armare® ropes

Composite Cables
Textile Standing Rigging

2025

ENGLISH VERSION

armare ropes

OUR ROPES HAVE THE AMERICA'S CUP INSIDE

OFFICIAL SUPPLIER Barcelona 2024 | Emirates TEAM NEW ZEALAND

armare ropes

Composite Cables Textile Standing Rigging

2025

20 Years of Experience

onboard the best around the world

Each project has its own story

Armare Ropes has been cooperating for many years with a team of internationally qualified sailors aimed to develop and test its products. A network of specialized technicians assist the teams during the different steps of development and testing as well as during the setting up of their boats for the most challenging races. This is how the participation of Armare Ropes to some of the most challenging oceanic world races, such as Vendee Globe, Barcelona World Race, Route du Rhum or Transat Jacques Vabres came off.

Armare Ropes has an undisputed experience in Composite Cables production: fifteen years of research and development and a race-proven 100% reliability record during various round the world regattas.

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Trusted by professionals
Professionals like riggers, technicians, sailmakers and designers all over the world choose composite cables designed and made by Armare Ropes for the rigging of sailing yachts built in the best shipyards worldwide, as well as to improve the performance of various kind of boats, such as in the handicap classes (i.e ORC-IRC), ocean racers (i.e. Mini Transat 650, Class 40, Imoca), grand prix one designs (e.g. Melges 32) and maxi yachts.

A Cable is not a Rope

discovering PBO-Zylon® advantages

PBO-Zylon® cables main advantages

The high modulus PBO- Zylon® textile cables, thanks to the special construction technology, guarantees exceptional performances that make them particularly suitable for lateral, fore and aft standing rigging solutions. Let's discover the main differences between traditional braided lines and PBO cables.

RIGGING WEIGHT COMPARISONS

Armare Ropes PBO-Zylon® cable

Other brand carbon cable

Standard Nitronic 50 cable

The yacht design evolution is a major demonstration of how textile rigging is one of the main areas of development in which it is possible to gain most in terms of lightness and performance.

MAIN ADVANTAGES

High loads and low elongations
Thanks to the "endless sling" construction fibers are equally tensioned.

No junctions, no friction
Cables are manufactured without splices or cone terminals that create friction sea.

Total reliability
No dimensional changes over time.

Lightness
Weight ratio 7:1 between N50 rod and PBO - Zylon® cables sized with the same stretch.

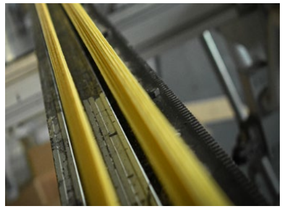
Exceptional resistance
Optimal resistance to atmospheric agents, thanks to the various layers of protective materials.

The “Endless Sling” Construction

lighter and stronger than stainless steel rod

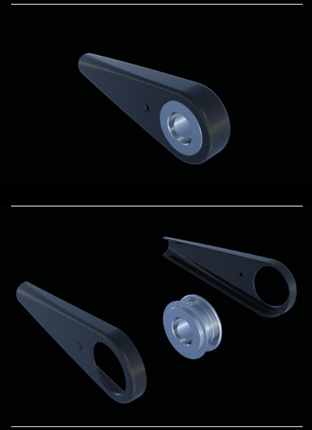
Introduction

This “Sling” process is based on continuous winding of the fiber between two fixed points placed at the required distance and controlled tension. This loop is joined, consolidated and protected by two different layers of special tape, which warrant stability and protection against the elements and other possible damages. Finally, a strong braid in Dyneema® covers the entire cable, giving to it the definitive appearance, while the terminals are resin molded at the ends of the cable, with the permanent inclusion of the technical fiber loops.



A creep near to zero

The result is an extremely safe single cable, with inimitable mechanical characteristics. This special construction, accurately controlled with sophisticated equipment, produces the highest modulus of stretching and the maximum lightness. It allows the cables to get exceptional breaking loads both under static and dynamic loads, and to face unforeseen peaks of stress.
The continuous development of construction techniques allows Armare to produce perfectly balanced and safe cables, which have an excellent durability. Intensive tests and exhausting sailing sessions, such as the participation in Vendee Globe, confirm the absolute reliability of our products, both in cruising and racing sailing boats of different sizes.



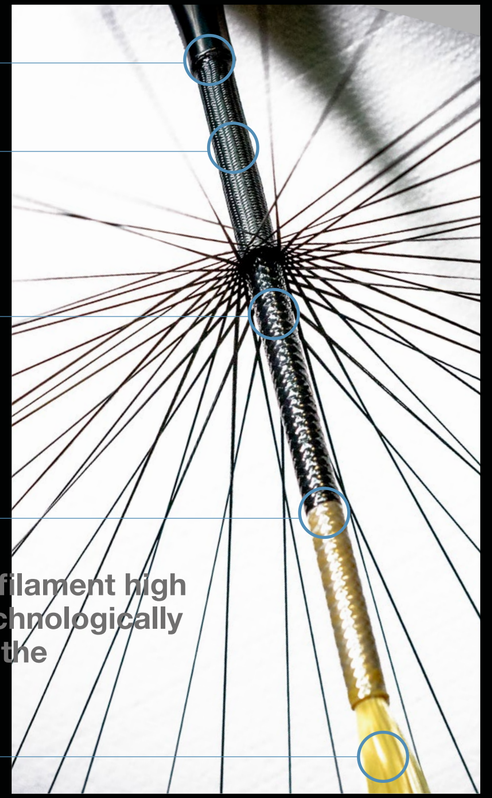
Openable terminal - Closed and exploded view

RESIN MOLDED TERMINAL

EXTERNAL BRAID: A DYNEEMA® COVER PROTECTS THE CABLE FROM EXTERNAL MECHANIC ACTIONS

PROTECTION LAYER: IT PRESERVES THE STRUCTURAL FIBER FROM UV RAYS

INNER LAYER: IT PROTECTS THE CABLE FROM THE PENETRATION OF MOISTURE, WATER, SALT AND ELEMENTS



The processing of continuous multifilament high modulus fibers is currently the most technologically advanced construction in the world for the production of fiber cables.

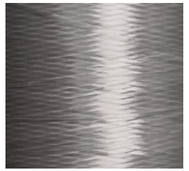
PBO® / KEVLAR® / DYNEEMA® FIBER

Technical Fibers

three different fibers, for various applications

PBO-Zylon® / Kevlar® / Dyneema®

The main technical fibers used for the construction of the cables are PBO-Zylon®, Kevlar® and Dyneema®. Fibers should be choosen depending from the application and according to the expected performance of the cable.



PBO-Zylon®
Thanks to the dimensional stability of its oriented fibers, PBO-Zylon® is the top in terms of performance under statics loads. It assures maximum lightness, smaller diameters, steadiness, resistance, zero creep. Armare Ropes suggests the PBO - Zylon® for applications such as standing rigging, forestay, backstay and torsional cables. PBO fibers are smaller, stiffer, stronger and lighter when compared to any other suitable material, making it the optimum solution for aft rigging.

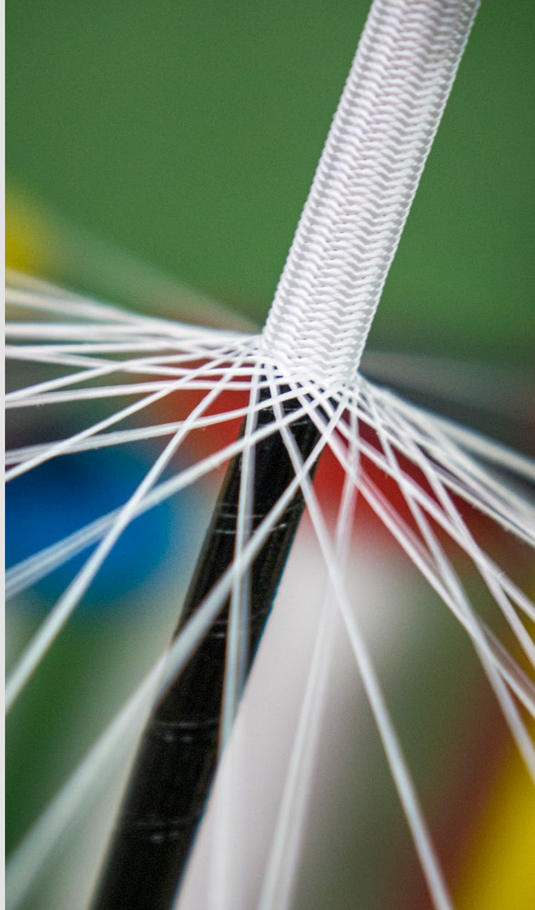
Kevlar®
Kevlar® 49 cables have high durability, high breaking loads and low stretching, maintaining reasonable diameters and reduced weight at a lower price level. Armare Ropes suggest Kevlar cables on cruising boats, for backstays, runners, checkstays, staysails and torsional cables.

Dyneema®
Dyneema® fiber has an excellent dynamic resistance and low elongation, turning it the perfect choice for the construction of backstays, runners and strops. Thanks to its extreme resistance to torsional cycles and load/unload stress, this fiber is also used to produce torsional cables, backstays, runners and strops. It is available in two versions: SK99 and DM20.

COMPOSITE CABLES & STANDING RIGGING / **TECHNICAL FIBERS**

DIFFERENT CORES FOR DIFFERENT APPLICATIONS

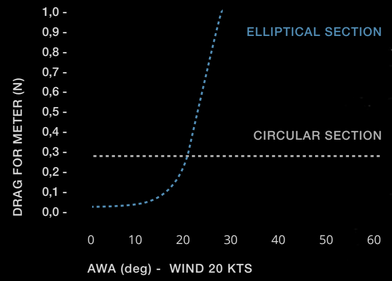
CORE	PBO-ZYLON®	KEVLAR®	DYNEEMA® SK99
CHARACTERISTICS	High resistance Minimal stretch Zero creep High stability under constant loads	Minimal stretch Low creep Good price	Very high resistance Low stretch Very light Best durability
DIAMETER	■	■ ■	■ ■ ■
WEIGHT	■ ■	■ ■ ■	■
RESISTANCE	■ ■ ■ ■	■ ■	■ ■ ■ ■ ■
PRICE	■ ■ ■ ■ ■	■ ■ ■ ■	■ ■
STRETCH	■	■ ■ ■	■ ■ ■ ■ ■
CREEP		■	■ ■ ■ ■
APPLICATIONS			
FORESTAY	■ ■ ■ ■ ■	■ ■ ■ ■	■ ■
BACKSTAY	■ ■ ■ ■ ■	■ ■ ■ ■	■ ■ ■
RUNNER/CHECKSTAY	■ ■ ■ ■ ■	■ ■ ■ ■	■ ■ ■
TORSIONAL	■ ■ ■ ■ ■	■ ■ ■ ■	■
BOBSTAYS	■ ■ ■ ■ ■	■ ■ ■ ■	■
STAYSAIL	■ ■ ■ ■ ■	■ ■ ■ ■	■ ■ ■
LATERAL RIGGING	■ ■ ■ ■ ■	■ ■ ■ ■	
LOCK STROPS			■ ■ ■ ■
FORESTAY STROPS	■ ■ ■ ■ ■	■ ■ ■ ■	■ ■ ■



PBO Advantages

About the cable cross section

The wind generates a resistance (called drag) on the entire rig and so on the stays also. That drag depends on the cross-sectional area of the body and the angle to the wind direction, and rises up with them. So, the bigger is the cable, the higher is the drag. Some competitors produce cables with elliptical section, but Armare Ropes has decide to adopt cables with circular section in order to keep a low resistance in every condition.



The graph compares the drag of two different type of cable at various Apparent Wind Angle (AWA). It can be seen that the drag of elliptical section is low at little AWAs, but rise exponentially over 20° AWA, while drag of circular section keeps constant through all range of angles. Ref. Aero-hydrodynamics of sailing C.A. Marchaj

An improved stability and reduced pitching, to sail fast with more comfort.

Better performance

Thanks to the general lightening of the rigging and the visible improvement of the righting moment, the boat can sail faster.

Best righting moment

The adoption of PBO® textile rigging provides various benefits to the performance of the sailboat, which may vary, according to dimensions and the proportional reduction of weight.

Increased stability

The motions of roll and pitch are definitely lower. It is calculated that, with the adoption of a textile standing rigging and stay, the pitching can be reduced by 5% and the rolling up to 30%.

Engineer Service

leading the customer to the best solution available

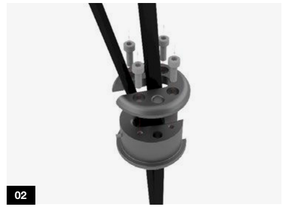
Drawings and design

Armare's engineering department approaches projects with the realization of technical drawings to allow the customer to be part of every step of the design and realization. To achieve this goal Armare Ropes offer a wide range of products: not only cables but also metal (e.g High grade Stainless steel, Aluminum alloy, titanium) and textile
(e.g. loops, strops) fittings.

Customization

Armare Ropes can design, project and realize in factory any kind of custom fitting, using a state-of-the-art approach. We used to work together with shipyards, naval architects and engineers and top sailing team to satisfy specific needs.

01



02

03

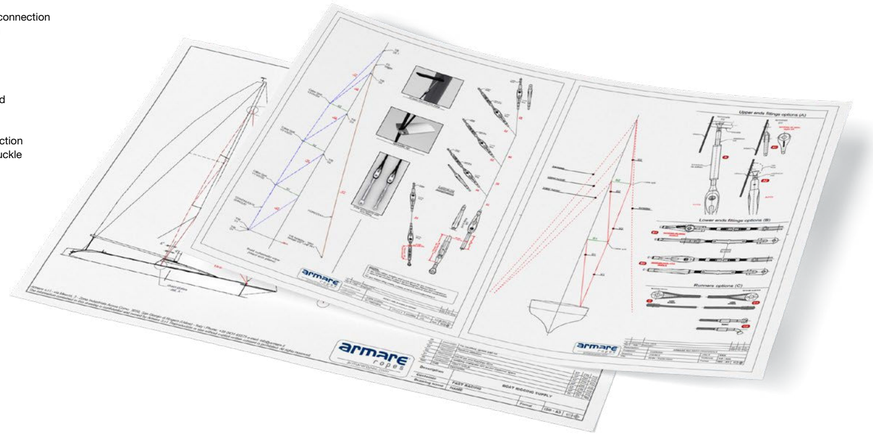
04

1 - Custom AT fitting which allows a "soft" connection between torsional cable and furler drum

2 - Custom spreader tip (formerly used with discontinuous rod rigging)

3 - Forestay: custom threaded fork designed to fit with existing fittings on board

4 - Design of verticals and diagonals connection with HTS external theaded fitting, turnbuckle and barrel pin on the chainplate



Drawing to recap the project\supply, so the customer can see the whole project and check together with us critical points allowing us to solve them much before the supply.

Fore & Aft Cables

lightness, strength, durability

Main applications

Three different technical fibers are available for the construction of this type of cables; the choice should be made in accordance with their application, i.e. whether used for the construction of runners, top masts, checkstays, forestays, or backstays. Backstays, runners and checkstays are often designed to a specific working load rather than a required stiffness, taking advantage of the weight saving.

- Runners
- Top masts
- Checkstays
- Forestays
- Backstays

Fore & Aft Cables

Easy to install and maintain

With the support of our technicians, the replacement of steel cable with textile standing rigging can also be performed in retrofit on any yacht. The durability of composite cables is long and their maintenance is simple and rapid. Any substitution can be easily done in a short time.

Ease of handling

The use of soft textile fibre for the cable's core gives it easy maneuverability and when not in use the cable can be easily coiled up and stored in a bag or below deck.

Better performance

Composite cables allow better windward and quicker maneuvers: motions in waves (roll and pitch) are damped thanks to weight reducing mainly in the upper part (lowering the COG), thus the boat sails lighter and faster. The optimization of the cable construction reduces overall diameters with consequent advantage in the decrease of windage. Armare Ropes obtains cables with minimum diameters and consequent advantage in the decrease of windage.

Light, safe & durable

Dry constructed Armare PBO® cables have a 50% higher safety ratio than ROD cables and their weight reduction reaches 80%. The PBO® cable is lighter and safer even when compared to other types of composite rigging and his adoption provides different benefits to the performance of any kind of sailboat.

Increased stability

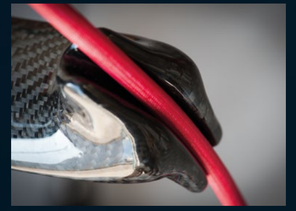
Textile rigging's weight is lower than rod's one. This weight reduction is even more evident in the up section of the stay, at two thirds of its length. The consequence is a clear reduction of the pitch and a considerable decrease of the luff banding.

Lateral Rig

Main applications

Armare provides complete standing rigging systems in PBO-Zylon® for boats up to 80 feet. The solutions are available both for new build and retrofit applications.

Armare Ropes produces and tests complete solutions for hightech textile equipment thanks to the partnership with professionals who have many years of experience in rigging field.



© CandidateSailing Ph: Dominik Matesa

— Standing Rigging Retrofit
— Standing Rigging New Build

New Build

Armare PBO® cables have a 50% higher safety ratio than ROD cables and their loss in weight reaches 80%.
The PBO® cable is lighter and safer even when compared to other types of composite rigging and its adoption provides different benefits to the performance of any kind of sailboat.

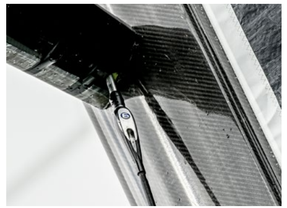
Retrofit

Armare Ropes has developed a complete retrofit system to replace rod with textile standing rigging, which interfaces with different kind of carbon or aluminum masts, and many fittings on the market. This is the perfect choice for those who want to get the best from their boat, as it is easy to install, it doesn't require many interventions (e.g spreader tips arrangement) on the current rigging and its maintenance is simple. Armare Ropes has the right solution to interface with every fitting in the market, as well is able to design and develop any custom solution.

Lateral Rig

Easy Installation, great aesthetics

The installation on board of a textile standing rigging is facilitated by the lightness and the flexibility of the cables; the use of PBO® cables allows the elimination of many parts of the additional mast fittings. This optimization provides further reduction on the total weight of the rigging, together with a drastic decrease of the necessary time for its installation. The cleaning of textile standing rigging ensures an optimal aesthetic result.



The team of professionals in Armare Ropes are able to satisfy each inquiry thanks to a special and unique way to assemble different materials that elevates these composite cables to an avant-garde product in the field of textile rigging.

External / Internal spreader

There are two different techniques for the passage on the spreaders, external and internal / Tip Cup. In this way, for example, the passage of the vertical on the third spreader is completed with a simple binding, which keep in seat the cable, while the passage on the first spreader is inner, using the existing seats (Tip Cup). Any change to the heads of the spreaders are made directly from Armare. Finally, a simple steel fitting system allow the link between the deck cable (V1) and the diagonal (D1), that are taken to the right tension through special stainless steel turnbuckles.

External Spreader

Custom splitted pin fitting
for spreader Tip connection

External Spreader

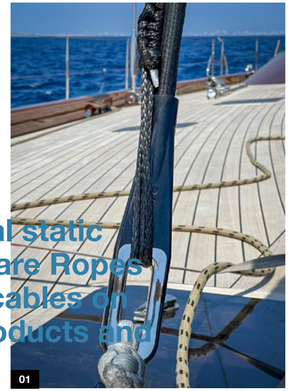
Internal Spreader / Tip Cup

Torsional Cables

Main applications

Torsional cables have been specifically designed to be used as a means of torque transmission along the cable, without loss of speed between tack and head of the furling sails, both for flying (e.g. code 0) and loose luff/spherical (e.g, asymmetrical spinnakers). Standard cables are made out of the same fibers used for single cables: PBO-Zylon®, Dyneema® SK99 or Dyneema® DM20 and Kevlar® 49. The cables can be supplied either with specific terminals for lashing or Pin applications.

The evaluation of the torsional static and cyclic resistance allows Armare Ropes to simulate the behaviour of the cables on board, in order to improve the products and to provide useful design data.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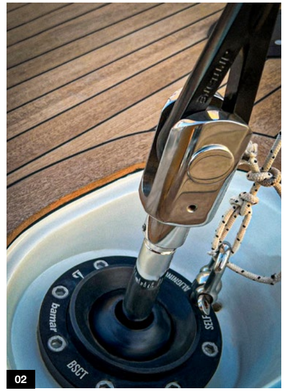

02

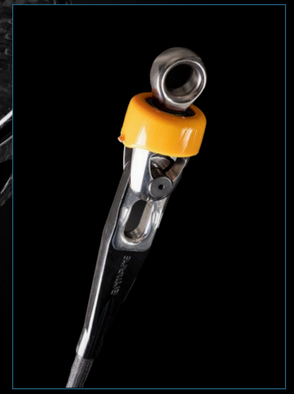

03

01 AT lash onboard Geist Spirit 111
Courtesy © One Palma

02 Torsional cable on Bamar furling unit

03 Torsional cable on Facnor unit

– Very easy handling
– Faster and safer Gen hoists & drops
– Improved race performance

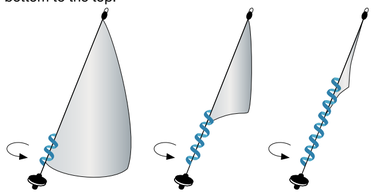


The forestay is connected to the Swivel on the mast directly with an AT terminal fitting

Torsional systems

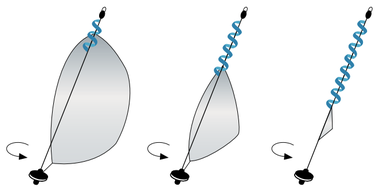
Bottom-up torsional system

It is the principle of the traditional winding: the torque transmission happens from the bottom upwards. The sail is secured with a lashing on both ends of the cable: the torsional force is applied to the drum and the textile cable transmits the torque along the cable until to the opposite end (at the top swivel) and the sail begins to wrap from the bottom to the top.



Top-down torsional system

The tack of the sail is fixed to the drum through a free tack swivel: the torsional force applied to the drum is transmitted almost instantly to the swivel at the top and causes the winding of the sail from the top to the bottom. When the winding has been completed, the halyard can easily be released and the sail can easily be traversed and stowed.



Structural cables

The Armare structural furling forestay is a bottom-up torsional cable with a special construction that increases working/breaking load and stiffness.
The forestay is connected directly to the furler drum on the deck and to the swivel on the mast; all these fittings are structural due to high rig loads.

Structural torsional forestay rigged on JIBER furling unit - Photo courtesy © UBI MAIOR Italia

Cable-less sails

In recent years the sailmakers have developed off-wind structured luff sails (e.g. code and downwind furling sails). This is allowed thanks to the load sharing between the internal structure of the sail and a special torsional cable which can be smaller and lighter compared to the cables used on traditional furling sails. These cables can be made with either a bottom-up or top-down configuration. Armare Ropes could produce custom cables for this application according to the specifications received from the sailmakers.

Light torsional cable used on a "load sharing"cable less-sail, onboard X 4.9 - Photo courtesy © One Palma

Technical data

PBO-Zylon® Fiber it is widely used in the construction of textile cables thanks to its optimal technical characteristics; composite fibre cables can reach performance equal to or superior to traditional high-grade steels used in the production of rigging such as the Nitronic 50, obtaining a massive saving of the overall weight of the rig. To choose a textile PBO cable that can replaces a rod, it is necessary to design it with the same axial stiffness (EA) and not on the breaking load data.

PBO-ZYLON® CABLES

CODE	BREAKING LOAD	MAX WORKING LOAD	DIAMETER	WEIGHT
	[daN]	[daN]	[mm]	[Kg/m]
PB 05	5,000	1,250	6.9	0.059
PB 10	10,000	2,500	9.5	0.085
PB 15	15,000	3,750	11.0	0.119
PB 20	20,000	5,000	12.3	0.148
PB 25	25,000	6,250	14.0	0.176
PB 30	30,000	7,500	15.2	0.205
PB 35	35,000	8,750	16.9	0.249
PB 40	40,000	10,000	17.9	0.290
PB 45	45,000	11,250	18.9	0.325
PB 50	50,000	12,500	19.7	0.379
PB 55	55,000	13,750	20.8	0.411
PB 60	60,000	15,000	21.8	0.442
PB 65	65,000	16,250	22.7	0.465
PB 70	70,000	17,500	23.0	0.491
PB 75	75,000	18,750	23.5	0.532
PB 80	80,000	20,000	24.6	0.560
PB 85	85,000	21,250	25.5	0.595
PB 90	90,000	22,500	26.0	0.647
PB 95	95,000	23,750	27.5	0.696
PB 100	100,000	25,000	29.0	0.755

KEVLAR® 49 CABLES

CODE	BREAKING LOAD	MAX WORKING LOAD	DIAMETER	WEIGHT
	[daN]	[daN]	[mm]	[Kg/m]
K49 05	5,000	1,250	9.0	0.075
K49 10	10,000	2,500	12.0	0.123
K49 15	15,000	3,750	14.5	0.165
K49 20	20,000	5,000	16.2	0.210
K49 25	25,000	6,250	17.5	0.260
K49 30	30,000	7,500	19.0	0.320
K49 35	35,000	8,750	20.0	0.350
K49 40	40,000	10,000	21.1	0.400
K49 45	45,000	11,250	22.5	0.450
K49 50	50,000	12,500	23.7	0.510
K49 55	55,000	13,750	24.6	0.574
K49 60	60,000	15,000	25.8	0.619
K49 65	65,000	16,250	26.9	0.662
K49 70	70,000	17,500	28.0	0.707
K49 75	75,000	18,750	29.3	0.751
K49 80	80,000	20,000	30.1	0.796
K49 85	85,000	21,250	31.2	0.844
K49 90	90,000	22,500	32.5	0.898
K49 95	95,000	23,750	33.8	0.946
K49 100	100,000	25,000	35.4	0.755

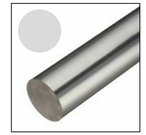
DYNEEMA® SK99 CABLES

CODE	BREAKING LOAD	MAX WORKING LOAD	DIAMETER	WEIGHT
	[daN]	[daN]	[mm]	[Kg/m]
DYN 05	5,000	1,250	8.6	0.054
DYN 10	10,000	2,500	11.9	0.082
DYN 15	15,000	3,750	14.1	0.115
DYN 20	20,000	5,000	16.0	0.147
DYN 25	25,000	6,250	17.2	0.173
DYN 30	30,000	7,500	18.8	0.207
DYN 35	35,000	8,750	19.7	0.231
DYN 40	40,000	10,000	20.5	0.263
DYN 45	45,000	11,250	22.1	0.298
DYN 50	50,000	12,500	23.2	0.327
DYN 55	55,000	13,750	24.3	0.364
DYN 60	60,000	15,000	25.5	0.398
DYN 65	65,000	16,250	26.3	0.431
DYN 70	70,000	17,500	27.2	0.464
DYN 75	75,000	18,750	28.0	0.497
DYN 80	80,000	20,000	28.8	0.530
DYN 85	85,000	21,250	29.6	0.563
DYN 90	90,000	22,500	30.5	0.596
DYN 95	95,000	23,750	31.4	0.630
DYN 100	100,000	25,000	32.5	0.755

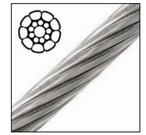
COMPARISON BETWEEN PBO-ZYLON®, NITRONIC 50 ROD, DYFORM WIRE CABLE

PBO-ZYLON							NITRONIC 50			DYFORM		
CODE	MAX WORKING LOAD	BREAKING LOAD	DIAMETER	WEIGHT	EA	STRETCH EQUIVALENT	DIAMETER	WEIGHT	BREAKING LOAD	DIAMETER	WEIGHT	BREAKING LOAD
	[daN]	[daN]	[mm]	[Kg/m]	[MN]	[DASH]	[mm]	[Kg/m]	[daN]	[mm]	[Kg/m]	[daN]
PB 3.0	750	3,000	5.8	0.043	2.20	**-3**	-	-	-	-	-	-
PB 3.7	925	3,700	6.2	0.047	2.70	**-4**	4.37	0.118	2,130	5.0	0.124	2,100
PB 4.0	1,000	4,000	6.3	0.050	3.00	**-5**	-	-	-	-	-	-
PB 4.5	1,125	4,500	6.5	0.054	3.50	**-6**	5.03	0.156	2,860	6.0	0.178	3,000
PB 5.3	1,325	5,300	7.0	0.058	4.20	**-7**	-	-	-	-	-	-
PB 6.2	1,550	6,200	7.6	0.063	4.95	**-8**	5.72	0.202	3,720	7.0	0.243	4,100
PB 7.5	1,875	7,500	8.0	0.072	6.10	**-10**	6.35	0.249	4,670	8.0	0.322	5,400
PB 9.2	2,300	9,200	9.4	0.080	7.72	**-12**	7.14	0.314	5,670	-	-	-
PB 10.3	2,590	10,360	9.7	0.086	8.56	**-15**	7.52	0.349	6,460	-	-	-
PB 12.9	3,237	12,950	10.5	0.105	10.94	**-17**	8.38	0.434	7,940	10.0	0.502	8,600
PB 17.3	4,340	17,360	11.7	0.130	13.74	**-22**	9.53	0.56	10,200	12.0	0.717	11,100
PB 22.4	5,602	22,410	13.6	0.162	18.66	**-30**	11.10	0.761	13,600	14.0	0.973	14,300
PB 28.1	7,037	28,150	15.2	0.197	24.43	**-40**	12.70	0.996	17,200	16.0	0.128	18,700
PB 35.3	8,837	35,350	17.1	0.250	30.85	**-48**	14.27	1.258	21,800	19.0	1.760	23,800
PB 49.6	12,402	49,610	19.5	0.350	42.55	**-60**	16.76	1.735	27,200	22.0	2.360	30,500
PB 57.3	14,325	57,300	21.0	0.401	48.59	**-76**	17.91	1.98	34,500	-	-	-
PB 67.2	16,800	67,200	22.8	0.470	57.66	**-91**	19.51	2.349	40,800	26.0	3.300	42,400
PB 86.3	21,575	86,300	25.7	0.597	74.83	**-115**	22.23	3.049	52,200	28.0	3.890	46,400
PB 112.0	28,000	112,000	29.5	0.770	97.74	**-150**	25.40	3.983	68,000	-	-	-

PBO-Zylon Cable



Nitronic 50 Rod



Dyform Rod

CUSTOM SIZE - As well as standard range sizes, Armare Ropes is able to produce cables to any given stretch equivalent, break strength or diameter

HOW TO USE THE COMPARATIVE TABLE STARTING FROM CERTAIN DATA

EA – AXIAL STIFFNESS: EA = L x F / **Δ**L (L = Length of the rope F = Applied force**,** Δ L = Elongation)
DIAMETER – Overall rod diameter (Nitronic 50)
DASH SIZING - BREAKING STRENGTH IN THOUSANDS OF POUNDS: I.E. -10 = 10,000 LB BREAKING STRENGTH. This number identifies a specific diameter of rod N50 with the respective EA

Terminals

Overview

To complete cables, Armare Ropes offers a wide range of terminals for pin or lashing, threaded terminals, purchase and torsional.

Many products that are sold on the market, apply systems of friction / cone / plug, which require the use of metal fitting with a consequent increase of complexity and weight.

Armare Ropes suggests the simplest and most effective solution for the terminals of the cable thanks to the resin mould, in which the technical fibers and the metal fitting are directly encapsulated.

Armare Ropes has developed a complete range of terminals to meet different installation needs, both for pin or for lashing. High efficiency torsional terminals are also available for use on furlers and drums.

Lastly the new innovative HTS (hanger with threaded stud) terminals eliminate the need to use a toggle for connection with existing fitting such as turnbuckles. All terminals are available in a wide range of sizes and with different breaking loads.

THREADED TERMINALS (HTS)

End fitting which eliminates the need to use toggle for connection with existing fitting such as turnbuckles.

THREADED TERMINALS (HTS)

End fitting which eliminates the need to use toggle for connection with existing fitting such as turnbuckles.

PIN TERMINALS

Terminals with custom holes for use with fixing pins, forks and toggles.

LASH TERMINALS

Rounded hole terminals designed to allow the passage of single braid Dyneema® lashings or unidirectional loops and strops.

AT PIN TERMINALS (AT)

Torsional terminals for use with pin on foresails furling system.

AT LASH TERMINALS (AT)

Torsional terminals for use with lash on foresails furling system.

AT FORK TERMINAL

Torsional AT terminal with a fork and a captive pin to join two torsional cables. Ideal for AT strops for flying headsails.

PURCHASE LIGHT TERMINALS (PLT)

3:1 purchase fitting, ideal for runners. Lightweight aluminum alloy construction with surface treatment to improve hardness and reduce friction of the line. The ideal fitting for runners purchase.

PURCHASE TERMINALS (PT)

4:1 Purchase fitting, eliminates the need of a block saving weight and maintenance. The ideal fitting for runners purchase.

HTS Terminals

End fitting which eliminates the need to use toggles for connection with existing fittings (e.g. turnbuckles) allowing direct connection to a threaded terminal (inside thread). Innovative design fittings keeping low dimensions and weight, thanks to the use of very high strength stainless steel. The terminals are available in a wide range of threads and breaking / working loads, with the possibility of further increasing the breaking load through specific optional treatments. In case of thread damage it is possible to repair it, preserving the cable and thus reducing the intervention costs. Finally, it is possible to interface the cable directly to the mast (captang system boomerang through bar spreaders).

The flexibility and customization of the solutions is a plus that distinguishes the Armare Ropes offer; the different terminals allows multiple configurations, which make it possible to satisfy the most varied needs.

In addition to the standard configurations, Armare Ropes technicians are available for the development of custom projects of all kinds, also to adapt to existing equipment during retrofit interventions.

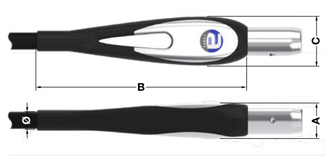
THE THREE VERSIONS OF HTS TERMINALS

HTS Terminal outside thread

HTS Terminal inside thread + stemball

HTS Terminal inside thread + telescopic turnbuckle

DIFFERENT TERMINALS IN COMPARISON
A) PIN terminal with fork and turnbuckle
B) HTS inside thread terminal + telescopic turnbuckle
C) HTS outside thread terminal + classic turnbuckle



INSIDE THREADED

OUTSIDE THREADED

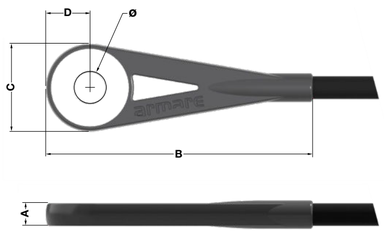
HTS SERIES TERMINALS DIMESIONS

SIZE		DIMENSIONS			MAX CABLE	OUTSIDE THREAD		INSIDE THREAD
	dash	A	B	C	Ø	MAX SIZE	STANDARD THREAD LENGTH	MAX SIZE
	-	[mm]	[mm]	[mm]	[mm]	UNF	[mm]	UNF
A	-17	21.5	128.0	30.0	10.5	5/8"	100.0	1/2"
B	-40	29.0	179.0	42.5	15.0	7/8"	100.0	3/4"
C	-60	38.0	218.0	52.5	19.0	1"	150.0	7/8"
D	-91	50.0	296.0	68.5	28.0	1-1/4"	200.0	1-1/8"

NOTES
- Metric thread also available
- Custom thread length available on request
- Material: high mechanical strenght stainless steel
- For every customisation needs please contact our technical office

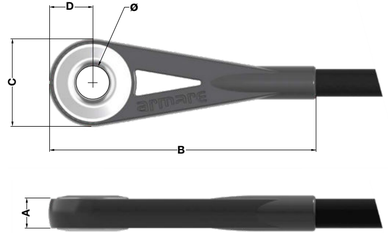
Pin / Lash Terminals

PIN TERMINALS DIMENSIONS



SIZE	A	B	C	D	Ø MAX PIN
	[mm]	[mm]	[mm]	[mm]	[mm]
AA	7.5	60	26	13	10.0
A	9.5	102	35	17	12.0
Bz12	12.0	138	46	23	16.0
Bz14	14.5	138	46	23	16.0
C	17.0	159	52	26	22.0
D	20.0	185	60	30	26.0
E	23.0	219	70	35	30.0
F	27.0	234	76	38	35.0
G	33.0	282	86	43	38.0
H	40.0	347	98	49	49.0

LASH TERMINALS DIMENSIONS

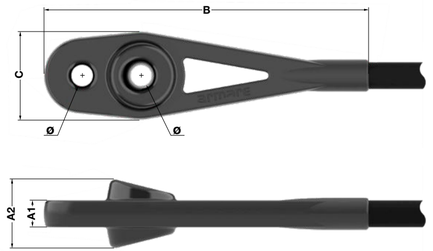


SIZE	A	B	C	D	Ø
	[mm]	[mm]	[mm]	[mm]	[mm]
00	7.5	60	26	13	8.0
0	9.5	102	35	17	11.0
1	14.5	138	46	23	17.0
2	17.0	159	52	26	21.0
3	20.0	185	60	30	24.0
4	23.0	219	70	35	26.0
5	27.0	234	76	38	28.0
6	33.0	282	86	43	32.0

Purchase Terminals

Armare Ropes has developed this new kind of fittings specified made for runners. The fiber cable is integrated in the terminal that works also as a 3:1 purchase; so the block is no longer necessary, significantly reducing the weight of the runner. This very lightweight fitting is made in aluminum alloy CNC machined, hard anodized with thick anti-friction surface treatment (PTFE) that allows a low friction of the rope. The result is a lightweight and small size terminal that do not require any additional block/ loop, and, above all,
no maintenance.

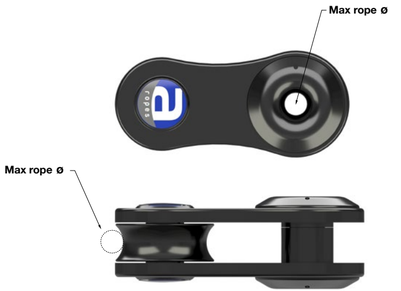
PURCHASE LIGHT (PLT) TERMINALS DIMENSIONS



SIZE	A1	A2	B	C	HOLES Ø	WEIGHT
	[mm]	[mm]	[mm]	[mm]	[mm]	[g]
A - PLT	11	28	165	45	10	80
B - PLT	14	36	190	52	12	119
C - PLT	19	47	220	60	14	208

PURCHASE (PT) TERMINALS

The runner lower end is connected to a low weight 4:1 purchase system that was specifically designed to fit with our pin terminals. The Purchase Terminal components are made in aluminum alloy hard anodized; the components subjected to friction are treated with thick anti-friction surface treatment (PTFE) that allows a low friction of the rope in the hole, while the pulley is installed on a low friction no-maintenance bearing.

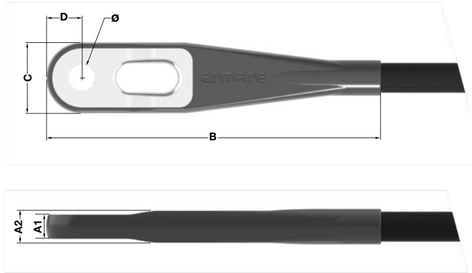


SIZE	ROPE Ø	WEIGHT	PIN TERMINAL
	[mm]	[g]	
A - PT	6	125	A
B - PT	8	171	B
C - PT	10	222	C
D - PT	12	295	D

Torsional Terminals (AT)

The Torsional terminals are designed to be used coupled with no-torsion cables, typically linked by swivel to foresail furler.
Its special construction, with a high-strength steel body inside the terminal, gives it extreme rigidity, hence the optimal torque transmission during operation, even in high load conditions. The torsional terminals are available in both Pin + Lashing and only Lashing versions.

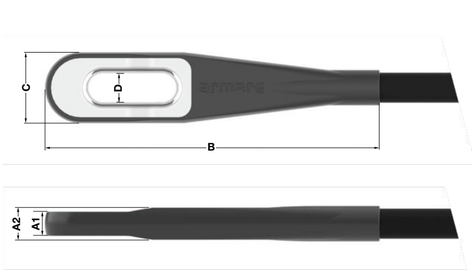
AT SERIES / PIN - LASHING



AT TERMINALS DIMENSIONS

SIZE	A1	A2	B	C	D	Ø MAX PIN
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
AT1	10.8	15.0	145	29	14.5	11.0
AT2	15.5	19.5	165	40	20.0	15.0
AT3	18.5	24.5	235	54	27.0	20.0
AT4	18.5	33.0	315	90	35.0	25.0
AT5	27.0	42.0	315	90	45.0	28.0

AT SERIES / LASHING



AT LASH DIMENSIONS

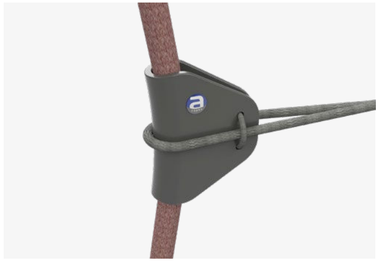
SIZE	A1	A2	B	C	D
	[mm]	[mm]	[mm]	[mm]	[mm]
AT1 LASH	10.8	15.0	145	29	14.5
AT2 LASH	15.5	19.5	165	40	20.0
AT3 LASH	18.5	24.5	235	54	27.0
AT4 LASH	18.5	33.0	315	90	35.0
AT5 LASH	27.0	42.0	315	90	45.0

Accessories

THF - THREADED FORK
Fitting designed to match with our pin terminal to allow a threaded stud such as ball stud or turnbuckle.

ARA - ROD ADAPTOR
Adaptor ideal for retrofit: it allows to replace the previous rod rig with a textile one, without changing the existing fitting such as turnbuckles, cups, etc.

LP - LINK PLATE
Designed to connect the forestay to the strop.



DFS - DEFLECTOR FRICTION SHEAVE
The solution for deflectors without stress for runners.

Lateral Rig / NEW BUILD APPLICATIONS

A — UPPER END FITTING

LR-A1 Lash fitting.
LR-A3 Stemball cap (cap tangs/twin tangs/micro tangs): HTS fitting (inside threaded) with existing or brand-new custom stemball
LR-A5 Pin terminal and THF fork with T-terminal.

B — INTERMEDIATE DIAGONAL

LR-B1 HTS fitting and turnbuckle; spreader bracket attachment.
LR-B2 Existing cap tangs/thrubar for rod. HTS fitting and turnbuckle, existing or brand new one.
LR-B4 HTS fitting (inside threaded) with existing or brand new custom T terminal.
NOTE: IT IS NECESSARY TO GET THE ORIGINAL T TERMINAL OR ITS OVERALL DIMENSIONS/ PART NUMBER/ BRAND

C — UPPER SPREADER TIP

LR-C1 Spreader tip with shroud backing. The shrouds are tightened by a lash Check if the existing shroud seat can fit with new cable; eventual adaption of the shroud seat.
LR-C2 Sparcraft type spreaders: replacing only spreader tips with one that fit our cables.

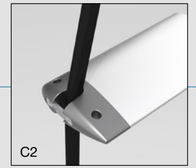
D — INTERMEDIATE / LOWER SPREADER TIP

LR-D3 Sparcraft type spreaders: replacing spreader tips only with one that fit our cables.
LR-D4 Spreader tip with shroud backing. The shrouds are tightened by a lash Check if the existing shroud seat can fit with new cable; eventual adaption of the shroud seat.

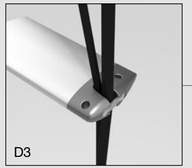
E — LOWER END VERTICAL / DIAGONAL SHROUD

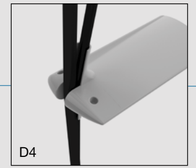
LR-E1 Only pin terminal.
LR-E2 Pin terminal with toggle and turnbuckle.
LR-E3 HTS fitting outside threaded with threaded stud and telescopic turnbuckle.
LR-E4 HTS fitting inside threaded with threaded stud and telescopic turnbuckle.
LR-E5 HTS fitting outside threaded and telescopic turnbuckle.

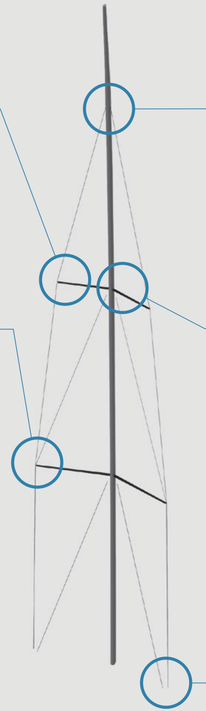
C - UPPER SPREADER TIP



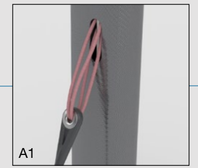
D - INTERMEDIATE / LOWER SPREADER TIP

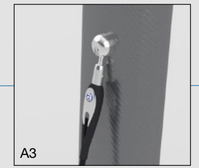


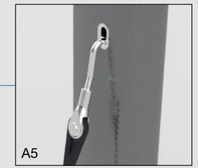




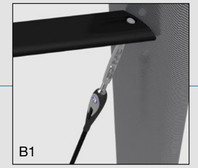
A - UPPER END FITTING

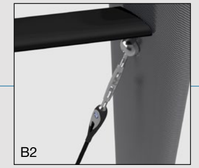


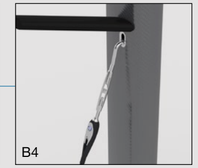




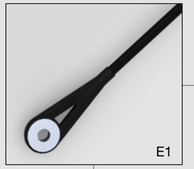
B - INTERMEDIATE DIAGONAL

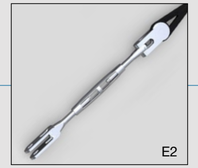






E - LOWER END VERTICAL / DIAGONAL SHROUD





NOTES
Installations shown in the boxes are the most used ones. Other combinations of our fittings could be feasible. Contact our technicians to check different solutions together.

Armare fittings are designed to fit with the most of existing carbon or aluminum masts. Our technical dept. is able to lead the customer to the successful replacement suggesting the best feasible solution; we are also able to design and realize fully customizable fittings to satisfy any customer's needs.

THF: Threaded Fork (see page 37)
HTS: Hanger Threaded Stud (see page 32)

Lateral Rig / RETROFIT APPLICATIONS

A — UPPER END FITTING

A2 End fitting with pin attachment such as fork, or toggle.
A3 Stemball cap (cap tangs/twin tangs/micro tangs): HTS fitting (inside threaded) with existing or brand-new custom stemball.
A4 HTS fitting (inside threaded) with existing or brand-new T-terminal.
A5 Pin terminal and THF fork with T-terminal.

B — INTERMEDIATE DIAGONAL

B1 HTS fitting and turnbuckle; spreader bracket attachment.
B2 Existing cap tangs/thrubar for rod. HTS fitting and turnbuckle, existing or brand new one.
B3 Existing eye tang. Pin fitting and turnbuckle, existing or brand new one.
B4 HTS fitting (inside threaded) with existing or brand new custom T terminal.

C — UPPER SPREADER TIP

C1 Spreader tip with shroud backing. The shrouds are tightened by a lash Check if the existing shroud seat can fit with new cable; eventual adaption of the shroud seat.
C2 Sparcraft type spreaders: replacing only spreader tips with one that fit our cables.

D — INTERMEDIATE / LOWER SPREADER TIP

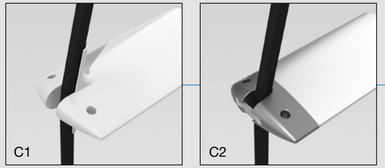
D1 Spreader end for rod tip cup: replacement of tip cup with brand new one made of aluminum alloy to fit the original seat into the spreader.
D2 Linked rig: re-use the original end spreader tip pin, making a brand-new plastic pulley (UV resistant) for backing the shrouds.
D3 Sparcraft type spreaders: replacing spreader tips only with one that fit our cables.
D4 Spreader tip with shroud backing. The shrouds are tightened by a lash Check if the existing shroud seat can fit with new cable; eventual adaption of the shroud seat.

E — LOWER END VERTICAL/DIAGONAL SHROUD

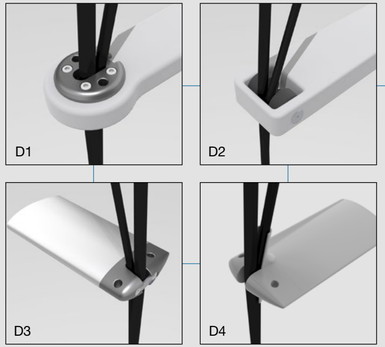
E1 Only pin terminal.
E2 Pin terminal with toggle and turnbuckle.
E3 HTS fitting outside threaded with threaded stud and telescopic turnbuckle.
E4 HTS fitting inside threaded with threaded stud and telescopic turnbuckle.
E5 HTS fitting outside threaded and telescopic turnbuckle.

NOTES
THF: Threaded Fork (see page 37)
HTS: Hanger Threaded Stud (see page 32)

C - UPPER SPREADER TIP



D - INTERMEDIATE / LOWER SPREADER TIP



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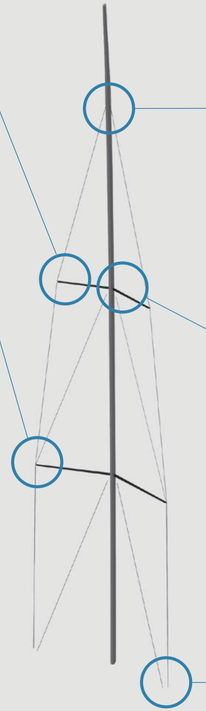
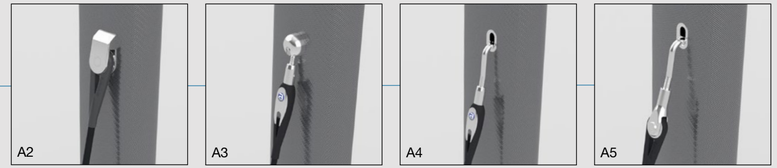
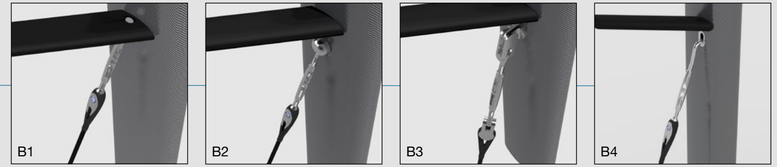


A - UPPER END FITTING



B - INTERMEDIATE DIAGONAL



E - LOWER END VERTICAL / DIAGONAL SHROUD

Fore & Aft Cables / APPLICATIONS

A — FORESTAY UPPER END

A1 Pin fitting for mast forestay pin connection (nose).
A2 Lash terminal for basket loop connection.

B — FORESTAY LOWER END

B1 HTS fitting outside threaded with turnbuckle;
ideal choice to replace an existing rod forestay
B2 Pin terminal with toggle and turnbuckle.
B3 Pin terminal with linkplate and strop connected to forestay jack.

C — BOBSTAY

C1 HTS fitting inside threaded + threaded rod fitted through stempost with nut (also spherical) placed into fore locker.
C2 Pin terminal with threaded fork fitted with nut (also spherical) placed into stempost.
C3 HTS terminal inside threaded with threaded stud; ideal to replace rod bobstay or brand new one.
C4 Lash terminal with loop fitted in the bowsprit end.

D — INNER / BABY STAY

D1 Same options as Bs; in case of hanks sails we apply an extra cover to protect the cable against friction.

E — RUNNERS

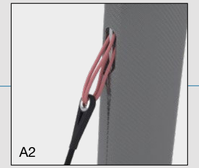
E1 Purchase Terminal (PT) 4:1 designed to fit with a Pin terminal.
E2 Purchase Light Terminal (PLT) 3:1 with low friction.

F — BACKSTAY

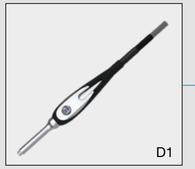
F1 Single cable with Pin fitting at both ends.
F2 Y configuration backstay with connection plate.
F3 Y configuration splitted backstay, without connection plate to save weight.

NOTE: installations shown in the boxes are the most used ones. Other combinations of our fittings could be feasible. Contact our technicians to check different solutions together.

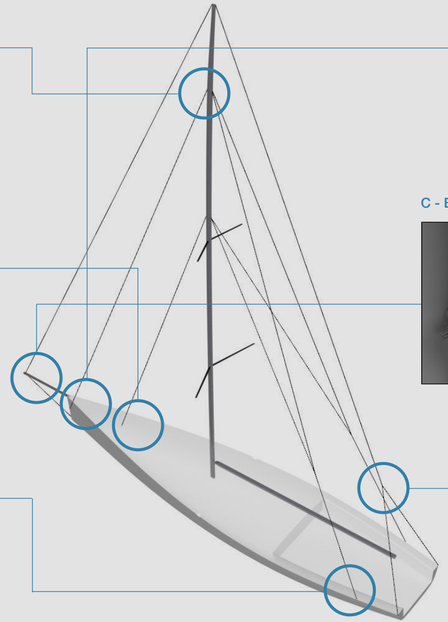
A - FORESTAY UPPER END



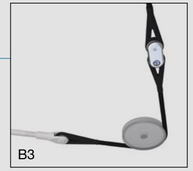
D - INNNER / BABY STAY



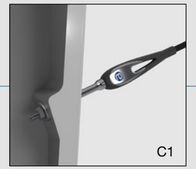
E - RUNNERS

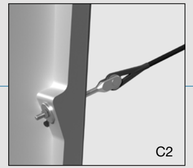


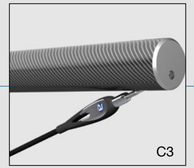
B - FORESTAY LOWER END

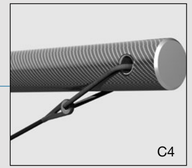


C - BOBSTAY

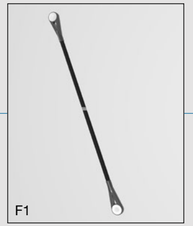


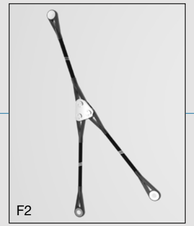


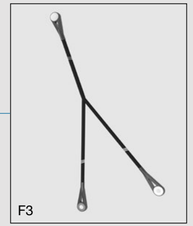




F - BACKSTAY







Torsional Cables / APPLICATIONS

A — BOTTOM UP

A1 AT fitting Pin and furler for Code 0 sail.

A2 AT lash and Tack plate connected to furler.

B — TOP DOWN

B1 AT fitting Pin and furler for gennaker.

C — TORSIONAL STRUCTURAL CABLE

C1 Upper end: Armare's torsional terminals are fully compatible with patented.

C2 Lower end: AT fitting for pin connected to furler (Pin connection).

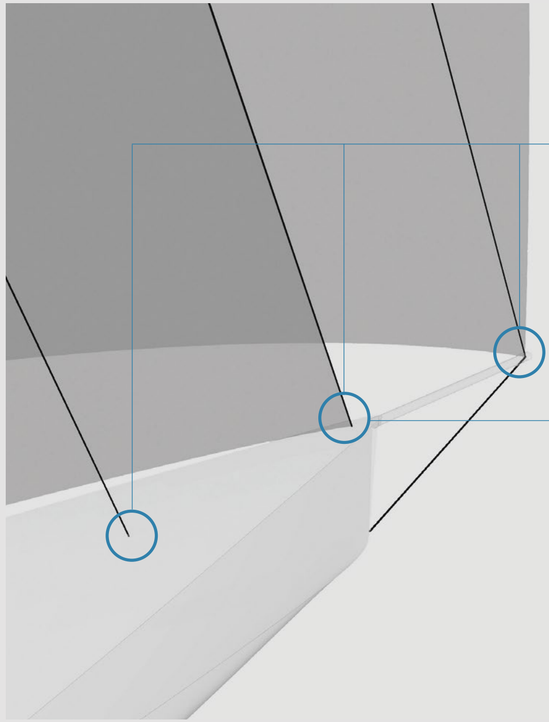
C3 Lower end: if the furler connection is threaded type, a fork adaptor it is necessary to connect forestay to the drum.

C4 Upper end: Anti torsion fitting and Dyneema® basket loop for swivel.

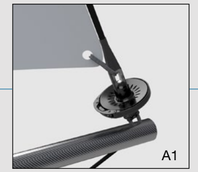
RETROFIT

Armare Ropes fittings are designed to fit with the most existing carbon or aluminum masts. Our technical dept are able to lead the customer to the successful replacement of the new Armare Ropes rig and to suggest the best solution; we are also able to design fully customable fittings to satisfy any customer's needs.

NOTE: installations shown in the boxes are the most used ones. Other combinations of our fittings could be feasible. Contact our technicians to check different solutions together.

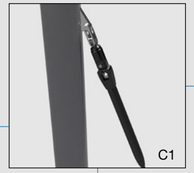


A - BOTTOM UP



B - TOP DOWN

C - TORSIONAL STRUCTURAL CABLE



Multihull / APPLICATIONS

A1 — CAP / LOWER SHROUDS UPPER ENDS

Used to supply Lash terminal or HTS + rod adaptor to fit with cups.

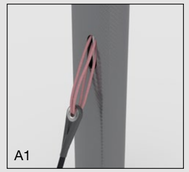
A2 — CAP / LOWER SHROUDS LOWER ENDS

Armare Ropes supply HTS terminal outside threaded both for brand new projects or retrofit; in that case it is possible to make a threaded stud exactly the same of the existing one. Other solutions are feasible, such as Pin terminal with turnbuckle.

B1-B2 MARTINGALE

One side with Pin terminal, the other one with HTS terminal with threaded stud. The other end (image B2) with HTS terminal with threaded stud directly connected to turnbuckle; other solutions are available such as Pin terminal with turnbuckle.

NOTE: installations shown in the boxes are the most used ones. Other combinations of our fittings could be feasible. Contact our technicians to check different solutions.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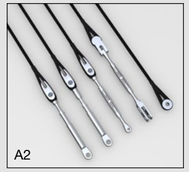
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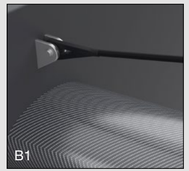
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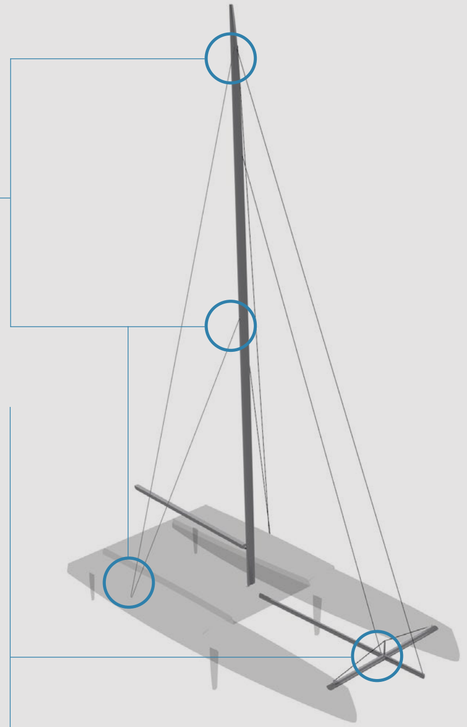
B2



Special Applications

A1 — TIE ROD

Many options are available for this type of cable; in the example an HTS outside threaded and turnbuckle at lower end; upper end with Pin terminal and toggle.

A2 — OUTRIGGER

Special application mainly on IMOCA class, the cable could be splitted (as in the image) with two upper ends, or single ended.

A3 BACKSTAY DEFLECTOR (UPPER LEG)

Solution with a Deflector Friction Sheave (DFS). An additional cover on the backstay protects it against friction.

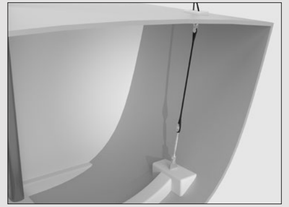
A4 BACKSTAY DEFLECTOR (LOWER LEG)

A single cable allow the connection between deflector's upper leg and tensioner.

A5 STEERING CABLES

Classic steel wire can be replaced effectively by textile cables, gaining in weight and safety.

NOTE: installations shown in the boxes are the most used ones. Other combinations of our fittings could be feasible. Contact our technicians to check different solutions together.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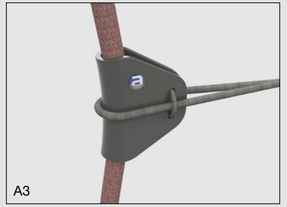
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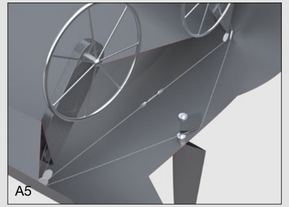
A2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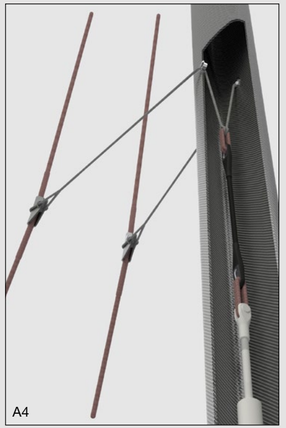
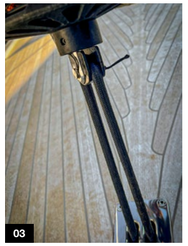

A4

Textile Loops and Strops / APPLICATIONS

As a complement to furling cables, forestays and shrouds, Armare Ropes designs and builds custom loops and strops making use of Dyneema® fiber properly treated. All loops are hand-made, following the technical specifications of the single project, in order to ensure optimal performance in terms of lightness, durability, flexibility, maximum working load and stretch.


01


02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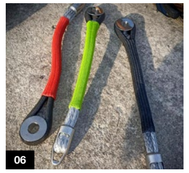
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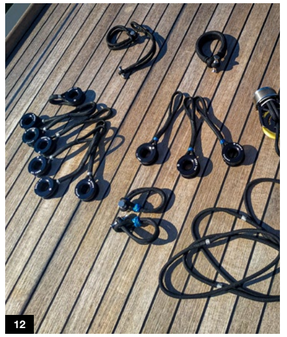

12

APPLICATIONS EXAMPLES

01 — Custom sized loops with T-Bone
02 — Forestay unidirectional loop for rake steps adjustment onboard Frers 63
03 — Unidirectional strop for connection between furler drum and hydraulic jack
04 — Custom strops with T-Bone
05 — Forestay strop onboard NEO 570
06 — Custom sized lock strops
07 — Deflector unidirectional loop oboard Mylius 60 CK
08 — Deflector unidirectional strop oboard MAXI 72
09 — Backstay connection loop onboard SWAN 45
10 — Additional snatch block used with the swivel of a furling unit to create a 2:1 halyard
11 — Custom loops to be added / integrated with cables terminal
12 — Loops and strops for various uses onboard

Furling lines specifically designed for use with various furlers; they can be made with various cores and covers, which can be integrated with the addition of markers to distinguish the furling direction. An additional snatch block can be used with furling lines.

Maintenance & Service

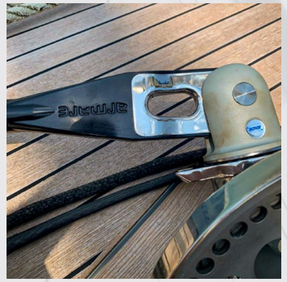
Thanks to the tests made in different and real sailing conditions on board of boats having highly different performances, armare can guarantee the durability of its composite cables if properly used. They can last in perfect working conditions for many years, even longer than the corresponding steel rod cables, fulfilling the sailor's expectation of performance.

CABLE LIFE GUIDELINES

CONSTANT LOADS
For vertical rigging and forestays the best choice is PBO®- Zylon, thanks to its exceptional resistance under constant loads. Over the years, PBO®- Zylon cables are proving to be extremely durable and resistant, even more lasting than the corresponding cables in Nitronic steel rod.

LOAD / OFF-LOAD
The rig are subject to very intensive loads, then they are fully un-loaded or even go negative (e.g. the rigging downwind sailing upwind). Even for these items, PBO®- Zylon is the best fiber, but suggested reduced intervals of inspection and maintenance.

TORSIONAL LOAD (RUNNING/TORSIONAL)
Although the torsional cables can be structural, they need a particular device in the construction, because it is necessary to provide excellent transmission of the torque along the cable, while maintaining good flexibility and allowing shipping. These cables are made of PBO®- Zylon, Kevlar® or Dyneema® and are more and more common and used. Armare Ropes torsional cable, structural and non-structural, have always proved characteristics of high efficiency and durability.



Quality Control

The production of a composite cable follows strict procedures, which assure the complete quality control of each cable. From design to testing, Armare records the technical features of each cable, in order to deliver to the customer a safe and guaranteed product; depending on the specific use of the cable, Armare Ropes contacts the registered client when it is necessary to program a cycle of inspections and service.

MAINTENANCE ADVICE

While cruising the weight/diameter optimization is secondary to longevity and the cable life may be decided from the design process. After 3 to 4 years (for race boats) and after 4 to 6 years (for cruising boats), Armare Ropes recommends sending back all the cables to the factory for an inspection service and testing cycle: the results of these tests provide guidance on whether or not, rigging elements need to be replaced.

The Engineering Department of Armare Ropes is composed of a group of highly qualified technicians that offer permanent technical assistance for the cables and if necessary they can also do the inspection on board. The terms here below are indicative and split, depending on the use and the navigation features the cable is usually subjected to. Generally speaking, a visual inspection should be made once a year as well as deeper inspections at suggested intervals. E.g. cables that are subjected to torsion need intervals of maintenance that are three times longer than the cables that are put under constant loads.

CABLES STORAGE
When mast is un-stepped the cables are to be kept coiled (max diam. possible of the coil) and in a clean, dry and safe space; avoid to keep them exposed to environment agents such as direct sunlight, rain, etc, and to twist them. Moreover put the cables far from acids, oils and other chemicals.

Service Intervals

CABLES INSPECTION

[A]: MAST STEPPED – VISUAL INSPECTION
- Monitoring cables for signs of damage, abrasion points, breaks in the cover
- Check all fittings: look for severe wear, bent pins, corrosion and cracks
- Monitoring end fittings and eventual heat shrink sleeve on either ends

[B]: MAST STEPPED – VISUAL INSPECTION
- Un-jack the mast if present or release the rig load
- Visual inspection like [A]
- Check \ lubrificate all accessible fittings
- Check all screw \ replace, eventually replace thread locker
- Re-tune all the standing rig

[C]: MAST UN-STEPPED – FULL SERVICE
- Un-step the mast
- Complete mast / fitting disassembly
- Visual inspection like [A]
- Metal items: non-destructive testing (NDT) is recommended
- Re-step and tune the mast

MAINTENANCE AND LIFE EXPECTANCY FOR CABLES IN PBO-ZYLON® AND KEVLAR®

		YACHT TYPE	
MAINTENANCE MEASURE		**RACE**	**CRUISE**
A	**Visual inspection**	Frequently (several times per year)	
B	**Visual inspection** (mast in – jack down)	At least once per year	
C	**Full service inspection** (mast un-stepped)	At least every 2 years	At least every 3 years

Note: Check Armare Ropes production data via NFC

CABLES LIFESPAN

Based on Armare's experience and several test carried out both in out laboratory and on board, the cables that has been inspected regularly with no evidence of damage can expect the following life time.

RACE BOATS
LATERAL RIG: 30,000 ÷ 35,000 miles or 4 years*
HEADSTAYS \ D1 \RUNNERS \ BACKSTAYS: 25,000 ÷ 30,000 miles or 3 years*

CRUISE BOATS
LATERAL RIG: 30,000 ÷ 35,000 miles or 5 years*
HEADSTAYS \ D1 \RUNNERS \ BACKSTAYS: 25,000 ÷ 30,000 miles or 4 years*
* whichever comes first

Cables' lifespan can be extended by Armare experts after tests and inspections performed in our factory. The tests are non-destructive and all cables are loaded at SWL comparing results with the cables design parameters.

NFC TECHNOLOGY

NFC technology (Near Field Communication) is an APP that can be downloaded by most of the smartphones. Using a common software and hardware protocol, this technology enables a mobile phone to communicate with TAG put inside of the terminals of composite cables. The connection happens in a short distance (maximum 2 cm) and according to protocols defined by the NFC standard: basically to use NFC you have to lay up your smartphone to the terminal, in order to get all the essential information about the cable, i.e. specific technical data and the date of production. In this way, the definition of the intervals of maintenance and service of every textile standing rigging becomes easy and safe.

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This brochure is not contractual. Armare Ropes reserves the right to modify the specifications without prior notice.
The technical specifications are indicative and subject to change without notice and are not with contractual or commercial proposal.

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armare ropes

via Enrico Fermi, 18 - Z. I. Aussa Corno
33058 San Giorgio di Nogaro (UD) - Italy
Ph +39 0431 65575 / info@armare.it

www.armareropes.com

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Fornitore Ufficiale

OFFICIAL SUPPLIER
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