

Splicebook

The expert's guide for professional splicing

Gleistein Ropes
The Perfect Line

The Perfect Line



Gleistein Ropes – connect with success







Wind, waves and weather – there is a hardly a better place to experience the true power of nature than on water. And it is this power that Captain Gleistein aspired to capture when deciding to manufacture ropes in Bremen.

Sailing has lost nothing of its appeal since the company was founded in 1824. And ropes from Gleistein nothing of their durability. The former outfitter of large sailing ships is today an internationally recognised specialist for all types of rope.

Anchors aweigh!
All raw materials, constructions and dimensions, every finishing technique as well as our entire know-how ensures you always obtain the best solution from us: Gleistein Ropes satisfies every rope demand in the area of water sports – from humble dinghies to the most extraordinary super yachts, professional racing yachts to old-timers, motor yachts to cruisers…

Our entire range of yachting ropes and useful practical information can be found at **www.gleistein.com.**

Get connected but don't tie the knot!
The best way to make a rope break faster is by tying a knot in it – as it is weakened by up to fifty percent. In contrast, a splice enables virtually the entire potential strength of the rope to be retained. That's why it is not only the best option from a technical perspective – at the end of the day it is also the most economical. There is an ideal solution for every construction, material and application. We can perform all splicing jobs you require.

With a bit of practice, skill and the right tools, you can also conduct this work yourself. This book will show you how: construction for construction, step by step. Come with us on a journey of discovery within the ropes!



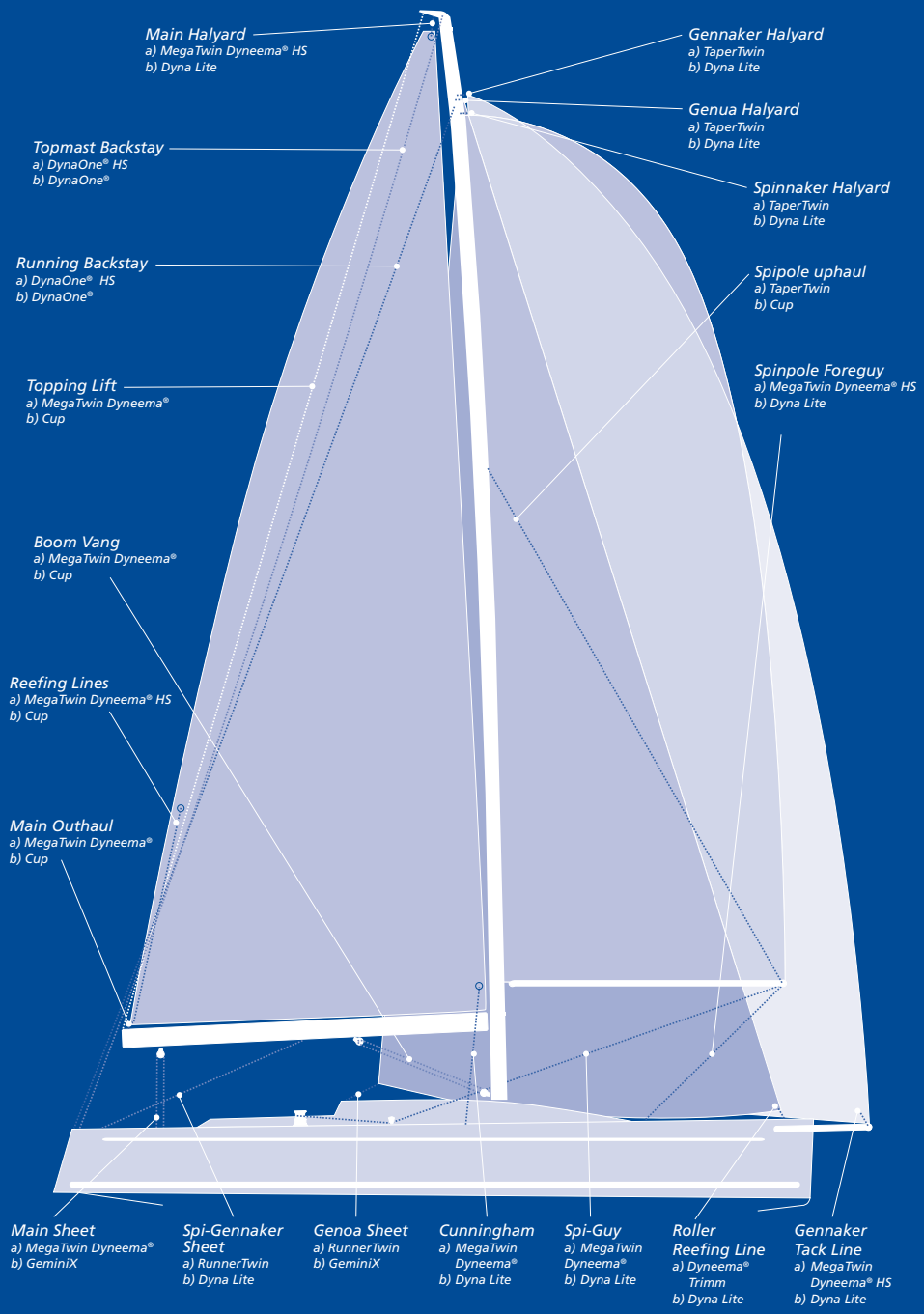


Know-how through practical experience: The RSC
Whoever splices looks beyond the surface of the rope. And for those wishing to find out more, Gleistein can provide first-hand information – at the RSC, the Rope Service Centre in Bremen.
Talk to us and make an appointment, watch as our master splicers weave their magic and take a look behind the scenes at our state-of-the-art production facilities.



The right rope

a) Racing b) Cruising
Our complete range of yachting ropes can be found at **www.gleistein.com**.



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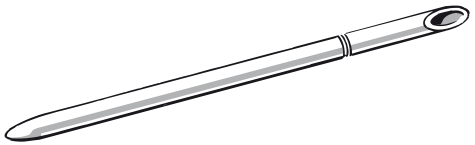
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Splicing tools and explanation of terms

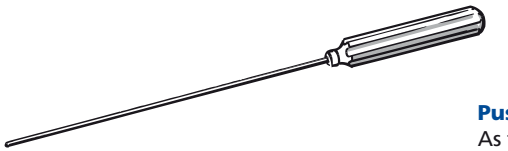
Tools

In order to splice, you'll need a pair of rope ends, patience and the right tools! These will vary according to the type of rope being spliced.
The splicing fid is a traditional tool to make openings beneath the strands of twisted or square plaited ropes.
Braided ropes are spliced using a fid and pusher. The fid works like a large sewing needle: it stiffens the rope end to allow it to be pulled through the braid more easily. Or even better: pushed – this is where the pusher comes into play.
The further tools retain the same function irrespective of the rope being spliced.
You can order our high quality splicing tools at all well stocked Gleistein Ropes dealers.



Fid

There is a different fid for every rope diameter (6mm or above). Its size is engraved on the tool. The fid is also a handy measuring tool. A fid that varies in size to the rope diameter is required in a small number of splice types.



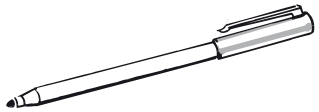
Pusher

As the name implies, the pusher pushes the fid and the rope end through the braid. Two sizes are generally available: one for small ropes up to 12mm diameter and another for thicker ropes.



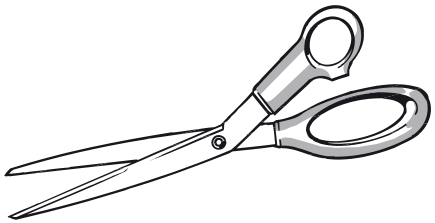
Tape

Smooth, elastic tape is extremely useful while splicing – mainly for quickly ensuring that the rope ends don't fray.



Marker pen

Felt-tipped pens are generally the most suitable.



Scissors

Sharp scissors will make your work much easier. Unfortunately, all types of synthetic fibres tend to dull metal scissors very quickly. As such, ceramic scissors are a good choice. Some riggers also use wire cutters, which have been proven to work well.
In the case of natural fibre ropes, a sharp knife may suffice for cutting.

Whipping twine, sewing needles, sailmaker's palm

Whipping twine is available in waxed and unwaxed versions. Sewing needles are required for e.g. sewn whipping. The sailmaker's palm helps when needing to sew through hard lines.

Winch / rigging bench

Sometimes it is helpful to use a winch for the final closing of a braided rope splice. It ensures the correct tensioning of the core of the rope over which the cover is to be milked.



Splicing fid

A spike with a conical or shovel-like grooved tip with which openings can be driven or levered between strands of twisted or square plaited rope. The splicing fid belongs to "standard issue" equipment of every splicer.

Explanation of terms

The instructions in this book should be comprehensible within the given context. Several terms appear repeatedly:

Fid length / short fid length

The length of the fid is standardised for every diameter and serves as a "growing" unit of measurement. The length from the back section of the fid down to the marking groove is a further unit of measurement: the short fid length.

Slack

Bunched up braiding that can be moved (milked) back over its core or back-spliced rope end.

Milking

The act of unbunching the slack.

Tapering

Reducing the thickness of the rope's cross-section over a particular length (in order to obtain an even thinning out along the splice zone).

Heat sealed point

A rope end that has been subsequently sealed through melting or cut using a heat-cutting knife.

Twin

In all double braid constructions, the braided core and surrounding cover share the load. Nevertheless, these twins are not equal.

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***GeoTwin* – high-strength double braids**
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***Cup* – Parallel core braids**
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MegaTwin – high-modulus double braids

E.g. RunnerTwin, MegaTwin Dyneema® HS, MegaTwin Dyneema®, MegaTwin T4, MegaTwin Vectran®, TaperTwin, Dyna Lite, Caribic Color

Eye splice

TaperTwin stripping instructions

Our high-modulus double braids are called MegaTwin. They feature a sophisticated construction and can take on extreme loads. The load-bearing high-modulus core boasts break loads and stretch characteristics that can exceed those of steel wire rope. An intermediate cover is often integrated to increase friction and improve the transfer of power with the protective cover to enable use in stoppers.

This chapter represents the master class of splicing. But with care and a bit of practice, the following techniques will let you create splices that enable the entire performance of the rope to be retained. And this means you will be in the position to make your own, highest quality, halyards, backstays, guys and traveller lines.

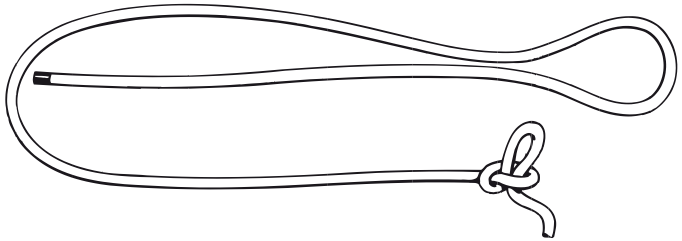
TaperTwin represents a special case: the core made with Dyneema® retains its cover only in the lower section – where it is handled and guided through fittings. The stripping instructions (p.14) provide detailed information on what needs to be done with the crossover section.



MegaTwin Vectran

Eye Splice

1.



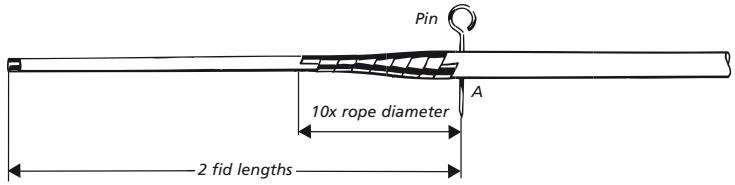
Preparation

Secure the rope end with a layer of tape. Should the end be heat sealed, cut off the end first. Most MegaTwin ropes incorporate a white intermediate cover made of staple fibres, to create friction between the core and cover to help avoid slipping during deployment with stoppers. This intermediate cover must be removed completely in the splicing area. To do this, remove the tape from the rope end and pull out around six fid lengths of the core.

Cut away the intermediate staple fibre cover at this point completely and pull it away from the core. NOTE: take special care not to damage the core during this step!

The staple fibre cover end must now be firmly secured to the core using a thin layer of tape. The cover is next milked back to the end of the rope and also secured with a layer of tape. Tie a slipknot into the rope at a distance of around six fid lengths from the rope end.

2.

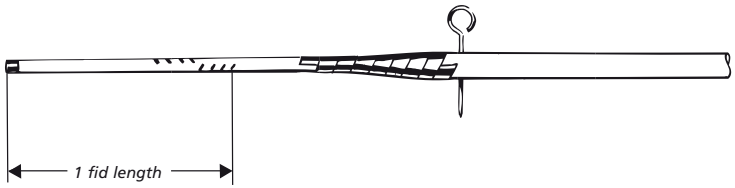


Shortening of the cover and fastening of the end of the cover

Sever the cover one fid length from the rope end and remove. Special care must be taken to ensure the core is not damaged in the process! Now, move the cover on the core in such a way that a space exists on its inside, which can later take up the back-spliced end of the tapered core.
Next, make a mark half a fid length from the end of the cover. Pull the cover back until the mark is two fid lengths away from the core end.
Fix it here by pushing a pin, awl, thin fid, etc. through the rope. This is now point “A”. The remaining cover from point “A” is unravelled over ¾ its length and tapered. This involves progressively cutting away half of the unravelled braided yarns in stepped manner. Now, starting from point “A” wind tape around the cover tail until it is securely fastened to the core.

It is important to only wind one layer of tape around the rope section to ensure it does not get too thick.

3.

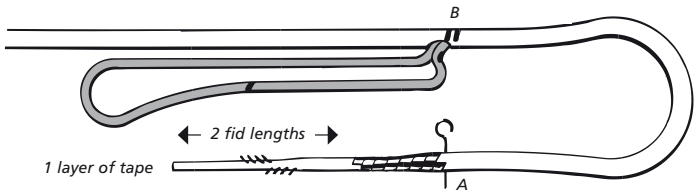


Precise tapering of the core end

This step is decisive for the strength, quality and appearance of the splice.
First, a layer of tape is wound around the core end.
The braid will consist of either single, dual, three-fold or four-fold yarns. Over a length of the rope, this braiding must be exactly halved. Tapering commences one fid length from the core end. Start by tapering in one braid direction first, e.g., braids running in a clockwise direction.
If the braid consists of single yarns, each second yarn is to be cut and pulled out of the core end – in the case of a 12-strand braid, three yarns per braiding direction. If the braid consists of two parallel yarns, one of each is to be cut and pulled out – in the case of a 12-strand braid this means, of course, six yarns per braiding direction.
If the braid consists of three yarns, two are cut and removed in the first braid then only one in the next, and so on. Once all the yarns have been halved in one direction, the procedure is then repeated in the other direction (e.g. anticlockwise).

A detailed depiction of this procedure is shown on page 45 in the chapter: "One – hollow braids"

4.

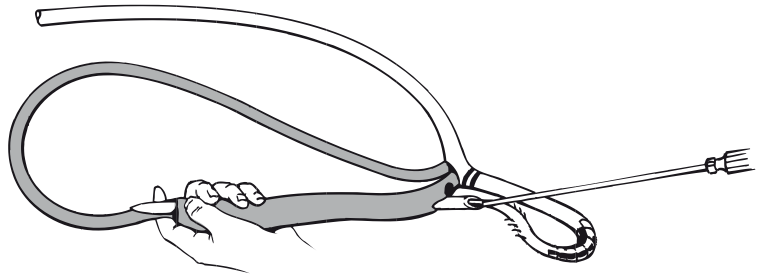


Measuring the eye and extracting a loop of the core

Form the eye to the desired size directly adjacent to point "A" and complete it at point "B". Fix this point with tight layer of tape or by using another pin – this is important, as there should be no cover-core slip during the next steps.
Now, the cover braid must be opened at point "B". This may be quite difficult to begin with, particularly in the case of tightly braided covers such as with MegaTwin ropes. Bend the rope sharply, ease the yarns apart using a tool (e.g. a pusher, fid or pin) to make an opening in the cover braid through which a loop of the core can be extracted from.

Pushing the tip of the fid under the yarns and rotating it until the yarns curl up slightly can help loosen the yarns and create sufficient slack in order to make an opening in the braid.

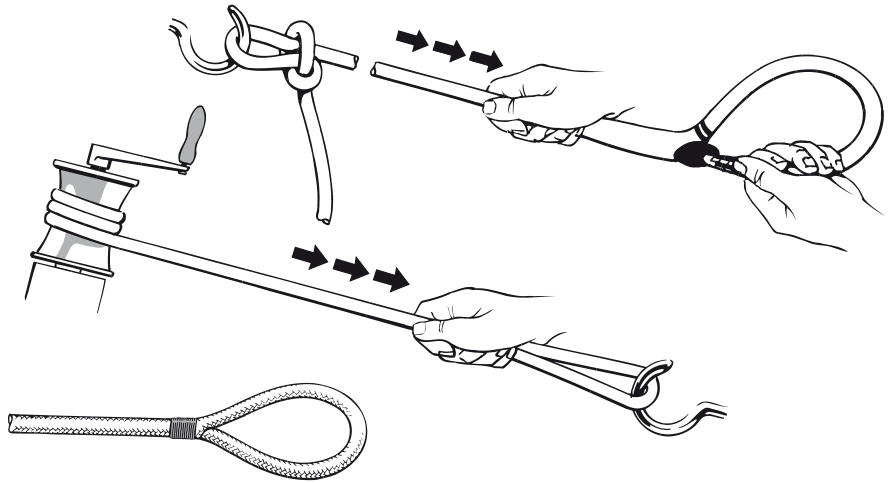
5.



Splicing of the core end into the core

The fid is introduced into the core loop directly behind point "B". As much braid as possible should be pushed onto the fid before it re-emerges.
The core end is then placed into the fid bore and pushed through the core loop by the pusher until the entire tapered core and cover end disappear into the loop.
The core loop should then be smoothed down to swallow any remaining exposed tapered core.

6.



Finishing off

Attach the slipknot to a hook and milk the slack of the cover over the core loop. At first this is relatively easy but becomes progressively more difficult as the core must also accommodate the rope end making it thicker and causing the cover to resist – which can result in the core loop bunching up. In such instances, attach the (incomplete) eye to a hook and the rope end on a winch, for example, to allow you to use more force to pull the remainder of the core loop into the rope.
Should a thimble need to be spliced into eye, it should be inserted shortly before the final pulling together to fix the thimble firmly in the eye.

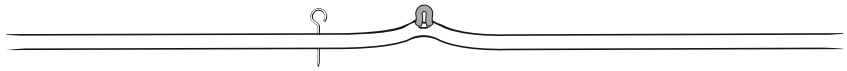
MegaTwin – TaperTwin stripping instructions

Regatta performance made to measure: light as a feather at the sail, grippy in the hand and protected in the stopper. TaperTwin is a sophisticated MegaTwin variety that is especially made for weight-optimised deployment – the cover only remains on the rope in the sections where it is required for handling on board.

The high performance, heat-set core made of Dyneema® therefore comes with its own thin protective coating.

With this splice, the fid size corresponds to the core diameter.

1.



Preparation
To begin, choose the exit point where the core is to be extracted from the cover braiding. This will be individually determined by the given situation on board. It should be taken into account that:

- the core behind the crossover point must take up the tapered cover end and that the section of rope with the removed cover will reduce in length by two times the rope diameter
- a splice that is made later at the end of the rope will significantly shorten its overall length. It is therefore recommended to conduct such a splice first.

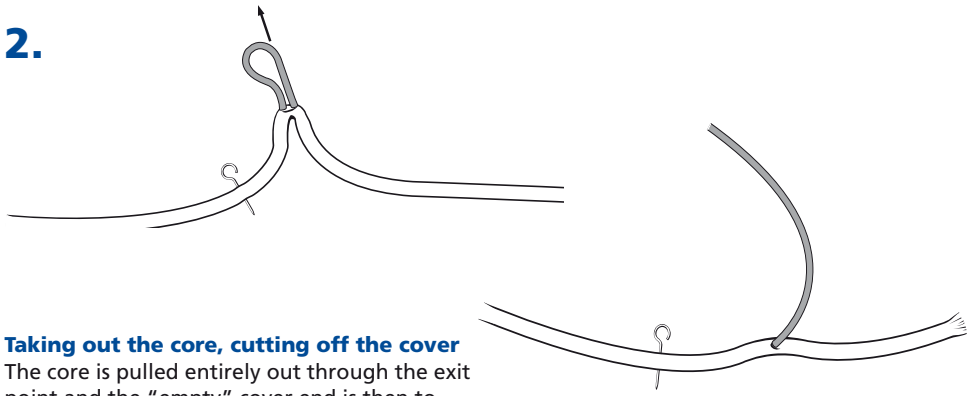
Place a pin one fid length from the exit point to ensure there is no core-cover slip.
Bend the rope sharply at the exit point to help retrieve the core.

The correct splice techniques for the Dyneema® core can be found in the chapter "One – hollow braids" from page 42.

MegaTwin
High-modulus double braids

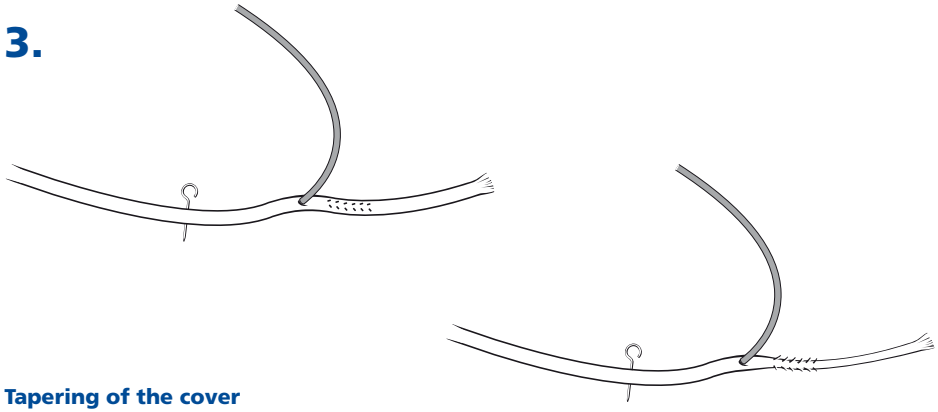
TaperTwin
Stripping instructions

2.



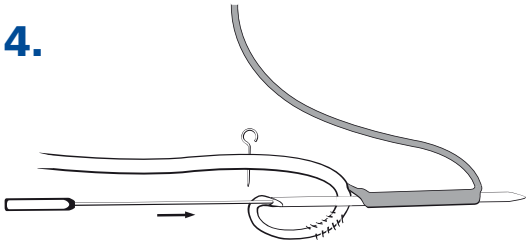
Taking out the core, cutting off the cover
The core is pulled entirely out through the exit point and the "empty" cover end is then to be cut off one fid length from the exit point.

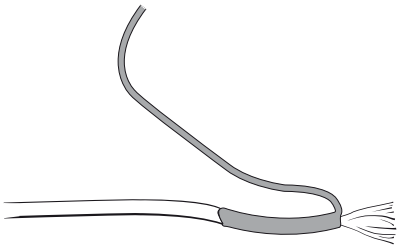
3.



Tapering of the cover
The cover will now be tapered, starting one to two rope diameters away from the exit point. For best results, proceed as follows: mark every second 2x12 or 2x16 strand pair, cut these through and then pull out the strand ends. This results in the cross-section of the cover being exactly halved without destroying the rope structure.
Secure the end with a firm layer of tape.

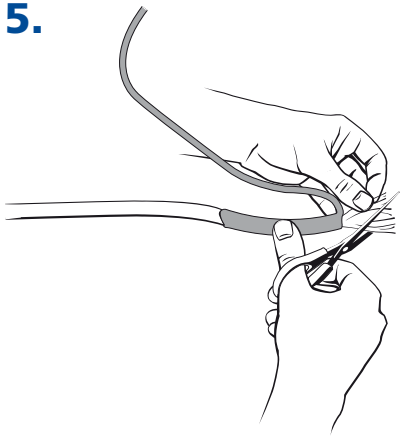
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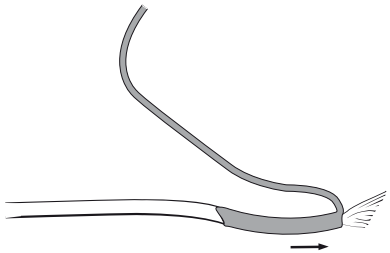


Inserting the cover end into the core
From the point where the cover and core are secured together with a pin, smooth out any slack in the cover that may be present. Insert the fid into the core at the exit point as far as possible before it re-emerges. The cover end is then placed in the fid bore and pushed through the core tunnel using a pusher.

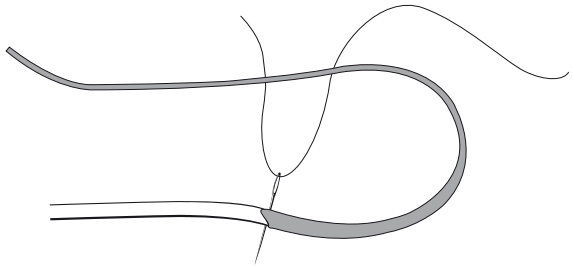
5.



Cover end disappears into core
Before the cover end disappears completely into the core, remove the tape and cut off the bundle of fibres diagonally. Smoothing out the residual slack will ensure the cover end will become completely engulfed in the core.



6.



Finishing off
It is imperative to finish off the splice with stitched whipping at the exit point to ensure that the cover does not come loose during deployment. Four whippings will provide sufficient stability at the transition point.



GeoTwin – high-strength double braids

E.g. Gemini X, Tasmania, Harkon, Standard, DockTwin, Bavaria, GeoTwin Polyester, GeoTwin Polyamide

Eye splice

End-to-end splice

Endless splice

Back splice

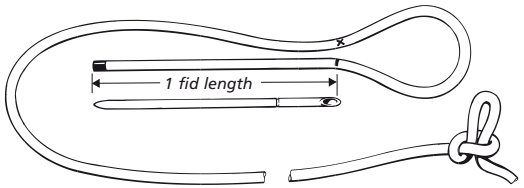
A round cover is braided over a braided core in this type of construction. The result is a strong, compact rope with a round cross-section, where the core and cover share loads equally. Depending on the choice of materials and type of braiding, the GeoTwin construction can be tailored to suit virtually any application on board. It has established itself as a reliable and economical solution in the area of water sports like no other construction.
When spliced, the strength of the core and cover must be effectively implemented. On the following pages, we will show you exactly how this is done.



Gemini X

Eye splice

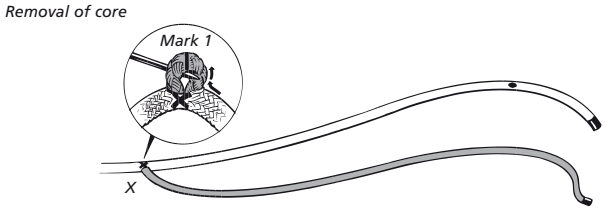
1.



Preparation
Secure the rope end with a layer of tape. If applicable, cut away any heat sealed rope ends.
Place a clear dot one fid length from the rope end. Use this point as the starting position for forming the eye to the required size and then place an "x" at the corresponding point on the other side to denote the eye's end.

Should a thimble need to be inserted, remember to take this into account when measuring out the eye. Tying a slipknot around five fid lengths away from "x" will ensure there is no slippage between core and cover in the rest of the rope during splicing.

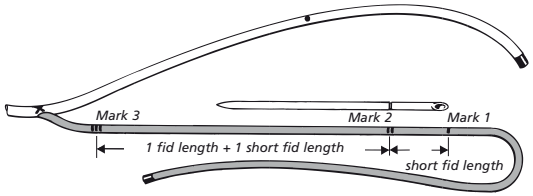
2.



Removal of core from cover
Bend the rope sharply at point "x". Push the cover yarns carefully to the side using the tip of a pusher or fid so that a hole forms in the braiding. Use the tip of the pusher to pull out the core slightly and make a mark on it (Mark 1).

Following this step, remove the core entirely from the cover and secure its end with a layer of tape.

3.

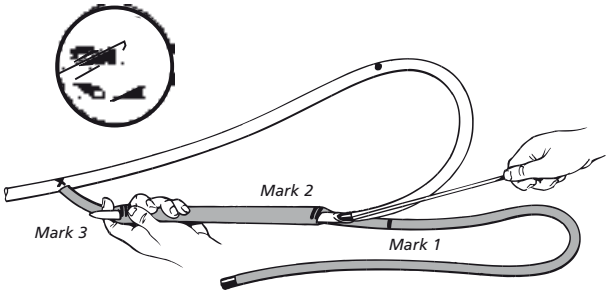


Marking the core

More of the core is now extracted from the cover in order to make additional markings. The fid serves as the measurement tool, with the back section of the fid down to the circumferential groove representing the short fid length.

Starting from Mark 1, measure a short fid length to determine and mark the location of Mark 2. Next, make a mark (Mark 3) one full fid length plus one short fid length away from Mark 2. It may be helpful to denote the various markings by drawing a corresponding number of rings around the rope circumference.

4.

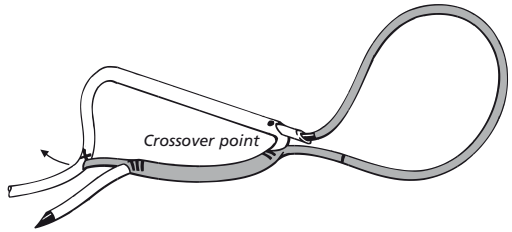


Pushing the cover through the core tunnel

Secure the cover end with a layer of tape and then taper the end to a point using a knife or pair of scissors.
Introduce the fid into the core at Mark 2 and exit at Mark 3.

Place the tapered cover end into the fid bore and use a pusher to push it through the tunnel until it reaches the other end at Mark 3. Here, pull the cover end out a little further.

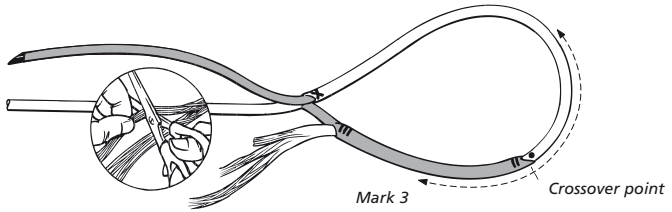
5.



Pushing the core end through the cover

As shown in the diagram above, the core end must now be guided through the cover – between the dot made in step 1 and the opening marked with "x" (or more precisely, around one rope diameter behind the "x"). To do this, insert the taped core end into the fid's bore and secure it there with a layer of tape. The fid is then introduced into the core at the dot – this is called the crossover point, where the positions of core and cover are switched. The fid should then re-emerge one rope diameter behind the mark "x" and the core end should be pulled out so far that the core loop disappears completely in the cover.
The crossover point is pulled closed using the loose cover end.

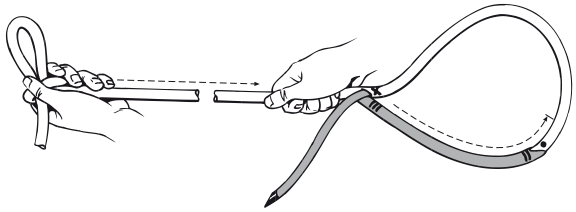
6.



Tapering the cover end

By tapering the cover end you not only make the splice look better, you also increase its strength. Begin by removing the tape at the end. Next, unravel the cover braid as much as possible and cut it in a stepped (diagonal) manner. Now, hold the rope at the crossover point and milk the slack out of the core. During this process the cover end will disappear into the core. After this, milk the slack out of the cover until the cover braid is taut again.

7.

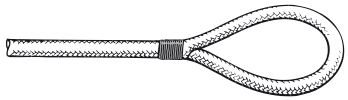


Milking the cover down over the core

The cover is now milked down over the core from the slipknot side. The core will disappear into the cover at the crossover point. The loose, superfluous core end is then cut off and by pulling on the splice eye the rope is then smoothed down.
If you are having trouble getting the cover to "swallow" the core and the splice zone, try one or more of the following tricks:

- If you hang the slipknot over a hook you can generate more power to push the cover back over the core.
- A hook will also give you an extra free hand. It therefore simplifies the task of holding the eye taut while milking the core into the cover.
- It sometimes also helps to complete the procedure in several smaller operations rather than just one.
- Moving the rope to and fro in the area around the crossover point can also help as the yarns give more easily under changing loads.
- It is possible for the core to bunch up at the crossover point and hinder the "swallowing" process. In such cases, simply brush the cover back in the direction of the slipknot and repeat the step.

8.



Finishing off

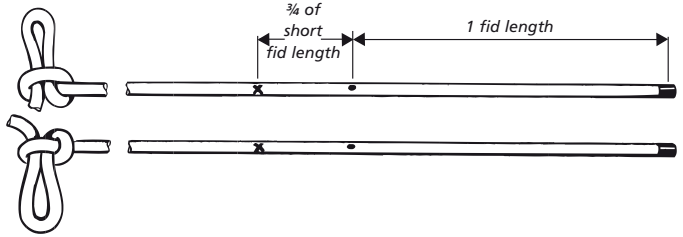
The splice should now look like the illustration above. We recommend you perform some simple whipping of the eye at the crossover point. Don't be alarmed if a "hollow" area is visible because the core end was cut off too close – this is merely an aesthetic issue and does not reduce the strength.

End-to-end splice

Due to the nature of its equal load-bearing characteristics between cover and core, the GeoTwin construction principally enables two different methods for joining together two ends of rope without losing strength.
In the technique shown below, a thickening remains around the splice zone, which tapers off harmoniously into the rope.

However, if the rope is used on rollers, it could jam at these points. For this reason, the end-to-end splice is less suited for creating endless slings. An endless splice should rather be used for such purposes (refer to page 28 onwards).

1.



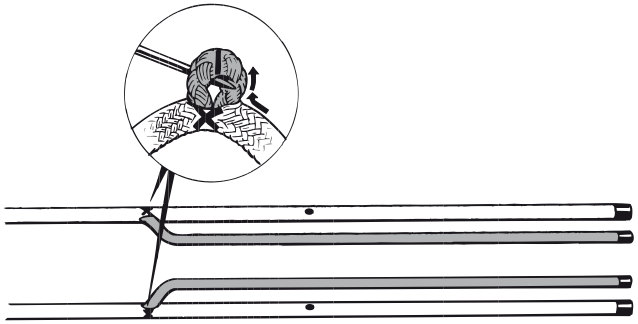
Preparation

Secure the rope end with a layer of tape. If applicable, cut away any heat sealed rope ends.
The same measurements must be made on each rope. Make a clear dot one fid length from the end of each rope – this will later become the crossover point. Next, place an "x" at ¾ of a fid length from the dot.

Tying a slipknot approx. five fid lengths away from the "x" will ensure there is no slippage between core and cover in the rest of the rope during splicing.

In the end-to-end splice, all steps are carried out equally for both ends of rope.

2.

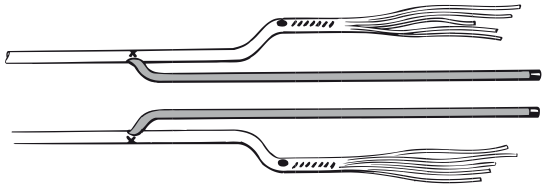


Taking the core out from the cover

Bend the rope sharply at point “x”. Push the cover yarns carefully to the side using the tip of a pusher or fid so that a hole forms in the braiding.

Use the tip of the pusher to pull out the core slightly and make a mark on it (Mark 1). Following this step, remove the core entirely from the cover and secure its end with a tight layer of tape.

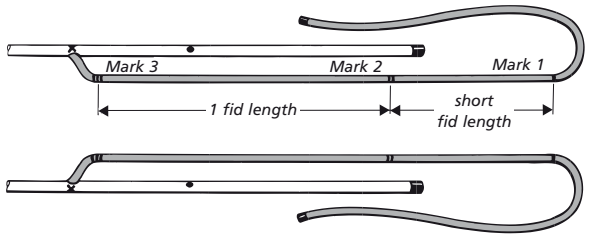
3.



Tapering the core and cover ends

a) Simple method

Taper the core end by cutting off the taped end diagonally. Tapering the cover end, meanwhile, is done as follows: commencing from the dot made in step 1, count seven yarn pairs towards the cover end. Now, unravel the cover end braiding until this point and then cut the yarns off in a stepped manner. The tapered and unravelled cover end should now be well secured with tape.



b) Precise method

This method of tapering involves halving both core and cover ends exactly. This ensures the splice zone will be finished very aesthetically. Commence by pulling the core out further from the cover and securing its end with a layer of tape.

Next, starting from Mark 1, measure a short fid length to determine and mark the location of Mark 2. Next, make a mark (Mark 3) one full fid length away from Mark 2. It may be helpful to denote the various markings by drawing a corresponding number of rings around the rope circumference.

The braid will consist of either single, dual, three-fold or four-fold yarns. Over a length of the rope, this braiding must be exactly halved. Tapering commences one fid length from the core end and develops between Marks 1 & 2. Start by tapering in one braid direction first, e.g., braids running in a clockwise direction.

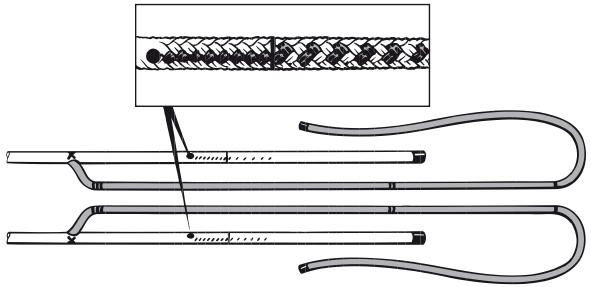
If the braid consists of single yarns, each second yarn is to be cut and pulled out of the core end – in the case of a 12-strand braid, three yarns per braiding direction. If the braid consists of two parallel yarns, one of each is to be cut and pulled out – in the case of a 12-strand braid this means, of course, six yarns per braiding direction.

If the braid consists of three yarns, two are cut and removed in the first braid then only one in the next, and so on. Once all the yarns have been halved in one direction, the procedure is then repeated in the other direction (e.g. anticlockwise).

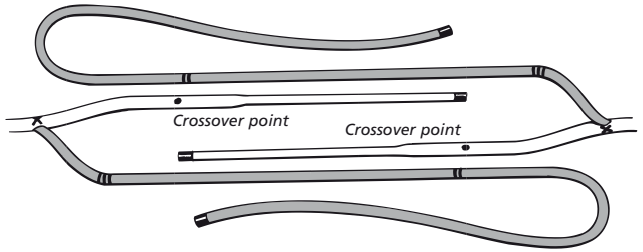
A detailed depiction of this procedure is shown on page 45 in the chapter: “One – hollow braids”

Follow a similar procedure with the cover end: to determine the starting position of the tapering zone, count seven yarn pairs from the dot made in step 1. The cover is halved by cutting and removing every second yarn from each pair of yarns. In a 24-strand braid, for example, there will be 2 x 12 yarns.

Alternatively, you may also cut and remove each second yarn pair – as alluded to in the illustration below. With this method 2 x 6 yarn pairs would be cut and removed in a 24-strand braid.



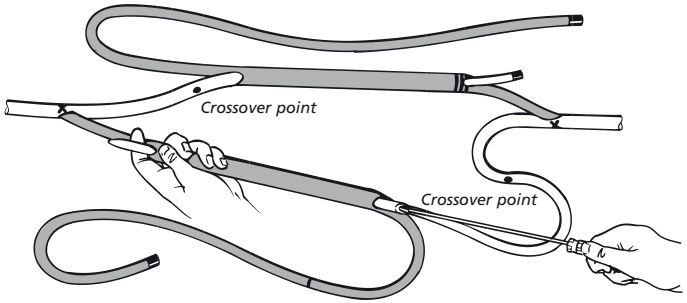
4.



Bringing the ropes into the splicing position

After both rope ends have been tapered in the same manner, place the ropes into the splicing position as shown in the illustration. Should you be splicing a continuous sling, be sure to check that the rope is not twisted.

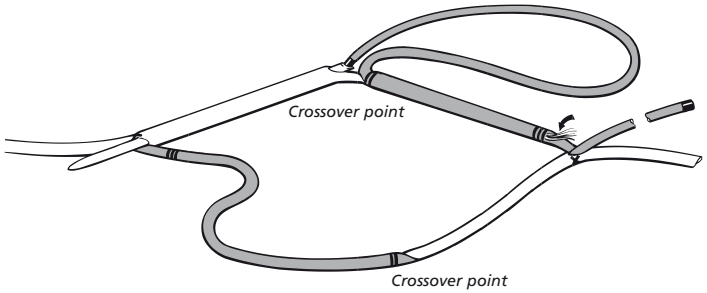
5.



Feeding the cover ends through the core

Introduce the fid at Mark 2 into the core and exit at Mark 3. Now, put the cover end of the second rope into the fid bore and feed it through the core using the pusher. Pull it out so far that the crossing point is still just visible. Proceed in the same manner for the other rope.

6.

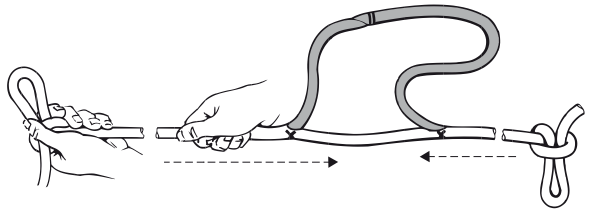


Feeding the core ends into the cover, pulling in the cover ends

Insert the fid into the cover approx. one rope diameter from the crossing point and push through the cover until approx. 3–4cm beyond the “x”. Next, place the core end into the fid bore and feed it through the cover using the pusher. The respective ropes now cross each other at the crossover point and Mark 2. Now, carefully pull on the rope ends to allow the intersection to settle. Avoid pulling in any lumps in this process!

Hold the first intersection point in your hand and stroke the core from there until it is smooth and even. In this process, the core will swallow the cover end. Next, the cover is stroked smooth and even from the crossover point to ensure that the core attains the correct position.
Repeat the procedure for the other rope.

7.



Finishing off

Hang one of the slipknots over a fixed hook. Now, grab the corresponding core around the area of the crossover point and hold taut. Use your other hand to milk out any bunched up cover in the splice zone. First, Mark 3 will disappear and then the crossover point at Mark 2. Hang the other slipknot over the hook and repeat the process. The hole will gradually but surely begin to shrink until it almost slips together completely.

Should all tapering have been completed in accordance with the precise method as outlined in step 3, the cover openings will push against each other snugly.
Cut off the core ends close to their exit points. We recommend to complete the splice with sewn whipping.



Endless splice

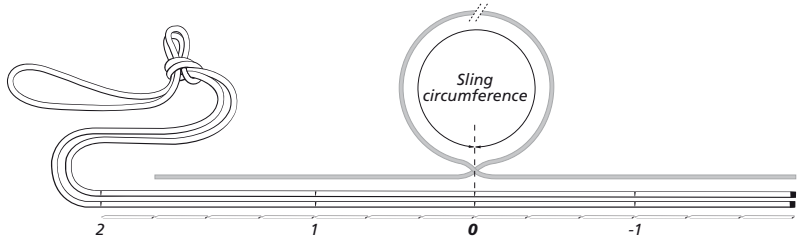
With all conventional splicing methods, it is common for the splice zone to be thicker than the remainder of the rope to compensate for the loss of strength due to the uncontinuous fibre strands. This means that in situations where rope is run through roller guides a spliced rope is unsuitable – until now that is!

The technique presented on the following pages makes the impossible possible: no thickening, no loss of strength. Yarns are unravelled and run parallel in the relevant sections of the splice zone meaning that more fibres can be taken up in the same space.

Skill and experience is required to master this technique. But the effort is worth it. It enables the creation of reliable, durable high-quality slings that can be deployed in modern endless mainsheet and foresail systems, for example.

With this splice, the fid size corresponds with that of the core diameter (e.g. 12mm rope = 8mm core = 8mm fid). The reduced fid size is also already taken into account in the measurements. As the splice zone is very long, comprising many fid lengths, it may be helpful to calculate dimension-relevant measurements into absolute measurements.

1.



Preparation

Define the total circumference of the sling and mark the end/start point with two "0" markings. These will comprise the crossover point where the rope ends will be introduced into one another later. On each side of point "0", add a splice allowance of six fid lengths (make sure you have read the important note above regarding the fid size!). Tape off both rope ends and cut off any heat-sealed ends, if applicable.

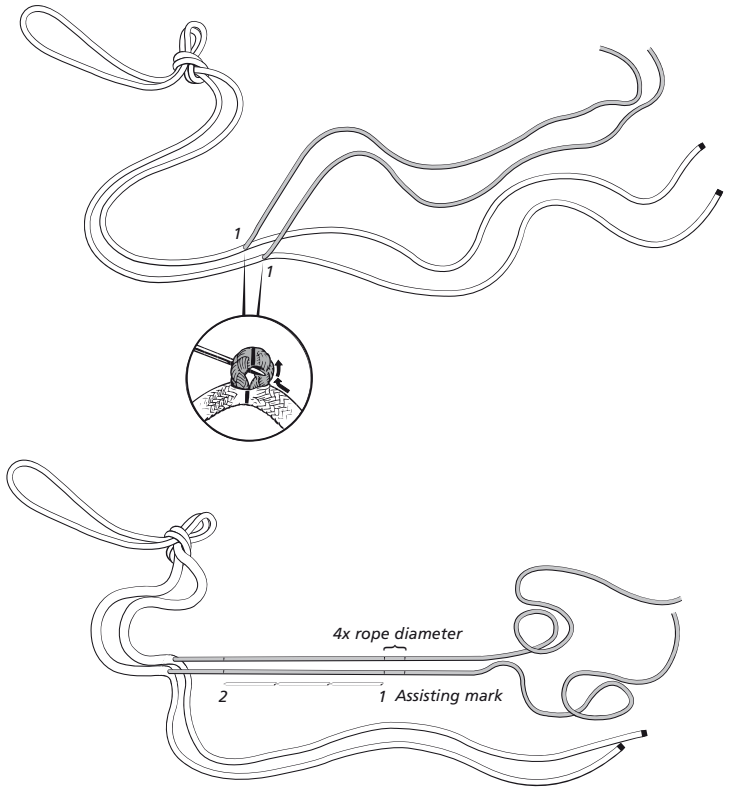
Now, from point "0", make the following markings:

- "-1" three fid lengths in the direction of the rope end
- "1" three fid lengths in the direction of the sling
- "2" seven fid lengths in the direction of the sling

Tying a slipknot approx. 12 fid lengths from point "0" will ensure there is no slippage between core and cover in the rest of the rope during splicing. As the illustration shows, this can be done for both rope ends together. It is crucial to ensure the rope sling is not twisted.

In the endless splice, all steps are carried out equally for both ends of rope.

2.



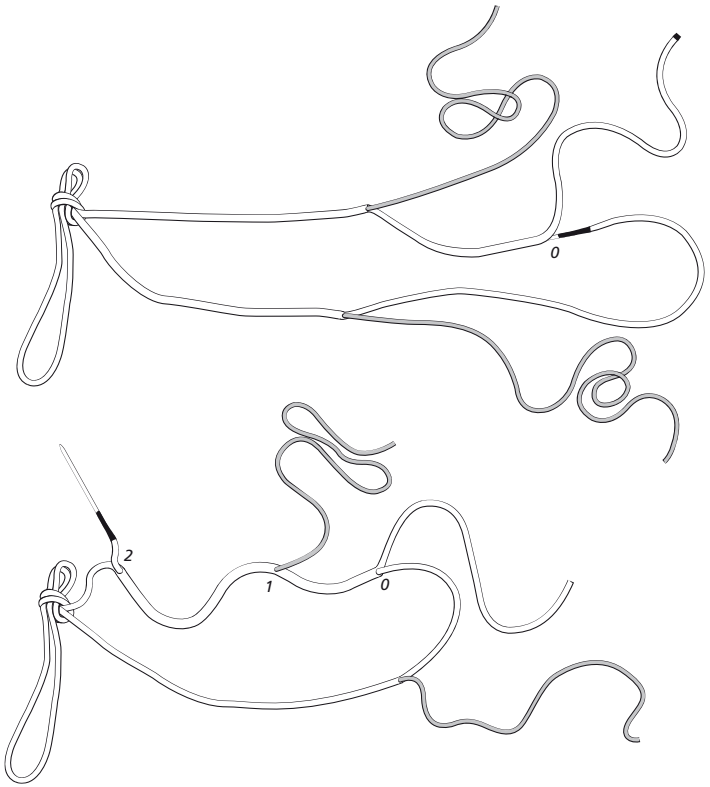
Taking out and marking the core

Bend the rope sharply at point "1". Push the cover yarns carefully to the side using the tip of a pusher or fid so that a hole forms in the braiding. Use the tip of the pusher to pull out the core slightly and place an assisting mark at this point.

Next, pull out the core completely and push the cover up along the core in the direction of the slipknot. Make the following additional markings on the core:

- "1" four rope diameter lengths from the assisting mark
- "2" three fid lengths further

3.



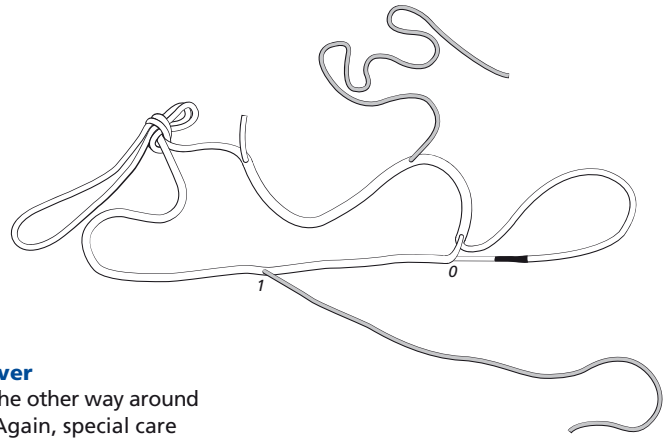
Pulling in the first cover

The rope ends come together in this step. It is crucial to ensure that none of the rope twists. Even if the "rest" of the rope was secured with a joint slipknot, special care must still be taken to avoid twisting in the splice zone.
Insert the cover end of one rope into the fid bore and secure firmly with tape. It is important to ensure a smooth transition from the fid to the rope so that the tape does not get caught while being pulled through. The fid must then be inserted at point "0" of the opposite end. It will reach the core of the other cover at point "1". Special care is required here to ensure that you do not pierce the cover of pick up any yarn loops! From here on, the fid must share the bunched up cover with the core.

Pulling the protruding end taut every now and again will help ensure that the core remains as thin and smooth as possible. Exit the fid out of the cover at point "2".

The pusher is unsuitable with this splice as it is quite simply too short! The fid is moved by bunching up the outer core and then pulling it through within the rope.

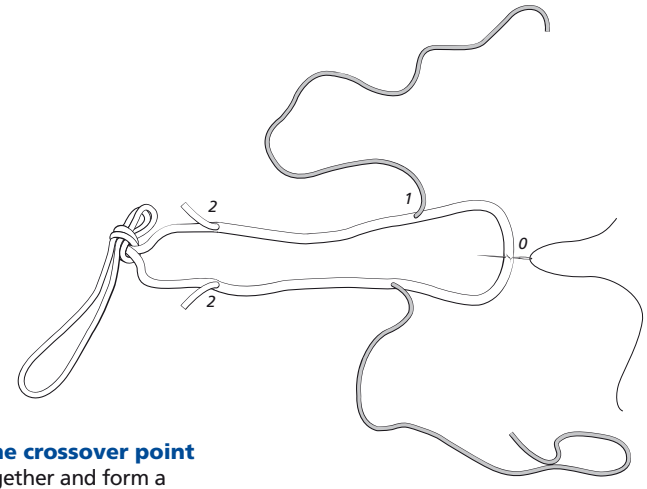
4.



Pulling in the second cover

The procedure is repeated the other way around for the second cover end. Again, special care is required to avoid twisting. Any twist gets pushed along the rope and will cause the cross-over point (point "0") to close and therefore result in a blockage.

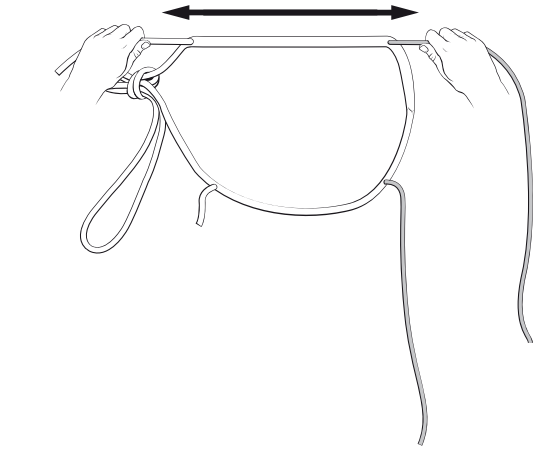
5.

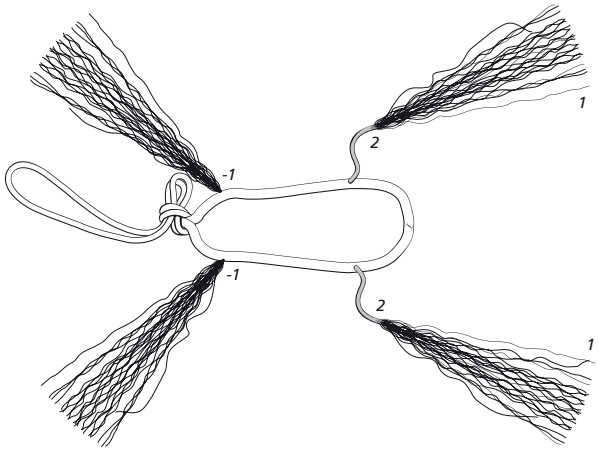


Closing and securing the crossover point

The "0" points will pull together and form a common crossover point by stroking out the cover slack in the surrounding material. This area should be secured with a small number of flat stitches to impede movement later.

6.



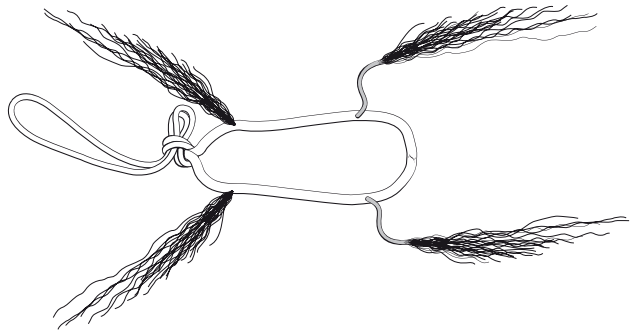


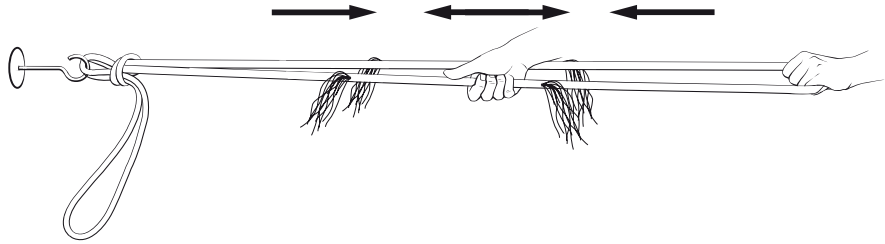
Tapering of core and cover ends

The protruding cover ends must now be pulled out to the position until point “-1” can be seen at the exit point. Be patient if the material behaves stubbornly in this process. Pulling simultaneously on the neighbouring core ends as shown in the illustration above can help.

Unravel the cover ends up to point “-1” and evenly taper the yarns between point “-1” and the end by cutting in a stepped manner.
Now, cut off the core ends at point “1” and then unravel these up to point “2”. Next, taper the yarns evenly in a stepped manner between point “2” and the end.

7.



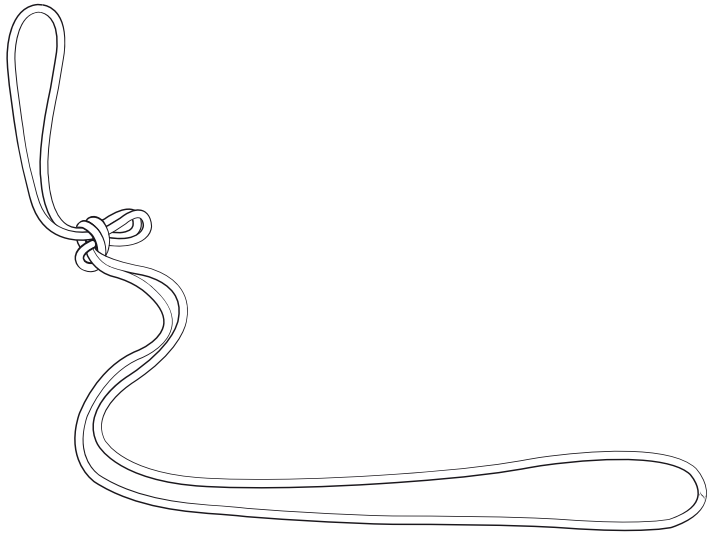


Pulling in the core and cover ends

The rope gradually swallows the tapered ends if the slack is milked out of the splice zone while under tension.
The easiest way to do this is by placing the slip-knot over a hook. Using one hand, hold on to the crossover point and pull the rope taut. Remove the slack from the cover by repeatedly milking from the crossing point to the direction of the slipknot and vice versa.
If the splice zone is particularly long, it may help if a second person assists in this step.

One possibility to help make the task easier is to step inside of the sling, hang it around your waist and keep it taut with you body’s weight. This then gives you two free hands – but then don’t forget to also remove the slack from the section of rope that is behind you!

8.



Finishing off

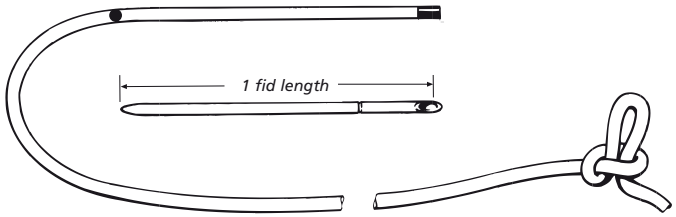
All four ends will have been completely swallowed once all of the slack has been milked out of the cover braiding. The unravelled fibres now lie mainly parallel in two long overlapping sections and obtain reliable traction due to the tightening braided hose.

Back splice

The back splice is a clean and safe method of finishing GeoTwin ropes. Whipping is not required and the rope remains flexible right to its very end.

As the transfer of strength is not an issue with a back splice, the length of the actual splice is simply a matter of taste. You can therefore, for example, halve all measurements listed in the instructions below, without affecting the stability of the splice.

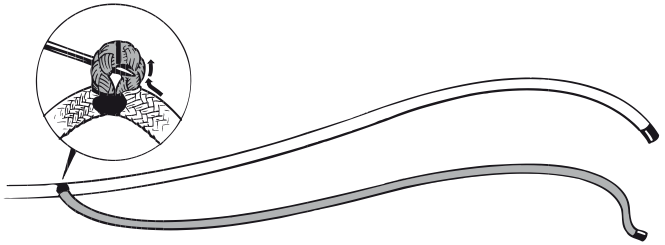
1.



Preparation

Secure the rope end with a layer of tape. If applicable, cut away any heat sealed rope ends. Place an “x” one fid length from the rope end. Tying a slipknot approx. five fid lengths away from the “x” marking will ensure there is no slippage between core and cover in the rest of the rope during splicing.

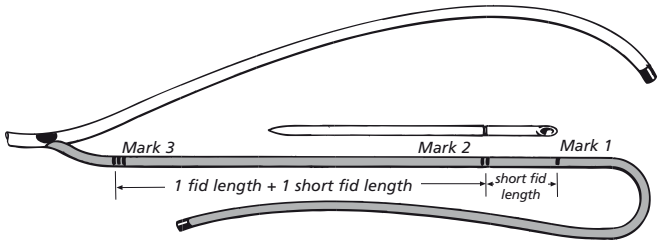
2.



Taking out and marking the core

Bend the rope sharply at point “x”. Push the cover yarns carefully to the side using the tip of a pusher or fid so that a hole forms in the braiding. Use the tip of the pusher to pull out the core slightly and make a mark on it (Mark 1). Following this step, remove the core entirely from the cover and secure its end with a layer of tape.

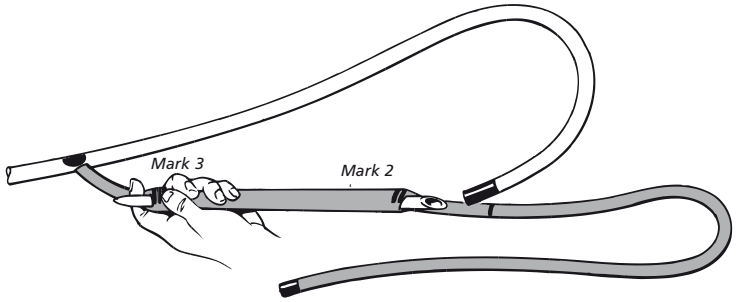
3.



Marking the core

More of the core is now extracted from the cover in order to make additional markings. Starting from Mark 1, measure a short fid length to determine and mark the location of Mark 2. Next, make a mark (Mark 3) one full fid length plus one short fid length away from Mark 2. It may be helpful to denote the various markings by drawing a corresponding number of rings around the rope circumference.

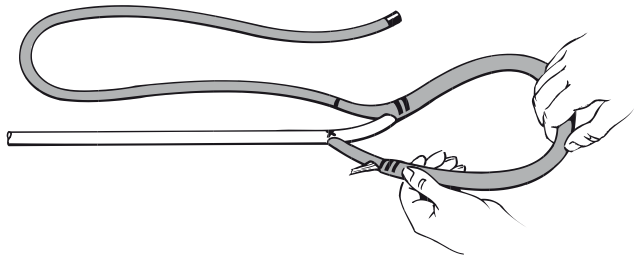
4.



Pushing the cover through the core tunnel

Secure the cover end with a layer of tape and then taper the end to a point using a knife or pair of scissors.
Introduce the fid into the core at Mark 2 and exit at Mark 3. Place the tapered cover end into the fid bore and use a pusher to push it through the tunnel until it reaches the other end at Mark 3. Here, pull the cover end out a little further.

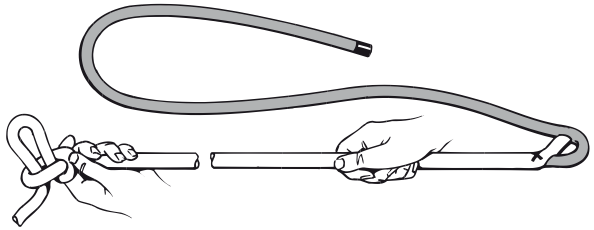
5.



Pulling the cover end into the core

Remove the tape from the protruding cover end. Taper off the end by unravelling it somewhat and cutting it diagonally in a stepped manner. Next, pull it in by milking the slack out of the core from Mark 2 in direction Mark 3. As soon as the cover end has disappeared in the core, hold it tightly at Mark 3 and stroke the rest of the slack out in the direction of Mark 2.

6.



Milking the slack out of the cover

Hang the slipknot on a hook. Commence milking the slack out of the cover – gently at first and gradually more vigorously. The cover will swallow Mark 3, then Mark 2. Finally, the cover will also engulf Mark 1. Occasionally kneading the rope end will assist when performing this splice.

7.



Finishing off

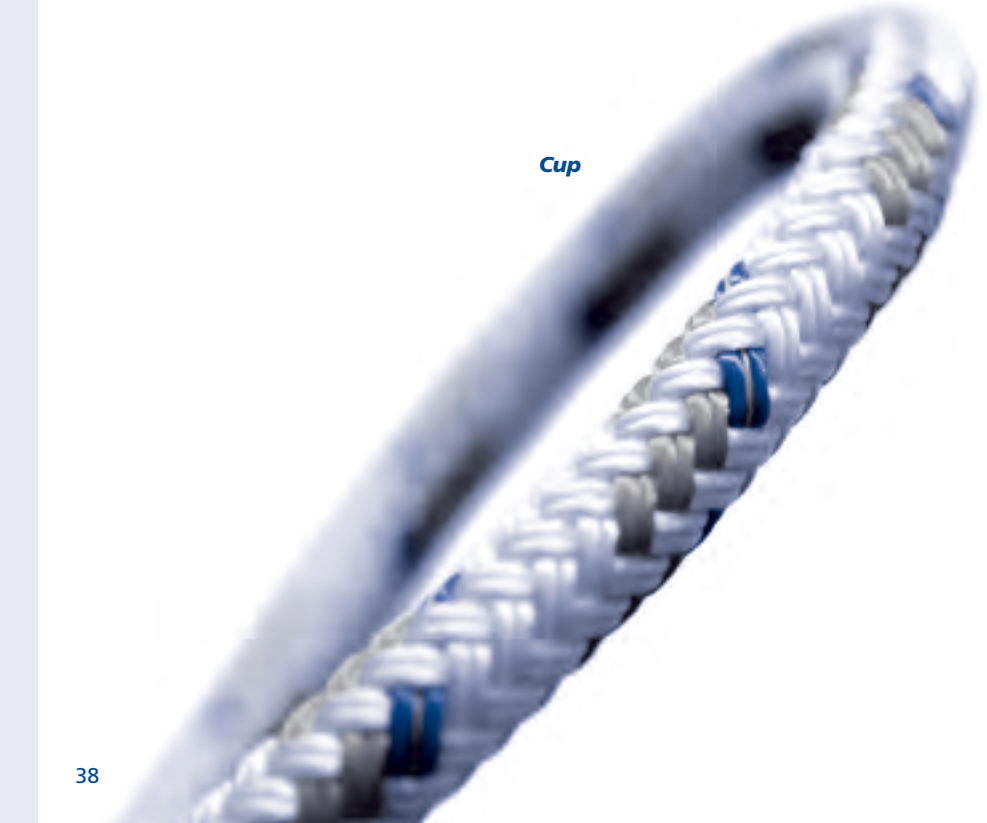
Cut off the protruding core end closely to the splice point and milk the last remaining slack out of the cover. The core end will disappear completely inside – and the splice is finished.

Cup – Parallel core braids

E.g. Cup

Eye splice

With Cup, Gleistein brought the world's first usable textile fibre-based halyard to the market in 1972. Comprised entirely of polyester, it boasted much greater strength and a level of stretch that until then was unheard of.
The reason: for the first time clear lines of responsibility were defined within the rope construction – with the core carrying the load, the cover protecting and bundling the core.
The core is made of continuous parallel fibres – which means construction stretch is completely eliminated. An intermediate cover is often also incorporated to improve grab between cover and core.
This special construction requires a special splicing technique, as the core doesn't pull together under load. Carefully spliced you'll enjoy, for example, exceptional halyards and perfect sheets that will provide reliable service on board for years on end.



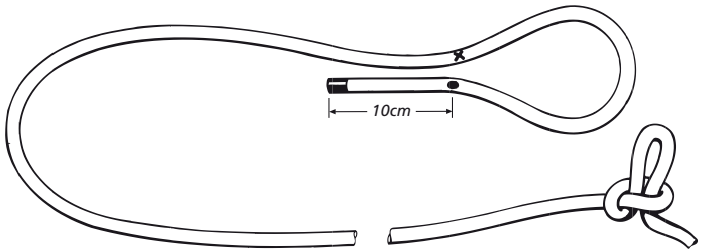
Cup

Eye splice

Under load, braids pull together and become tighter. This "pulling grip" effect is used by most splicing methods to "trap" in the spliced braids.

With Cup it's a different story: there is no constructional stretch and no contraction of the core under load.
This is where the cover comes into play again: it provides the necessary contact pressure to give the required traction.

1.

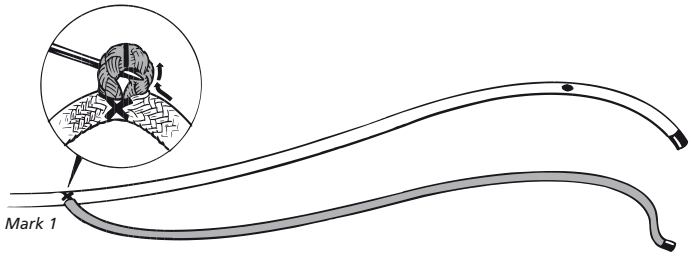


Preparation

Secure the rope end with a layer of tape. If applicable, cut away any heat sealed rope ends.
Begin by clearly placing a dot 10cm from the rope end. From this point, measure out the size of the eye you require and mark this with an "x".

Should you wish to splice in a thimble, please remember to take this into account when making the marking. Tying a slipknot approx. five fid lengths away from the "x" marking will ensure there is no slippage between core and cover in the rest of the rope during splicing.

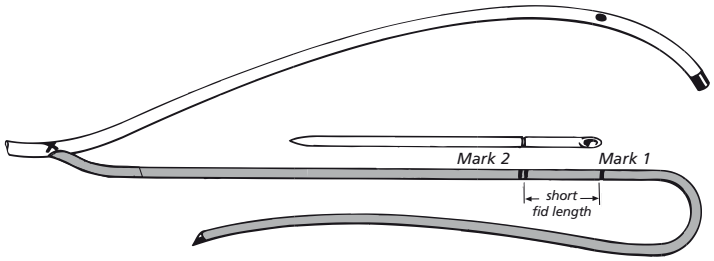
2.



Taking out and marking the core

Bend the rope sharply at point "x". Push the cover yarns carefully to the side using the tip of a pusher or fid so that a hole forms in the braiding.
Use the tip of the pusher to pull out the core slightly and make a mark on it (Mark 1).
Following this step, remove the core entirely from the cover – together with the intermediate cover, if applicable – cut off the end diagonally and form into a point with the help of some tape.

3.

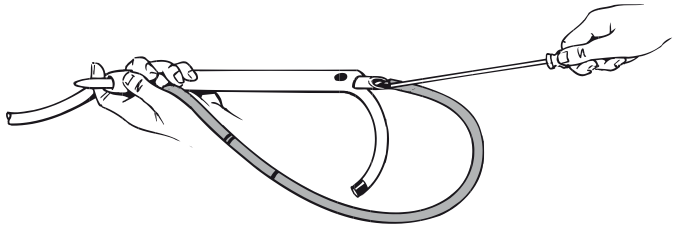


Marking the core

More of the core is now extracted from the cover in order to make an additional marking.

From Mark 1, measure a short fid length to determine and mark the location of Mark 2.

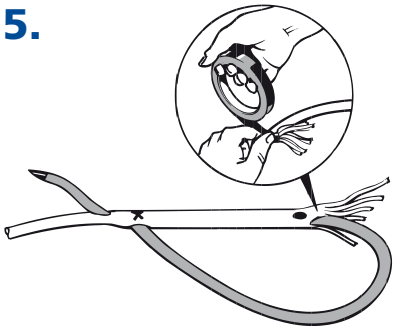
4.



Pushing the core end through the cover

Insert the fid at the dot made in step 1 and exit again 2–3cm beyond the "x" marking. Place the pointed core end into the fid bore and guide it through the tunnel using a pusher. After exiting from the cover, keep pulling until the point at which Mark 2 disappears at the insertion point (marked by the dot). The core is fixed in this position securely with tape, which is tightly wound around the cover at the dot.

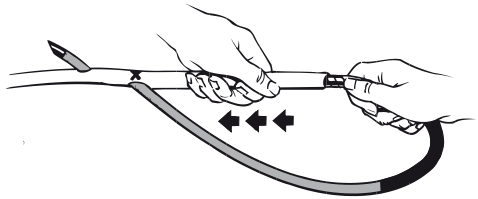
5.



Tapering and fixing the cover end

Remove the tape from the cover end. Taper its end by first unravelling it to where the cover is taped to the core and then cutting it in a stepped manner.
The thinned out fibres should then be put against the core starting at the dot marking and securely fixed. Sticky tape has proven to be good to do this, as the windings must be as thin and smooth as possible – without any kinks or buckles.

6.

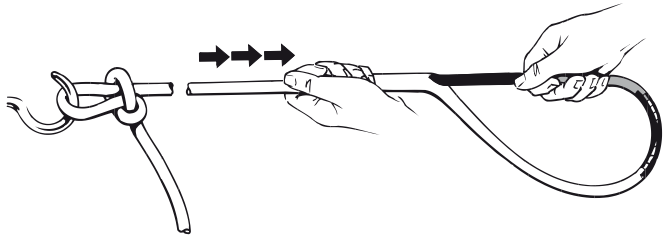


Milking the slack out of the eye

During splicing, slack will have gathered in the cover over the area of the eye – which is the section of rope between the dot and "x" marking. Smooth this out by stroking from the dot in the direction of the "x".

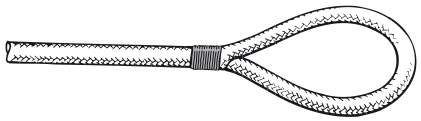
Once all slack has been removed, closely cut off the core end at the exit point. It will disappear completely with some final stroking.

7.



Finishing off

Attach the slipknot to a secure hook. Pull taut by holding the core from within the eye.
The pushed up cover can now be milked over the splice zone with the other hand. This may be difficult at first as the loop is thicker due to the tape holding the yarn ends. Should this step prove too difficult, try stroking the cover in the other direction again and starting over. It is sometimes also helpful to soften the area by hitting it with a wooden mallet or the fid. In the end, the cover should swallow the entire core area.



One

So simple, yet so effective: in One, a single supporting braid determines the rope's technical properties – and thereby opens up unlimited deployment possibilities: from a textile replacement for steel wire ropes to elastic safety lines.

Hollow braids

P. 46 Smooth eye splice with whipping
P. 48 Brummell lock splice
P. 52 Tucked eye splice
P. 53 End-to-end splice



One – Hollow braids

E.g. TaperTwin gestrippt, Discover, DynaOne HS®, DynaOne®, GeoOne Polyester, GeoOne Polyamide, GeoOne Hempex, VectraOne, Dyneema® Trimm

Eye splice

End-to-end splice

The same numbers of left and right-hand laid yarns are braided in a circular manner. Various different attributes are attainable depending on the braid length, material, number of strands and finish deployed. MegaOne ropes are generally made as 12-strand braids using pure, high modulus fibres. They boast an exceptionally low level of elongation and some – especially the heat-set varieties made of Dyneema® – surpass the break load of their equally thick wire rope counterparts.
GeoOne ropes are available as 8, 12 and 16-strand braids and are constructed using high-strength fibres. Depending on the type and dimensions, they can be deployed universally or be optimised for specific purposes.

But there is one thing that almost all hollow braids have in common: they all splice well. This is primarily due to two independent factors:

1. **Their open construction allows the rope to be opened easily to enable the rope ends to be fed through easily.**

2. **Hollow braids are like stockings: if pulled they contract and get tighter and grip onto whatever is inside.**

Various techniques exist for splicing hollow braids. The most suitable technique needs to be considered for each case. Four techniques will be shown on the following pages and we will explain their specific characteristics.



DynaOne® HS

Differences and similarities to consider when splicing high modulus and high-strength hollow braids.

MegaOne and GeoOne ropes are similar in both their construction and function. As such, the following splicing techniques can principally be used for all hollow braids. However, it must be taken into account that high modulus raw materials boast a considerably higher level of strength. With MegaOne rope, the splice end (or tail) must run out evenly over a longer length to ensure the strength is securely and evenly transferred.

Using the example of a 12-strand braid, we will show how to halve the rope over a defined distance, without destroying the rope structure. In the case of GeoOne ropes, tapering is more a question of aesthetics. Here, splicing needn't be conducted quite as attentively as with the high modulus fibres – and the rope end lengths being spliced back into the rope needn't be as long.

Rope consisting of pairs of strands



Rope consisting of single yarn strands



Tapering by halving precisely

Cut away any heat-sealed ends or tape from the rope ends.
With MegaOne ropes, proceed according to your applicable type of 12-strand braid:

- In the case of a rope with pairs of strands, one yarn of each pair is marked for each of the six yarn pairs – as shown in the illustration above.
- If the strand consists of single yarn strands, mark every second yarn of each of the six strands running in each direction – as also shown in the above illustration.

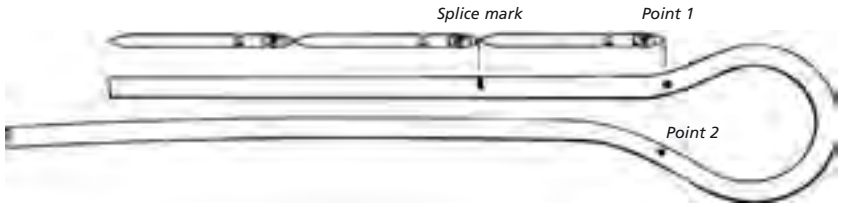
Cut and remove the marked yarns. Next, secure the tapered end with a tight layer of tape. Transposing the marked sections of the one braiding direction onto the other allows the length of the tapering area to be doubled.

Smooth eye splice with whipping

The tapered rope end is fed into the braided sleeve, which holds it tight once put under load due to the resulting contraction.
This easy yet effective technique is suitable for all hollow braids. And in instances where a thimble is to be inserted, the technique provides an additional advantage as the size of the eye can be adjusted right up to the time before it is finally whipped.

Whipping is important as the splice can otherwise open quite easily when not under load. With MegaOne ropes, it is important to ensure a sufficiently long splice zone and to take special care during tapering.

1.



Preparation

Make a mark for Point 1 by measuring three fid lengths from the rope end. Next, determine the size of the eye you require and mark Point 2 accordingly.

Place a splice Mark one fid length back from Point 1. It is from this point that the rope end is tapered in accordance with the guidelines shown on **page 45**.

One
Hollow braids

Smooth eye splice
with whipping

2.



Pulling in the rope end

Insert the rope end into the fid bore and fix with tape. Insert the fid into the braided sleeve at Point 2 and exit around three fid lengths later. Bunch up the rope and pull the end out up to the splice Mark. The eye will close up during this process until Point 1 is at Point 2.

In the area of the last half fid length, single yarns can be cut out of the rope end so that it is tapered further, if required. Remove the tape at the end.

3.



Finishing off

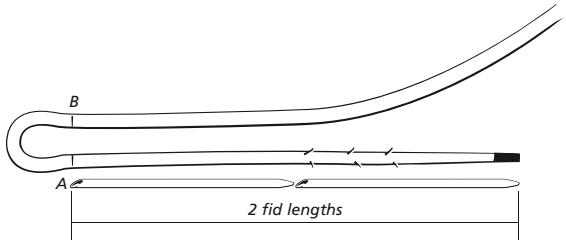
Should you wish to splice in a thimble, now is the time. Place it in the eye. By pulling on the exiting rope end the eye will tighten around the thimble.
It is important to lock stitch and whip the splice at the intersection of Points 1 & 2 to eliminate the possibility of the rope end slipping out.

Finally, milk out the slack from the direction of the eye until completely smooth. The end will disappear in the braid in this process.

Brummell lock splice

This splicing technique uses a clever "magic trick" and has become particularly widely used with high modulus hollow braids. Rather than primarily using the gripping effect of the hollow braid under load to ensure strength is effectively transferred, with this technique the rope traverses itself in the finished splice and is thereby also secured against unwanted unravelling. As such, the brummell lock splice is its own whipping, so to speak.

1.

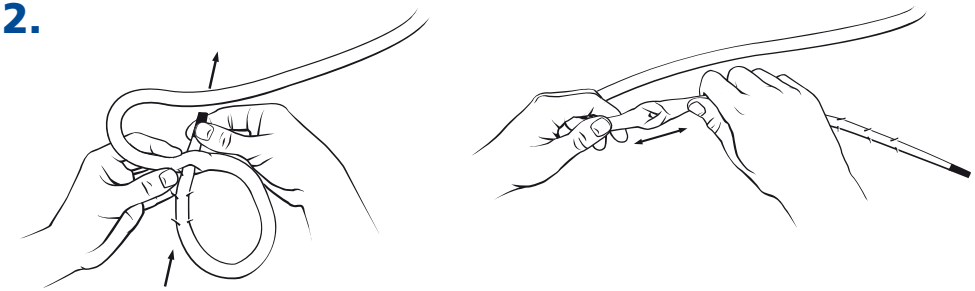


Preparation

Place "Mark A" two fid lengths from the rope end. Form the eye to the required size and then make "Mark B" at the spot corresponding to "Mark A", as shown in the illustration above. For the proceeding steps it is very helpful to ensure both of these marks are on the same side of the rope in an untwisted state.
Now, make a splice mark one fid length from the rope end. Taper the rope end from this point as shown on page 45.

! This splicing technique requires that two rope diameters must be added to the desired eye size. This is particularly important to take into account for instances where a thimble is to be fitted!

2.



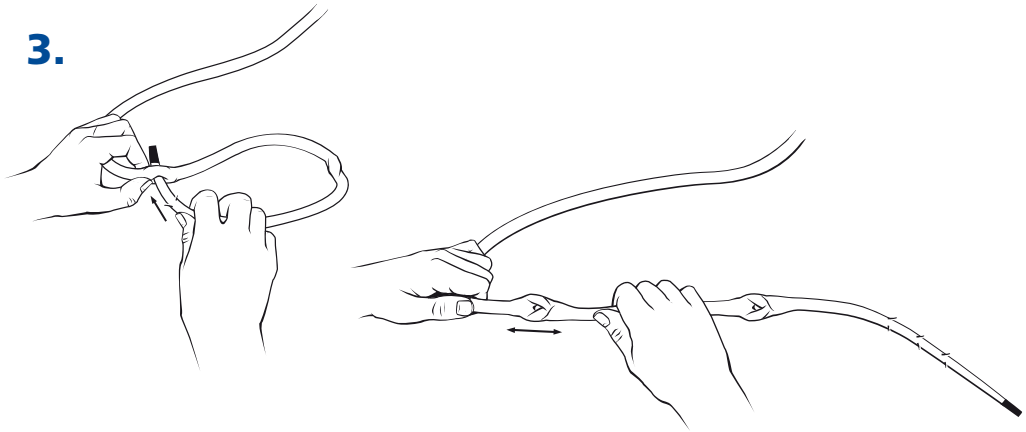
Tucking in and pulling through at Mark A

Use the fid to loosen the braid at Mark A and create a through hole. Take special care to ensure that:

- individual strands are not damaged or punctured in the process
- the through hole is created in the middle of the rope to warrant that both strands are equally strong

Feed the end of the rope into the hole and pull through completely. Once the last nodule of rope has been pulled through with a sharp tug, the two strands – separated in the braid by the hole – will now be twisted once within themselves.

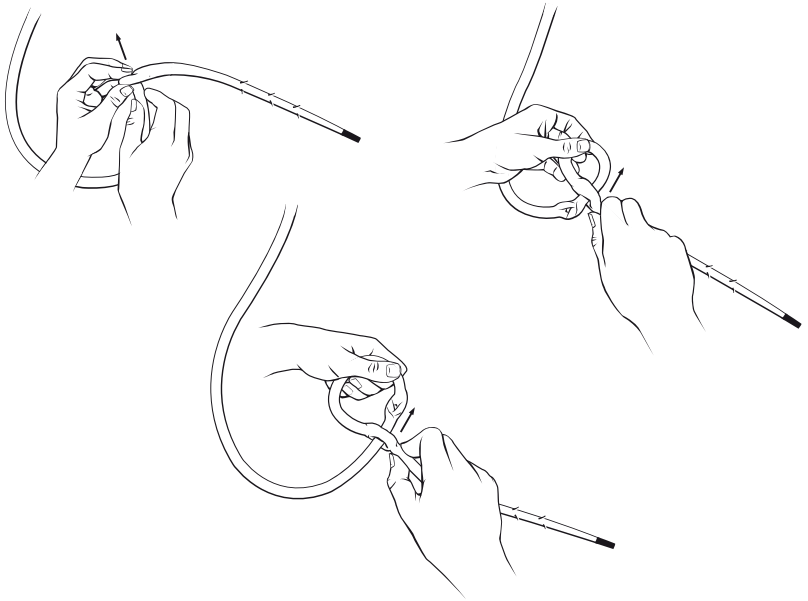
3.



Tucking in and pulling through at Mark B

Repeat the procedure now at Mark B. In this step it is important to ensure that the positioning of the hole and the tucking in of the rope end corresponds precisely with that in step 2. This will make sure that the eye will not be twisted in itself later.

4.

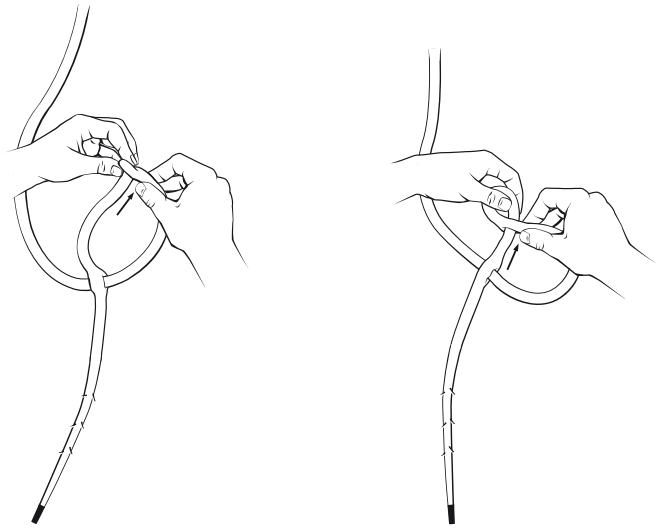


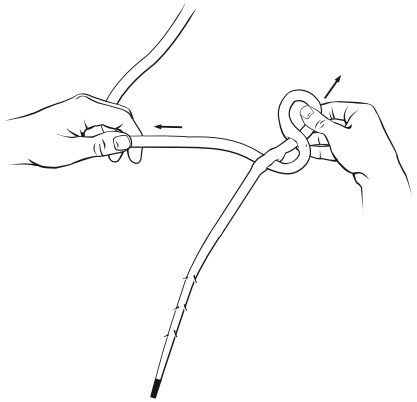
Pulling back a loop at Mark A

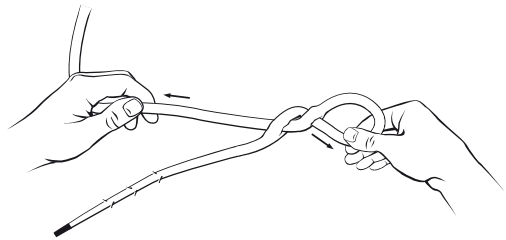
A rope loop must now be made at Mark A, as shown below in the illustration. The material is likely to be a little stubborn at first, but with some kneading should loosen up considerably.

Any twisting will be gone as soon as the loop appears. Now, pull the loop out until is just passes Mark B.

5.





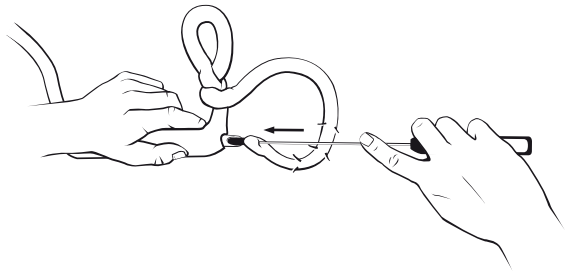


Forming the eye at Mark B

The actual eye must now be formed at Mark B. In principle, this step is the same as the previous one only that the loop is not pulled out of the length of rope but from the inverted section of the rope end which was pulled through in step 4.

Here too, any twisting will disappear once the loop in pulled out.
Should you wish to splice in a thimble, insert it in the loop now.
By pulling both the rope and the eye simultaneously, the two crossover points will pull together.

6.



Finishing off

Place the rope end into the fid bore and secure with tape. Enter the fid into the braided sleeve beneath the last crossing and exit again. Around two fid lengths from the entry point. Bunch up the rope and pull the end through until the splice mark appears.

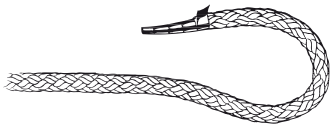
Taper the rope end in the last half fid length a little more by cutting out individual yearns, simply gauge what is necessary by eye. Remove the tape at the rope end. Milk out the slack from the direction of the eye and the rope end will disappear completely within the rope.



Tucked eye splice

This splicing technique allows you to make a reliable end termination in next to no time – and in many cases you won't even need any special tools. Multiple deflections ensure that the rope end that has been spliced back onto itself remains secure even under alternating loads. The tucked eye splicing technique described below is intended for use with GeoOne ropes. The technique is not recommended for use with MegaOne ropes: please stick with the brummell lock splice or smooth eye with whipping splice as described in the previous pages if using MegaOne ropes.

1.



Preparation

Cut off the rope end diagonally and secure with a layer of tape.
Place a mark one full and one short fid length from the end. From this mark, determine the size of the eye and make a second mark at the corresponding point.

2.



First and second tucks

Push the rope end through the centre of the hollow braiding at the second mark and pull it through the hole until the first mark just disappears into it. A fid might be a handy aid for tight braids. At a distance about 1-2 rope diameters up from the first tuck, make a second tuck in the opposite direction and pull tight.

3.



Finishing off

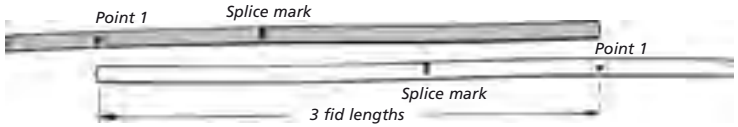
Make two further tucks in the same manner. Then let the rope end disappear into the braiding sleeve – a fid or pusher may be helpful for this task. To obtain a smoother transition point, it is recommended to taper the rope end again by cutting in a stepped manner and securing with a new thin layer of tape beforehand.

End-to-end splice

To extend hollow braids or to make a sling, we generally recommend smooth splices in which both rope ends are carefully tapered and cleanly disappear into the respective other rope end from the crossover point.

Like with the smooth eye splice, it pulls tight once put under load due to the resulting contraction to deliver strength.
With MegaOne ropes, it is important to ensure a sufficiently long splice zone and to take special care during tapering.

1.



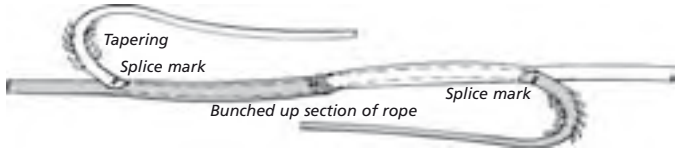
Preparation

Mark the crossing point with "Point 1" three fid lengths from the rope end. Going back one fid length from here, place a splice mark on the rope.

The rope is tapered back from this splice mark as described in the instructions on **page 45**.

! In the end-to-end splice, all steps must be conducted for each corresponding rope end.

2.



Pulling in the rope ends

Place the end of rope 1 in the fid bore and secure with tape. Insert the fid into the braid sleeve at the crossing point of rope 2 and exit again around three fid lengths further. Rope 2 will bunch up as you pull rope 1 out up to the splice mark. Now, pull in the end of rope 2 just before the crossing point of rope 1. The two crossing points should come together completely. It is not absolutely necessary to whip here – a few simple stitches will usually suffice to ensure that the rope ends do not slip out.

3.



Finishing off

Taper off a little more in an area around half a fid from each end by cutting out individual yarns. Simply gauge this with your eye.
Remove any tape from the ends.

Now, milk out any remaining slack from the direction of the crossing points. During this process, both rope ends should slip into the braid.

Square

A rope with more than just one angle: The economical square plait rope is unbeatably robust and grippy, is easy to splice – and has therefore become the most popular type of construction for ship mooring lines.

Square plaits

P. 57 Eye splice



Square – square plaits

E.g. GeoSquare Polyester, GeoSquare Polyamide, GeoSquare GeoProp

Eye splice

The square plait is constructed from a total of eight strong strands that are braided in pairs. The pairs duck through the middle of the rope and come out on the other side, only to deflect sharply and change direction again. This means that square plaits feature a relatively high level of constructional stretch.
Half of the strands are left laid, the other half are right laid.

The strong foreturning provides excellent dimensional stability in these types of ropes and their cross-section is virtually square. Square plaits have established themselves throughout the world among professionals and amateurs alike as they are robust, grippy and torque-free.
And best of all, they are also easy to splice. Let's show you how!



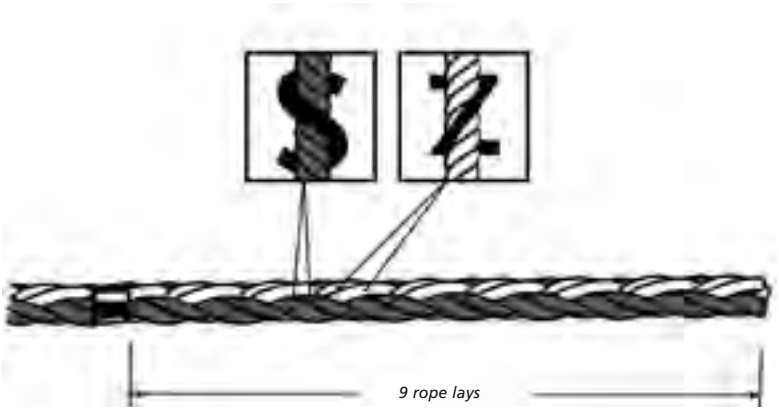
GeoSquare GeoProp

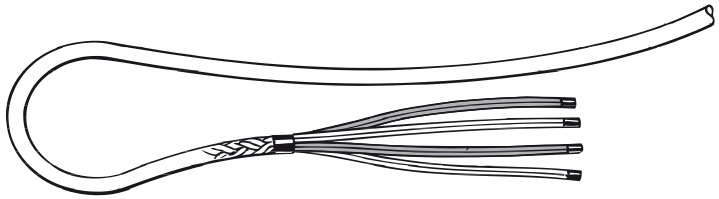
Eye splice

Square plaited ropes are braided from four strand pairs. The strands are twisted either clockwise or anticlockwise. This is also referred to as either "Z" or "S" rope lay. The illustration below shows how easy it is to recognise the direction of rope lay.
This splicing technique requires that Z strands are spliced only under S strands – and S strands only under Z strands.

In this way, the strands to be spliced in will run parallel to the corresponding braid strands: S strands run with the S strands, Z strands run with the Z strands. Another splicing technique involves splicing Z strands under S strands and S strands under Z strands. The strength is the same – but the splice is more difficult to complete.

1.





Preparation

Remove any tape or, if applicable, heat sealing at the end of the rope.
Place a secure layer of tape at the end of the 9th rope lay from the end, then also secure the ends of each strand with a layer of tape.

Next, tape each of the four strand pairs together with a thin layer of tape as splicing will occur in pairs. Now, unravel the rope up to the taped off point at the 9th rope lay – from which the size of the eye is now to be formed.

2.



S strands under Z strands

Begin, for example, with the S strand pairs. The first S strand pair is spliced under an Z strand pair, the second S pair under the next Z pair below, as shown in the illustration. The back-spliced S strands accompany, so to speak, the lower S strands of the rope. A splicing fid is the ideal tool to help leverage openings under the strands.



Z strands under S strands

Now, turn the splicing area over. Proceed as follows with the Z strand pairs: the first Z strand pair is spliced under a S strand pair, the second Z pair und the next S pair below. Here too, the back-spliced Z strands appear to "accompany" the other Z strands of the rope.

Further tucks

Pull the initial tucks tight evenly. While doing so, ensure that the material does not swell up in the eye area.
The further tucks are done as follows: the S strand pairs are guided along the following S strand pairs below and likewise, the Z strand pairs are guided along the following Z strand pairs below them.

3.



Finishing off

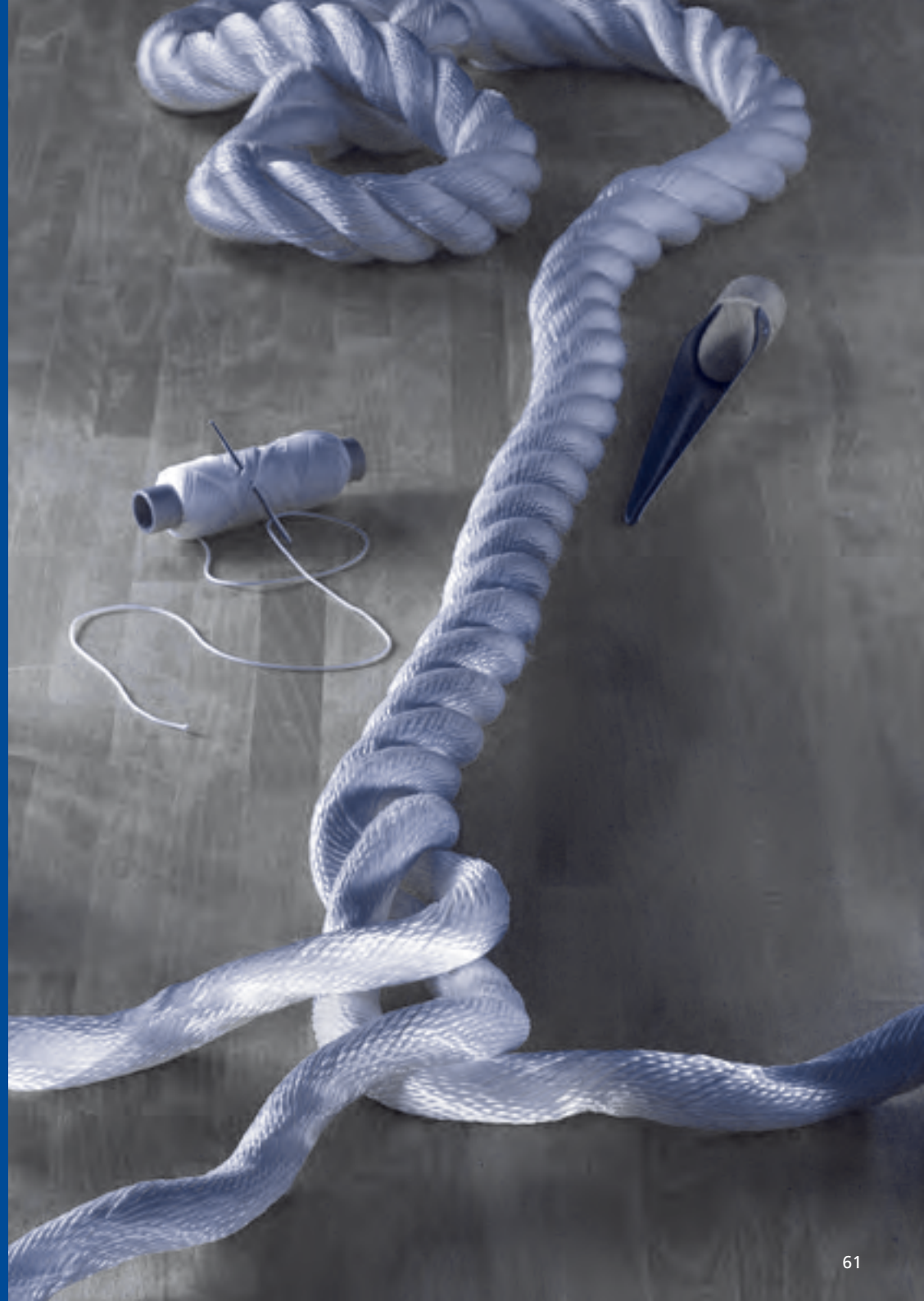
The strand tails will be "used up" after around four or five tucks per strand pair. After being pulled taut, the protruding ends should then be melted off smoothly, or the ends of the pairs bound by tape and then heat-sealed. Cleanest results can be obtained by heat sealing the ends closely and covering with sewn whipping. Finally, remove any remaining tape applied at the beginning of the splice.

Twist

The classic construction… Irresistibly simple and proven over five millennia: the laid (twisted) rope. This durable and economical construction still impresses in many areas to this very day for various areas of deployment.

3-strand laid ropes

P. 63 Eye splice



Twist – 3-strand laid ropes

E.g. GeoTwist Polyester, GeoTwist Polyamide, GeoTwist GeoProp, GeoTwist Thempest, GeoTwist Hempex

Eye splice

Fibres are twisted to yarn, yarn to twine, twine to strands. The laid rope consists of three, four or six strands. The direction of twist alternates at each construction stage. The rope is therefore pretensioned and thereby provides its own stability and integrity.
If you were to follow a single fibre in a finished rope, you would see several overlapping helical forms. The numerous deflections also result in a high level of constructional stretch. Laid ropes are robust, very grippy and can be easily spliced.

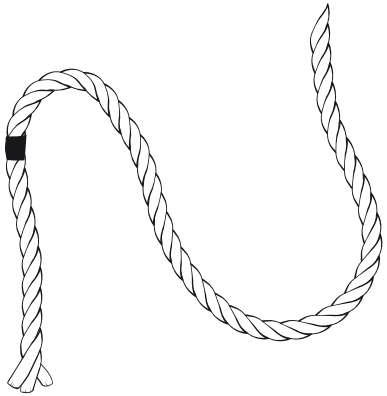
The laid rope has found a "secure haven" in area of classic yachts and is still very much in demand for use as mooring lines, whipping twine or safety lines.
Splicing techniques make use of the clamping force of the strands, which are tucked under one another in the opposite direction of the twist.



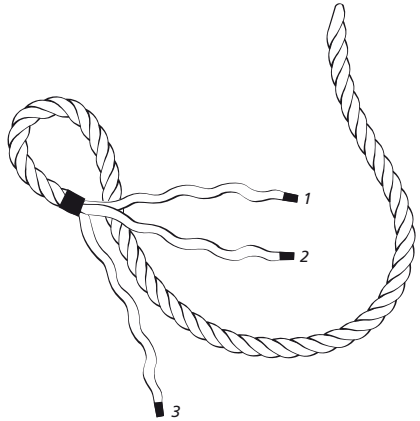
GeoTwist GeoProp

Eye splice

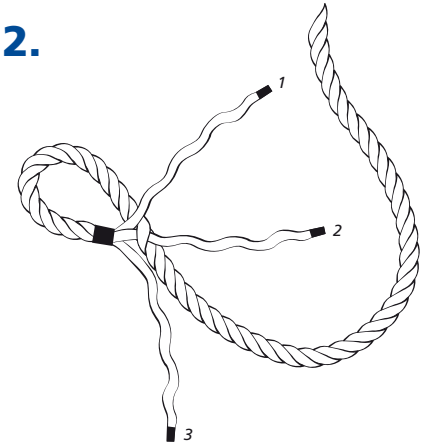
1.



Preparation
Apply a layer of tape over four turns – four complete rotations of each strand – from the rope end. The point is found by either following one strand up the rope for four complete rotations or counting 12 lays of rope (3 strands x 4 rotations = 12 lays) from the rope end.
Next, unravel the three strands up to the tape. Secure each strand end by taping or heat sealing to protect against unravelling.
Strands 1 and 2 must now be placed over the rope as shown in the illustration. The crossing point of the two strands and the rope below determines the size of the eye.

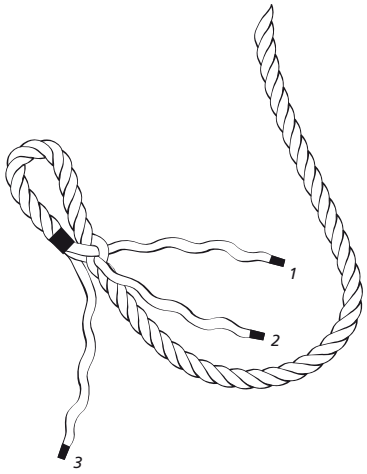


2.



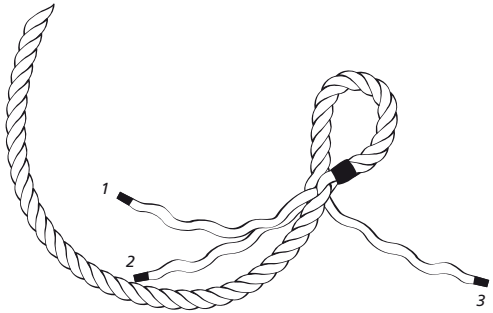
Tucking through strand 2
At the crossing point determined in the step above, tuck strand 2 under the top strand of the rope below. A splicing fid is helpful to create the necessary gap, or you can open the rope a little by twisting against direction of the lay and holding the resulting loop with your other hand.

3.



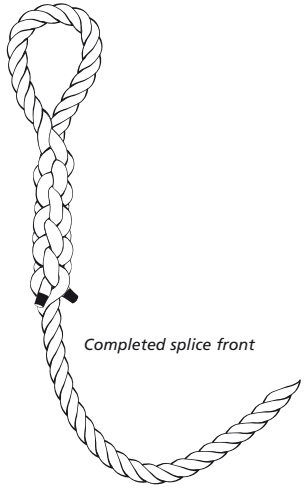
Tucking through strand 1
Now, using the same principle as before, tuck through strand 1 under the next strand of the rope. Turn the splicing area a little towards you to make this step easier.

4.



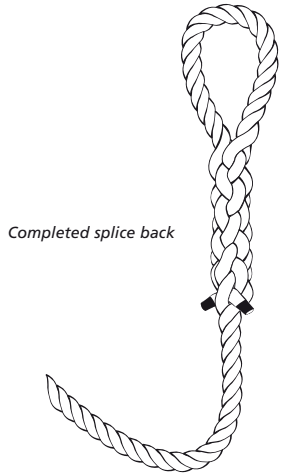
Tucking through strand 3
Turn the rope and the eye over, as the first tuck of strand 3 will occur on what was previously the underside.
Tuck strand 3 under the third fixed strand in the rope under the crossing point – a characteristic bow will be able to be seen above the tucking point.
To recap: each of the open (unravelled) strands will now have each been tucked under a fixed strand, always against the lay of the rope.

5.


Completed splice front

Tucks two to five
The strands are now each tucked in sequence against the lay of rope, alternating above then below the fixed strands – effectively making a six-strand braid.
Continue splicing layer by layer in rotation so that the splice zone expands out from the eye evenly.
Pull the strands tight after every rotation and turn them a little in the direction of their natural lay to ensure they retain their firm, round cross-section – which helps to ensure a clean splicing area.

6.


Completed splice back

Finishing off
The splice is finished after five tucks per strand have been completed. Cut off the remaining strand ends to a length of around one rope diameter and heat seal, glue or whip to finish off.

Whipping

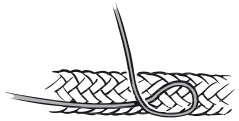
Whipping is used to prevent rope ends from opening up and fraying. The whipping twine is bound closely around the rope and secured firmly at the ends. In general, whipping is superior to other alternatives: for example, it is more durable than tape which can decompose in salt water, and does not suffer from a potential problem from heat sealing where it is possible for intact fibres to break away at the melt point.
On the following pages, we will show you two of the most common methods for whipping.



Simple whipping

Simple whipping is usually sufficient for securing the ends of ropes or strands. You can start around one or two diameter lengths away from the rope end and wind the twine around up to the end. The finish is even cleaner if you start whipping a few centimetres further up the rope then subsequently cutting and heat-sealing the rope end directly at the end of the whipping. The heat-sealing process causes the rope end to swell a little and therefore also provides a supporting edge for the whipping.

1.



Make a loop and start winding

Using the whipping twine, make a loop on the rope that faces the direction of the rope end. The loop is then repeatedly wound over in tight lays and under even tension in the direction of the rope end.

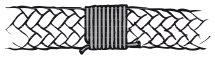
2.



Tucking in the whipping end

Whipping should continue around one or two rope diameter lengths. The twine end should then be guided through the small loop created in step 1.

3.

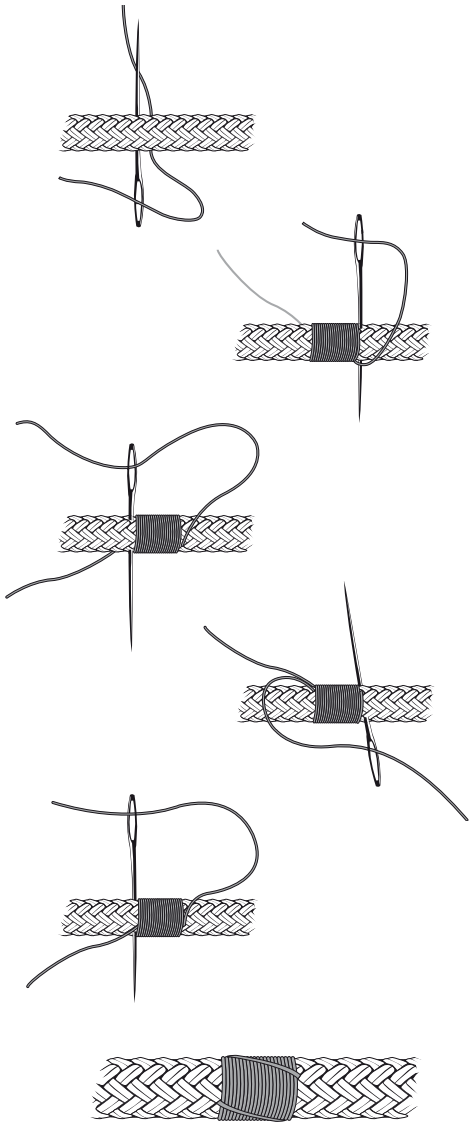


Securing and cutting off the ends

Draw the loop tight by pulling on the other end of the whipping twine until it disappears under the whipping.
Once the end of the loop reaches the middle of the wound whipping, both ends of the protruding yarns are cut off cleanly.
The whipping is now complete.

Sewn whipping

Sewn whipping literally gets to the core of the matter: multiple stitches through the rope ensure reliable protection against movement between core and cover, strands of fibres, or the rope and its back-spliced end. A strong sewing needle is required to perform this whipping procedure.



Fix and start winding

Fix the whipping twine by piercing the rope and pulling it through twice. Allow several centimetres of whipping twine tail to remain as it will be needed later to tie and sew up the whipping. Now, with even tension, wind the twine around the rope in tight, clean lays.

Finishing the winding

Keep winding for one to two rope diameters in length. Then push the needle with whipping twine directly through the centre of the rope so that it re-emerges directly on the other side where the winding is finishing.

Cross stitch three times

Cross the whipping twine diagonally over the windings made and push the needle through the rope here – a little off centre so that it comes out about two thirds around the other side, and must be flush with the beginning of the whipping. From here, cross the whipping twine diagonally once more in the same screw thread direction as the first cross stitch. Push the needle through the rope once again; this time making sure the exit point is directly between the first two exit points. From here cross stitch over one more time, parallel to the first two cross stitches.

To determine the correct exit points and angles it may prove helpful to first practice on a 3-strand laid rope as the three cross stitches will each run exactly along the "valleys" between the strands.

Finishing off

The whipping twine is now pushed through with the needle to where the other end of the twine from the beginning is sticking out. Here, knot both ends together tightly before hiding both twine ends in the rope with one last stitch and clipping of the ends cleanly.

Brief rope facts

Interrelationships and history

The previous chapters in this book have presented a large amount of useful information. On the following pages, we'd like to provide you some additional background info that gives you a further insight into the world of rope:

How are a rope's qualities developed? Can you create a perfect rope that is suitable for practically all applications? How easily can a construction simply be copied? You'll find the answers to these and other questions here!



GeoSquare Polyamid

Rope constructions

Four constructions are used in the area of water sports:

Twin

Double braid construction rope is the most common yacht rope. Core and cover share the load equally, even though the applications may vary considerably.

One

With a round plait rope, a supporting braid determines the rope's technical properties: It functions without a core – or without a cover, depending on your view of things…

Square

In a square plait rope, eight strands are interwoven to form a roughly quadratic cross-section. It is very robust and has good grip, while simultaneously being relatively economical and easy to splice.

Twist

Laid (twisted) rope has existed for centuries. It is economical to manufacture and absorbs impact elastically, although it can open up under strain.

Raw materials

In principle, every construction can be combined with any raw material or a mixture of different fibres. We distinguish between two classes of raw materials:

1. Mega

The triumph of high modulus fibres began with Aramide, also known as Kevlar®. Dyneema®, Zylon® and Vectran® have meanwhile taken the lead. Because almost all molecular chains in the fibres are aligned in parallel, outstanding qualities result. Dyneema® provides even greater strength than steel with the same cross-section. And Gleistein Ropes, with its heat stretching technology, can truly claim to be a worldwide leader in this area, so that the strength and stretch of braided ropes has been further optimised.

2. Geo

Polyester, Polyamide and Polypropylene are high-strength fibres and provide especially well-balanced all-round properties at moderate prices. They ensure excellent handling and are clearly superior wherever elastic stretch is required. High-strength fibres are also extremely versatile and form the basis of our broad range of products, right up to optically similar, but technically far superior natural fibre substitutes. Real natural fibres no longer play a role in the yacht ropes sector – not even in our "Classics" market segment.



CarbicColor

Worth knowing

High-tenacity double-braid ropes: GeoTwin

The GeoTwin construction with its braided-over core provides a strong and evenly rounded cross-section. Core and cover are made of the same high-strength material and take the strain equally.

High modulus double-braid ropes: MegaTwin

A high modulus fibre core ensures extremely high breaking loads with minimum stretch. This takes the strain, while the high-tenacity fibre cover provides grip and protects the high-quality core from damage. Gleistein also uses a woolly intermediate cover, which decreases friction between core and cover – otherwise the core could slip through the cover when in a stopper.

High modulus round braid: MegaOne

The cover is omitted to give outstanding strength with a minimum cross-section and weight for high-performance applications. To protect the high-quality materials from the effects of weather and friction, they are refined with special coatings.

Braid lengths

Depending on the haul-off speed in the machine, braids can be manufactured with a very compressed braid pattern, a strong cross-section and high elasticity. Braids with an elongated braid pattern have a more flexible cross-section and very low stretch, due to the low number of turns in the fibre. MegaTwin ropes combine these properties: long braid lengths in the core for low stretch and short braid lengths in the cover for better abrasion resistance.

The first usable textile halyard

In 1972 Gleistein introduced a revolutionary new innovation: CUP. Double-braid polyester ropes had too much stretch, which was the result of a combination of material stretch and construction stretch. In those days there was no better material available, so the braid length of the core of CUP was increased to "infinite" – the fibres are simply aligned in parallel, completely eliminating the constructional stretch.

Heat-set rope

Gleistein is a pioneer in the area of stretching technology. Braided cores made of high modulus fibres are subjected to controlled tensile loading under certain physical conditions – including heat. For Dyneema® in particular, breaking load and stretch are significantly further improved, also improving the efficient use of materials.

The best material for covers

Polyester is an excellent material for the protective covers of MegaTwin ropes. Polyester is very durable and retains its outstanding all-round qualities under almost all conditions – the exception being instances where a lot of heat is generated at which point the surface could begin to melt and its positive attributes negated. But under what circumstances will a rope onboard get so hot? Probably only when a huge amount of friction is developed as it runs through a winch at very high speeds – and then it is likely to only be relevant in the toughest of competitive regattas. Even for those types of exceptional cases is there answer: namely using ultra-high performance Aramide or Vectran® in the cover as these fibres boast an extremely high melting point.

Square-plaited ropes: Square

The square-plaited rope is a bridge between braided and laid (twisted) rope. It is cost-effective to manufacture and has a relatively high level of constructional stretch, but it is torque-free. It plays an important role in industrial shipping, because because just about any member of the crew can splice it.

Laid (twisted) ropes: Twist

Laid or twisted rope is already 5,000 years old, but it's not on the scrap heap yet: it still can shine in many areas, namely anywhere where a high degree of constructional stretch is needed, such as in a mooring line. Or wherever the fact that this construction has been around so long is appreciated, such as on traditional ships! Gleistein has a separate product range for all lovers of traditional ships: the Classics.

The ideal rope

There are of course universal ropes, but there's no such thing as the perfect rope for everything! A high level of stretch might be required or not, a buoyant rope can't be an anchor warp, high-end ropes increase performance, but could be harder to handle, and could put too much strain on the fittings. A very strong cover provides more durability, but reduces flexibility, and so on. Gleistein can supply the optimum product for every task on board – or a universal rope, but not both at once! Nobody else can do it either.

But can't a good rope be copied fairly easily?

Given the right machines and lots of time for experimenting, yes. And indeed, they do get copied. But the support and security of a reputable manufacturer is something that can't be copied. And because a good rope is not necessarily a well-deployed rope, a copy is just not enough. Gleistein provides the right rope for every application – and that makes better economic sense in the long run.



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