BAB III
METODOLOGI PERANCANGAN

3.1. Metode Perancangan

Metode yang digunakan pada perancangan bejana tekan ini adalah:

1. Bejana tekan yang dirancang bertipe vertikal.
2. Bejana tekan yang dirancang memiliki kapasitas 6 m^3, tekanan internal 40 barg, tekanan eksternal *full vacuum* dan temperatur 120˚C.
3. Perhitungan dan perancangan menggunakan standar ASME (*American Society of Mechanical Engineering*) sec. VIII div 1.
4. Perancangan menggunakan *software* PV Elite 2014.

3.2. Data Perancangan

Data perancangan menggunakan data yang sudah ada yaitu data *sheet fuel gas scrubber* milik Qatar Petroleum, Bul Hanine Arab "C" Gas Cap Recycling. Semua komponen perancangan menggunakan standar ASME Sec. VIII Div. 1.

3.2.1 Data Desain Bejana Tekan

Data desain bejana tekan vertikal *fuel gas scrubber* ditunjukkan pada tabel 3.1 s/d tabel 3.5.

Tabel 3.1. Data Desain.

Parameter	Satuan	Nilai
Orientation		*Vertical*
Contents		HC, H2S, CO2
contents		HC, H2S,CO2
Criticality Rating		2
Service		*Lethal, Sour*
Design Code		ASME Sec. VIII Div 1

Parameter	Satuan	Nilai
Code Stamp		Yes
Temperature		
- Design - Upper/Lower	˚C	120/4
-Operating - Max/Normal/Min	˚C	65/ - /59
Pressure		
-Design (Internal)	barg	40
-Design (External)	barg	*Full Vacuum*
-Operating – Max/Normal/Min	barg	-/ 34/-
Corrosion Allowance	mm	3
Specific Gravity Liquid (HC/W)		*Refer Sheet 2*
Gross Capacity	m^3	6
Vessel Diameter (ID)	mm	1300
Vessel Length (T/L TO T/L)	mm	4000
Shop Hydro test Pressure (N&C)		*Per code*
Wind		BS CP3, *Chapter* V, *Part* 2
Design Wind Speed	m/s	45
Seismic (refer Environmental data)		1535-0-56-0001
Shell Thickness (NOM)	mm	30 VTC
Min. Head Thickness (Top/Bot)	mm	29/29 VTC
Skirt Thickness/Height	mm	8/1500
Weld Joint Efficiencies		
-Shell		1,0
-Shell		1,0
-Head		1,0
Inspection and Testing		
Third Party Inspection		*Yes*
Non Destructive Testing		
-Radiography		100%

Parameter	Satuan	Nilai
-Ultrasonic		*Yes, Per code/spec*
-Magnetic Particle		100%
-Dye Penetrant		*Per code/spec*
Post Weld Heat Treatment		*Yes*
Material Impact Test Required		*Per code/spec*
Certified Elevated Temp. Test Required		*No*
Insulation (By others)	mm	*No*
Fireproofing	mm	*No*
Painting (External)		ES-Q-12
Painting (Internal)		*No*

Tabel 3.2. Data Material Konstruksi.

Part	***Material Specification***
Shell	SA516Gr.60
Cladding/Lining of shell	-
Heads	SA516Gr.60
Cladding	-
Supp. Skirt (Top/Bottom Sec.)	SA516Gr.60/SA283GR.C
Reinforcing pads	-
Reinforcing Pads	
Self Reinforcing Nozzles	SA105
Nozzle neck (pipes)	SA106Gr.B
Forged Flanges	SA105
Internal Flanges	-
Welding Elbow	SA 234 WPB
Demiste	*Solution Treated* SS316L
Baffles	-

Part	***Material Specification***
Distributor Pipes	-
Base Ring/ Gusset Plate	SA 283 GR C
Vacuum Stiffener Rings	-
Vortex Breakers	-
Saddles	-
Internal Attachments	SA516 Gr.60
External Attachments	SA 283 GR C
External Bolts	SA 193 GR B7
Nuts	SA 194 GR 2H
Gaskets External	*Spiral Wound*
Gaskets Internal	
Internal Bolts	SS 316
Nuts	SS 316

Tabel 3.3. Data Konstruksi.

Type of Heads	2:1 Ellipsodial
Type of Support	*Skirt Supported*
Type of Support	*Skirt Supported*
Platform/Ladder/Pipe Clip	*Required*
Insulation Supports	*Required*
Manway Davit	*Required*
Earthing Boss	*Required*
Lifting Lugs/Eyes/Trunions	*Required*
Name Plate	*Required*, SS 316

Tabel 3.4. Estimasi Berat.

Empty	Kg	5,700 VTC
Shipping	Kg	VTA
Operation	Kg	7,800 VTC
Field Test	Kg	12,900 VTC

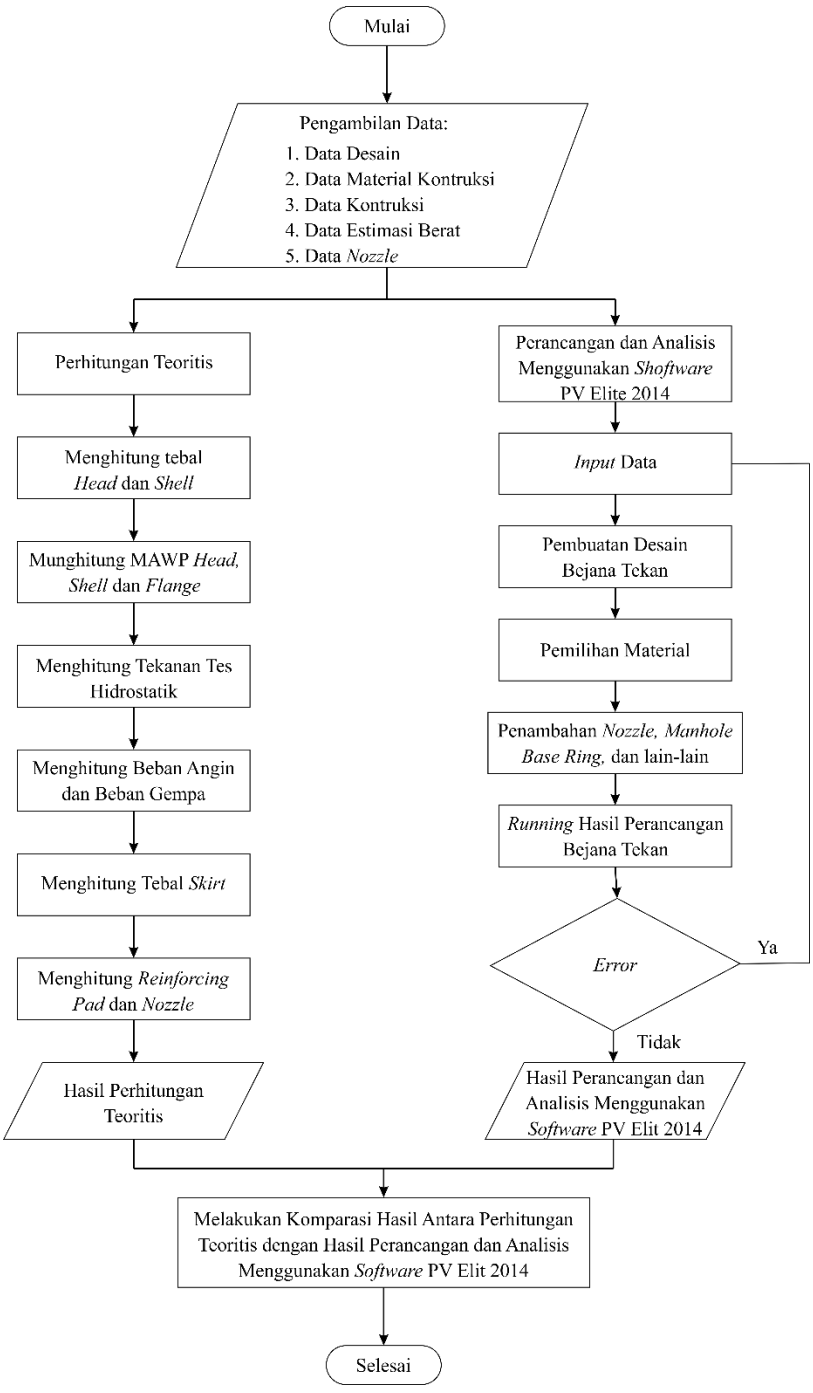
Tabel 3.5. Data *Nozzle*.

Mark No	***Size***	***Flange***		***Service***
	NPS	***Rating***	***Type/Face***	
N1	6”	300#	SR/RF	*Fluid Inlet*
N2	4”	300#	SR/RF	*Vapour Outlet*
N3	3”	300#	SR/RF	*Drain*
N4	4”	300#	WN/RF	*PSV*
N5	2”	300#	WN/RF	*Vent*
N6	2”	300#	WN/RF	*Utility Connection*
N6	2”	300#	WN/RF	*Utility Connection*
K1A/B	2”	300#	WN/RF	*Level Indicator*
K2A/B	2”	300#	WN/RF	*Level Indicator*
K3	2”	300#	WN/RF	*Pressure Indicator/Transmitter*
K4	2”	300#	WN/RF	*Pressure Indicator/Transmitter*
K5	2”	300#	WN/RF	*Temperatur Indicator/Transmitter*
M1	20”	300#	SR/RF	*Manway*
S_A	ID.610	-	-	*Skirt Access*
Sv	2”	-	-	*Skirt Vent*
Ss	6”	-	-	*Skirt Sleeve*

Lampiran 1. Data *Sheet Fuel Gas Scrubber*

3.3. Diagram Alir

Diagram alir perancangan ulang bejana tekan vertikal *fuel gas scrubber* kapasitas 6 m^3, tekanan internal 40 barg, tekanan eksternal *full vacuum* dan temperatur 120˚C, dengan menggunakan bantuan *software* PV Elite 2014 ditunjukkan oleh gambar 3.1 berikut:



Gambar 3.1. *Flowchart* Perancangan Bejana Tekan.