

INCH-POUND

MIL-DTL-2710C
10 September 2010
SUPERSEDING
MIL-L-2710B
25 March 1991

DETAIL SPECIFICATION

LINKS, CHAIN, DETACHABLE, REGULAR AND PEAR-SHAPED

Reactivated after 10 September 2010 and may be used for new and existing designs and acquisitions.
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This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers regular and pear-shaped detachable links for connecting shots of anchor chain, for connecting the anchor to the outboard swivel shot, and for connecting other chain appendages as necessary.

1.2 Classification. The detachable links are of the following types, classes, and sizes as specified (see 6.2):

Type I - Regular

Class 1 - Standard

Sizes:

1-7/8 inch; 2 inch; 2-1/8 inch; 2-1/4 inch; 2-3/8 inch; 2-1/2 inch; 2-5/8 inch;
2-3/4 inch; 2-7/8 inch; 3 inch; 3-1/8 inch; 3-1/4 inch; 3-3/8 inch; 3-1/2 inch;
3-5/8 inch; 3-3/4 inch; 3-7/8 inch; 4 inch; 4-3/4 inch

Class 2 - Heavy duty

Sizes:

2-3/4 inch; 3 inch; 3-1/2 inch

Comments, suggestions, or questions on this document should be addressed to Defense Logistics Agency Aviation VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297-5616, or e-mailed to STDZNMGT@dla.mil . Since contact information can change, you may want to verify the currency of this address information using the ASSIST database at https://assist.daps.dla.mil/ .
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Class 3 - High strength

Sizes:

3/4 inch; 7/8 inch; 1 inch; 1-1/8 inch; 1-1/4 inch; 1-1/2 inch; 1-3/8 inch;
1-5/8 inch; 1-3/4 inch

Type II - Pear-shaped

Sizes:

Number 2: 3/4 - 7/8 inches
Number 3: 1 - 1-1/8 inches
Number 4: 1-1/4 - 1-1/2 inches
Number 5: 1-5/8 - 2 inches
Number 6: 2-1/8 - 2-3/8 inches
Number 7: 2-1/2 - 3-1/8 inches
Number 8: 3-1/4 - 3-1/2 inches

1.3 Detachable link components. Detachable links consist of the following components (see figure 1 and figure 2):

- a. C-link.
- b. Coupling plate - right hand.
- c. Coupling plate - left hand.
- d. Taper pin.
- e. Hairpin (hairpin will be furnished only for detachable links used in an outboard swivel shot (see 6.2)).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 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 of the documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

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

FEDERAL SPECIFICATION

VV-G-632

- Grease, Industrial, General Purpose

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FEDERAL STANDARD

FED-STD-595/27038 - Miscellaneous, Semigloss

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-24441/20 - Paint, Epoxy-Polyamide, Green Primer, Formula 150, Type III

MIL-PRF-24635 - Coating Systems, Weather-Resistant, Exterior Use

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-130 - Identification Marking of U.S. Military Property

MIL-STD-2035 - Nondestructive Testing Acceptance Criteria

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

2.2.2 Other government drawings. The following other government drawings form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation or contract.

DRAWINGS

NAVY

803-860062 - Links, Detachable, Standard and Heavy Duty

803-921790 - Links, Detachable High Strength

803-6397316 - Link, Detachable, Pear Shaped

804-840327 - Tool Boxes and Tools (Steel Box) for Assembling and Disassembling Detachable Links

(Copies of these drawings are available from Commander, Naval Sea Systems Command, 1333 Isaac Hull Avenue SE, Washington Navy Yard, DC 20376-1080.

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.

AMERICAN SOCIETY FOR QUALITY (ASQ)

ASQ Z1.4 - Sampling Procedures and Tables for Inspection by Attributes

(Copies of this document are available online at <http://www.asq.org/> or from American Society of Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203.)

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ASTM INTERNATIONAL

ASTM A275/A275M	- Standard Practice for Magnetic Particle Examination of Steel Forgings
ASTM A322	- Standard Specification for Steel Bars, Alloy, Standard Grades
ASTM A370	- Standard Test Methods and Definitions for Mechanical Testing of Steel Products
ASTM A580/A580M	- Standard Specification for Stainless Steel Wire
ASTM A581/A581M	- Standard Specification for Free-Machining Stainless Steel Wire and Wire Rods
ASTM A582/A582M	- Standard Specification for Free-Machining Stainless Steel Bars

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

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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.

3.2 Material. Material for the detachable link components shall be as specified in 3.2.1 through 3.2.4. Material used in normal production shall be the same composition as material used for first article sample in chemistry, quality, and properties.

3.2.1 C-link and right and left hand coupling plates. Steel used in the manufacture of the C-link and coupling plates shall be forged from alloy steel as specified in table I.

3.2.1.1 C-link and coupling plate material chemical composition. The chemical composition of the steel of the C-link and coupling plates shall conform to the chemical composition of the American Iron and Steel Institute (AISI) alloy steel grades specified in table I (see 4.5.1).

3.2.2 Taper pin. The taper pin shall be machined from type 416 stainless steel. The finished taper pin shall conform to ASTM A582/A582M, condition H.

3.2.2.1 Taper pin material chemical composition. The chemical composition of the stainless steel of the taper pin shall conform to the chemical composition of type 416 stainless steel in accordance with ASTM A582/A582M (see 4.5.1).

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TABLE I. C-link and coupling plates material.

Detachable link classification	ASTM A322, grade
Type I, Class 3 3/4 inch through and including 1-1/2 inch	8637 or 4340
Type II Number 2 and number 3	
Type I, class 1 1-7/8 inch and over	
Type I, class 2 2-3/4 inch, 3 inch, and 3-1/2 inch	4340 or 8640
Type I, class 3 1-5/8 inch and 1-3/4 inch	
Type II Number 4 through and including number 8	

3.2.3 Plug. The plug shall be cast from antimony alloy and lead.

3.2.3.1 Plug material chemical composition. The chemical composition of the plug shall be 8 ±0.5 percent antimony alloy and the remaining element shall be lead (see 4.5.1).

3.2.4 Hairpin. The hairpin, when specified (see 6.2), shall be formed from stainless steel wire, type 304 or 303, condition A, conforming to ASTM A580/A580M or ASTM A581/A581M, respectively.

3.2.4.1 Hairpin material chemical composition. The chemical composition of the stainless steel of the hairpin shall conform to the chemical composition of type 304 of A580/A580M or type 303 of ASTM A581/A581M (see 4.5.1).

3.2.5 Recovered materials. Unless otherwise specified herein, materials incorporated in the products covered by this specification shall be new and may 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 expressly specified.

3.3 Heat treatment. C-link and coupling plates shall be heat treated above the upper transformation temperature, at a combination of temperature and time to produce a fine grain structure throughout the component and produce a minimum tensile strength of 170,000 pounds per square inch (lb/in²) (Brinell hardness 341 to 375, or direct equivalent in accordance with ASTM A370 (see 6.4)). The components shall not be heated more than twice. Heat treatment

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records shall be made available for inspection and shall include time and temperature, quenching, stress relieving, and cooling method.

3.4 Mechanical properties. The unmachined C-link and coupling plate samples shall be sectioned for determination of the tensile strength specified in 3.3. If it is impracticable to take specimens from finished components, the specimens may be taken from stock of the same heat or melt of steel.

3.5 Brinell hardness - C-link and right and left hand coupling plates. The Brinell hardness shall be established for a first article sample of the C-link and coupling plates in accordance with 4.5.6.

3.6 Brinell hardness - taper pin. The finished taper pin surface shall have a Brinell hardness of 350 (minimum) (see 4.5.5).

3.7 Dimensions. Dimensions and tolerance for type I and type II detachable link components shall be in accordance with the drawings specified below (see 4.4.1):

- a. Type I, class 1 and class 2 - Drawing 803-860062.
- b. Type I, class 3 - Drawing 803-921790.
- c. Type II - Drawing 803-6397316.

3.7.1 Pull draft angles, C-link and coupling plates. All pull draft angles of C-links and coupling plates of detachable links shall be measured in accordance with 4.4.1.1. The pull draft angle limits shall be 3 degrees minimum and 10 degrees maximum. Draft angles greater than 10 degrees will not be acceptable and the link shall be rejected.

3.8 C-link and coupling plate surfaces. Flashing, burrs, irregularities, and rough edges shall be contour ground to a fair surface. No surface shall be ground after proof test of the detachable link. The forgings shall be free from surface irregularities, dents, and undercutting in excess of the amounts specified in table II (see 4.4.2).

TABLE II. Allowable surface defects of forgings.

Detachable link size		Allowable surface defect (inches)
Type I (inches)	Type II (size no.)	
3/4 to 1-1/2	Numbers 2 to 4	1/32
1-5/8 to 2-1/2	Numbers 5 and 6	1/16
2-5/8 to 3-1/2	Numbers 7 and 8	3/32
3-5/8 to 4	-	1/8
4-3/4	-	5/32

3.9 Taper pin surface. The taper pin machine surface quality shall be in accordance with the applicable drawing specified in 3.7 (see 4.4.3).

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3.10 Fit of coupling plates on C-link. Coupling plates shall be fitted to the C-link in accordance with the applicable drawings as specified in 3.7. There shall not be any movement between the coupling plates and C-link at the C-link opening (see 4.4.6).

3.11 Taper pin engagement. The taper pin shall be driven into the assembled detachable link (see figure 2) with the required assembly punch specified in drawing 804-840327. The taper pin depth of engagement in the coupling plates shall be as specified in the drawings specified in 3.7 (see 4.4.7).

3.12 Hairpin fit. Hairpin, when specified (see 6.2), shall be installed after the taper pin is driven home (see 3.11, figure 1, and figure 2). With the hairpin fully seated in the groove of the coupling plate, the ends of the hairpin shall project a minimum of 2-1/2 hairpin diameters and a maximum of 3 hairpin diameters beyond the groove of the opposite coupling plate (see 4.4.8).

3.13 Proof load. The detachable link shall withstand the proof load specified in table III (type I) and table IV (type II) without developing any surface fracture or defects which would interfere with the serviceability or disassembly of the detachable link (see 4.5.3).

TABLE III. Physical properties for type I detachable links.

Link size (inches)	Type I, class	Proof load (lbs)	Minimum breaking load (lbs)
3/4	3	67,500	91,100
7/8		88,200	119,000
1		116,100	156,700
1-1/8		145,000	195,000
1-1/4		178,200	240,600
1-3/8		211,500	285,500
1-1/2		252,000	340,200
1-5/8		292,500	395,000
1-3/4		352,000	476,000
1-7/8	1	285,000	432,000
2		322,000	488,000
2-1/8		362,000	548,000
2-1/4		403,000	610,000
2-3/8		447,000	675,000
2-1/2		492,000	744,000
2-5/8		540,000	813,000
2-3/4 HD ¹		2	649,000
2-7/8	1	640,000	965,000
3 HD ¹	2	762,000	1,150,000
3-1/8	1	748,000	1,128,000
3-1/4		805,000	1,250,000
3-3/8		862,000	1,304,000

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TABLE III. Physical properties for type I detachable links - Continued.

Link size (inches)	Type I, class	Proof load (lbs)	Minimum breaking load (lbs)
3-1/2 HD ¹	2	1,080,000	1,700,000
3-5/8 ²	1	-	-
3-3/4		1,045,900	1,575,000
3-7/8 ²		-	-
4 ²		-	-
4-3/4		1,700,000	2,550,000

¹ HD - Heavy duty. Also can be used for class 1 corresponding size.

² Detachable links for these sizes have not been developed. The proof and minimum breaking loads will be indicated as the detachable links are developed.

TABLE IV. Physical properties for type II detachable links.

Link number	Link size ¹ (inches)	Proof load (lbs)	Minimum breaking load (lbs)
2	3/4 HS - 7/8 HS	88,200	119,000
3	1 HS - 1-1/8 HS	145,000	195,000
4	1-1/4 HS - 1-1/2 HS	252,000	340,000
5	1-5/8 HS - 1-3/4 HS	352,000	476,000
	- 2		
6	2-1/8 - 2-3/8	447,000	675,000
7	2-1/2 - 3-1/8	762,000	1,150,000
	- 2-3/4 HD		
	- 3 HD		
8	3-1/4 - 3-1/2	1,080,000	1,700,000
	- 3-1/2 HD		

¹ HS - High strength; HD - Heavy duty.

3.14 Breaking load. The detachable link shall withstand the minimum breaking load specified in table III (type I) or table IV (type II) without failure (see 4.5.2).

3.15 Markings. Markings shall be as described in 3.15.1 and 3.15.2.

3.15.1 Size markings. Each C-link and right hand coupling plate of the detachable link shall be permanently marked in raised letters and figures to indicate the size of the link. The letters and figures shall be clear, readable, and of the size, embossed height, and location as specified in the drawing specified in 3.7 (see 4.4.4).

3.15.2 Property markings. Each C-link of the detachable link shall be permanently marked in raised letters with "US MILITARY PROPERTY". The letters shall be clear and readable in normal operational use, and the marking size shall satisfy the legibility requirements of MIL-STD-130 (see figure 3).

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3.16 Matched identification numbers. The C-link and coupling plates of each detachable link assembly shall be marked (see 6.2) with matched identification numbers. The numbers on all components of a link shall be the same in order to identify the link and ensure mating of parts. Each link of the lot shall have a different identification number. The number shall be indented a minimum of 0.063 inch and a maximum of 0.094 inch. The identification number shall be stamped on the C-link and coupling plates after the coupling plates have been tightly closed on the C-link (see 3.10). The indented numbers shall be 0.250 inch high and located in the areas shown on figure 3. Stamping dies shall be of the round bottom, low stress type (see 4.4.5). The identification numbers shall be assigned by the manufacturer and be traceable to production and test inspection records.

3.17 Finish (see 6.5). The C-link and right and left hand coupling plates shall be thoroughly cleaned by tumbling or sand blasting. After satisfactory completion of all tests and inspections, the detachable link shall be assembled with the taper pin. Before shipment the taper pin shall be coated with grease conforming to VV-G-632, and lightly driven into the assembled detachable link for ease of disassembly (plug and hairpin shall not be installed). The assembled detachable link shall then be primed with two coats of epoxy polyamide, green primer, formula 150 in accordance with MIL-DTL-24441/20 (3 mils thick each coat). The assembled detachable link shall then be surface topcoated with two coats of silicone alkyd enamel conforming to type II, class 2, grade A of MIL-PRF-24635 (3 mils thick dry film each coat). Surface topcoat color shall be in accordance with FED-STD-595/27038. As an alternate topcoat, two coats of No. 40 Vitanic black asphalt varnish (NSN 8010-00-160-5856 or 8010-00-299-0214) may be used (3 mils thick dry film each coat). The plug bore in the C-link shall be protected to prevent paint from contacting the bore surface (see 4.4.7 and 4.4.9).

4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. First article inspection shall consist of the examinations and tests specified in table V (see 6.3).

TABLE V. First article examination and tests.

Inspection	Requirement paragraph	Examination or test paragraph
<u>Detachables link</u>		
Proof load test	3.13	4.5.3
Breaking load test	3.14	4.5.2
Finish	3.17	4.4.7, 4.4.9

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TABLE V. First article examination and tests - Continued.

Inspection	Requirement paragraph	Examination or test paragraph
<u>C-link component</u>		
Chemical composition	3.2.1.1	4.5.1
Tensile test	3.4	4.5.4
Pull draft angle	3.7.1	4.4.1.1
Brinell hardness test ¹	3.5	4.5.6
Dimension conformance	3.7	4.4.1
Surface	3.8	4.4.2
Markings	3.15, 3.15.1	4.4.4
Identification numbers	3.16	4.4.5
<u>Right and left hand coupling plates</u>		
Chemical composition	3.2.1.1	4.5.1
Tensile test	3.4	4.5.4
Pull draft angle	3.7.1	4.4.1.1
Brinell hardness test ¹	3.5	4.5.6
Dimension conformance	3.7	4.4.1
Surface	3.8	4.4.2
Markings (right hand coupling plate only)	3.15	4.4.4
Identification numbers	3.16	4.4.5
Fit	3.10	4.4.6
<u>Taper pin</u>		
Chemical composition	3.2.2.1	4.5.1
Brinell hardness test ¹	3.6	4.5.5
Dimension conformance	3.7	4.4.1
Surface	3.9	4.4.3
Engagement	3.11	4.4.7
<u>Plug</u>		
Chemical composition	3.2.3.1	4.5.1
Dimension conformance	3.7	4.4.1
<u>Hairpin (when specified (see 6.2))</u>		
Chemical composition	3.2.4.1	4.5.1
Dimension conformance	3.7	4.4.1
Fit	3.12	4.4.8

¹ Hardness measurement methods, tests and testers such as Rockwell, Knoop, and Vickers, shall be direct equivalents to Brinell and may be substituted solely in accordance with ASTM A370 (see 6.4).

4.2.1 First article inspection samples. The following samples shall be prepared for first article inspection examinations and tests specified in table V. Samples shall be clean, bright, and free of paint or other coatings which would tend to conceal defects during inspection or testing. Detachable link samples shall consist of a minimum of:

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4.2.1.1 Finished detachable link without hairpin and without plug installed. One finished detachable link, without the hairpin installed (see 6.2) and without the plug installed, for the following inspections and tests:

- a. Dimension conformance:
 - (1) C-Link.
 - (2) Right and left hand coupling plates.
 - (3) Taper pin.
 - (4) Plug.
 - (5) Hairpin.
 - (6) Pull draft angle for C-link and coupling plates.
- b. Surface examination:
 - (1) C-link.
 - (2) Right and left hand coupling plates.
 - (3) Taper pin.
- c. Marking examination:
 - (1) C-link.
 - (2) Right and left hand coupling plates.
- d. Identification number examination:
 - (1) C-link.
 - (2) Right and left hand coupling plates.
- e. Taper pin engagement.
- f. Hairpin fit.
- g. Proof test:
 - (1) Assembled detachable link. The assembled detachable link shall be subjected to a proof test after the above examinations have been accomplished.

4.2.1.2 Unmachined detachable link components. The following unmachined detachable link components, heat treated as necessary, for the test noted:

- a. C-link and coupling plate (right or left hand):
 - (1) Chemical composition.
 - (2) Tensile test.
 - (3) Brinell hardness test.
- b. Taper pin:
 - (1) Chemical composition.
 - (2) Brinell hardness test.
- c. Plug:
 - (1) Chemical composition.

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- d. Hairpin:
 (1) Chemical composition.

4.2.1.3 Finished detachable link for breaking load test. One finished detachable link for a breaking load test. The detachable link used for the proof test from 4.2.1.1(g) above with the hairpin and plug installed, may be used for the breaking test.

4.2.1.4 Finished detachable link, without hairpin or plug, for finish inspection. One finished detachable link, without the hairpin or plug installed, for a finish (paint) inspection.

4.3 Conformance inspection. Detachable link samples shall be selected in accordance with 4.3.1 and shall be inspected in accordance with table VI. The samples shall be clean, bright, and free of paint or other coating which would tend to conceal defects during the testing and inspection (see 6.3).

TABLE VI. Conformance examinations and tests.

Inspection	Requirement paragraph	Examination or test paragraph
<u>Detachable Link</u>		
Proof load test	3.13	4.5.3
Breaking load test	3.14	4.5.2
Finish	3.17	4.4.7, 4.4.9
<u>C-Link component</u>		
Tensile test	3.4	4.5.4
Dimension conformance	3.7	4.4.1
Draft angles	3.7.1	4.4.1.1
Brinell hardness ¹	3.5	4.5.6
Surface	3.8	4.4.2
Markings	3.15, 3.15.1	4.4.4
Identification numbers	3.16	4.4.5
<u>Right and left hand coupling plates</u>		
Tensile test	3.4	4.5.4
Dimension conformance	3.7	4.4.1
Draft angles	3.7.1	4.4.1.1
Brinell hardness ¹	3.5	4.5.6
Surface	3.8	4.4.2
Markings (right hand coupling plate only)	3.15	4.4.4
Identification numbers	3.16	4.4.5
Fit	3.10	4.4.6
<u>Taper pin</u>		
Dimension conformance	3.7	4.4.1
Surface	3.9	4.4.3
Engagement	3.11	4.4.7
Brinell hardness ¹	3.6	4.5.5

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TABLE VI. Conformance examinations and tests - Continued.

Inspection	Requirement paragraph	Examination or test paragraph
<u>Plug</u> Dimension conformance	3.7	4.4.1
<u>Hairpin (when specified (see 6.2))</u> Dimension conformance	3.7	4.4.1
Fit	3.12	4.4.8

¹ Hardness measurement methods, tests and testers such as Rockwell, Knoop, and Vickers, shall be direct equivalents to Brinell and may be substituted solely in accordance with ASTM A370 (see 6.4).

4.3.1 Sampling for conformance inspection. Sampling shall be in accordance with ASQ Z1.4, inspection level II, with the acceptance quality limit (AQL) as specified in the contract (see 6.2).

4.3.1.1 Sampling of finished detachable links. For the purpose of sampling finished detachable links, extra detachable links and detachable link components (see 4.3.1.2) shall be provided in each lot. A lot shall consist of not more than 100 finished detachable links (without plug or hairpin (see 6.2) installed) of the same type, class and size. Each detachable link component shall be manufactured consecutively and from the same heat or melt of steel.

4.3.1.2 Conformance inspection of detachable link components. Each of the following detachable link components of the lot shall be subjected to the following inspections prior to proof testing (see 4.4.1, 4.4.1.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, and 4.5.6):

- a. C-link dimension conformance.
- b. C-link surface examination.
- c. C-link Brinell hardness testing.
- d. C-link pull draft angles examination.
- e. Right and left hand coupling plates dimension conformance.
- f. Right and left hand coupling plates surface examination.
- g. Right and left hand coupling plates Brinell hardness testing.
- h. Right and left hand coupling plates pull draft angles examination.
- i. C-link and right hand coupling plate marking examination.
- j. C-link and coupling plates identification number examination.
- k. Taper pin dimension conformance.
- l. Taper pin surface examination.
- m. Taper pin Brinell hardness testing.
- n. Plug dimension conformance.
- o. Hairpin dimension conformance.

4.3.1.3 Conformance inspection of 10 detachable links. After satisfactory completion of inspections specified in 4.3.1.2, a random sampling of 10 detachable links shall be selected from each lot and shall be subjected to the following inspections (see 4.4.6, 4.4.7, and 4.4.8):

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- a. Fit of right and left hand coupling plates on C-link examination.
- b. Taper pin engagement examination.
- c. Hairpin fit examination.

4.3.1.4 Conformance inspection of each detachable link. After satisfactory completion of inspections specified in 4.3.1.3, each detachable link of the lot shall be subjected to a proof test (see 4.5.3) and a finish (paint) inspection (see 4.4.9).

4.3.1.5 Conformance inspection of sample detachable links and components. An extra detachable link, with hairpin when specified (see 6.2), and plug installed shall be furnished for each lot for the breaking load test (see 4.5.2). In addition to the extra detachable link for the breaking load test, an extra C-link and coupling plate (left or right hand) or stock (see 3.4) shall be furnished for a component specimen tensile test (see 4.5.4).

4.3.1.6 Disposition of chain samples. Test samples and unused samples shall be either shipped and the finished detachable link retained at the manufacturing facility, or scrapped at the discretion of the contracting officer. If retention or shipping is desired, each sample shall be identified.

4.4 Examination methods.

4.4.1 Dimension conformance of detachable link components. The dimensions of each detachable link component (C-link, coupling plates, taper pin, plug, and hairpin (when specified see 6.2)) shall be measured. The measurements of each detachable link component shall be as specified on the applicable drawing specified in 3.7. The C-link and right and left hand coupling plates shall be remeasured after proof testing. The detachable link shall be rejected if any one of its components does not conform to the dimensional requirements of 3.7. The plug or hairpin shall be rejected if it does not conform to the dimensional requirements of 3.7.

4.4.1.1 Measurement of pull draft angles. The measurements of pull draft angles of C-links and coupling plates of 3/4 through 1-1/2 inch detachable links shall be carried out with an optical comparator to comply with the requirements in 3.7.1. The pull draft angles of 1-5/8 through 4-3/4 inch detachable links shall be performed with a template capable of measuring pull draft angles of a maximum of 10 degrees. All measurements of pull draft angles will be made at 90 degree increments.

4.4.2 Surface examination of C-link and right and left hand coupling plates. After cleaning all surfaces and before proof testing, all surfaces shall be visually examined. After proof testing and before painting, the surfaces shall be completely inspected using the magnetic particle method of examination in accordance with ASTM A275/A275M and MIL-STD-2035. If a surface irregularity, dent, or undercut exceeding the criteria of 3.8 is found on the C-link or coupling plates surfaces, the detachable link shall be rejected.

4.4.3 Surface examination of taper pin. After cleaning the taper pin, the machine surface quality of the taper shall be visually examined and compared to a machine surface roughness gauge made from pure nickel. If the taper pin machine surface quality is less than the requirement of 3.9, the taper pin shall be rejected.

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4.4.4 Marking examination. The markings on the C-link and right hand coupling plate surfaces shall be visually examined. If the letters and figures are poorly embossed and unreadable, it will be permissible to machine or grind the embossing to produce readable letters and figures. Machining or grinding below the surface line of the C-link or coupling plate is not permitted and shall be cause for rejection of the detachable link. Markings shall meet the requirements specified in 3.15 through 3.15.2.

4.4.5 Identification numbers examination. The identification numbers on the C-link and coupling plate shall be visually examined. If the stamping exceeds the maximum depth or if the stamping was struck by dies other than the low stress type, the detachable link shall be rejected. The identification numbers shall be as specified in 3.16.

4.4.6 Examination of coupling plates fit on C-link. The coupling plates shall be placed on the C-link without the taper pin installed. There shall not be any movement between the coupling plates and the C-link as specified in 3.10. If there is movement between the coupling plates and the C-link, it will be permissible to refit the coupling plates on the C-link (see 3.10) and the fit reinspected. If movement is still present, the detachable link shall be rejected. If more than two detachable links are rejected because of the coupling plate fit, the entire lot of detachable links shall be inspected.

4.4.7 Examination of taper pin engagement. The taper pin, when driven tightly into the detachable link, shall be visually examined. If the paint applied to the detachable link fails the examination, the detachable link may be sandblasted to white metal, repainted (see 3.17), and reinspected. The finish shall be as specified in 3.17. If the taper pin engagement in the coupling plates does not conform to the required dimensions, the detachable link shall be rejected. If more than two detachable links are rejected, then the entire lot of detachable links shall be inspected for taper pin engagement. The taper pin shall meet the requirements specified in 3.11.

4.4.8 Examination of hairpin fit. The fit of the hairpin and the projection of the hairpin ends beyond the coupling plate shall be in accordance with 3.12. If the ends of the hairpin project less than the minimum specified length beyond the coupling plate, the hairpin shall be rejected. The hairpin ends shall not be bent and the hairpin shall be removed following the examination.

4.4.9 Examination of finish. The paint shall show no film failures, such as loss of adhesion, blistering, pinholing, checking, or cracking. The plug bore in the coupling plates shall be examined for evidence of paint on the surface. The finish shall meet the requirements specified in 3.17.

4.5 Testing methods.

4.5.1 Chemical composition. The material samples selected in accordance with 4.2.1.2 shall be analyzed to determine the chemical composition. The chemical composition of the material used in the manufacture of the C-link and coupling plates (see 3.2.1.1), the taper pin (see 3.2.2.1), the plug (see 3.2.3.1), the hairpin (see 3.2.4.1) for the first article and product testing shall be verified by a chemical or spectrographic analysis conducted by the detachable link manufacturer. Material not within the composition tolerances shall be rejected.

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4.5.2 Detachable link breaking load test. Samples for the break tests shall be tested for breaking load. If, in normal production only, it is considered that the test equipment would be endangered by a sudden break, it shall be considered acceptable if the detachable link is loaded to the required breaking strength and maintained at load for 15 seconds. Samples used in first article testing shall be tested to destruction. The break testing machine shall have been calibrated within the 12 months previous to the breaking load test. The samples shall meet the breaking load requirements of tables III and IV. Samples which break below the level specified in tables III and IV shall cause rejection of the entire lot.

4.5.3 Detachable link proof test. Detachable links shall be proof tested by securing them in a testing machine either singly or assembled into sections. The proof load testing machine shall have been calibrated within the 12 months previous to the detachable link proof load test. If there is a sign of fracture, including breaking or cracking, during the proof test, the detachable link shall be rejected. Recording of the applied load shall be taken of all proof load tests during both first article and conformance tests. Detachable links shall meet the requirements specified in 3.13.

4.5.4 Tensile test. A tensile specimen shall be taken from the C-link and one coupling plate (left or right). The tensile test shall be conducted with procedures using standard specimens conforming to ASTM A370 (see 3.4, 4.2.1.2, and 4.3.1.5). If the tensile test fails to meet the requirements of 3.4, but is within 3,000 lb/in² of the required tensile strength, a retest of another specimen selected from the same sample will be permissible. The test specimens shall meet the requirements of 3.4.

4.5.5 Brinell hardness test for taper pin. The Brinell hardness test shall be conducted in accordance with ASTM A370. If the hardness of the taper pin surface fails to meet the minimum hardness requirements of 3.6, the taper pin shall be rejected.

4.5.6 Brinell hardness test for C-link and coupling plates. The Brinell scale hardness of the sample components (see 4.2.1.2) shall be conducted in accordance with ASTM A370. The components failing to meet the minimum hardness requirements of 3.3 shall be rejected.

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

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

6.1 Intended use. The detachable links covered by this specification are intended for use in anchor chain connecting applications, and connecting other chain appendages as necessary.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type, class, and size of detachable link required (see 1.2).
- c. Hairpin, if required (see 1.3, 3.2.4, 3.12, 4.2.1, table V, table VI, 4.3.1.1, 4.3.1.5, and 4.4.1).
- d. First article inspection, if required (see 3.1).
- e. AQL (see 4.3.1).
- f. Identification number, location, and type of identification (see 3.16).
- g. Packaging requirements (see 5.1).

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, or 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. Preparation of first article reports should conform to MIL-HDBK-831, "Preparation of Test Reports". 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 Hardness testing. Although Brinell scale hardness testing has been specified throughout this document, users may employ government-approved alternate methods of hardness testing in sole accordance with ASTM A370. For consistency, all non-Brinell hardness scale measurements should be converted to direct equivalent Brinell scale values.

6.5 Caution. Caution should be taken during cleaning and coating processes as described in 3.17. The contractor is responsible for the safe reutilization and disposal of all materials generated by this process in accordance with ASTM A380, "Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems".

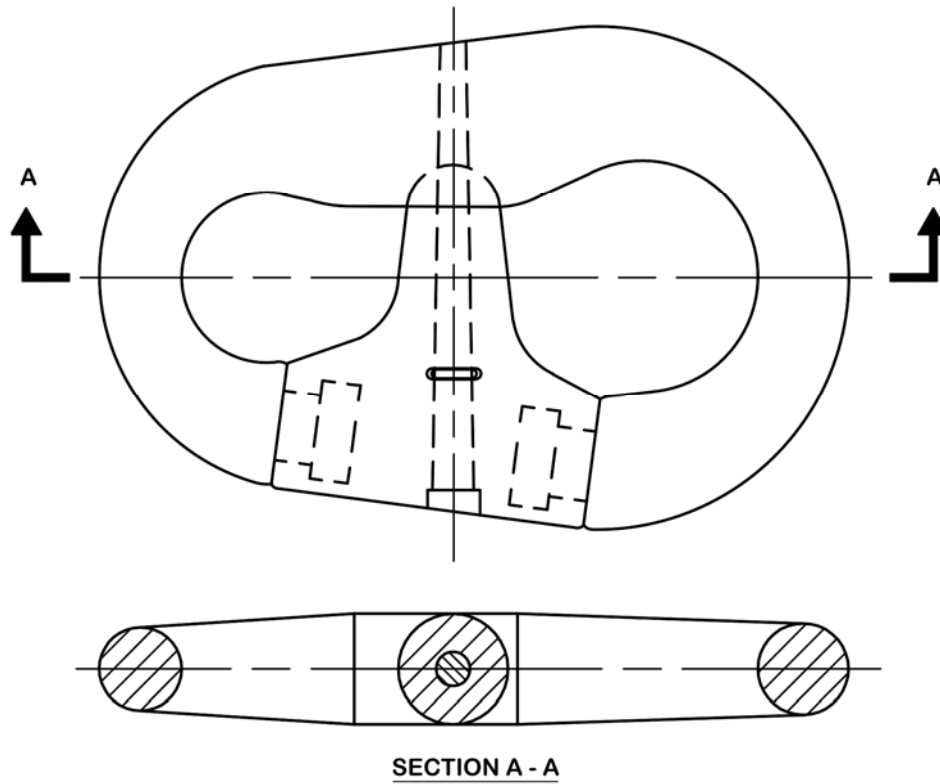
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6.6 Subject term (key word) listing.

Anchor
Anchoring
Appendages
C-link
Coupling plate
Ground tackle
Hairpin
Heavy duty
High strength
Mooring
Plug
Swivel shot
Taper pin

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

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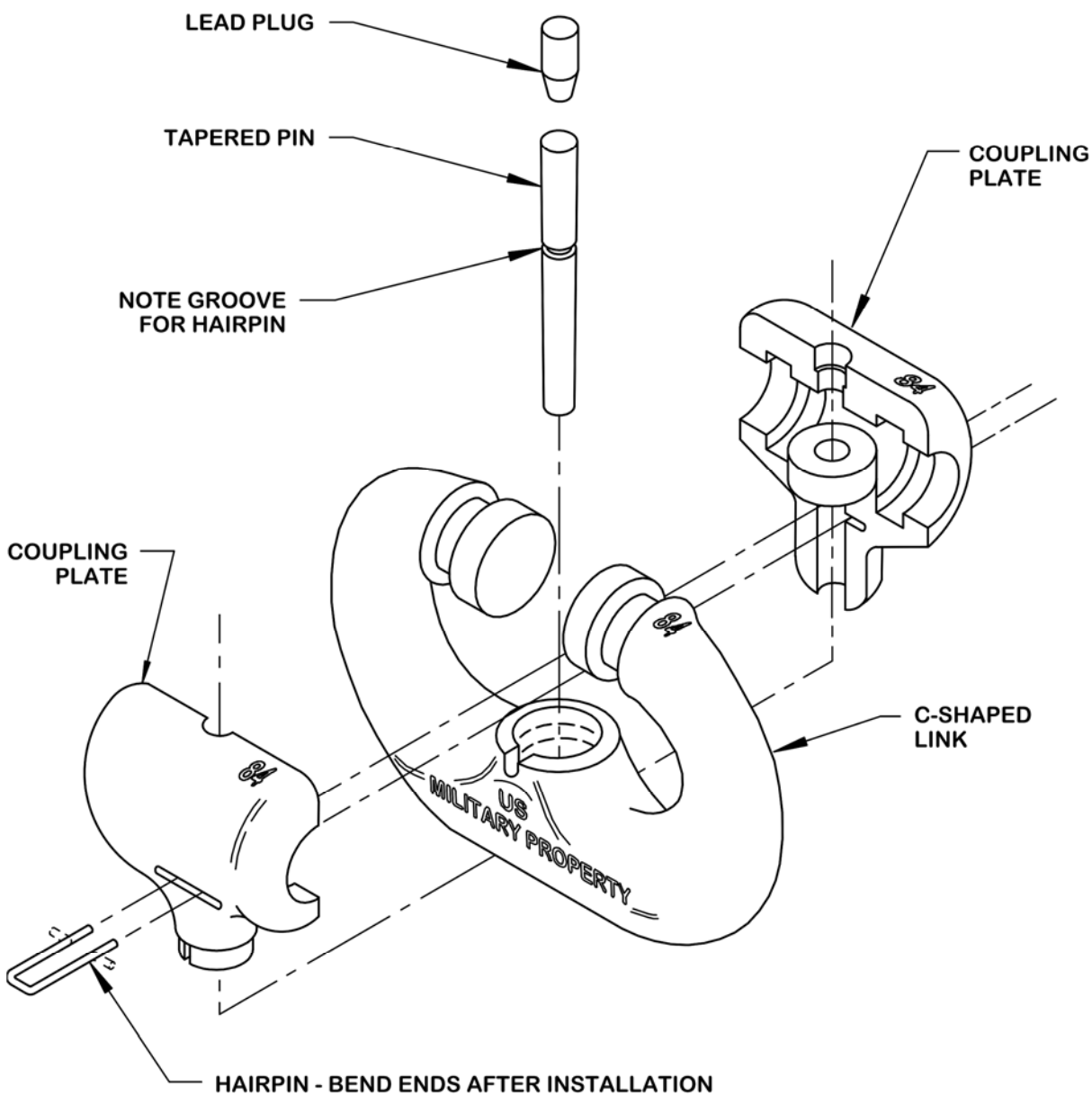


NOTE:

1. Groove in taper pin, holes and recess in coupling plates, and hairpin are furnished only for links used in outboard swivel shots.

FIGURE 1. Pear-shaped detachable link with hairpin.

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NOTE:

1. Groove in taper pin, holes and recess in coupling plates, and hairpin are furnished only for links used in outboard swivel shots.

FIGURE 2. C-shaped detachable link with taper pin.

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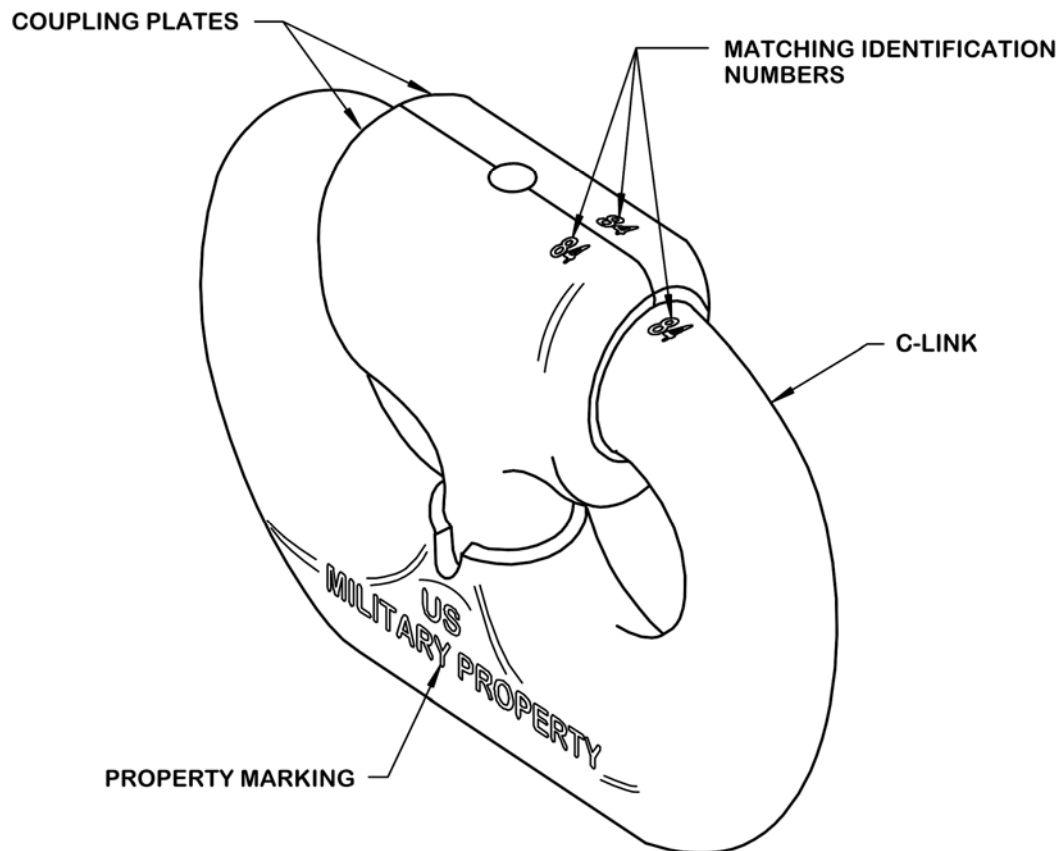


FIGURE 3. Detachable link markings.

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Custodians:

Navy - SH
Air Force - 99
DLA - GS

Preparing Activity:

DLA - GS5

(Project 4010-2010-002)

Review Activity:

Navy - YD

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 database at <https://assist.daps.dla.mil/>.