PROJECT :			**DATE :**	
PROJ. NO.:			**BY :**	
CLIENT :			**REV :**	
UNIT :			**DOC NO.:**	

Draining Time Calculation (Vertical Vessel)

Line No. :		**Section 1**	
Differential Pressure	bar	0.00	
Differential Static Head	mm	12000	
Equipment Diameter	mm	3900	
Initial Liquid Level Height	mm	10000	
Final Liquid Level Height	mm	0	
Density @ Flowing Condition	kg/m3	1000.0	
Viscosity @ Flowing Condition	Cp	0.6	**Section 2**
Equivalent Pipe Length	m	50	400
Nominal Pipe Size	inch	3	6
Schedule No.	----	80	80
Line Roughness (DEF.)	inch	0.0018	0.0018

Calculation Results		**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**
Vessel Liquid Level	mm	10000	10000	9000	9000	8000	8000	7000	7000	6000	6000	5000	5000	4000	4000	3000	3000	2000	2000	1000	1000
Reynold 's No.		669254	336892	657182	330815	640941	322640	624292	314259	607203	305657	589635	296814	568229	286038	549595	276658	533619	268615	513639	258558
Friction Factor	----	0.0182	0.0178	0.0182	0.0169	0.0182	0.0169	0.0182	0.0170	0.0182	0.0170	0.0183	0.0171	0.0183	0.0181	0.0183	0.0182	0.0183	0.0172	0.0184	0.0173
Velocity	m/s	5.451	1.381	5.353	1.356	5.221	1.323	5.085	1.289	4.946	1.253	4.803	1.217	4.629	1.173	4.477	1.134	4.347	1.101	4.184	1.060
Volumetric Flow Rate	m3/hr	83.63	83.63	82.12	82.12	80.09	80.09	78.01	78.01	75.88	75.88	73.68	73.68	71.01	71.01	68.68	68.68	66.68	66.68	64.18	64.18
Drainage Volume	m3	11.94		11.94		11.94		11.94		11.94		11.94		11.94		11.94		11.94		11.94	
Required Time for Draining	**min**	**8.57**		**8.72**		**8.94**		**9.18**		**9.44**		**9.72**		**10.09**		**10.43**		**10.74**		**11.16**	
Total Drain Volume	**m3**	**119.40**																			
Total Spent Time for Draining	**hr**	**1.62**																			

Notes

PROJECT :			**DATE :**	
PROJ. NO.:			**BY :**	
CLIENT :			**REV :**	
UNIT :			**DOC NO.:**	

Draining Time Calculation (Horizontal Vessel)

Line No. :		**Section 1**	
Differential Pressure	bar	0.00	
Differential Static Head	mm	4000	
Equipment Diameter	mm	2500	
Equipment Length	mm	5000	
Initial Liquid Level Height	mm	2500	
Final Liquid Level Height	mm	0	
Density @ Flowing Condition	kg/m3	1000.0	
Viscosity @ Flowing Condition	Cp	0.60	**Section 2**
Equivalent Pipe Length	m	250	450
Nominal Pipe Size	inch	3	6
Schedule No.	----	40	40
Line Roughness (DEF.)	inch	0.0018	0.0018

Calculation Results		**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**	**Section 1**	**Section 2**
Vessel Liquid Level	mm	2500	2500	2250	2250	2000	2000	1750	1750	1500	1500	1250	1250	1000	1000	750	750	500	500	250	250
Reynold 's No.		179699	90901	174747	88397	171069	86536	167315	84637	163482	82698	159563	80715	155552	78686	151442	76607	147225	74474	142893	72283
Friction Factor	----	0.0199	0.0202	0.0199	0.0203	0.0199	0.0203	0.0199	0.0203	0.0200	0.0204	0.0200	0.0204	0.0200	0.0205	0.0200	0.0205	0.0201	0.0206	0.0201	0.0206
Velocity	m/s	1.384	0.354	1.345	0.344	1.317	0.337	1.288	0.330	1.259	0.322	1.229	0.314	1.198	0.306	1.166	0.298	1.134	0.290	1.100	0.282
Volumetric Flow Rate	m3/hr	23.76	23.76	23.10	23.10	22.62	22.62	22.12	22.12	21.61	21.61	21.09	21.09	20.56	20.56	20.02	20.02	19.46	19.46	18.89	18.89
Drainage Volume	m3	1.44		2.55		3.16		3.53		3.71		3.71		3.53		3.15		2.52		1.36	
Required Time for Draining	**min**	**3.63**		**6.62**		**8.39**		**9.59**		**10.30**		**10.55**		**10.29**		**9.44**		**7.76**		**4.32**	
Total Drain Volume	**m3**	**28.66**																			
Total Spent Time for Draining	**hr**	**1.35**																			

Notes