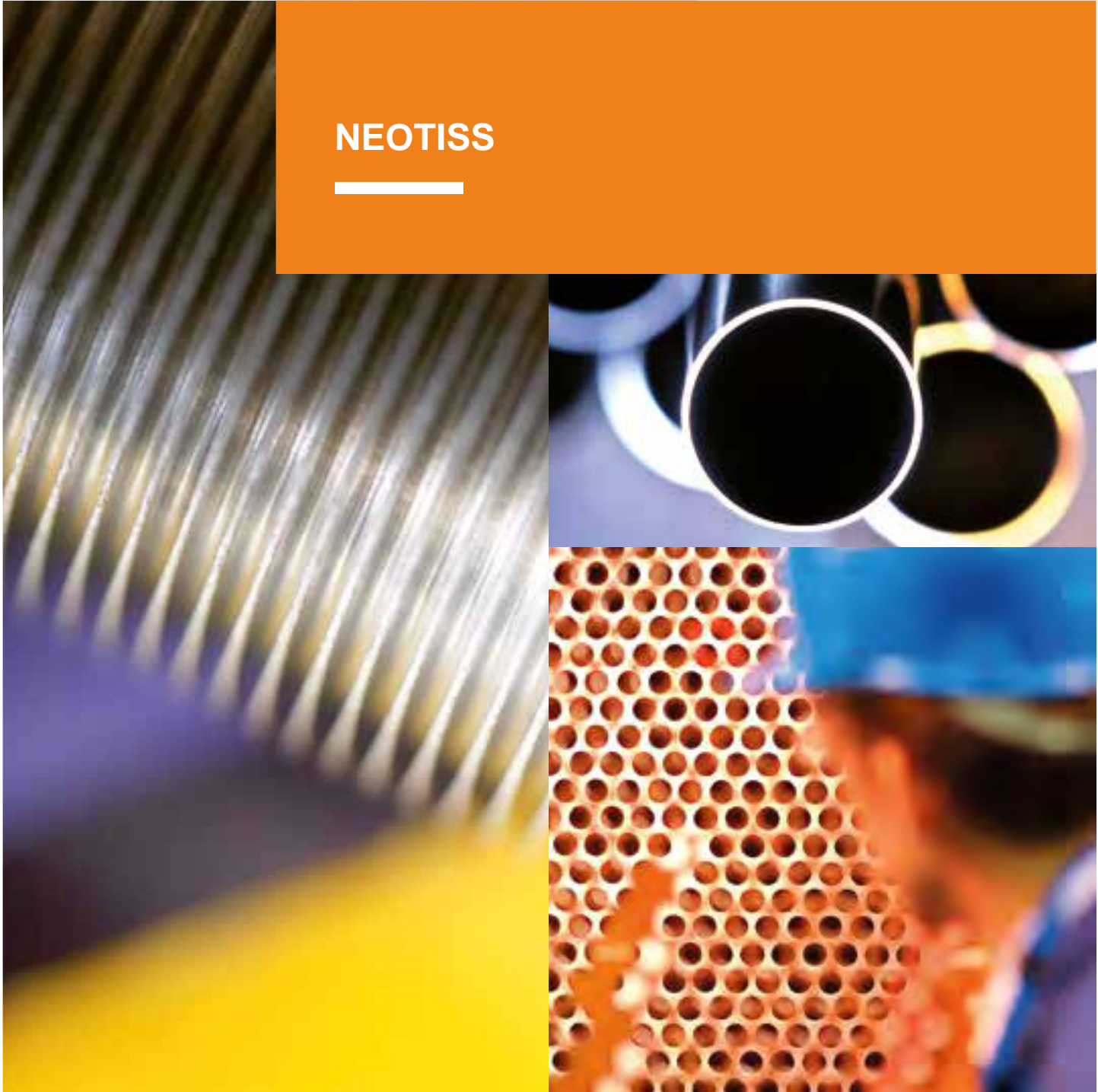




NEOTISS

HIGH PERFORMANCE TUBE

NEOTISS



A spirit of excellence

NEOTISS is the world leader in premium welded tubular solutions, serving all demanding markets. Our greatest pride and responsibility is to meet and exceed customer expectations. « Beyond the tube » translates our desire to offer every client the best solution beyond specifications with tailored products and services.

NEOTISS

Quality and safety

We provide the highest level of quality and safety. This level is guaranteed by our stringent control procedures and unchallenged technical experience. Every tube leaving our facilities is controlled, safe and traceable. Our best testimony of product quality is our long list of references worldwide.

Innovation

Our innovation teams develop ambitious innovation and research programs to enhance the performance of our tubes in the toughest environments.

Premium at heart

Our offer is based on an exclusive relationship and dialogue with our clients : every order is tailored to meet all its requirements. Our premium offers include a variety of specifications and services all along the value chain.

Close to market

You can rely on our local sales force and our worldwide factory network in 5 countries on 3 continents.



Markets

Tubes for every application Tough, reliable and durable

We supply high performance welded tubes for various markets from power generation (nuclear, thermal and renewable), desalination, petrochemical & chemical, process applications to automotive or aerospace.

Our tubes are notably used in Condensers, high-pressure and low-pressure FeedWater Heaters as well as MSRs (Moisture Separator Steam Reheaters), EGR Cooler or SCR systems.

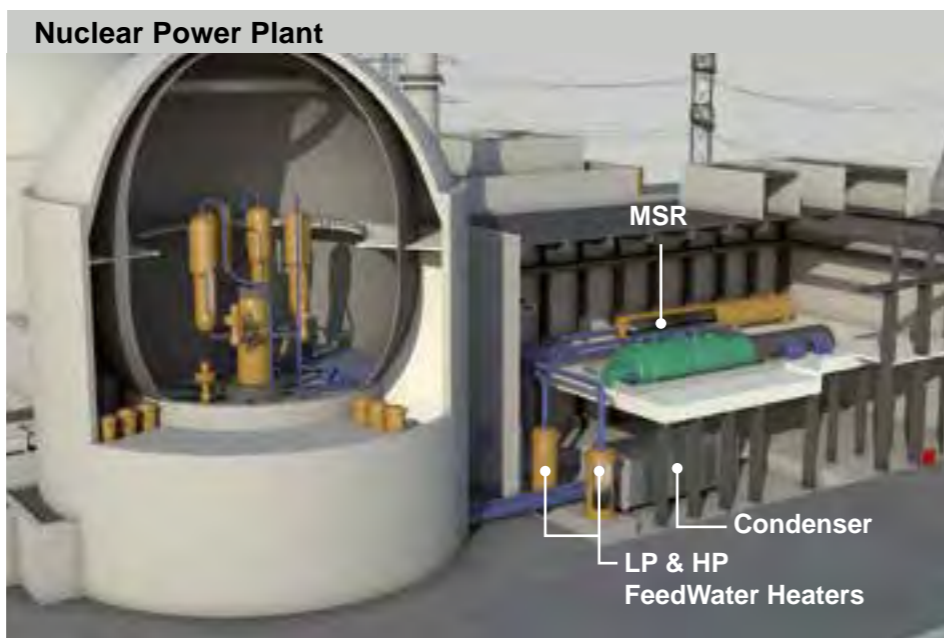
NEOTISS has extended its expertise to high-performance products for the harshest environments. We can provide tubes that sustain seawater, brackish water or corrosive products with outstanding durability and reliability.

Wherever you need high performance thin welded tubes, NEOTISS can deliver

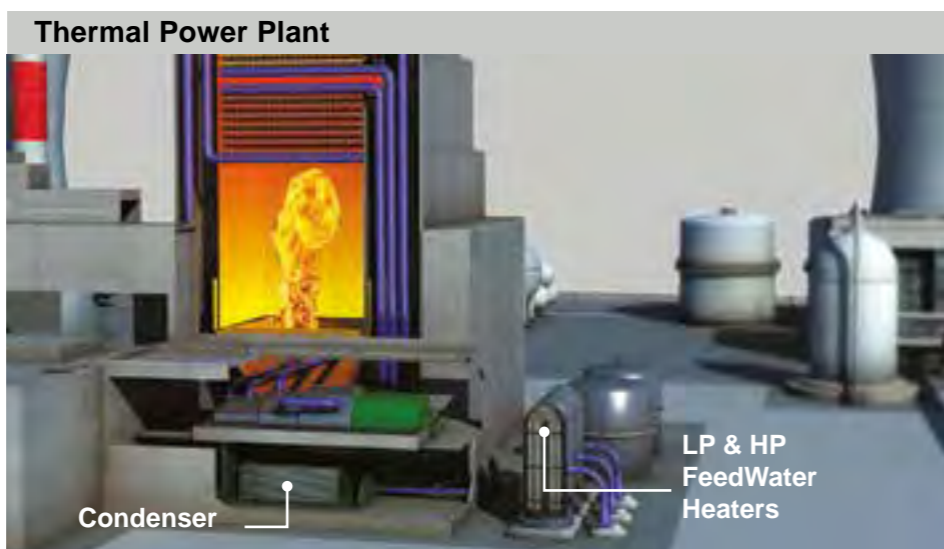
Power Plants

We deliver technologically advanced tubes guaranteeing the best dimensional and metallurgical characteristics for Nuclear Power Plants, Thermal Power Plants, Renewable Energy Power Plants (Geothermal, Concentrating Solar Power, and Ocean Thermal Energy Conversion).

More than **500** power plants delivered



©Vallourec



©Vallourec



Desalination

As a leader in large titanium projects, NEOTISS is there to serve the Desalination market and its requirements.

More than **100** desalination plants delivered

Petrochemical & Chemical and Other Process Applications

These applications require tubes able to resist corrosive and high-temperature operating environments. At NEOTISS, we tailor products for the most challenging applications in the world with a wide range of grades and dimensions.



More than **20** LNG trains delivered



Automotive

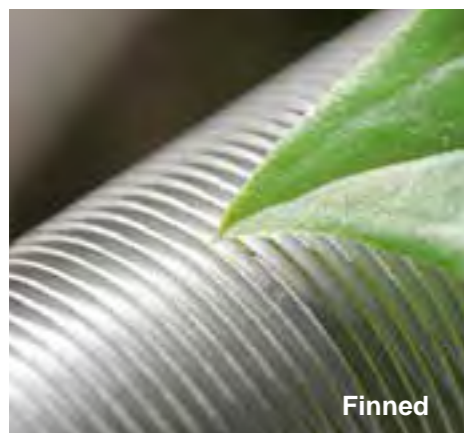
Our Automotive tubes are designed and selected by automotive equipment manufacturers in particular for EGR coolers and SCR systems. We are able to mass-produce at a PPM level.

More than **9 million** cars equipped

Aerospace

The Aerospace market uses demanding applications with very tight requirements such as hydraulic lines or ducting systems.





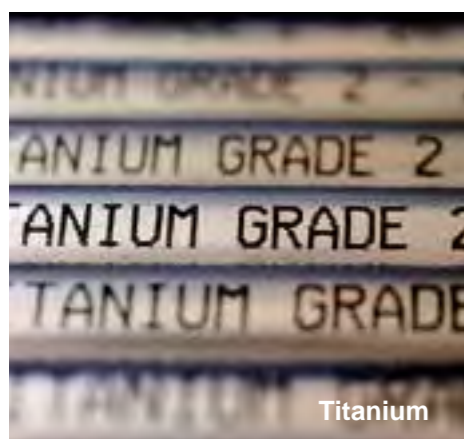
Finned



Bent



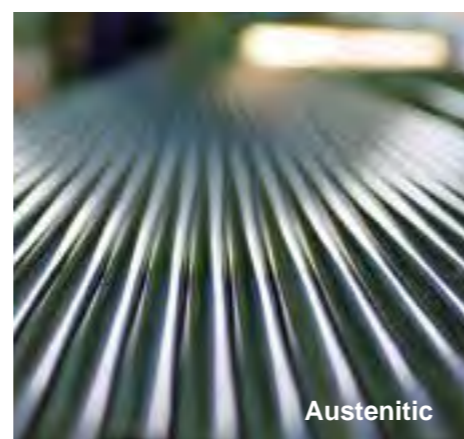
Corrugated



Titanium



TP 439



Austenitic



Straight & smooth

Products

Welded tubes, tailored to your needs

NEOTISS provides a wide range of grades and sizes: titanium, austenitic stainless steel, ferritic stainless steel (TP439 used for MSR and FWH HP), duplex, super stainless steel and other specific high alloys grades. Our tubes can be straight or U-bent and smooth or with enhanced surface (corrugated, low finned, helix, and inner ribbed). We can also produce different shapes from round, oblong, or square to rectangular tubes. Each order is unique and every tube delivered has been defined, designed, produced, inspected and packaged.

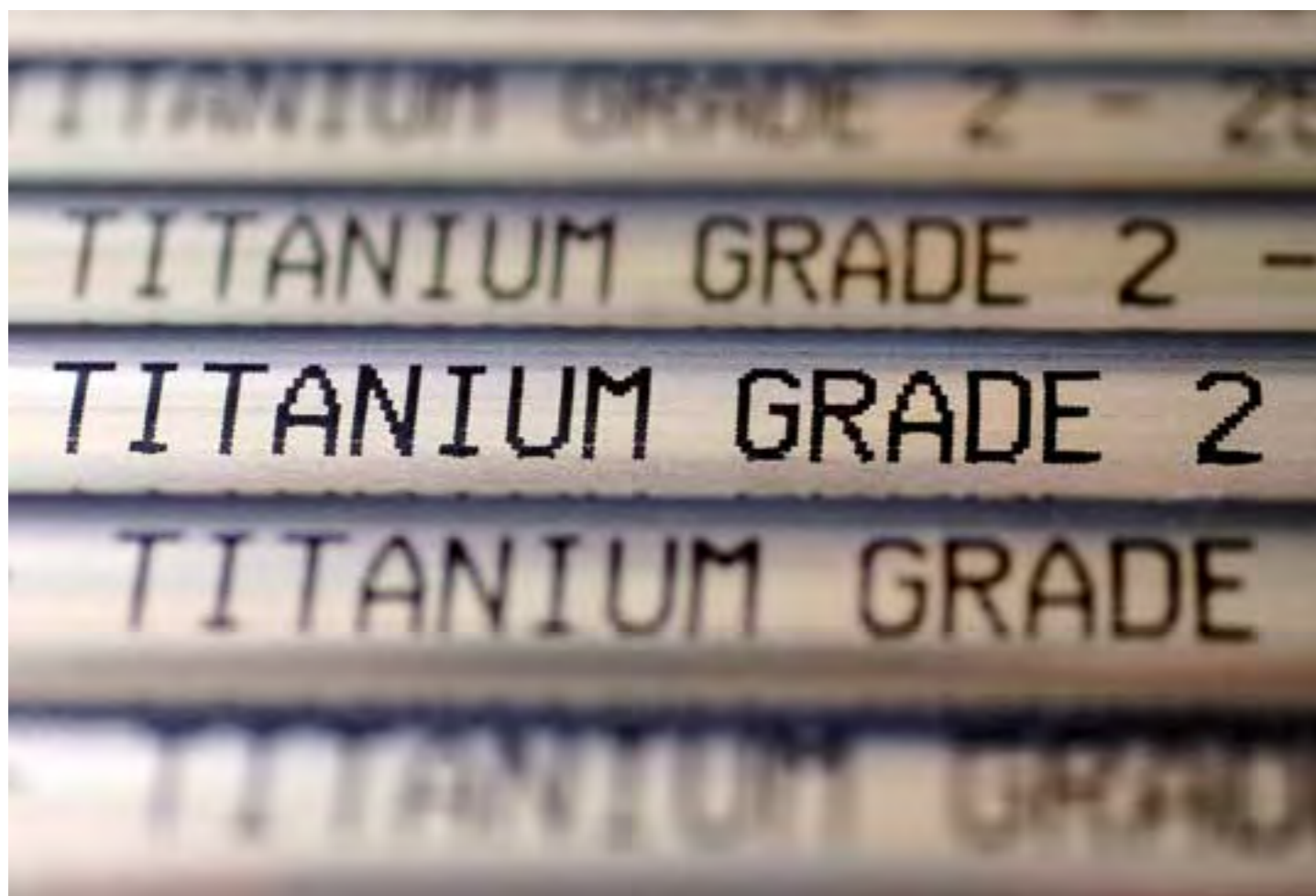
The weld : a proven reliability

Tube welding technology guarantees the best dimensional characteristics for your tubes. The thickness is constant and high performance thin walls are possible. The diameter and weld bead thickness are always under control as well as every metallurgical characteristic.



Premium titanium & stainless steel welded tubes





Titanium

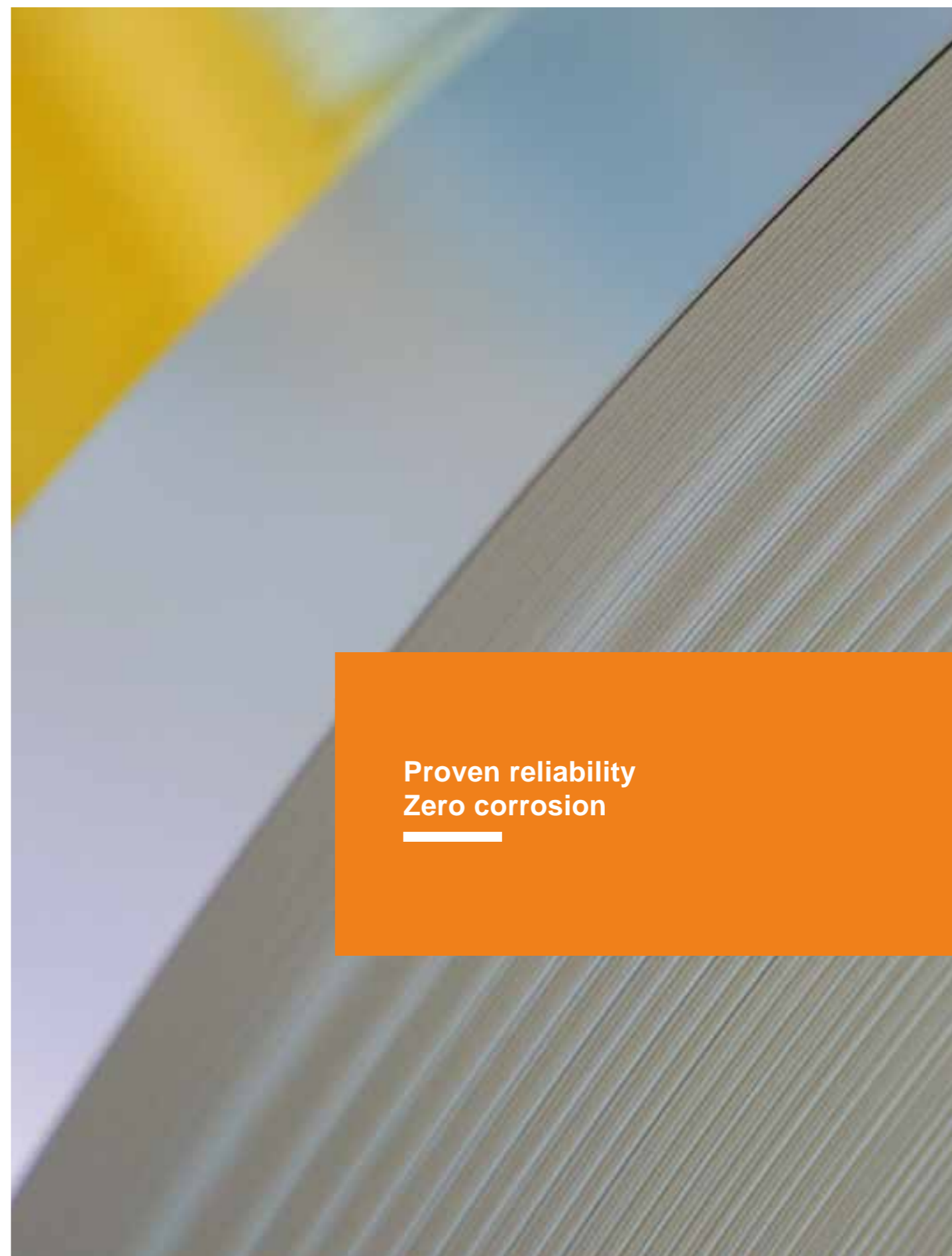
The superior solution

Titanium is the most efficient and cost-effective material for an increasing number of applications. It offers unmatched corrosion resistance combined with high mechanical properties.

Moreover, our titanium welded tubes can be manufactured in very thin-wall gauges saving both on cost and weight.

Titanium experts

World leader in titanium tubes, NEOTISS has the experience and expertise to bring the highest level of technical assistance, to help integrate titanium tubes with our customers' design. In addition we have secured access to superior titanium strip, with a capacity to meet the needs of the market.



Proven reliability
Zero corrosion



Manufacturing process

Expert manufacturing process

Tube mill strip is uncoiled and fed through a multiple stand forming mill which shapes the strip into a tube. The tube is welded without filler metal in an inert atmosphere using a non-consumable tungsten electrode (T.I.G. welding) or laser technology. Dimensional properties are achieved when the as-welded tube passes through a final, multi-stage sizing mill. Mechanical and thermal stresses are relieved by in-line induction heating under inert atmosphere. Afterwards, the tube is straightened, 100% Eddy Current (EC) tested, line marked, then automatically cut. Finished tube ends are deburred. The product is subsequently dimensionally inspected, tested through NDT controls (pneumatic testing, EC inspection and Ultrasonic Testing) and packaged to customer specification.



Excellence in every plant

Our manufacturing process is designed to guarantee the highest level of quality and safety for tubes, in accordance with customer specifications, and beyond. We believe in constantly improving our factories and production methods. Our equipment is state-of-the-art and we implement stringent maintenance procedures to ensure the highest quality of every tube coming off of our lines. Every NEOTISS factory shares the same values and practices, ensuring the same excellence everywhere, both in the production process and plant management.

Industry Leader in Finning Complex Metals

Fins are formed on bare tubes using a cold forming process. No metal is added or removed during finning operations. After finning, the tubes can be bright annealed and tested (Eddy Current, Hydrostatic). The low-profile fins increase the tube heat transfer area up to three times compared to a similar length bare tube. The stability and precision of our process is what makes our brands NEOTISS™ HPT Finned Tubes & NEOTISS™ MSR Tubes industry leaders.



Over 30 state-of-the-art welding lines in the world



Process control

Mastering the process control

With over 40 years of experience and continuous progress NEOTISS masters the entire welding process and provides the highest level of quality and safety in the market.

Non Destructive Testing (NDT)

NDT is at the heart of our quality process and is the result of an unmatched experience of welded tubing solutions. NEOTISS has always been a pioneer in NDT and provides high-end controls including ultrasonic, Eddy Current, pneumatic and hydraulic testings.

Leaders in ultrasonic testing

NEOTISS was the first company in the world to develop ultrasonic testing on welded tubes, as early as in 1977, exceeding the ASTM B 338 standard that only required Eddy Current inspection. Thanks to our research team, we have improved the ultrasonic testing on welded tubes and can offer it as standard for all demanding customers.



EDDY CURENT TESTING



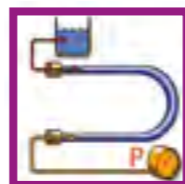
ULTRASONIC TESTING



PNEUMATIC TESTING AIR/AIR



PNEUMATIC TESTING AIR-UNDER WATER



HYDRAULIC TESTING

Helium Test

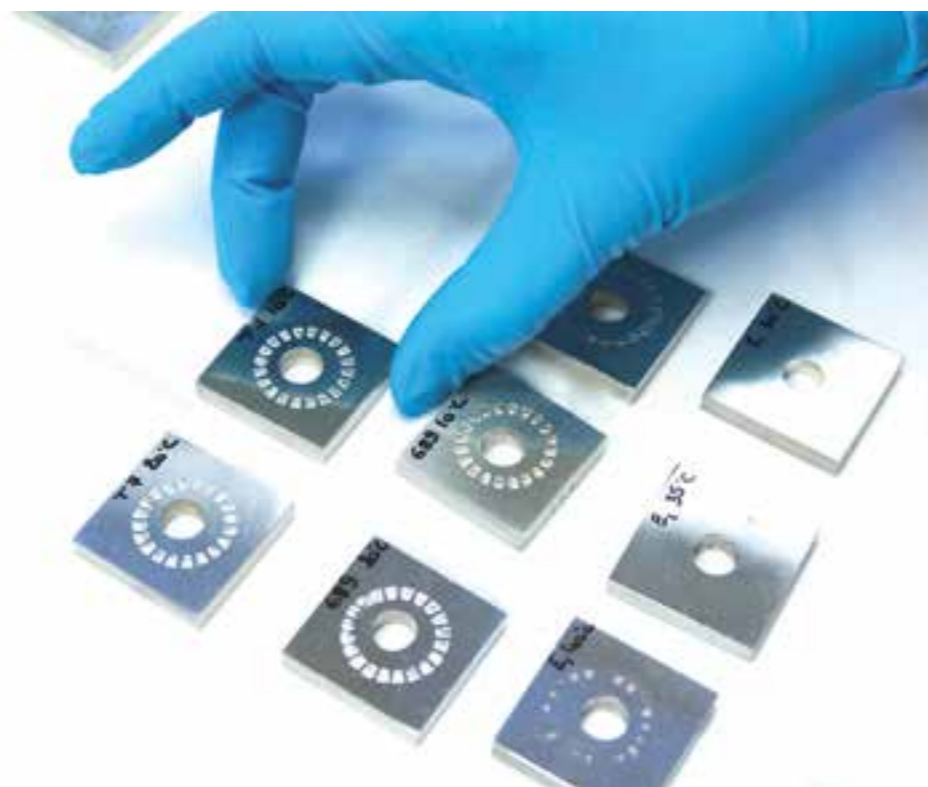
NEOTISS developed the first in-line fully automatic helium leak test to control the integrity of its tubes. This leak testing method offers higher sensitivity and reliability to reduce the gap of detection between the final leak tests performed on heat exchangers and the standard leak test performed on tubes.



HÉLIUM



Certified quality and safety



NEOTISS dedicated resources

1

Integrated research center at the cutting edge of technology

10

Research and technical support managers

5

Technical partnerships with customers

Innovation

The power of NEOTISS research

NEOTISS endeavors to develop research and create innovative solutions for its customers with its own research center based in France.

Our Innovation teams deploy extensive research programs in two directions:

- To enhance the performance and longevity of our tubes in the toughest environments.
- To optimize the production process, including non destructive testing methods and premium packaging solutions.

We seek to design and produce uniquely tailored products for the most demanding applications in the world. Our most qualified engineers and experts are here for you : feel free to share your technical challenge with us!

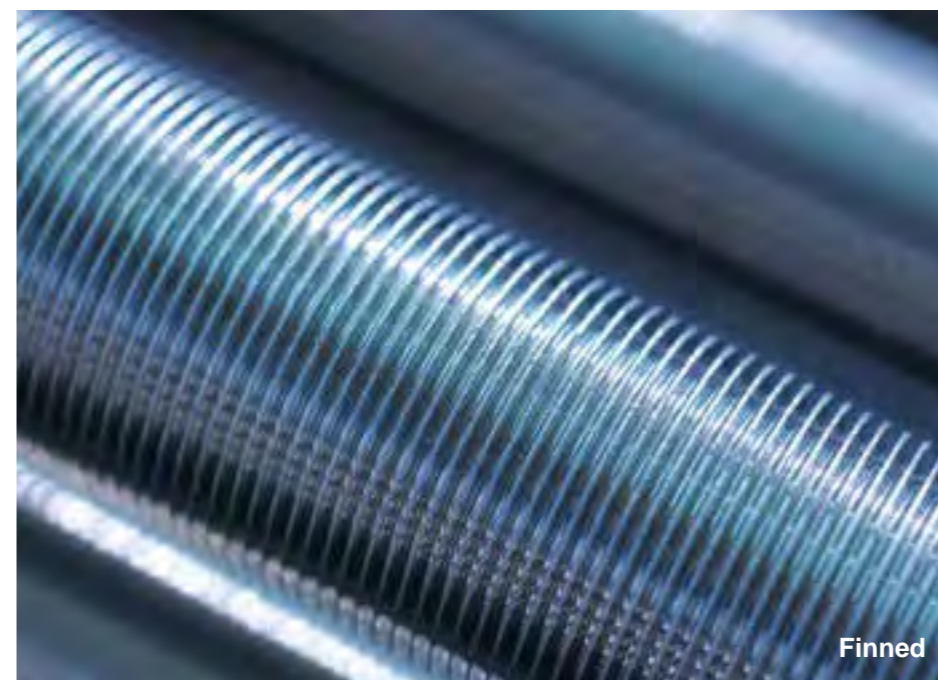


Corrugated

Heat exchange enhancement

Seeking optimal performance for a better cost of ownership

NEOTISS constantly develops its technology to procure thinner wall and enhanced surface tube. Finning and corrugation improve heat transfer and lower cost and size of the heat exchanger.



Finned

We provide for example NEOTISS™ MSR Tubes, ferritic finned tubes specially designed for MSR units. The ferritic material, TP439 is best suited for the high temperature in the MSR. Tube surface area is increased by 3x as a result of the finning process.

We also provide NEOTISS™ HPT Finned Tubes, a finned tubular solution which yields numerous benefits for shell and tube exchangers including reduced size and cost for new equipment, increased performance of existing equipment, and availability in corrosion resistant materials such as titanium and duplex stainless steel.

NEOTISS™ Helix Tubes

We developed a new generation of condenser tubes maximizing heat transfer performance by at least 40% versus smooth tubes¹. The patented helix design is a longitudinal deformation generating turbulences within the fluid, reducing the boundary layer thermal resistance and therefore increasing the overall heat transfer of the tube. NEOTISS™ Helix Tubes can be a competitive solution for new projects (condenser of reduced size and cost) or a performance solution for retrofit projects (debottlenecking).

¹Based on measurements performed on our pilot condenser

Increase your performance
Lower your costs
Save energy





Premium service

Creative solutions

Client proximity is our pride. NEOTISS assists its customers in a creative way to support their most critical projects. We can help design a project and recommend the most adapted technical specifications and best available services. For example, we can offer exclusive services through long-term agreements and collaborative planning: secure price and availability of raw material, optimize logistics or deliver production flexibility. In other instances, for your most demanding projects (long tubes, stringent transport and storage conditions or specific tube installation), we can develop and produce customized packaging solutions.

Our ultimate goal is to deliver you the best service to lower your total cost of ownership.

Exclusive NEOTISS™ Pack Solution offer

On-site operations are tricky and involve a great number of teams and operators. We can make your life easier: ask about our on-site services. We can ease and secure deliveries and supervise handling, tubing and retubing operations. NEOTISS can bring you unmatched on-site assistance for optimal quality. Our services are tailored to your every specific need.



Optimized logistics
Packaging solutions
On site technical assistance

Typical standards and materials

Table with columns for Standards, Applications, Typical chemical requirements in % according to ASTM, and Tubing Typical Tensile requirements (min). Includes rows for Ferritic, Duplex, and Austenitic stainless steels.

Table for TITANIUM ALLOYS with columns for Chemical composition (C, N, H, Fe, O, Others) and Tensile properties (TS, YS, EI).

Table for NICKEL ALLOYS with columns for Chemical composition (Ni, Cr, Mo, Fe, W, Co, Ti, Others) and Tensile properties (TS, YS, EI).

Table for Mechanical and Physical Properties with columns for Typical Yield strength 0.2 at high temperature, Thermal conductivity, Density, Coefficient of expansion, and Young modulus (tensile).

Table for Mechanical and Physical Properties (continued) with columns for Yield strength, Thermal conductivity, Density, Coefficient of expansion, and Young modulus.

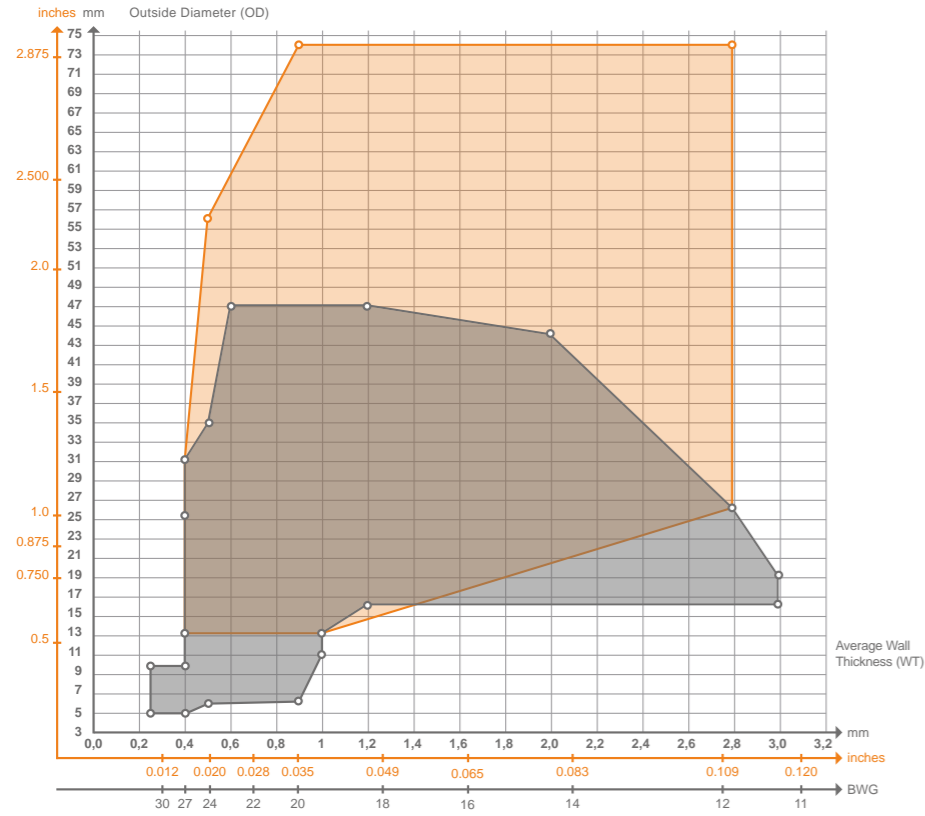
Table for Mechanical and Physical Properties (continued) with columns for Yield strength, Thermal conductivity, Density, Coefficient of expansion, and Young modulus.

AL 29-4C® is registered trademarks of ATI Properties, Inc., an affiliate of Allegheny Ludlum. LDX 2101®, 254 SMO®, 153MA® and 253MA® are registered trademarks of Outokumpu. (1) Oil and gas applications, (2) Mechanical applications, (3) Annealed, (4) 690 MPa (100 ksi) if OD ≤ 25 mm (1 in.), (5) 450 MPa (65 ksi) if OD ≤ 25 mm (1 in.)

Other nickel alloys are available upon request

Titanium and Stainless Steel Welded Tubes

Diameter and wall thickness capabilities



Titanium Alloys
 12.7 mm ≤ OD ≤ 73 mm (0.5" - 2.875")
 0.4 mm ≤ WT ≤ 2.77 mm (0.015" - 0.11")

Stainless Steels
 12.7 mm ≤ OD ≤ 46.2 mm (0.5" - 1.82")
 0.4 mm ≤ WT ≤ 3.05 mm (0.015" - 0.12")

Legend: ■ Titanium Alloys, ■ Stainless Steels

Other dimensions can be considered upon request

Length and Bending Capabilities

MAXIMUM AVAILABLE LENGTH	BENDING CAPABILITIES		TUBE OUT-OF-ROUNDNESS IN THE BENT PART
	R min	R max	
For straight tubes: 25 m - 82 ft	1.5 OD for 7.5 < OD/WT < 30	1 150 mm (U-shapes: 960 mm)	8 % maxi for R ≥ 100 mm 10 % maxi for 2 x OD ≤ R < 100 m
For bent tubes : Developed: 42 m - 151 ft Straight leg: 22 m - 72 ft	OD x (0.17 OD/WT - 3.5) for 30 < OD/WT < 38		12 % maxi for 1.5 x OD < R < 2 x OD

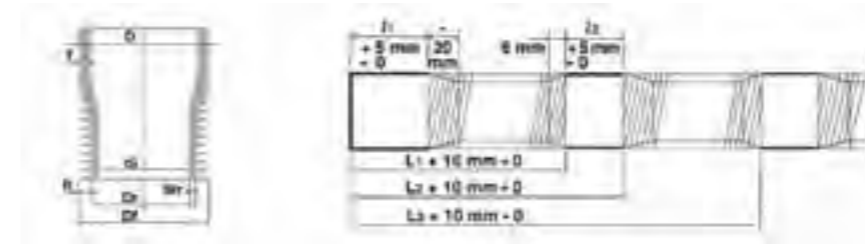
Titanium U-bent tubes can be considered upon request.

OD: Outside Diameter
 WT: Average Wall Thickness
 R: Bending Radius

NEOTISS™ MSR Tubes Integrally Finned Welded Tubes Grades 439 L

**NEOTISS™ MSR Tubes 19 ± 1.0 FINS / INCH Height of fin h: 1.5 mm - 0.059 in ± 10%
 Thickness at 1/2 height: 0.366 mm - 0.014 in ± 10%**

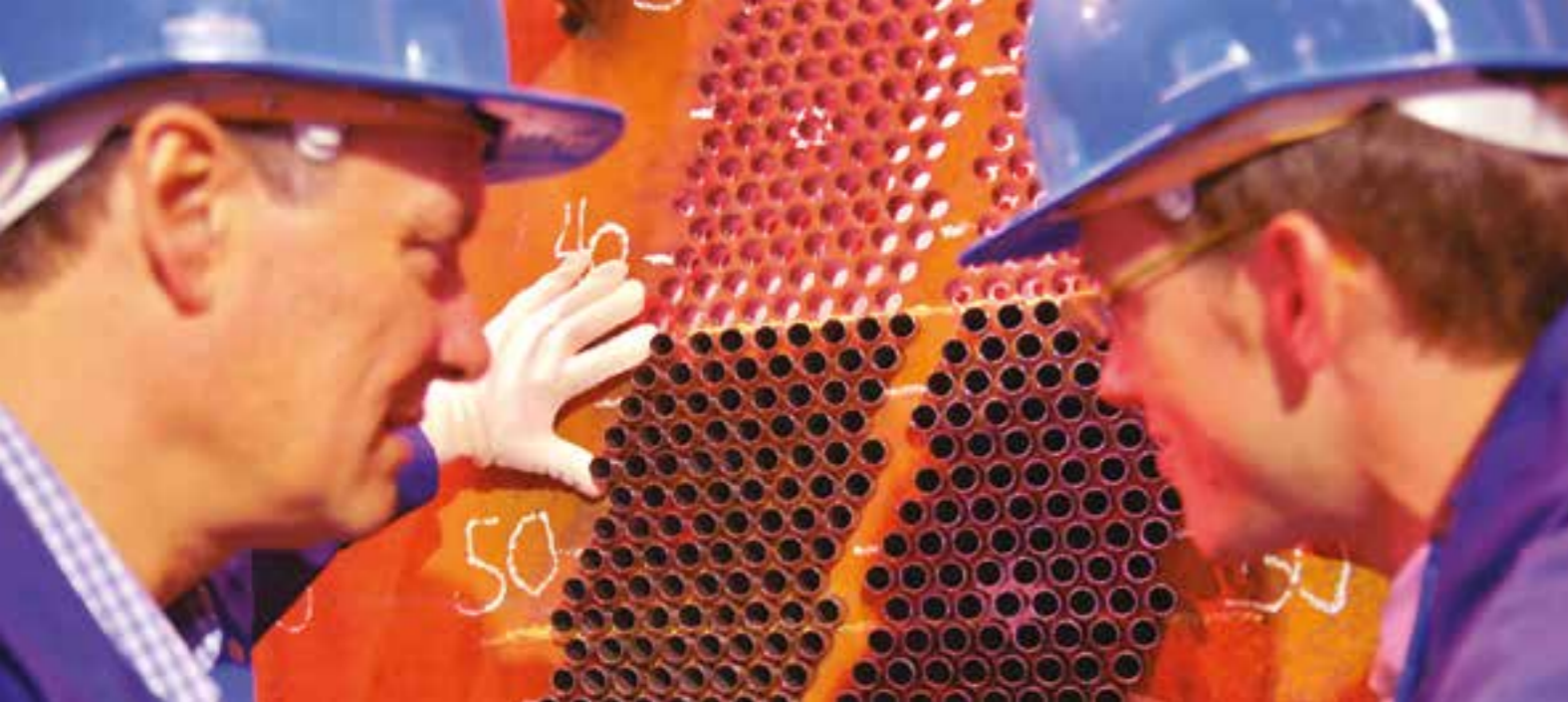
Plain section			Finned section - Mean values										
D	T	Mean weight	Df	Dr	Wr	Wr min	Se Outer surface	Sp Projected surface	Di	Internal cross section	Si Internal surface	Se / Si	Mean weight
mm in.	mm in.	(kg / m) (lbs / ft)	mm in.	mm in.	mm in.	mm in.	(m2 / m) (sq.ft / ft)	(m2 / m) (sq.ft / ft)	mm in.	(mm2) (sq. in.)	(m2 / m) (sq.ft / ft)		(kg / m) (lbs / ft)
19.050.750	1.65/1.75 .065/.069	0.695 .467	19.05 .750	16.05 .632	1.16 .046	1.05 .041	0.158 .518	0.0173 .056	13.95 .549	152.8 .2368	0.044 .144	3.62	0.581 .390



**NEOTISS™ MSR Tubes 27 ± 1.0 FINS / INCH Height of fin h: 1.27 mm - 0.050 in ± 10%
 Thickness at 1/2 height: 0.292 mm - 0.011 in ± 10%**

Plain section			Finned section - Mean values										
D	T	Mean weight	Df	Dr	Wr	Wr min	Se Outer surface	Sp Projected surface	Di	Internal cross section	Si Internal surface	Se / Si	Mean weight
mm in.	mm in.	(kg / m) (lbs / ft)	mm in.	mm in.	mm in.	mm in.	(m2 / m) (sq.ft / ft)	(m2 / m) (sq.ft / ft)	mm in.	(mm2) (sq. in.)	(m2 / m) (sq.ft / ft)		(kg / m) (lbs / ft)
19.050.750	1.65/1.75 .065/.069	0.695 .467	19.05 .750	16.51 .650	1.11 .044	1.06 .042	0.186 .610	0.0173 .057	14.33 .564	161.3 .2500	0.045 .148	4.14	0.580 .390
22.22 .874	1.83 .072	0.904 .610	22.22 .874	19.68 .774	1.24 .048	1.20 .047	0.222 .728	0.021 .069	17.20 .677	232 .359	0.054 .177	4.06	0.754 .509

Other dimensions and profiles can be manufactured upon request.



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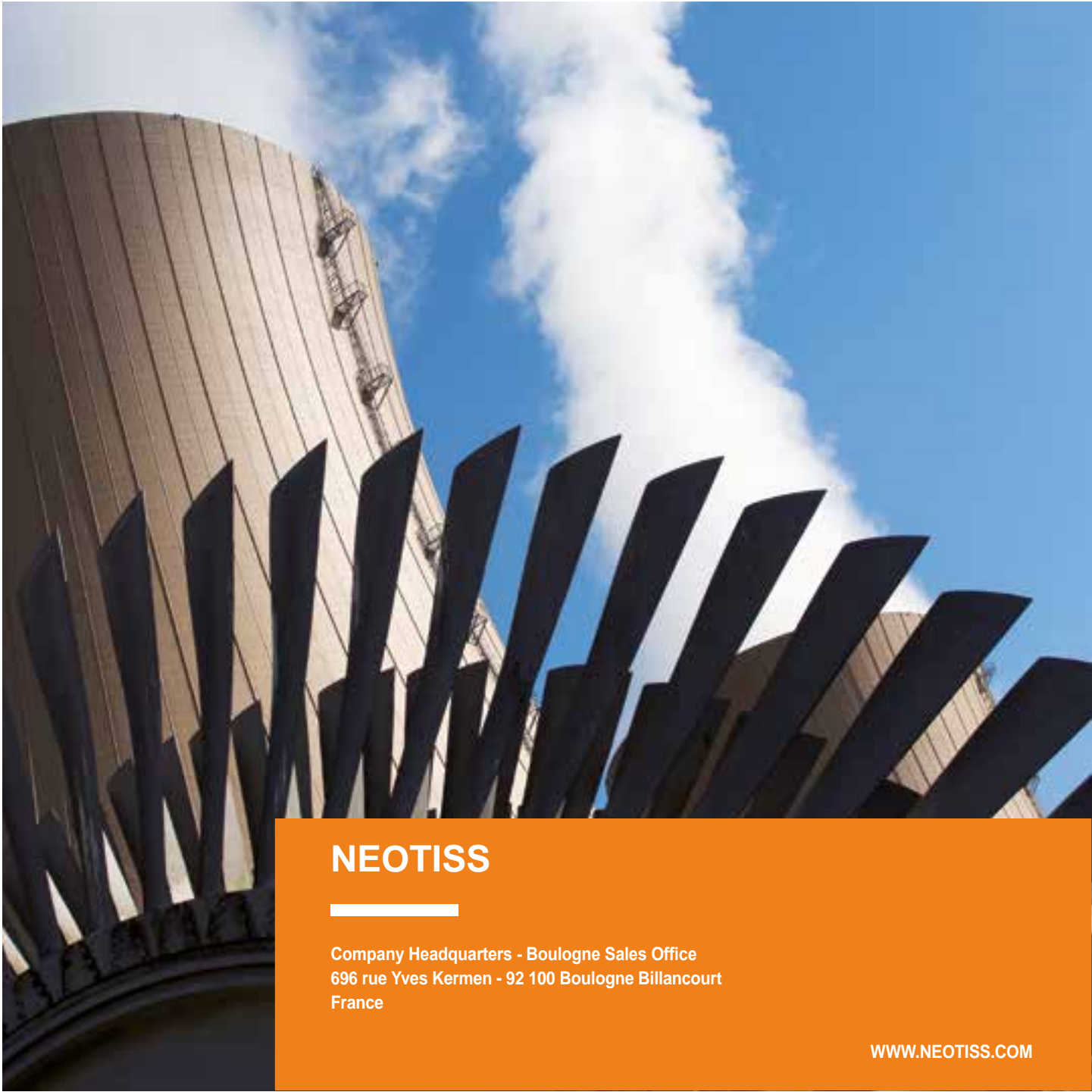
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International Presence





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