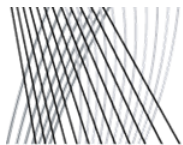


ZenaMix

Technical Datasheet



SoluzioniTessili
ROPE



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ZenaMix is produced for SOLUZIONI TESSILI ROPE by **FOUR BROTHERS ROPE**, the leading company in China in the production of synthetic fibre ropes.

With more than 70 years of experience in the field and an annual productive capacity of 35.000 Tons, **FBR** is a high-tech reality with focus on R&D and decades of experience in the extrusion of synthetic fibres.

With this background **FBR** selects and uses only top-quality polymers to internally extrude high tenacity Polyester and high tenacity Polyolefin fibres, that are then perfectly balanced to produce our ZenaMix.

FBR is a ISO 9001 certified company and IMPA approved supplier, and works following the operation principle of pursuing first-class quality.



SPECS

ZenaMix Floating 8/12 strd					
Diameter	Circ	Weight		MBL	LDBF
<i>mm</i>	<i>Inches</i>	<i>Ktex</i>	<i>Kg/100m</i>	<i>Tons</i>	<i>Tons</i>
24	3	336	33,64	14,0	12,5
28	3 1/2	459	45,91	18,6	16,6
32	4	595	59,55	23,9	21,3
36	4 1/2	741	74,09	31,1	27,8
40	5	914	91,36	37,6	33,6
44	5 1/2	1.091	109,09	44,8	40,0
48	6	1.318	131,82	51,7	46,2
50	6 1/4	1.409	140,91	56,0	50,0
52	6 1/2	1.500	150,00	60,0	53,6
56	7	1.791	179,09	69,4	62,0
60	7 1/2	2.005	200,45	79,5	71,0
64	8	2.259	225,91	88,5	79,0
70	8 3/4	2.691	269,09	105,3	94,0
72	9	2.841	284,09	110,9	99,0
80	10	3.491	349,09	134,4	120,0
85	10 1/2	3.932	393,18	152,3	136,0
90	11 1/8	4.400	440,00	170,2	152,0
96	12	5.000	500,00	192,6	172,0
104	13	5.859	585,91	226,2	202,0
112	14	6.741	674,09	261,0	233,0

RAW MATERIAL:	Polyester / Mixed Polyolefins
CONSTRUCTION	8/12/24 strands
JACKETED	No
COLOR	White
SPECIFIC GRAVITY:	0,99
MELTING POINT:	265°C / 165°C
ELONGATION AT 50% of BL:	9%
ABRASION RESISTANCE	Very good
UV RESISTANCE	Very good

- More diameters available on request.
- Weight and length tolerance: $\pm 5\%$
- LDBF refers to the Line Design Break Force, the minimum force that a new, dry, spliced mooring line will break at when tested, according to OCIMF MEG₄ recommendations.

SPECS

ZenaMix Sinking 8/12 strd					
Diameter	Circ	Weight		MBL	LDBF
<i>mm</i>	<i>Inches</i>	<i>Ktex</i>	<i>Kg/100m</i>	<i>Tons</i>	<i>Tons</i>
24	3	353	35,32	15,4	13,8
28	3 1/2	482	48,20	20,5	18,3
32	4	625	62,52	26,2	23,4
36	4 1/2	778	77,80	34,2	30,6
40	5	959	95,93	41,4	37,0
44	5 1/2	1.145	114,55	49,3	44,0
48	6	1.384	138,41	56,9	50,8
50	6 1/4	1.480	147,95	61,6	55,0
52	6 1/2	1.575	157,50	66,0	59,0
56	7	1.880	188,05	76,4	68,2
60	7 1/2	2.105	210,48	87,5	78,1
64	8	2.372	237,20	97,3	86,9
70	8 3/4	2.825	282,55	115,8	103,4
72	9	2.983	298,30	122,0	108,9
80	10	3.665	366,55	147,8	132,0
85	10 1/2	4.128	412,84	167,6	149,6
90	11 1/8	4.620	462,00	187,3	167,2
96	12	5.250	525,00	211,9	189,2
104	13	6.152	615,20	248,9	222,2
112	14	7.078	707,80	287,1	256,3

RAW MATERIAL:	Polyester / Mixed Polyolefins
CONSTRUCTION	8/12/24 strands
JACKETED	No
COLOR	White
SPECIFIC GRAVITY:	1,10
MELTING POINT:	265°C / 165°C
ELONGATION AT 50% of BL:	9%
ABRASION RESISTANCE	Very good
UV RESISTANCE	Very good

- More diameters available on request.
- Weight and length tolerance: $\pm 5\%$
- LDBF refers to the Line Design Break Force, the minimum force that a new, dry, spliced mooring line will break at when tested, according to OCIMF MEG₄ recommendations.

ZenaMix

ZenaMix is a special composite rope that mixes yarns from high tenacity Polyester and high tenacity Polyolefins. This combination, together with the rope construction, assure flexibility and good handling, always guaranteeing that the rope maintains its round shape even under heavy stress conditions.

This makes ZenaMix our best seller for mooring applications, indeed its technical characteristics make this product ideal to respond to the needs of all types of modern vessels, both passengers or cargo.



The yarns of the two fibres are twisted and then combined in different percentages to obtain the two main versions of the product, floating (with a mix of 30% PES and 70% Polyolefins) and non-floating/sinking (50% - 50%).


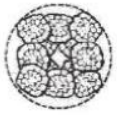
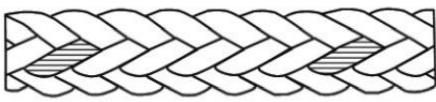

These mixes of course are also studied in order to guarantee the best response of the final product to the phenomena of chafing and abrasion, that causes a great increase in the temperature of the fibres. Polyester has a higher melting point than Polyolefins (260° C vs 165° C), for this reason it is twisted on the external side of each singular strand, creating a protective layer that ensures a longer life of the rope even under heavy stress conditions.



Of course, many other aspects deeply influences the wear resistance of the rope and, consequently, its lifespan.

- Linear Density: this value indicates the mass per unit length of the rope. A higher value generally corresponds to a heavier rope, a higher bearing surface of material and a higher MBL.

- The number of twist per meter of each single yarn and strand. A higher nr of twist corresponds to a higher resistance to chafing, due to the fact that this means a larger contact surface of the rope. On the contrary, the more the fibres are twisted, the more the MBL drops.
- On the same way, the pitch of a rope influences its resistance and its MBL. Generally, a longer pitch corresponds to a higher MBL and a lower response to abrasion, while a shorter pitch will lead to a larger contact surface at the expense of a lower MBL.

ROPE CONSTRUCTIONS			
8-strand			Torque Balanced
12-strand			Torque Balanced

The correct choice in the decision of all the above-mentioned aspects is fundamental in order to obtain a perfectly balanced rope that mixes a high MBL together with a great resistance to wear, and therefore with a higher lifespan.

All ZenaMix Floating ropes produced by FBR have achieved certifications from most of the main international classification societies.

PRODUCT	MEG4	ABS	DNV	CCS	NK	LR	BV
ZenaMix Floating	✓	✓	✓	✓	✓	✓	✓

FBR manufactures, tests and documents all ZenaMix ropes following the ISO 2307-2019 standards and the guidelines of appendix B of MEG4, the Mooring Equipment Guidelines issued by OCIMF.

The performance indicators requested by MEG4 are always shown on the Mill certificates:

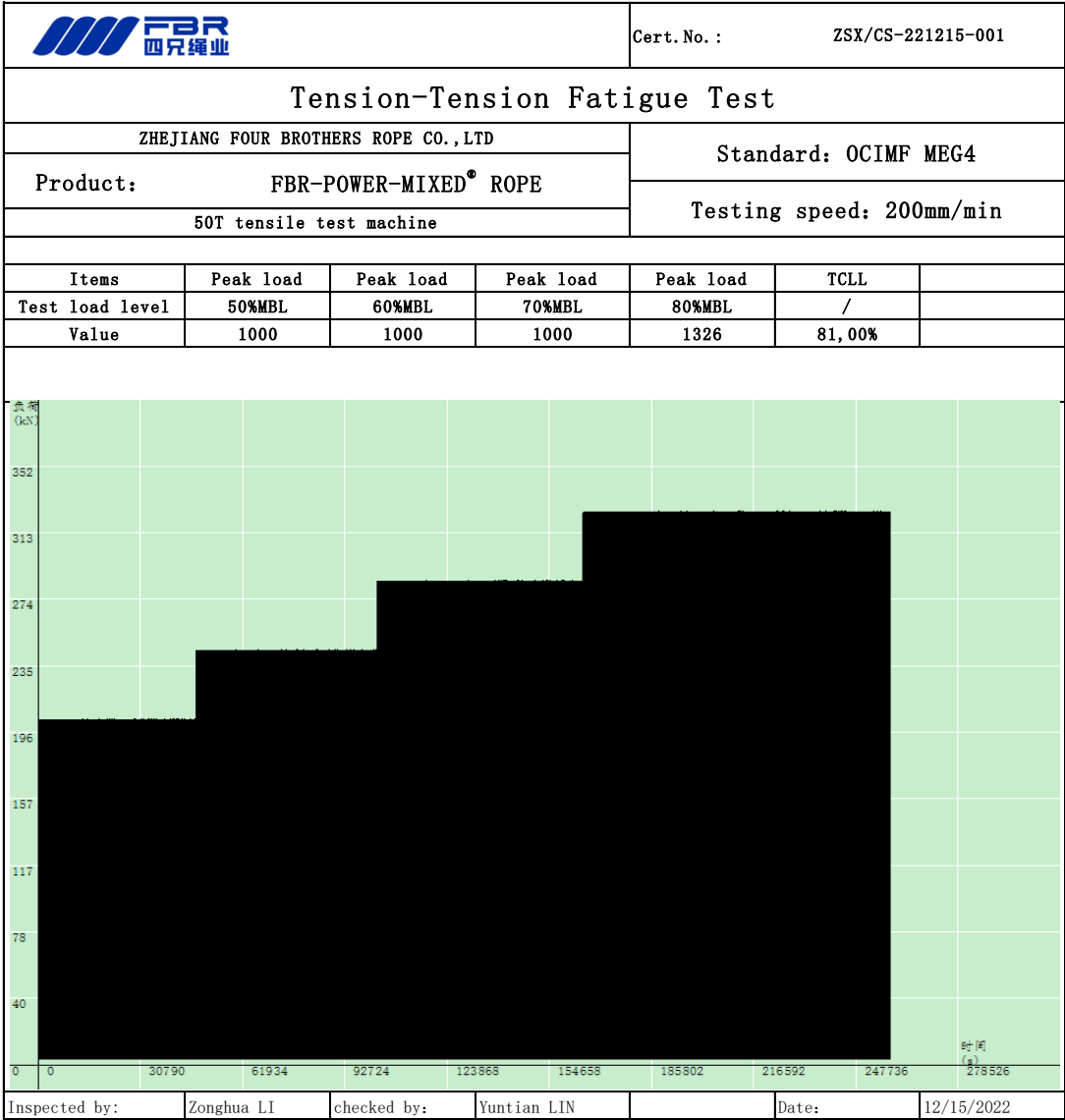
- Line Design Break Force (LDBF)
- Line Linear Density (LLD)
- Load Bearing Linear Density (LBLD)
- Line Tenacity (LT)
- Maximum Line Tenacity (MLT)
- D/d Ratio
- Angled Break Force (ABF)
- Angled Endurance (AE)
- Temperature (T) % BF at 20°C
- Axial Compression Resistance (ACR)
- Average Immediate Strain (e)

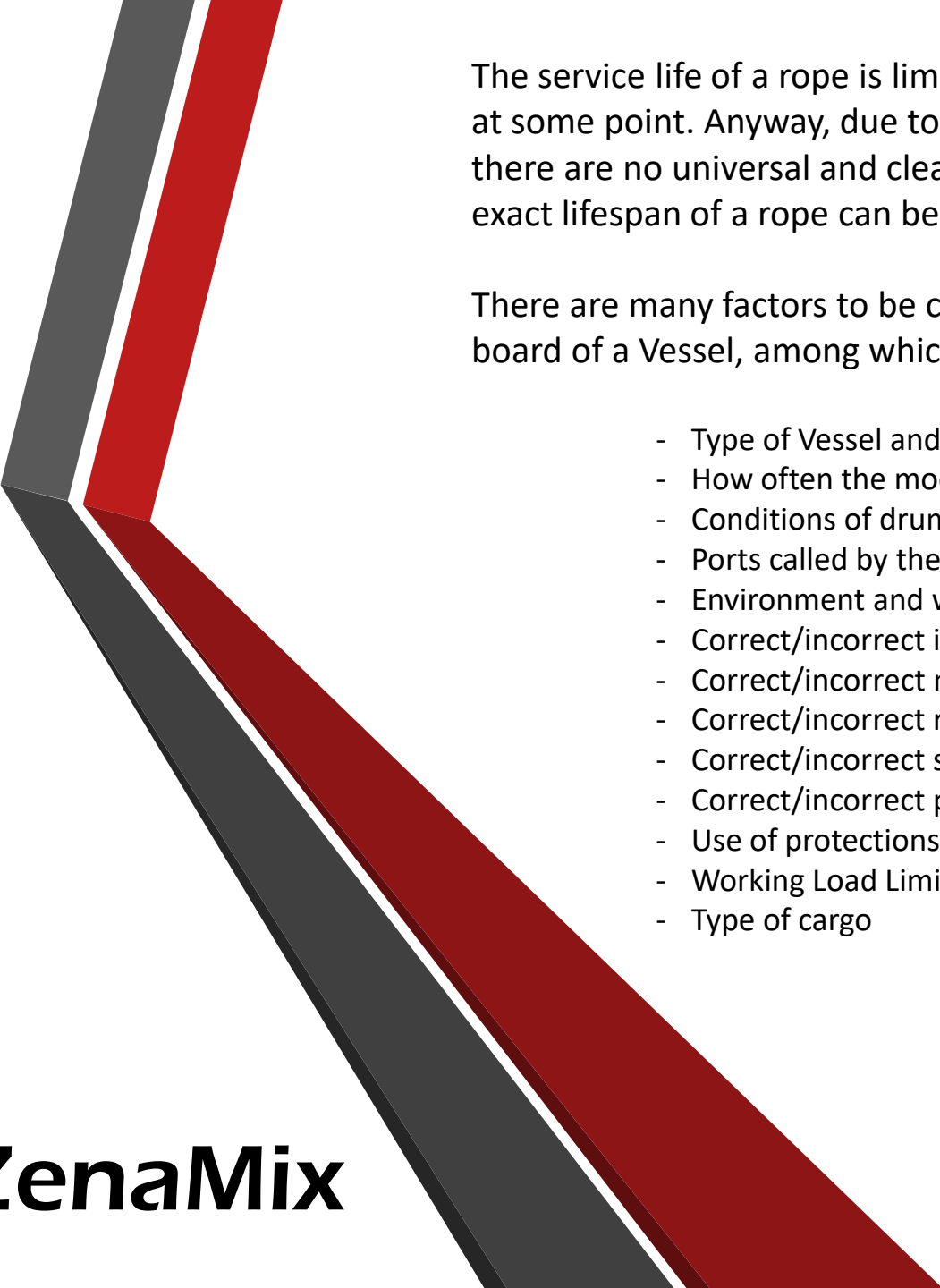
ZenaMix

TCLL is another important test carried out internally by FBR. This value indicates the maximum percentage of the nominal breaking strength at which a rope can be cycle loaded 1,000 times under closely controlled laboratory conditions, and measures the rope’s resistance to tension-tension fatigue.

Basically, the higher the percentage, the greater the resistance to cyclical tensile loading and therefore the lifespan of the rope. In most recent tests ZenaMix ropes have achieved a TCLL value of 81%, showing a much higher resistance if compared to many of its direct competitors.

ZenaMix

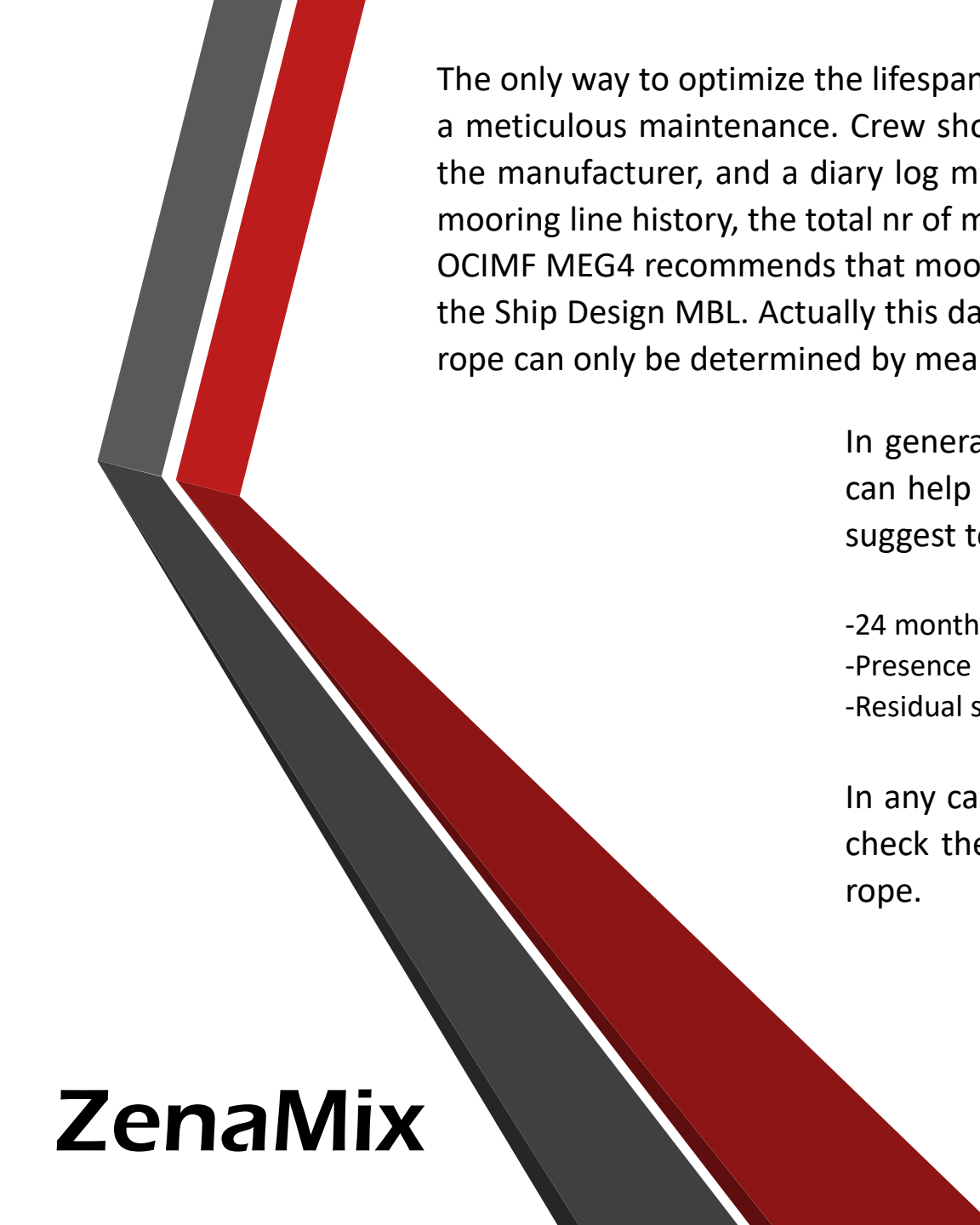




The service life of a rope is limited, any rope will gradually lose its strength after use and must be replaced at some point. Anyway, due to the differences in operating environment and working conditions, nowadays there are no universal and clear regulations on the service life of ropes worldwide and determining the exact lifespan of a rope can be very difficult.

There are many factors to be considered in order to understand the possible life cycle of a mooring rope on board of a Vessel, among which the most important are:

- Type of Vessel and the design of its mooring plan
- How often the mooring ropes are used
- Conditions of drums, fairleads, chocks and Panama eyes of the Vessel
- Ports called by the Vessel and mooring conditions
- Environment and weather conditions
- Correct/incorrect installation of the ropes
- Correct/incorrect maintenance of the mooring equipment
- Correct/incorrect rope handling on board
- Correct/incorrect storage of the ropes
- Correct/incorrect positioning of the ropes
- Use of protections for ropes against chafing and abrasion.
- Working Load Limit (WLL) of the ropes.
- Type of cargo



The only way to optimize the lifespan of a rope is a correct rope handling/use, a correct installation on board and a meticulous maintenance. Crew should be well-trained to understand the guidelines and recommendations of the manufacturer, and a diary log must be kept in order to record as much information as possible such as the mooring line history, the total nr of mooring hours, particular events, etc.

OCIMF MEG4 recommends that mooring lines should be retired when their residual strength has reached 75% of the Ship Design MBL. Actually this data is very difficult to interpret, due to the fact that the residual strength of a rope can only be determined by mean of a destructive test on the bench.

In general the presence on board of a clear and updated Line Management Plan can help the operator to keep trace of the lifespan of a rope but, in any case, we suggest to replace the mooring lines when one of the below conditions occur:

- 24 month of continuous use
- Presence of serious damage on the rope (see our User's Manual for more info)
- Residual strength lower than 75% of the Ship Design MBL

In any case, a visual inspection should take place after each operation in order to check the presence of any sign of wear and the actual condition of the mooring rope.

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