be tightly drawn, neatly made, and both eye and splice shall be served with type IV, class 4, tarred hemp round line in accordance with T-R-650.

### 3.3 Material.

3.3.1 Steel wires. The diameter of the finished, galvanized, steel wires shall be  $0.106 \pm 0.003$  inch. The wires shall be made from either open hearth or electric furnace steel and shall contain not more than 0.04 percent sulphur and 0.04 percent phosphorous. The galvanized wires shall conform to the following requirements:

Tensile strength - 2150 pounds, minimum breaking strength.  
Elongation - 5 percent minimum, in 10 inches after fracture.

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The wires shall be round, smooth, of uniform high quality, and shall be free from splits, seams, scales, splints, flaws, excessive nonmetallic inclusions and other defects. The wires and the rods from which they are drawn shall be free from welds, joints, or splices of any kind. The wires shall be zinc coated, as specified in 3.3.4.

### 3.3.2 Link-thimble assemblies.

3.3.2.1 End links. The end links shall be made of forging steel by the open hearth or electric furnace process, and shall be heat-treated, as required. The steel used shall have a minimum elongation of 18 percent in 2 inches. The welding rod used shall produce a weld which will match the mechanical properties of the forging.

3.3.2.2 Thimbles. The thimbles shall be made of cast steel in accordance with ASTM A 27, grade 70-36. The cast thimbles shall meet the radiographic standard of ASTM E 446.

3.3.2.3 Proof load. The proof loads for link-thimble assemblies shall be as specified in table II.

TABLE II. Proof loads for link-thimble assemblies.

Rope size designation	Proof loads
9 by 5	105,000
9 by 4	80,000
8 by 3	56,000
7 by 3	47,000
6 by 3	40,300
4 by 3	26,800
3 by 3	20,100

### 3.3.3 Fiber parts.

3.3.3.1 Manila. The manila yarn used to cover the individual wires shall be a good grade number 18 yarn having a breaking strength of not less than 300 pounds per yarn for an average of ten tests. The yarn shall be untanned, free from tar, grease, and oil, and in the finished rope shall contain not more than 5 percent oil by weight.

3.3.3.2 Jute. The jute used as strand core shall be long fiber, good quality, acid-free jute of sufficient density to fully support the wires of the strands of each rope. The jute strand cores for rope size designations 7 by 3, and 4 by 3 and jute rope core for rope size designations 9 by 5 and 9 by 4 shall be in accordance with T-R-650. The jute cores shall have a pH value not less than 6.5 and not greater than 7.5 and shall be made up as specified in table III.

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TABLE III. Jute strand cores.

Rope size designation	Cores
9 by 5	11 ply, 180 pounds
9 by 4	11 ply, 180 pounds
8 by 3	11 ply, 180 pounds
7 by 3	3/8 inch diameter, 3 strand
6 by 3	9 ply, 180 pounds
4 by 3	5/32 inch diameter, 3 strand
3 by 3	No core

3.3.4 Zinc coating. The steel wires and the link-thimble assemblies shall be zinc coated by either the hot-dip (galvanized method), ASTM A 153, or the electro-deposition process, ASTM B 633, class Fe/Zn 25, type II. The coatings shall be adherent, uniform, smooth, and continuous.

3.3.5 Construction. Each wire shall be separately and completely covered with five manila yarns tightly and evenly laid on with a left lay (Z) of approximately 3 inches, without laps or folds. The wires shall be laid-up with a right lay (S) to form the strands and the strands shall be laid-up in a left lay (Z) to form the rope. The length of lay (pitch) of the rope and the strands shall be as specified in table IV. Each strand of rope size designations 9 by 5, 9 by 4, 8 by 3, 7 by 3, 6 by 3, and 4 by 3 shall have at the center a jute core, as specified in table III. The 9 by 4 and 9 by 5 rope constructions shall also have 3-strand, jute rope cores as follows: 1/2-inch diameter for 9 by 4 and 13/16-inch diameter for 9 by 5. No jute strand core shall be used in the 3 by 3 rope construction.

TABLE IV. Length of lay (pitch).

Rope size designation	Length of turn		
	Rope (inches)	Strand (inches)	Yarn (inches)
9 by 5	16-1/2	10	3
9 by 4	15-1/2	10	3
8 by 3	9	7	3
7 by 3	11-1/2	8-1/4	3
6 by 3	8	6	3
4 by 3	7-1/2	4-1/2	3
3 by 3	6-1/2	5-1/4	3

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3.3.5.1 Breaking strength. The finished ropes shall have a breaking strength not less than that specified in table V.

TABLE V. Minimum rope breaking strengths.

Rope size designation	Minimum rope breaking strength (pounds)
9 by 5	105,000
9 by 4	80,000
8 by 3	56,000
7 by 3	47,000
6 by 3	40,300
4 by 3	26,800
3 by 3	20,100

3.4 Workmanship. Grapnel and buoy ropes shall be of balanced construction, evenly and securely laid, and free from kinks, loose or open strands, loose wires or yarn threads, and be reasonably free from dirt and extraneous material or other defects and irregularities, which may be detrimental to serviceability and appearance.

3.4.1 Fiber parts. Manila yarns and jute cores shall be thoroughly cleaned, free from waste, evenly twisted, and of uniform ply.

3.4.2 Link-thimble assemblies. The links and thimbles shall be free from sharp edges, seams, pipes, flaws, cracks, scales, fins, porosity, hard spots, excessive nonmetallic inclusions and segregations and all other defects of material and workmanship which may affect their strength and serviceability or that of the ropes used therewith.

3.4.3 Zinc coating. The zinc coating shall be free from uncoated spots, injurious lumps, blisters, gritty areas, acid spots, black spots, dross, or flux; shall withstand handling during shipment and storage, and shall be free from any area of paint or other coating. The coating shall be not less than 0.7 ounce per square foot.

#### 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, 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 ensure supplies and services conform to prescribed requirements.

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4.1.1 Responsibility for compliance. All items shall 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 the 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.

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

- (a) First article inspection (see 4.2.1).
- (b) Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. The first article inspection shall be performed on one unit when a first article is required (see 3.1 and 6.2). The inspection shall consist of the examination specified in 4.4 and the test specified in 4.5. The first article shall be a first production item and shall be representative of the design, construction, and manufacturing technique applicable to the remaining units to be furnished under the contract.

4.2.2 Quality conformance inspection. The quality conformance inspection shall consist of the examination specified in 4.4 and the tests specified in 4.5.

4.3 Sampling. A lot consists of units of the same size and construction offered for delivery at one time under one contract or order. Samples for inspection shall be selected from each lot in accordance with tables VI and VII.

TABLE VI. Sampling for visual examination and testing of the end item.

Lot size	Sample size
2 - 8	3
9 - 15	5
16 - 25	8
26 - 50	13
51 - 90	20
91 - 150	32
151 - 280	50
281 - 500	80
501 - 1200	125
1201 - 3200	200
3201 - 10000	315

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TABLE VII. Sampling for examination of length.

Lot size	Sample size
1 - 10	All
11 - 500	10
501 - 3200	13
3201 - 10000	20

4.3.1 Sampling for examination. Sample units shall be selected at random from each lot in accordance with table VI and shall be 0 percent defective.

4.3.2 Sampling for testing. Sample units shall be selected at random from each lot in accordance with table VI and shall be 0 percent defective. Approximately 30 feet or a specimen long enough for tests shall be taken from each sample unit.

#### 4.4 Examination.

4.4.1 End item for visual defects. Each of the sample units selected in accordance with 4.3.1 shall be examined to verify conformance with the requirements of 3.2.2 and 3.4 which do not involve tests. Any sample unit having one or more defects shall be rejected. If any defects are noted in the original sample units, additional units shall be randomly selected as specified in the original sampling plan and if any defects are noted, the entire lot shall be rejected.

4.4.2 Length. The sample unit for this examination shall be one reel. The sample size shall be as specified in table VII. The lot size shall be the number of units in the inspection lot. Defects shall be as specified in 4.4.2.1.

4.4.2.1 Defects with regard to length shall be considered to exist if any of the following are determined during inspection:

- (a) Length of unit less than or more than length specified.
- (b) Length of unit less than marked on ticket.
- (c) Reels not in continuous length.

4.5 Test procedures. Each of the sample units selected in accordance with 4.3.2 shall be subjected to the tests specified in 4.5.1 through 4.5.8. If any sample unit fails the applicable test, the entire lot shall be rejected.

#### 4.5.1 Determination of lay (pitch).

4.5.1.1 Specimen. The length of lay or pitch of rope, each strand, and the yarns covering each wire, shall be made at the free end of the reel or coil, prior to splicing the outer link-thimble assembly.



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4.5.1.2 Procedure. When measuring the lay there shall be no axial load on the rope. Beginning not less than 10 feet from the end of the rope, the length of five or more lays of the rope shall be measured, each strand, and the yarns covering each wire. The distances measured shall be divided by the number of pitches. The average of these pitches shall not exceed that specified in table IV.

4.5.2 Breaking strength test of finished rope.

4.5.2.1 Specimen. The sample length shall be seized at both ends and subjected to the breaking strength test.

4.5.2.2 Procedure. The sample length shall be tested to destruction under surveillance of the Government inspector.

4.5.2.3 The finished ropes shall have a breaking strength not less than that specified in table V for the applicable rope size designations.

4.5.3 Tests of link-thimble assemblies.

4.5.3.1 Radiographic tests.

4.5.3.1.1 The thimbles shall be subjected to radiographic examination specified in MIL-STD-271 and the following:

4.5.3.1.2 Radiographic examination shall be conducted on the first casting of a particular design.

4.5.3.1.3 When a number of castings are to be made from the same pattern or design by the same foundry, the amount of radiographic examination to be conducted on subsequent castings of the same design may be reduced as the command or agency concerned or its authorized representative considers permissible, after examination of the radiographs from the first casting, provided the same foundry technique is used in producing the subsequent castings.

4.5.3.1.4 If, at any time after the first casting is produced, the manufacturer elects to alter his foundry technique in order to eliminate defects revealed in the first or subsequent castings, the first casting submitted for inspection after such change shall be considered as a new "first casting" and shall be subjected to radiographic examination.

4.5.3.1.5 When the manufacturer has a number of orders for duplicate castings and employs the same foundry technique in their production, these castings may be considered as subsequent castings provided that not more than 6 months shall have elapsed between the completion of one order and the start of the succeeding order. Where more than 6 months have elapsed before starting the manufacture of a succeeding order, the first casting of the new order shall be radiographed.

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4.5.3.1.6 Where a number of castings of the same design are produced by a standardized technique, the Government inspector shall select castings in accordance with 4.3.2 and shall subject the selected castings to radiographic inspection specified in MIL-STD-271.

4.5.3.1.7 Radiographic examination shall be conducted on the heat treated and on the rough machined casting. Where radiographic examination after rough machining will unduly delay completion of the contract, such examination may be made before machining provided that the surface of the casting is sufficiently smooth and the cross section is sufficiently close to that of the rough machined casting that no internal defects are obscured and the sensitivity is equal to 2 percent of the rough machined dimensions.

4.5.3.2 Proof load tests.

4.5.3.2.1 The end links and thimbles shall be tested to determine conformance with the proof load requirements specified in table II.

4.5.3.2.2 The number of end links and thimbles to be subjected to the proof load tests shall be the same as that specified for radiographic examination of thimbles (see 4.5.3.1.6).

4.5.3.3 If any end link or thimble fails in the proof load test or is found defective in the radiographic test, all end links and thimbles of the same lot shall be subjected to the proof load test and the radiographic test.

4.5.4 Tests of steel wires.

4.5.4.1 Tensile and elongation. The tensile strength and elongation of the galvanized wires shall be determined in accordance with ASTM E 8 except that the speed of the pulling head of the testing machine during the test shall not exceed 0.15 inch per inch per minute. The elongation shall be determined as the permanent increase in length after fracture of a marked section of the wire originally 10 inches in length.

4.5.4.2 Torsion. The wire shall withstand a minimum of 10 twists in an 8-inch length before fracture. The fractured specimen shall show no evidence of helical splits. The torsion test shall be made in a standard torsion machine or equal, with one head of the machine rotating and the opposite head nonrotating but movable horizontally. The test shall be applied to a free length of wire at a rate of not more than 60 revolutions per minute (r/min) employing sufficient weight to keep the specimen from kinking.

4.5.4.3 Mandrel wrap. Eight turns of wire shall be wrapped and unwrapped in a close helix about a cylindrical mandrel having a diameter of 0.212 inch at a rate of approximately fifteen turns per minute without fracturing the steel. Two turns of wire shall be wrapped in a close helix about a cylindrical mandrel having a diameter of 1/2 inch at a rate of approximately fifteen turns per minute without causing the galvanizing to flake or loosen sufficiently to permit the removal of any of the zinc from the wire by rubbing with the fingers.

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4.5.5 Tests of manila yarns. The minimum breaking strength of the manila yarns, as specified in 3.3.3.1, shall be determined by method 6016 of FED-STD-191.

4.5.6 Tests of jute. The pH value of the jute cores, as specified in 3.3.3.2, shall be determined by method 2811 of FED-STD-191.

4.5.7 Lubricant content. A specimen for lubricant determination shall be weighed, and then the lubricant extracted with petroleum ether or other suitable solvent, in a Soxhlet apparatus for 1 hour. The solvent shall be evaporated from the oil contained in a tared flask, and the oil dried for 1 hour at 100 to 105 degree celsius (°C), and then weighed, and the percent of lubricant calculated, to determine conformance with 3.3.3.1. The boiling point range of the petroleum ether shall be between 30 and 65°C.

4.5.8 Tests for galvanizing. The zinc coating shall be tested by the method specified in ASTM B 633, when the electrodeposition process is used, and ASTM A 153, when the hot-dip galvanizing process is used, to determine compliance with 3.4.3.

4.6 Inspection of packaging. Packing and marking shall be examined for compliance with section 5 of this specification.

## 5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition.)

5.1 General requirements. The grapnel and buoy ropes shall be closely wound on reels or in coils as specified (see 6.2), full length, of one size to a reel or coil. When ropes are to be shipped on reels, the inner and outer ends of the rope shall be securely attached to the reel.

5.2 Packing. Packing shall be level A or commercial as specified (see 6.2).

5.2.1 Level A. The rope shall be prepared for shipment without contact preservative and shall be completely enclosed and wrapped in a waterproof barrier material, as specified in MIL-STD-163.

5.2.2 Commercial. The rope shall be packed commercially as specified in MIL-STD-163 without contact preservative and shall be completely enclosed or wrapped in a waterproof barrier material.

5.3 Marking. Each reel or coil shall be plainly and indelibly marked with the following:

- (a) Size designation.
- (b) Quantity (length of reel or coil).
- (c) Gross weight.
- (d) Contract number.
- (e) Contractor.
- (f) Manufacturer.

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In addition to the above, and any special marking specified in the contract or order (see 6.2), shipments shall be marked in accordance with MIL-STD-163.

## 6. NOTES

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

6.1 Intended use. Grapnel and buoy ropes covered by this specification are intended for use in cable laying and cable retrieving operations.

6.2 Acquisition requirements. Acquisition documents must 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) Rope size designation (see 1.2).
- (d) When first article is required (see 3.1 and 4.2.1).
- (e) Length, if other than specified (see 3.2.1).
- (f) Whether rope is to be furnished in reels or coils (see 5.1).
- (g) Level of packing required (see 5.2).
- (h) Special marking required (see 5.3).

6.3 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, a standard production item from the contractor's current inventory (see 3.1), and the number of items to be tested as specified in 4.2.1. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. 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. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4 Caution should be taken during the plating process. The contractor shall be responsible for the safe reutilization and disposal of all material generated by this process in accordance with ASTM A 380, section 8.2 and 8.7.

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6.5 Subject term (key word) listing.

Compound strand  
Link-thimble  
Manila  
Steel wire  
Zinc

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

Preparing activity:  
Navy - SH  
(Project 4010-N043)

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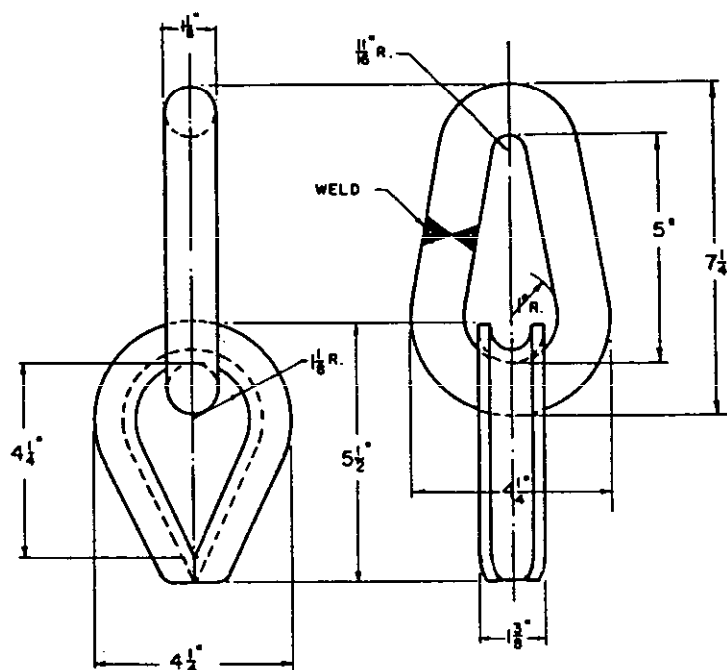


FIGURE 1. Link-thimble assembly for grapnel rope (7/8 inch diameter)  
size - 3 by 3.

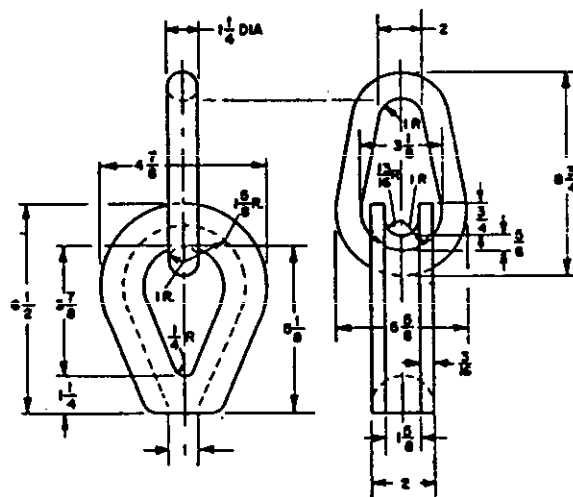


FIGURE 2. Link-thimble assembly for grapnel rope (1-3/8 inch diameter)  
size 6 by 3.

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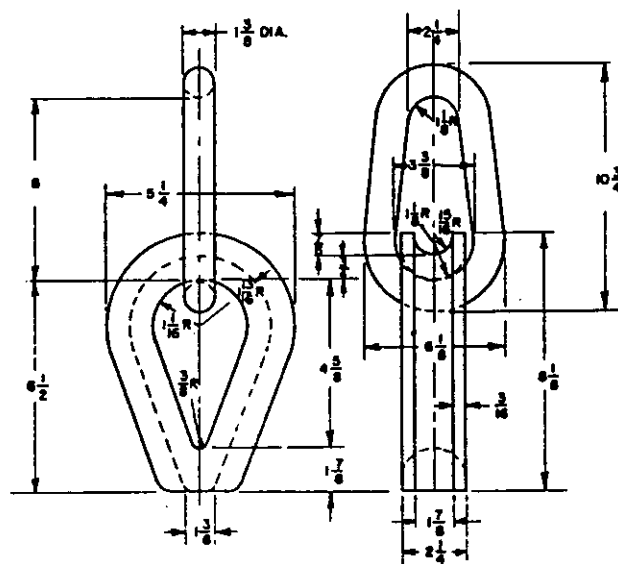


FIGURE 3. Link-thimble assembly for grapnel rope (1-5/8 inch diameter)  
size 8 by 3.

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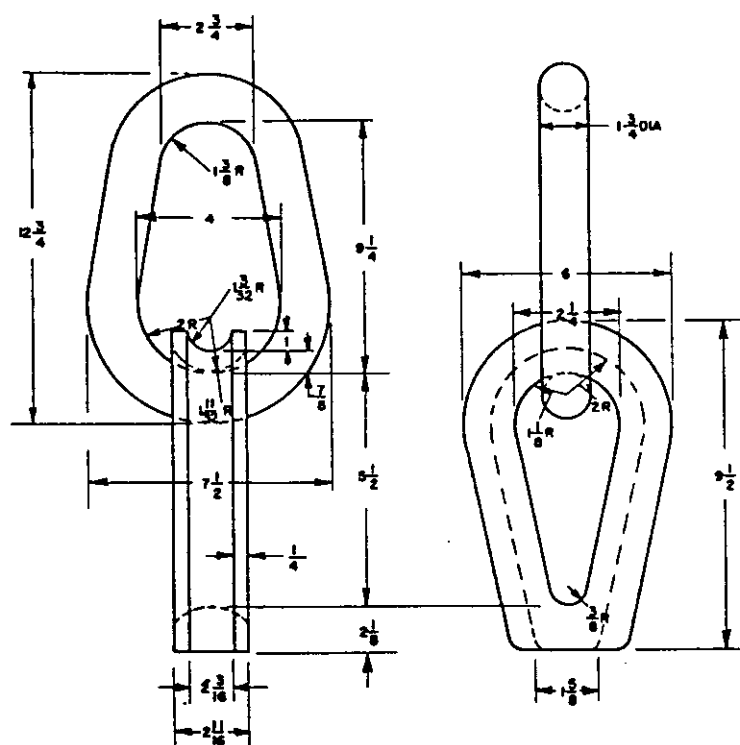


FIGURE 4. Link-thimble assembly for grapnel rope (2-3/32 inch diameter)  
size 9 by 4.



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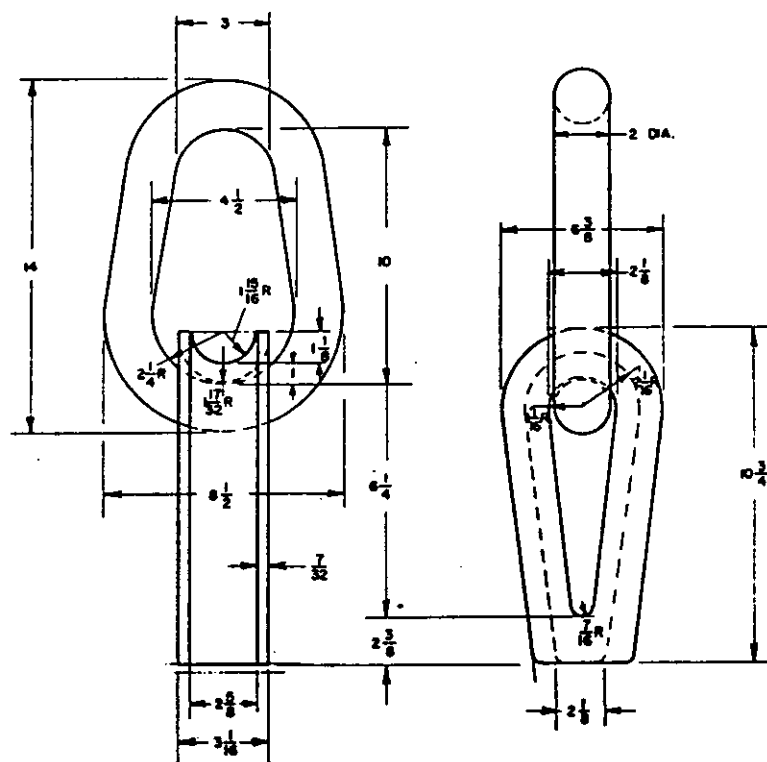


FIGURE 5. Link-thimble assembly for grapnel rope (2-3/8 inch diameter)  
size 9 by 5.

# 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. The 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.

### I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER

2. DOCUMENT DATE (YYMMDD)

3. DOCUMENT TITLE

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

### 6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)

7. DATE SUBMITTED (YYMMDD)

(1) Commercial

(2) AUTOVON  
(If applicable)

### 8. PREPARING ACTIVITY

a. NAME Technical Point of Contact (TPOC):

Mr. Jack Hall (SEA 56W23)

b. TELEPHONE (Include Area Code)

(1) Commercial

(2) AUTOVON

PLEASE ADDRESS ALL CORRESPONDENCE AS FOLLOWS:

TPOC: 703-602-1844

8-332-1844

c. ADDRESS (Include Zip Code)

Commander, Naval Sea Systems Command

Department of the Navy (SEA 55Z3)

Washington, DC 20362-5101

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:

Defense Quality and Standardization Office

5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466

Telephone (703) 756-2340 AUTOVON 289-2340