

Dear Reader,

This is already the fourth edition of our BEXConnect, the second about our maritime ropes. One of the reasons for publication of this new edition are the upgraded specifications. Our continuous research and development has led to better efficiency in the ropes, offering lighter and smaller ropes for the same breaking strength. Our special marine finish is one of the key features in this development, giving the ropes a much better wear resistance in a marine environment. Tests conform ASTM have proven the positive influence of marine finish on the yarn-on-yarn abrasion. On an applied tension of 5% on the yarns we have a difference of app. 31 cycles to failure for a standard yarn and 906 cycles to failure for a yarn with marine finish.

Best example for this continuous research and development is the creation of our BexcoFlex, a composite product of our Bexcord yarn with Polyester. This rope has been introduced successfully in the tanker market, responding to the OCIMF requirements on strength, fatigue life, abrasion and friction resistance and has been accepted by many shipowners as a replacement for nylon and for the no longer accepted PP, both as mooring lines and as tails. You can find the specifications of this BexcoFlex and other ropes in this issue.

Of course we will now start promoting this rope in various other segments in the shipping market.

In this issue, you will not only find the upgraded specifications of our 8 strand ropes, but also of our Ultraline®. This Ultraline® can now already be considered as a standard in the towing market, with supplies to all the major towing operators in Europe. It is also a widely accepted alternative in the cable laying market, where we booked a lot of newbuilding orders and spares in 2001.

The same goes for our Atlas® ropes, where we have been able to increase our market share over the last few years.

Of course we are now also aiming at potential outside Europe, our home market. In this aspect, we have created - besides our already existing distribution network in Australia - new distribution points for our ropes in various ports all over the world, Singapore becoming one of our key distribution points with large stock facilities.

Should you have any further questions, do not hesitate to contact us.

Guy Blondé
Development Manager Maritime

The mooring line for safety, high savings and easy work on board

Atlas® Ropes have been produced and sold successfully into the marine market for 50 years. Experts believe in the fantastic material. Have you ever been in the situation where it comes to saving once life? Low quality materials have been caused dramatic affairs in the past, if container ships or other liners such as ULCC's and VLCC's were not secured properly. And here is the story on the whole idea. When starting the production and registration of the product name Atlas® Ropes in the fifties it was the idea to find an alternative for the old conventional heavy steel ropes and manila respectively sisal ropes. Big advantages of material were found soon and these are the reasons why Atlas® has such a positive reputation in the market.

Synthetic wire ropes have a total stretch of about 18%. Thus, at a load of about 55% of capacity, an Atlas® rope will stretch by only 6 to 7% or, in the case of a 75 meter line, by 4,5 to 5 meters. This is well within the range of most discharge booms so that positioning can be warranted. Because of their reversible stretch properties, synthetic wire ropes are excellent in regaining their shape after having been exposed to a high load. Atlas® ropes allow secure working on board while experiencing gusts of wind and marked differences between high and low water due to their dynamic properties. Damage to the rope is easy to be recognized by the naked eye and damage to the handling crew through loose wires and strands is practically zero.

Compared to all other types of mooring lines, Atlas® ropes are very light in weight. Since they practically float and do not absorb water, they can be used for vessels of virtually any size. In most cases, three crew members are handling two lines each suffice at either mooring or departure. Thus, the time required for the mooring or departures of large vessels can be cut in half and therefore saves labor hours.

Owing to the positive strain properties of synthetic wire ropes, winch corrections at rising tide or during unloading are rarely required. Atlas® ropes are maintenance free and can be repaired

easily by the crew through splicing. Contrary to other types of synthetic lines, Atlas® ropes are developing a protective surface known as fiber felt which protects them against radiation of sun.

Assuming proper use, the life span of Atlas® ropes is very long - as a minimum 15 to 20 years has been experienced. Atlas® ropes are dimensionally stable, flexible, maintenance free, resistant to corrosion and seawater, achieve very high fatigue strength under reserved bending and can be stowed while wet. In principle it is not necessary to have any typical winch design for Atlas® ropes, though the design should allow for the larger disc diameter that is needed for fibre ropes compared with steel ropes and for a correspondingly longer drum. It is particularly advantageous in this respect to separate the winch drum into a working section and a stowing section. That way only parts of the mooring line are getting stressed. After using the rope for a certain period, the mooring line can be turned around so that the unused parts can take over the strain - if necessary.

At relatively small diameters, Atlas® ropes have high strength properties - long term bending tests illustrate the good service performance of Atlas® ropes. The use of Atlas® ropes on modern ships of advanced design make it easier to meet the demands for more economic operation that are made by present day shipping.

Advantages of Atlas® ropes are not a coincidence but based on innovation and professionalism whereas experience and know-how are the keypoints. As a total summary - Atlas® ropes pay fully back and keep you save.



Comparing Ropes Ropes

In the last 20 years there has been a rapid increase in the number of generically different fibres available. Merely at their stress strain properties would indicate little difference between them. However the secondary properties do reveal marked differences between the fibres and these properties should be used to select the fibre for a particular application. The rope construction can capitalise on a fibre's strengths or mitigate its weaker points. For any application careful selection of both the fibre type and the rope construction is essential.

I. FIBRE TYPES

All synthetic fibres are produced from polymers, that is to say from molecules that repeat more or less ad infinitum. Here the polymers commonly used in ropes are briefly discussed.

Polypropylene

For ropes polypropylene is most often produced as split film, whereas other fibres are mostly produced as multi-filament. Polypropylene is chemically inert and has a low density (it floats).

Polyamide

Polyamide was the first synthetic fibre discovered and has the highest elongation of all fibres used in ropes today, but is sensitive to hydrolysis.

Polyester

Polyester is a very reliable fibre with mechanical properties quite close to those of polyamide. The abrasion resistance and the tension-tension fatigue performance of polyester are excellent.

Composite

Composite is a mixed or composite fibre based on polyester and our proprietary bexcord yarn. It combines the abrasion resistance and fatigue life of polyester with the lower density of polyamide.

HMPE

Polyethylene is an amorphous plastic with relatively low tensile strength compared to what would be possible were it aligned and crystalline. Gel spinning is a process which achieves this goal, the generic name for this type of fibres is HMPE (High Modulus PolyEthylene). The fibre has a very high tensile strength, a low density (0.97) and thus it also floats. The fibre has an extremely low coefficient of friction and is extremely resistant to internal and external abrasion. The lifetime in cycling over sheaves is extraordinary.

Here an overview is given of the main fibre properties. Steel is included as a reference.

	Tensile strength N/mm	Modulus of elasticity N/mm%	Elongation to break (yield) %	Density kg/l
Polypropylene	500	4 200	12.0	0.91
Polyamide	850	5 500	18.0	1.14
Polyester	1 050	9 000	12.5	1.38
Composite	650	4 300	15.0	1.14
Gel spun PE	3 300	85 000	3.5	0.97
Steel wire	2 160	200 000	1.1	7.86

II. ROPE TYPES

Various techniques are used to convert fibres into ropes. Fibres can tolerate substantial twist during manufacture and this allows a wide range of possibilities for a rope construction. The basic rope constructions are plaited or braided, parallel yarn or strand and laid ropes.

Here an overview will be given of the typical sizes supplied by BEXCORopes. Our actual product range is wider and many options

and features are available in the various rope designs. Please contact us for additional information.

Plaited Ropes

Plaited ropes are sometimes described as square braids.



They are produced on a plaiting machine containing eight reels, each containing one strand. Groups of two reels interweave as a pair around the other pairs of reels to produce an eight strands rope of a somewhat square cross section. Plaited ropes are torque free.

There are 8 and 12 strand plaited ropes.

Our plaited Ropes are :

1. Polypropylene / 2. Polyester / 3. BexcoPet 138 / 4. Nylon / 5. BexcoLon 114 / 6. Polyethylene / 7. Bexcord 091 / 8. Compo 099 / 9. Compo 110 / 10. BexcoFlex / 11. DeltaFlex 2000

Ultraline® Ropes

The Ultraline® design has been developed to give a rope extra protection against wear and tear without changing the primary characteristics significantly. This has been achieved by braiding a cover over the rope. The core(s) can now be optimised for performance in the application and the cover for wear and abrasion resistance.



There are three basic core designs. The most common is the parallel-strand design. Each of the strands or sub-ropes consists of a 3 strand rope that will be produced in both right-hand lay and left-hand lay. The sub-ropes will be laid parallel to each other. The lay-up of the sub-ropes is such that the finished rope will have a torque-balanced construction. Other designs used are 8 strand plaited cores or 6+1 laid cores. Marine finishes have been developed for each material and put on the cores in order to improve the life expectancy under normal use.

For the cover a number of design choices are available. First is the choice of the material for the cover and then thickness of the cover and interaction with the inner strength member can also be adjusted. Bexcoline Compo 110 is the preferred material for most applications. With its high abrasion resistance and relative low weight this material will maximise the life of the rope.

The same materials are used in the Ultraline® ropes as in plaited ropes, giving similar characteristics. However, because of the higher abrasion resistance, this design Ultraline® Bexcord 091 already has an excellent abrasion resistance.

Six-strand ropes

A laid construction as Atlas® and Caesar lines



are Polyamide, six-strand ropes. They have mono- and multi-filaments in the strands. The mono-filaments give the ropes excellent dimensional stability and abrasion resistance. The stretch of the Polyamide in combination with the dimensional stability makes these lines ideal for mooring, especially on a constant-tension winch.

GENERAL INFO

On simply demand detailed information on rope characteristics, handling, splicing maintenance and repair is available.

Information on our offshore and deepwater lines is given in other publications.

The products described in this paper only give an overview, our actual product range is far more extensive. Also our technical staff is available to develop special products for specific applications.

GENERAL

Plaited ropes of the BEXCOLINE range are well established in marine and off-shore applications, because of their ease in handling and non-rotating behaviour. They are produced on a plaiting machine containing eight reels, each containing one strand, groups of two reels interweave as a pair around the other pairs of reels to produce an eight strand rope of a somewhat square cross section.

BexcoFlex use the BEX-yarn composite fibre with polyester as strength member, with excellent fatigue characteristics and abrasion resistance. A special marine finish is applied to further increase the wear resistance in a marine environment. This finish has been tested conform ASTM D6611-00 and is water repellent. The fatigue life is comparable to pure polyester, but the weight for a given strength is comparable to that of nylon. Wet and dry strength is identical.

Features

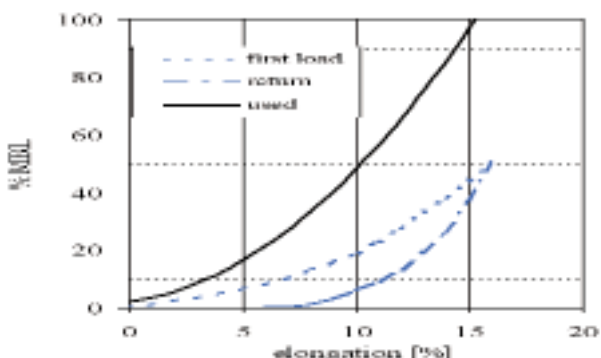
- **Material:** High tenacity BEX-yarn
High tenacity polyester
- **Construction:** 8 strand plaited
- **Treatment:** Marine finish
- **Color of Rope:** White plus a marker yarn
- **Approx. Spec. Gravity:** 1,1 non floating
- **Melting Point:** 165° C / 260° C
- **Abrasion Resistance:** Excellent
- **U.V.resistance:** Good
- **Temperature resistance:** Good
- **Chemical resistance:** Excellent, except in the presence of alkalis
- **Rot/ Mildew Resistance:** Excellent
- **Dry & wet conditions:** Wet strength equals dry strength
- **Range of use:** Fishing, inland shipping, merchant, navy, mooring

New Strongest rope ever



Product code	dia mm	circ "	MBL		Weight	
			tf	kN	kg/100m	kg/coil
429.032.870	32	4	30,6	300	68,5	151
429.036.870	36	4,5	35,2	345	79,5	175
429.040.870	40	5	42,5	417	96,6	213
429.044.870	44	5,5	49,1	482	112	247
429.048.870	48	6	55,7	546	128	282
429.052.870	52	6,5	64,2	630	149	327
429.056.870	56	7	72,7	713	169	372
429.060.870	60	7,5	81,1	796	190	417
429.064.870	64	8	90,3	886	211	465
429.068.870	68	8,5	104	1025	246	542
429.072.870	72	9	113	1107	267	587
429.076.870	76	9,5	134	1315	315	692
429.080.870	80	10	148	1448	348	765
429.088.870	88	11	175	1719	415	913
429.096.870	96	12	205	2014	489	1076
429.104.870	104	13	235	2308	563	1238
429.112.870	112	14	269	2639	646	1421
429.120.870	120	15	301	2951	725	1594
429.128.870	128	16	339	3330	821	1806
429.136.870	136	17	379	3722	920	2024
429.144.870	144	18	416	4081	1011	2225
429.152.870	152	19	464	4551	1131	2489
429.160.870	160	20	507	4971	1239	2726
429.168.870	168	21	563	5526	1381	3038

MBL = Minimum Breaking Load conform ISO 2307



Tested conform ASTM D6611-00

- Coil length: 220m
- Spliced strength: ±10% lower
- Weight and length tolerance: ± 5%
- Diameter: ± 2%



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