

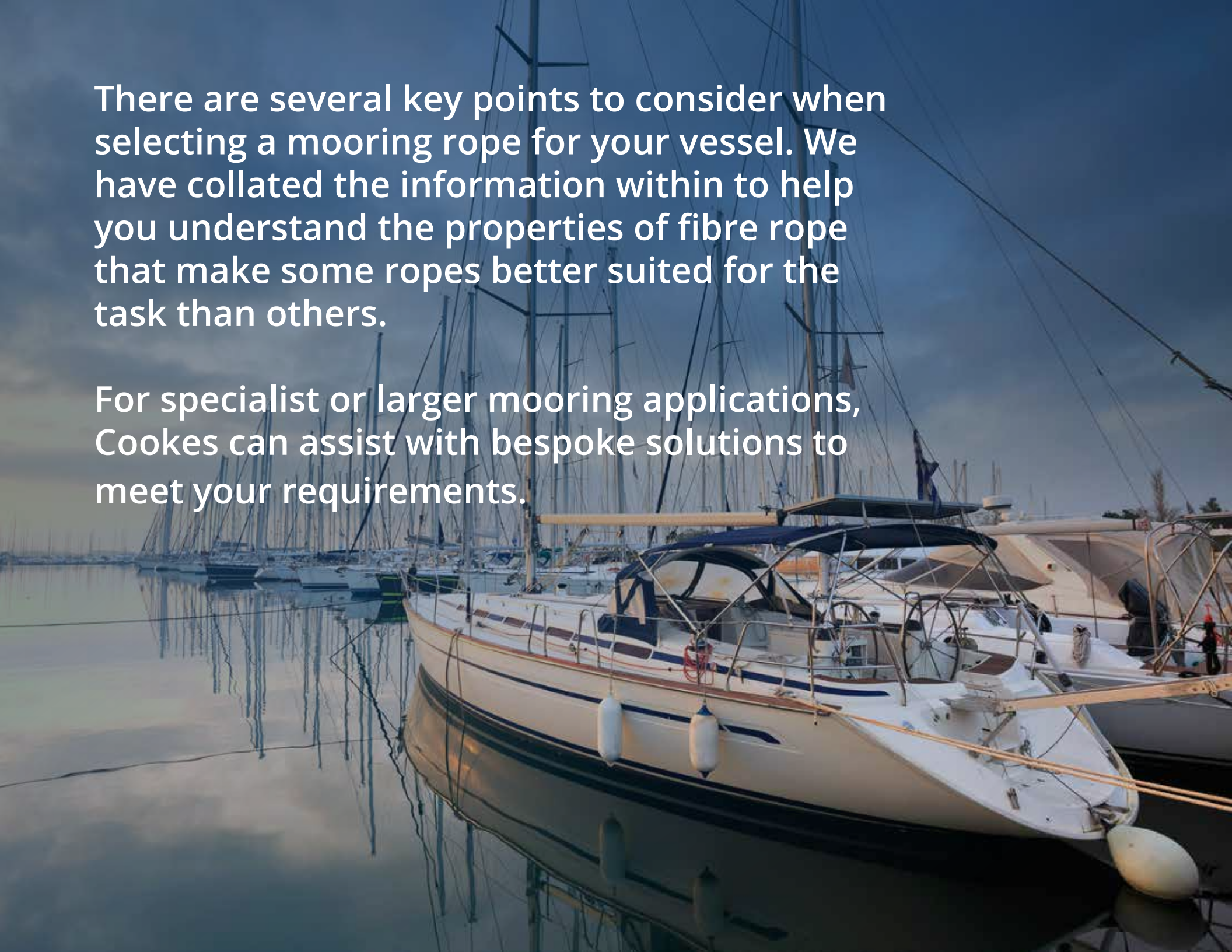


**FIBRE ROPE
SELECTION
AND SPECIFICATION**

FOR VESSEL MOORING APPLICATIONS

There are several key points to consider when selecting a mooring rope for your vessel. We have collated the information within to help you understand the properties of fibre rope that make some ropes better suited for the task than others.

For specialist or larger mooring applications, Cookes can assist with bespoke solutions to meet your requirements.



Choosing the correct mooring line for your vessel

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Fibre Rope Properties

AN INTRODUCTION TO THE PROPERTIES OF FIBRE ROPE

To keep this information relevant and concise to vessel mooring, we will cover the properties of the following fibres: Nylon, Polyester, Polypropylene & Dyneema. To see the properties of other ropes, visit our guide on fibre rope properties.

Polyester

Polyester is the most commonly used material in many vessel mooring applications. Polyester ropes are available in a wide range of colours and weights; the most common weights are 250, 500, 1,000 & 1,500 denier. It features good UV resistant properties and all colours are colourfast.

The rope boasts good abrasion resistance, especially when twisted and prolonged exposure in water has little effect on the rope.

Nylon

Nylon has a higher strength and elongation properties than polyester allowing it to handle shock loads better. These properties make nylon an ideal fibre rope for mooring lines and sea anchors. Like Polyester, Nylon has a high resistance to abrasion; however, it tends to harden over time.

Polypropylene

Polypropylene is a lightweight material that is used throughout the marine industry for rescue lines and anything else that requires a light weight floating rope. Its abrasion resistance is not equal to polyester and other yarns, but it is UV stabilised. This type of yarn also has excellent chemical resistance and does not retain water.

Polypropylene is useful as a multi-purpose rope but loses strength under heavy shock loads which can make it less than ideal for mooring applications when tidal shock loading is a factor.

Dyneema

Dyneema® Fibre is one of the more common high-performance fibres available on the market. It features high strength, low elongation, excellent chemical resistance and UV resistance properties.

The Dyneema® SK75, SK78 and SK90 yarn is the strongest fibre in our current range. Negatives in using Dyneema® are the slippery nature of the fibre and the tendency to creep, i.e. elongation under a prolonged load.

Rope may be susceptible to breaking under shockloading, however a common practice is to use a nylon shock absorber in a mooring system containing Dyneema.





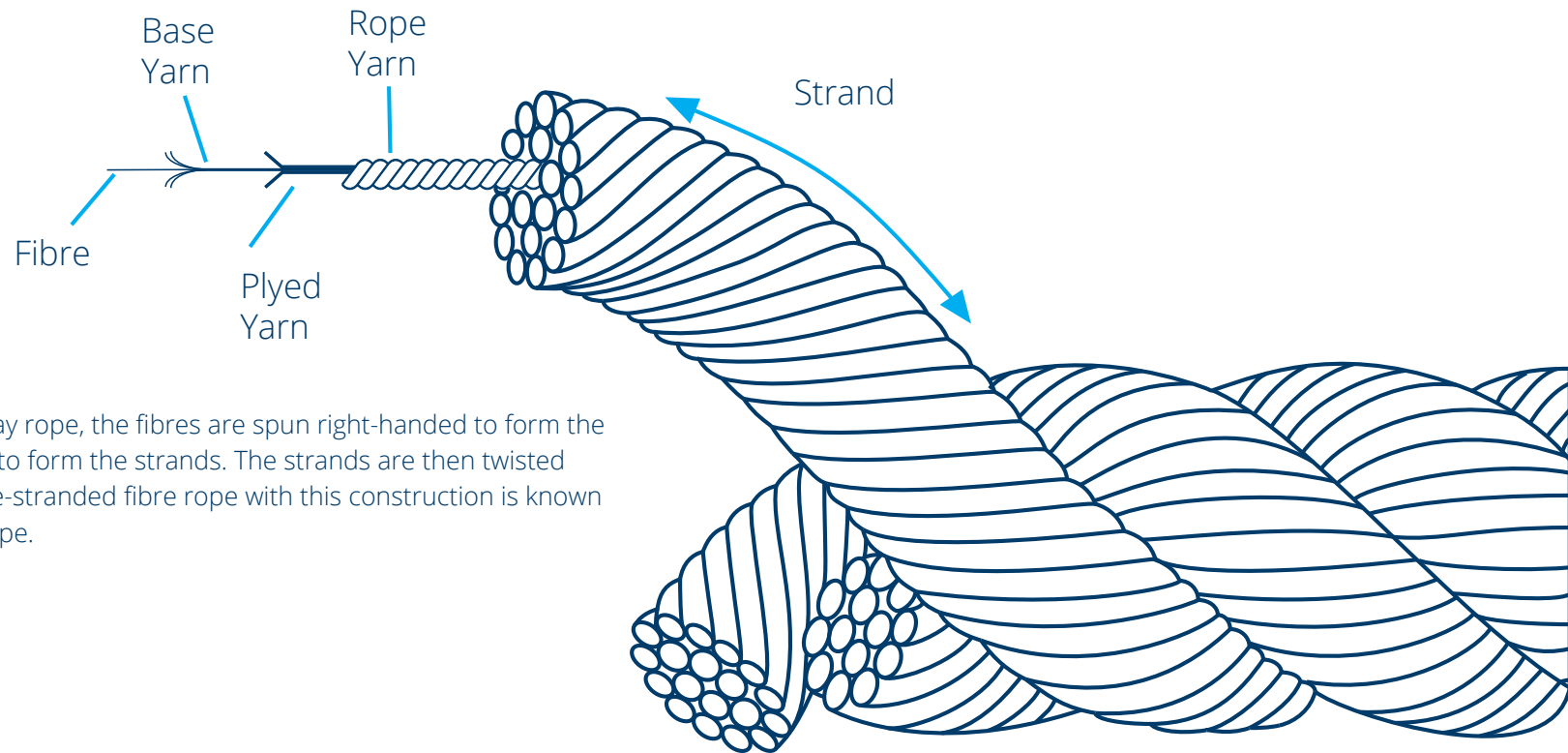
Rope Construction

UNDERSTANDING THE CONSTRUCTION OF FIBRE ROPE

Fibre ropes are made from natural or synthetic fibres of various lengths. The fibres are twisted together to form a yarn. This twisting process binds the fibres together in a way that they are held together by friction when the rope is subject to strain. The yarns are laid up to form a strand; the strands are then laid up to form a rope.

ROPE LAY

Rope lay refers to the way the strands are twisted together to form the rope. Ropes used in vessel mooring applications primarily use right-hand lay, plaited and braided ropes.



Right hand lay

In a conventional right-hand lay rope, the fibres are spun right-handed to form the yarns & the yarns twisted left to form the strands. The strands are then twisted right to form the rope. A three-stranded fibre rope with this construction is known as a right-hand hawser laid rope.

Rope Construction

Braided Ropes

Braided ropes are constructed by criss-crossing strands so that each strand passes alternately over and under one of the others to form a circular rope.

Double Braided Ropes

Double braided ropes or braid on braid ropes feature a braided core, covered by a braided sheath. This construction shares the total load between the core and the sheath and offers some benefits over right-hand hawser ropes;

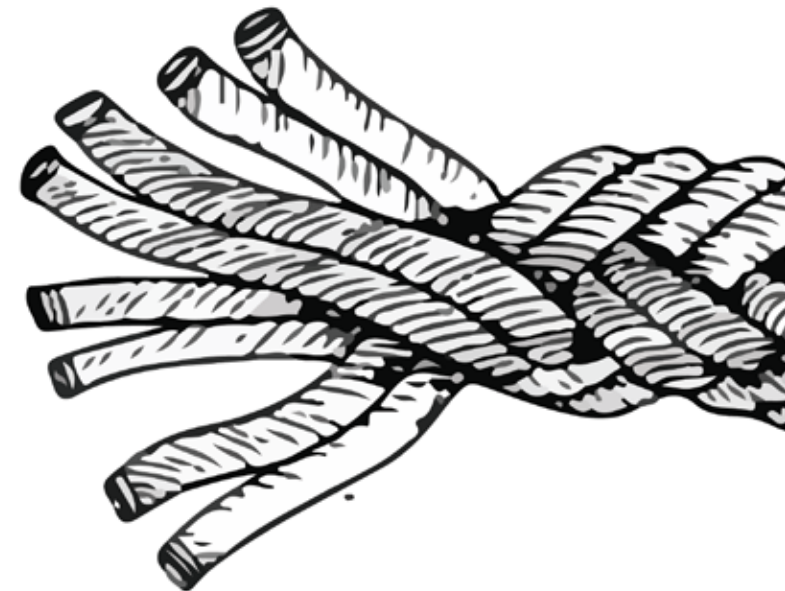
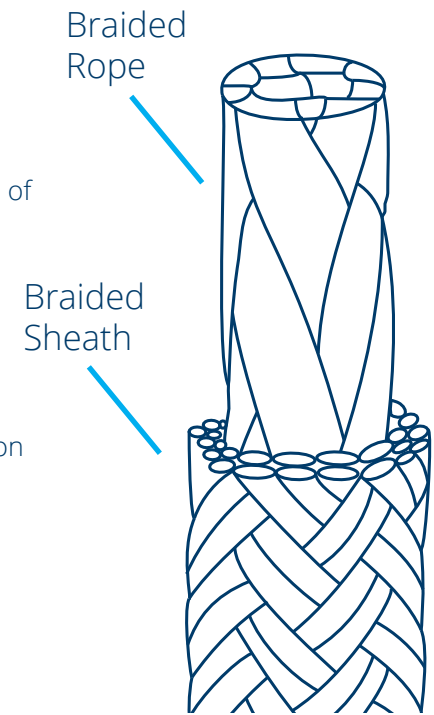
- ✓ Good flexibility
- ✓ Easy handling when wet or dry
- ✓ Non-rotation & kinking
- ✓ Even sheath wear

Regardless of sheath wear, the core in a double braid rope retains its original strength.

Plaited Ropes

Eight plait ropes consist of eight strands plaited in pairs, each pair passing over one pair and under the next. Four left hand lay strands' and four right hand lay strands make Multiplait a torque balanced construction. These ropes are easily terminated and the twisted strands offer good abrasion resistance.

The image to the right show how the ropes are plaited and the opposite strand lays that make up a plaited rope.

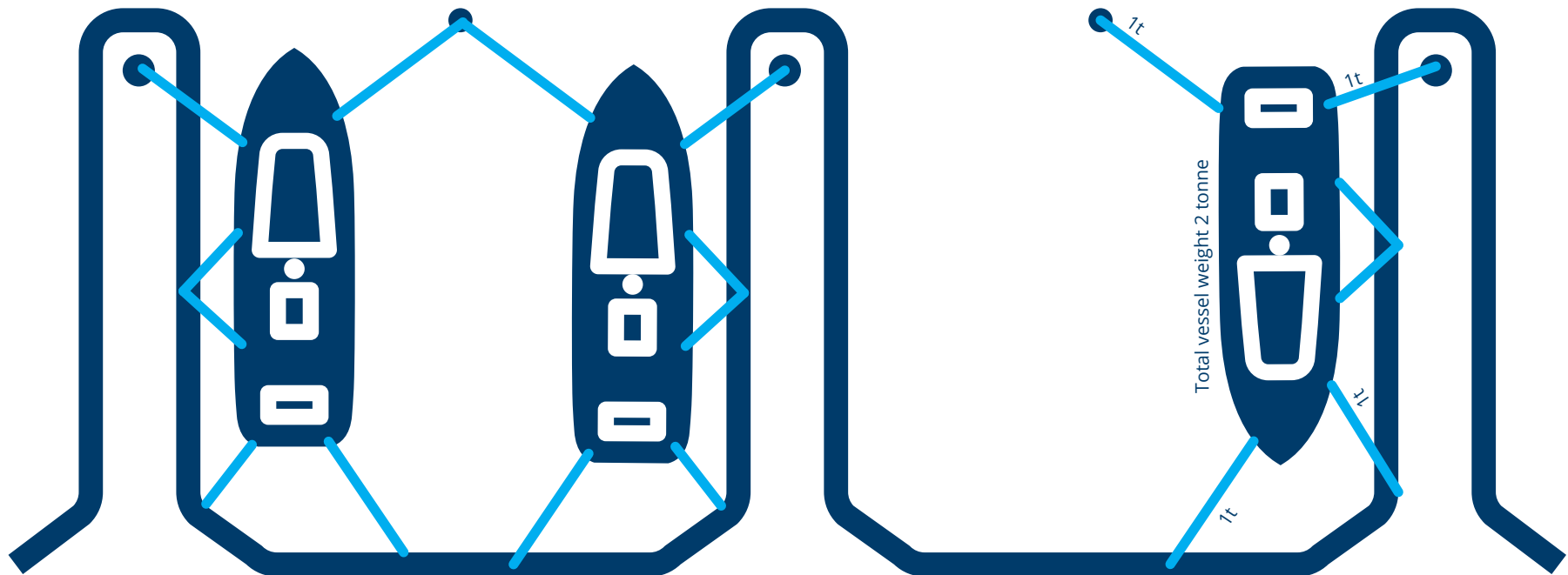


Breaking load

UNDERSTANDING BREAKING LOADS OF FIBRE ROPES

An essential factor when selecting a fibre rope for vessel mooring is the Breaking Load Limit (BLL) of the rope. The breaking load limit of fibre rope can be defined as the load at which the rope will break, or at which the rope will suffer damage (visible or non-visible) that will affect the performance & reliability of the rope.

In vessel mooring applications, Cookes recommend, when selecting fibre ropes for mooring lines that the total breaking load of your ropes = 2x the weight of your vessel. This will account for shockloading caused by tidal conditions and ensure the integrity of your fibre ropes.



Floating or Non-Floating

SHOCK LOADING

Shock loads are simply a sudden change in tension from a state of slack or low load to one of high load. Any sudden load that exceeds the break load by more than 10% is considered a shock load. Synthetic fibres have memory and retain the effects of being overloaded or shock loaded and can fail at a later time even though loaded within the Breaking Load Limit.

Nylon Ropes are ideal for situations where shock loading is an issue due to their elongation properties. However, this can lead to stretch of the rope over time and should be accounted for when using Nylon ropes.

BENEFITS OF FLOATING ROPES

There are a couple of distinct advantages of floating ropes vs non-floating ropes.

Handling of the ropes

Floating ropes are often lighter for the strength offered by non-floating ropes.
Less likely to end up in the propellers than non-floating ropes, during mooring.

Sinking ropes offer a softer handling, however their porous fibres mean the ropes sink and gather weight over time.



Conclusion

WHICH ROPE SHOULD I USE?

When selecting a fibre rope for a vessel mooring It is important to understand the conditions in which the vessel will be moored.

Is the marina or port prone to severe weather & tidal changes?

What are the rules of the local marina or port where my vessel is or will be moored?

How often will I be handling my ropes & will this effect my ability to properly moor my vessel.

This will allow you to identify what type of fibre rope will work best for your vessel.

WHEN TO USE NYLON

The properties of nylon fibres make it very well suited as a mooring line where severe weather, tidal fluctuations and heavy swells are prevalent. Its strength, elongation and abrasion resistance have given nylon a reputation for being a reliable and strong rope for most vessel mooring applications.

WHEN TO USE POLYESTER

Polyester ropes are a proven and reliable mooring rope for most conditions. Their abrasion resistance, UV resistance and good elongation properties make this rope a suitable choice for vessel mooring. Where there is severe weather or tidal fluctuations you may want to opt for Nylon, although Polyester is a very good all round rope for mooring.

WHEN TO USE POLYPROPYLENE

Polypropylene is an ideal solution where extreme or severe weather is not an issue - the lighter weight of the rope, its UV resistance and floating properties make this rope useful for where handling of the fibre rope is a priority.

Always ensure that the breaking load of polypropylene rope well exceeded what is required when using this type of fibre for vessel mooring, due to its tendency to weaken under shock loading.

WHEN TO USE DYNEEMEA

The strength, abrasion resistance and low elongation properties of Dyneema make this rope a solid rope for mooring application where you require little movement of the vessel.





contact@cookes.co.nz

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twitter.com/bridonbekaert

Head Office

Bridon New Zealand Limited
trading as **Cookes**

6-10 Greenmount Drive, East Tamaki
PO Box 14 422, Panmure
Auckland
0508 274 366
+64 9 274 4299

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contact@cookes.co.nz

0508 274 366
+64 9 274 4299

www.cookes.co.nz

BRIDON · BEKAERT
THE ROPES GROUP