

# Steel Finned Tubes

## S/T Trufin® and Turbo-Chil® in Ferrous Alloys

Wieland has developed an array of finned tubes in a variety of welded and/or seamless ferrous alloys with surface enhancements on the outside only or outside and inside surfaces.

If other alloys are required, please contact the Wieland Marketing Department.

## External Standards

S/T Trufin and Turbo-Chil supplied in ferrous alloys are produced from plain surface tube material purchased to one of the following ASTM and/or ASME standards: ASTM A179, A213, A214, A249, A334, A439, ASME SA179, SA213, SA214, SA249 and SA334. The ASTM and ASME standards are identical except for A213/SA213 and A249/SA249.

The elimination of nonstraightened tubes in the ASME standard is the only difference between the standards. S/T Trufin and Turbo-Chil that meets the requirements of Paragraph UG-8(b), ASME Boiler and Pressure Vessel Code, Section VIII, are made to an average wall in the finned area. When a minimum wall is required, the next heavier wall size should be used. Steel S/T Trufin is also governed by ASTM A498.

## U-BEND

Supply of tubes in U-bend shape is possible for all ferrous alloys, including nondestructive tests and annealing of bent section

## Plain Sections

Plain ends and lands of 1" (25.4 mm) and over are standard. For plain ends and lands down to 5/8" (15.9 mm), contact the Wieland Marketing Department.

Plain end lengths 1" (25.4mm) and over are supplied as standard. If plain ends less than 1" (25.4 mm) are required, contact the Wieland Marketing Department.

Land Lengths 1" (25.4mm) and over are supplied as standard. If land lengths down to 5/8" (15.9 mm) minimum are required, contact the Wieland Marketing Department.

Distances of 18" (457.2 mm) and over between lands are supplied as standard.

For Spacing between lands less than 18" (457.2 mm), contact Wieland Marketing Department.

## Temper

All Steel S/T Trufin and Turbo-Chil are supplied in the "as finned" condition. Plain ends and lands are supplied in the condition as described by the governing plain tube ASTM or ASME standard. Contact Wieland department for heat treatment possibilities.

## Range of available Dimensions

### S/T Trufin<sup>®</sup> Enhanced Surface Tubes UNS Steel

Catalog Number	Plain Ends		Finnend Section			Area		Weight per Unit Length lbs/ft (kg/m)
	Outside Diameter inch (mm)	Wall Thickness inch (mm)	Min. Wall Under Fins inch (mm)	Finned Section Nom. Root Diam. inch (mm)	Nominal Inside Diameter inch (mm)	Actual Outside Surface ft <sup>2</sup> /ft (m <sup>2</sup> /m)	Ratio Actual Outside/Nominal Inside	

#### 11 Fins per inch – Alloy Group III

67-115109	3/4 (19.05)	0.125 (3.18)	0.097 (2.46)	0.625 (15.88)	0.407 (10.34)	0.386 (0.118)	3.64	0.828 (1.232)
67-117083	1 (25.40)	0.100 (2.54)	0.074 (1.88)	0.875 (22.23)	0.709 (18.00)	0.526 (0.160)	2.84	0.930 (1.384)
67-117091	1 (25.40)	0.109 (2.77)	0.081 (2.06)	0.875 (22.23)	0.693 (17.60)	0.526 (0.160)	2.91	1.039 (1.546)
67-117102	1 (25.40)	0.115 (2.92)	0.091 (2.31)	0.875 (22.23)	0.671 (17.04)	0.526 (0.160)	3.01	1.080 (1.607)
67-117106	1 (25.40)	0.122 (3.10)	0.095 (2.41)	0.875 (22.23)	0.663 (16.84)	0.526 (0.160)	3.04	1.142 (1.699)

For S/T Trufin<sup>®</sup> 11 FPI, the average fin height is 0.059" (1.500 mm) and the average fin width is 0.035" (0.889 mm).

#### 16 Fins per inch – Alloy Groups I & III

60-163049	1/2 (12.70)	0.065 (1.65)	0.044 (1.118)	0.375 (09.53)	0.277 (07.04)	0.261 (0.080)	3.60	0.288 (0.428)
60-164065	5/8 (15.88)	0.085 (2.16)	0.058 (1.473)	0.500 (12.70)	0.370 (09.40)	0.340 (0.104)	3.51	0.481 (0.716)
60-165065	3/4 (19.05)	0.085 (2.16)	0.058 (1.473)	0.625 (15.89)	0.495 (12.57)	0.418 (0.127)	3.23	0.595 (0.885)
60-165083	3/4 (19.05)	0.095 (2.41)	0.074 (1.880)	0.625 (15.89)	0.459 (11.66)	0.418 (0.127)	3.48	0.666 (0.990)
60-166065	7/8 (22.23)	0.085 (2.16)	0.058 (1.473)	0.750 (19.05)	0.620 (15.75)	0.496 (0.151)	3.06	0.681 (1.013)
60-166083	7/8 (22.23)	0.095 (2.41)	0.074 (1.880)	0.750 (19.05)	0.584 (14.83)	0.496 (0.151)	3.24	0.791 (1.176)
60-167083	1 (25.40)	0.095 (2.41)	0.074 (1.880)	0.875 (22.23)	0.709 (18.01)	0.574 (0.175)	3.09	0.912 (1.357)

For S/T Trufin<sup>®</sup> 16 FPI, the average fin height is 0.053" (1.346 mm) and the average fin width is 0.010" (0.254 mm).

#### 19 Fins per inch – Alloy Group III

60-193042	1/2 (12.70)	0.060 (1.52)	0.037 (0.940)	0.375 (09.53)	0.291 (07.39)	0.319 (0.097)	4.19	0.239 (0.355)
60-193049	1/2 (12.70)	0.065 (1.65)	0.044 (1.118)	0.375 (09.53)	0.277 (07.04)	0.319 (0.097)	4.40	0.284 (0.423)
60-193058	1/2 (12.70)	0.075 (1.91)	0.049 (1.245)	0.375 (09.53)	0.259 (06.58)	0.319 (0.097)	4.71	0.286 (0.425)
60-194049	5/8 (15.88)	0.065 (1.65)	0.044 (1.118)	0.500 (12.70)	0.402 (10.21)	0.414 (0.126)	3.94	0.362 (0.538)
60-194058	5/8 (15.88)	0.075 (1.91)	0.049 (1.245)	0.500 (12.70)	0.384 (09.75)	0.414 (0.126)	4.12	0.396 (0.589)
60-194065	5/8 (15.88)	0.085 (2.16)	0.058 (1.473)	0.500 (12.70)	0.370 (09.40)	0.414 (0.126)	4.27	0.456 (0.679)
60-194072	5/8 (15.88)	0.090 (2.29)	0.065 (1.651)	0.500 (12.70)	0.356 (09.04)	0.414 (0.126)	4.44	0.480 (0.714)
60-195049	3/4 (19.05)	0.065 (1.65)	0.044 (1.118)	0.625 (15.88)	0.527 (13.39)	0.507 (0.155)	3.67	0.447 (0.665)
60-195058	3/4 (19.05)	0.075 (1.91)	0.049 (1.245)	0.625 (15.88)	0.509 (12.93)	0.507 (0.155)	3.80	0.485 (0.722)
60-195065	3/4 (19.05)	0.085 (2.16)	0.058 (1.473)	0.625 (15.88)	0.495 (12.57)	0.507 (0.155)	3.91	0.568 (0.845)
60-195072	3/4 (19.05)	0.090 (2.29)	0.065 (1.651)	0.625 (15.88)	0.481 (12.22)	0.507 (0.155)	4.03	0.592 (0.881)
60-195083	3/4 (19.05)	0.095 (2.41)	0.074 (1.880)	0.625 (15.88)	0.459 (11.66)	0.507 (0.155)	4.22	0.618 (0.920)
60-196058	7/8 (22.23)	0.075 (1.91)	0.049 (1.245)	0.750 (19.05)	0.634 (16.10)	0.588 (0.179)	3.54	0.595 (0.885)
60-196065	7/8 (22.23)	0.085 (2.16)	0.058 (1.473)	0.750 (19.05)	0.620 (15.75)	0.588 (0.179)	3.62	0.675 (1.004)
60-196072	7/8 (22.23)	0.090 (2.29)	0.065 (1.651)	0.750 (19.05)	0.606 (15.39)	0.588 (0.179)	3.71	0.689 (1.024)
60-196083	7/8 (22.23)	0.095 (2.41)	0.074 (1.880)	0.750 (19.05)	0.584 (14.83)	0.588 (0.179)	3.85	0.762 (1.134)
60-196095	7/8 (22.23)	0.110 (2.79)	0.084 (2.134)	0.750 (19.05)	0.560 (14.22)	0.588 (0.179)	4.01	0.835 (1.243)
60-197058	1 (25.40)	0.075 (1.91)	0.049 (1.245)	0.875 (22.23)	0.759 (19.28)	0.695 (0.212)	3.50	0.697 (1.037)
60-197065	1 (25.40)	0.085 (2.16)	0.058 (1.473)	0.875 (22.23)	0.745 (18.92)	0.695 (0.212)	3.56	0.697 (1.037)
60-197072	1 (25.40)	0.090 (2.29)	0.065 (1.651)	0.875 (22.23)	0.731 (18.57)	0.695 (0.212)	3.63	0.813 (1.210)
60-197083	1 (25.40)	0.095 (2.41)	0.074 (1.880)	0.875 (22.23)	0.709 (18.01)	0.695 (0.212)	3.74	0.873 (1.299)
60-197095	1 (25.40)	0.110 (2.79)	0.084 (2.134)	0.875 (22.23)	0.685 (17.40)	0.695 (0.212)	3.88	0.988 (1.471)
60-197109	1 (25.40)	0.125 (3.18)	0.097 (2.464)	0.875 (22.23)	0.657 (16.69)	0.695 (0.212)	4.04	1.135 (1.688)

For S/T Trufin<sup>®</sup> 19 FPI, the average fin height is 0.053" (1.346 mm) and the average fin width is 0.011" (0.279 mm).

## S/T Trufin<sup>®</sup> Enhanced Surface Tubes UNS Steel

Catalog Number	Plain Ends		Finnend Section			Area		Weight per Unit Length lbs/ft (kg/m)
	Outside Diameter inch (mm)	Wall Thickness inch (mm)	Min. Wall Under Fins inch (mm)	Finned Section Nom. Root Diam. inch (mm)	Nominal Inside Diameter inch (mm)	Actual Outside Surface ft <sup>2</sup> /ft (m <sup>2</sup> /m)	Ratio Actual Outside/Nominal Inside	

### 26 Fins per inch – Alloy Groups I & III

65-265035	3/4 (19.05)	0.055 (1.40)	0.031 (0.787)	0.640 (16.26)	0.570 (14.48)	0.651 (0.198)	4.30	0.367 (0.546)
65-265042	3/4 (19.05)	0.065 (1.65)	0.037 (0.940)	0.640 (16.26)	0.556 (14.12)	0.651 (0.198)	4.46	0.409 (0.607)
65-265049	3/4 (19.05)	0.075 (1.91)	0.044 (1.118)	0.640 (16.26)	0.542 (13.77)	0.651 (0.198)	4.58	0.450 (0.670)
65-265065	3/4 (19.05)	0.085 (2.16)	0.058 (1.473)	0.640 (16.26)	0.510 (12.95)	0.651 (0.198)	4.86	0.592 (0.881)
65-267035	1 (25.40)	0.055 (1.40)	0.031 (0.787)	0.890 (22.61)	0.820 (20.83)	0.885 (0.270)	4.12	0.632 (0.940)
65-267042	1 (25.40)	0.065 (1.65)	0.037 (0.940)	0.890 (22.61)	0.806 (20.47)	0.885 (0.270)	4.19	0.714 (1.062)
65-267072	1 (25.40)	0.092 (2.32)	0.065 (1.650)	0.890 (22.61)	0.746 (18.95)	0.885 (0.270)	4.54	0.850 (1.265)

For S/T Trufin<sup>®</sup> .26 FPI, the average fin height is 0.052" (1.320 mm) and the average fin width is 0.014" (0.357 mm).

### 28 Fins per inch – Alloy Group I

65-285028	3/4 (19.05)	0.050 (1.27)	0.025 (0.635)	0.672 (17.07)	0.616 (15.65)	0.514 (0.157)	3.19	0.363 (0.540)
65-285035	3/4 (19.05)	0.055 (1.40)	0.031 (0.787)	0.672 (17.07)	0.602 (15.29)	0.514 (0.157)	3.26	0.396 (0.590)
65-285042	3/4 (19.05)	0.065 (1.65)	0.037 (0.940)	0.672 (17.07)	0.588 (14.94)	0.514 (0.157)	3.34	0.460 (0.684)
65-285049	3/4 (19.05)	0.070 (1.78)	0.044 (1.118)	0.672 (17.07)	0.574 (14.58)	0.514 (0.157)	3.42	0.493 (0.734)
65-285065	3/4 (19.05)	0.085 (2.16)	0.058 (1.473)	0.672 (17.07)	0.542 (13.77)	0.514 (0.157)	3.62	0.591 (0.879)
65-285083	3/4 (19.05)	0.095 (2.41)	0.074 (1.880)	0.672 (17.07)	0.506 (12.85)	0.514 (0.157)	3.88	0.666 (0.991)
65-286028	7/8 (22.23)	0.050 (1.27)	0.025 (0.635)	0.797 (20.24)	0.741 (18.82)	0.605 (0.184)	3.12	0.345 (0.513)
65-286035	7/8 (22.23)	0.055 (1.40)	0.031 (0.787)	0.797 (20.24)	0.727 (18.47)	0.605 (0.184)	3.18	0.402 (0.598)
65-286042	7/8 (22.23)	0.065 (1.65)	0.037 (0.940)	0.797 (20.24)	0.713 (18.11)	0.605 (0.184)	3.24	0.458 (0.682)
65-286049	7/8 (22.23)	0.070 (1.78)	0.044 (1.118)	0.797 (20.24)	0.699 (17.75)	0.605 (0.184)	3.31	0.514 (0.765)
65-286065	7/8 (22.23)	0.085 (2.16)	0.058 (1.473)	0.797 (20.24)	0.667 (16.94)	0.605 (0.184)	3.47	0.637 (0.947)
65-286083	7/8 (22.23)	0.095 (2.41)	0.074 (1.880)	0.797 (20.24)	0.631 (16.03)	0.605 (0.184)	3.66	0.767 (1.141)
65-287028	1 (25.40)	0.050 (1.27)	0.025 (0.635)	0.922 (23.42)	0.866 (22.00)	0.696 (0.212)	3.07	0.399 (0.593)
65-287035	1 (25.40)	0.058 (1.47)	0.028 (0.711)	0.922 (23.42)	0.852 (21.64)	0.696 (0.212)	3.13	0.573 (0.852)
65-287042	1 (25.40)	0.065 (1.65)	0.037 (0.940)	0.922 (23.42)	0.838 (21.28)	0.696 (0.212)	3.18	0.623 (0.928)
65-287049	1 (25.40)	0.070 (1.78)	0.044 (1.118)	0.922 (23.42)	0.824 (20.93)	0.696 (0.212)	3.24	0.653 (0.972)
65-287065	1 (25.40)	0.083 (2.11)	0.058 (1.473)	0.922 (23.42)	0.792 (20.12)	0.696 (0.212)	3.37	0.787 (1.171)
65-287083	1 (25.40)	0.095 (2.41)	0.074 (1.880)	0.922 (23.42)	0.756 (19.20)	0.696 (0.212)	3.53	0.889 (1.323)

For S/T Trufin<sup>®</sup> 28 FPI, the average fin height is 0.037" (0.940 mm) and the average fin width is 0.011" (0.279 mm).

**Do You Want to Learn More  
About Wieland Thermal Solutions?**

Please join our website  
[wieland-thermalsolutions.com](http://wieland-thermalsolutions.com)

# Steel Finned Tubes

## Range of available Dimensions

### S/T Turbo-Chil® Double Enhanced Surface Tubes UNS Steel

Catalog Number	Plain Ends		Finnend Section			Area		Ratio Actual Outside/Nominal Inside	Weight per Unit Length lbs/ft (kg/m)
	Outside Diameter inch (mm)	Wall Thickness inch (mm)	Min. Wall Under Fins inch (mm)	Finned Section Nom. Root Diam. inch (mm)	Nominal Inside Diameter inch (mm)	Actual Outside Surface ft <sup>2</sup> /ft (m <sup>2</sup> /m)			

#### 19 Fins per inch – Alloy Group III

56-1952542	3/4 (19.05)	0.072 (1.83)	0.037 (0.940)	0.678 (17.22)	0.594 (15.09)	0.359 (0.109)	2.30	0.428 (0.637)
------------	-------------	--------------	---------------	---------------	---------------	---------------	------	---------------

For S/T Turbo-Chil® 19 FPI, the average fin height is 0.032" (0.813 mm) and the average fin width is 0.015" (0.381 mm).

#### 28 Fins per inch – Alloy Group I

56-2850628	3/4 (19.05)	0.053 (1.35)	0.025 (0.635)	0.668 (16.97)	0.612 (15.54)	0.496 (0.151)	3.10	0.305 (0.454)
56-2850635	3/4 (19.05)	0.059 (1.50)	0.031 (0.787)	0.668 (16.97)	0.598 (15.19)	0.496 (0.151)	3.16	0.366 (0.545)

For S/T Turbo-Chil® 28 FPI, the average fin height is 0.037" (0.940 mm) and the average fin width is 0.011" (0.279 mm).

## Engineering Data

	Wall in Finned Portion inch (mm)	Sieder and Tate <sup>2</sup> Constant STC <sub>i</sub>	Constants used in Calculating Darcy Friction Factor <sup>1</sup>	
			C	D
19 Fin Turbo-Chil	0.042 (1.067)	0.043	0.750	0.293
28 Fin Turbo-Chil	0.028 (0.711)	0.053	0.806	0.264
28 Fin Turbo-Chil	0.035 (0.889)	0.051	1.028	0.293

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

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

UNS Nomenclature	Common Industry Name	*ASTM Spec Number Welded (Seamless)	Tensile Strength Minimum ksi (MPa)	Yield Strength Minimum ksi (MPa)	Hardness Maximum Rockwell B
------------------	----------------------	-------------------------------------	------------------------------------	----------------------------------	-----------------------------

#### Alloy Group I – Austenitic Stainless Steel

S31600	316 Welded (Seamless)	A249 (A213)	75 (517)	30 (207)	90
S31603	316L Welded (Seamless)	A249 (A213)	70 (485)	25 (170)	90
S30400	304 Welded (Seamless)	A249 (A213)	75 (517)	30 (207)	90
S30403	304L Welded (Seamless)	A249 (A213)	70 (485)	25 (170)	90

#### Alloy Group II – Ferritic Stainless Steel

S43035	TP 439 Welded (Seamless)	A268	60 (415)	30 (205)	90
--------	--------------------------	------	----------	----------	----

#### Alloy Group III – Plain Carbon Steel

K01200	Seamless Low Carbon	A179	60 (414)	30 (207)	72
K01807	Welded Low Carbon	A214	-	-	72
K03008	Seamless Grade 1	A334	55 (379)	30 (207)	85
K31918	Seamless Grade 3	A334	65 (448)	35 (241)	90

\* For equivalent ASME specification, mechanical property data is identical.

#### For further information please contact:

Nuno Duarte | Director Global Business Development – Process Technology  
 P +351 253 969 390 @ nuno.duarte@wieland.com

**wieland**

Wieland-Werke AG | Graf-Arco-Straße 36 | 89079 Ulm | Germany  
 info@wieland-thermalsolutions.com | wieland-thermalsolutions.com

This printed matter is not subject to revision. No claims can be derived from it unless there is evidence of intent or gross negligence. The product characteristics are not guaranteed and do not replace our experts' advice.