



Separator Sizing in Aspen Hysys



Example 1: Size a horizontal separator whose function is to separate dissolved gas from methanol. Here is the condition of the separator:

Flowrate	246700	Kg/hr
Operating Pressure	4	barg
Operating Temperature	47	C
Composition	Methanol 79.53%, Water 18.65% CO ₂ 0.7%, H ₂ 0.7%, CH ₄ 0.1%	Mol%
Fluid Package	PR	



Simulation and sizing in Aspen Hysys

Steps to be taken:

1. Add Methanol, Water, CO₂, H₂, CH₄
2. Select PR as the fluid package
3. Enter simulation environment and define the stream 4, select a separator, change its icon.
4. Define stream 5 and 6 as the outlets

Material Stream: 4

Worksheet Attachments Dynamics

Worksheet	Stream Name	4	Vapour Phase	Liquid Phase
Conditions	Vapour / Phase Fraction	0.0099	0.0099	0.9901
Properties	Temperature [C]	48.00	48.00	48.00
Composition	Pressure [kPa]	501.3	501.3	501.3
Oil & Gas Feed	Molar Flow [kgmole/h]	8424	83.20	8341
Petroleum Assay	Mass Flow [kg/h]	2.467e+005	1151	2.455e+005
K Value	Std Ideal Liq Vol Flow [m3/h]	304.3	2.942	301.3
User Variables	Molar Enthalpy [kJ/kgmole]	-2.478e+005	-1.039e+005	-2.492e+005
Notes	Molar Entropy [kJ/kgmole-C]	35.60	131.7	34.64
Cost Parameters	Heat Flow [kJ/h]	-2.087e+009	-8.641e+006	-2.079e+009
Normalized Yields	Liq Vol Flow @Std Cond [m3/h]	303.5	1965	300.1
Emissions	Fluid Package	Basis-1		
	Utility Type			

OK

Delete Define from Stream... View Assay



Material Stream: 4

Worksheet Attachments Dynamics

Worksheet

- Conditions
- Properties
- Composition
- Oil & Gas Feed
- Petroleum Assay
- K Value
- User Variables
- Notes
- Cost Parameters
- Normalized Yields
- Emissions

	Mole Fractions	Vapour Phase	Liquid Phase
Methane	0.0001	0.0083	0.0000
CO	0.0000	0.0000	0.0000
CO2	0.0071	0.2238	0.0050
Hydrogen	0.0071	0.6900	0.0003
H2O	0.1873	0.0030	0.1891
Methanol	0.7984	0.0749	0.8056

Total 1.00000

Edit... View Properties... Basis...

OK

Delete Define from Stream... View Assay

5.Simulation output

Separator: V-101

Design Reactions Rating Worksheet Dynamics

Worksheet

- Conditions
- Properties
- Composition
- PF Specs

Name	4	6	5
Vapour	0.0099	0.0000	1.0000
Temperature [C]	48.00	48.00	48.00
Pressure [kPa]	501.3	501.3	501.3
Molar Flow [kgmole/h]	8424	8341	83.20
Mass Flow [kg/h]	2.467e+005	2.455e+005	1151
Std Ideal Liq Vol Flow [m3/h]	304.3	301.3	2.942
Molar Enthalpy [kJ/kgmole]	-2.478e+005	-2.492e+005	-1.039e+005
Molar Entropy [kJ/kgmole-C]	35.60	34.64	131.7
Heat Flow [kJ/h]	-2.087e+009	-2.079e+009	-8.641e+006

Delete OK Ignored

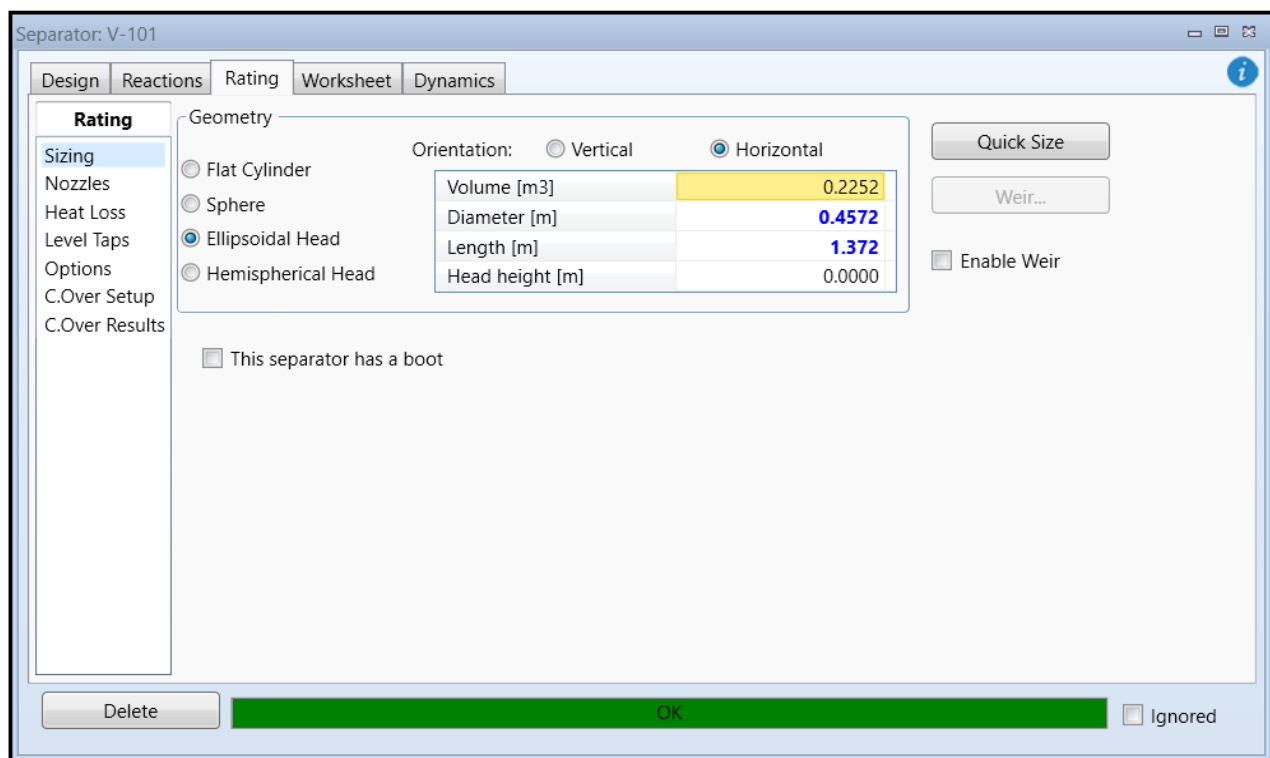


6. Now click on the separator, go to rating tab, and click on quick sizing. Also select horizontal orientation and ellipsoidal head.

Note:

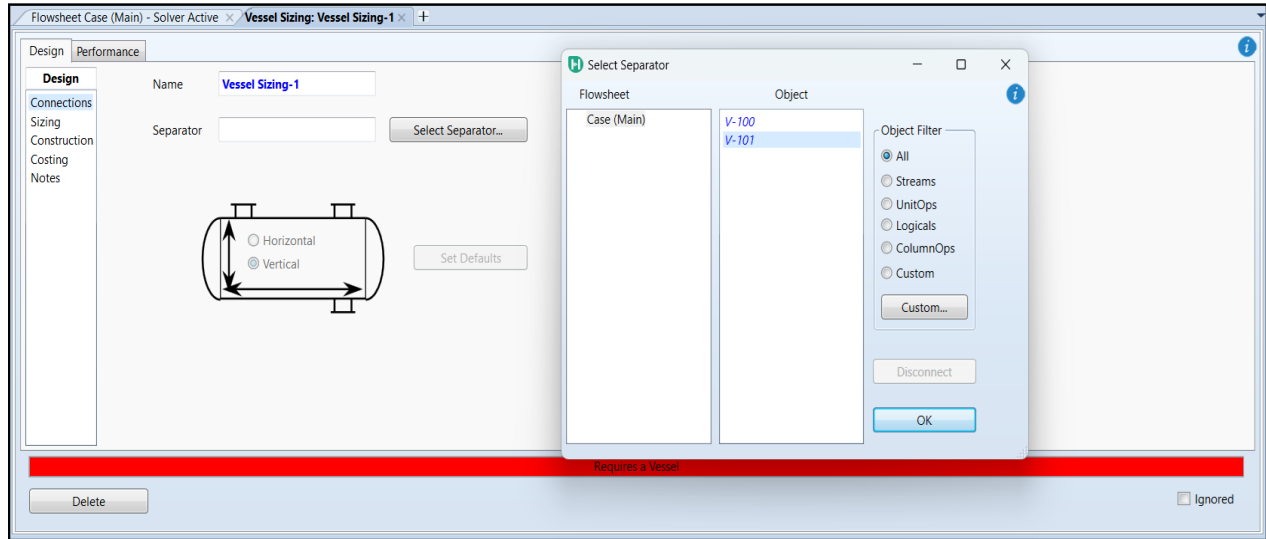
Simple rule in separator design:

1. If gas flowrate to liquid flowrate is high or otherwise it is gas dominant, then we use vertical separator.
2. If liquid flowrate to gas flowrate is high or otherwise it is liquid dominant, then we use horizontal separator.

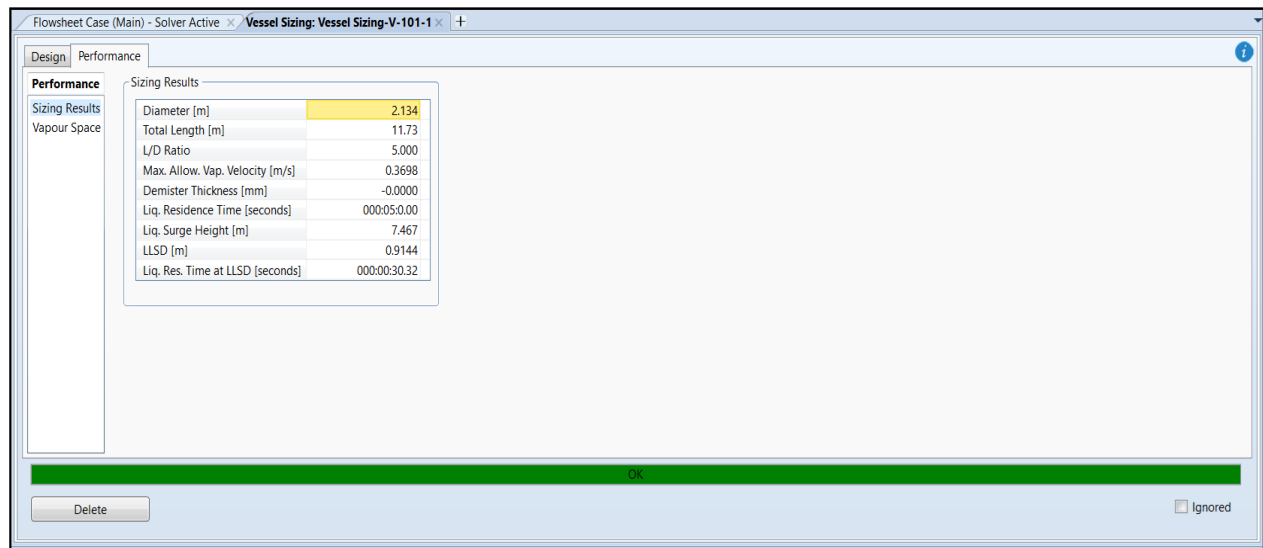




7. Under Home, click on Equipment Design and select vessel sizing.



8. The moment you click OK, the separator is sized. To see the result, go to Performance tab.



Based on the result, the diameter is 2.13 m and the length is 11.73 m.



9. To see the assumption taken by Aspen Hysys, go to Design/Sizing tab.

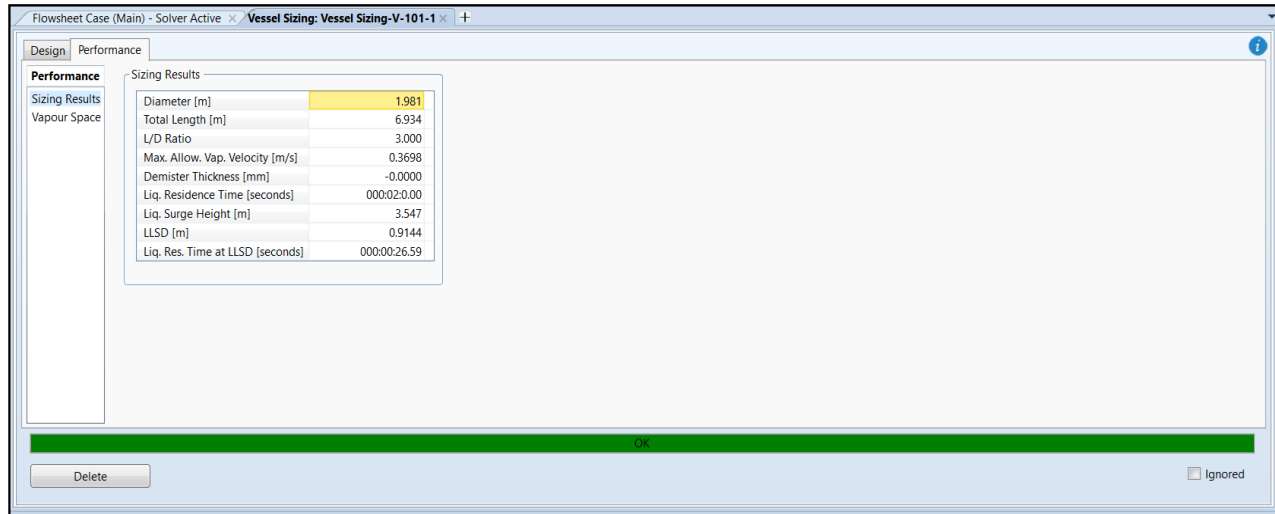
Available Specifications		Active Specifications	
Max. Vap. Velocity		L/D Ratio	5.000
Diameter		Liq. Res. Time	000:05:0.00 sec
Demister Thickness		Demister to Top	0.3048 m
Liq. Surge Height			
L LSD			
Nozz. To Demister			
Tot. Length - Height			

Based on experience, the L/D ratio is high and the separator is oversized. Let's reduce the L/D to 3 which is more typical. Also, based on the literature the residence time should be changed to 2 minutes.

Available Specifications		Active Specifications	
Max. Vap. Velocity		L/D Ratio	3.000
Diameter		Liq. Res. Time	000:02:0.00 sec
Demister Thickness		Demister to Top	0.3048 m
Liq. Surge Height			
L LSD			
Nozz. To Demister			
Tot. Length - Height			



10. Let's see the optimized results.



11. Here is the comparison between Aspen Hysys, excel-sheet and licensor results.

Parameter	Svercheck	Aspen Hysys	Licensor
D	2215 mm	1981 mm	2125 mm
L	6300 mm	6934 mm	6450 mm