



NEOTISS™ Helix Tubes

How to improve your condenser performance

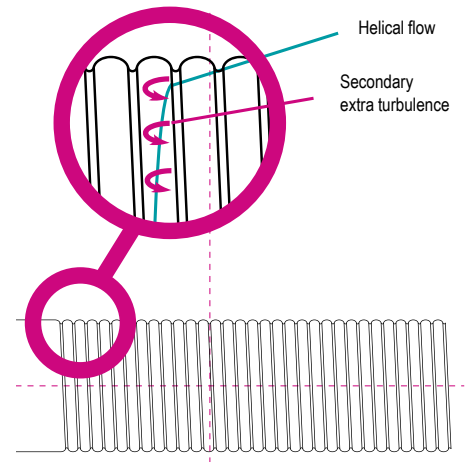
The concept

NEOTISS™ Helix Tube is a tube designed to maximize heat transfer performance during condensation in steam surface condenser applications.

The protected helix design is a longitudinal cold deformation generating turbulences within the fluid. It reduces boundary layer thermal resistance and

therefore increases the overall heat transfer of the tube.

NEOTISS™ Helix Tube in titanium material has been developed through intensive research and trials to find the best parameters to maximize heat transfer performance and minimize the pressure drop generated by the turbulences.



Heat transfer improvement
above

40%

versus smooth tubes ^[1]

Limited extra pressure drop

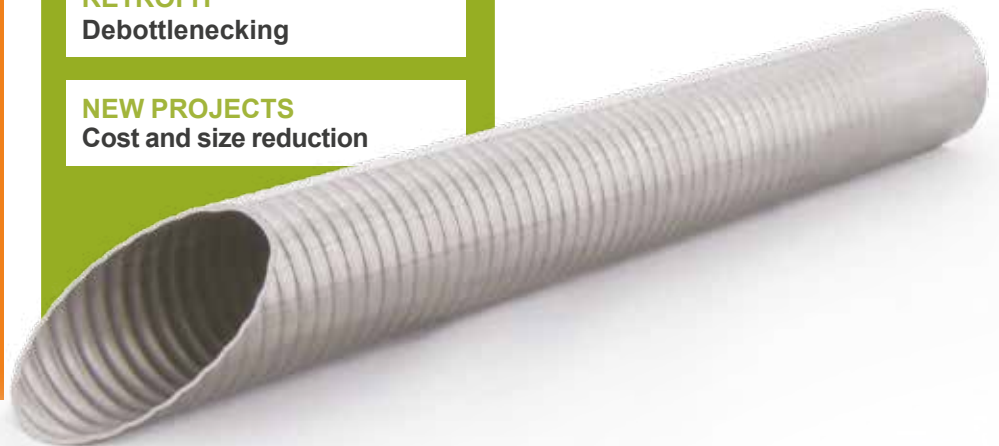
Good cleaning ability

Adapted to your standard
tubing practices

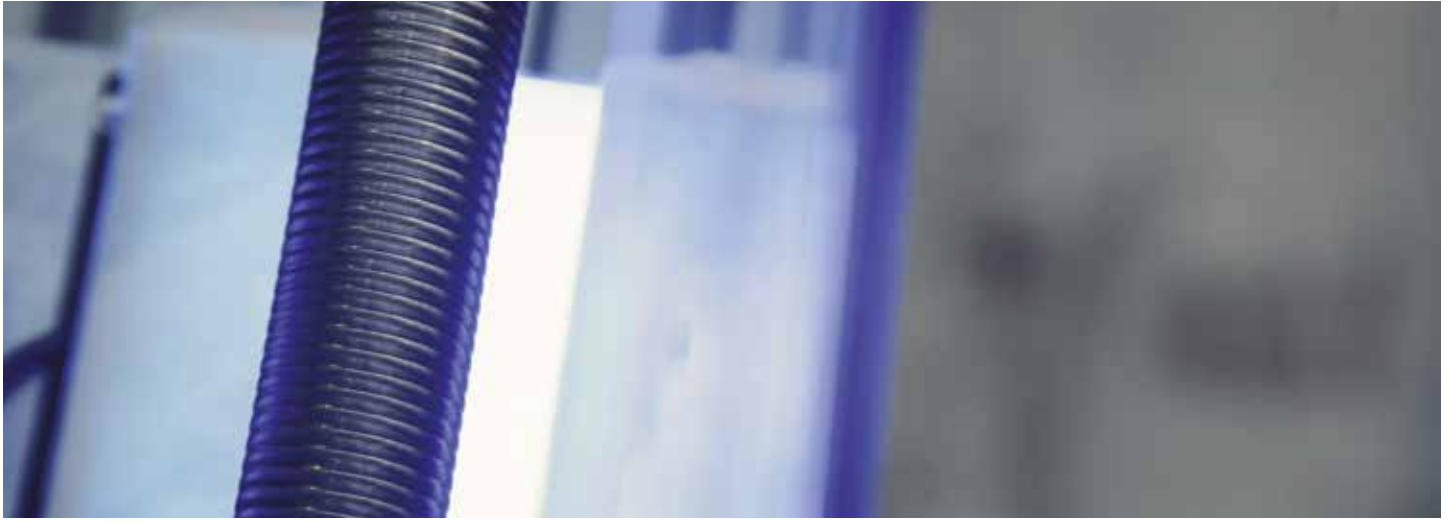
BENEFITS

RETROFIT
Debottlenecking

NEW PROJECTS
Cost and size reduction



^[1] based on measurements performed on our pilot condenser



Heat transfer

Trials performed on **NEOTISS™ Helix Tube** have demonstrated that this **40% minimum heat transfer improvement is stable**

- for inlet cooling water velocity between 1m/s (3.28ft/s) and 2,5m/s (8.2ft/s)
- for a delta temperature between 10°C (18°F) and 16°C (28.8°F) (delta temperature being the difference between the inlet cooling water and the temperature of the steam) ^[1]

The linearity between the heat transfer coefficient and the square root of inlet cooling water velocity has also been verified.

These results have been measured in laboratory conditions. The condenser designer shall therefore build his own hypothesis while developing tube bundle and shell configurations.

Easy to clean

Tube cleaning is an important factor in condenser design and depends on various parameters like material, roughness or tube geometry. NEOTISS conducted a specific study on **NEOTISS™ Helix Tube cleaning** ability and found that **NEOTISS™ Helix Tubes** are as easy to clean as smooth tubes. ^[2]

Pressure drop

The hydraulic losses of a condenser are determined by many parameters like the waterboxes inlet and outlet design, stagnancies, swirl and the tube bundle design itself. The turbulences created by **NEOTISS™ Helix Tube** will unavoidably generate extra pressure loss in the condenser. However, the special design developed limits this additional pressure drop from 35% to 150%.

Dimensions

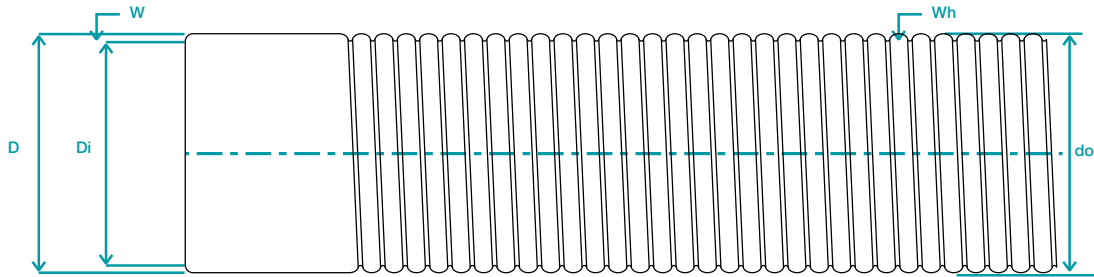
The design of **NEOTISS™ Helix Tube** has been optimized in order to have the dimensional properties in accordance with the **ASTM B338 standard**. The straightness, in particular, is in compliance with tubing standards.

There is no diameter reduction of the helix part, resulting in no additional vibrations in intermediate support plate compared to a smooth tube.

^[1] Specific values of heat transfer coefficient with inlet cooling water and delta temperature can be provided on demand.

^[2] Detailed results can be provided on demand.

Section Drawing



D: outside diameter of Plain End

Di: inside diameter of Plain End

W: wall thickness Plain End

do: outside diameter of Helix Part

Wh: wall thickness Helix Part

The dimensions

Smooth Part			Helix Part	
Outside Diameter (D)	Inside Diameter (Di)	Wall Thickness (W)	Outside diameter (do)	Wall Thickness (Wh)
19.05mm (0.75")	18,05mm (0.71")	0.5mm (0.02")	19.05mm (0.75")	0.5mm (0.02")
19.05mm (0.75")	17.65mm (0.695")	0.7mm (0.028")	19.05mm (0.75")	0.7mm (0.028")
22.22mm (0.875")	21.22mm (0.835")	0.5mm (0.02")	22.22mm (0.875")	0.5mm (0.02")
22.22mm (0.875")	20.82mm (0.819")	0.7mm (0.028")	22.22mm (0.875")	0.7mm (0.028")
25.4mm (1")	24.4mm (0.96")	0.5mm (0.02")	25.4mm (1")	0.5mm (0.02")
25.4mm (1")	24mm (0.944")	0.7mm (0.028")	25.4mm (1")	0.7mm (0.028")

For other dimensions, please contact NEOTISS

NEOTISS™ Helix Tubes Tolerances

Outside Diameter of Plain End:

- $D < 25.4\text{mm}$: $\pm 0.102\text{mm}$ (0.004")
- D from 25.4 to 38.1mm (1 to 1.5"): $\pm 0.127\text{mm}$ (0.005")

Wall thickness tolerance of Plain End: $\pm 10\%$

Plain end length: $-0\text{mm} / +40\text{mm}$ (1.57")

Squareness: 0.016mm/mm (0.016in./in.)

Outside Diameter of Helix Part:

- $D < 25.4\text{mm}$: $\pm 0.102\text{mm}$ (0.004")
- D from 25.4 to 38.1mm (1 to 1.5"): $\pm 0.127\text{mm}$ (0.005")

Wall thickness tolerance of Helix Part: $\pm 10\%$

Overall length: $-0\text{mm} / +3\text{mm}$ (0.125")

NEOTISS™ Helix Tubes Standards

ASTM B-338: Standard Specification for Seamless and Welded Titanium and Titanium Alloy Tubes for Condensers and Heat Exchangers

NEOTISS™ Helix Tubes Specification

All smooth tubes: according to ASTM B-338

All Helix Tubes:

Non Destructive Testing

- 100% dimensional tolerances
 - Go ring gauge: Maxi OD+0.05mm (0.002") on each end
 - No Go ring gauge: Min OD on each end
 - Smooth areas length
- 100% Eddy Current Tested
- 100% Leak Tested:
 - Air Pressure Differential Test: 7 bars (101.5 psi)
 - Helium Leak Test: 5 bars (72.5 psi)

Destructive Testing

Testing	Criteria	Frequency
Micrographic test	Wall thickness helix part	1 per lot



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