WOLVERINE TUBE, INC.
Engineering Thermal Innovation

TURBO-CLF®

For High Fouling Applications

Extended Performance for Tube-Side Fouling

Turbo-CLF has been designed for condensing applications with fluids on the inside of the tube, like seawater, that tend to cause fouling. Condensers with a fouling liquid on the inside will have a drop off in performance over time due to fouling. Turbo-CLF has been engineered to extend the performance of a unit when tube-side fouling is a problem. The integral helical ridges on the inside of the tube have a two-fold purpose. The ridges increase the internal surface area and cause turbulation of the tube-side fouling. Independent research has confirmed that the ridge spacing and helix angle of Turbo-CLF will accomplish this task.

External Standards
This product is produced in alloy C12200 to meet the mechanical, chemical, and testing requirements of ASTM B75/B359 and in alloy C70600 to meet the mechanical, chemical, and testing requirements of ASTM B466/B359. For application to the ASME pressure vessel code, the product will be produced to meet the requirements of ASME SB75/SB359 for alloy C12200 and to SB466/SB359 for alloy C70600. Other applicable standards - DIN 1787, DIN 17671, DIN 17664, and ADW 6/2 WD TUV 420/5.

Plain Sections
Plain end and land of 1” (25.4 mm) and over are standard. For plain end and land lengths down to 5/8” (15.9 mm), contact the Wolverine Marketing Department. Spacing between lands of 18” (457.2 mm) and over are supplied as standard.

Lengths
Overall lengths, with power brush deburred ends, are supplied from 4’ (1.219 m) to 60’ (18.288 m) as standard. Overall lengths, with chamfered ends, can be supplied from 3’ (0.914 m) to 28’ (8.534 m) as standard lengths.

Temper
Turbo-CLF is supplied, as standards, in the “as finned” condition with plain ends and lands in the annealed condition. Material can be supplied in the annealed condition the entire length by special request.

Contact us at (256) 353-1310 or mkt@wlv.com

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Standard Sizes			Plain End Dimensions		Finned Section Dimensions			
Catalog Number	Outside Diameter inch (mm)	Nominal Wall inch (mm)	Outside Diameter inch (mm)	Wall inch (mm)	Fin Height inch (mm)	Outside Diameter inch (mm)	Min. Wall Under Fins inch (mm)	Root Diameter inch (mm)
Turbo-CLF								
110-4051028	3/4 (19.05)	0.028 (0.711)	0.748 (19.0)	0.048 (1.22)	0.038 (0.965)	0.745 (18.9)	0.025 (0.635)	0.670 (17.2)
110-4051035	3/4 (19.05)	0.035 (0.899)	0.748 (19.0)	0.053 (1.35)	0.038 (0.965)	0.745 (18.9)	0.031 (0.787)	0.670 (17.2)
110-4071035	1 (25.4)	0.035 (0.889)	0.995 (25.3)	0.053 (1.35)	0.038 (0.965)	0.993 (25.2)	0.031 (0.787)	0.919 (23.3)

Standard Sizes			Inside Dimensions		Areas			
Catalog Number	Weight Per Foot lb/ft (kg/m)	Fins Per Inch	Nominal Inside Dia. inch (mm)	Ridge Height inch (mm)	Nominal Inside Surface Area ft^2/ft (m^2/m)	Actual Inside Surface Area ft^2/ft (m^2/m)	Nominal Outside Surface Area ft^2/ft (m^2/m)	Actual Outside Surface Area ft^2/ft (m^2/m)
Turbo-CLF								
110-4051028	0.355 (0.528)	40	0.614 (15.6)	0.017 (0.432)	0.161 (0.0491)	0.185 (0.0564)	0.196 (0.0597)	0.713 (0.2173)
110-4051035	0.406 (0.604)	40	0.600 (15.2)	0.016 (0.406)	0.157 (0.0478)	0.180 (0.0549)	0.196 (0.0597)	0.713 (0.2173)
110-4071035	0.531 (0.790)	40	0.849 (21.6)	0.016 (0.406)	0.222 (0.0677)	0.245 (0.0747)	0.260 (0.0792)	0.966 (0.2944)

Engineering Data

Catalog Number	Sieder and Tate[2] Constant STC^i	Constants used in Calculating Darcy Friction Factor[1] C	D
Turbo-CLF			
110-4051028	0.048	0.830	0.275
110-4051035	0.047	0.645	0.256
110-4071035	0.046	0.357	0.207

1. Constants applicable to Reynolds numbers greater than 20,000. [$f_{Darcy} = C(Re)^{-D}$]

2. To calculate inside heat transfer coefficient: $hi = (k/D_{i\,nom}.)(STC_i)Re^{0.8}Pr^{1/3}[\mu/\mu_{wall})^{0.14}$

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