



LANKHORST

**STRENGTH
IN DEPTH**



OIL & GAS

DEEPWATER DEPLOYMENT.



WIRECO
A World Ahead



© All rights reserved. Information in this document is provided in connection with Lankhorst® products. No license, express or implied, by estoppels or otherwise, to any intellectual property rights is granted by this document. No parts of this document may be reproduced in any form without the express written permission of Lankhorst. All information supplied herein, whether in the nature of data, recommendations or otherwise, is supported by research and/or experience and believed reliable, but Lankhorst gives no warranties of any kind, expressed or implied, including, but not limited to, fitness for a particular purpose or actual results obtained. It is the user's responsibility to independently determine suitability of any products and to test and verify the same, and to ensure that its use of the products complies with all applicable laws, regulations and safety rules. Lankhorst assumes no liability whatsoever in respect of any consequence from the application, processing, use of, or reliance on, the aforementioned information or products. Lankhorst expressly disclaims any infringement of the rights owned or controlled by a third party regarding intellectual, industrial or other property. The information provided by Lankhorst herein is provided "as is, where is" and with all faults; the user accepts all liability in respect of or resulting from the application, processing, use of, or reliance on, the aforementioned information or products. The purchase and use of any product described herein is subject to the Terms and Conditions of Sale of Lankhorst Euronete Portugal which are available on our website www.lankhorstoffshore.com. This document is subject to change without notice or obligation.

LANKHORST OFFSHORE... STRENGTH IN DEPTH

Lankhorst Offshore is a world leader in the development, engineering and manufacture of synthetic fibre ropes for deepwater mooring, fibre rope deployment systems, riser and mid-water arch tether systems, single point mooring offloading systems and floating offshore wind turbines.

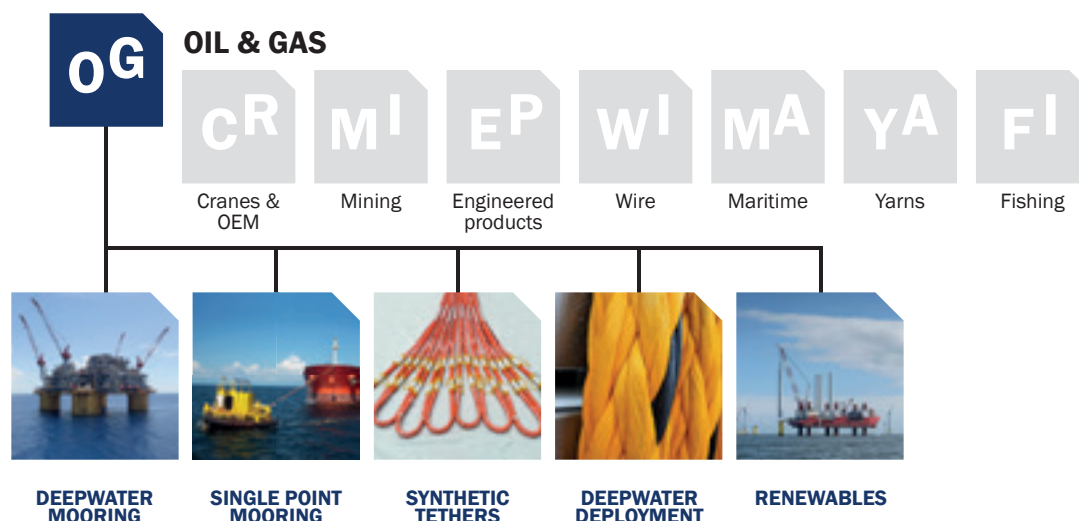
Innovation is at the heart of our business. We are committed to setting the standard for performance and reliability in the most demanding offshore environments. Our strengths in engineering and technical know-how are matched by an in-depth knowledge of offshore applications stretching back over more than 200 years.

Lankhorst Offshore continuously strives for improved product performance, customer satisfaction and product innovation. As part of WireCo® WorldGroup, the world's leader in manufacturing, engineering, and distributing wire rope, synthetic rope, specialized assemblies, wire products and electromechanical cable, we draw on extensive research and testing facilities at WireCo® WorldGroup's Global Synthetics R&D facility in Portugal. Here we have an on-going research program into mooring and deployment rope materials and constructions, designed to support offshore energy companies in meeting ever more demanding project and environmental challenges.

We have fully equipped production sites and R&D departments, located in Portugal and at our sister company Lankhorst Euronete Brasil Indústria e Comércio Ltda (LEB), with capabilities to produce a wide range of offshore ropes

Lankhorst Euronete Portugal has been certified by Lloyd's Register Quality Assurance and Lankhorst Euronete Brasil by Bureau Veritas Certification according to ISO 9001:2015.

Lankhorst Offshore trades under the names of Lankhorst Euronete Portugal S.A. (LEP) and Lankhorst Euronete Brasil (LEB).



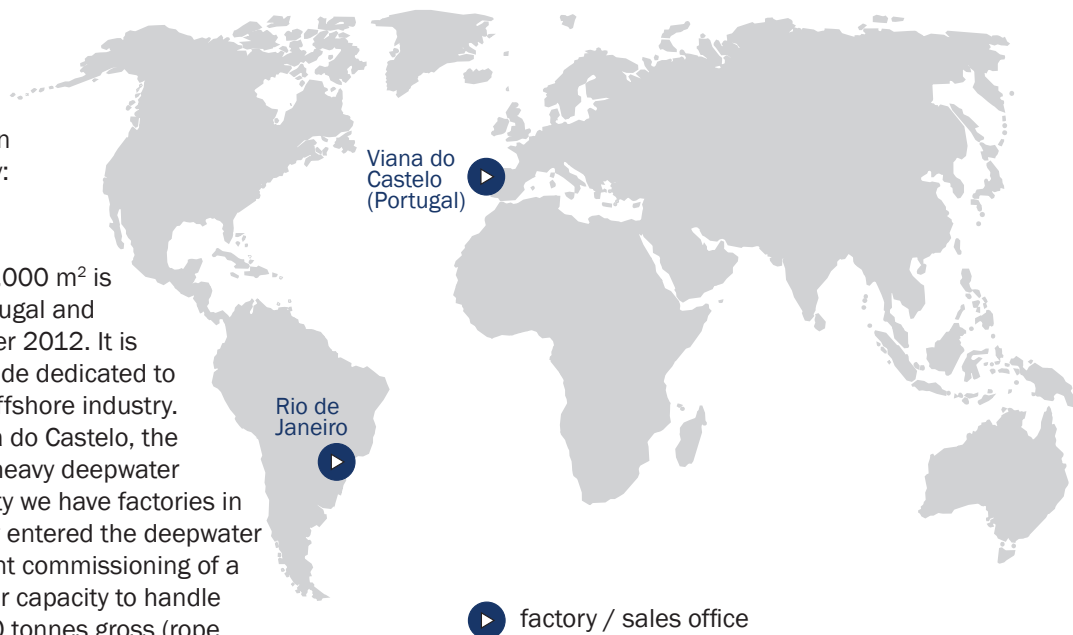
FACTORIES

Locations

The most modern factories in the world dedicated to production of ropes for the offshore industry:

Portugal

The Lankhorst Offshore site of 6,000 m² is located in Viana do Castelo, Portugal and became operational in September 2012. It is the most modern factory worldwide dedicated to the production of ropes for the offshore industry. Positioned near the port of Viana do Castelo, the facility is well suited to produce heavy deepwater mooring ropes. Next to this facility we have factories in Maia and Paredes. The company entered the deepwater tether market in 1998. The recent commissioning of a new reel take-up stand brings our capacity to handle single piece weights of up to 250 tonnes gross (rope and reel).



▶ factory / sales office

Lankhorst Euronete Portugal in Viana do Castelo



**THE MOST MODERN
FACTORIES IN THE
WORLD DEDICATED
TO PRODUCTION
OF ROPES FOR THE
OFFSHORE INDUSTRY**

Brazil

The production facility of Lankhorst Euronete Brasil covers around 10,000m² in an 17,000m² property in the industrial site of Queimados in Rio de Janeiro with easy access to the ports of Rio de Janeiro and Sepetiba. The company started production of deep water mooring ropes in 2012. Production capacity was doubled in 2015 with the addition of a complete new production line using state-of-the-art machinery.

Lankhorst Euronete Brasil in Rio de Janeiro



FACILITIES

Our factories are dedicated to the design, production and testing of offshore mooring ropes and specialty products such as deepwater installation ropes. Modern production and testing equipment permits all the following activities to be undertaken in-house:

- Stranding of base yarn into strands
- Braiding or twisting of strands into sub-ropes
- Application of soil ingress filters
- Production of braided jacket material (twisted yarn / cut resistant tape)
- Closing (over braiding) of sub-ropes into mooring ropes
- Length Measurement System (LMS) under tension up to 30 tonnes
- Length marking under tension in 75 m increments
- Axial (anti-twist) line marking
- Full scale proto-type testing
 - Break strength testing up to 1,200 tonnes
 - Tension-tension fatigue testing
 - Stiffness and elongation testing
 - Simulation of installation and "What If" scenarios.
 - Cut resistant jacket testing
 - Linear density testing.

GOING DEEP ...


Without fibre ropes, many of today's deepwater projects would be beyond all but the largest cranes. The weight of steel wire ropes makes wire rope lifting/lowering systems both inefficient and impractical at water depths greater than 2,000m - 3,000m. Development of the LANKO®DEEP AHC fibre rope by Lankhorst Offshore is bringing deepwater projects within the reach of smaller, more cost-effective lifting systems and vessels.

LANKO®DEEP AHC fibre rope has been designed from the outset for deepwater lowering and recovery projects. It offers significant operational and environmental benefits compared with steel wire ropes. Operationally the ropes are easier to handle and allow engineers to lift and deploy the maximum load without the need to factor in the self-weight of steel wire.

Lankhorst Offshore offers an integrated approach to fibre rope deployment systems in which the LANKO®DEEP AHC rope yarn and rope construction are optimized for the winch technology. It incorporates fully optimised cyclic bending over sheave (CBOS) fatigue and load bearing characteristics making it ideal for use in the deepwater deployment winch systems. LANKO®DEEP AHC allows the efficient spooling of long lengths of fibre rope without the risk of rope cutting into lower spooled layers causing handling and abrasion issues that have, until now, limited the use of fibre rope in deepwater deployments.

LANKO®DEEP AHC rope has featured in the award winning fibre rope deployment 'Soft Rope System' in collaboration with DSM Dyneema and Deep Tek winch technology. It is also the rope technology underpinning the development of the FibreTrac offshore crane developed by MacGregor. The LANKO®DEEP AHC rope is deployed on a novel capstan, developed by Parkburn Precision Handling Systems as a capstant winch.

Using LANKO®DEEP AHC fibre-rope technology enables crane and winch developers to take advantage of their system's full lifting capacity at practically any depth. Lankhorst Offshore offers technical support and testing facilities to assist companies looking for a competitive edge in offshore lifting projects.



**TAKE ADVANTAGE
OF FULL LIFTING
CAPACITY AT ALMOST
ANY DEPTH BY USING
LANKO®DEEP AHC
FIBRE ROPE**

DEEPWATER DEPLOYMENT SYSTEMS

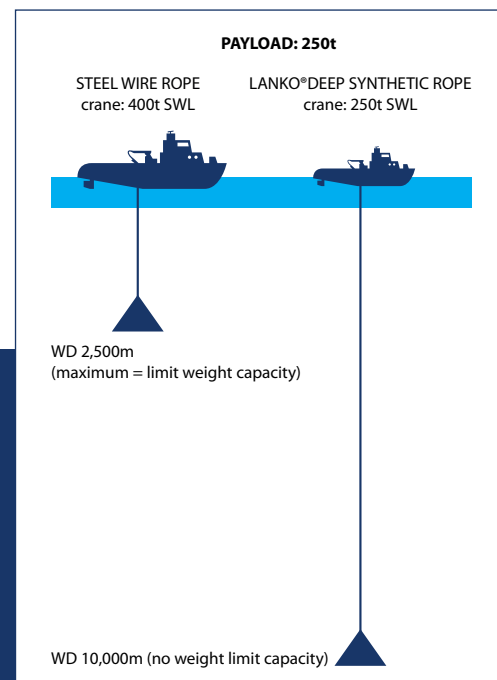
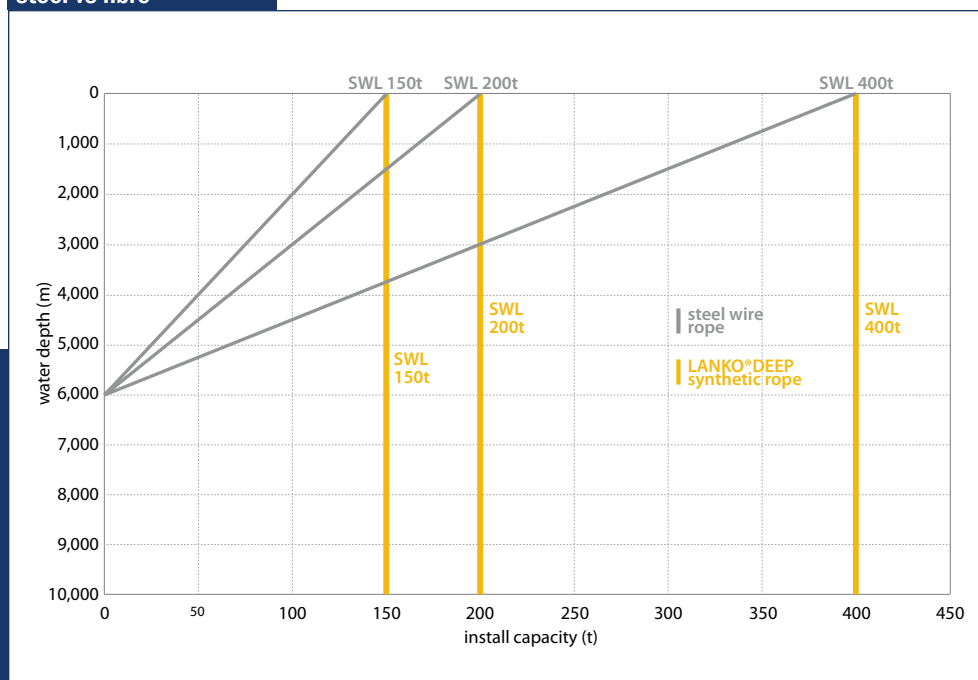
Demands for deepwater lifting and lowering have grown steadily as the oil and gas industry has sought to increase the extent of subsea processing. As a result the industry is now faced with the need for lifting and lowering heavy and sizable subsea processing units into deeper waters.

The weight of steel wire ropes makes wire rope lifting/lowering systems both inefficient and impractical at water depths greater than 2,000m. At 3,000m, the lifting capacity is reduced by 50%; the other 50% is to support the weight of the steel wire.

The solution to optimising lift and lowering capacity is to use a Fibre Rope Deployment System (FRDS). The weight of fibre rope is much less than the steel wire rope, making them almost neutrally buoyant when used in water and with a 100% crane capacity, irrespective of the water depth.

For new vessels, the FRDS makes it possible to use the crane's full capacity at 3,000m water depth with the following advantages: smaller winches and sheaves, lower investment costs and the opportunity to use smaller vessel. For existing vessels, the flexibility of the FRDS approach enables cranes to be retrofit to accommodate the FRDS fibre rope system.

capacity vs water depth steel vs fibre



INDUSTRY LEADING ROPE TEST FACILITY

Lankhorst Offshore has a dedicated rope test machine for loads up to 1,200 tonnes. It can also conduct tension-tension fatigue testing of ropes to any fatigue regime specified by clients and certified verification authorities. The test facility can be used for proof loading and length verification of tethers up to 25m in accordance with various industry standards such as ABS, BV and DNV GL rules.



ROPE SELECTION

LANKO®DEEP AHC



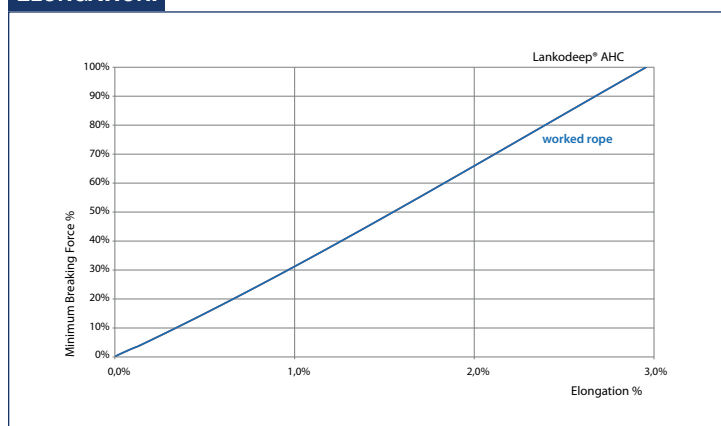
LANKO®DEEP AHC is the first rope designed specifically for deepwater deployment systems. It has an optimal balance of load bearing capacity and bending flexibility. At the same time, safe use is assured by many service life enhancing features.

LANKO®DEEP AHC is constructed using an innovative rope design: 12x3 - 12 strand braided where each strand is a 3 strand rope. This design gives a minimal number of cross-over points and therefore significantly reduces internal abrasion. In addition, the rope is coated with a proprietary coating technology for further robustness and bending service life improvements. LANKO®DEEP AHC is based on a special Dyneema® fibre grade that helps reduce the tension required when bedding in the rope, as well as, reducing internal heating and abrasion.

LANKO®DEEP AHC rope construction has advantages over the traditional 12 strand ropes:

1. simpler to splice
2. easier to inspect
3. readily repairable.

ELONGATION:



ø rope mm	weight in air kg/m	weight in water kg/m	MBF (spliced) tonne
48	1.5	-0.03	163
52	1.8	-0.04	190
56	2.1	-0.04	219
60	2.4	-0.05	249
64	2.7	-0.06	282
68	3.1	-0.07	297
72	3.4	-0.07	328
76	3.8	-0.08	374
80	4.2	-0.09	397
88	5.1	-0.11	468
96	6.1	-0.13	549
104	7.2	-0.15	599
112	8.3	-0.18	688
120	9.5	-0.21	781
128	10.8	-0.23	878
136	12.2	-0.27	977
144	13.7	-0.30	1,092
152	15.3	-0.33	1,223
168	18.7	-0.40	1,450

	SPECIFIC GRAVITY	0,98
	UV RESISTANCE	excellent
	ABRASION RESISTANCE	excellent
	CHEMICAL RESISTANCE	good
	MELTING POINT	approx. 147 °C
	CONSTRUCTION	12 strand plaited
	COLOUR	dark grey or yellow/black
	WATERABSORPTION	0%





DEEPWATER DEPLOYMENT ROPES



LANKHORST

LANKHORST EURONETE PORTUGAL, S.A.

Rua Fornos da Cal no 321
(near Avenida Do Cabedelo)
Darque
4935-226 VIANA DO CASTELO

Rua da CERFIL (Cap. Gramaxo)
4475-468 NOGUEIRA DA MAIA
PORTUGAL

T: +351 229 619 200

LANKHORST EURONETE BRASIL, INDÚSTRIA E COMERCIO LTDA.

Rua Minas Gerais 1920,
Distrito Industrial de Queimados
CEP 26.373-280 - Queimados
RIO DE JANEIRO
BRASIL

T: +55 21 2663 9000

E: deepwaterdeployment@lankhorstoffshore.com

WWW.LANKHORSTOFFSHORE.COM



WIRECO
A World Ahead

STAY CONNECTED



1123