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THORPE BAY YACHT CLUB
QUICK GUIDE TO MOORING @ TBYC

The following notes and supplement are provided as guidance to Members who have a mooring at the club. In applying for or accepting a mooring, Members agree to the conditions on this page and elsewhere (e.g. in the Club Rules):

The responsibility for the mooring is entirely that of the mooring holder and they must satisfy themselves that the design of the mooring and equipment used is more than suitable for their boat i.e. that sufficient safety margin is allowed for.

In no way can TBYC or Moorings Officer accept any liability or responsibility for any failure.

The allocation of a mooring is made under the terms of the Club Rules and the Southend on Sea Borough Council's standard terms and conditions (as amended by the Essex Act 1987 – Section 81. Copies are available from the Club Secretary.

Mooring roots are the responsibility of the mooring holder but may only be replaced under the supervision of the Moorings Officer. The Moorings Officer usually makes arrangements for inspection/replacement annually, prior to Lift-In.

To stay clear of nearby boats, the length of mooring riding chain from the root (sea bed) to the bow roller must not exceed 7 fathoms (42 feet or 13 m). If connecting to existing root, make sure you have uncovered all riser chain and check riser & root for condition & length.

Riding Chain must not be less than:

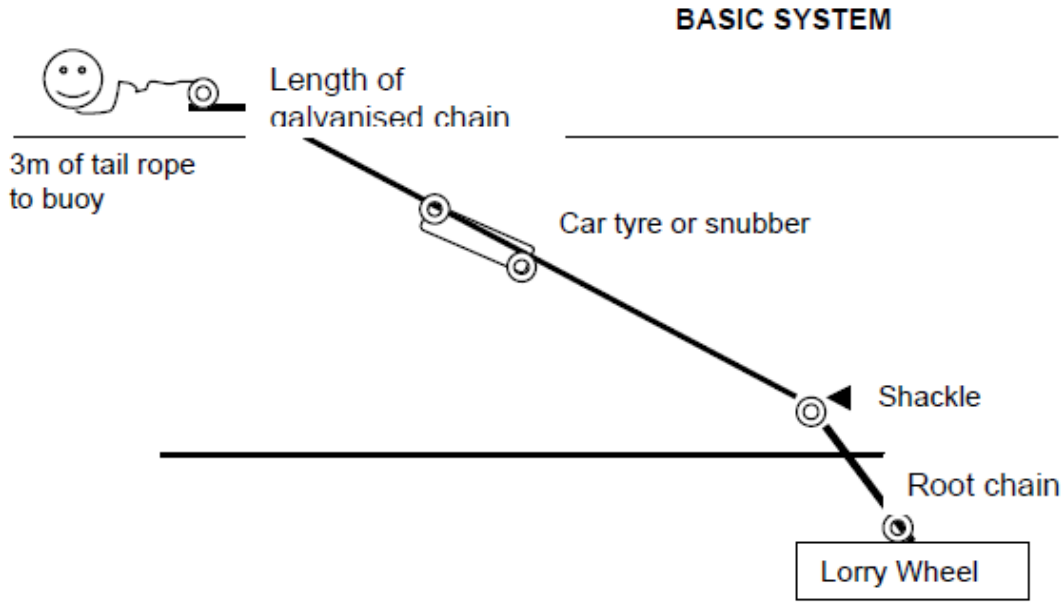
- 8mm (3/8") - under 22 feet boat length incl. Sandhoppers
- 13mm (½") - 22ft – 25ft boat length
- 16mm - 26ft – 29ft boat length
- 30ft plus boats - as appropriate

The system must be chain from root to kingpost. Rope pennants are recommended as back-up to the chain pennant, and for ease of pick-up. Shackles must be backed up by another shackle or alternative, and all pins moused.

Members must check and maintain their moorings as necessary. E.g. at start, during and at end of the season.

Acknowledgement

The information in this guide has been based on extracts from 'The Professional Users' Guide to Norfloat Buoys, Fenders, Aids to Navigation and Mooring Systems, amended for Thorpe Bay conditions. We would like to thank Norfloat for providing this invaluable guidance. http://www.norfloat.com/



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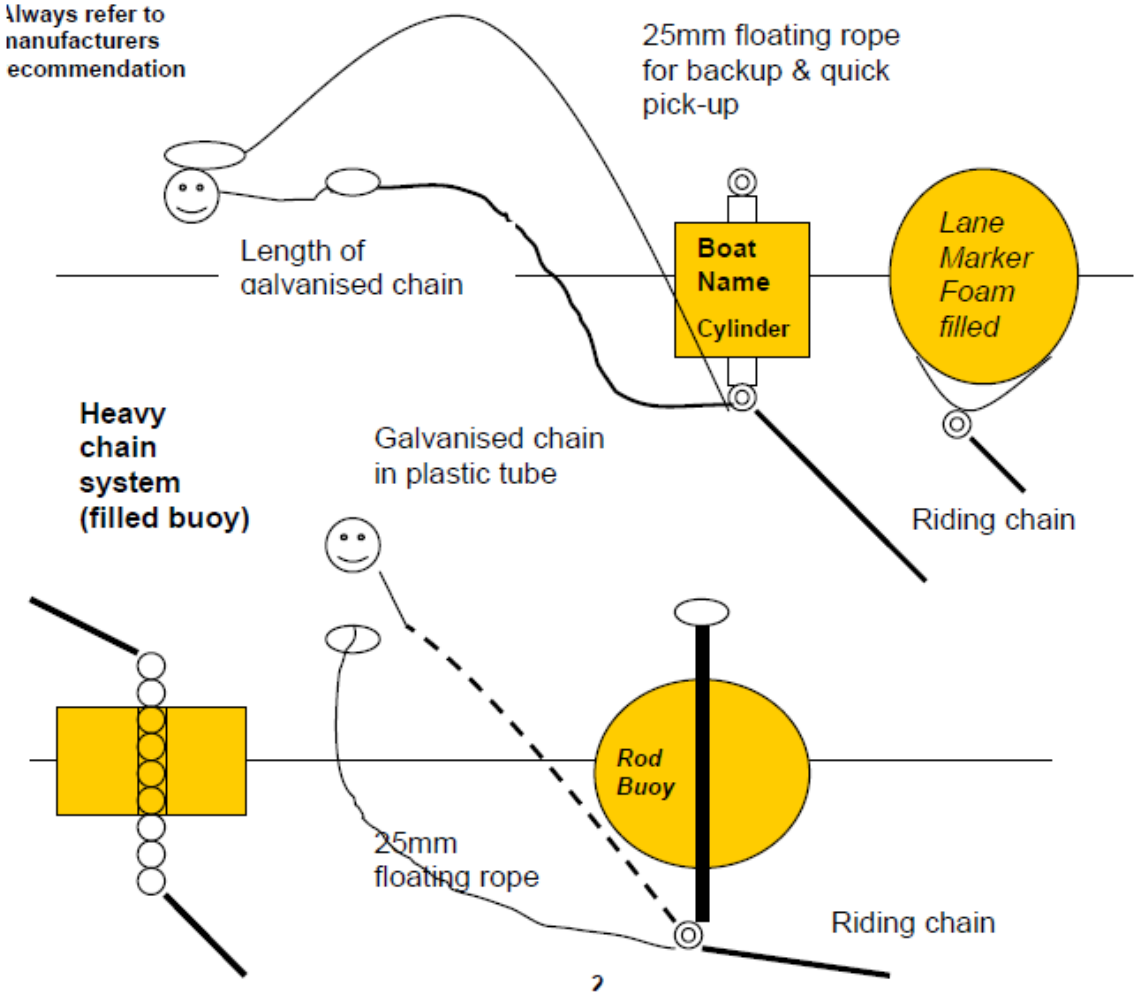

Joining chain

Shackles are the most common point of failures, so shackles are doubled up.

Overlap chain ends by several links and shackle the end link of each to the adjoining link using largest shackle that fits. There is more clearance in the end-link, so put body of shackle there and its pin through a link in the adjoining chain. (With tested shackles, pin is often thicker than body. Check fit in the chandlers.) It is probably best that the end link of the smaller chain takes the strain. Consider replacing cheap pins with bolts & locknuts.

Suggested purchase list for moorings (excluding root)

Under 22 ft. basic system

Buoy (without steel rings etc)
13m (42ft) 8mm (3/8) black (ungalvanised) tested chain [11 m (36ft) Sandhoppers]
2m (6ft) 5/16" (7mm) galvanised chain pennant
3 m (9ft) 20mm dia rope (non-floating) rope pennant/pickup
1 thimble
2 x 3/8" 'U' shackle (tested) - root to riser
2 x 5/16" 'U' shackles - riser to chain-pennant
2 x 5/16 bow shackles - end loop and rope pennant
Wire or black cable ties for mousing

22 ft – 25ft. basic system

Buoy (without steel rings etc)
13m (42ft) 13mm (1/2") black (ungalvanised) tested chain
3m (9ft) 3/8" (8mm) galvanised chain
3 m (9ft) 20mm dia rope (non-floating)
1 thimble
2 x ½" (12mm) 'U' shackle (tested) - root to riser
2 x 3/8" 'U' shackle (tested) - riser to chain-pennant
2 x 3/8 bow shackles - end loop and rope pennant
Wire or black cable ties for mousing

For larger boats scale up accordingly (see page 1)

Over 24 ft

Buoy (with steel rings and / or shaft)
13m (42ft) black (ungalvanised) tested chain (see page 1 for suggested link size)
3.75 m (12ft) 3/8" (8mm) galvanised chain [or larger according to bow roller]
4.5 m (15ft) 20mm dia rope (floating)
2 thimbles
2 x ½" (12mm) 'U' shackles (tested) root to riser
6 x 3/8 bow shackles - riser-buoy, buoy-chain-pennant, loop & rope pennant
Plastic tube (protects buoy against chafing)
Pick-up buoy and rope (if required)
Wire or black cable ties for mousing

The above lists and associated sketches are suggestions only. It is up to individuals to accept or modify the system at their own discretion and satisfaction.

Recommendations

Chain

Buy fully tested chain and shackles that are oversized for the weight of your boat. Paying a few pounds less may result in costing you hundreds later. Oversize chains wear less, last longer and increase the safety factor substantially. Black (ungalvanised) riser chain has been found to last as long if not longer.

- If possible buy mid-link chain (it allows a larger shackle to be used)
- Check your chain frequently and replace it every 3 to 4 years

A 30' boat was moored on this thin link, worn to about 1/6 of its original cross-sectional area.

Shackles

The most frequent point of failure, with a shorter life than chain. Failures occur because if they are too small, are poor quality, are worn, the pin has not been secured (moused), the mousing breaks, or the pin-eye rusts through. So:

- buy tested shackles
- use the largest shackle possible (or two shackles in parallel) & mouse securely
- remember – most 'agricultural mild steel shackles only have a Safe Working Load (SWL) of around 30cwt or 1.25 tons/tonnes
- check shackles frequently and replace before necessary.

Swivels

Help to prevent chain twisting, tangling and breaking. Badly twisted chain is much weakened, so if this is happening, you need to add a swivel. However, if one is used it is another source of wear and a single point of failure. Oversize it, check often and replace it before necessary.

Mooring Buoys

Mooring Buoys are either solid foam or inflatable and have a rod/ring, solid bar or chain to shackle to the riding chain. They do have their advantages particularly if you have a heavy riding chain.

- Paint the boat name on the buoy
- Minimum size – 300m (12") yellow or orange. In general the bigger the better.

With small-medium mooring buoys, the rod & upper loop are lightweight so pick-up buoy / pennants must shackle to bottom swivel, *not the top ring.* Larger buoys (as in photo) have the connecting swivel on top. Use galvanised chain and/or heavy ropes for pennants.

Snubbers

Failures seem to happen as a result of snatching, twisting, worn or loose equipment or a combination. A longer length of chain does not seem to reduce snatching to any degree, but a snubber and weight in the riding chain do. A tyre about half-way down the chain acts as a robust snubber and adding a length of scrap chain adds weight.

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Supplementary information to the Quick Guide to Mooring at TBYC

Moorings

Riser chains, swivels and most importantly the shackles need to be checked at least once a year for wear or corrosion (every shackle in the system should be moused / seized).

Pick-up buoys should always be connected to the correct swivel of the mooring buoy with heavy rope and / or chain pennant line to the boat.

With severe tide and seas at Thorpe Bay, chain should be used across the deck with a heavy rope pennant as back-up. Ensure that the stem head fitting is sturdy enough with high sides and use a drop-nosed pin or rope tie to prevent the chain jumping out and sawing through the side of the boat.

Rope pennant lines must be made properly, with a thimble spliced in one end (four tucks), and a soft eye in the other. A length of poly-tube over the rope will prevent chafe. The pennant if used as back up to the chain should not be under tension, so if the chain pennant fails the boat is still attached to the riser chain by an unworn rope. A rope pennant may be as strong as chain, but remember splices reduce the breaking strain of rope by about 30%.

Chains and Shackles

Quality: Beware of reconditioned chain; it is often totally unsuited to the marine environment. Avoid high tensile steel; it is used extensively in the fishing industry, is often available second hand and is 'work hardened'. Its life will not match that of new steel.

Chain Anodes: Fitted to the riser of the mooring it can extend the life of a chain dramatically. Chain wears/rusts most at upper end, so turning end-to-end increases its life.

Cheap shackle after a season. Only mousing held the pin in.

Mixed Metals: Never mix metals in a mooring. Stainless Steel shackles are not happy under water, particularly if attached to galvanised chain and will give problems.

Shackles: Avoid cheap 'commercial' shackles from the Far East; their corrosion rate can be fantastic. Pay more, for a shackle made to British Standard 3032, which will give good service. Mouse shackles – corrosion and wear can loosen shackle pins, and the eyes can rust through. Use black cable ties, Monel or galvanised wire for seizing, NOT white cable ties, copper, or other metal. Grease or LocTite pins and threads, and don't over-tighten.

Swivels: These can be one of the biggest source of problems, and should be checked often and renewed if necessary every season. Use a oversized fabricated swivel as they far outlast the forged type, and are a fraction of the cost.

Oversized swivel allows two shackles (with bolts & nyloc nuts) to riser, & rope + chain pennants.

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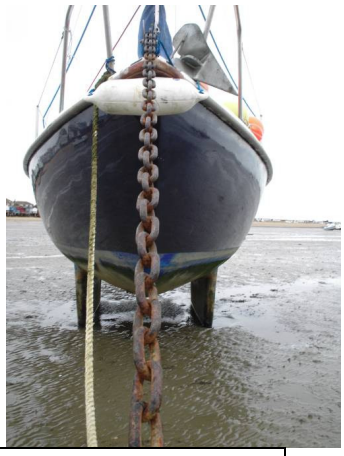
Chain strength and weight comparisons:



Please note: all sizes, weights and proof loads are approximate as they vary from maker to maker. Always check with your supplier.

Chain weights etc are generally taken from manufacturers tables and are provided as a guide. Always check with your supplier to confirm their exact specification for the chain or shackles being purchased.

Size (mm)	Size (inches)	Weight (kg/m)	Proof Load (kg)
Long Link			
13	½	3.34	3190
16	5/8	5.06	4530
19	¾	7.14	6820
22 7/8	10.46	10000 26	1
13.38	12770		
Medium Link			
13	½	3.50	3200
16	5/8	5.30	4800
19	¾	7.40	9100
26	1	12.80	11800
38	1.5	13.38	27300
Short Link			
11	9/16	2.67	2280
13	1/2	3.72	3190
16	5/8	5.64	4830
19	7/8	7.96	6820

Mooring Ropes

The tables below provide some basic comparisons for a variety of ropes fibres, both synthetic and natural. All the breaking strains are approximate, as they can vary from maker to maker. Ropes made from a similar fibre will perform in much the same way so the tables will give a good indication of performance.

Synthetic and natural fibre ropes, approximate breaking strains in kg.

Dia (mm)	Polyester 3 strand	Nylon 3 strand	Nylon Multiplait	Polypropylene 3 strand
12	3200	3700	3800	2400
14	3900	5100	4600	3200
16	5000	6600	6600	4200
18	7000	7900	7200	4800
20	7700	9700	9800	6200
24	11200	14200	14300	8400
28	14600	18600	18500	10800
32	18800	22600	23900	13600

Polyester rope is low stretch but subject to UV attack over long periods, Nylon is high stretch and is little affected by sunlight. Polypropylene floating rope is badly affected by sunlight and will readily chafe, but is very low cost compared to others.

Dia (mm)	Sisal 3 strand	Manila 3 strand	Polyethylene 3 strand	Polyester 16 Plait
12	950	1060	1540	3700
14	1280	1440	2090	5130
16	1800	2030	2800	6700
18	2160	2440	3500	8410
20	2870	3220	4300	
24	4060	4570	6100	
28	5410	6070	8000	
32	6930	7790	10400	

Sisal and Manila are natural fibres with much lower breaking strengths and limited uses; Polyethylene is also low on strength when compared with Polyester or Nylon, but has mainly industrial and commercial fishing applications.

Buoys and Fenders

Inflation: If you purchase a buoy or fender deflated remove the re-fill and see if the empty barrel will fit onto the valve holder of a car tyre foot pump – you will usually find one that fits. Gently push the connector into the valve opening, and inflation can begin. At 20°C / 68°F the correct pressure is 0.15 bar / 2psi.

Cleaning: When inflatable buoys and fenders get dirty, first try a mild detergent, such as washing up liquid. If the dirt is still a problem try white spirit. Stronger cleaners may damage PVC and make the surface sticky and dull.

Long Life: Do not over-inflate. All manufacturers give an approved working size for their products. If inflated to the correct size, a buoy will have the capacity to expand during hot weather, and absorb impact.

When marker or net buoys are used as mooring buoys, to support the riser chain, always use a buoy with a heavy duty rope eye and slide a short length of plastic tube onto the shackle pin to reduce wear. Remember to mouse the shackle pin.

Foam Filled Buoys: Foam filling gives increased strength and the ability to stay afloat when damaged. No attempt should ever be made to inject extra foam into these buoys to increase buoyancy.

Floatation: The volume and shape of the buoy determines the buoyancy and floatation characteristics. If a buoy floats low in the water, the riser chain is too heavy for the buoy in that depth of water.

Chain links fused with corrosion and shells.

Preparing new roots for the annual root dig.

This guide is designed to be printed A5 size; or print 2-up on landscape A4 page.

To print as a booklet, use Print options, or manually load 2 x A4 pages print 2-up, ordered 8,1,6,3, 4,5,2,7

The responsibility for any mooring is entirely that of the mooring holder and they must satisfy themselves that the design of the mooring and equipment used is more than suitable for their boat, location and conditions; i.e. that sufficient safety margin is allowed for. In no way can Thorpe Bay Yacht Club or any of its members or staff accept any liability or responsibility for any failure.