

Shell & Coil heat exchangers were designed with the end-user in mind. High efficiency Shell & Tube Heat Exchangers fabricated from 316L Stainless Steel that are flexible to use in wide range of capacities & applications. Unique features include circular layers of helically corrugated tubes, compact design, & connection angles ranging from 100 - 105 degrees.

Turbulent flow is the dominant mode of fluid flow through our Heat Exchanger. Whereas in a laminar flow condition, the flow structure is characterized by smooth motion of fluid layers with no mixing of adjacent layers. A turbulent flow is characterized by random, three-dimensional motion of particles. The mixing of fluid layers is a result of velocity of fluctuations present in turbulent flow.

Turbulent flow, or mixing of fluid layers is desired in the operation of Heat Exchangers. It provides a better mixing, or distribution, of heat in both the shell & tube sides. The random movement of fluid particles also reduces deposit buildup by performing a "scoop-n-lift" action with debris lodged along the heat exchanger surfaces. Although turbulence is a direct function of density and viscosity of the fluid, the flow velocity, and size of the tubes, the corrugated tubes inside of the heat exchangers induce more turbulence to flow due to its "bumpy" shape. As a result, the Shell & Coil designed heat exchangers are highly efficient units and can be categorized as self-cleansing.

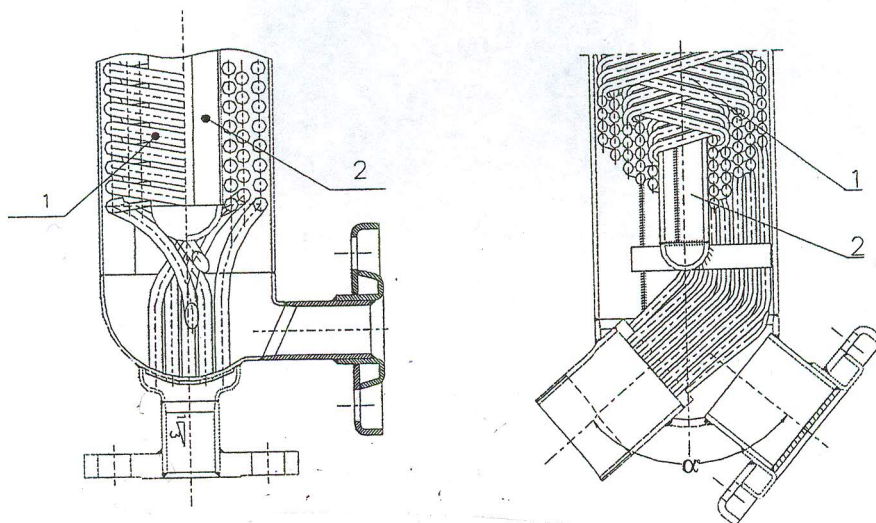
Shell & Coil Heat Exchangers differ from other shell & tube units by the shape and placement of the corrugated tubes inside of the unit. The tubes are fabricated into helical coils. The coils are placed inside of the shell forming circular layers that make up the tube bundle. Each layer flows in opposite directions to the layers surrounding it resulting in an overall criss-cross pattern.

The design offers many advantages over conventional heat exchangers. The large number of tubes closely packed together provides a large heat transfer area within a compact space, resulting in higher performance at a relatively lower cost. The layers of tubes in the criss-cross pattern provide rapid and more uniform heat transfer and increases the overall heat transfer coefficient.

The Heat Exchangers are designed for Vertical installations. This, along with their compact size, enables them to be installed in any application. This design requires less installation space and lower installation costs.

### Construction Features

The Heat Exchangers are designed and fabricated as a single unit with non-removable parts. The Cylindrical Shell encloses the tube bundle which consists of circular layers of helically-corrugated tubes.



**Figure 1 Cross-section of X(left) and XK(right) type heat exchangers.**

1- Tube Bundle, 2- Core

X Heat Exchangers = Smooth Tube Bundles XK Heat Exchangers = Corrugated Tube Bundles

(4) Symmetrical Inlet & Outlet Connections

# Operating Principle

THS, Inc.

A Heat Exchanger is a device in which heat is transferred from one flowing medium to another. Shell & Tube Heat Exchangers are the most common type of heat exchangers used in applications such as Liquid to Liquid, Liquid to Gas, & Gas to Gas. Shell & Coil units are counterflow units which from a thermodynamic perspective, are more efficient than standard units.

Each layer of helically wound tube has a stream which is flowing in an opposite directions to its surrounding layers of tubes. This causes a criss-cross pattern which produces a highly efficient exchanger. The tube bundle has perforated bottoms which are welded near the connections. Both ends of the cylindrical shell are enclosed within hemispherical heads.

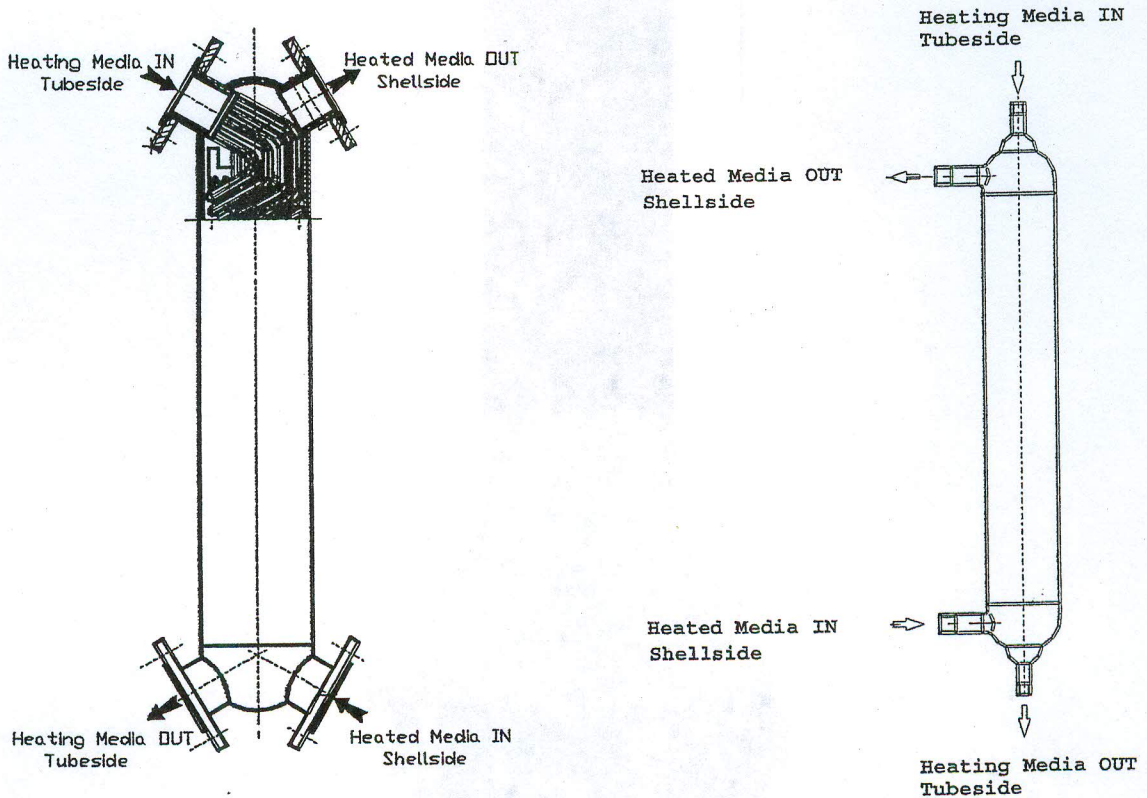


Figure 1 Flow Distribution in Heat Exchangers

**THS**

Shell & Coil HX

Technical Heat Transfer Services, Inc.

P.O. Box 801

Amherst, NY 14226-0801

Phone:(716)-743-1855 Fax: (716)-743-0124