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ENERGY GROUP

HEAT EXCHANGER



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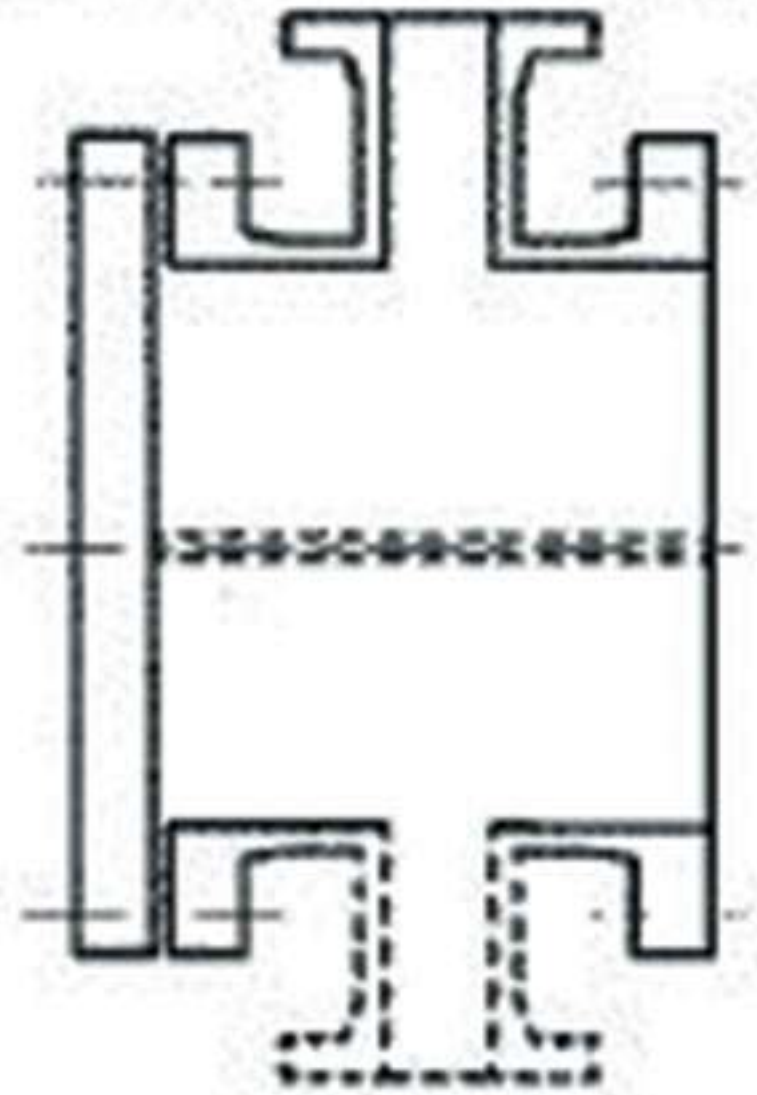
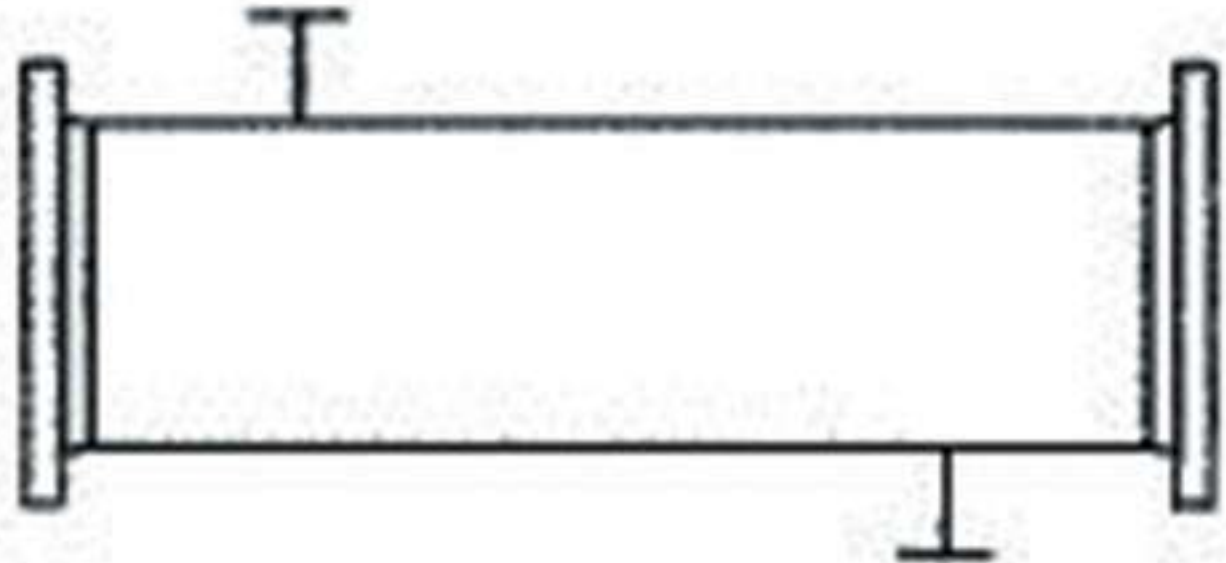
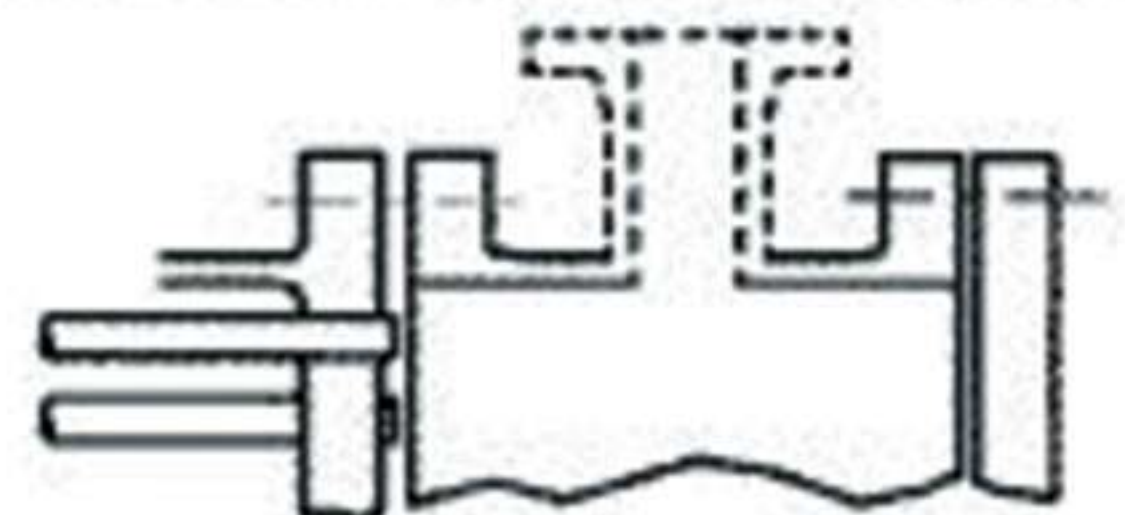
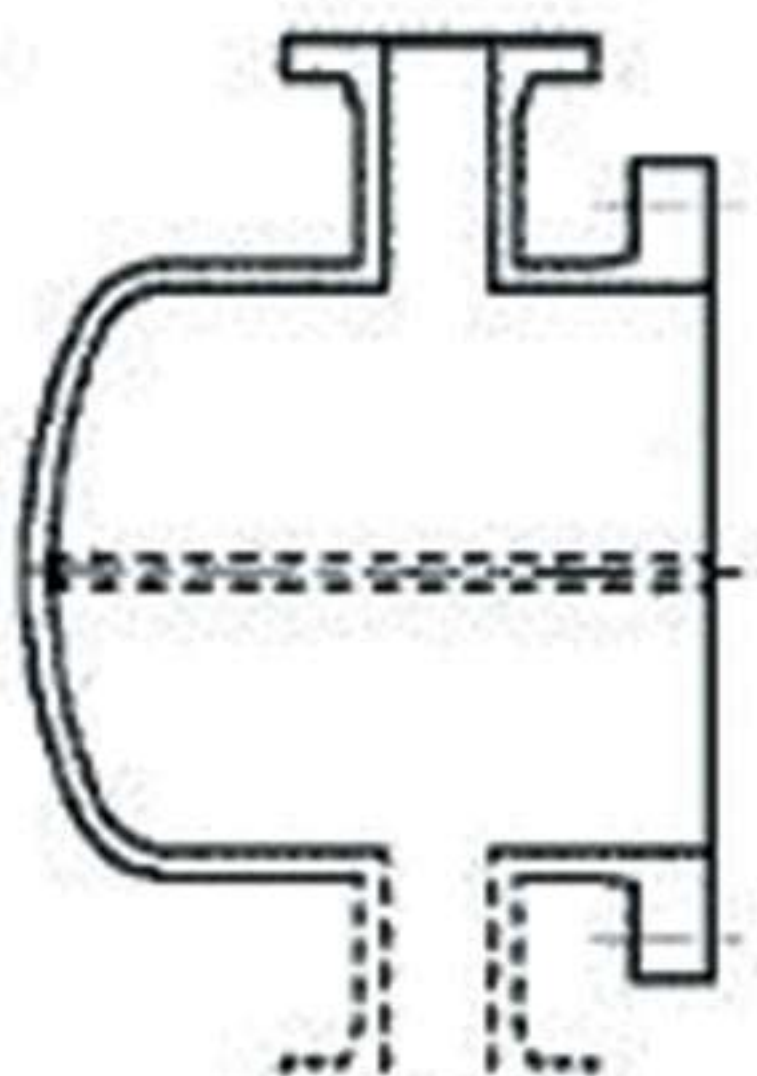
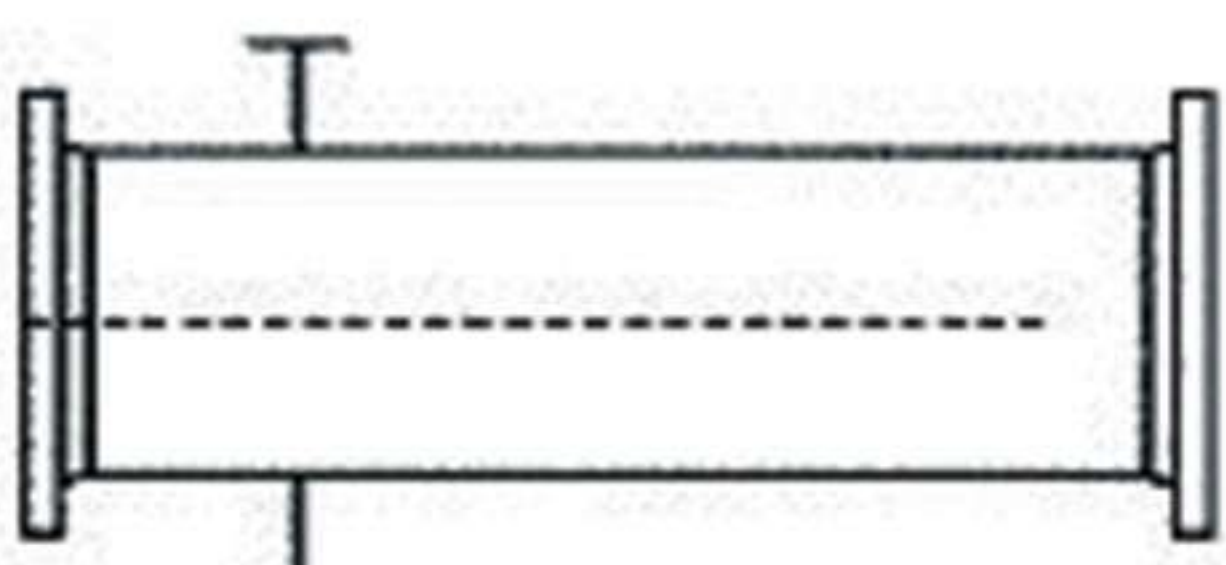
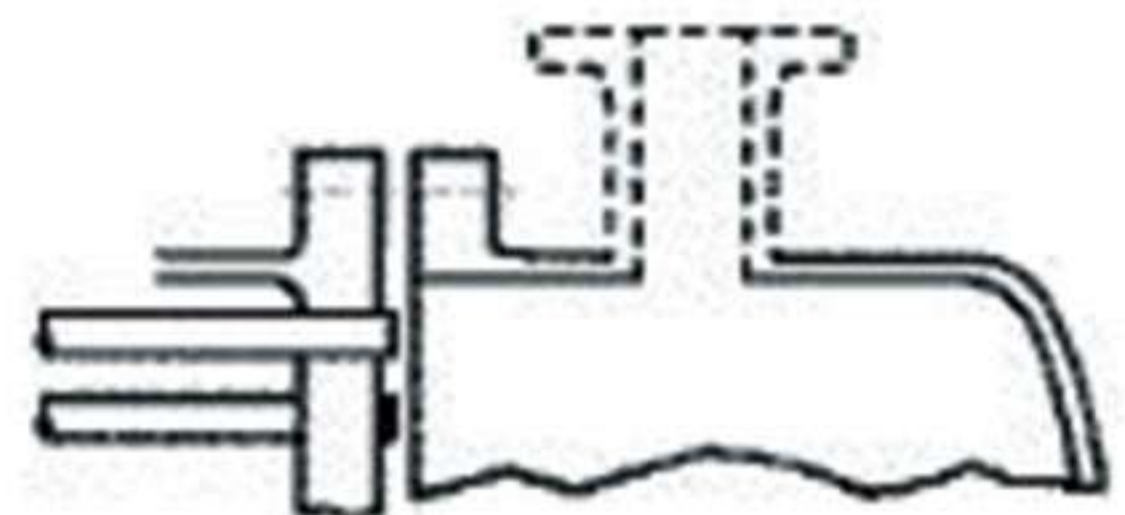
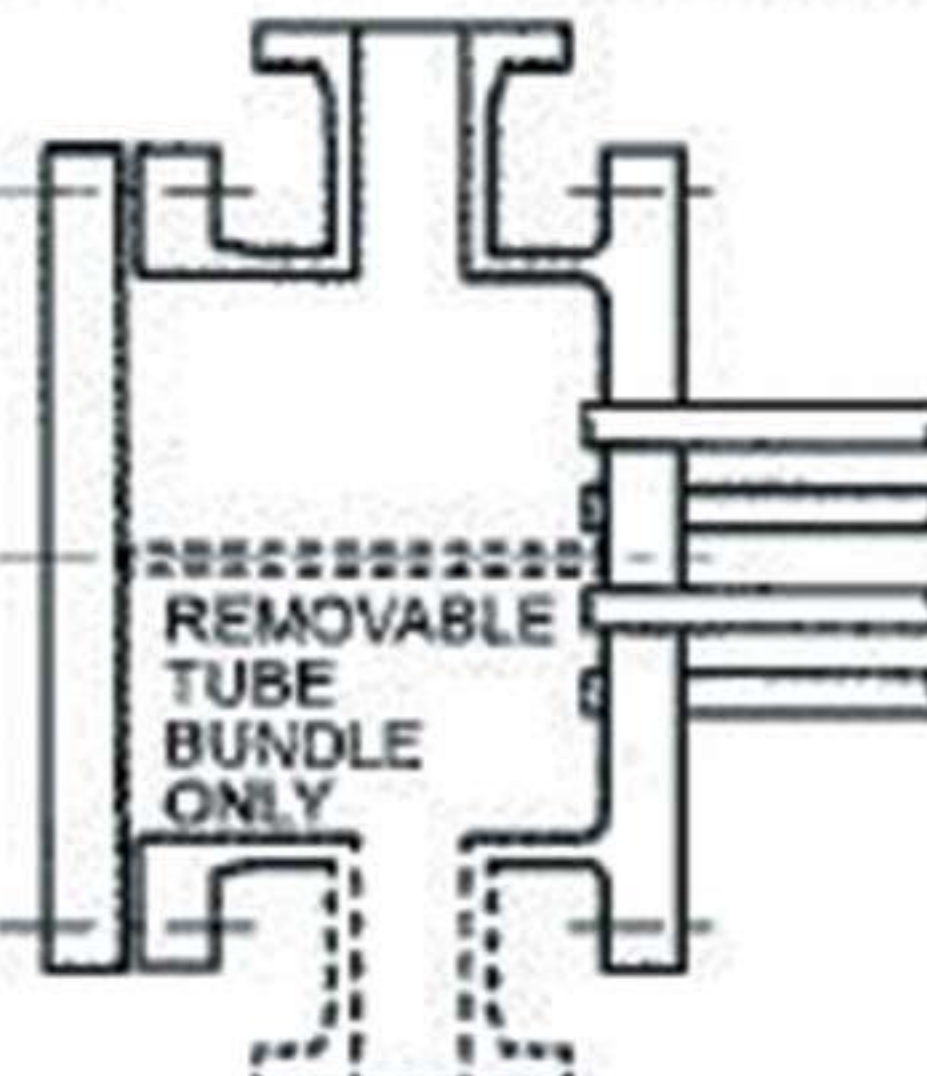
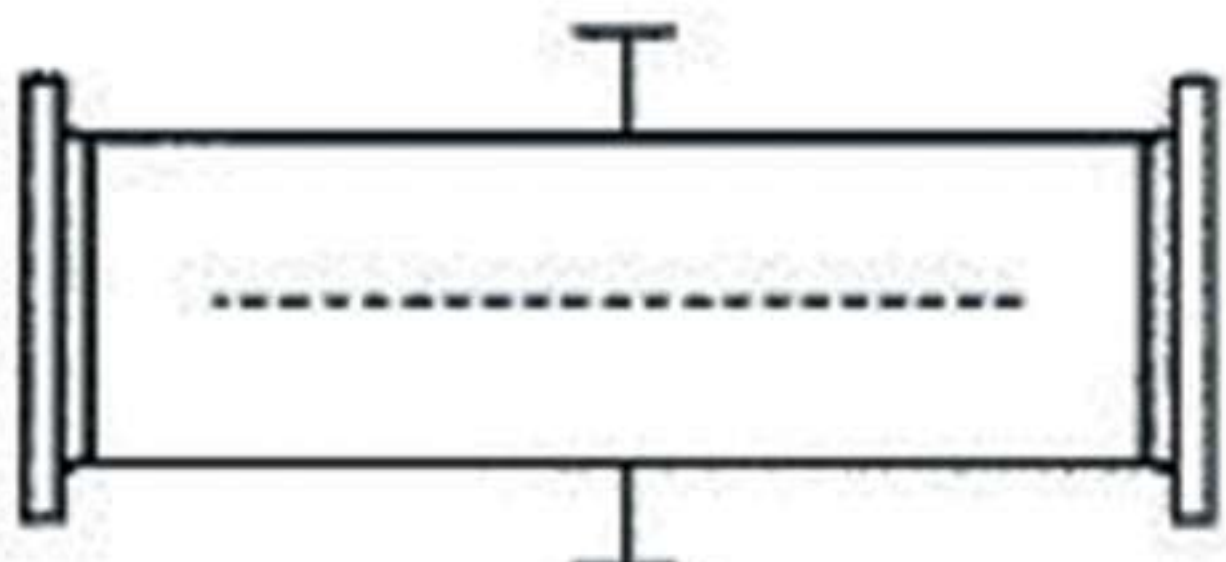
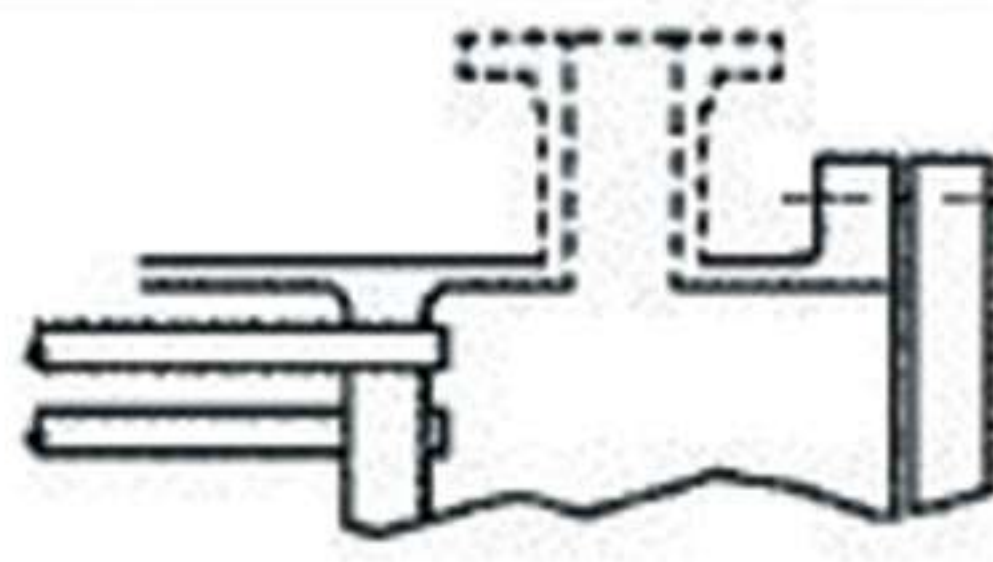
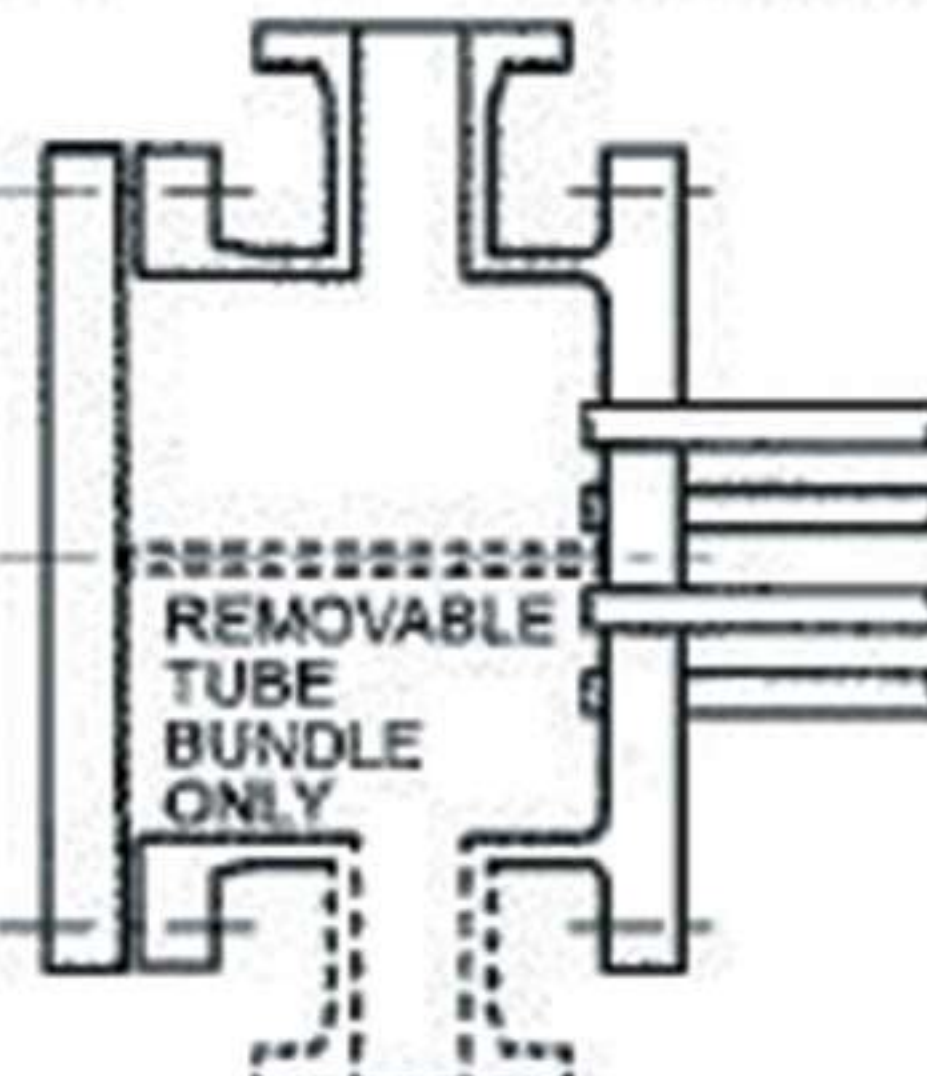
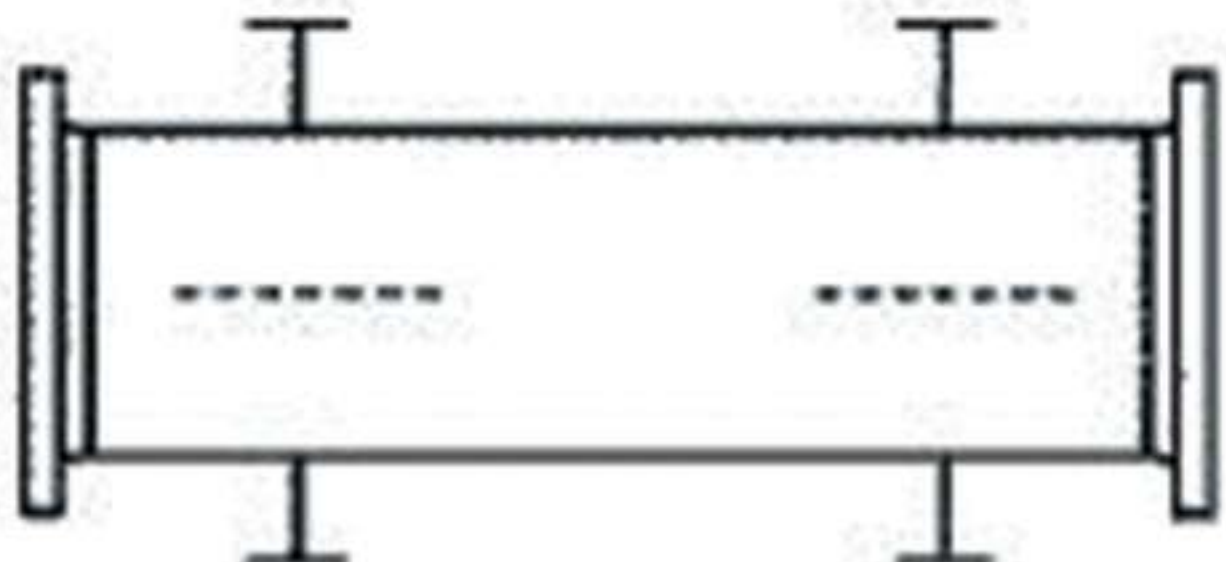
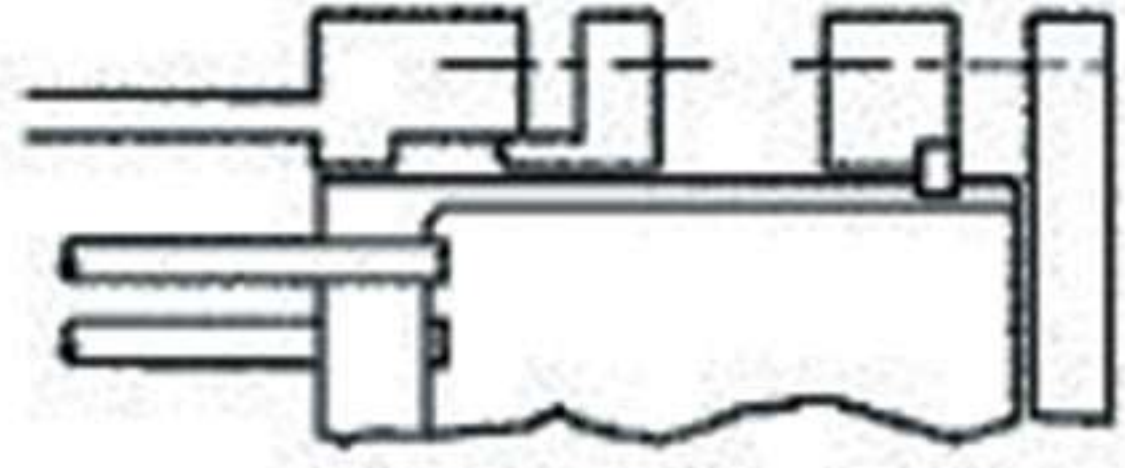
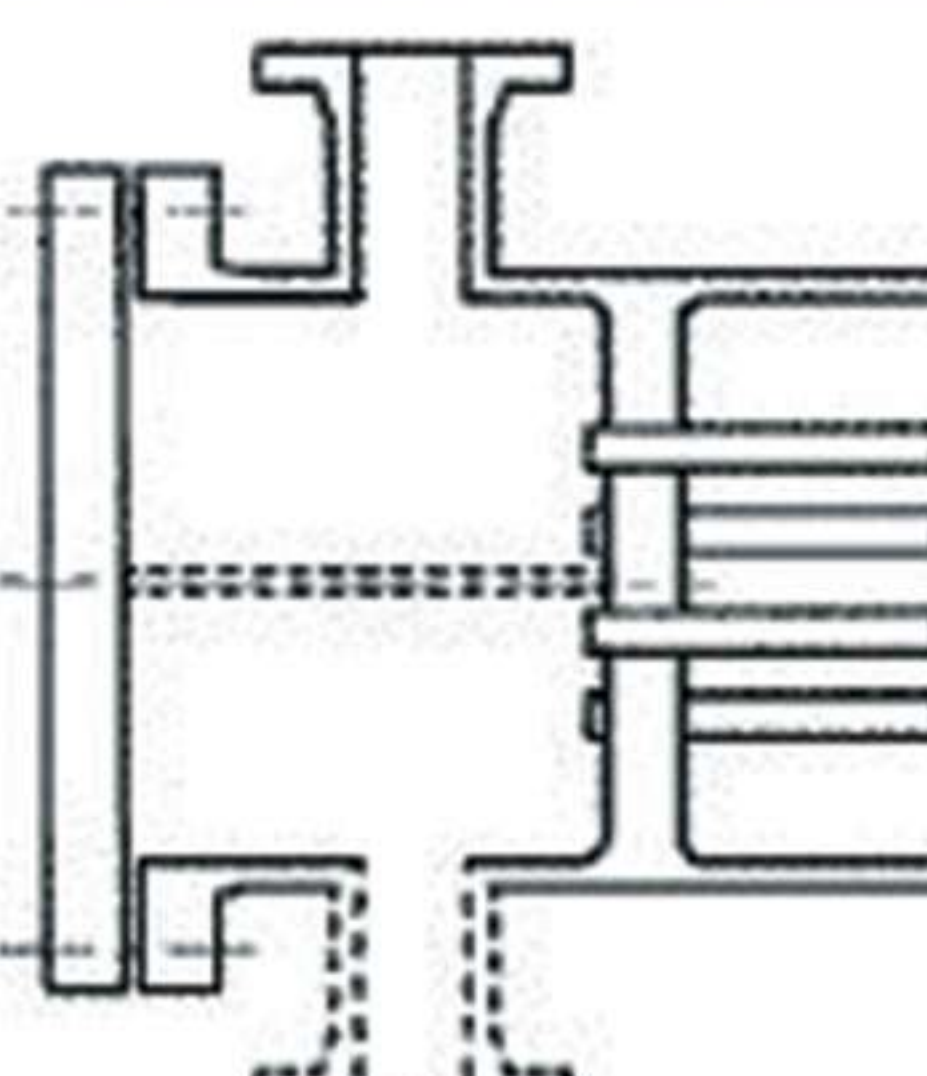
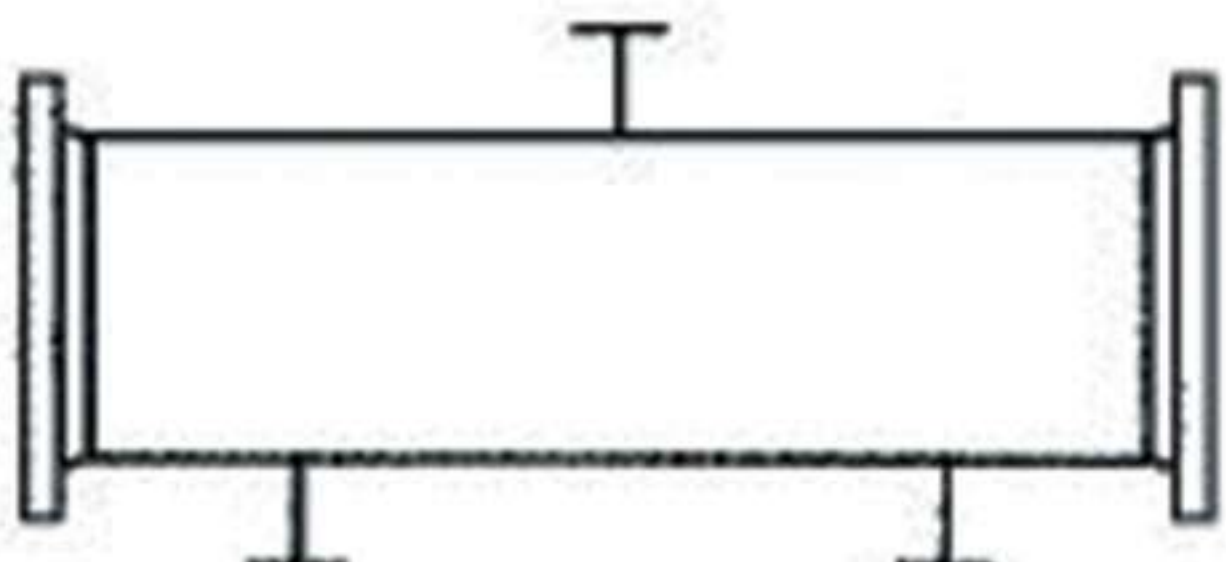
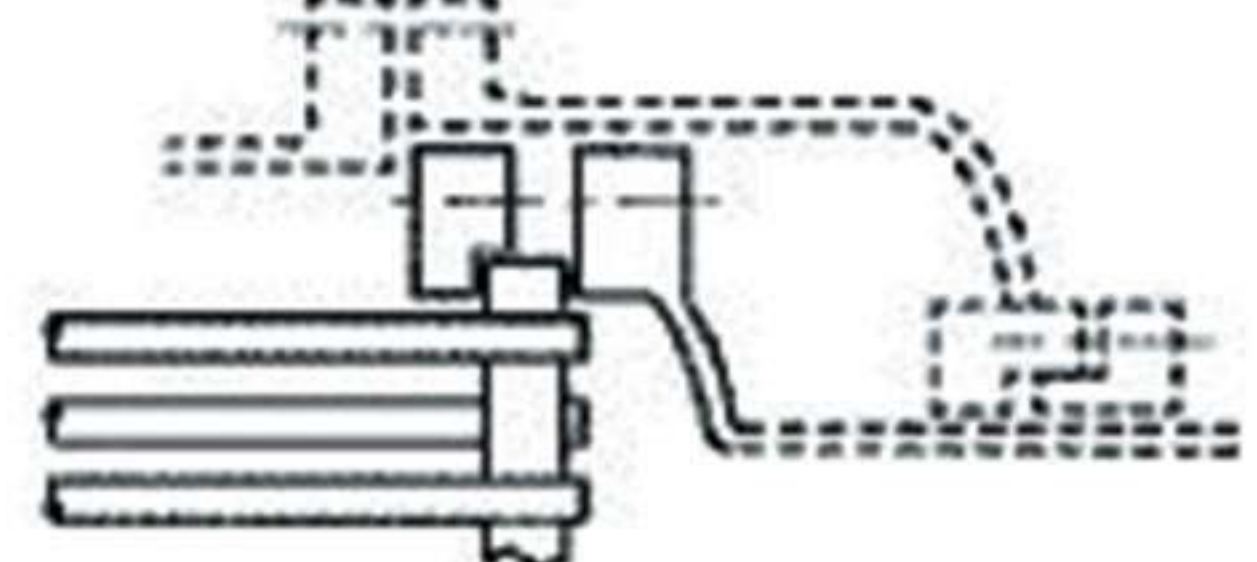
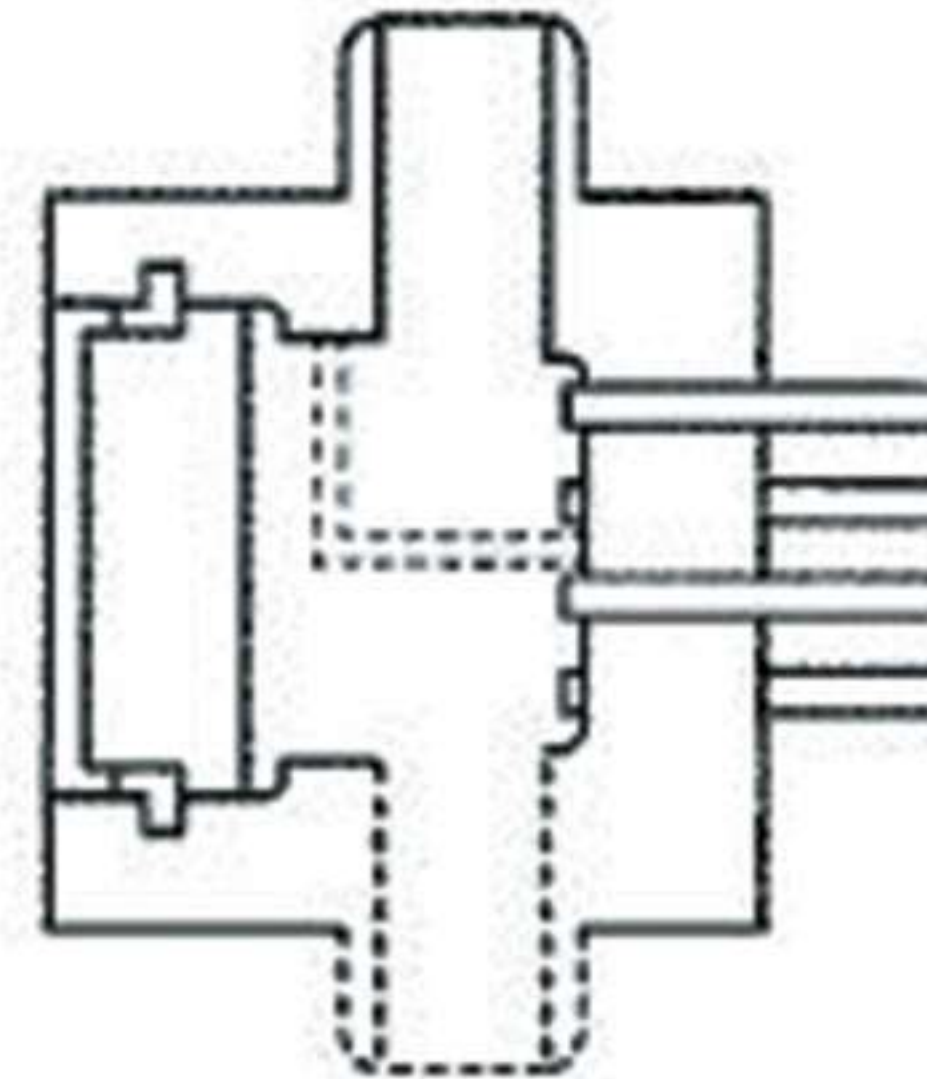
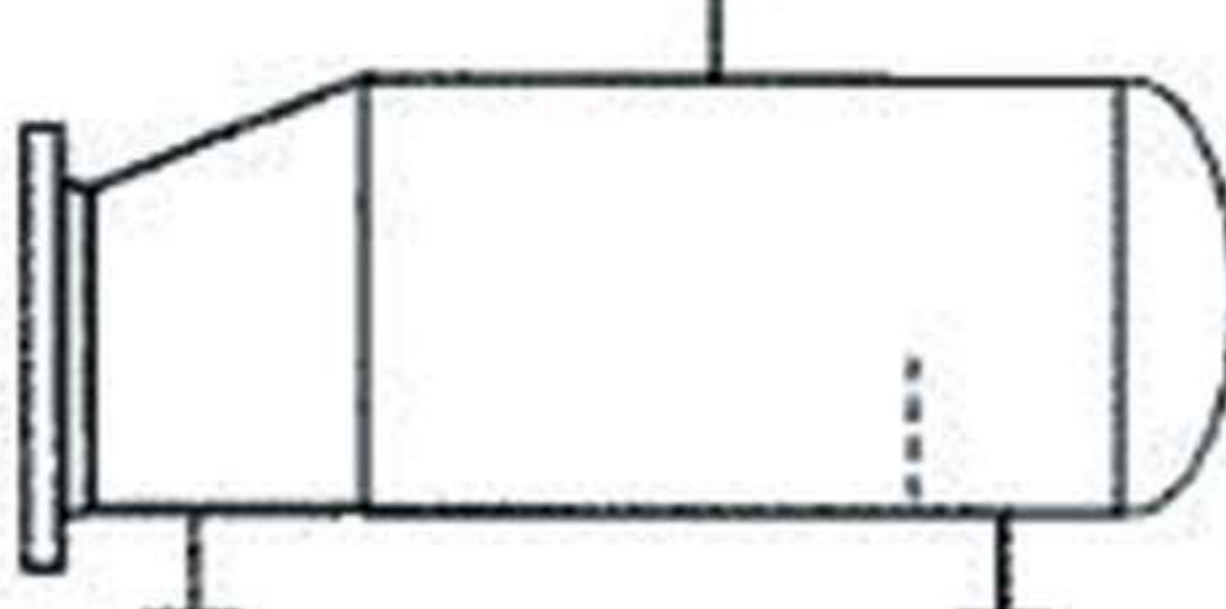
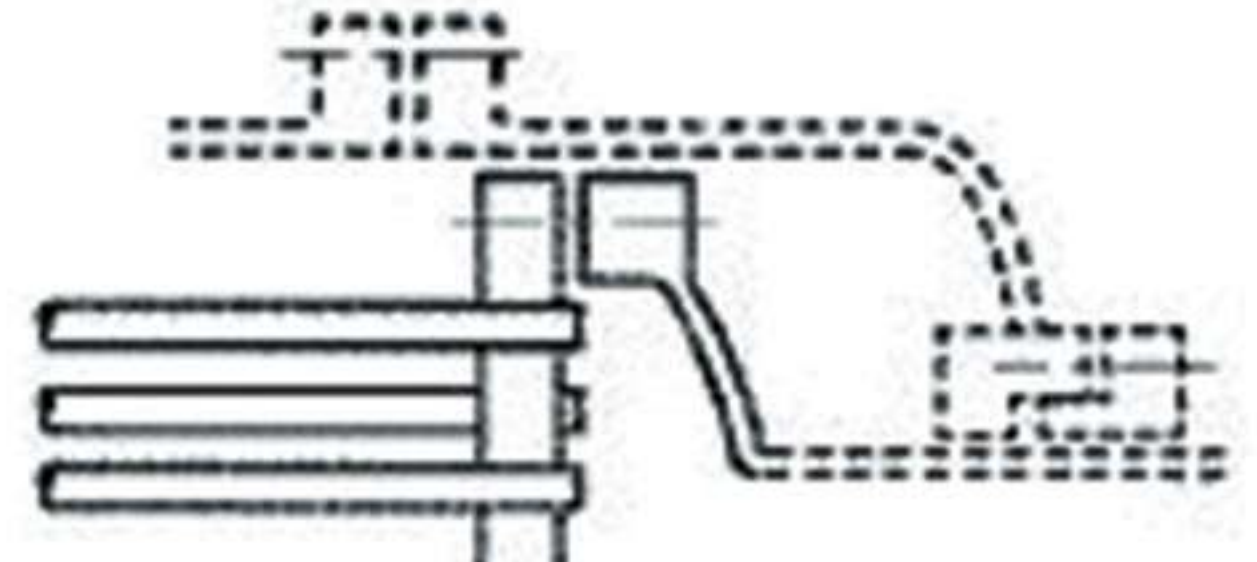
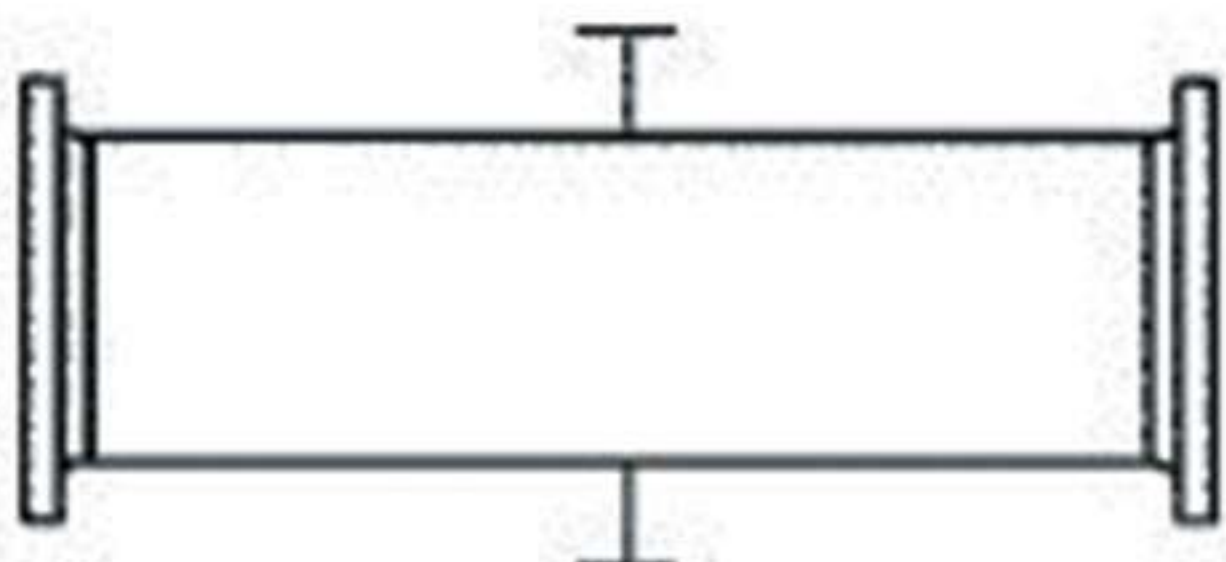
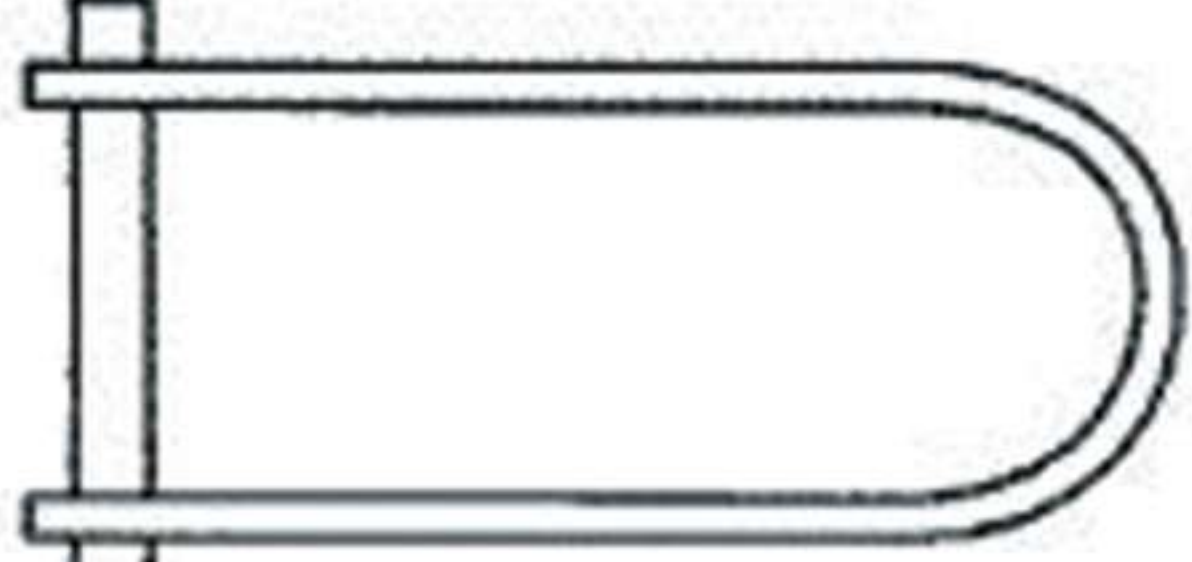
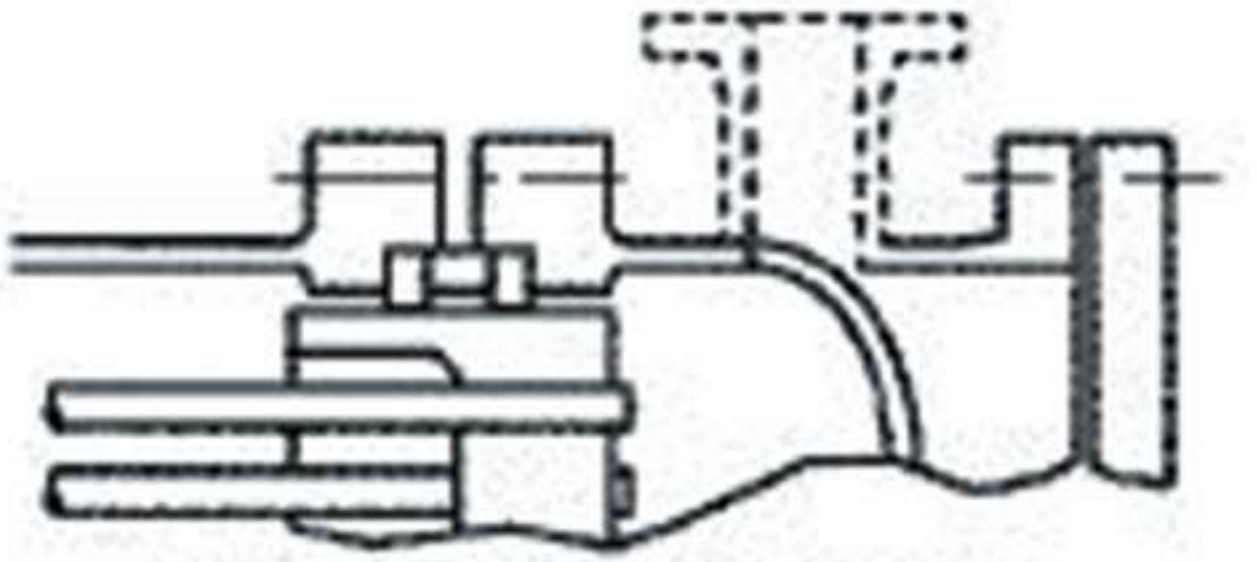
HEAT EXCHANGERS



Product Description

Heat exchangers are critical equipment in various industries for transferring heat from one fluid to another without mixing them.

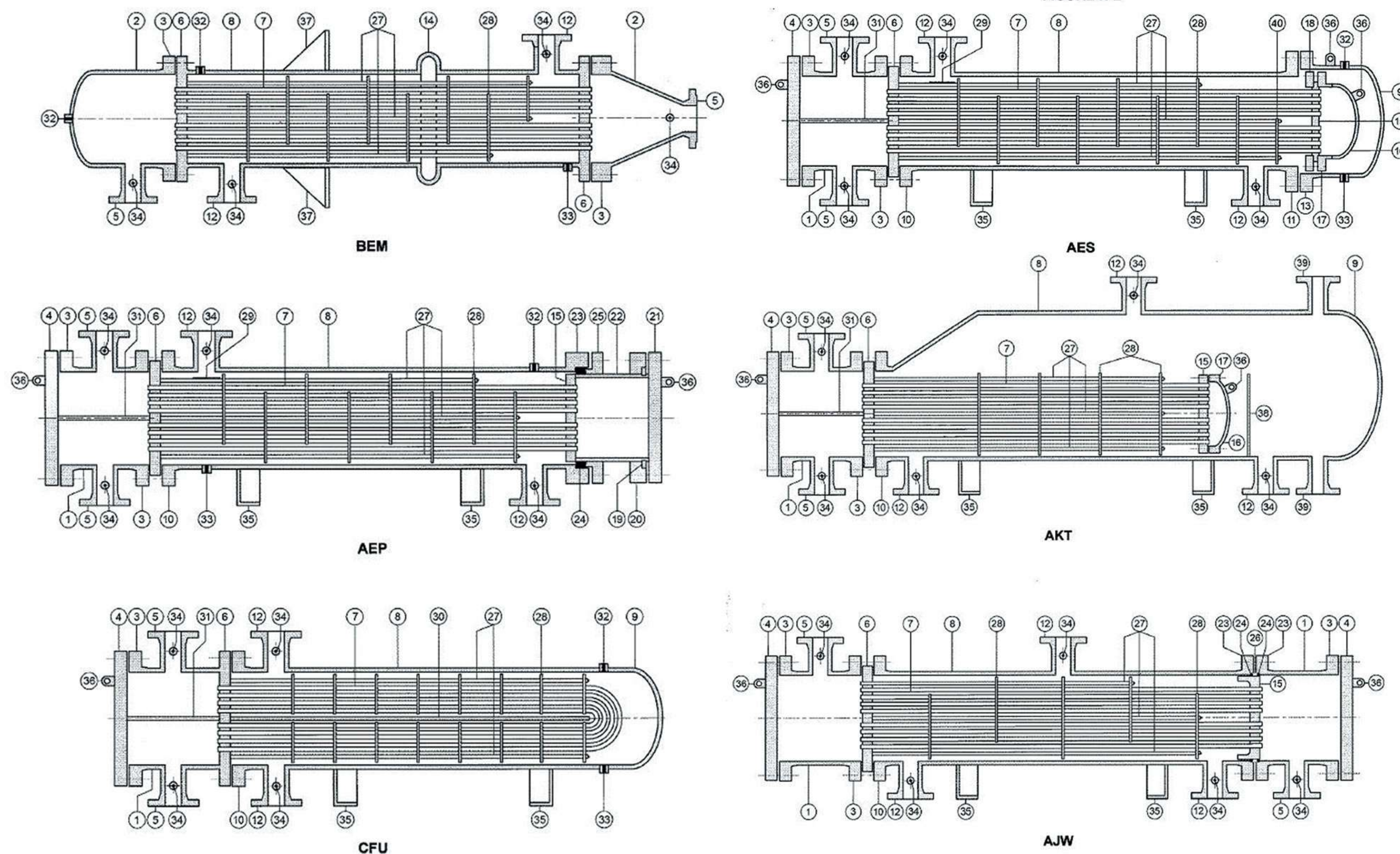
TEMA Types of Heat Exchangers

FRONT END STATIONARY HEAD TYPES		SHELL TYPES		REAR END HEAD TYPES	
A B C N D		E F G H J K X		L M N P S T U W	
	CHANNEL AND REMOVABLE COVER		ONE PASS SHELL		FIXED TUBESHEET LIKE "A" STATIONARY HEAD
					
	BONNET (INTEGRAL COVER)		TWO PASS SHELL WITH LONGITUDINAL BAFFLE		FIXED TUBESHEET LIKE "B" STATIONARY HEAD
					
	REMOVABLE TUBE BUNDLE ONLY		SPLIT FLOW		FIXED TUBESHEET LIKE "N" STATIONARY HEAD
					
	CHANNEL INTEGRAL WITH TUBESHEET AND REMOVABLE COVER		DOUBLE SPLIT FLOW		OUTSIDE PACKED FLOATING HEAD
					
	CHANNEL INTEGRAL WITH TUBESHEET AND REMOVABLE COVER		DIVIDED FLOW		FLOATING HEAD WITH BACKING DEVICE
					
	SPECIAL HIGH PRESSURE CLOSURE		KETTLE TYPE		PULL THROUGH FLOATING HEAD
					
			CROSS FLOW		U-TUBE BUNDLE
					
					EXTERNALLY SEALED FLOATING TUBESHEET

- 01. Stationary Head-Channel
- 02. Stationary Head-Bonnet
- 03. Stationary Head Flange-Channel or Bonnet
- 04. Channel Cover
- 05. Stationary Head Nozzle
- 06. Stationary Tubesheet
- 07. Tubes
- 08. Shell
- 09. Shell Cover
- 10. Shell Flange-Stationary Head End
- 11. Shell Flange-Rear Head End
- 12. Shell Nozzle
- 13. Shell Cover Flange
- 14. Expansion Joint
- 15. Floating Tubesheet
- 16. Floating Head Cover
- 17. Floating Head Cover Flange
- 18. Floating Head Backing Device
- 19. Split Shear Ring
- 20. Slip-on Backing Flange

- 21. Floating Head Cover-External
- 22. Floating Tubesheet Skirt
- 23. Packing Box
- 24. Packing
- 25. Packing Gland
- 26. Lantern Ring
- 27. Tierods and Spacers
- 28. Transverse Baffles or Support Plates
- 29. Impingement Plate
- 30. Longitudinal Baffle
- 31. Pass Partition
- 32. Vent Connection
- 33. Drain Connection
- 34. Instrument Connection
- 35. Support Saddle
- 36. Lifting Lug
- 37. Support Bracket
- 38. Weir
- 39. Liquid Level Connection
- 40. Floaring Head Support

FIGURE N-2



1. Shell and Tube Heat Exchangers Description

Shell and tube heat exchangers consist of tube bundle that are placed inside the shell, axis of the tubes is parallel to the axis of the shell. In these heat exchangers one fluid is inside tube and the other fluid in shell common-current and countercurrent with the tubes.



Heat Exchanger Components:

Main components of these exchangers are tube bundle, shell, head, front-end head, rear-end head, baffles, tube sheets, tie rods, channels, inlet and outlet nozzles.

Shell

The shell is one of the most important components of the heat exchanger, which is made of carbon steel, brass and stainless steel.

Baffle

To increase the heat transfer efficiency inside the shell, plates called baffles are used that increase efficiency of heat transfer by turbulence increase. The baffle will be affected to circulating of heat exchange.



Tube Sheet

Tube sheets are forged sheets that placed between the tube bundle and shell. The tubes are inserted through holes in the tube sheets and are either expanded or welded in both positions.



Tube Bundle

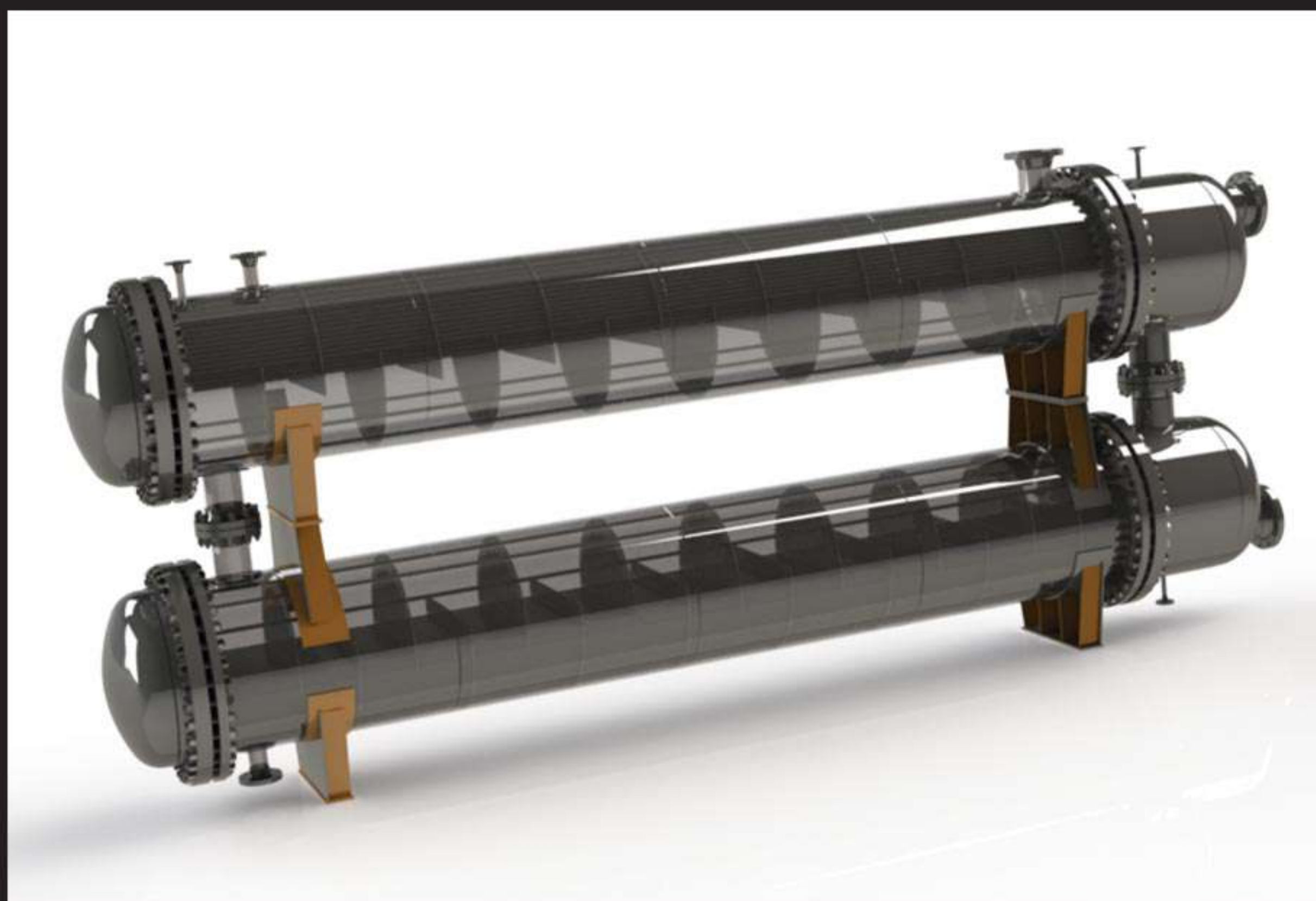
Tube Bundles are the tubes that collect the Heat exchanger's surfaces. Depending on the specific use, the tubes can be constructed of different materials, such as Carbon steel, stainless steel, copper, or titanium.



Applications of the shell and tubes

The main point in the design of these exchangers is considering the thermal expansion and easier cleaning. The assembly and manufacturing cost of these exchangers is low compared to other exchangers. These types of exchangers usually made in the following ways:

- 1 Shell and tube exchangers with fixed tube sheet where the shell is welded to the tube sheet. cleaning inside the tubes is easy.
- 2 Shell and tube exchangers with U-shaped tubes, which have only one tube sheet, therefore have the lowest construction cost.



2. Double Exchanger

The simplest form of heat exchanger is double pipe heat exchanger, (known as a concentric pipe, hairpin, jacked pipe and jacketed U-tube heat exchangers), consists of a single pipe mounted inside another. One fluid flow in the inner pipe, while a second fluid flows in the outer pipe annulars. This type of exchanger is for small heat transfer levels (up to 50 m²) and also suitable for the flow of hot and cold fluids at high pressures. Cleaning, repair and maintenance of these exchangers is easy, they can be used in heavy sediment conditions.

Tube Bundle

Shell: SA-516 Gr.70 (Normalized)/ SA-240 TP.304, T.P316

Tube: SA-179, SA-213 T.P 304 L/316.

Tube sheet: SA-105 (Forged), SA-182 Tp.304/316

Baffles: SA-240 T.P 304/316. Tie rods: SA-105, SA-276 T.P 304/316

Channels: SA-516 Gr.70(Normalized), SA-240 T.P 304/316

Ring flanges: SA-105(forged), SA-182 T.P 304/316

Inlet and Outlet Pipe: SA-106 Gr. B, SA-335 P11, SA-213 T.P 304/316

Inlet and Outlet Flange: SA-105, SA-182 T.P 304/316

Standards

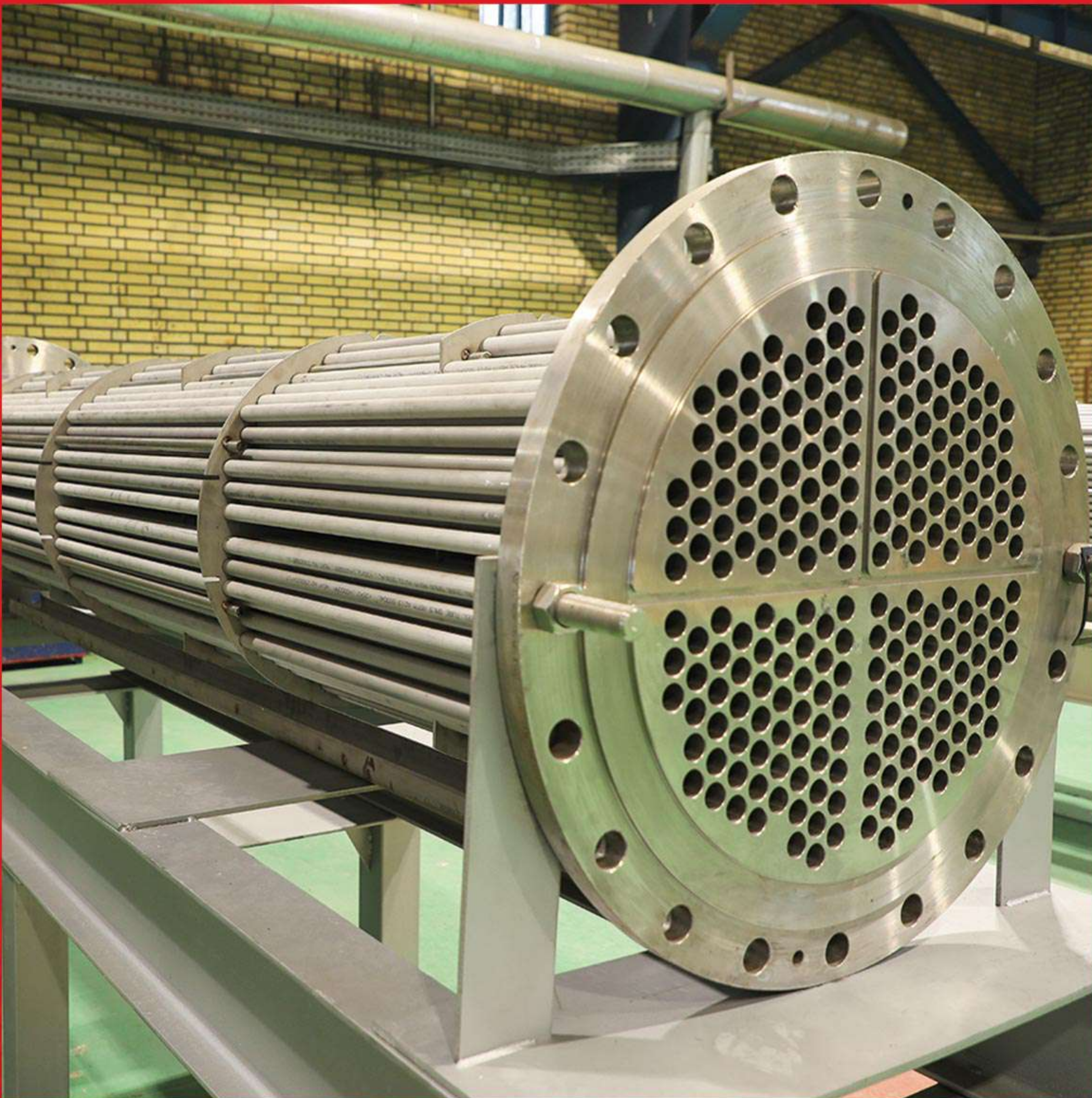
Design and fabrication according to: TEMA Class B, C and R
ASME Code, Section VIII, Division 1 standards: API 660

TEMA Sample Data Sheet

1	Company: Scinno Tech Co.									
2	Location: Kerman									
3	Service of Unit: Ammonia Sulfate Solution Cooler									
4	Item No.: E-101									
5	Date: 1401/04/04, Rev No.: 2									
6	Size:	1070 - 5880	mm	Type:	AES	Horizontal	Connected in:	1 parallel	1 senes	
7	Surf/unit(eff.)	175.9	m ²	Shells/unit	1		Surf/shell(eff.)	175.9	m ²	
8	PERFORMANCE OF ONE UNIT									
9	Fluid allocation			Shell Side			Tube Side			
10	Fluid name			Water			Ammonia Sulfate Solution			
11	Fluid quantity, Total			65.5995			65.5995			
12	Vapor(In/Out)			0			0			
13	Liquid			236158			236158			
14	Noncondensable			0			0			
15										
16	Temperature(In/Out)			25			30			
17	Bubble/Dew point			/			/			
18	Density Vapor/Liquid			/ 998.27			/ 997.34			
19	Viscosity			/ 0.8974			/ 0.7998			
20	Molecular wt, Vap									
21	Molecular Wt, NC									
22	Specific heat			/ 4.192			/ 4.19			
23	Thermal conductivity			/ 0.6004			/ 0.607			
24	Latent heat			kJ/kg						
25	Pressure(abs)			5			4.46908			
26	Velocity(Mean/Max)			0.58			0.65			
27	Pressure drop, allow./calc.			1.5			0.53092			
28	Fouling resistance(min)			m ² -K/W			0.00053			
29	Heat exchanged			1374.6			MTD(corrected)			
30	Transfer rate, Service			685.3			Dirty			
31				686.5			Clean			
32							1393.8			
33							W/(m ² -K)			
34	CONSTRUCTION OF ONE SHELL									
35	Sketch									
36				Shell Side			Tube Side			
37	Design/Vacuum/test pressure			bar			5 / / 7.5			
38	Design temperature/MDMT			°C			65 /			
39	Number Passes per shell						1			
40	Corrosion allowance			mm			1.6			
41	Connections			In			in			
42	Size/Rating			Out			1 10 / 150 ANSI			
43	Nominal			Intermediate			/ 150 ANSI			
44	Tube #:			224			OD: 44.45			
45	Tube type:			Plain			Insert: None			
46	Shell			SA-516 70 K02700			ID 1070			
47	Channel or bonnet			SA-240 316L S31603			OD 1094			
48	Tubesheet-stationary			SA-240 316L S31603			-			
49	Floating head cover			SA-240 316L S31603						
50	Baffle-cross			SA-516 70 K02700			Type			
51	Baffle-long-						Seal Type			
52	Supports-tuble			U-bend			0			
53	Bypass seal						Tube-tubesheet joint			
54	Expansion joint			-			Type			
55	RhoV2-Inlet nozzle			1666			Bundle entrance			
56	Gaskets-Shell side			Spiral-Wound Metal Fib			Tube side			
57	Floating head			Spiral-Wound Metal Fib						
58	Code requirements			ASME Code Sec VIII Div 1			TEMA class			
59	Weight/Shell			7940.3			Filled with water			
60	Remarks									



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