

YACHT RIGGING

MADE IN SWITZERLAND
SINCE 2000

DNV TYPE APPROVED
AS 9100D AEROSPACE & DEFENCE CERTIFIED

1. Carbo-Link rigging solutions
2. Why CL SOLID?
3. CL SOLID terminations
4. Project portfolio examples
5. Lightning strike resistance
6. Contact



1. ABOUT

Carbo-Link has been supplying carbon rigging solutions since 2001.

CL SOLID carbon rigging is an evolution of bundled carbon solutions first developed by Carbo-Link's management at EMPA between the 1970's & late 1990's. CL SOLID's superior stiffness, enhanced resistance to chafe & impact, and reduced cross-section combined with minimal service requirements makes CL SOLID the optimum rigging choice.

CL SOLID rigging is made from continuously wound, unidirectional prepreg carbon fibre tape embedded in a toughened resin matrix. CL SOLID rigging is cured into a solid cable, either round or elliptical (CL ELLIPSE). All prepreg tape is made in-house in accordance to Aerospace certified processes; optimizing fibre type & tape width whilst ensuring the perfect fibre alignment. CL SOLID rigging features fully integrated titanium terminations custom engineered & manufactured in-house.

CL SOLID, CL ELLIPSE & CL HYBRID rigging is DNV GL Type Approved.

SOLUTIONS



CL SOLID

Stiff. Lightweight.
Durable. All with minimal
service at a low cost of
ownership.



CL TORQUE

The most efficient
forestay furl with zero
torsional degradation
over time.



CL ELLIPSE

All the value of CL
SOLID rigging plus
an elliptical profile for
optimum performance.



CL HYBRID

Flexible carbon
where required, solid
carbon elsewhere in a
continuous cable.

2.**WHY CL SOLID?****SIMPLICITY - RELIABILITY - PERFORMANCE****1 LOW COST OF OWNERSHIP**

- Never need to send rigging away for a service or recovering
- Structural integrity and performance maintained throughout ownership (comparable to a yachts hull)

2 SUPERIOR DURABILITY

- Toughened resin system results in superior chafe and impact resistance
- No soft cover to chafe, or individual rods susceptible to damage

3 SIMPLE SERVICE & INSPECTION

- Nothing hiding beneath the cover. Visual inspections of the surface identify rigging health
- Possible to NDT with the mast stepped or un-stepped at high-load areas and local points of interest

4 REDUCED LIKELIHOOD OF LIGHTNING STRIKE

- CL SOLID is grounded and able to unload charge > integrated fittings with a direct connection to the yachts hull
- There is no static build-up, which in turn reduces the likelihood of being struck

5 SIMPLE LOGISTICS

- Can be delivered coiled or full length with final handover on-site
- Simple storage with mast during refit periods > no shipping required throughout rigging lifespan

6 INTEGRATED FITTINGS

- Fully integrated into the cable which in-turn reduces weight
- No bonded joints or reliance on threaded fittings between cable termination and interface > no creep or bedding-in

7 REDUCED LIKELIHOOD OF VIBRATION

- Vortex shedding can occur on any tensioned cable > CL DAMPER proven to be highly effective solution if required
- Elliptical rigging is less susceptible to vortex shedding (vibration) as proven on all existing elliptical projects

8 SMALL DIAMETER

- Upto 35% smaller cross-section than bundled rigging due to 100% consolidation of fibres
- No bundled rods with gaps and no additional consolidation cover

9 RELIABLE & OPTIMISED ELLIPSE

- No structural difference between round and elliptical solid carbon rigging
- Research, numerical analysis and sailing time prove ellipse ratio's of 2.0:1 or shorter balance all considerations

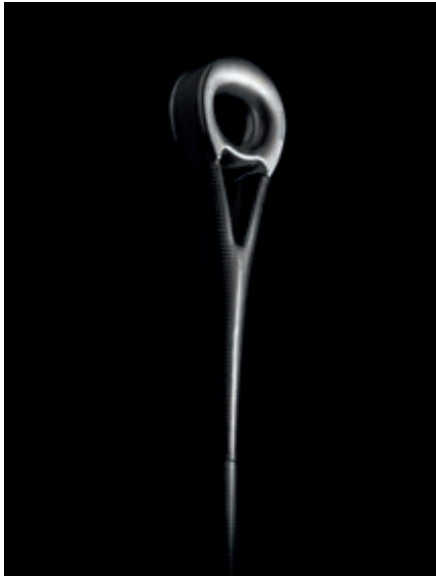
10 2 YEAR WARRANTY

- Not limited to any type of sailing - includes racing and all associated training requirements
- See 'General Terms & Conditions' for comparison to alternative suppliers

3. TERMINATIONS



PIN



LASHING



SPHERICAL BEARING



BALL HEAD



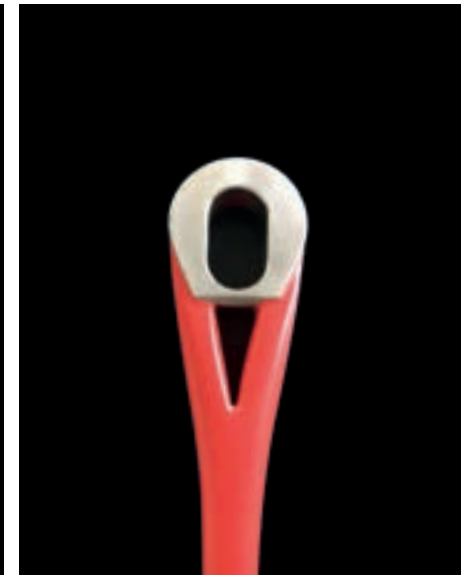
SHIMMED



JAW



TORSIONAL



SLOTTED

4a. CL ELLIPSE EXAMPLES



'GALATEIA'

Wally Cento

- CL ELLIPSE lateral rigging
- CL SOLID forestay + CL STROP
- CL HYBRID ELLIPSE backstays



'VISIONE'

Baltic 147

- CL ELLIPSE laterals
- CL TORQUE forestay



'CANNONBALL'

Maxi 72

- CL ELLIPSE laterals
- CL SOLID: ROUND forestay + CL STROP
- CL HYBRID ELLIPSE backstays



'NILAYA'

RP Nauta 43m

- CL ELLIPSE laterals
- CL TORQUE forestay
- CL HYBRID ELLIPSE backstays

4b. CL SOLID EXAMPLES



'NGONI'

Dubois 58m

- CL SOLID: ROUND laterals
- CL ROUND forestay
- CL FLEX topmast backstays



'Sea Eagle II'

Dykstra 83m

- CL SOLID: ROUND laterals
- CL ROUND forestay & inner forestay



'SAUDADE'

Wally 148

- CL SOLID: ROUND laterals
- CL TORQUE forestay



'LIONHEART'

J Class 44m

- CL SOLID: ROUND laterals
- CL SOLID: ROUND forestay

4c.
CL TORQUE
EXAMPLES



‘CANOVA’

Baltic 142

- CL TORQUE forestay
- CL ELLIPSE laterals
- CL HYBRID topmast backstays



‘SAMURAI’

Rhodes Young Design 42m

- CL TORQUE forestay & inner forestay
- CL SOLID: ROUND laterals



‘NAVALARIS’

ITA Catamarans

- CL TORQUE forestay
- CL SOLID shrouds & diamonds
- CL ELLIPSE martingale & CL SOLID whisker stays



‘SAUDADE’

Wally 148

- CL TORQUE forestay
- CL SOLID: ROUND laterals
- CL SOLID backstay

5. REDUCED LIGHTNING STRIKE VULNERABILITY

#1 FULLY INTEGRATED FITTINGS

- Carbon cables are in direct contact with the fitting, which is in direct contact with the hull
- Resulting in a direct path of least resistance to the ground
- Any charge caused by electrical or magnetic fields decays immediately

#2 REDUCTION IN STATIC CHARGE

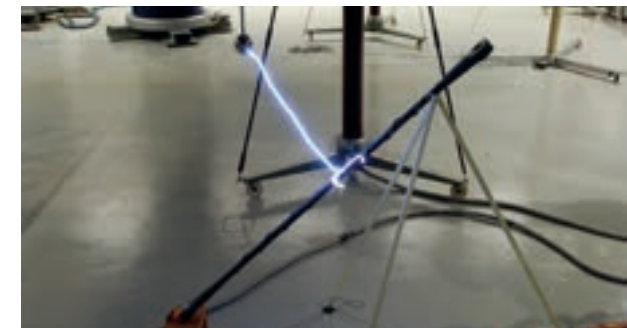
- The rigging has high-conductivity and direct path of low resistance
- Creates a lower static charge in the system
- Therefore, reducing the probability of a strike

#3 THOROUGHLY TESTED

- Various laboratory tests at ETH Zurich to better understand cause and effect
- Carbo-Link have supplied over 12,000 CL SOLID carbon crane cables to Liebherr
 - Cranes reaching heights of 220m
 - Zero lightning strike damage after multiple strikes worldwide
- Numerous strikes on CL SOLID rigging - M5, Skade, Lot 99, Path - with no damage

#4 OHMIC CURING PROCESS

- An electrical charge is sent through all CL SOLID rigging variations during the production process, leveraging the high-conductivity of the carbon
- No further protection or conductivity enhancing components are necessary



6. **CONTACT**

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