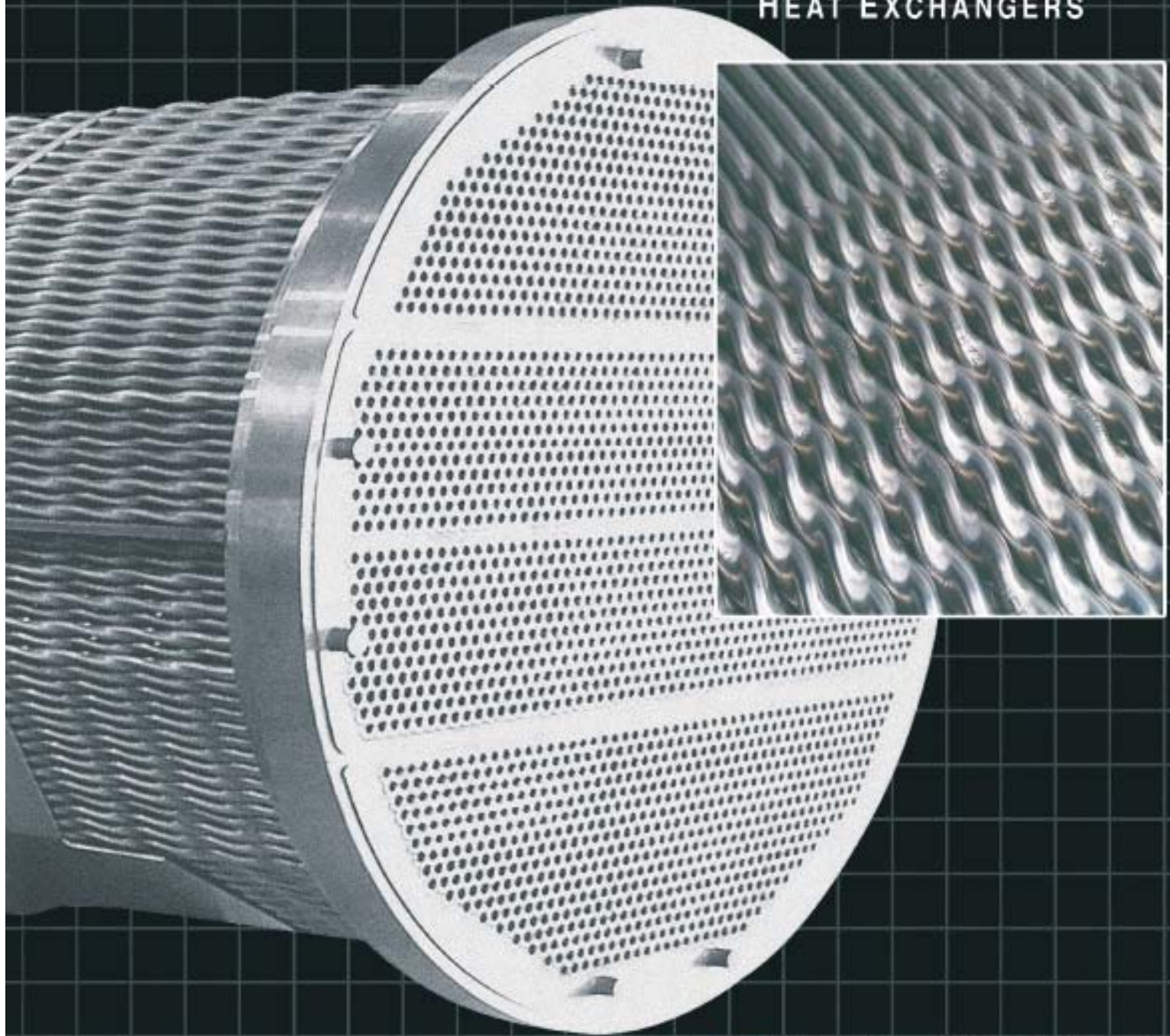


**TWISTED TUBE<sup>®</sup>**

**HEAT EXCHANGERS**



**K KOCH**  
HEAT TRANSFER COMPANY

## ANSWERING THE NEED

### *The TWISTED TUBE<sup>®</sup> 1 Heat Exchanger*

You don't have to live with traditional heat exchanger problems.

It's time to consider a more sensible alternative the TWISTED TUBE heat exchanger.

#### *TWISTED TUBE technology offers:*

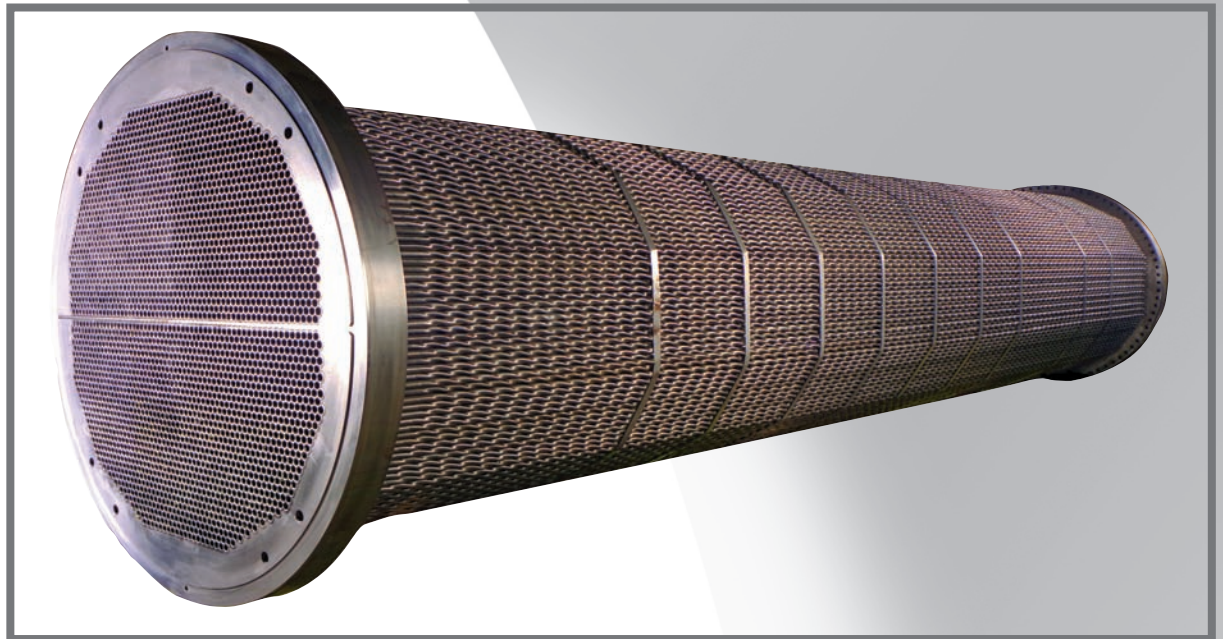
- Increased heat transfer
- Smaller exchangers or fewer shells
- Elimination of vibration
- Reduced fouling



#### *When used as retrofit bundles or*

#### *exchangers, TWISTED TUBE technology also offers:*

- Increased capacity
- Lower installed costs
- Lower pressure drop
- Extended run time between cleanings



### *Designed to be Different*

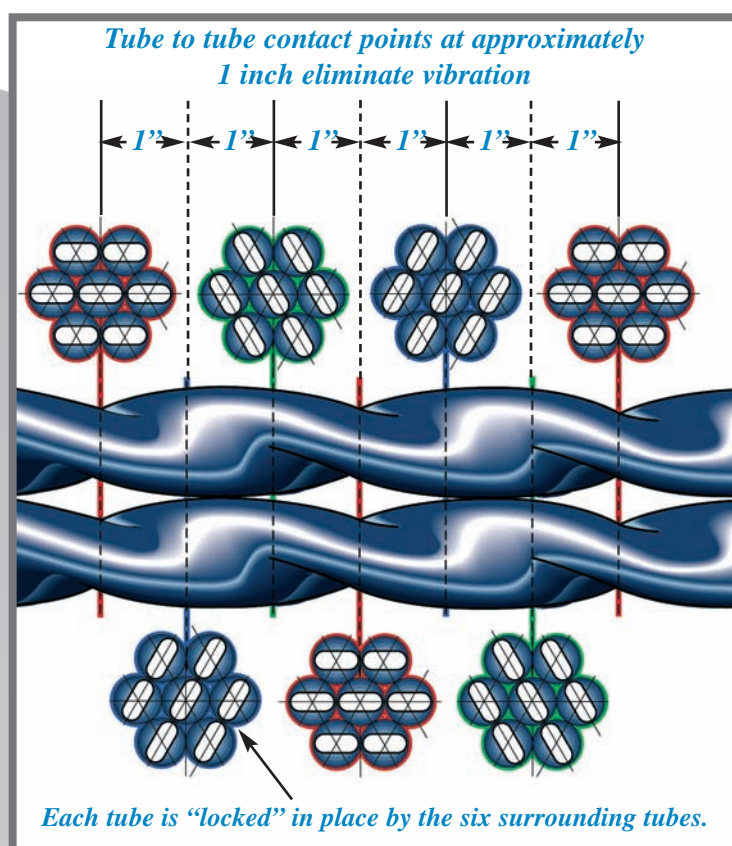
We looked at typical problems with shell & tube heat exchangers then we solved them with a revolutionary tube shape and bundle construction. The result is better performance than ever before. Since 1985, hundreds of TWISTED TUBE exchangers have been operated under a wide variety of field conditions. Over the years, TWISTED TUBE technology has proven to be more efficient, reliable and trouble-free than any other exchanger. Ongoing research and product development ensures that Koch Heat Transfer customers get maximum performance from their TWISTED TUBE heat exchangers.

## CONSIDER THE ADVANTAGES

### More Efficient Heat Transfer

TWISTED TUBE® heat exchangers provide a higher heat transfer coefficient than any other type of tubular heat exchanger. Here's why:

- Complex swirl flow on the shellside induces the maximum turbulence to improve heat transfer.
- Powerful tubeside turbulence is achieved even at high viscosities and/or low velocities.
- Uniform flow distribution gives more effective length and surface area than shell & tube exchangers.



### APPLICATIONS

- Crude Preheat
- Feed / Effluent for:
  - Reformer (CCR and semi-regeneration)
  - Hydrotreater
  - Hydrocracker
  - Alkylation
- Overhead condensers
- Reboilers (kettle and J-shell)
- Lean / rich amine
- Compressor interstage coolers

### BAFFLE-FREE TUBE SUPPORT

Koch Heat Transfer Company's\* innovative TWISTED TUBE design avoids the need for baffles. The unique helix shaped tubes are arranged in a triangular pattern. Each tube is firmly and frequently supported by adjacent tubes, as shown in illustration above, yet fluid swirls freely along its length. This support system eliminates tube vibration, which is a common problem in some heat exchanger services. The twist arrangement for baffle-free support with gaps aligned between the tubes also provides for easier cleaning on the shellside. The TWISTED TUBE heat exchangers are round at each end, allowing for conventional tube-to-tubesheet joints to be used.

# DESIGNED FOR EFFICIENCY

## TWISTED TUBE® *Cleaning Efficiencies*

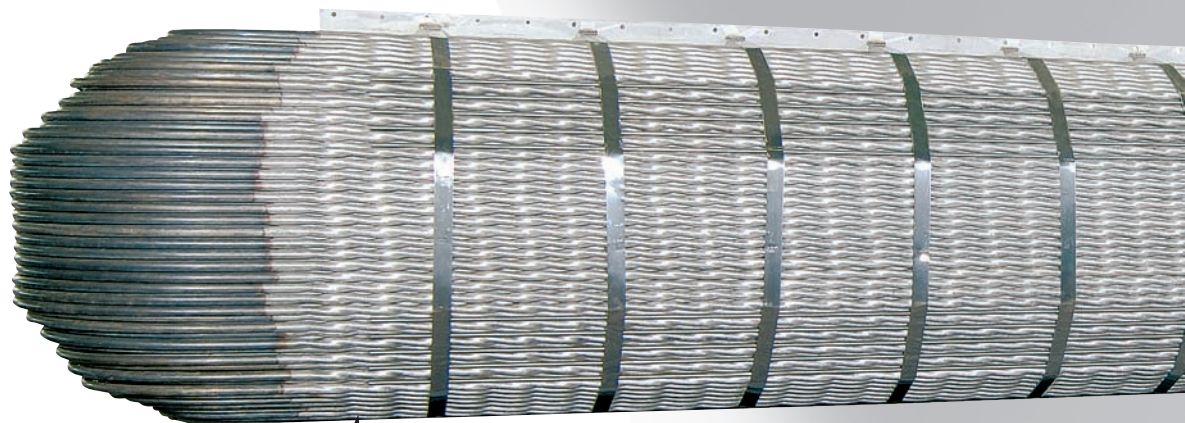
### Shellside

- Cleaning lanes allow complete mechanical cleaning by hydroblasting.
- Chemical cleaning-in-place (CIP) is more effective in TWISTED TUBE heat exchangers than conventional S&T due to uniform flow distribution.



### Tubeside

- Tubeside effectively cleaned by hydroblasting.
- Chemical cleaning-in-place (CIP) is more effective in TWISTED TUBE heat exchangers than conventional S&T due to swirl flow.
- No special tools required.

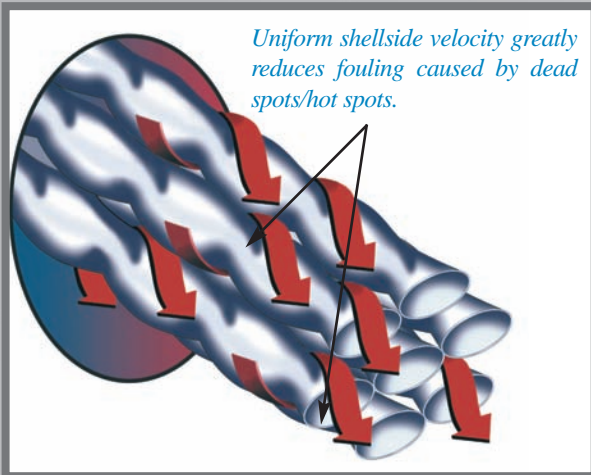
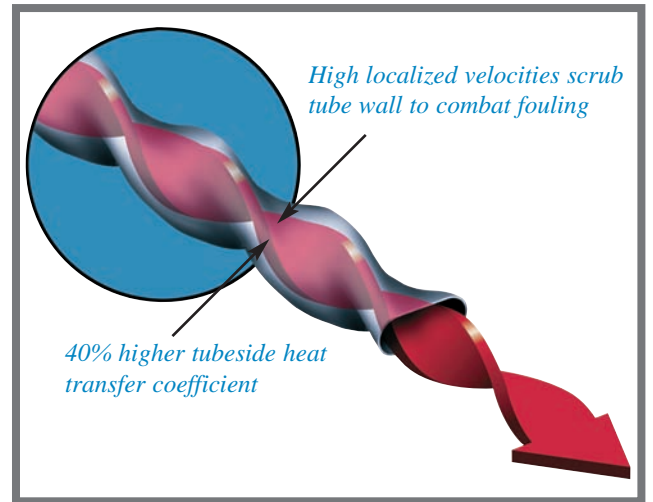


*Continuous one piece "U" Tube Construction with Alignment*

# IMPROVING FLOW

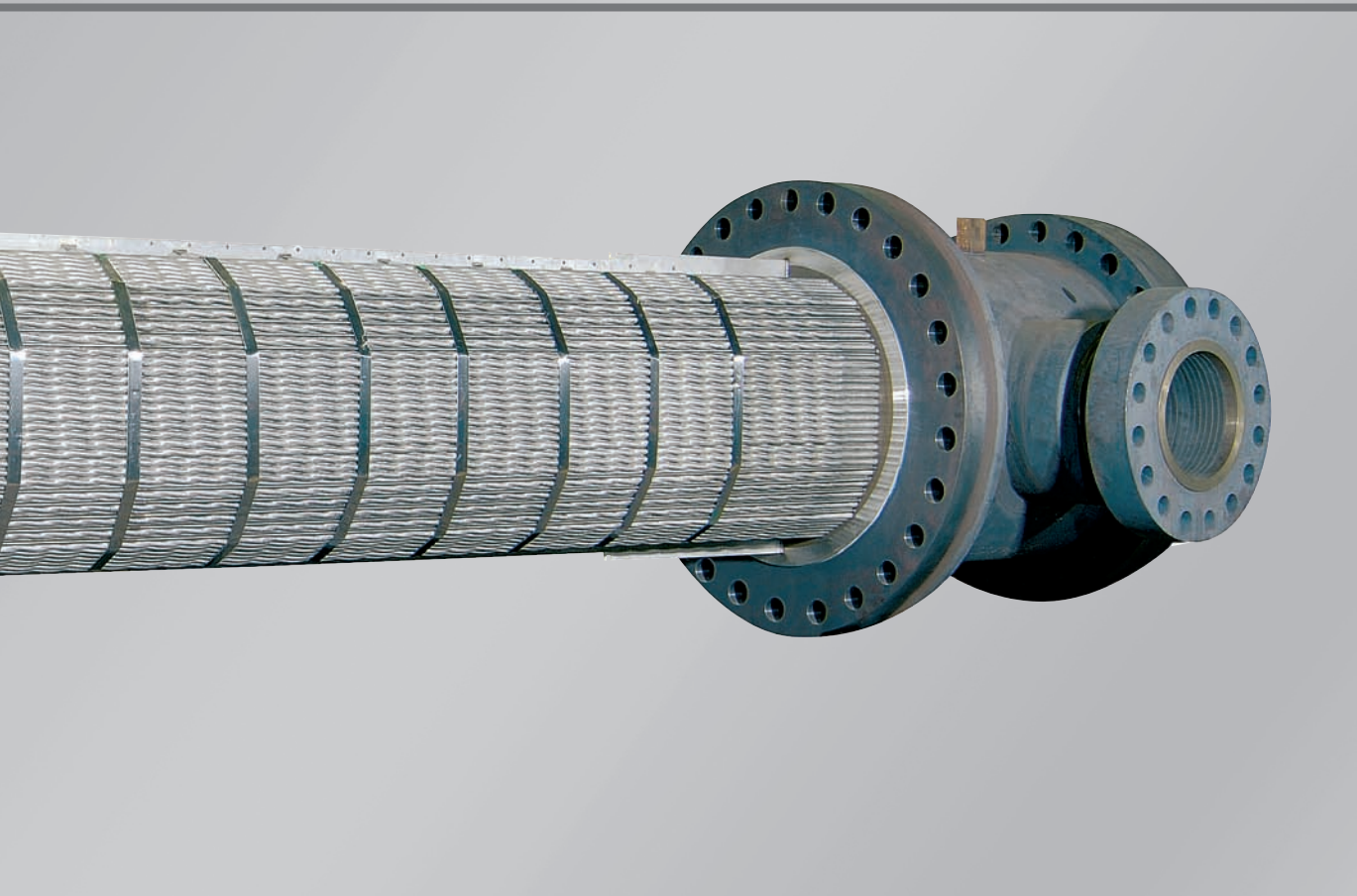
## Improved Tubeside Flow

- TWISTED TUBE® technology provides the highest heat transfer coefficient possible in tubular heat exchangers.
- Swirl flow in tubes creates turbulence to improve heat transfer.
- Turbulent flow achieved even at low velocities and/or high viscosities.



## Uniform Shellside Flow

- Heat transfer coefficient is consistently high.
- Complex interrupted swirl flow on shellside maximizes turbulence while minimizing pressure drop.
- Flow distribution and velocity are homogeneous.



# IMPROVING EFFICIENCY

## The **TWISTED TUBE®** Advantage

### Improvements over conventional shell & tube heat exchangers

#### **Increased Heat Transfer Coefficient**

- Swirl flow creates turbulence resulting in higher tubeside coefficient.
- Uniform fluid distribution combined with interrupted swirl flow results in optimized shellside coefficient.

#### **Lower Pressure Drop**

- The longitudinal swirl flow of TWISTED TUBE technology reduces the high pressure drop associated with segmental baffles.
- TWISTED TUBE heat exchangers are usually shorter in length and have fewer number of passes, for a lower pressure drop on the tubeside.

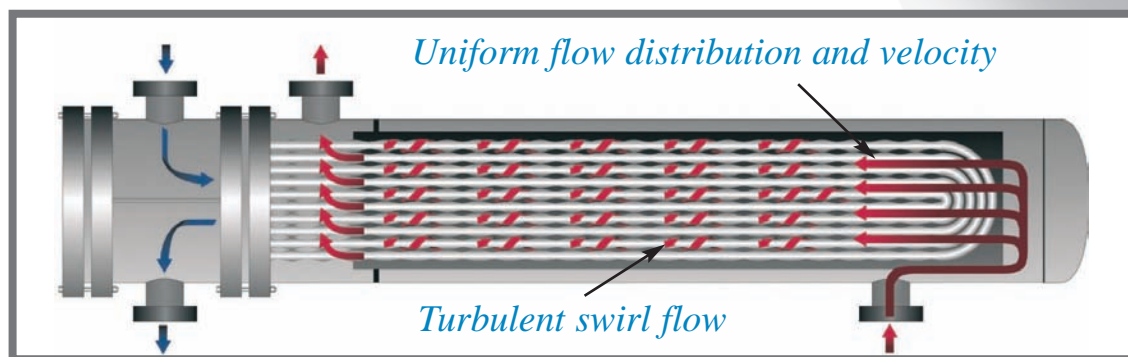
#### **No Vibration**

- Baffle-free design directs shellside fluid to true longitudinal flow.
- Each tube using TWISTED TUBE technology is extensively supported at multiple contact points along its entire length.
- Tube fretting and failure due to vibration is eliminated.

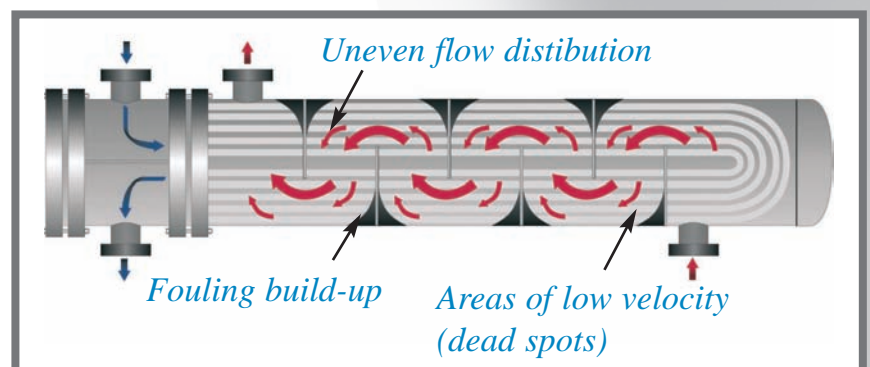
#### **Reduced Fouling**

- Baffle-free design eliminates dead spots where fouling can occur.
- Velocity is constant and uniform.
- Constant flow distribution controls tube wall temperature.

## TWISTED TUBE



## CONVENTIONAL SHELL & TUBE



1 TWISTED TUBE® is registered in: CTM, US

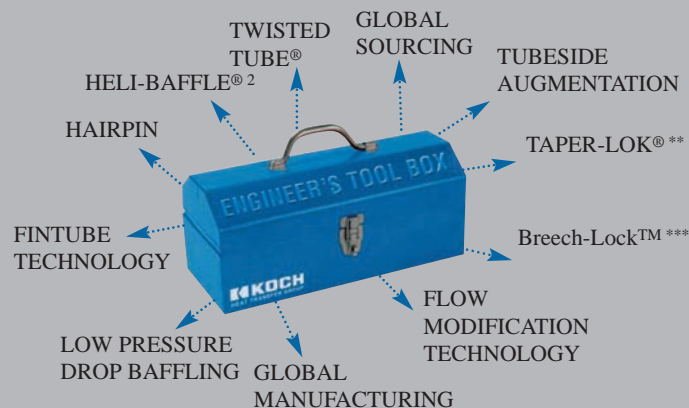
2 Heli-Baffle® is registered in: CTM, JP, KR

3 BROWN FINTUBE® is registered in: CTM, MX, US

\* Koch Heat Transfer Company is the sole supplier of BROWN FINTUBE products

\*\*\* Breech-Lock™ is a registered trademark of ABB Lumus Heat Transfer

# KOCH HEAT TRANSFER GROUP



### THE ONLY SOURCE YOU'LL NEED FOR HEAT TRANSFER SOLUTIONS.

As a global leader in developing advanced process heat transfer technologies, Koch Heat Transfer Group combines its technical expertise, vast resources and 50 years of industry experience to provide the world's most comprehensive selection of tubular heat exchanger products and solutions.

Our thermal engineers rely on the Koch Heat Transfer "toolbox" of state-of-the-art technologies to develop the best possible solutions for our customers' applications. From research and development through thermal and mechanical design, best-in-class manufacturing, technical assistance and aftermarket service, our engineers help you optimize your heat transfer systems to make your operations more efficient and productive.



# K KOCH

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