

## Enhanced Surfaces for Pharmaceutical

Pharmaceutical processing depends upon heat exchangers performing a variety of functions. Vipertex<sup>®</sup> tubes can improve thermal transfer up to five times compared to smooth tubes. Consider what increased thermal transfer capacity can mean to your operation. Contact the Vipertex<sup>®</sup> team to find out how our enhanced tubing and surfaces can improve the efficiency of your operation.

Vipertex<sup>®</sup> stainless steel tubes are 3A certified, making them readily adapted to sanitary applications.



Vipertex<sup>®</sup> enhanced surfaces are rolled in coil form, promoting repeatability, volume production and cost efficiency. These surfaces can then be transformed into tube or used in a flat configuration to incorporate into heat exchanger designs with greater flexibility and scalability, helping you optimize a solution for your project.

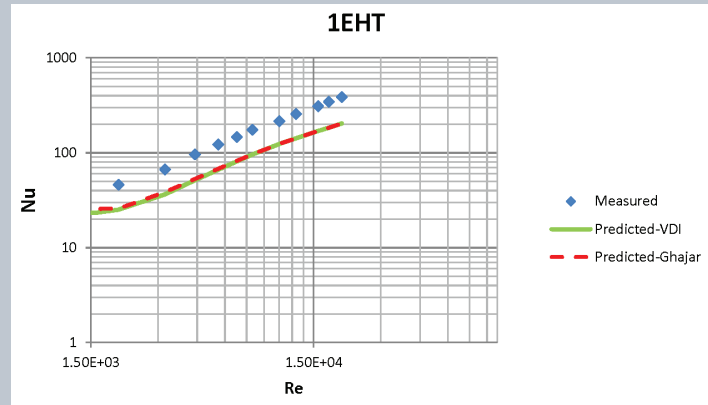
Whether you are retrofitting an existing installation or building new, let us help you determine the economic value of using Vipertex<sup>®</sup>.

## Pressure Applications

Vipertex® tubes can be used in exchangers operating at most pressure levels. Different alloy systems, wall thicknesses and processing specifications contribute to the ability to produce various pressure ratings.

Burst and collapse tests of welded Vipertex® tubes confirm higher ratings than their smooth, welded tube counterparts. It is apparent that the enhanced surface pattern serves to create a stronger, more rigid tube.

Variation of single phase heat transfer performance (Nu) with flow rate (Re) shows an increase of heat transfer performance of around 100% in Vipertex® tubes when compared to smooth tubes. This evaluation was performed at HTRI®.



## Flow Rate

Typical single phase Vipertex® performance enhancement values are near 100%. This produces performance enhancement criteria (PEC) values greater than 1.

## Two Phase Applications

Vipertex® tubes work extraordinarily well in single phase processes. Additionally, they enhance two phase applications.

Vipertex® is available in various surface texture options that may, based on other operating conditions, be more appropriate for particular functions, such as evaporators or condensers.

## Fouling

Vipertex® enhanced surfaces have heat transfer anti-fouling characteristics for many conditions. Studies have been performed in crude, and once through water. Results show the design of the Vipertex® surface produces a wall shear that cleans the tube surface, allowing less debris to form on the surface.

## Charging Substance

Since Vipertex® tubes are produced in a variety of alloy systems, optimization is possible to accommodate a wide variety of charging substances. It is important to consider what substances come in contact with the enhanced surfaces in your heat exchanger. This is helpful in determining a suitable alloy, as well as a suitable enhanced heat transfer pattern.

The increased thermal efficiency of a Vipertex® installation can reduce the amount of charging substance required, which provides the following benefits:

- Charge minimization
- Less environmental liability
- Footprint reduction

## Temperature Range

Vipertex® enhanced surfaces can be produced in a number of alloy systems that can be optimized for operating temperatures ranging from high temperature to cryogenic, allowing the use of Vipertex® products in a wide variety of conditions.