

Chapter 2. Marlinespike Seamanship

the art of working with and shaping ropes

When a piece of rope acquires a specific use aboard, it becomes a 'line' with a specific name
synthetics have largely replaced natural fibres and require different handling

each synthetic has strengths and weaknesses

a synthetic that floats is valuable as a heaving line but not as anchor rode

Required to demonstrate in class

Reef Knot*

Rolling Hitch

Anchor Bend

Bowline on a Bight

Ashley's Constrictor Knot

Clove Hitch*

Double Sheet Bend*

Round Turn and Two Half Hitches*

* from Boating also Figure 8, Bowline,

May complete at home and bring to class

West Country Whipping (use prewaxed marline for whippings, extra-thick waxed dental floss or waxed linen thread)

Eye Splice

Short Splice

www.animatedknots.com.

Types of Line

common materials: nylon, polyester, and polypropylene.

Nylon is made in both three strand and double braid line

double braided form is stronger and less inclined to kink

polypropylene is three stranded

not resistant to degradation from sunlight

replace if chalky

Polyester double braid is low stretch

commonly is used for almost all control lines on sailboats

Newer high strength materials include aramid (Kevlar) and high modulus polyethylene (Spectra)

used on racing sailboats

UV sensitive

Purpose

The *Table of Uses* Table 2.1 list ways line is used, purpose, characteristics and type of fibre

Size

size of line refers to its diameter in millimetres or fractions of an inch

Imperial	Metric	Imperial	Metric
1/4"	6mm	5/16"	8 mm
3/8"	10mm	1/2"	12 mm
5/8"	16 mm	3/4"	18mm

Line with a diameter of 6 mm (1/4 in) is described as 6millimetre line or 1/4-inch line etc.up to 25 mm (1-in) line. Lines with a diameter greater than 25 mm (1-in) are hawsers and are measured by circumference

Strength

quoted breaking strength for new rope is determined by loading under near-laboratory conditions

Table 2.2 shows the approximate breaking strength of some synthetic fibre ropes

real load that will cause a line to break depends on the age and condition of the line and the manner in which the load is applied, i.e. gradually, or as a sudden shock.

A *safety factor*, or allowance, must be applied when selecting a rope for a specific purpose.

For ordinary purposes on board, a factor of 5 is adequate.

Where human life is involved, a factor of 15 should be used.

For example:

Quoted breaking strength of 10 mm 3-strand polypropylene)Table 2.2(= 1,000 kg)2,200 lbs(Safety factor for hoisting a dinghy, is 5.

Safe working load = $1,000/5 = 200$ kg (440 lbs)

This only applies when the line is new and in good condition, at which time it should safely hoist a load of up to 200 kg (440 lbs)

When the *required working load* is known, the rope selected for the job should have a quoted breaking strength equal to or greater than this load, multiplied by the safety factor.

For example:

Required - a rope intended to support a person weighing 100 kg (220 lbs). Applying the factor of 15, the breaking strength of the rope should be:

$100 \text{ kg} \times 15 = 1,500$ kg (3,300 lbs)

Again, applies to new line in good condition

In practice these sizes should be considered as the minimum.

Requirements for line vary greatly among different boats.

Mooring Lines

Size

boats between 6 m (20 ft) and 9 m (30 ft) in length use 12 mm (1/2 in) line

larger boats need 16 mm (5/8 in) line

boats less than 6 m (20 ft) can use 10 mm (3/8 in) line

must be strong enough to withstand pressure during storms

mooring lines are subject to considerable chafing

use anti-chafing gear in chocks to reduce wear prolong line

Lengths

mooring lines should be fairly long, and will depend on such things as docking facilities, tidal range etc

bow line should not be long enough to foul the propeller if drags in the water

bow and stern lines should always be ready for use

spring lines rigged when needed and a 15 m (50 ft) line will usually be sufficient.

Mooring Lines Names

Figure 2.1 illustrates 8 lines to secure a boat

tie long lines at an angle to dock

lines must be long enough so that in heavy wave action that the fitting is not yanked off the wharf, or the cleat off the boat.

fore-and-aft running lines called spring lines keep strain on the lines and fastenings to a minimum

limit the fore and aft movements of the boat

extra spring lines should be used for storm conditions

Anchor Rode

should always be ready for use

not be used for any other purpose

replace if any sign of wear

mark the anchor rode at regular intervals in some way such as every 5 m (15 ft)

Other Considerations

Table 2.3 block size and line size

lines should be comfortable to handle in normal conditions

Storage and Stowage

untangle loose lines first

start coiling at secure end

make sure all coils are the same size

coil laid line clockwise to avoid kinking and tangling

braided line may be coiled in a figure eight

Lines should be stowed close to where they will be needed but, at all times, out of the way of deck traffic when docking, the coil of dock line should be laid on deck, in a convenient place, with the free end down *faked or flaked* line - coiled in loose figure-eights, then laid on deck flemished down - secured to the deck in a tight, flat, mat-like coil (Figure 2.2)
other lines are stored by securing the coils so that they will not fall apart, and then hanging them in a convenient place

Block and Tackle

for heavy load to be lifted, the hauling line is passed through two or more blocks in an arrangement known as a block and tackle
used on sailboats to raise and lower sails
on powerboats used to raise and lower a dinghy

Blocks

A sheave (shiv) is a pulley which turns on an axle or pin.
A *block* is one or more portable sheaves, housed and protected with some means of securing it to a hook or eye blocks may be single (one sheave), double, triple or more
a snatch block, (figure 2.3) hinges open to allow a line to be placed directly on the sheave-either at the working end, the bitter end or in the middle
A line to be reeved (fed) through a block must not be too large or the bend will damage the line the sheave diameter should be not less than 8 times the line diameter

Tackles

(figure 2.4) are rigged by using blocks and line to gain a mechanical advantage
pull to be exerted on an object can be multiplied by two, three, four or five times,
when system is at rest, the tension in the line is equal to the weight of the load divided by the number of parts that support the load
note that the hauling part (A) is not helping to support the load
using arrangement (1), a 'two-part tackle', the mechanical advantage is two. A tension of 25 kg in the line will support a 50 kg mass
note that the hauling part has to travel twice as far as does the 50 kg mass.

Whipping

to prevent fraying or unravelling
wrapping the end of the line tightly, for the length of one diameter of the line, with waxed marline
for a very secure whipping, a second whipping is made three diameters along the line from the first.

West Country Whipping (Figure 2.6)

very secure whipping for all types of line
consists of a series of overhand knots made alternately, first on one side of the line and then on the other

no special tools are required.

knots are made successively right-over-left, left-over-right, as in a square knot

an added overhand turn each time, makes the whipping hold even better

finish with a surgeon's knot-a reef knot with an extra turn in the first half hitch (the 'right over left' one). Tuck the shortened ends into the last turn, (See Figure 2.6)

A knot is formed in a single line; e.g., the figure eight knot.

A hitch secures a rope to another object-the other object can be another rope, if it does not form part of the knot-e.g., the clove hitch.

A bend ties the ends of two ropes together; e.g., the sheet bend.

For added security in any knot, add two half hitches

Slipped Reef Knot Figure 2.14

reef knot to be untied quickly

Ashley's Constrictor Knot Figure 2.15

variation of the clove hitch

difference is 'under the other object' for the clove hitch and 'over the other object' for Ashley's constrictor. It is important to pass the lead under the 'X', and straight up.

may be used

as a semi-permanent whipping

as a seizing

or repaired spars

holds reliably only over a convex surface

best over a yielding surface such as chafing gear over a line

gets tighter as additional load is applied

difficult to untie.

Rolling Hitch Figure 2.17

useful for attaching a line to a post or to another line, if that line is taut

is a clove hitch with an extra round turn at the start

can tolerate heavy loads and can be used anywhere that the strain is parallel to the load without slipping

attaching a flag to the backstay and using two pennants sewn into the hoist

excellent for tying off halyards from mast when docked.

Fisherman's Bend or Anchor Bend Figures 2.19 and 2.20

variation on the round turn and two half hitches:

the first hitch is taken through the round turn

best knot to fix to anchor

Sheepshank Figure 2.21.

temporarily shortening a line

two bights are formed in the line

the line is looped back on itself in two places

A stopping can be put on one end to prevent the sheepshank from falling apart when the load on it is eased.

Bowline on a Bight Figure 2.22

two-loop knot

used for lowering or raising an outboard from a dinghy

can be used as a makeshift bosun's chair

to retrieve a man overboard

two loops large enough to allow one leg to be slipped through each

person holds on to the standing part (the part that is attached to the boat or other object)

person is overboard and injured, take a single hitch under the arms and around the chest.

Spanish Bowline Figure 2.23

double loop knot that can be used to lift a person

if victim is conscious, each loop is placed around a leg and the victim holds onto the standing part

serve as a makeshift bosun's chair

unconscious person one loop is placed around the armpits and the second loop is placed around the knees

if not properly tightened can slip

Splices

splice is preferable to a knot for joining ropes

it retains a much greater portion of the rope's strength and is less likely to snag on hardware

this course requires proficiency in two methods of splicing three-strand rope

eye splice is the best method of putting a permanent loop in the end of a line

very strong, because the ends of the strand are interwoven with those of the standing part

Short Splice

joins two pieces of rope using