

Kettle Type Heat Exchanger (BKU) Design & Estimation

Excel Program



Details

Version : 1.2
Release Date : 16 February, 2021
Software : Excel **Size :** 1.5 MB
Design Type : Mechanical

Design Code : ASME Sec. VIII Div. 1 & TEMA
TEMA Type : BKU

Options :

TEMA Class : R and CB
Passes : 2, 4, 6
Nozzle Flange : Slip On and Weld Neck
 Tubesheet Cons. : Forge and Plate
Material : SS304, SS304L, SS316, SS316L, CS (SA516) and Custom to add

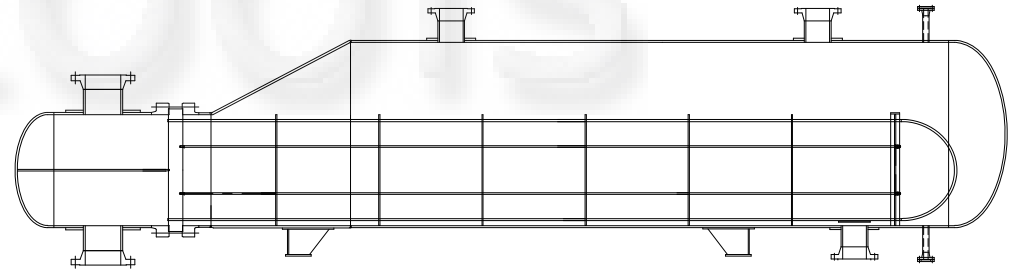
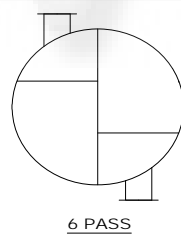
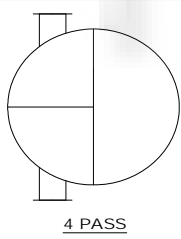
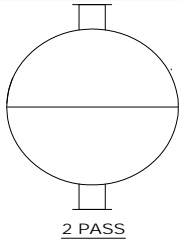
Calculations available :

Shell Thickness - ASME UG 27 (1) and TEMA R & CB 3.1.3
 Dish End Thickness - ASME App. 1-4c and TEMA R & CB 3.1.3
 Tubesheet - TEMA RCB 7.132
 Body Flange - ASME App. 2 2-7 a)
 Nozzle - ASME UG 45
 Baffle - TEMA R & CB 4.4.1
 Tie Rod - TEMA R & CB 4.7.1

Output : 1. BOQ with Costing.

2. G.A Drawing (Hori. Pos. Only) in PDF File.
 Purpose : Pre-Bid/Costing and making fabrication drawing
 (Drg. not to use for fabrication purpose)

PASS PATTERNS



Screenshots

INPUTS

CALCULATION

BODY FLANGE

DRAWING INPUTS

DRAWING

DATABASE

BKU v1.2.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Help Tell me what you want to do

ESTIMATE SHEET		Dtd. 13.04.17		EQPT NO : E-61111B		DESIGN CODE		ASME VIII DIV.1 TEMA R	
CLIENT :		HEAT EXCHANGER		DRG NO.		TYPE		BKU HTA 329 m2	
TITLE :				ENQUIRY NO. 63		QTY		1	

SL. NO.	ITEM	QTY	SIZE	THK	MATERIAL	WT IN KGS	RATE RS/KG	AMOUNT [RS]	LABOUR CHARGES	WT IN KGS	RATE	AMT
1	Tube	1	25.04 OD x 4186 Mtr	2.108	SA213 TP304	5086	350	1780142	SS316 Bundle wt	7741	15	1E+05
2	Tubesheet	1	1460 Dia.	90	SA182 F304	1204	450	541757	CS Cons wt	7741	2	15483
3	Baffles	4	1930 Dia.	14	SA240 Gr.316	1308	200	340159	CS wt	4433	14	62067
4	Tie rod	10	12 Dia. x 4.2 Mtr	--	SS316	38	200	8345	SS316 Cons wt	4433	25	1E+05
5	Spacer	10	15 NB x 4.2 Mtr	SCH 10	SS316	4	200	840	D/E Forming	424	25	10590
6	Sliding plate	2	150 W x 4200 Lg.	10	SA240 Gr.316	101	200	22176	Transport			0
7	Main shell IC 1930	1	6089 Circ. x 4095	8	SA240 Gr.316	1596	200	351088	Design + Drg			20000
8	Small shell II 1400	1	4424 Circ. x 200	8	SA240 Gr.316	57	200	12458	Document			5000
9	Channel shell II 1400	1	4424 Circ. x 500	8	SA240 Gr.304	142	155	24137	Testing			10000
10	Dish end (SS)	1	2338.8 Blank Dia.	8	SA240 Gr.316	274	200	71360	XRay	93	235	21855
11	Dish end (TS)	1	1724 Blank Dia.	8	SA240 Gr.304	149	155	30050	Mockup Testing			0
12	Body flange (SS)	1	1525 OD x 1400 ID	80	SA182 F316	203	650	131777	Tube drilling	886	45	39870
13	Body flange (TS)	1	1525 OD x 1400 ID	120	SA182 F304	304	450	136845	Expansion	886	30	26580
14	Ecc Cone	1	1930 1400 920 Dxdxh	8	SA240 Gr.316	321	200	96153	Drilling Baffles	886	1.5	4 5318
15	Partition plate	2	1400 x 996	12	SA240 Gr.304	554	155	94392	Tie Rod	10	200	1 2000
16	Nozzle pipes					65		28056	Final M/C			1 10000
17	Nozzle flanges					105		55915	Transport			1 6000
18	RF Pad					17		5014	Sand blasting	29.2	250	1 7299
19	Pad for Saddle	2	300 x 2080	8	SA240 Gr.316	80	200	17572	Painting	29.2	200	1 5840
20	Saddle	2			CS	546	50	35490	Hydro test			1 5000
21	Lifting pad	2	50 x 250	8	SS316	1.6	200	352	N2 filling			1 5000
22	Lifting lug	2	80 x 150	16	CS	3	50	169	Packing			1 3000
23	Jack screw				SS316		200	0	Welding	886	15	1 13290
24	Dowel pin				CS		50	0	SR for Dish	424	10	4 4236
25	Gasket							2000	Transport			
26	Fasteners				SA193 Gr.B7/2H	17		13849	Ecc. Cone Forming	321	20	6410
27	Name plate				SS				Transport			
									Tube bending + SR	443	500	2E+05
	Jig material											Total 5E+05
												direct 25% #####
												TOTAL #####

Tube bundle	7741											
CS wt	15483											
Material		3800097						Ex work FOB Quoted	5611775			
Labour		631724						Two yrs spares	0			
Total		4431820										

ESTIMATION

Ready

Input Sheet

Type	BKU	HTA m²	GROSS	329.33
TEMA Class	R		EFF	317.39
Orientation	Horizontal			

	Shell Side	Tube Side
Design Pressure kgf/cm²g	3	10.16
Design Temperature C	120	398
Mean Metal Temperature C	50	200
No. Passes per Shell	1	6
Material	SS316	SS304
Corrosion Allowance	0	0

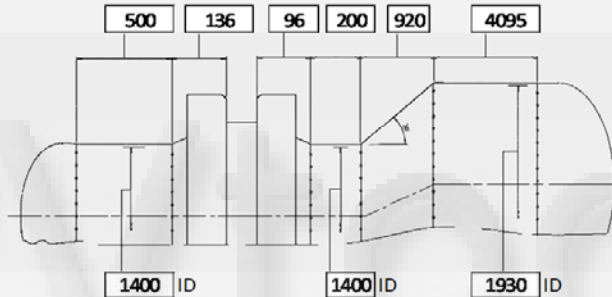
Nozzles	Inlet	250 NB	200 NB
	Outlet	50 NB	200 NB
	Vent	50 NB	
	Drain	80 NB	

U Tube	
OD	25.04
Thk	2.108
St. Length	4200
Qty	443
Pitch	38.1
Layout	90

Main Shell ID	1930
Ch. Shell ID	1400

Support Qty	4
Spacing	819

Radiography (SS/TS)	Spot	Spot
Tubesheet Cons.	Forge	
Nozzle Flange Type	Weld Neck	



Description	Material	Thk/Size	
		Min.	Consider
Main Shell	SA240 Gr.316	8.0	8
Channel Shell	SA240 Gr.304	8.0	8
Dish Head (SS)	SA240 Gr.316	8.0	8
Dish Head (TS)	SA240 Gr.304	8.0	8
Body Flange (SS)	SA182 F316	75.9	80
Body Flange (TS)	SA182 F304	110.6	120
Tubesheet	SA182 F304	76.6	90
Partition Plate	SA240 Gr.304	12	12
Baffle	SA240 Gr.316	14	14

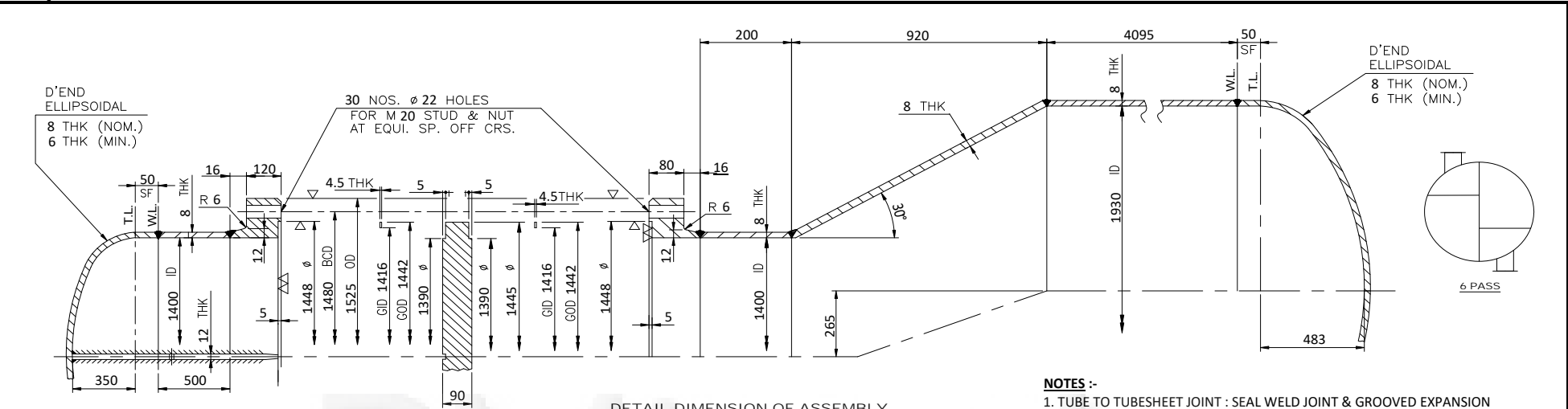
99 Max
Bolt 20 M 30 Nos

168.3 Max

Tie Rod	SS316	12 Dia. 10 Nos	
Spacer	SS316	15 NB	SCH 10
Nozz. Flange (SS)	SA182 F316	150#	150#
Nozz. Neck (SS)	SA312 TP 316	SCH 40	SCH 40
Nozz. Flange (TS)	SA182 F304	300#	300#
Nozz. Neck (TS)	SA312 TP 304	SCH 80	SCH 80
Gasket (SS)	Spiral Wound	4.5	4.5
Gasket (TS)	Spiral Wound	4.5	4.5
Fastner	SA193 Gr.B7	--	--

EFF HTA m²
322.85

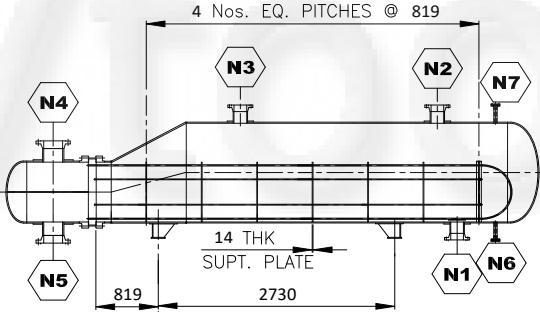
Output



DETAIL DIMENSION OF ASSEMBLY

- NOTES :-**
1. TUBE TO TUBESHEET JOINT : SEAL WELD JOINT & GROOVED EXPANSION
 2. EXPANSION BELLOW : NO

MATERIAL OF CONSTRUCTION FOR MAJOR COMPONENTS:	
COMPONENT	MATERIAL
TUBES	SA213 TP304
TUBESHEET	SA182 F304
MAIN SHELL	SA240 Gr.316
CHANNEL SHELL	SA240 Gr.304
CHANNEL D'END	SA240 Gr.304
GIRTH FLANGE TS	SA182 F304
GIRTH FLANGE SS	SA182 F316
TIE-ROD	SS316
BAFFLE PLATE/SEALING & SLIDING STRIP	SA240 Gr.316
GASKET GIRTH FLG. (T./SHT TO CH. FLG.)	Spiral Wound
GASKETS NOZ. FLG. (SHELL)	
GASKETS NOZ. FLG. (CHANNEL)	
BOLTING (GIRTH FLANGES)	SA193 Gr.B7
BOLTING (NOZZLE FLG.) SHELL SIDE	
BOLTING (NOZZLE FLG.) CHANNEL SIDE	
SADDLE SUPPORT	CS
WRAPPER PLATE	SA240 Gr.316
PASS PARTITION PLATE	SA240 Gr.304



N7	SHELL VENT	50	40	150#	SORF	150
N6	SHELL DRAIN	80	40	150#	SORF	150
N5	CHANNEL OUTLET	200	80	300#	SORF	150
N4	CHANNEL INLET	200	80	300#	SORF	150
N3	SHELL OUTLET	50	40	150#	SORF	150
N2	SHELL OUTLET	50	40	150#	SORF	150
N1	SHELL INLET	250	40	150#	SORF	150
Nozz. No.	Service	Size NB	Sch.	Class	Type	NOZZ. PROJ.
		NOZZLE SCH.		FLANGES		

TUBE DETAILS	25.04 OD	2.108 (Min.) THK	38.1 PITCH
	443 NOS.	4200 ST. LRNGTH	90 LAYOUT

DESIGN CODE	ASME SEC. VIII DIV. 1 & TEMA CLASS R		
EFF. HTA (m²)	322.85		
	UNIT	SHELL SIDE	TUBE SIDE
DESIGN PRESSURE	kgf/cm2 g	3	10.16
DESIGN TEMPERATURE	°C	120	398
TEST PRESS. (HYDRO)	kgf/cm2 g	3.9	13.208
CORROSION ALLOWANCE	mm	0	0
NO. OF PASSES	Nos.	1	6
FLUID (CIRCULATED)			
MDMT	°C		
RADIOGRAPHY		Spot	Spot
JOINT EFFICIENCY		0.85	0.85
HEAT TREATMENT		NA	NA


COMPANY NAME

CLIENT	DATE	REV. NO.
TITLE	ENQUIRY NO.	
DRAWING NO.	QTY	

Demo Video

	Watch Online Link tiny.cc/a7rluz
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