

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Other Fibre Products**

with type designation(s)

Carbo-Link CL SOLID (ROUND) and CL ELLIPSE carbon standing rigging.

Issued to

Carbo-Link AG
Fehraltorf, ZH, Switzerland

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 for sailing yachts****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**Issued at **Hamburg** on **2020-11-13**This Certificate is valid until **2025-11-12.**DNV GL local station: **Augsburg**for **DNV GL**Approval Engineer: **Hasso Hoffmeister**.....
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.



Job Id: **262.1-033817-1**
Certificate No: **TAK00001Z4**
Revision No: **1**

Product description

Solid carbon cables made from pre-preg tapes and custom end fittings. The pre-preg tapes are made by pre-impregnating carbon fibres with a toughened resin matrix system. The pre-preg tapes are then continuously wound around custom end fittings, creating a continuous carbon loop with integrated terminations.

The rigging cables can be round (CL SOLID) or elliptical (CL ELLIPSE), or a combination of the two shapes.

Application/Limitation

Rigging Configurations:

- "Continuous", wound around, lead over and/or divided at a termination or intermediate junction to form a rigging configuration with multiple cables and end fittings fully integrated into one solution.
- "Discontinuous", with two end fittings for each cable, allowing individual use and/or multiple cables linked together.

Additional considerations:

- Circular (CL SOLID) and/or elliptical (CL ELLIPSE) cross section of cable.
- Cable stiffness and break load are treated independently. Stiffness requirements drive cable cross-section whilst break load drives fitting size. Subsequently, cable stiffness can be optimized to meet exact requirements.
- "Added stiffness" cables: These cables receive added stiffness but obtain MBL and MWL values as per below table. These cables are designated using the nomenclature: CL-HT_xxxMN+yyyMN, where "xxx" indicates the stiffness in the basic cable as per the below table and "yyy" indicating the added stiffness.

Cable Range:

Cable Part No.:	Tensile Stiffness EA	MBL**	MWL***
	[MN]	[kN]	[kN]
CL-HT_014MN	13,6	138	59
CL-HT_018MN	18,1	185	79
CL-HT_025MN	25,3	247	105
CL-HT_035MN	35,1	335	142
CL-HT_050MN	49,6	458	195
CL-HT_068MN	68,1	601	256
CL-HT_096MN	95,7	841	358
CL-HT_135MN	134,6	1167	497
CL-HT_188MN	188,3	1605	683
CL-HT_268MN	268,0	2230	949
CL-HT_383MN*	383,0	3125	1330
CL-HT_540MN*	540,1	4351	1851
CL-HT_770MN*	770,2	6145	2615

Intermediate sizes can be interpolated.

End Fittings****:

Straight Pin Termination (including Shimmed Pin Termination)
Lashing Termination
Barrel Pin Termination

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Spherical Bearing Termination
Ball Head Termination (including Threaded Seat)
Female Threaded Termination

(*)= Cables: Cables with a tensile stiffness of more than 320MN are not to be used as "Diagonal shrouds" or in other applications in relative short lengths underlying the possibility of slackening.

(**)= MBL: Minimum break load. Manufacturer's data, statistically assured minimum values, confirmed by static tensile tests.

(***)= MWL: Maximum Working Load, confirmed by "tensile to slack" fatigue testing.

(****)= Free articulation of end fitting must be provided.

Representative Testing has been witnessed and Carbo-Link's facilities have been audited for verification and approval.

Marking of product

Each product shall be marked with the TA Certificate number.

Periodical assessment

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, records of tests and facility Audit:

Only visible on Original certificate