INCH-POUND
MIL-L-2710B
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SUPERSEDING
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(See 6.7)

MILITARY SPECIFICATION

LINKS, CHAIN, DETACHABLE, REGULAR AND PEAR-SHAPED

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

1. SCOPE

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

1.2 Classification. The detachable links shall be 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.

Class 3 - High strength.
Sizes:
3/4 inch; 7/8 inch; 1 inch; 1-1/8 inch; 1-1/4 inch;
1-3/8 inch; 1-1/2 inch; 1-5/8 inch; 1-3/4 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 55Z3, 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.

AMSC N/A FSC 4010

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 shall consist of the following components:

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

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

TT-V-51	- Varnish, Asphalt.
VV-G-632	- Grease, Industrial, General Purpose.
PPP-B-601	- Boxes, Wood, Cleated-Plywood.
PPP-B-621	- Boxes, Wood, Nailed and Lock-Corner.
PPP-B-636	- Boxes, Shipping, Fiberboard.
PPP-D-729	- Drums, Shipping and Storage, Steel, 55-Gallon (208 Liters).
PPP-F-320	- Fiberboard; Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.

MILITARY

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

MILITARY (Continued)

MIL-L-19140 - Lumber and Plywood, Fire-Retardant Treated.
MIL-P-24441 - Paint, Epoxy Polyamide, Green Primer, Formula 150, Type I.
DOD-E-24635 - Enamel, Gray, Silicone Alkyd Copolymer Semigloss (For Exterior Use). (Metric)

STANDARD

MILITARY

MIL-STD-129 - Marking for Shipment and Storage.

(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.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

NAVAL SHIP SYSTEMS COMMAND (NAVSHIPS)

803-860062 - Links, Detachable, Standard and Heavy Duty.
803-921790 - Links, Detachable, High Strength.
804-840327 - Tool Boxes, and Tools for Assembling and Disassembling Detachable Links.

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

803-6397316 - Links, Detachable, Pear-Shaped.

(Application for copies should be addressed to: Commander, Portsmouth Naval Shipyard, Code 202.2, Portsmouth, NH 03801.)

PUBLICATION

NAVSEA

0900-LP-003-8000 - Metals, Surface Inspection Acceptance Standards.

(Application for copies should be addressed to 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 documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A 275 - Standard Method for Magnetic Particle Examination of Steel Forgings. (DoD adopted)

A 322 - Standard Specifications for Steel Bars, Alloy, Standard Grades.

A 370 - Standard Test Methods and Definitions for Mechanical Testing of Steel Products. (DoD adopted)

A 380 - Standard Recommended Practice for Cleaning and Descaling Stainless Steel Parts, Equipment, and Systems.

A 580 - Standard Specification for Stainless and Heat-Resisting Steel Wire. (DoD adopted)

A 581 - Standard Specification for Free Machining Stainless and Heat-Resisting Steel Wire.

A 582 - Standard Specification for Free-Machining Stainless and Heat-Resisting Steel Bars, Hot-Rolled or Cold-Finished. (DoD adopted)

D 3951 - Standard Practice for Commercial Packaging. (DoD adopted)

(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 6.4) in accordance with 4.3.

3.2 Material. Material for the detachable link components shall be as specified in 3.2.1, 3.2.2, 3.2.3 and 3.2.4. Material used in normal production shall be the same composition as material used in 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.

TABLE I. C-link and coupling plates material.

Detachable link classification	ASTM A 322, grade
Type I, class 3 3/4-inch through and including 1-1/2 inch Type II Number 2 and number 3	8637 or 4340
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 Type I, class 3 1-5/8 inch and 1-3/4 inch Type II Number 4 through and including number 8	4340 or 8640

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 limitation of AISI alloy steel grades specified in table I (see 4.6.1).

3.2.2 Taper pin. The taper pin shall be machined from type 416 stainless steel. The finished taper pin shall conform to ASTM A 582, 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 ASTM A 582 (see 4.6.1).

3.2.3 Plug. The plug shall be cast from material of 8 $\pm$ 0.5 percent antimony alloy and the remaining element shall be lead.

3.2.3.1 Plug material chemical composition. The chemical composition of the plug shall conform to 3.2.3 (see 4.6.1).

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 A 580 and ASTM A 581 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 ASTM A 580 or ASTM A 581 (see 4.6.1).

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 specifically 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 times to produce a fine grain structure throughout the component and produce a minimum tensile strength of 170,000 pounds per square inch (lb/in^2) (Brinell hardness 341 to 375). The components shall not be heated more than twice. Heat treatment 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 4.6.6.

3.6 Brinell hardness - taper pin. The finished taper pin surface shall have a Brinell hardness of 350 (minimum) (see 4.6.5).

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 4.5.1):

(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 4.5.1.1. 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 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 4.5.2).

TABLE II. Allowable surface defects of forgings.

Detachable link size (inches)		Allowable surface defect (inches)
Type I	Type II	
3/4 to 1-1/2	Number 2 to number 4	1/32
1-5/8 to 2-1/2	Number 5 & 6	1/16
2-5/8 to 3-1/2	Number 7 & 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 4.5.3).

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 4.5.6).

3.11 Taper pin engagement. The taper pin shall be driven into the assembled detachable link 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 4.5.7).

3.12 Hairpin fit. Hairpin, when specified (see 6.2), shall be installed after the taper pin is driven home (see 3.11). 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 three hairpin diameters beyond the groove of the opposite coupling plate (see 4.5.8).

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 4.6.3).

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 2/	2	649,000	981,000
2-7/8	1	640,000	965,000
3 HD 2/	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
3-1/2 HD 2/	2	1,080,000	1,700,000
3-5/8	1	1/	1/
3-3/4		1,045,900	1,575,000
3-7/8		1/	1/
4		1/	1/
4-3/4		1,700,000	2,550,000

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

2/ HD - Heavy duty. Also can be used for class I corresponding size.

TABLE IV. Physical properties for type II.

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

3.14 Breaking load. The detachable link shall withstand the minimum breaking load specified in table III (type I) and table IV (type II) without failure (see 4.6.2).

3.15 Markings. Each C-link and right hand coupling plate of the detachable link shall be permanently marked in raised letters and figures. 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 4.5.4).

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 numbers shall be indented a minimum of 1/16 inch and maximum of 3/32 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 1/4 inch high and located in the areas shown on figure 1. Stamping dies shall be of the round bottom, low stress type (see 4.5.5). The numbers shall be assigned by the manufacturer and be traceable to production and test inspection records.

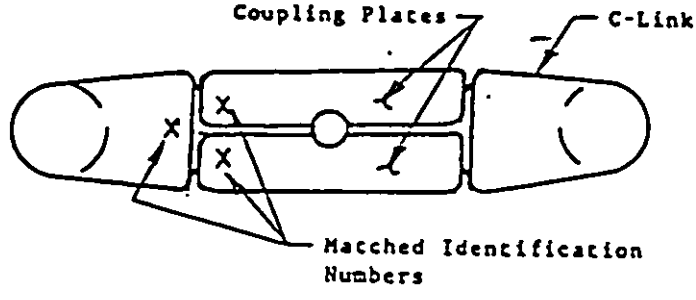

FIGURE 1. Location of C-link and coupling plates identification numbers.

3.17 Finish. 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, grade 2, lightly driven into assembled detachable link for ease of disassembly (plug and hairpin shall not be installed). The assembled detachable link shall then be coated with two coats epoxy polyamide, green primer, Formula 150 in accordance with MIL-P-24441, 3 mils thick each coat and two coats silicone alkyd enamel black, 3 mils dry film thickness each coat in accordance with DOD-E-24635, color 27038. As an alternative, black, two coats, 3 mils dry film thickness each coat may be used in accordance with TT-V-51. The plug bore in the C-link shall be protected to prevent paint from contacting the bore surface (see 4.5.7 and 4.5.9).

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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

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

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

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

TABLE V. First article examination and tests.

Inspection	Applicable requirement	Applicable method
Detachable link		
Proof load test	3.13	4.6.3
Breaking load test	3.14	4.6.2
Finish	3.17	4.5.7 & 4.5.9
C-link component		
Chemical composition	3.2.1.1	4.6.1
Tensile test	3.4	4.6.4
Pull draft angle	3.7.1	4.5.1.1
Brinell hardness test	3.5	4.6.6
Dimension conformance	3.7	4.5.1
Surface	3.8	4.5.2
Markings	3.15	4.5.4
Identification numbers	3.16	4.5.5
Right and left hand coupling plates		
Chemical composition	3.2.1.1	4.6.1
Tensile test	3.4	4.6.4
Pull draft angle	3.7.1	4.5.1.1
Brinell hardness test	3.5	4.6.6
Dimension conformance	3.7	4.5.1
Surface	3.8	4.5.2
Markings (right hand coupling plate only)	3.15	4.5.4
Identification numbers	3.16	4.5.5
Fit	3.10	4.5.6
Taper pin		
Chemical composition	3.2.2.1	4.6.1
Brinell hardness test	3.6	4.6.5
Dimension conformance	3.7	4.5.1
Surface	3.9	4.5.3
Engagement	3.11	4.5.7
Plug		
Chemical composition	3.2.3.1	4.6.1
Dimension conformance	3.7	4.5.1
Hairpin (when specified see 6.2)		
Chemical composition	3.2.4.1	4.6.1
Dimension conformance	3.7	4.5.1
Fit	3.12	4.5.8

4.3.1 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:

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

(1) Dimension conformance:
C-link
Right and left hand coupling plates
Taper pin
Plug
Hairpin
Pull draft angle for C-link and coupling plates

(2) Surface examination:
C-link
Right and left hand coupling plates
Taper pin

(3) Markings examination:
C-link
Right and left hand coupling plates

(4) Identification number examination:
C-link
Right and left hand coupling plates

(5) Taper pin engagement

(6) Hairpin fit

(7) Proof test:
Assembled detachable link. The assembled detachable link shall be subjected to a proof test after the above examinations have been accomplished.

(b) The following unmachined detachable link components, heat treated as necessary, for the tests noted:

(1) C-link and coupling plate (right or left hand):
Chemical composition
Tensile test
Brinell hardness test

(2) Taper pin:
Chemical composition
Brinell hardness test

(3) Plug:
Chemical composition

(4) Hairpin:
Chemical composition

(c) One finished detachable link for a breaking load test. The detachable link used for the proof test from (a) (7) above with the hairpin and plug installed, may be used for the breaking test.
(d) One finished detachable link, without the hairpin or plug installed, for a finish (paint) inspection.

4.4 Quality conformance inspection. Detachable link samples shall be selected in accordance with 4.4.1 and shall be inspected in accordance with table VI. The samples shall be clean, bright, free of paint or other coating which would tend to conceal defects during the testing and inspection (see 6.3 and appendix).

TABLE VI. Quality conformance examination and tests.

Inspection	Applicable requirement	Applicable method
Detachable link		
Proof load test	3.13	4.6.3
Breaking load test	3.14	4.6.2
Finish	3.17	4.5.7 & 4.5.9
C-link component		
Tensile test	3.4	4.6.4
Dimension conformance	3.7	4.5.1
Draft angles	3.7.1	4.5.1.1
Brinell hardness	3.5	4.6.6
Surface	3.8	4.5.2
Markings	3.15	4.5.4
Identification numbers	3.16	4.5.5
Right and left hand coupling plates		
Tensile test	3.4	4.6.4
Dimension conformance	3.7	4.5.1
Draft angles	3.7.1	4.5.1.1
Brinell hardness	3.5	4.6.6
Surface	3.8	4.5.2
Markings (right hand coupling plate only)	3.15	4.5.4
Identification numbers	3.16	4.5.5
Fit	3.10	4.5.6

TABLE VI. Quality conformance examination and tests - Continued.

Inspection	Applicable requirement	Applicable method
Taper pin		
Dimension conformance	3.7	4.5.1
Surface	3.9	4.5.3
Engagement	3.11	4.5.7
Brinell hardness	3.6	4.6.5
Plug		
Dimension conformance	3.7	4.5.1
Hairpin (when specified see 6.2)		
Dimension conformance	3.7	4.5.1
Fit	3.12	4.5.8

4.4.1 Sampling for quality conformance inspection.

4.4.1.1 Sampling of finished detachable links. For the purpose of sampling finished detachable links, extra detachable links and detachable link components (see 4.4.1.2) 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.

4.4.1.2 Quality 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 4.5.1, 4.5.1.1, 4.5.2, 4.5.3, 4.5.4, 4.5.5, and 4.6.6):

(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.

4.4.1.3 Quality conformance inspection of 10 detachable links. After satisfactory completion of inspections specified in 4.4.1.2, a random sampling of 10 detachable links shall be selected from each lot and shall be subjected to the following inspections (see 4.5.6, 4.5.7, and 4.5.8):

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

4.4.1.4 Quality conformance inspection of each detachable link. After satisfactory completion of inspections specified in 4.4.1.3, each detachable link of the lot shall be subjected to a proof test. Each detachable link of the lot shall be subjected to a finish (paint) inspection (see 4.5.4 and 4.6.3).

4.4.1.5 Quality conformance inspection of sample detachable links and components. An extra detachable link, with the hairpin (when specified (see 6.2)) and plug installed shall be furnished for each lot for the breaking load test (see 4.6.2). 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 4.6.4).

4.4.1.6 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.

4.5 Examination methods.

4.5.1 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.

4.5.1.1 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 comparitor to comply with the requirements in section 3.7. 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 angle of maximum 10 degrees. All measurements of pull draft angles will be made at 90-degree increments.

4.5.2 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 magnetic particle inspected in accordance with ASTM A 275 and NAVSEA 0900-LP-003-8000. 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.

4.5.3 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.

4.5.4 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. Marking shall meet the requirements specified in 3.15.

4.5.5 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.

4.5.6 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 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.

4.5.7 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.

4.5.8 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 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.

4.5.9 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.

4.6 Testing methods.

4.6.1 Chemical composition. The material samples selected in accordance with 4.3.1(b) 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.

4.6.2 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 the load for 15 seconds. Samples 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. The samples which break below the level specified in tables III and IV shall cause rejection of entire lot.

4.6.3 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 quality conformance tests. Detachable links shall meet the requirements specified in 3.13.

4.6.4 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 A 370 (see 3.4, 4.3.1(b), and 4.4.1.5). If the tensile test fails to meet the requirements of 3.4, but is within 3,000 lb/in^2 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.

4.6.5 Brinell hardness test for taper pin. The Brinell hardness test shall be conducted in accordance with ASTM A 370. If the hardness of the taper pin surface fails to meet the minimum hardness requirement of 3.6, the taper pin shall be rejected.

4.6.6 Brinell hardness test for C-link and coupling plates. The Brinell scale hardness of the sample components (see 4.3.1(b)) shall be conducted in accordance with ASTM A 370. The components failing to meet the minimum hardness requirement of 3.3 shall be rejected.

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

5. PACKAGING

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

5.1 Packaging requirements. Detachable links shall be preserved level A, C, or commercial and packed level A, B, or commercial as specified (see 6.2). In addition, for Navy acquisitions, the following applies:

(a) Navy shipboard stowage fire-retardant requirements.

(1) Lumber and plywood. When specified (see 6.2), all lumber and plywood, including laminated veneer material used in shipping container construction members, blocking, bracing, and reinforcing shall be fire-retardant treated material conforming to MIL-L-19140 as follows:

Levels A and B - Type II - weather-resistant.
Category 1 - general use.

Level C - Type I - non-weather resistant.
Category 1 - general use.

(2) Fiberboard. When specified (see 6.2), fiberboard used in the construction of class domestic, non-weather resistant fiberboard and cleated fiberboard boxes including interior packaging forms shall meet the flamespread and the specific optic density requirements of PPP-F-320.

5.2 Preservation. Preservation shall be level A, C, or commercial, as specified (see 6.2), and shall afford adequate protection against corrosion, deterioration, and physical damage during shipment from the supply source to the contracting activity and until early installation.

5.2.1 Level A. Detachable links shall be preserved by method I of MIL-P-116, using type P-1 and P-19 preservatives. Preservatives shall be applied to unpainted surfaces of all components (excluding hairpin and plug) prior to pinning coupling plates with taper pin.

5.2.1.1 Unit containers. Detachable links weighing less than 5 pounds each shall be packed in fiberboard boxes conforming to PPP-B-636, class weather-resistant. Box closure shall conform to method V of the appendix to the specification. The gross weight of the boxes shall not exceed the limitations of the applicable box specification. Detachable links weighing more than 5 pounds each shall be bulk packed, and detachable links over 200 pounds net weight shall be individually packed in containers as specified in 5.2.2.

5.2.2 Level C. Detachable links shall be preserved and unit packed as specified for level A except that unit container may be of the non-weather resistant domestic class.

5.2.3 Commercial. Detachable links shall be preserved in accordance with ASTM D 3951.

5.3 Packing. Packing shall be level A, B or commercial, as specified (see 6.2).

5.3.1 Level A. Detachable links, plugs, and hairpins, preserved as specified (see 5.2), shall be individually packed in substantial cloth bags and shall be packed in containers conforming to any one of the following specifications at contractor's option:

Specification	Container	Classification
PPP-B-601	Box, wood, cleated-plywood	Overseas type
PPP-B-621	Box, nailed, wood	Class 2 - overseas
PPP-D-729	Drum	Type IV

Gross weight of shipping containers shall not exceed 200 pounds except for individually packed detachable links. Boxes exceeding 200 pounds gross weight shall be modified by the addition of 4 by 4 wood skids in accordance with PPP-B-601 or PPP-B-621. Wood boxes containing packaged items shall be provided with waterproof caseliners conforming to MIL-L-10547. Caseliners shall be closed and sealed in accordance with the appendix thereto. Container closure shall be as specified in the applicable container specification or appendix thereto.

5.3.2 Level B. Detachable links, plugs, and hairpins, preserved as specified (see 5.2), shall be individually packed in substantial cloth bags and shall be packed in containers conforming to any one of the following specifications at contractor's option:

Specification	Container	Classification
PPP-B-601	Box, wood, cleated-plywood	Domestic type
PPP-B-621	Box, nailed, wood	Class 1 - domestic
PPP-D-729	Drum	Type IV

Gross weight of shipping containers shall not exceed 200 pounds except for individually packed detachable links. Boxes exceeding 200 pounds gross weight shall be modified by the addition of 3 by 4 wood skids in accordance with PPP-B-601 or PPP-B-621. Container closure shall be as specified in the applicable container specification or the appendix thereto.

5.3.3 Commercial. Detachable links preserved as specified (see 5.2) shall be packed in accordance with ASTM D 3951.

5.4 Marking. In addition to any special marking required by the contract or order (see 6.2), unit packs and exterior shipping containers shall be marked in accordance with MIL-STD-129 for levels A, B and C and ASTM D 3951 for commercial.

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 components as necessary.

6.2 Acquisition requirements. Acquisition documents must specify the following:

(a) Title, number, and date of this specification.
(b) Type, class and size of detachable link required (see 1.2).
(c) 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).
(d) Hairpin, if required (see 1.3, 3.2.4, 3.12, 4.3.1, table V, table VI, 4.4.1.1, 4.4.1.5, and 4.5.1).
(e) First article inspection if required (see 3.1).
(f) Identification number, location, and type of identification (see 3.16).
(g) Level of preservation and packing required (see 5.1, 5.2, and 5.3).
(h) When lumber and plywood are to be fire-retardant treated (see 5.1(a)(1)).
(i) When fiberboard is to meet the flamespread and optical density requirements of PPP-F-320 (see 5.1(a)(2)).
(j) Special marking, if required (see 5.4).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/ provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

Reference Paragraph	DID Number	DID Title	Suggested Tailoring
4.3	DI-MISC-80678	Certification/data report	-----
4.3, 4.4 and appendix	DI-MISC-80653	Test reports	-----

The above DID's were those cleared as of the date of this specification. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 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 4.3.1. 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.

6.5 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 A 380.

6.6 Subject term (key word) listing.

C-link
Coupling plate
Hairpin
Heavy duty
High strength
Plug
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 extensiveness of the changes.

Custodians:
AF - 99
Navy - SH

Review activities:
AF - 82
DLA - IS

User activity:
Navy - YD

Preparing activity:
Navy - SH
(Project 4010-0169)

APPENDIX

TEST REPORTS TECHNICAL CONTENT REQUIREMENTS

10. SCOPE

10.1 Scope. This appendix covers the technical content requirements that shall be included on test reports when required by the contract or order. This appendix is mandatory only when data item description DI-MISC-80653 is cited on the DD Form 1423.

20. APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30. TECHNICAL CONTENT REQUIREMENTS

30.1 First article inspection reports. When required by the contract or order, first article inspection reports shall contain the following information:

(a) Results of first article examinations and tests.
(b) Material chemical composition; method of chemical composition analysis; and a certified copy of the results of each analysis, listing the chemical composition.
(c) Statement: "Records in the form of strip charts are available covering heat treating."

30.2 Quality conformance inspection reports. When required by the contract or order, quality conformance inspection reports shall contain the following information:

(a) Results of quality conformance examinations and tests.
(b) Identification numbers assigned by the manufacturer.
(c) Statement: "Records in the form of strip charts are available covering heat treating."

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 MIL-L-2710B	2. DOCUMENT DATE (YYMMDD)

3. DOCUMENT TITLE
LINKS, CHAIN, DETACHABLE, REGULAR AND PEAR SHAPED

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) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME Technical Point of Contact (TPOC): Mr. George Prentice (SEA 56W23) PLEASE ADDRESS ALL CORRESPONDENCE AS FOLLOWS:	b. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON TPOC: 703-602-1937
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