

MIL-C-24356A(SH)  
 21 April 1982  
 SUPERSEDING  
 MIL-C-24356(SHIPS)  
 12 February 1971  
 (See 6.6 and 6.7)

## MILITARY SPECIFICATION

### COUPLINGS, SEGMENTED, AND SPLIT CLAMPS REATTACHABLE, 2-1/2-, 4-, 6- AND 7-INCH, FOR REFUELING-AT-SEA HOSE

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 2-1/2-, 4-, 6- and 7-inch segmented, reattachable couplings and split clamps intended for use on 2-1/2-, 4-, 6- and 7-inch hose meeting the requirements of MIL-H-22240, and primarily intended for use in, but not limited to, refueling-at-sea.

#### 1.2 Classification.

1.2.1 Coupling and split clamp designation. Couplings and split clamps covered by this specification shall be designated in the following form (see 6.2.1 and 6.3).

M24356 - XX-XX

Military specification code number _____	
Size code number (see 1.2.1.1) _____	
Coupling or split clamp identification code letters (see 1.2.1.2) _____	

1.2.1.1 Size. The size (inside diameter of hose to be used) of the couplings or split clamps is identified by two digits (see table I).

TABLE I. Code number to size.

Code number	Size (inside diameter)
25	2 1/2-inch
40	4 inch
60	6 inch
70	7 inch

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 3242, 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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1.2.1.2 Coupling of split clamp identification. The type of fitting (female coupling of figure 1, male coupling of figure 1 or split clamp of figure 3) is identified by two letters (see table II).

TABLE II. Code letters to fitting type.

Code letters	Fitting type
SC	Split clamp
FC	Female coupling
MC	Male coupling

## 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

#### MILITARY

- MIL-H-775 - Hose, Rubber, Plastic, Fabric, or Metal (Including Tubing); and Fittings, Nozzles and Strainers, Packaging of.
- MIL-A-8625 - Anodic Coatings, for Aluminum and Aluminum Alloys.
- MIL-H-22240 - Hose, Rubber, Petroleum Based Fuels and Water Services, Discharge Only, Smooth Bore, Lightweight Buoyant Type.

### STANDARDS

#### FEDERAL

- FED-STD-151 - Metals; Test Methods.

#### MILITARY

- MS20995 - Wire, Safety, or Lock.
- MS28775 - Packing, Preformed, Hydraulic, Plus 275°F, ("O" Ring).

(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.)

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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.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip, Spec. for. (DoD adopted)
- A 276 - Stainless and Heat-Resisting Steel Bars and Shapes, Spec. for.
- B 26 - Aluminum-Alloy Sand Castings, Spec. for. (DoD adopted)
- B 221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube, Spec. for. (DoD adopted)
- B 247 - Aluminum-Alloy Die and Hand Forgings, Spec for.
- D 2000 - Rubber Products in Automotive Applications, Classification for. (DoD adopted)

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

## 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 references cited herein, the text of this specification shall take precedence.

## 3. REQUIREMENTS

3.1 Qualification. The reattachable end couplings furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.4).

3.2 Material.

3.2.1 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and shall be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

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3.2.2 Couplings. The materials for all couplings and split clamps shall be as shown in table III.

TABLE III. Material composition.

Name of part	Figure number	Material <sup>1/</sup>	Applicable document	Remarks
End coupling nipple; male or female	1	Cast or wrought aluminum alloy	ASTM B 26, Alloy 356-T6 or B 221, 6061-T6	Anodized, MIL-A-8625 type I
Split clamp half	2	Aluminum wrought or extruded	ASTM B 221, 6061-T6 or B 247, 6061-T6	Anodized, MIL-A-8625 type I
Band for split clamp	3	Corrosion-resisting steel	ASTM A 167, GR. 11	
Screws and nuts	3	Corrosion-resisting steel	ASTM A 276, type 316	
End coupling body	1	Wrought aluminum alloy	ASTM B 221, 6061-T6 or B 247, 6061-T6	Anodized, MIL-A-8625 type I
"O" ring	-	Synthetic rubber	ASTM D 2000	MS28775 for dimensions only Coupling size (inches)   "O" ring dash size 2-1/2   234 4   346 6   438 7   442

<sup>1/</sup> Materials differing from those specified, but of similar types having equal or superior physical and chemical properties, will be considered where more appropriate for the coupling design and if satisfactory to the contracting activity.

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### 3.3 End couplings.

3.3.1 The dimensions of the male and female couplings shall be in accordance with figure 1. The dimensions of the split clamp and band assembly shall be in accordance with figures 2 and 3. The female clamp coupling shall be fitted with an "O" ring seal in the groove. Split clamp designs other than those shown on figures 2 and 3 are acceptable subject to approval of the Naval Sea Systems Command (NAVSEA). However, the proposed split clamp design shall be interchangeable with any couplings which can be obtained under this specification. The split clamp must not have parts which can be lost during assembly or disassembly.

3.3.2 The end couplings shall be of the segmented reattachable type securely gripping the hose and maintaining such grip without significant relaxation. The coupling shall be readily removable and reattachable to a new section of hose by the use of commonly available hand tools or tools which are normally carried onboard ship. The latter should be verified with the contracting activity at the time that approval is requested. The hose couplings shall meet all the applicable performance requirements specified when attached to hose constructed in accordance with MIL-H-22240, without developing any weakness and without causing damage to the hose. (In this connection, reasonable deformation of the hose in the coupling is tolerable, provided no damage or incipient failure is created thereby.) The gripping action shall involve the reinforcement without the deformation causing any damage to any part of the hose; reliance shall not be placed upon gripping of the tube and cover alone. The internal nipple and external members in contact with the hose shall have the largest possible radii at their ends, to prevent damage to the hose as a result of severe flexing or collapsing of the hose. The end of the nipple inside the hose shall be not more than 1/2 inch back from the end of the external clamping member. The coupling exterior shall be free of projections which can snag on ship's structure or become damaged through rough handling. All components of the coupling shall be designed to withstand rough handling, including dropping, without deformation.

3.3.2.1 The 2-1/2 and 4-inch end couplings may be a solid socket design.

3.3.3 The coupling should incorporate means to obtain gripping of the hose to its predetermined optimum amount only and to insure that this condition can be obtained repeatedly by any operator, without exercising special skill or judgment. It shall be readily evident to the operator that the coupling is properly made up. Conversely, means shall be incorporated to prevent improper coupling make-up. The coupling design shall be such that the grip on the hose will not tend to decrease with a pull on the hose.

3.4 Tensile pull. Couplings, when attached to hose meeting the requirements of MIL-H-22240, shall withstand the tensile pull test specified in 4.7.1 without any apparent damage to the hose or weakness of the coupling grip.

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3.5 High pressure hold. Couplings, when attached to hose meeting the requirements of MIL-H-22240, shall withstand the high pressure hold test specified in 4.7.2.

3.6 Proof. Hose couplings shall pass the proof tests specified in 4.7.3.

3.7 Marking.

3.7.1 Stamping. Each nipple and segment shall be stamped at a place so as not to weaken the coupling. Stamping shall include, but not necessarily be limited to the following:

- (a) Manufacturer's name or trademark.
- (b) Size, in inches.
- (c) Specification number (MIL-C-24356).

3.8 Drawings. Drawings shall be furnished in accordance with the data ordering document included in the contract or purchase order (see 6.2.2). When applying for qualification testing for reattachable end couplings, the contractor shall submit to NAVSEA and the Defense Contract Administration Services Management Area (DCASMA), one set of detailed drawings containing all information, including dimensions, tolerances, finishes, and materials thereon. Upon qualification approval, the drawings shall be validated by DCASMA and two microfilm copies of the validated drawings shall be sent to NAVSEA.

3.9 Workmanship. Workmanship shall be such that there are no sharp or rough edges that could damage the hose or injure personnel. All parts shall be free of dirt, metal shavings, or other contamination.

#### 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.

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

- (a) Qualification inspection (see 4.3).
- (b) Quality conformance inspection (see 4.5).

4.3 Qualification tests. Qualification tests shall be conducted on reattachable end couplings at a laboratory satisfactory to NAVSEA. Qualification tests shall consist of the tests specified in table IV.

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4.3.1 Samples for qualification.

4.3.1.1 Reattachable end couplings. Four sets of reattachable end couplings of each size shall be subjected to the examination and tests specified in 4.6 and table IV. Each reattachable end coupling shall be supplied with a mating test plug secured with a split clamp assembly. The outside diameter of the mating test plugs should not exceed the outside diameter of the coupling bodies. The test plugs shall remain in the couplings during the drop test specified in table IV.

TABLE IV. Outline of qualification testing of reattachable end couplings (for each sample, tests shall be conducted in the numerical order represented by the numbers in the blocks).

Test number	Tests	Reattachable end coupling test sequence			
		Sample No. 1	Sample No. 2	Sample No. 3	Sample No. 4
1	Make up hose assembly and verify ease of make up	1,5	1,5	1,4	1,6
2	High pressure hold test (see 4.7.2)	3	3	-	-
3	Proof test (see 4.7.3.1)	2, 6	2,6,8	2,5,7	2,4,7
4	Tensile pull test (see 4.7.1)	-	7	6	-
5	Drop hose assembly 5 times onto a steel or set concrete floor from a height of 10 feet, such that both end couplings hit at approximately the same time.	-	-	-	3
6	Disassemble the sample and verify ease of disassembly, see that the hose is not damaged and cut 6 inches off each end of hose and reconduct test number 1. <sup>1/</sup>	4	4	3	5

<sup>1/</sup> Elapsed time from completion of test no. 6 to rerun of test no. 1 on shortened sample shall be no more than 1 hour.

4.3.1.2 Hose. Hose samples required for qualification testing of reattachable end couplings shall be in accordance with MIL-H-22240. Wall thicknesses shall be as specified in table V. Only the cover of the hose samples shall be ground, if necessary, to obtain the desired wall thickness.

TABLE V. Tabulation of hose samples.

Sample number	Length of hose between couplings (minimum) (feet)	Wall thickness (inch) (minimum) (see 4.3.1.2 and notes 1 and 2)
1	2	0.454 min
2	2	.410 max
3	2	.454 min
4	2	.410 max

See notes at top of next page

## NOTES to table V:

1. The maximum and minimum dimensions required for the hose samples shall be evident on at least 80 percent of the hose circumference.
2. Where 0.454 inch minimum wall thickness is required for test, the actual maximum wall thickness shall not exceed that allowed by MIL-H-22240. Where 0.410 inch maximum wall thickness is required for test, the actual minimum wall thickness shall be not less than that allowed by MIL-H-22240.

4.4 Sampling for quality conformance inspection.

4.4.1 Lot. A lot shall consist of all reattachable end couplings manufactured under the same conditions and of the same size offered for delivery at one time.

4.4.2 Sampling for visual and dimensional examination. A random sample of reattachable end couplings shall be selected from each lot, in accordance with table VI for the examination specified in 4.6. If in any sample the number of defective reattachable end couplings exceeds the acceptance number for either AQL for that sample, the lot represented by the sample shall be rejected.

TABLE VI. Sampling for visual and dimensional examination AQL (approx.) = 2.5 percent defective for major defects and 10.0 percent defective for major and minor defects combined.

Number of reattachable end couplings in lot	Number of reattachable end couplings in sample	AQL = 2.5 percent		AQL = 10.0 percent	
		Acceptance number (defectives)	Rejection number (defectives)	Acceptance number (defectives)	Rejection number (defectives)
15 and under	10	0	1	2	3
16 to 40	15	1	2	3	4
41 to 110	25	1	2	5	6
111 to 300	35	2	3	7	8
301 and over	50	3	4	9	10

4.4.3 Sampling for tests. One set of reattachable end couplings shall be selected at random from each lot and shall be assembled with a length of hose, meeting the requirements of MIL-H-22240, to provide a free length between couplings of not less than 36 inches nor more than 40 inches and subjected to the tests specified in 4.5.

4.5 Quality conformance inspection. The sample reattachable end couplings selected in accordance with 4.4 shall be subjected to the examination specified in 4.6, test numbers 1 and 6 of table IV.

4.6 Examination. Each of the sample reattachable end couplings selected in accordance with 4.3.1.1 and 4.4.2 shall be examined to verify conformance to the requirements of this specification and approved drawings with respect to dimensions, tolerances, finishes, materials, and workmanship.

4.7 Test methods. Physical tests for metal parts shall be determined in accordance with FED-STD-151. For tests which require couplings attached to a section of hose, each end coupling shall have a mating blank connected thereto by a split clamp assembly. Couplings shall be installed on hose for those tests requiring hose assemblies.

4.7.1 Hose and coupling tensile pull test. The test hose assemblies shall be subject to the pull listed below. The pull shall be maintained for at least 5 minutes.

<u>Hose size (inches)</u>	<u>Tensile pull (pounds)</u>
2-1/2	5,000
4	5,000
6	12,000
7	12,000
6 type B	16,000

4.7.2 High pressure hold test. The sample for the high pressure hold test shall have the ends blanked off and shall be subjected to a hydrostatic pressure equal to 70 percent of the minimum burst pressure for a period of 5 minutes. The pressure shall then be dropped to zero pounds per square inch (lb/in<sup>2</sup>). The assembly shall then be repressurized to the above pressure for an additional 5 minutes. There shall be no indication of failure or leakage of fittings (see 3.5).

4.7.3 Proof tests. Hose couplings shall be subjected to the following proof test (see 3.6) for not less than 5 minutes duration during which time there shall be no leakage, deformation of hose couplings, or coupling blow off:

Hose coupling 2-1/2-inch	- 300 lb/in <sup>2</sup>
Hose coupling 4-inch	- 300 lb/in <sup>2</sup>
Hose coupling 6-inch	- 300 lb/in <sup>2</sup>
Hose coupling 7-inch	- 250 lb/in <sup>2</sup>

4.8 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.

## 5. PACKAGING

(The preparation for delivery requirements specified herein apply only for direct Government acquisitions. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.5.)

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5.1 Preservation and packaging, packing and marking. Reattachable end couplings shall be preserved and packaged levels A or C; packed level A, B, or C as specified and marked in accordance with MIL-H-775 (see 6.2.1).

## 6. NOTES

6.1 Intended use. Couplings covered by this specification are intended for use with hose conforming to MIL-H-22240 in fueling at sea applications. Maximum operating pressure of fueling at sea systems is 150 lb/in<sup>2</sup>.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Military specification part number required (see 1.2.1 and 6.3).
- (c) Preservation, packaging, packing, and marking requirements other than those required by 5.1.

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 DAR 7-104.9 (n) (2) 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>
3.8	Drawings, engineering and associated lists	DI-E-7031	Level 3 Design activity designation - contractor Drawing number - contractor Delivery of microfilm - required

(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

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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).

**6.3 Definitive military specification part number.** The military specification part number is a definitive part number which corresponds to the fittings covered by this specification and defines the options presented under this specification. The military specification code number (M24356 for MIL-C-24356) with a dash after it, the hose size code number and the coupling or split clamp identification code letters are combined to form the definitive military specification part number (see 1.2.1).

**6.4** With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in the Qualified Products List QPL-24356 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is Naval Sea Systems Command, SEA 3242, Department of the Navy, Washington, DC 20362, and information pertaining to qualification of products may be obtained from that activity.

**6.4.1** Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

**6.5 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.

**6.6 Supersession data.** Items deleted in this specification are covered by various other documents as follows:

Item	As shown in MIL-C-24356(SH)	New document
(a) Female split clamp to flange	Fig 4	Std Dwg. 805-4472647
(b) Adapters to 4" male hose	Fig 5	
4 inch		805-4472640
6 inch		805-4472641
7 inch		805-4472642
(c) Adapters to 6" NPT	Fig 6	Deleted
(d) Male split clamp to fig.	Fig 7	805-4472639
(e) Spanner wrench	Fig 8	803-2260821

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

Preparing activity:  
Navy - SH  
(Project 4730-N405)

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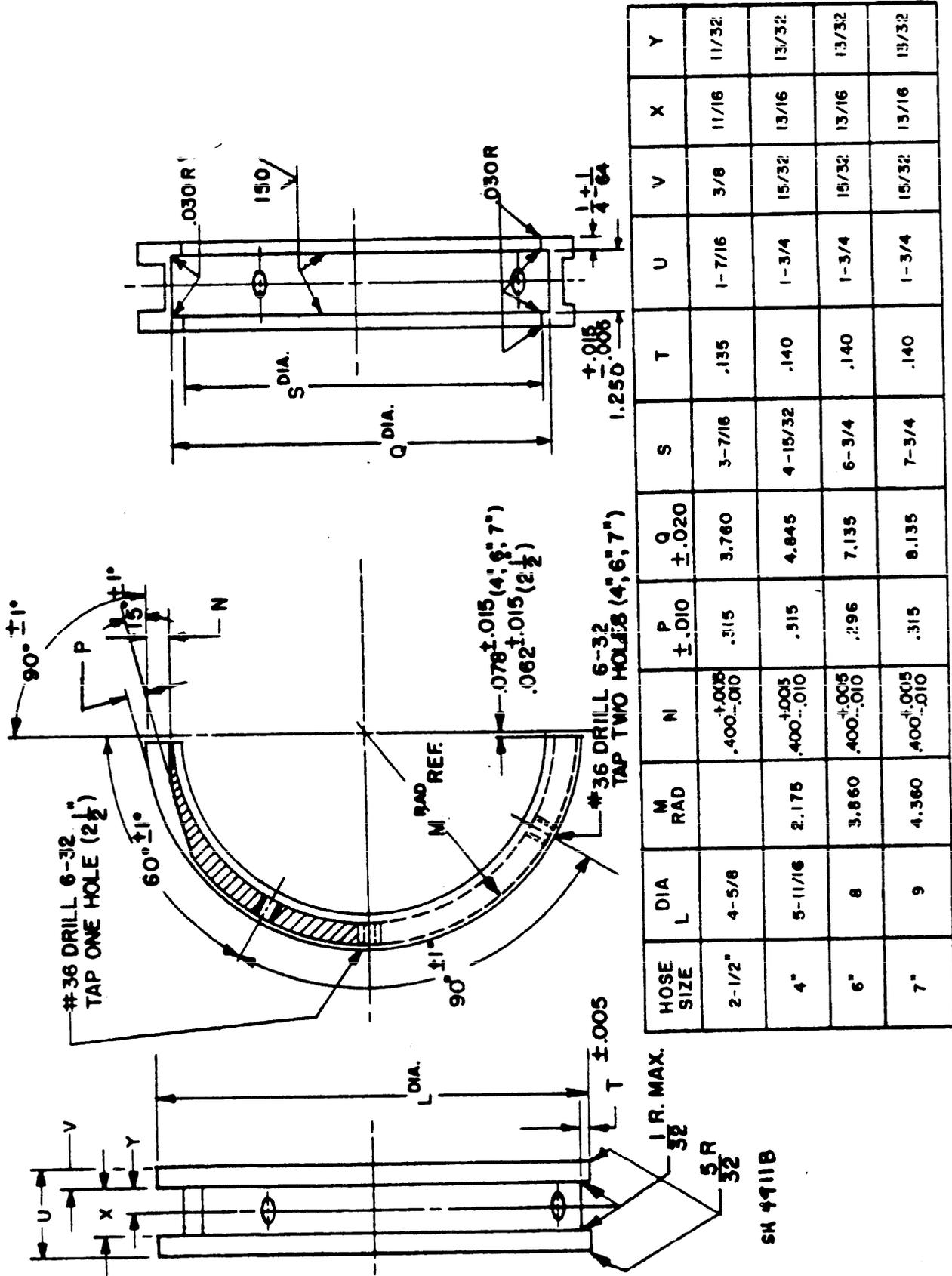


FIGURE 1. Reattachable coupling.



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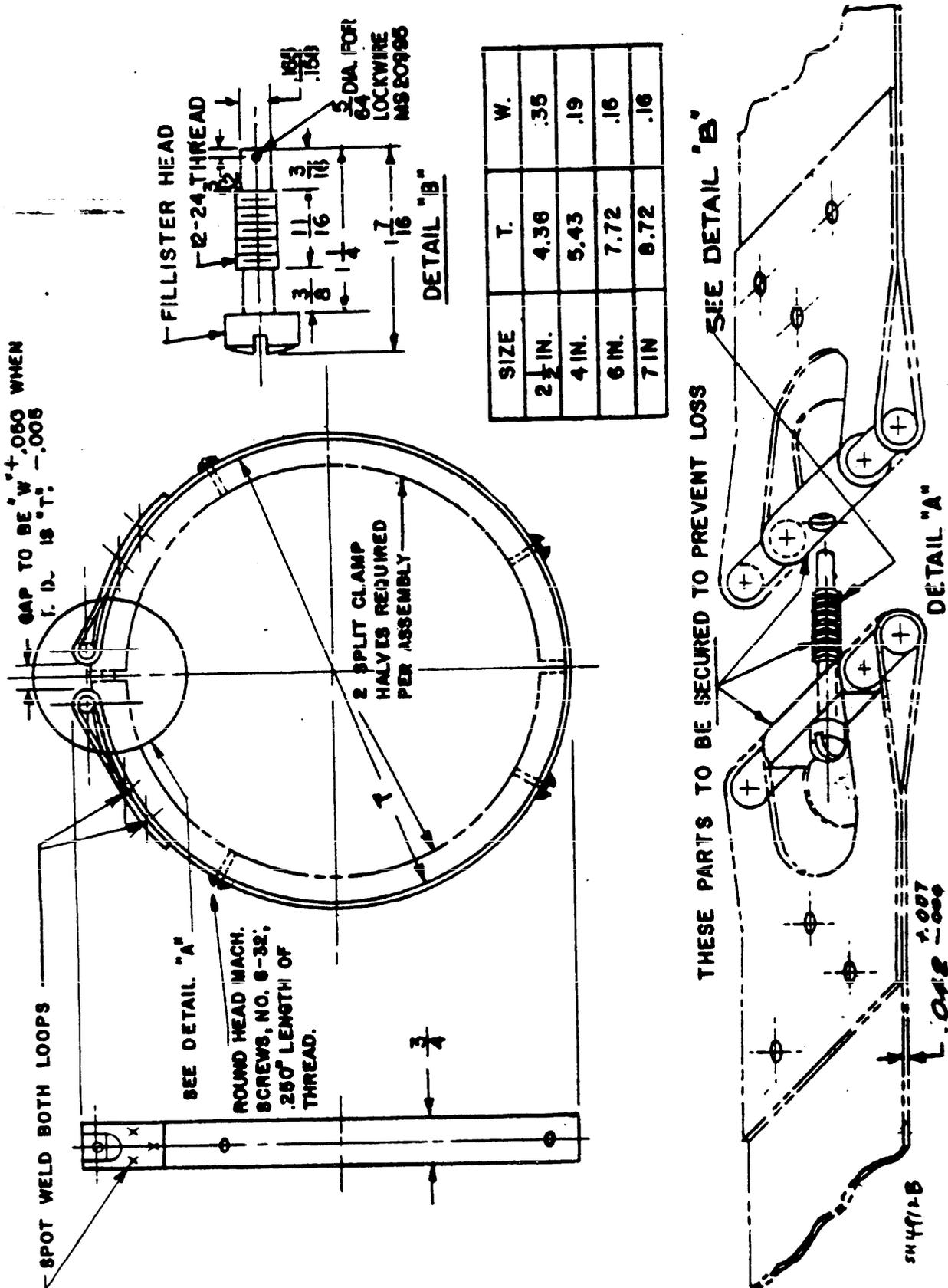


FIGURE 3. Split clamp and band - assembly and details.



**INSTRUCTIONS:** In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide comments. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and used. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

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# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

*(See Instructions - Reverse Side)*

1. DOCUMENT NUMBER

2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

 VENDOR USER MANUFACTURER OTHER (Specify): \_\_\_\_\_

b. ADDRESS (Street, City, State, ZIP Code)

## 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)

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