Heat Exchanger

Heat exchanger is equipment widely used both upstream and downstream facilities, built for efficient heat transfer from one medium to another. Heat exchangers are classified by flow arrangement, parallel flow and counterflow. Parallel flow (cocurrent) is flow when two fluids enter the exchanger at the same end and travel parallel to one another to the other side. Counterflow (countercurrent) is when two fluids enter the exchanger from opposite ends.

Coolers:
- Air-cooled
- Cooling towers

Commonly used types:
- Shell and tube
- Plate
- Plate fin
- Air cooled

In oil and gas facilities, following types are commonly used:

Commonly used:
- Bath heaters
- Direct
- Indirect

Fluid-fluid:
- Shell and tube
- Double pipe
- Plate and frame

Uses of heat exchangers may vary depending on the process requirements, such as heat and cool fluids, heat recovery, separation, reboiling, condensing.

Shell and Tube (S & T)

Shell and tube heat exchangers consist of a bundle of tubes and shell. Heat transfer occurs when one fluid that needs to be heated or cooled flows through the tubes and the second fluids runs over the tubes that provides the heat or absorbs the heat required.

Common services:
- Liquid-liquid
- Liquid-vapor
- Vapor-vapor

Components:
- Shell with two nozzles
- Tube sheets
- Heads
- Transverse baffles
Configuration

Configuration depends on each process requirements. Main consideration for the design should be fluid involved, corrosion potential, problems of cleaning, pressure drop, heat transfer efficiency, tubes usually 20 ft and 40 ft.

Components of shell-and-tube exchangers:

1. Shell
2. Shell Cover
3. Shell Channel
4. Shell Cover End Flange
5. Shell Nozzle
6. Floating Tubesheet
7. Floating Head
8. Floating Head Flange
9. Channel Partition
10. Stationary Tubesheet
11. Channel
12. Channel Cover
13. Channel Nozzles
14. The Roads and Spacers
15. Transverse Baffles or Support Plates
16. Impingement Baffle
17. Vent Connection
18. Drain Connection
19. Test Connection
20. Support Saddles
21. Lifting Ring
TEMA nomenclature shows different arrangements of the shells, tubes and baffles in heat exchanger.

Basic types of shell and tube heat exchangers are **Fixed Tube Sheet, Floating Head, U - Tube**.

**Floating Head**
U-tube Heat Exchanger

Fixed tube