



# ZPJE

Creating Value for Our Customers

Zhenhai Petrochemical Jianan Engineering Co.,Ltd.  
镇海石化建安工程股份有限公司

## Spiral Tube Heat Exchanger

Spiral tube heat exchangers have been used for many years, in fact, since the beginning of cryogenic liquefaction industry. For more than 30 years, ZPJE has developed a unique state of the art know how of heat exchange calculation, hydraulic simulation and mechanical modeling of spiral tubes design to enable this technology to be used in refinery, petrochemical and Oil&Gas businesses.

The result of this intense R&D development is the publication of more than 178 national and international patents, and 22 software copyrights for the calculation program used to simulate the heat exchange, the pressure drop and the mechanical strength of this type of exchanger.

## Design

The design of spiral tube heat exchangers consist of many tubes arranged in multiple layers of helical coils, around a center pipe. This tube bundle is enclosed in a cylindrical pressure vessel. The fluid on the tube side and on the shell side flows in opposite directions, making the equipment a true countercurrent heat exchanger.

### On the Shell Side :

The high turbulence flow is created by the patented design of the tube coils. The variation of the fluid velocity between the tubes creates a pulse-surge collision flow regime increasing subsequently the heat exchange coefficient outside the tubes.

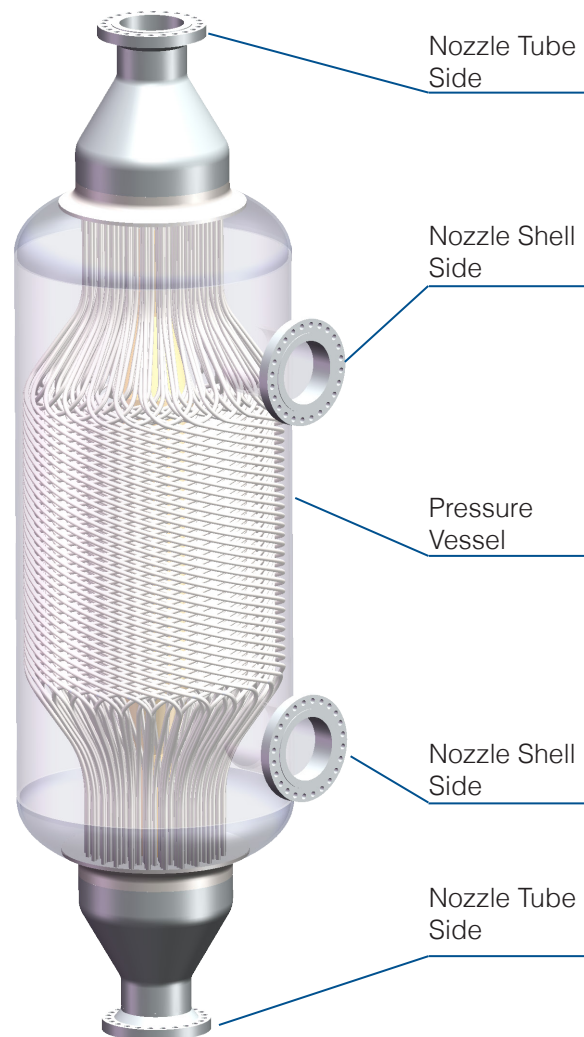
The possibility of fouling is greatly limited by the non-baffle design, the turbulence of the fluid and the very low surface roughness of the tubes.

### On the Tube Side :

The Helix-pattern flow in the tubes creates, thanks to the centrifugal forces, a secondary flow consisting of a pair of vortices enhancing the heat transfer coefficient at the peripheral of the tubes.

Spiral tubes are coiled layer by layer in opposite direction to have a homogeneous heat transfer all along the exchanger.

Spiral tube heat exchangers can offer a heat exchange up to 30,000 m<sup>2</sup> for reforming and aromatic processes, and up to 10,000 m<sup>2</sup> for Hydroprocessing in a single unit.





# ZPJE

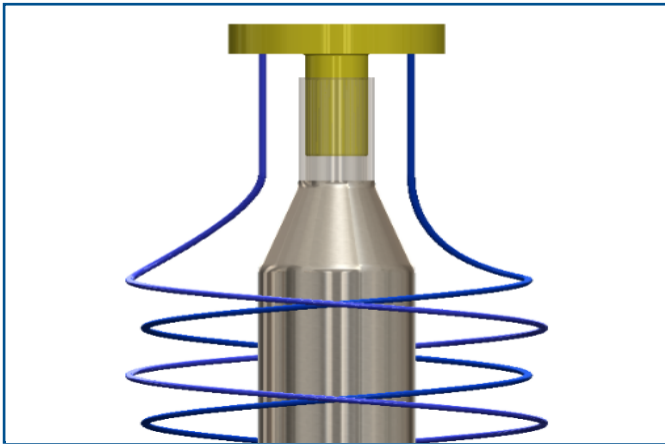
Creating Value for Our Customers

## Robustness

The flexible spiral wound tube bundle allows for a differential expansion between the bundle and the shell. This expansion is guided vertically by the center pipe design.

This patented design gives

- Resilience under upset conditions
- Resistance to thermal and pressure shock
- No limit for cooling and heating rate during startup, shutdown and upset conditions within design pressure and temperature.



## Performances

- Heat transfer efficiency 2 to 3 times higher than conventional S&T exchangers.
- Minimum temperature difference between the two fluids (pinch point) as low as 2°C (4°C for 2 phase flow).
- Minimum pressure drop on shell side : 2-3 kPa
- Operating ranges : up to 650°C and 26 Mpa.
- No limitation on reverse pressure.

## Fabrication

Tubes materials :

- Materials: CS, Cr-Mo(1Cr-0.5Mo, 1.25Cr-0.5Mo, 2.25Cr-1Mo), SS(304, 304L, 304H, 316, 316L, 321, 321H), super SS(SMO254), Duplex SS(2205), Titanium, High Nickel Alloy(Incoloy 825, Inconel 600).

Tubes manufactured in our warehouse

- 300 Series Stainless steel
- Maximum seamless tube length : 100+ m
- Surface Roughness : <Ra 0.3

Shell Material: CS, Cr-Mo(1Cr-0.5Mo, 1.25Cr-0.5Mo, 2.25Cr-1Mo), SS(304, 304L, 304H, 316, 316L, 321, 321H), Titanium.

Pressure vessel diameter: up to 6,000 mm,

Weight: over 700 metric tons.

Maximum surface: 30,000+ m<sup>2</sup> in a single shell.

Certifications :

- PED 4.3 qualified by E.U.
- A1, A2 pressure vessel design and manufacturing licenses in China
- ASME authorization certificates of U & U2.
- ISO 9001:2015
- ISO 14001:2015
- ISO 45001:2018

## Contact Us

**Zhenhai Petrochemical Jianan Engineering Co.,Ltd.**

Lianhua Road, Jiaochuan Street, Zhenhai District, Ningbo, Zhejiang, China

**In China :**

Zhenning Zhang

[sales@izpje.com](mailto:sales@izpje.com)

+86 574-86443513

+86 574-86449171

**In Europe :**

Christophe Gajecki

[christophe.gajecki@](mailto:christophe.gajecki@htransferconsulting.com)

[htransferconsulting.com](http://htransferconsulting.com)

+33 602029453



<http://www.sthezpje.com>