Certificate No:
TAK000024A

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Synthetic Fibre Ropes

with type designation(s)
FBR-POWERNEEMA® RRR ROPE,
FBR-POWERNEEMA® JACKETED RRR ROPE

Issued to
Zhejiang Four Brothers Rope Co., Ltd
Linhai, **China**

is found to comply with
DNV class programme DNV-CP-0100 – Type approval – Synthetic fibre ropes for towing, mooring and anchoring
ISO 10325:2018 "Fibre ropes – High modulus polyethylene – 8-strand braided ropes, 12-strand braided ropes and covered ropes"
Cordage Institute, CI-1502:2019 Test Methods for High Modulus Reduced Recoil Risk Rope
OCIMF Mooring Equipment Guidelines (MEG4), Fourth Edition 2018 [test requirements]

Application :

Mooring and Towing of Ships and HSLCs.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Issued at **Høvik** on **2022-05-06**
This Certificate is valid until **2027-05-05**.
DNV local station: **Ningbo CMC**

Approval Engineer: **Gisle Hersvik**

for **DNV**

Gustav Heiberg
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.

Product description

FBR-POWERNEEMA® RRR ROPE, 12-strand plaited/braided synthetic fibre ropes without jacket
FBR-POWERNEEMA® JACKETED RRR ROPE, 12-strand plaited/braided synthetic fibre ropes with jacket (HMPE or PES)

- Fibre material, core: UHMWPE
- Fibre material, jacket: Polyester (PES), UHMWPE
- With or without marine finish
- RRR: Reduced Recoil Risk. An RRR-component is a rope component, which by design is intended to stay intact at first break and thus prevent sudden, complete rope failure and inhibit or prevent recoil.

FBR-POWERNEEMA® RRR ROPE - Compliance with OCIMF Mooring Equipment Guidelines (MEG4)
Mooring Line Base Design Certificate FBR-POWERNEEMA® RRR ROPE – 24 mm to 72 mm.
- Certificate reference: **FBR/MEG-DNVLBDC-22-001**.
Mooring Line Certificates will be issued with basis in manufacturer's template for *Mooring Line Certificate*.

FBR-POWERNEEMA® JACKETED RRR ROPE - Compliance with OCIMF Mooring Equipment Guidelines (MEG4)
Mooring Line Base Design Certificate FBR-POWERNEEMA® JACKETED RRR ROPE (PES/HMPE) – 24 mm to 72 mm.
- Certificate reference: **FBR/MEG-DNVLBDC-22-002** [PES jacket]
- Certificate reference: **FBR/MEG-DNVLBDC-22-003** [HMPE jacket]
Mooring Line Certificates will be issued with basis in manufacturer's template for *Mooring Line Certificate*.

Zhejiang Four Brothers Rope Co., Ltd has performed the full test scenario, including as follows:
- B8.5.7 Angled endurance: 17,000 cycles (17,000 cycles mentioned in MEG4).
- B8.5.10 Axial compression fatigue: 10,000 cycles (10,000 cycles mentioned in MEG4).

The RRR-feature using an ISP (Inner Stretchy Part, inner core element) has been tested in accordance with Cordage Institute, CI-1502:2019 Test Methods for High Modulus Reduced Recoil Risk Rope.

FBR-POWERNEEMA ® RRR ROPE, same as FBR-POWERNEEMA® ROPE, but with ISP.
FBR-POWERNEEMA® JACKETED RRR ROPE, same as FBR-POWERNEEMA® JACKETED ROPE, but with ISP.

ISP in FBR-POWERNEEMA® RRR ROPE and FBR-POWERNEEMA® JACKETED RRR ROPE is reducing danger for recoil and is not influencing ropes' performance indicators.

Rope Characteristics

The Rope Characteristics are tabulated on the next pages observing the following:

Fibre ropes are to be delivered with a linear mass within ±5% of the nominal linear mass given in the tables.

The reference number corresponds to the approximate diameter, in millimetres.

The linear density, in kilotex, corresponds to the net mass per length of rope, expressed in grams per metre or in kilograms per thousand metres.

The breaking forces quoted in the below tables relate to spliced ropes.

FBR-POWERNEEMA® RRR ROPE: 12-strand braided/plaited, synthetic fibre ropes without jacket

- Specific gravity: 0.97 (floats in seawater)

ROPE CHARACTERISTICS FBR-POWERNEEMA® ROPE					
Reference number/Size		Linear density		Spliced MBL	
		excl. ISP	incl. ISP		
Diameter [mm]	Circ. [Inch]	[ktex]	[ktex]	kN	mT
24	3	324	346	480	49.0
26	3 -1/4	387	409	548	55.9
28	3 -1/2	444	466	634	64.7
30	3- 3/4	512	534	710	72.4
32	4	589	611	826	84.3
34	4 -1/4	655	677	890	90.8
36	4 -1/2	720	742	994	101.4
38	4 -3/4	816	878	1089	111.1
40	5	880	942	1196	122.0
44	5 -1/2	1078	1140	1430	145.9
48	6	1264	1326	1626	165.9
52	6 -1/2	1512	1574	1922	196.1
56	7	1760	1822	2218	226.3
60	7 -1/2	2010	2099	2500	255.1
64	8	2260	2349	2783	284.0
68	8 -1/2	2585	2674	3146	321.0
72	9	2910	2999	3508	358.0

Note:
Diameters 24 mm and 72 mm have been tested in accordance with CI-1502:2019.

FBR-POWERNEEMA® JACKETED RRR ROPE: 12-strand braided/plaited, synthetic fibre ropes with polyester jacket

- Specific gravity: 1.38 (sinks in seawater)

ROPE CHARACTERISTICS FBR-POWERNEEMA with POLYESTER jacket					
Reference number/Size		**Linear density**		**Spliced MBL**	
		excl. ISP	**incl. ISP**		
Diameter [mm]	**Circ. [Inch]**	**[ktex]**	**[ktex]**	**kN**	**mT**
24	3	370	392	372	38.0
28	3-1/2	510	531	505	51.5
32	4	673	694	663	67.7
36	4-1/2	860	881	831	84.8
40	5	1058	1080	1030	105.1
44	5-1/2	1290	1352	1240	126.5
48	6	1562	1624	1450	148.0
52	6-1/2	1854	1916	1730	176.5
56	7	2181	2243	1970	201.0
60	7-1/2	2546	2608	2270	231.6
64	8	2834	2923	2590	264.3
68	8-1/2	3206	3295	2930	299.0
72	9	3621	3710	3270	333.7

Note:
Diameters 24 mm and 72 mm have been tested in accordance with CI-1502:2019.

FBR-POWERNEEMA® JACKETED RRR ROPE: 12-strand braided/plaited, synthetic fibre ropes with HMPE jacket

- Specific gravity: 0.97 (floats in seawater)

ROPE CHARACTERISTICS FBR-POWERNEEMA with HMPE jacket					
Reference number/Size		**Linear density**		**Spliced MBL**	
Diameter [mm]	**Circ. [Inch]**	**excl. ISP**	**incl. ISP**	**kN**	**mT**
		[ktex]	**[ktex]**		
24	3	346	368	372	38.0
28	3-1/2	470	492	505	51.5
32	4	611	633	663	67.7
36	4-1/2	772	794	831	84.8
40	5	940	962	1030	105.1
44	5-1/2	1150	1212	1240	126.5
48	6	1360	1422	1450	148.0
52	6-1/2	1600	1662	1730	176.5
56	7	1850	1912	1970	201.0
60	7-1/2	2120	2182	2270	231.6
64	8	2400	2489	2590	264.3
68	8-1/2	2720	2809	2930	299.0
72	9	3070	3159	3270	333.7

Note:
Diameters 24 mm and 72 mm have been tested in accordance with CI-1502:2019.

Application/Limitation

The CI-1502:2019 approval range covers ropes with nominal diameter from 24 mm to and including 72 mm.

The OCIMF MEG4 approval range covers ropes with nominal diameter from 24 mm to and including 72 mm.

Type Approval documentation

Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**, and according to:
- ISO 2307:2019, Fibre ropes -- Determination of certain physical and mechanical properties.
- ISO 9554:2019, Fibre ropes -- General specifications.
- Cordage Institute, CI-1502:2019 Test Methods for High Modulus Reduced Recoil Risk Rope.
- OCIMF's Mooring Equipment Guidelines (MEG4) [requirements to testing].
- DNV-CP-0100.

Marking of product

Product/package shall be marked with *manufacturer's name:* ***Zhejiang Four Brothers Rope Co., Ltd.****, place of production*, *type designation* and *diameter*.

The marking is to be carried out in such a way that it is visible, legible and indelible. The marking of product is to enable traceability to the DNV Type Approval Certificate.

Periodical assessment

The scope of the Periodical Assessment is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.

Periodical assessments (for Certificate Retention / Certificate Renewal) shall be performed according to DNV-CP-0338.

This certificate is only valid if required Periodical assessments are carried out with satisfactory results. To check the validity of this certificate, please look it up in https://approvalfinder.dnvgl.com

END OF CERTIFICATE