



<b>PROJECT :</b>			<b>DATE :</b>	
<b>PROJ. NO.:</b>			<b>BY :</b>	S.R.M
<b>CLIENT :</b>			<b>REV :</b>	
<b>UNIT :</b>			<b>DOC NO.:</b>	

### Nitrogen Requirement for Vacuum Purging

Input Data		
Initial Oxygen Concentration	mol frac	0.21
Final Oxygen Concentration	mol frac	0.000012
Vacuum Pressure	bara	0.1
Pressurization Pressure	bara	1.2
System Volume	m3	3
Nitrogen Supply Temperature	°C	40

Results		
No. of Required Cycle	----	4.0
Nitrogen Volume	m3	11.00
Nitrogen Mass	kg	14.38
Final Oxygen Concentration	ppm	12.00
<b>Nitrogen Consumption</b>	<b>Nm3</b>	<b>11.51</b>

#### Notes


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### Nitrogen Requirement for Pressure Purging

<b>Input Data</b>		
Initial Oxygen Concentration	mol frac	0.21
Final Oxygen Concentration	mol frac	0.000012
Depressurization Pressure	bara	1.2
Pressurization Pressure	bara	4.0
System Volume	m3	3.0
Nitrogen Supply Temperature	°C	40

<b>Results</b>		
Oxygen Conc. @ 1st filling	mol frac	0.06
No. of Required Cycle	----	8.0
Nitrogen Volume	m3	16.80
Nitrogen Mass	kg	73.22
Final Oxygen Concentration	ppm	12.00
<b>Nitrogen Consumption</b>	<b>Nm3</b>	<b>58.58</b>

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### Nitrogen Requirement for Continuous Purging

Input Data		
Initial Oxygen Concentration	mol frac	0.21
Final Oxygen Concentration	mol frac	0.000012
System Volume	m3	3
Nitrogen Supply Temperature	°C	40
Mixing Efficiency	%	25

Results		
Nitrogen Volume	m3	117.24
Nitrogen Mass	kg	140.52
Final Oxygen Concentration	ppm	12.00
<b>Nitrogen Consumption</b>	<b>Nm3</b>	<b>112.42</b>

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### Nitrogen Requirement for Pressure Purging (Detailed Calculation)

Input Data		
Initial Oxygen Concentration	mol frac	21
Final Oxygen Concentration	ppm v	12
Pressurization Pressure	bara	4.0
Depressurization Pressure	bara	1.2
System Volume	m3	3
Ambient Temperature	° C	40
Nitrogen Temperature	° C	40

Calculation Results		
Ambient Oxygen Density	kg/m3	1.2459
Ambient Nitrogen Density	kg/m3	1.0901
Max Press. Oxygen Density	kg/m3	4.9835
Max Press. Nitrogen Density	kg/m3	4.3606
Initial Oxygen Content	kg	0.8
Initial Nitrogen Content	kg	3.0

Purging Cycle	Pressuring						Average MW
	Initial Press	Final Press	Nitrogen Added	Total Mass	Oxygen		
	bara	bara	kg	kg	mass %	ppmw	
1	0	4.0	9.34	13.08	6.0000	60000	28.212
2	1.2	4.0	9.13	13.08	1.8136	18136	28.064
3	1.2	4.0	9.15	13.08	0.5453	5453	28.019
4	1.2	4.0	9.15	13.08	0.1637	1637	28.006
5	1.2	4.0	9.16	13.08	0.0491	491	28.002
6	1.2	4.0	9.16	13.08	0.0147	147	28.001
7	1.2	4.0	9.16	13.08	0.0044	44	28.000
8	1.2	4.0	9.16	13.08	0.0013	13	28.000
<b>Nitrogen Consumption</b>		<b>Kg</b>	<b>73.40</b>				

Final Press	Density	Mass		Oxygen Content	
		Oxygen	Nitrogen	mol%	ppm v
		kg	kg		
1.2	1.3181	0.2372	3.7169	5.2897	52897
1.2	1.3111	0.0713	3.8621	1.5905	15905
1.2	1.3091	0.0214	3.9058	0.4775	4775
1.2	1.3084	0.0064	3.9189	0.1433	1433
1.2	1.3082	0.0019	3.9228	0.0430	430
1.2	1.3082	0.0006	3.9240	0.0129	129
1.2	1.3082	0.0002	3.9244	0.0039	39
1.2	1.3082	0.0001	3.9245	0.0012	11.6