To Recover LPG by Divided Wall Column

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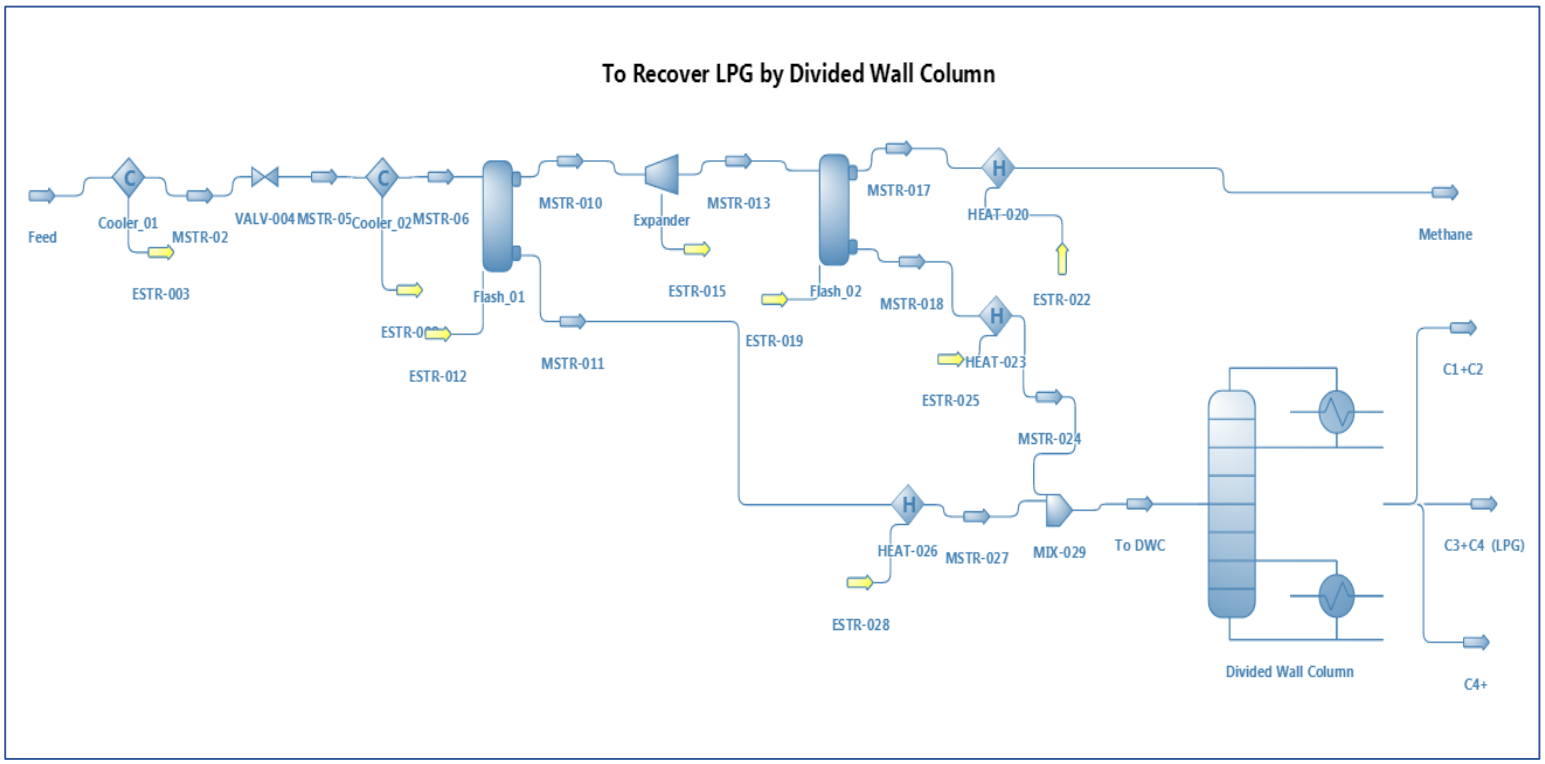
Background & Description:

The LPG market has seen a steady increase in prices due to increasing demand for LPG worldwide, While it is possible to recover LPG in natural gas processing operations, this raises the capital and operating costs of the plant considerably. For this reason, it is important to reduce costs during these processes. The divided wall column (DWC), is one of the most promising technologies to minimize energy consumption and reduce operating costs. This flowsheet studies the addition of an LPG recovery plant to an existing natural-gas plant. A DWC requires much less energy, capital investment, and plant space than conventional columns in series or parallel configurations. In fact, DWCs can have 20–30% lower capital cost requirements than conventional tower designs.

Natural gas contains heavier hydrocarbon components collectively known as NGL. These components include ethane, propane, butane, pentane and fractions of heavier Hydrocarbons, and they must be removed to control the natural gas dew point. They can also be sold as products or as feed for different industries. Separated NGL is sent to the LPG recovery plant to separate LPG, which contains propane (C3), isobutane (i-C4) and normal butane (n-C4) from stabilized condensate (C5+)

As, you can see LNG in recovered from main feed from turbo expander 1 & 2, then it is send to DWC to recover LPG. The top product of DWC contains Methane and Ethane, side stream contains Propane and Butane, and the bottom product contains heavier hydrocarbon (LNG).



Results:

Master Property Table							
Object	**To DWC**	**Methane**	**Feed**	**C4+**	**C3+C4(LPG)**	**C1+C2**	**Unit**
Temperature	264.018	291.15	303.15	277.16	241.574	190.132	K
Pressure	3.58E+06	3.58E+06	8.3E+06	101325	101325	101325	Pa
Mass Flow	6.21189	65.9114	72.1233	3.55594	1.4	1.25595	kg/s
Molar Flow	121.598	4001.49	4123.09	50.1841	31.0073	40.4067	mol/s
Molar Fra. (Mix) / Methane	0.0159516	0.974268	0.946005	9.94916E-21	3.31479E-14	0.048004	
Molar Fra. (Mix) / Ethane	0.276207	0.0204545	0.0279972	4.88363E-20	3.96932E-05	0.831175	
Molar Fra. (Mix) / Propane	0.264833	0.00204901	0.00979902	0.0393496	0.931507	0.0332834	
Molar Fra. (Mix) / Isobutane	0.113892	0.00014503	0.00349965	0.25	0.0420223	1.79682E-07	
Molar Fra. (Mix) / N-butane	0.0932975	4.96553E-05	0.00279972	0.213511	0.0203166	1.73846E-09	
Molar Fra. (Mix) / Isopentane	0.0541769	2.11612E-06	0.00159984	0.128967	0.00373172	1.71089E-14	
Molar Fra. (Mix) / N-pentane	0.0372803	4.32069E-07	0.00109989	0.0892412	0.001765	2.54353E-16	
Molar Fra. (Mix) / N-hexane	0.0542462	1.03544E-08	0.00159984	0.13112	0.000518611	4.41576E-23	
Molar Fra. (Mix) / Benzene	0.00339041	1.0237E-10	9.999E-05	0.0082033	1.91002E-05	0	
Molar Fra. (Mix) / Toluene	0.00339041	6.05378E-12	9.999E-05	0.00821341	2.73849E-06	0	
Molar Fra. (Mix) / N-heptane	0.0372945	9.98593E-11	0.00109989	0.0903221	7.12684E-05	0	
Molar Fra. (Mix) / N-octane	0.0169521	7.8995E-13	0.00049995	0.0410721	5.50221E-06	0	

Table 1: Streamwise Results for the Recovery of LPG by DWC Flowsheet

References:

Chemsep Database: http://www.chemsep.com/downloads/index.html

VLE Data : http://vle-calc.com/