Separator Sizing in Aspen Hysys

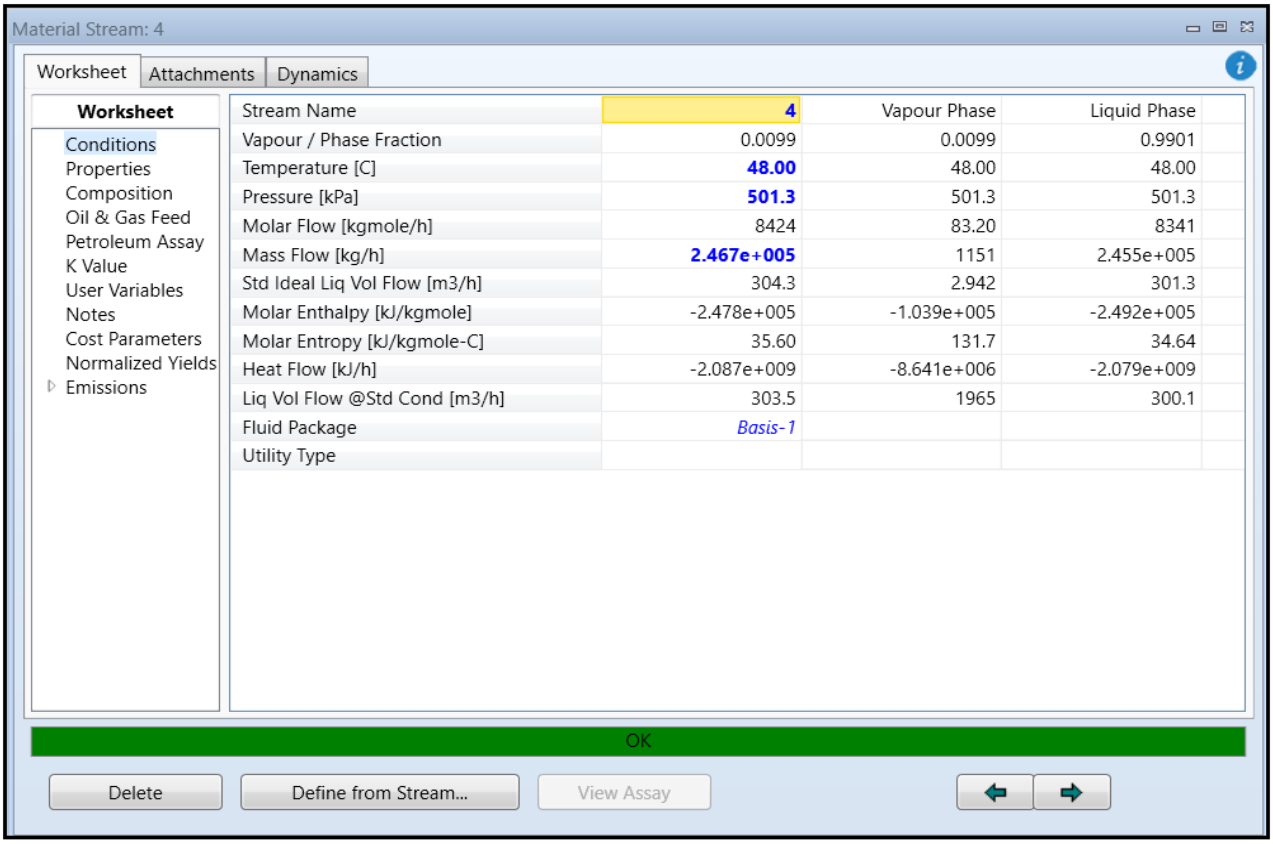
Example 1: Size a horizontal separator whose function is to separate dissolved gas from methanol. Here is the condition of the separator:

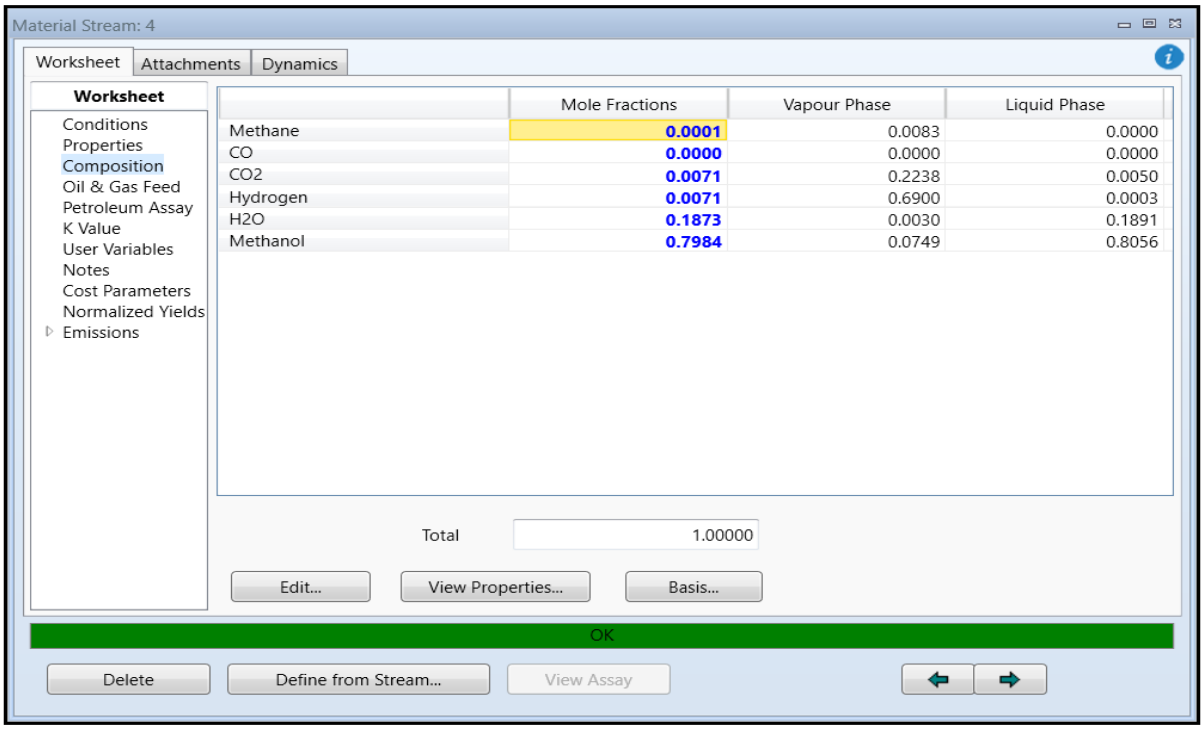
Flowrate	246700	Kg/hr
Operating Pressure	4	barg
Operating Temperature	47	C
Composition	Methanol 79.53%, Water 18.65% CO_2 0.7%, H_2 0.7%, CH_4 0.1%	Mol%
Fluid Package	PR	

Simulation and sizing in Aspen Hysys

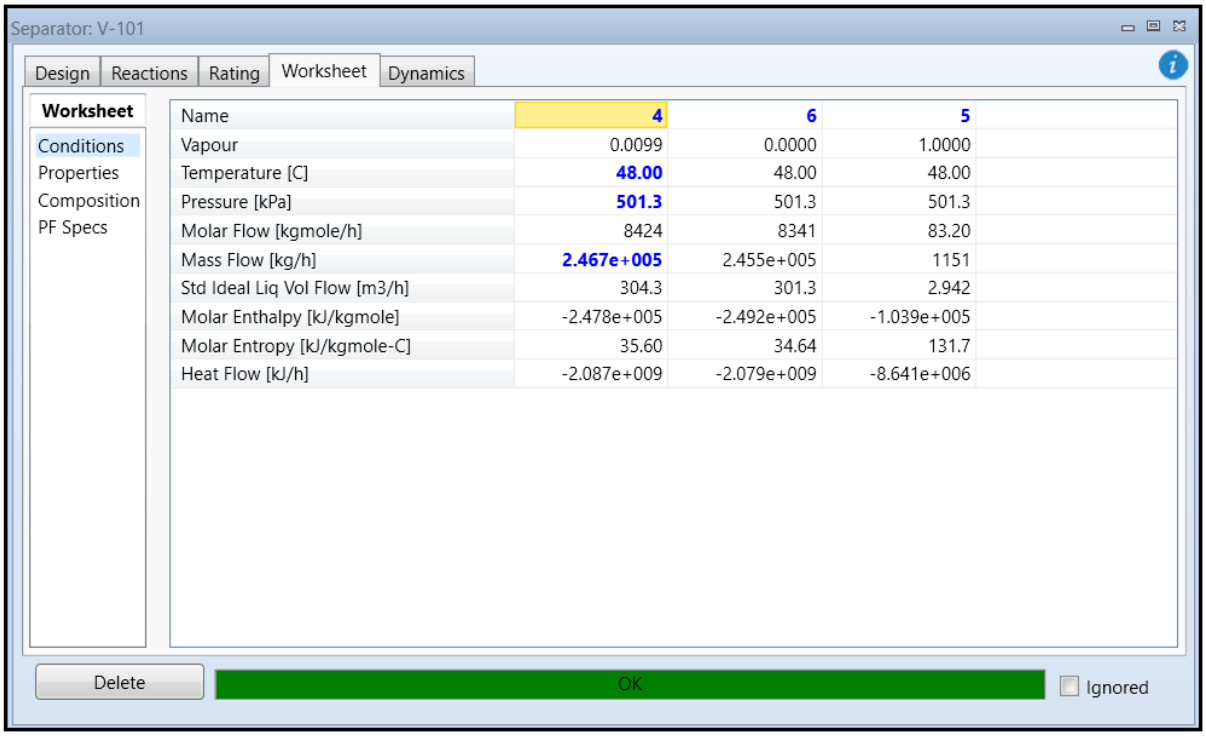
Steps to be taken:

1.Add Methanol, Water, CO_2, H_2, CH_4
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





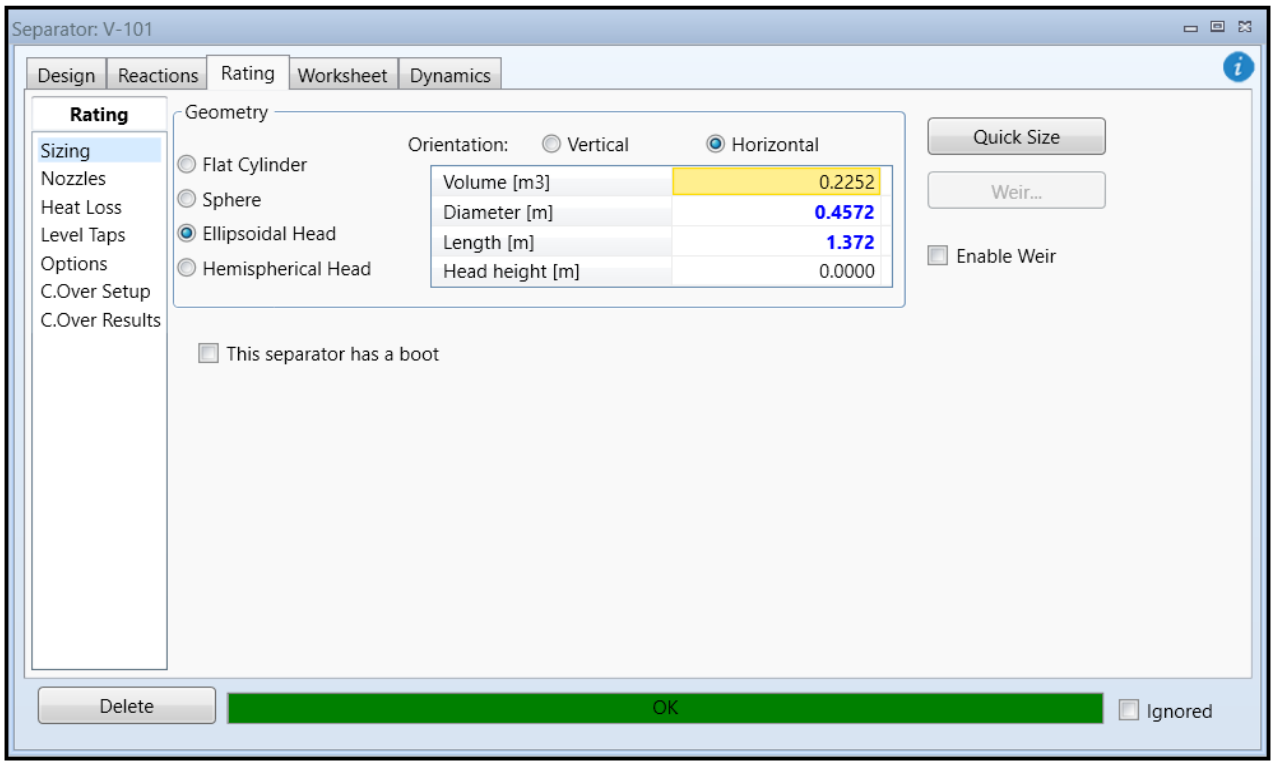
5.Simulation output



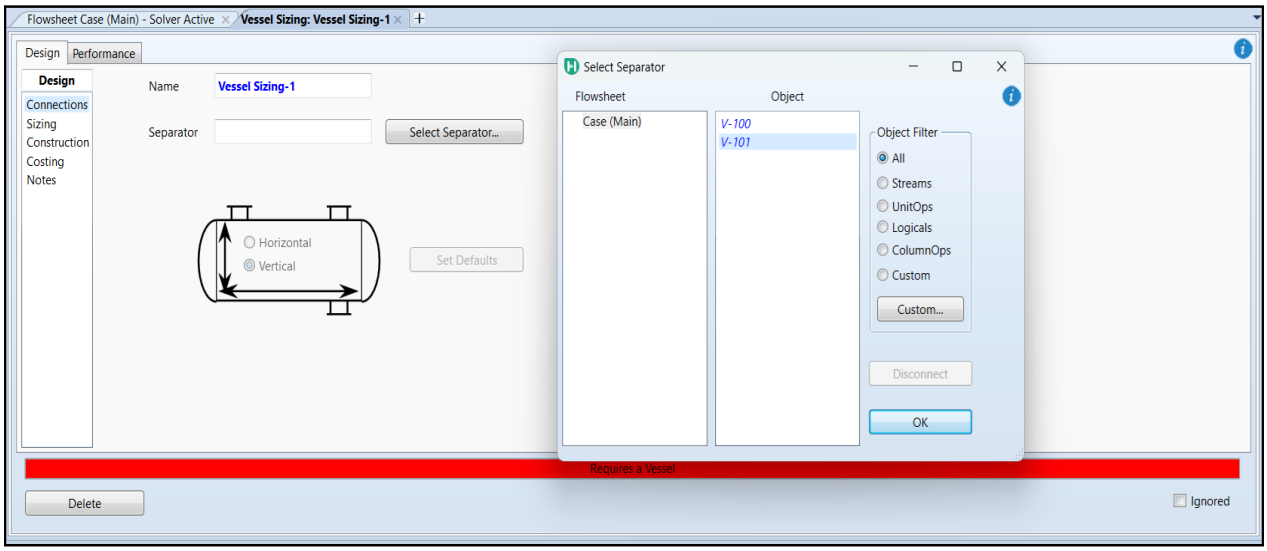
6.Now click on the separator, go to rating tab, and click on quick sizing. Also select horizontal orientation and ellipsoidal head.

Note:

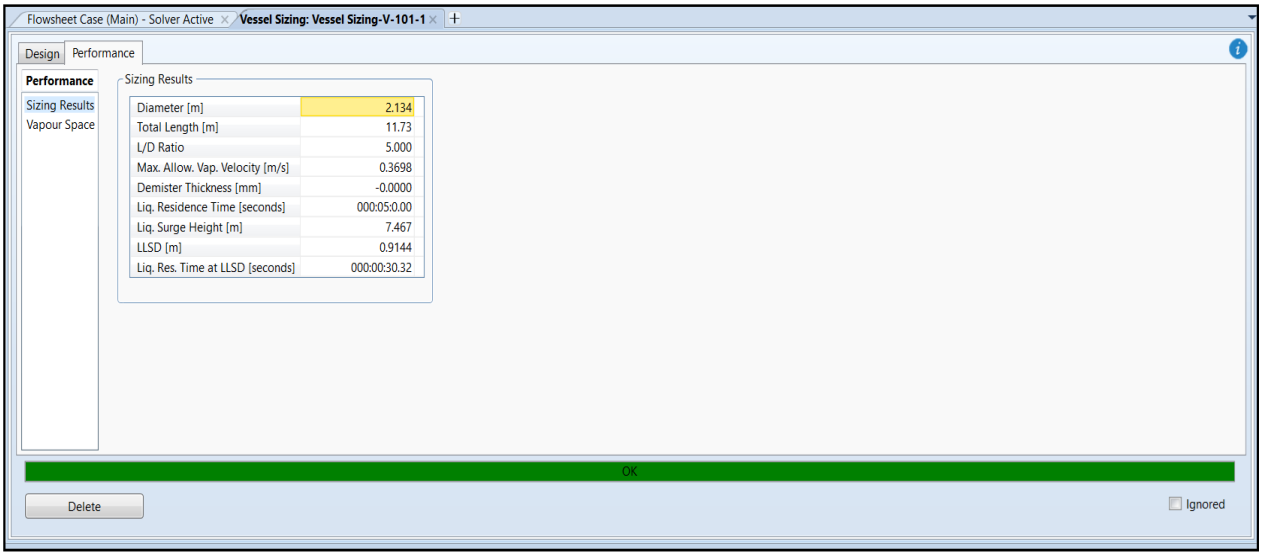
Simple rule in separator design:
1.If gas flowrate to liquid flowrate is high or otherwise it is gas dominant, then we use vertical separator.
2.If liquid flowrate to gas flowrate is high or otherwise it is liquid dominant, then we use horizontal separator.



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

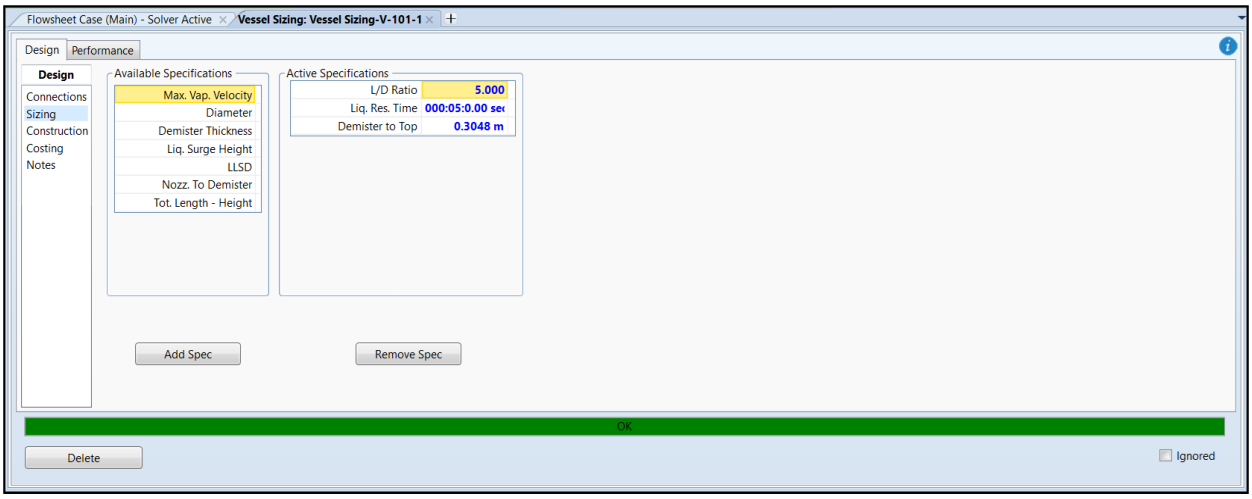


8.The moment you click OK, the separator is sized. To see the result, go to Performance tab.

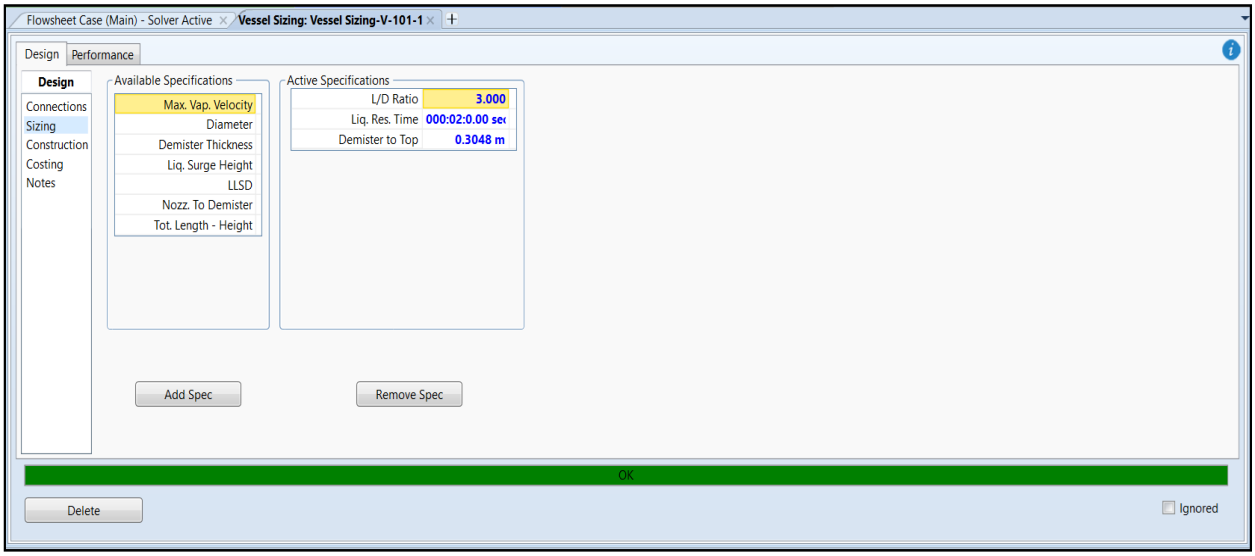


Based on the result, the diameter is 2.13 m and the length is 11.73 m.

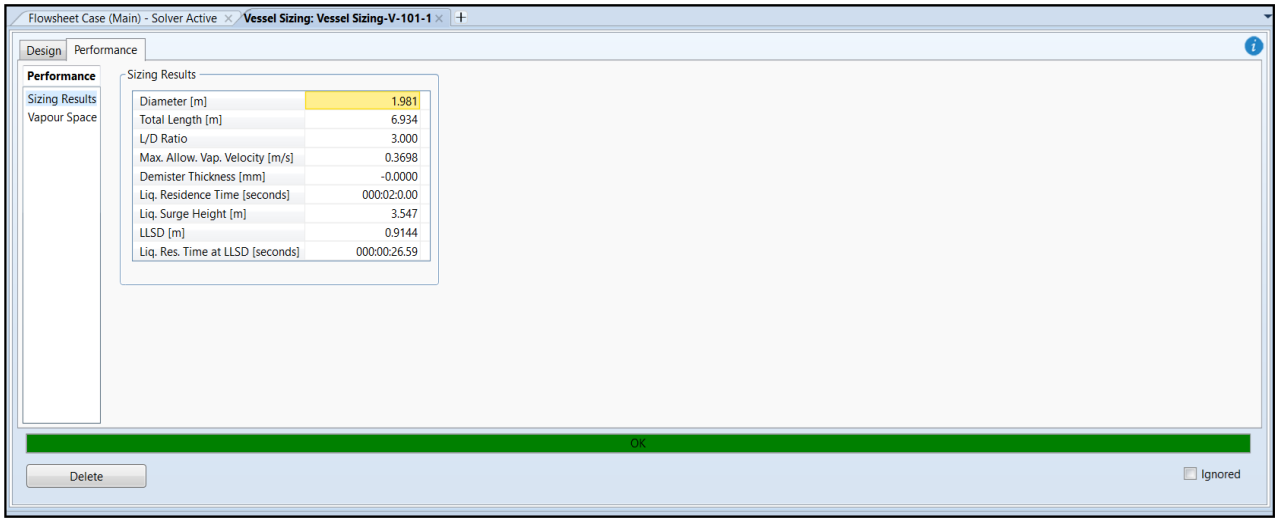
9.To see the assumption taken by Aspen Hysys, go to Design/Sizing tab.



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.



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