

Shell & Tube Heat Exchanger (BEU) Design & Estimation

Excel Program



Details

Version : 1
Release Date : 16 October, 2020
Software : Excel **Size :** 1 MB
Design Type : Mechanical

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

Options :

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

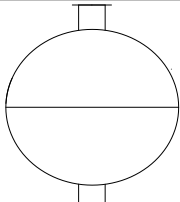
Calculations available :

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

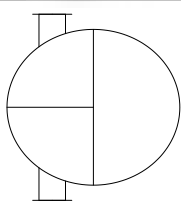
Output : 1. BOQ with Costing.
 2. G.A Drawing (Hori. Pos. Only) in PDF File.

Purpose : Pre-Bid/Costing and making fabrication drawing
 (Drg. not to use for fabrication purpose)

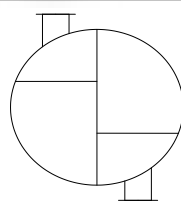
PASS PATTERNS



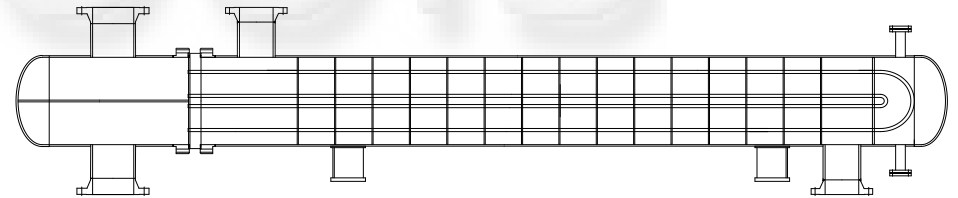
2 PASS



4 PASS



6 PASS



Screenshots

The screenshots show various stages of the design and estimation process:

- INPUTS:** Shows input parameters and material selection tables.
- CALCULATIONS:** Displays calculation steps and results.
- BODY FLANGE:** Shows technical drawings of the heat exchanger body and flange.
- DRAWING INPUTS:** Shows input data for generating the final drawing.
- DRAWING:** Shows the final technical drawing of the heat exchanger.
- DATABASE:** Shows a database of materials and their properties.

The Excel spreadsheet (BEU.xlsx) contains the following data:

ESTIMATE SHEET	Dtd.	18.08.20	EQPT NO :	E-61111B	DESIGN CODE	ASME VIII DIV.1 & TEMA R
CLIENT :			DRG NO.		TYPE	BEM HTA 1387.3 m2
TITLE :	HEAT EXCHANGER		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	20 OD x 22080 Mtr.	2	SA179	19602	110	2156217	CS Bundle wt	25066	12	300798		
2	Tubesheet	1	1912 Dia.	140	SA266 Gr.2	3150	250	787462	CS Cons wt	25066	2	50133		
3	Baffles	11	1800 Dia.	10	SA516 Gr.60	2193	50	142573	CS wt	12542	14	175585		
4	Tie rod	12	16 Dia. x 6 Mtr.	--	CS	113	50	6239	CS Cons wt	12542	6	75251		
5	Spacer	12	20 NB x 6 Mtr.	SCH 10	CS	8	50	390	D/E Forming	1355	25	33883		
6	Sliding plate	2	W x Lg.	10	SA516 Gr.60	0	50	1.1	Transport			1	0	
7	Main shell ID 1800	1	5737 Circ. x 6900	26	SA516 Gr.60	8080	50	1.1	444387	Design + Drg		1	20000	
8	Channel shell ID 1800	1	5725 Circ. x 500	22	SA516 Gr.70	494	50	1.1	27188	Document		1	5000	
9	SS Dish End	1	2188 Blank Dia.	24	SA516 Gr.60	707	50	1.3	45963	Testing		1	10000	
10	TS Dish end	1	2188 Blank Dia.	22	SA516 Gr.70	648	50	1.3	42132	X Ray	93	235	1	21855
11	SS Body flanges	1	1912 OD x 1800 ID	180	SA266 Gr.2	507	250	126815	Mockup Testing			1	0	
12	TS Body flanges	1	1912 OD x 1800 ID	185	SA266 Gr.2	521	250	130338	Tube drilling	3680	70	1	257600	
13	Partition plate	1	1800 x 1229	16	SA516 Gr.70	278	50	1.1	15282	Expansion	3680	30	1	110400
14	Partition plate	1	900 x 1229	16	SA516 Gr.70	139	50	1.1	7641	Drilling Baffles	3680	1.5	11	60720
15	Nozzle pipes					58		5825	Tie Rod	12	200	1	2400	
16	Nozzle flanges					156		38875	Final M/C			1	10000	
17	RF Pad					46		3452	Transport			1	6000	
18	Pad for Saddle	2	300 x 1950	26	SA516 Gr.60	239	50	1.1	13134	Sand blasting	42.456	250	1	10614
19	Saddle	2			CS	516	50	1.3	33540	Painting	42.456	200	1	8491.2
20	Lifting pad	2	50 x 250	26	CS	5.2	50	1.1	286	Hydro test			1	5000
21	Lifting lug	2	80 x 150	16	CS	3	50	1.1	169	N2 filling			1	5000
22	Jack screw				SS316		200	500	Packing			1	3000	
23	Dowel pin				CS		50	500	Welding	3680	15	1	55200	
24	Gasket						2000	2000	SR for Dish	1355	10		13553	
25	Fasteners				SA193 Gr.B7/2H	144		72059	Tube bending + SR	1840	500		920000	
26	Name plate				SS			1000					Total	#####
	Jig material												direct 25%	540120
						37608	TOTAL	4103966					TOTAL	#####

ESTIMATION Summary:

Material	4103966	Ex work FOB Quoted	8577711
Labour	2700602	Two yrs spares	0
Total	6804569		
25%	1701142		

Navigation: INPUTS | ESTIMATION | CALCULATIONS | BODY FLANGE | DRAWING INPUTS | DRAWING | DATABASE

Input Sheet

TEMA Class	R
Orientation	Horizontal
Process Side	Shell Side

HTA m ²	GROSS	1387.3
	EFF	1350

	Shell Side	Tube Side
Design Pressure kgf/cm2g	15	15
Design Temperature °C	120	120
Mean Metal Temperature (Shell/Tube) °C	50	200
No. Passes per Shell	1	4
Material	CS 60	SS304
Corrosion Allowance	3	0

Nozzles	Inlet	300 NB	250 NB
	Outlet	50 NB	200 NB
	Vent	25 NB	25 NB
	Drain	25 NB	25 NB

U Tube	
OD	20
Thk	2
St. Length	6000
Qty	1840
Pitch	26.4
Layout	30

Shell ID	1800
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Baffle Qty	11
Spacing	500
Inlet Spacing	533
% Cut	25
Position	Vert.

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

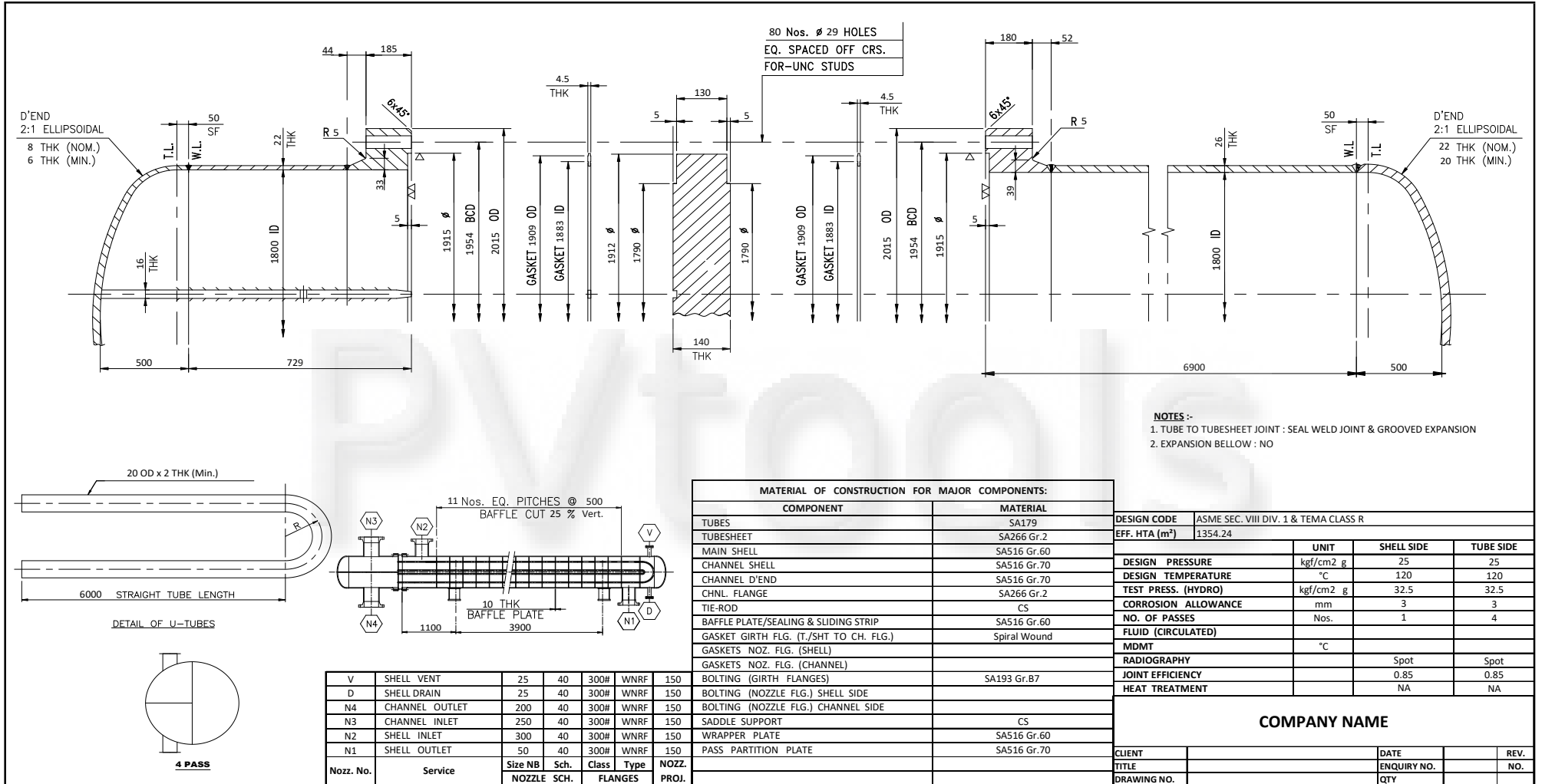
Description	Material	Thk/Size	
		Min.	Consider
Main Shell	SA516 Gr.60	16.3	18
SS Dish Head	SA516 Gr.60	14.1	18
Channel Shell	SA240 Gr.304	13.9	14
TS Dish Head	SA240 Gr.304	11.6	14
SS Body Flange	SA266 Gr.2	137.5	140
Tubesheet	SA266 Gr.2	125.2	140
TS Body Flange	SA182 F304	151.8	160
Partition Plate	SA240 Gr.304	12	12
Baffle	SA516 Gr.60	10	10

		93 Max
Bolt	27 M	80 Nos
158.3 Max		

Tie Rod	CS	16 Dia.	
		12 Nos	
Spacer	CS	20 NB	SCH 10
Nozz. Flange (SS)	SA105	150#	150#
Nozz. Neck (SS)	SA106 Gr.B	SCH 80	SCH 80
Nozz. Flange (TS)	SA182 F304	150#	150#
Nozz. Neck (TS)	SA312 TP 304	SCH 40	SCH 40
Gasket	Spiral Wound	4.5	4.5
Fastner	SA193 Gr.B7	--	--

HTA m ²	1354.24
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Output



Demo Video

	<p>Watch Online Link http://tiny.cc/qwnluz</p>
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