

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Other Fibre Products

with type designation(s)

Future Fibres AEROsix Carbon Composite Standing Rigging

Issued to

FUTURE FIBRES RIGGING SYSTEMS, S.L.
Alcácer, Valencia, Spain

is found to comply with

DNV GL class programme DNVGL-CP-0413 – Type approval – Carbon and PBO cable rigging for sailing yachts

Application :

Standing Rigging elements for Sailing Yachts

Issued at **Hamburg** on **2020-04-15**

This Certificate is valid until **2025-04-14**.

DNV GL local station: **Area NB/CMC Iberia**

for **DNV GL**

Approval Engineer: **Hasso Hoffmeister**

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Andree Orth
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 GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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

Aerosix Carbon Composite Standing rigging with end fitting sizes 9 to 40

Application/Limitation

General:

Carbon Fibre composite standing rigging made of a bundled plurality of pultruded, pre-consolidated carbon fibre composite elements. They are terminated in metal cone fittings, comprising a) an "external" end fitting comprising an internal thread for accepting a variety of different interfaces, free articulating fittings and b) an "internal" end fitting made to bear against a tang fitting. The products underwent a design review and physical prototype testing, according to DNVGL-CP-0413. Further, the production facilities were audited.

Details:

The certification is valid for:

- "Discontinuous" Aerosix carbon composite standing rigging cables
- "Continuous" Aerosix carbon composite standing rigging cables
- Braid cover materials for Category A chafe protection
 - o Technora
 - o Polyester
 - o Ultra High Molecular Weight Polyethylene (UHMWPE) Color Coated
- End fittings:
 - o Internal Fitting
 - o External Fitting
- Cable carrying extra "cutouts" (reinforcements) in the endfittings
 - o *Note: a potential increase in strength properties remains outside this certification; it was however verified that this addition is having no detrimental effect on strength properties*

The type approval is valid for the complete range in the table (see page 3) below including the split design for continuous cables as specified in the approval documentation

Maintenance and Replacement details are to be regarded from the documentation of the manufacturer.

Limitations:

The Type Approval covering:

- Structural integrity of standing rigging cables, according to DNVGL-CP-0413:
 - o Static ultimate strength
 - o Fatigue strength
 - o Chafe resistance
 - o Impact resistance

Product Range

Cable Part Number*	50%P / 50%R	35%P / 65%R	Nominal EA (MN)	MBL** (kN)	MWL*** (kN)
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Job Id: **262.1-032019-1**
 Certificate No: **TAK00001W3**

	Plate "ppp"	Rods "rrr"	Plate "ppp"	Rods "rrr"			
9 - I/E - rrr x 1 - ppp / 1P x 12/24	11	10	8	13	3	25	12
9 - I/E - rrr x 1 - ppp / 1P x 12/24	19	18	13	24	6	43	20
12 - I/E - rrr x 1 - ppp / 1P x 12/24	19	19	14	24	6	45	21
12 - I/E - rrr x 1 - ppp / 1P x 12/24	37	36	26	47	12	86	40
15 - I/E - rrr x 1 - ppp / 1P x 12/24	37	37	26	48	12	87	41
15 - I/E - rrr x 1 - ppp / 1P x 12/24	61	60	43	78	20	142	67
18 - I/E - rrr x 1 - ppp / 1P x 12/24	61	61	43	79	20	143	67
18 - I/E - rrr x 1 - ppp / 1P x 12/24	100	99	70	129	33	233	109
21 - I/E - rrr x 1 - ppp / 1P x 12/24	100	100	70	130	33	234	110
21 - I/E - rrr x 1 - ppp / 1P x 12/24	142	141	100	183	47	332	156
24 - I/E - rrr x 1 - ppp / 1P x 12/24	142	142	100	184	47	333	156
24 - I/E - rrr x 1 - ppp / 1P x 12/24	181	180	127	234	60	423	199
27 - I/E - rrr x 1 - ppp / 1P x 12/24	181	181	127	235	60	424	199
27 - I/E - rrr x 1 - ppp / 1P x 12/24	238	237	167	308	79	556	261
30 - I/E - rrr x 1 - ppp / 2P x 12/24	238	238	167	309	79	558	262
30 - I/E - rrr x 1 - ppp / 2P x 12/24	280	279	196	363	93	655	307
35 - I/E - rrr x 1 - ppp / 2P x 12/24	280	280	196	364	93	656	308
35 - I/E - rrr x 1 - ppp / 2P x 12/24	385	384	270	499	128	901	423
40 - I/E - rrr x 1 - ppp / 2P x 12/24	385	385	270	500	128	902	423
40 - I/E - rrr x 1 - ppp / 2P x 12/24	520	519	364	675	173	1217	571

(*) X - I/E - rrr x T - ppp / YP x 12/24

X = Fitting size
 I/E = Fitting Internal/External
 rrr = number of A6E in Rods
 T = 1 or 3 Tow Rods
 ppp = number of A6E in Plates
 Y = number of plates
 P = Plates
 12/24 = number of k filaments in A6 Plate Ends

(**) MBL = Minimum Break load. Statistically assured minimum values, derived from static tensile tests

(***) MWL = Maximum Working Load, derived from "tensile to slack" fatigue testing

Marking of product

Each product shall be marked with the TA Certificate number.

Periodical assessment



Job Id: **262.1-032019-1**
Certificate No: **TAK00001W3**

For retention of the Type Approval, a DNV GL surveyor shall perform periodical assessment after two years (+/-90 days) and after 3.5 years (+/-90 days) to verify that the conditions for the approval are complied with

Type Approval documentation

END OF CERTIFICATE