

Multi Pressure Vessel Design & Estimation

Version 1.3

Excel Program

PVtools
pvtools.weebly.com

Version : 1.3

Release Date : 15 Jun, 2023

Software : Excel **Size :** 5.2 MB

Design Type : Mechanical

Design Code : ASME Sec. VIII Div. 1

Options :

Vessel Position : Vertical and Horizontal

Dish End : Ellipsoidal (2:1), Torispherical (10%)

Nozzle Flange Cons. : Solid and Lined

Nozzle Flange : Slip On and Weld Neck

Vessel Support : Saddle, Leg & Skirt

Material : SS304, SS304L, SS316, SS316L, SA516, SA515,
Titanium, Nickel, Monel and Custom to add

Calculations available :

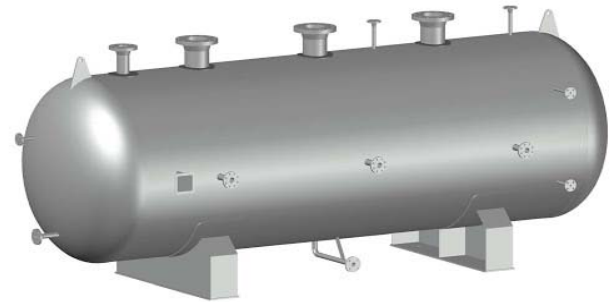
Shell Thickness - ASME UG 27 (1)

Dish End Thickness - ASME App. 1-4c

Nozzle - ASME UG 45

Output : BOQ with Costing.

Vertical & Horizontal GA Drawing



Screenshots

INPUT

Client: JVC Enquiry No.: 11 Date: 30.03.23

Sl. No.	Tag No.	Material	Shell Size	Design Temp	Design P	C.A.	Shell Thk	Dish Thk	Mannhole	Size	Qty	Size	Qty	Size	Qty	Size	Qty	Nozzle	Sch./Mat.	Supports	
1	V-101	SA240 Gr. 304	500	2000	50	5	4.0	10	4.4	10	600	2	150	1	25	1	25	2	40/1500	80/3000	LEG

NOZZLE FLANGE TYPE: WNRF **FASTNER MOC:** SA193 B7 **SHELL RT:** SPOT
NOZZLE FLANGE IN: SOLID **GASKET MOC:** SPWAD **GASKET:** 2 **SPARES:** **FASTNER:** 12%
DISH TYPE: TORISPHERICAL (10%) **SUPPORT MOC:** CS

ERECTOR & COM.: SPARES: 2 FASTNER: 12%
COMPANY NAME: PVTtools

VERTICAL DRAWING

DESIGN CODE: ASME SEC. VIII DIV. 2

Design Pressure	MPa	5
Design Temperature	°C	300
Weld Pencil Symbol	Left	B. E.
Corrosion Allowance	mm	3
Radioactivity		SPOT
Joint Efficiency		0.85
Heat Treatment		None

MATERIAL OF CONSTRUCTION FOR MAJOR COMPONENTS:

COMPONENT	MATERIAL
Shell	SA240
Shell Flange	SA240
Nozzle Neck	SA240
Nozzle	SA240
Support	CS

COMPANY NAME: PVTtools

HORIZONTAL DRAWING

COMPONENT MATERIAL

Shell	SA240
Shell Flange	SA240
Nozzle Neck	SA240
Nozzle	SA240
Support	CS

DESIGN CODE: ASME SEC. VIII DIV. 2

COMPANY NAME: PVTtools

CALCULATION

SHELL THICKNESS
ASME SEC. VIII DIV. 1 UG-27 (1)

MOC	SA240 Gr. 304
Radius	R = 250 mm
Design Temperature	T = 50 °C
Design Pressure	P = 5 Kg/cm²
Stress Value	S = 1408 Kg/cm²
Joint Efficiency	E = 0.85
Corrosion Allowance	CA = 3 mm

PR = 1250
SE = 0.6P + CA = 1153.8 + 3 = 4.06
Required Thickness = 4.05 mm
Consider Thickness = 10 mm

TORISPHERICAL (10%) DISH THICKNESS
ASME SEC. VIII DIV. 1 Appendix 1-4 d

MOC	SA240 Gr. 304
Diameter	D = 500 mm
Design Temperature	T = 50 °C
Design Pressure	P = 5 Kg/cm²
Stress Value	S = 1408 Kg/cm²
Joint Efficiency	E = 1

ESTIMATION

ITEM	QTY	SIZE	TIME/MATERIAL	WF RATE	AMOUNT	LABOUR	CHARGE	WF RATE	AMT
Shell	1	500 Dia.	1500	100	150000	200	20000	20	4000
Shell Flange	1	500 Dia.	1000	80	80000	150	15000	15	3000
Nozzle Neck	1	500 Dia.	1000	80	80000	150	15000	15	3000
Nozzle	2	500 Dia.	1000	80	160000	150	30000	15	6000
Support	2	500 Dia.	1000	80	160000	150	30000	15	6000
Material	1	SA240 Gr. 304	1500	100	150000	200	20000	20	4000
Shell Flange	1	SA240 Gr. 304	1000	80	80000	150	15000	15	3000
Nozzle Neck	1	SA240 Gr. 304	1000	80	80000	150	15000	15	3000
Nozzle	2	SA240 Gr. 304	1000	80	160000	150	30000	15	6000
Support	2	SA240 Gr. 304	1000	80	160000	150	30000	15	6000
Painting	1	SA240 Gr. 304	1500	100	150000	200	20000	20	4000
Hydrotest	1	SA240 Gr. 304	1500	100	150000	200	20000	20	4000
Transport	1	SA240 Gr. 304	1500	100	150000	200	20000	20	4000
Documentation	1	SA240 Gr. 304	1500	100	150000	200	20000	20	4000
TOTAL					1760000		200000		80000

Maximum Allowable Stress, Kg/cm² for Metal Temperature, °C

Material	38	65	100	125	150	200	250	300	325	350	375	400	425	450	475	500
SA240 Gr. 304	1203	1203	1203	1203	1203	1203	1203	1173	1142	1102	1061	907	768	640	484	323
SA240 Gr. 304L	1106	1106	1106	1106	1106	1106	1106	1076	1046	1006	965	811	672	544	388	227
SA240 Gr. 308	1178	1178	1178	1178	1178	1178	1178	1148	1118	1078	1037	883	744	616	460	299
SA240 Gr. 309	1178	1178	1178	1178	1178	1178	1178	1148	1118	1078	1037	883	744	616	460	299

DATABASE

ITEM	QTY	SIZE	TIME/MATERIAL	WF RATE	AMOUNT	LABOUR	CHARGE	WF RATE	AMT
Rate per kg	1	Plate	50	100	5000	8.00	14	8	
SA516 Gr. 60	50	100	150	0.00	14	8			
SA516 Gr. 65	50	100	150	0.00	14	8			
SA516 Gr. 70	50	100	150	0.00	14	8			
SA516 Gr. 60	45	110	200	7.65	29	8			
SA516 Gr. 65	50	100	150	0.00	14	8			
SA516 Gr. 70	50	100	150	0.00	14	8			
SA240 Gr. 304L	250	300	700	0.00	25	25			
SA240 Gr. 304L	180	250	450	0.00	25	20			
SA240 Gr. 304	180	250	450	0.00	25	20			
SS304	600	800	1600	0.00	25	30			
TI Gr. 2	3000	3500	4000	4.82	25	200			
Nickel 201	2500	3500	4000	0.80	25	300			
Nickel 200	2500	3500	4000	0.80	25	200			
Inconel 600	2500	3500	4000	0.80	25	200			
Muvel	3000	3000	4000	0.80	25	200			
Hastelloy C22	2000	3000	4000	0.80	25	200			
Hastelloy C276	2000	3000	4000	0.80	25	200			
SA56	45								

TRANNS. SADDLE

TI Gr. 2	50	5000
Nickel 201	750	5000
Inconel 600	1000	8000
Muvel	1500	10000
Hastelloy C22	2000	12000
Hastelloy C276	2500	15000

Input Sheet

Multi Pressure Vessel Design & Estimation																													
CLIENT xyz										ENQUIRY NO. 11				DATE 10.03.23															
SR No.	TAG NO.	MATERIAL	SHELL SIZE		DESIGN TEMP. °C	DESIGN P. Kg/cm ²	C.A.	SHELL THK		DISH THK		MANHOLE		N O Z Z L E S								NOZZLE SCH./RAT.		SUPPORTS	TRANSPORT	PROFIT	AMOUNT	QUOTED	AVG. RATE
			ID	WL/WL				MIN.	CONS.	MIN.	CONS.	SIZE	QTY	SIZE	QTY	SIZE	QTY	SIZE	QTY	SIZE	QTY	SIZE	QTY						
1	V-101	SA240 Gr. 304	500	2000	50	5	3	4.0	10	4.4	10	600	2	150	1	80	2	25	1	25	2	40/150#	80/300#	LEG		20%	1,049,183		529
2	V-102	Monel	800	1000	100	5	3	5.1	6	5.7	6	600	1	25	1	25	1	25	1	25	2	160/150#	80/300#	SKIRT		25%	6,852,327		5366
3	V-103	SA516 Gr. 70	1500	3000	60	2	3	4.3	6	4.6	6	600	1	25	2	25	2	25	3	25	5	160/150#	40/150#	SADDLE		25%	318,910		174
4	V-104	SA516 Gr. 70	1800	2500	110	6	3	7.5	8	8.9	10	600	1	25	1	25	1	25	1	25	1	160/150#	80/300#	LEG		25%	480,736		187
5	V-105	SA516 Gr. 60	1400	3000	125	15	3	13.4	14	16.3	14	600	2	25	3	25	5	25	2	25	1	160/300#	80/300#	SADDLE		25%	675,887		167
6	V-106	SA516 Gr. 60	1350	2000	150	10	3	9.6	10	11.6	12	600	1	25	1	25	3	25	5	25	3	160/150#	80/300#	SADDLE		25%	410,548		174
7	V-107	SA240 Gr. 316	900	1500	165	20	0	7.6	8	9.8	10	600	1	25	2	25	5	25	3	25	0	40/300#	80/300#	SADDLE		25%	1,026,932		752
8	V-108	SA516 Gr. 60	700	1200	85	5	3	4.7	6	5.2	6	600	1	25	2	25	6	25	2	25	2	160/150#	40/150#	SADDLE		25%	181,999		251
9	V-109	SA240 Gr. 304L	1550	2000	130	15	0	11.8	12	15.1	12	600	1	25	4	25	2	25	1	25	3	40/300#	40/150#	SADDLE		25%	935,135		372
10	V-110	SA516 Gr. 60	950	1500	115	20	3	12.4	14	15.0	18	600	1	25	1	25	5	25	5	25	2	160/300#	80/300#	SKIRT		25%	373,116		180
11	V-111	SA516 Gr. 60	750	1200	95	12	3	7.4	8	8.7	10	600	2	25	2	25	3	25	5	25	0	160/150#	80/300#	SADDLE		25%	420,908		226
12	V-112	SA240 Gr. 304L	1150	2000	75	25	0	14.6	16	18.6	16	600	1	25	5	25	1	25	2	25	2	40/300#	80/300#	SADDLE		25%	1,085,452		409
13	V-113	SA516 Gr. 70	1100	1800	60	5	3	5.3	6	6.0	8	600	1	25	1	25	5	25	3	25	1	160/150#	40/150#	LEG		25%	257,988		232
14	V-114	SA516 Gr. 60	800	1300	100	10	3	6.9	8	8.1	10	600	1	25	3	25	2	25	2	25	3	40/150#	40/150#	SADDLE		25%	207,555		221
15	V-115	SA515 Gr. 70	1650	2800	55	30	3	24.0	25	29.7	25	600	2	25	4	25	2	25	1	25	2	160/300#	40/150#	SADDLE		25%	833,772		140
16	V-116	SA516 Gr. 60	850	1300	165	18	3	10.6	12	12.7	12	600	0	25	1	25	4	25	1	25	0	160/300#	160/300#	SKIRT		25%	169,786		168
17	V-117	Nickel 200	725	1200	70	10	0	6.1	8	7.9	8	600	0	25	3	25	5	25	5	25	2	40/150#	40/150#	SADDLE		25%	1,827,674		3614
18	V-118	SA516 Gr. 60	1050	2500	50	15	3	10.8	12	13.0	12	600	1	25	6	25	2	25	3	25	2	160/150#	80/300#	LEG		25%	401,286		190
19	V-119	Inconel 600	1375	2250	95	10	0	5.0	6	6.5	6	600	1	25	4	25	1	25	1	25	0	40/150#	40/150#	SADDLE		25%	5,386,596		3414
20	V-120	SA516 Gr. 60	1300	2300	120	30	3	22.4	24	27.6	24	600	1	25	2	25	1	25	6	25	2	160/300#	160/300#	LEG		25%	613,667		155

NOZZLE FLANGE TYPE	WNRF	FASTNER MOC	SA193 B7	SHELL RT	SPOT	ERECTION & COM. SPARES	
NOZZLE FLANGE IS	SOLID	GASKET MOC	SPWD	DISH RT	FULL	GASKET	2 each
DISH TYPE	TORISPHERICAL (10%)	SUPPORT MOC	CS			FASTNER	10%

Version : 1.3, 2023	Design Code : ASME Sec.VIII Div.1	Created By : Pradeep Nayak from Dombivli, India	PVtools pvtools.weebly.com
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2. PayPal : <https://www.paypal.me/Pvtools>

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Demo Video

Watch Online Link

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