

INCH-POUND

MIL-DTL-28619D
20 October 1997
SUPERSEDING
MIL-A-28619C(YD1)
26 August 1994

DETAIL SPECIFICATION

ANCHORS, STATO MOORING, 200 TO 15,000 POUNDS

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

1. SCOPE

1.1 Scope. This specification covers stato mooring anchors, including stabilizers, wedges, and palm extensions.

1.2 Classification. The anchor, with stabilizers, wedges, and palm extensions, should be one of the following classes, as specified (see 6.2):

- | | |
|----------|---|
| Class 1: | 200 pound (lb) (91 kilogram (kg)) nominal weight. |
| Class 2: | 3,000 lb (1 361 kg) nominal weight. |
| Class 3: | 6,000 lb (2 722 kg) nominal weight. |
| Class 4: | 9,000 lb (4 083 kg) nominal weight. |
| Class 5: | 12,000 lb (5 443 kg) nominal weight. |
| Class 6: | 15,000 lb (6 804 kg) nominal weight. |

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data which may improve this document should be sent to: Commanding Officer (Code 15E2), Naval Construction Battalion Center, 1000 23rd Avenue, Port Hueneme, CA 93043-4301, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.
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2. APPLICABLE DOCUMENTS

2.1 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 documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specification and standard. The following specification and standard form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents should be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplements thereto, cited in the solicitation (see 6.2).

SPECIFICATION

FEDERAL

A-A-1632 - Varnish, Asphalt.

STANDARD

MILITARY

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

(Unless otherwise indicated, copies of the above specification and standard are available from the Defense Automated Printing Services, Attn: DoDSSP, 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 specification to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC) (Code Ident 07071)

813464 - Budocks Stato Mooring Anchor, 15,000 lb, Hinge for Stabilizers
(Alternative Construction).

813503 - Budocks Stato Mooring Anchor, 15,000 lb, General Assembly.

813504 - Budocks Stato Mooring Anchor, 15,000 lb, Details.

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- 813505 - Budocks Stato Mooring Anchor, 15,000 lb, Details.
- 813507 - Budocks Stato Mooring Anchor, 200 lb, General Assembly.
- 813508 - Budocks Stato Mooring Anchor, 200 lb, Details.
- 813509 - Budocks Stato Mooring Anchor, 200 lb, Details.
- 813510 - Budocks Stato Mooring Anchor, 3,000 lb, General Assembly.
- 813511 - Budocks Stato Mooring Anchor, 3,000 lb, Details.
- 813512 - Budocks Stato Mooring Anchor, 3,000 lb, Details.
- 813513 - Budocks Stato Mooring Anchor, 6,000 lb, General Assembly.
- 813514 - Budocks Stato Mooring Anchor, 6,000 lb, Details.
- 813515 - Budocks Stato Mooring Anchor, 6,000 lb, Details.
- 813516 - Budocks Stato Mooring Anchor, 9,000 lb, General Assembly.
- 813517 - Budocks Stato Mooring Anchor, 9,000 lb, Details.
- 813518 - Budocks Stato Mooring Anchor, 9,000 lb, Details.
- 813519 - Budocks Stato Mooring Anchor, 12,000 lb, General Assembly.
- 813520 - Budocks Stato Mooring Anchor, 12,000 lb, Details.
- 813521 - Budocks Stato Mooring Anchor, 12,000 lb, Details.
- 813561 - Budocks Stato Mooring Anchor, 9,000 lb, Hinge for Stabilizers (Alternate Construction).
- 813583 - Budocks Stato Mooring Anchor, 6,000 lb, Hinge for Stabilizers (Alternate Construction).
- 813584 - Budocks Stato Mooring Anchor, 3,000 lb, Hinge for Stabilizers (Alternate Construction).
- 879085 - Budocks Stato Mooring Anchor, 12,000 lb, Hinge for Stabilizers (Alternate Construction).

(Copies of documents required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the Contracting Officer.)

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 the documents which are DoD approved are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of the documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

ASTM

- ASTM A 36/A 36M - Structural Steel.
- ASTM A 275/A 275M - Magnetic Particle Examination of Steel Forgings.
- ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- ASTM A 668/A 668M - Steel Forgings, Carbon and Alloy, for General Industrial Use.
- ASTM E 4 - Force Verification of Testing Machines.

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(Application for copies should be addressed to American Society for Testing and Materials, 100 Barr Harbor Drive, Conshohocken, PA 19428-2959.)

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1 - Structural Welding Code, Steel.

(Application for copies should be addressed to the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.)

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP 10 - Near-White Blast Cleaning.

(Application for copies should be addressed to the Steel Structures Painting Council, 40 24th Street, 6th Floor, Pittsburgh, PA 15222-4643.)

2.4 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 in accordance with 4.2.

3.2 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible 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. Unless otherwise specified, none of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification.

3.3 Design. The anchors shall be designed to have a holding power to weight ratio of 15 to 1 in mud bottoms and 20 to 1 in sand bottoms. Each class of anchor should be in accordance with applicable drawings as shown in table I.

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TABLE I. Applicable drawings.

Class	Nominal weight, lb (kg)	Applicable drawing no.
1	200 (91)	813507 813508 813509
2	3,000 (1 361)	813510 813511 813512 813584
3	6,000 (2 722)	813513 813514 813515 813583
4	9,000 (4 083)	813516 813517 813518 813561
5	12,000 (5 443)	813519 813520 813521 879085
6	15,000 (6 804)	813503 813504 813505 813464

3.4 Construction. The complete anchor assembly shall conform to the requirements and dimensions specified herein and on the applicable drawings. No deviation from the prescribed dimensions or tolerances is permissible without prior approval of the contracting officer. The tolerance criteria of the fluke angle with respect to the anchor shank shall be 50 degrees ± 1 degree for mud use, and 34 degrees ± 1 degree for sand use.

3.4.1 Shank. The shank shall be either cut from structural steel conforming to ASTM A 36, or forged from steel conforming to ASTM A 668, class D.

3.4.2 Stabilizers. Stabilizers for class 1 anchors shall be welded to the to the anchor. Stabilizers for class 2 through class 6 should be hinged or welded as specified (see 6.2).

3.4.3 Wedges. Unless otherwise specified (see 6.2), wedges will be provided. When provided, the required number and sizes of bolts, nuts, and washers shall also be provided for complete installation. Bolts, nuts and washers should conform to ASTM A 325.

3.4.4 Palm extensions. Unless otherwise specified (see 6.2), palm extensions shall be provided for field welding to the tripping palms. When palm extensions are to be shop welded to the

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tripping palms, an alternate fabrication method may be used. The alternate method permits the palm extension and the tripping palm to be fabricated from one continuous piece of structural steel.

3.4.5 Shackle and pin. A shackle and pin conforming to ASTM A 668, class K, shall be provided.

3.5 Performance.

3.5.1 Proof load. The complete anchor assembly shall be capable of withstanding a proof load for the applicable class of anchor as shown in table II without damage, permanent deformation, cracks, or distortion. The proof load shall be applied as shown on the applicable drawing.

TABLE II. Proof loads for anchors by class.

Class	Weight, lb (kg)	Proof load, lb (kg)
1	200 (91)	10,000 (4 530)
2	3,000 (1 361)	72,600 (32 888)
3	6,000 (2 722)	121,000 (54 813)
4	9,000 (4 083)	156,000 (70 668)
5	12,000 (5 443)	185,000 (83 805)
6	15,000 (6 804)	214,000 (96 942)

3.6 Cleaning and coating. After testing and examination and before coating, all parts shall be cleaned. All oil, grease, loose scale, and other foreign substances which would prevent bonding of the coating to the metal should be removed. Anchor parts shall be shot blasted to near white metal in accordance with SSPC SP-10. After cleaning, all parts shall receive one coat of asphalt varnish conforming to A-A-1632. The asphalt coating should be not less than 3 mils (0.08 millimetre (mm)) thick and applied in accordance with manufacturer's recommendations.

3.7 Dimensions. The dimensions and tolerances for each class of anchor and component parts shall be in accordance with the applicable drawings.

3.8 Weight. The nominal weight of the assembled anchor shall be as specified in table II for the applicable class of anchor.

3.9 Identification marking. Marking of each anchor shall be in accordance with MIL-STD-130. The following information shall be stamped or raised in letters not less than 0.75-inch (19 mm) high on both the shank and tripping palm of the anchor assembly. Stamped markings shall be round face characters with not less than 0.06-inch (1.5 mm) depth; raised markings shall be not less than 0.06-inch (1.5 mm) relief.

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ANCHOR, STATO MOORING

Class: _____
 Nominal weight (lb): _____ (kg): _____
 Holding power ratio: Mud: 15:1 Sand: 20:1
 Year fabricated: _____
 Manufacturer's name: _____
 U.S. NAVY

3.10 Interchangeability. All units of the same classification furnished with similar options under a specific contract shall be identical to the extent necessary to ensure interchangeability of component parts, assemblies, accessories, and spare parts.

3.11 Workmanship.

3.11.1 Steel fabrication. The steel used in fabrication shall be free from kinks, sharp bends, and other conditions which would be deleterious to the finished product. Manufacturing processes shall not reduce the strength of the steel to a value less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to ensure uniformity of size and shape.

3.11.2 Bolted connections. Bolt holes shall be accurately punched or drilled and shall have the burrs removed. Washers or lockwashers shall be provided in accordance with good commercial practice, and all bolts, nuts, and screws shall be tight.

3.11.3 Welding. Welding procedures shall be in accordance with AWS D1.1 for dynamically loaded structures. The surface of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Welds shall be of sufficient size and shape to develop the full strength of the parts connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof and service loading.

3.11.4 Forgings. Forgings shall be of uniform quality free of detrimental flash, scale, cracks, hard spots, cold shuts, or other defects which might render the forging unsound for the intended use.

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).

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4.2 First article inspection. The first article inspection shall be performed on one anchor, with stabilizers, wedges, and palm extensions when a first article is required (see 3.1 and 6.2). This inspection shall include the examination of 4.4 and the tests of 4.5. The first article may be either a first production item or a standard production item from the supplier's current inventory, provided the item meets the requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

4.3 Conformance inspection. Unless otherwise specified (see 6.2), the quality conformance inspection shall consist of the examination of 4.4 and the tests of 4.5.

4.4 Examination. Each anchor, with stabilizers, wedges, and palm extensions shall be examined for compliance with the requirements specified in section 3 of this document. Any redesign or modification of the contractor's standard product to comply with specified requirements, or any necessary redesign or modification following failure to meet specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations in accordance with AWS D1.1 and dimensional measurements. Noncompliance with any specified requirement or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.5 Tests. Failure to pass any of the following tests shall constitute failure to meet the requirements of this specification. Weld repair procedures and repair examinations shall be in accordance with AWS D1.1. Procedures must be reviewed and approved by the Government representative prior to repair.

4.5.1 Proof test. Each anchor shall be assembled with shackles, welded or hinged stabilizers, wedges, and palm extensions, and shall be subjected to the applicable proof load as specified in table II. After attachment of the proof-test load, the welds around the stopper, the bearing block, the fluke stiffeners, and the area along the palm-to-fluke joints shall be inspected for permanent deformation, cracks, or distortion. Appearance of any one or combination of the above discrepancies shall be cause for rejection. Anchors shall be gaged before and after the proof test to determine any permanent deformation or distortion caused by the load. The proof test machine shall be certified in accordance with ASTM E 4.

4.5.2 Magnetic particle test. All forged components and all welds shall be magnetic tested. After the proof load test specified in 4.5.1, and prior to cleaning and coating (see 3.6), all forged components of the anchor shall be subjected to magnetic particle test in accordance with ASTM A 275. All welds shall be examined and evaluated in accordance with AWS D1.1 for dynamically loaded structures.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite

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packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. 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.

6. NOTES

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

6.1 Intended use. Stato mooring anchors are for use as permanent mooring type anchors for use in mud or sand bottoms.

6.1.1 Anchor use data. Stato mooring anchor characteristics were developed to obtain a high holding power to weight ratio of 15 to 1 in mud and 20 to 1 in sand. For further information on stato anchors, a summary of the design, tests, and applications are given in the Naval Facilities Engineering Command Design Manual DM-26 for Harbors and Coastal Facilities.

6.1.2 Mud bottom use. Mud bottom use conditions require that no wedge inserts be used. This permits the flukes to rotate and reach the optimum 50-degree angle between the shank and fluke. The tripping palm extensions are required to achieve this within a reasonable drag distance.

6.1.3 Sand bottom use. Sand bottom use conditions require that wedge inserts must be used. This limits the fluke rotation to an optimum 34 degrees. Tripping palm extensions are not required, but do not detract from the anchor's use in sand.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of the specification.
- b. Class of anchor 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 2.2.1 and 2.3).
- d. When first article is required (see 3.1 and 4.2).
- e. When stabilizers for class 2 through 6 are to be hinged or welded (see 3.4.2).
- f. When wedges are not required (see 3.4.3).
- g. When palm extensions are not to be provided for field welding (see 3.4.4).
- h. Conformance inspection, if other than specified (see 4.3).
- i. Packaging requirements (see 5.1).

6.3 First article. When a first article inspection is required, the item will be tested and should be a first article sample, or it may be a standard production item from the contractor's current inventory as specified in 4.2. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

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6.4 Subject term (key word) listing.

Palm extensions
Shank
Stabilizers
Wedges

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

Custodian:
Navy - YD1

Preparing Activity:
Navy - YD1

Review Activity:
Navy - SH

(Project 2040-0220)

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-DTL-28619D

2. DOCUMENT DATE (YYMMDD)
971020

3. DOCUMENT TITLE

ANCHORS, STATO MOORING, 200 TO 15,000 POUNDS

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

R. E. PAMPLONA

b. TELEPHONE *Include Area Code)*

(1) Commercial 805-982-5843 (2) AUTOVON 551-5843

c. ADDRESS *(Include Zip Code)*

COMMANDING OFFICER, NCBC CODE 15E2D
1000 23RD AVENUE
PORT HUENEME, CA 93043-4301

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:
DEFENSE QUALITY AND STANDARDIZATION OFFICE
5203 Leesburg Pike, Suite 1403, Falls Church, VA 22401-3466
Telephone (703) 756-2340 AUTOVON 289-2340