

H-40 ANCHORING, MOORING, AND STRONG POINTS

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H-40 ANCHORING, MOORING, AND STRONG POINTS

Based on ABYC's assessment of the existing technology, and the problems associated with achieving the goals of this standard, ABYC recommends compliance with this standard for all boats, associated equipment, and systems manufactured after July 31, 2004.

40.1 PURPOSE

This standard is a guide for the selection, design, construction, and installation of fittings and equipment for anchoring, mooring, docking, lifting, towing and trailering of boats.

NOTE: The operator is responsible for equipping the boat with ground tackle, mooring and docking lines appropriate to the boat's intended use and area of operation.

40.2 SCOPE

This standard applies to fittings and equipment that are attached to, or carried on boats for anchoring, mooring, docking, lifting, towing and trailering of boats.

NOTE: This standard does not address loads that may be encountered on grounded or swamped boats.

40.3 DEFINITIONS

For the purpose of this standard, the following definitions apply.

Anchor - A device designed to engage the bottom of a waterway, and through its resistance to drag, maintain a boat within a given radius.

Anchor cleat - A fitting used to secure an anchor rode or other line to the boat.

Anchor rode - The line, cable, chain and other fittings connected to an anchor.

Anchor rollers - Rollers or fittings designed to assist in leading the anchor rode outboard, and/or to stow the anchor.

Backing plate/block - Localized reinforcement of the deck or hull structure.

Boat weight - The boat weight includes engine, batteries, full fuel system, the heaviest production tolerances, and factory-supplied, permanently installed, non-portable appurtenances.

Bow eyes and bow straps - Fittings on the stem of a boat used for towing or loading and unloading from a trailer.

Chain stopper - A device designed to secure the chain and relieve the load from the capstan and/or windlass.

Chocks - Fittings, usually on the rail or deck of a boat, that serve as fair leads for anchor rodes and other lines.

Cleat - Fitting designed to be used to secure a line.

Ground tackle - A general term for the gear (e.g., anchor, anchor rodes, and shackles) used for securing a boat to an anchor or mooring.

Length overall (LOA) - The straight line horizontal measurement from the foremost part of the boat to the aftermost part of the boat, measured parallel to the centerline and to the waterline. Attached bow sprits, pulpits, boomkins (bumpkins), rudders, sails, outboard engine brackets, handles, railings and other similar attached extensions are not included in the measurement. Integrally formed, molded, or welded components and appendages, such as bow pulpits, swim platforms, attachment structures for the propulsion systems, and structural rub rails installed by the builder are included in the length.

Samson post - The upper end of a vertical timber or metal post on the foredeck to which an anchor rode or dock line can be made fast.

Strong point - Any fitting on a boat designed to be used for the attachment of anchor chains, anchor lines, tow lines, and warps (e.g. bollards, cleats, samson posts, masts, bow eyes on trailerable craft, and similar devices).

40.4 ANCHORING AND MOORING

40.4.1 General

40.4.1.1 All boats shall be equipped with fittings, including a strong point, so that they may be anchored by the bow and secured to a dock or mooring.

40.4.1.2 All fittings or parts of a boat that may change the direction of pull of the dock line and anchor rodes shall be smoothed and rounded to a radius of not less than one-half of the diameter of the maximum intended line size [e.g., a 1/4 inch (6.5 mm) radius for 1/2 inch (13 mm) diameter line].

40.4.2 Materials

40.4.2.1 The anchor shackle, or other means of attaching the anchor to the rode, shall exceed the minimum breaking strength of the weakest component of the ground tackle. (See [AP.TABLE I](#).)

40.4.2.2 Combinations of materials shall be used to minimize galvanic corrosion (see [ABYC E-2, Cathodic Protection.](#))

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40.4.3 Design and Construction - General

40.4.3.1 For boats over 20 ft (6 m) in LOA, provision shall be made for the deployment of two anchor rodes over the bow.

40.4.3.2 Chocks

40.4.3.2.1 If only one bow chock is used, the opening shall be of sufficient size to accommodate two anchor rodes of the recommended size, plus chafing gear.

40.4.3.2.2 If two bow chocks are used, each shall be of sufficient size to accommodate the recommended size of dock line or anchor rode, plus chafing gear.

40.4.3.2.3 Chocks shall be fastened to withstand the forces applied by an anchor line subjected to the permanent mooring loads in [TABLE I](#).

40.4.3.2.4 Chocks shall be mounted to minimize bends in the line, and to prevent the rode from chafing at the toe rail, deck, or rub rail.

40.4.3.3 Anchor Rollers

40.4.3.3.1 If only one anchor roller is used, it shall be of sufficient size to accommodate two anchor rodes plus chafing gear. The designed working surfaces of the anchor roller shall be smooth and rounded to a radius not less than three times the diameter of the maximum intended line size. The working surface and edges of the structure shall have a radius one-half the diameter of the maximum intended line size.

40.4.3.4 Strong Points

40.4.3.4.1 Strong points shall be of sufficient size to accommodate two anchor rodes or dock lines.

40.4.4 Installation

40.4.4.1 Anchors stowed on deck shall be secured so that they will not break loose when subjected to a vertical force equal to five times the weight of the anchor.

40.4.4.2 Strong points shall have a safe working load greater than, and be fastened to withstand, twice the permanent mooring loads in [TABLE I](#).

40.4.4.3 Windlass or Capstan

40.4.4.3.1 A windlass or capstan, if installed, shall be fastened to withstand three times the rated capacity of the windlass.

40.4.4.3.2 The structure to which the windlass or capstan is fastened shall be designed and constructed to withstand twice the permanent mooring loads in [TABLE I](#).

NOTE: *A windlass or capstan is not considered to be a strong point to be used for securing an anchor rode to the boat.*

40.4.4.3.3 Boats equipped with an anchor windlass shall be equipped with a chain stopper, bitt, cleat, or Samson post to permit the transfer of the load from the windlass.

40.5 **TOWING AND TRAILERING**

40.5.1 General - Boats designed to be towed (e.g., a tender) or winched onto a trailer shall be equipped with a bow eye or bow strap.

40.5.2 Materials - Bow eyes and bow straps shall be constructed of a material which will minimize galvanic corrosion (see [ABYC E-2, Cathodic Protection](#)) with the hull materials.

40.5.3 Design and Construction

40.5.3.1 Bow eyes and bow straps shall be of suitable dimension to accommodate the towing line or trailer hook, but not less than one inch inside diameter.

40.5.3.2 The inside working surface shall be smooth and rounded.

40.5.3.3 A bow eye or strap, and their points of attachment to the hull, shall be able to accommodate a direct tension pull of two times the sum of the weight of the boat and its recommended weight capacity.

40.5.4 Installation

40.5.4.1 The bow eye shall be installed parallel with the centerline.

40.5.4.2 Bow eyes and bow straps shall be through bolted with backing plate(s)/block(s), and washers and nuts, or welded to the structure of metal boats. (See [FIGURE 1](#).)

40.6 **LIFTING SYSTEMS**

40.6.1 Design and Construction

40.6.1.1 As installed, fittings used for lifting

40.6.1.1.1 shall have minimum hole diameter of 1 1/8 inch (28 mm), and

40.6.1.1.2 shall have a safety factor of at least five on the ultimate strength, and at least three on the yield strength, based on the resultant load at each fitting.

NOTE: *The resultant load is based on several factors including the boat weight, the number of lifting fittings, lifting angles, location of lifting fittings in relation to the center of gravity of the boat, etc.*

40.6.1.2 Lifting fittings shall be designed and installed to withstand a horizontal load equal to 160% of the vertical requirements in order to withstand loads imposed where cables do not lift directly upward.

40.7 Owner's Manuals

40.7.1 The information in Table II of the Appendix shall be provided in the owner's manual. (See [ABYC T-24, Owner/Operator's Manual.](#))

40.7.2 Where the purpose of a specific strong point is not self-evident, the boat manufacturer shall either label the strong point or provide suitable information in the owner's manual.

FIGURE 1 – Bow Eye Installation

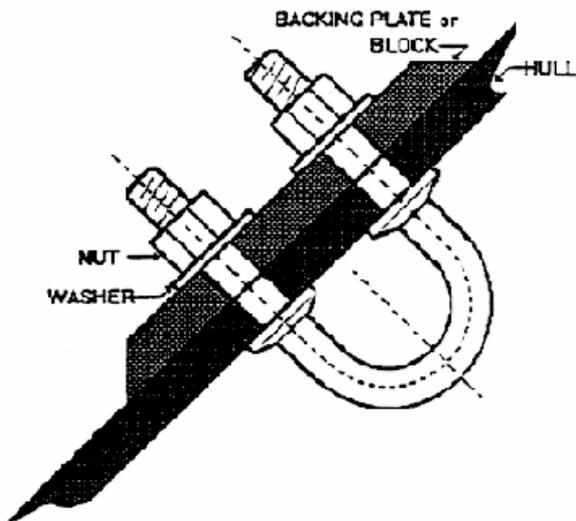


TABLE I - DESIGN LOADS FOR SIZING DECK HARDWARE

LOA See Notes ft. (m)	Beam See Notes		Permanent Mooring lbs. (kN)	Storm Anchor lbs. (kN)	Working Anchor lbs. (kN)
	Sail ft. (m)	Power ft. (m)			
10 (3.0)	4 (1.2)	5 (1.5)	480 (2.1)	320 (1.4)	160 (0.7)
15 (4.5)	5 (1.5)	6 (1.8)	750 (3.3)	500 (2.2)	250 (1.1)
20 (6.1)	7 (2.1)	8 (2.4)	1080 (4.8)	720 (3.2)	360 (1.6)
25 (7.6)	8 (2.4)	9 (2.7)	1470 (6.5)	980 (4.4)	490 (2.2)
30 (9.1)	9 (2.7)	11 (3.4)	2100 (9.3)	1400 (6.2)	700 (3.1)
35 (10.7)	10 (3.0)	13 (4.0)	2700 (12.0)	1800 (8.0)	900 (4.0)
40 (12.2)	11 (3.4)	14 (4.3)	3600 (16.0)	2400 (10.7)	1200 (5.3)
50 (15.2)	13 (4.0)	16 (4.9)	4800 (21.4)	3200 (14.2)	1600 (7.1)
60 (18.3)	15 (4.6)	18 (5.5)	6000 (26.7)	4000 (17.8)	2000 (8.9)

NOTES:

1. *When using this table with the length overall or beams, use whichever gives the highest load, assuming freedom to oscillate is permitted and moderate shelter from seas proportionate to hull size.*
2. *Boats with canvas and large superstructure, use the load one category higher than that determined by using the powerboat column.*
3. *These values include the effects of wind, current and wave action.*

APPENDIX

AP.TABLE I - WORKING LOAD LIMIT FOR ANCHOR RODES

Nominal Diameter in.(mm)	Nylon See Notes 2 & 3		Galvanized Chain See Note 4			Shackles Weldless Drop Forged lbs. (kN)
	3 and 8 Strand lbs. (kN)	Double Braided lbs. (kN)	BBB lbs. (kN)	Proof Coil lbs. (kN)	High Test lbs. (kN)	
¼ (6)	186 (.82)	208 (.93)	1300 (5.8)	1300 (5.8)	2600 (11.6)	1000 (4.4)
5/16 (8)	287 (1.3)	326 (1.5)	1900 (8.5)	1900 (8.5)	3900 (17.3)	1500 (6.7)
3/8 (10)	405 (1.8)	463 (210)	2650 (11.8)	2650 (11.8)	5400 (24)	2000 (8.9)
7/16 (11)	557 (2.5)	624 (2.8)	-	-	-	3000 (13.3)
½ (12)	709 (3.2)	816 (3.6)	4500 (20)	4500 (20)	9200 (41)	4000 (17.8)
9/16 (14)	888 (4)	1020 (4.5)	5875(26.1)	-	-	-
5/8 (16)	1114 (5)	1275 (5.7)	6900 (30.7)	6900 (30.7)	11500 (51.2)	6500 (29)
¾ (18)	1598 (7.1)	1813 (8.1)	10600 (47.2)	10600 (4810)	16200 (72)	9500 (42.3)
7/8 (22)	2160 (9.6)	2063 (9.2)	-	12800 (57)	-	12000 (53.4)
1 (24)	2795 (12.4)	3153 (14)	-	13950 (62)	-	15000 (66.7)
1 ¼ (30)	4345 (19.3)	4838 (22)	-	-	-	23000 (102.3)
1 ½ (36)	6075 (27)	6875 (30.6)	-	-	-	-
2 (48)	10575 (47)	12363 (55)	-	-	-	-

NOTES:

1. Only nylon rope is shown in Ap.Table I because of its elasticity and ability to absorb shock loads. Working loads for nylon rope are based on factors of safety, line strength loss due to knots and splices and additional factors including abrasion and aging. Chains other than proof coil or high test are suitable for anchor rode. Size according to manufacturer's working load ratings.

2. Thimbles used shall be those designated for use with the particular size of rope required.

3. Rope - 3 and 8 strand or braided (plaited)

a. Breaking test figures used to determine the working loads are "average." Minimum will be 10% below "average."

b. Design (safety) factors of 8 are used for 3 strand, 8 strand and double braid rope. These strengths are based on data supplied for new and unused rope of current manufacture in accordance with Cordage Institute standards.

4. Check with manufacturers' recommendations for materials not listed in AP Table I.

5. Strengths vary by manufacturer, check with manufacturer regarding actual strengths.

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Origin and development of ABYC H-40, Anchoring, Mooring and Lifting.

ABYC published the first edition of H-40, formerly *A-5, Anchoring, Mooring, Docking, Towing and Lifting*, in 1996. The 2003 revised edition is the work of the Hull and Deck Project Technical Committee.

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