

A world leader in enhanced heat transfer technology.

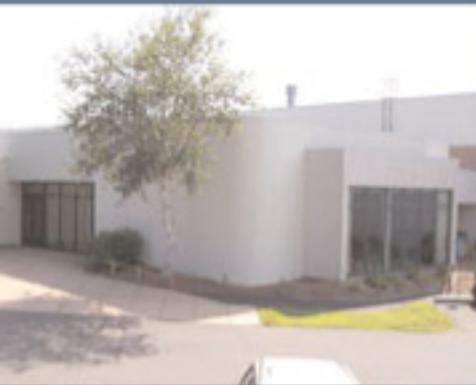


 **Turbotec[®]**

Heat Exchangers and Flexible Connectors

Putting a New Twist on Heat Transfer Technology

Stop looking for innovative heat transfer solutions to fit your space and performance requirements. Turbotec Products, Inc. is the only resource you need when it comes to high performance, high quality heat exchangers and flexible connector products for virtually any space conditioning, refrigeration, automotive, biomedical, plumbing, water heating and aerospace application. For more than 35 years, Turbotec has been a leader of innovative heat exchange technology. Our experts are ready to help solve your complex heat transfer issues.



Engineers and Specifiers Are Turning to Turbotec

Our unique patented TRU-TWIST® twisted tube technology assures the maximum amount of heat transfer in a compact package. Available coaxial coil configurations include straight, spiral, slim, helix and trombone, using premium quality copper, cupro-nickel, carbon steel, stainless steel, aluminum, titanium or other materials. Turbotec tubing offers dramatic increases in heat transfer efficiency – providing up to 4 times the efficiency of smooth tubing.

Little wonder that process and design engineers from a wide variety of industries turn to Turbotec for flexible, reliable, efficient heat transfer solutions under the most demanding performance, environmental and dimensional constraints.

Engineered Solutions for All Your Heat Transfer Needs

At Turbotec, we understand that heat transfer technology goes beyond coils and tubes. That is why our engineering team works closely with your engineering staff to provide just the right enhanced heat transfer solution for virtually any application need. We utilize the latest design technologies and equipment to dramatically reduce new product development cycles. Manufacturing is performed in a Lean Sigma, ISO 9001:2000 and Total Quality Management environment to assure that our products meet or exceed the application requirements of our customers.

Patented Technology Provides High Performance

Our technology allows us to provide more surface area for a given length of tubing while creating a turbulent mixing action that results in very high heat transfer through the tube walls. Our specialized manufacturing techniques provide tubing with significant performance and efficiency advantages over alternative products. In addition, Turbotec tubing can be shaped into virtually any space-saving configuration. All of which makes Turbotec the smart specification for engineers in a broad array of industries.



Turbotec Advantages

- Up to 300% enhancement in BTU/Hr heat transfer
- Increased burst pressure and compression strength thresholds
- Plain and formed tube ends for simple connection
- Greater value than other specialized tubing — more BTU's per dollar



Condenser/Evaporator Coaxial Coils

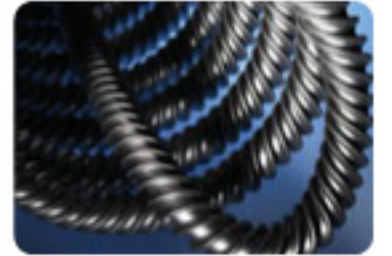
Applications: Residential and commercial heating and cooling, ice machines, and marine air conditioning applications.

The value/BTU selection standard for residential and commercial heating and cooling is the Turbotec coil. Water-cooled, water-source and earth-coupled equipment manufacturers worldwide turn to Turbotec high-efficiency condensers and evaporators. Our innovative product designs and enhanced heat transfer technology are put to work in residential and commercial applications every day. Turbotec coils are even used in marine air conditioning and engine oil cooling applications on yachts and pleasure boats.

Heat Transfer Tube

Applications: Chiller and condenser barrels, absorption chillers, intercoolers and gas furnaces to provide heating and cooling office buildings and factories. Also available for pool or spa water applications.

Turbotec's patented technology imparts an enhanced surface on tubing that offers significantly better heat transfer properties. In fact, our heat transfer tubes can transfer up to 300% more BTU/hour when compared to smooth tubing. Turbotec heat transfer tubes are available in diameters from 1/8-inch (.32cm) to 6-inches (15.24cm) and in lengths up to 40-feet (12.19m); other lengths and diameters are available on a custom order basis. In addition, grooved tube and twisted fluted tube configurations are also available with a variety of enhanced surfaces and textures.



Double Wall Heat Exchangers

Applications: Heat pumps, chillers and heat recovery systems. Also, used for domestic hot water in a variety of applications including food processing plants, bottling facilities, restaurants, hotels and even ice hockey rinks.

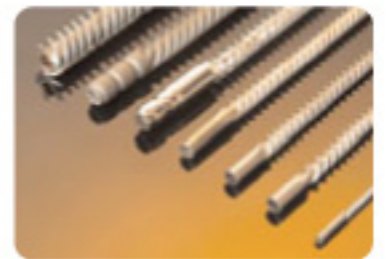
Turbotec's unique TRU-TWIST properties allow for compact designs to pack maximum performance in minimum space for potable water applications. Double wall heat exchanger tubing is the heart of today's water source heat pumps, chillers and heat recovery systems. Our superior vented double wall heat transfer technology approaches single wall performance while meeting code requirements for domestic hot water in a variety of applications such as food processing plants, bottling facilities, restaurants, hotels and ice skating rinks, among others.



Flexible Connectors

Application: Vibration isolators and aerospace heat exchange systems.

Bath and kitchen fixture manufacturers turn to Turbotec for flexible connectors in a variety of configurations and materials including copper, cupro-nickel, carbon and stainless steel, and aluminum. Dependable, high performance makes Turbotec a major supplier for flexible connectors, vibration isolators and aerospace heat exchange systems.



Titanium and Plastic Swimming Pool Heat Exchangers

Turbotec titanium and plastic tube heat exchangers, manufactured to precise standards, have raised the bar when it comes to the swimming pool heat pump industry. Our materials are currently being used by the top swimming pool heat pump manufacturers. In fact, our tubing and coils provide solutions to many of the world's leading original equipment manufacturers for pool care applications, including residential and commercial applications.

Our breakthrough titanium coaxial heat exchange tubing is also available for corrosive and erosive environments including pool and spa water applications. Ideal for new and replacement applications, titanium tubing is impervious to harsh and potentially corrosive chemicals found in these demanding environments.



What Makes Turbotec the Smart Specification?

Performance Data

Simply stated, Turbotec TRU-TWIST® twisted tube technology provides significantly higher heat transfer over integrally finned tube products.

Look at the difference in heat transfer characteristics between a Turbotec titanium twisted tube and an integrally finned titanium tube, and see the difference for yourself. The choice is clear!

For additional information and technical data please visit www.turbotecproducts.com.

Overall Heat Transfer Coefficient
Turbotec Twisted Titanium Tube vs. Integrally Finned Tube

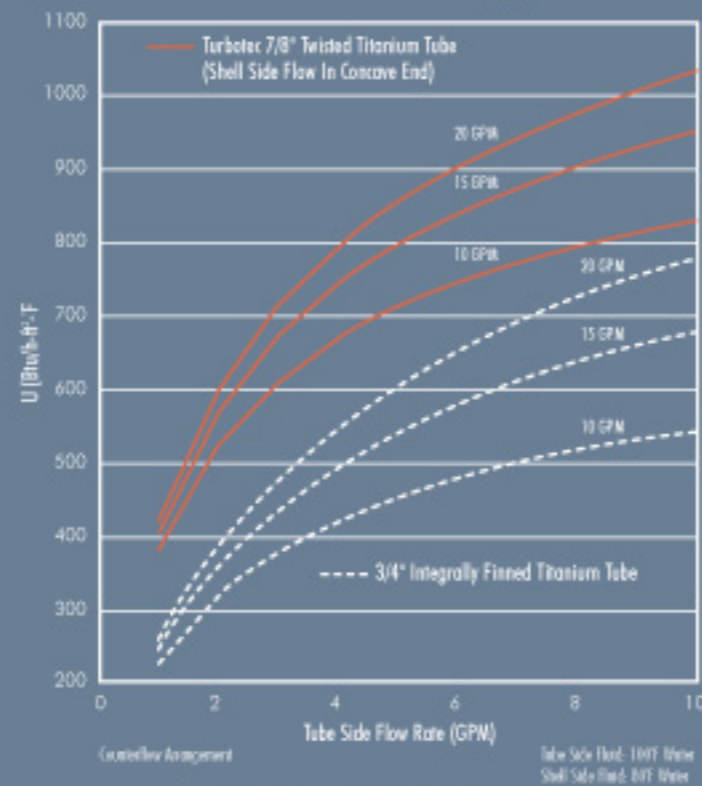


Figure 1 – U vs. Tube Side Flow Rate



Tube Side Pressure Drop

Turbotec Twisted Titanium Tube vs. Integrally Finned Tube

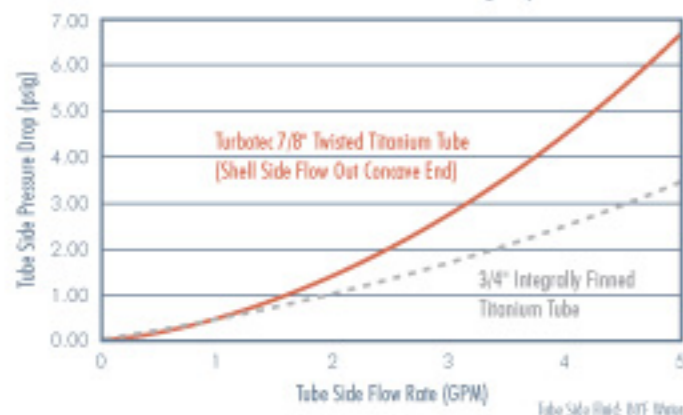


Figure 2 – Tube Side ΔP vs. Flow Rate

Shell Side Pressure Drop

Turbotec Twisted Titanium Tube vs. Integrally Finned Tube

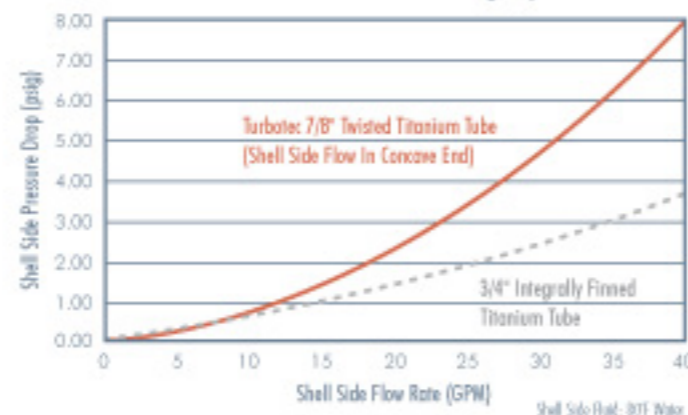


Figure 3 – Shell Side ΔP vs. Flow Rate

Specifications and Application Guide

Table 1 Parametric Information (reference only)

Mechanical Parameter	A	B	C	D
Number (No. of flutes)	3	4	4	5
Pitch (between adjacent flutes)	1-9/64	9/16	3/8	1/4
Fluted I.D. (clear bore)	0.67	0.61	0.58	0.50
Fluted O.D.	1.15	1.05	1.0	0.86
Surface Area Augmentation (na) ¹	1.5	1.7	2.1	3.0
Outside Surface Area Ratio ²	1.05	1.1	1.3	1.5

Notes:

1. Surface Area Augmentation (na) is defined for Turbotec as the increase in surface area provided by Turbotec tubes compared with a smooth tube of equivalent I.D. expressed as the ratio:
2. Outside surface area ratio is defined for Turbotec as the ratio of surface area provided by Turbotec tubes compared to a smooth tube whose O.D. is equivalent to the fluted O.D. of Turbotec.

$$(na) = \frac{\text{Area (Turbotec inside)}}{\text{Area (smooth tube inside)}}$$

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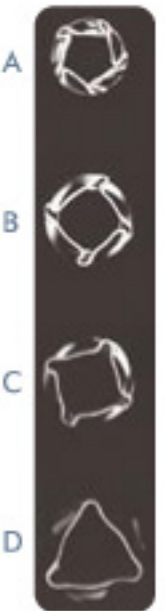
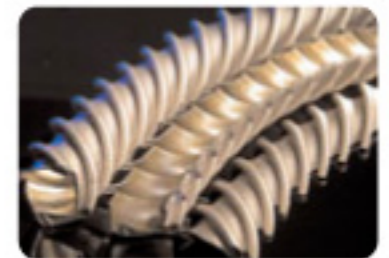


Table 2

Style	Most common usage/characteristics
A	Air to Air (or gas) Nearly equivalent flow rates and temperature differentials Minimum surface area augmentation per unit length Most rigid
A&B	Air to Air (or gas) Non-coilable
B	Shell side liquid to tube side change of state (refrigerant evaporation) More Rigid
B & C	Liquid to Liquid Nearly equivalent flow rates and temperature differentials Best match between film coefficients Average surface area increase per unit length
C	Shell side change of state (refrigerant condensing) to tubeside liquid Tube-in-Tube exchangers
C & D	Best for coilability (most limber)
D	Tubeside liquid to non-turbulence shell side liquid Maximum surface area augmentation per unit length



For additional information visit www.turbotecproducts.com.



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