

VALVE TRAIN PRESSURE DROP

BY FREEZE-PRO, INC.

Date: May 16, 2002

TO:
FROM:
REF:

REV021402

Design Conditions

Refrigerant	Ammonia	
Liquid Supply Temperature	95	F
Operating Temperature	20	F
Capacity	25	Tons
Recirculation Rate	3.0	(X:1)

Total Mass Flow Rate	10.7	lb/min
Saturated Mass Flow Rate	9.0	lb/min
Inlet Vapor Quality, x	0.15	-
Recirc mass flow rate	27.1	lb/min

RECIRCULATED COLD LIQUID FLOW 27.1 lb/min

Pres. In (Psig)	33.5	Temp. in (Deg F)	20		
Valve	SIZE	Cv	ΔP	ΔT	
R/S Globe W	3/4	14	0.1	0.1	
S-8	1/2	2.7	2.2	2.2	
CK-4	3/4	7.1	0.3	0.3	
R/S Globe W	3/4	14	0.1	0.1	
Total $\Delta P / \Delta T$			2.7	2.7	
Pres. Out (Psig)	30.8	Temp. out (Deg F)	17.4		

HOT LIQUID FLOW 10.7 lb/min

Pres. In (Psig)	181.2	Temp. in (Deg F)	95		
Valve	SIZE	Cv	ΔP	ΔT	
R/S Globe SCR	1/2	7.2	0.1	0.0	
S-8	1/2	2.7	0.4	0.1	
R/S Globe SCR	1/2	7.2	0.1	0.0	
Total $\Delta P / \Delta T$			0.5	0.2	
Pres. Out (Psig)	180.7	Temp. out (Deg F)	94.7		

COLD VAPOR FLOW, gas only 10.7 lb/min

Pres. In (Psig)	33.5	Temp. in (Deg F)	20		
Valve	SIZE	Cv	ΔP	ΔT	
Han. Angle W	2	80	0.1	0.1	
HS-4A / W	2	47	0.3	0.3	
Han. Globe W	2	67	0.1	0.1	
Total $\Delta P / \Delta T$			0.5	0.5	
Pres. Out (Psig)	33.0	Temp. out (Deg F)	19.6		

HOT VAPOR FLOW Actual Vapor Temp., °F 180

Pres. In (Psig)	181.2	Temp. in (°F)	180		
Valve	SIZE	Cv	ΔP	ΔT	
R/S Globe W	1	22	0.4	0.1	
CK-1	3/4	9.5	2.0	0.6	
R/S Globe SCR	1	22	0.4	0.1	
Total $\Delta P / \Delta T$			2.7	0.9	
Pres. Out (Psig)	178.5	Temp. out (Deg F)	94.0		

RECIRC COLD VAPOR FLOW, two phase 27.1 lb/min

Pres. In (Psig)	33.5	Temp. in (Deg F)	20		
Valve	SIZE	Cv	ΔP	ΔT	
Herl Angle	2	63.7	0.2	0.2	
CK5	1 1/2	37	0.7	0.7	
Herl Globe	2	41.4	0.6	0.5	
Total $\Delta P / \Delta T$			1.5	1.4	
Pres. Out (Psig)	32.0	Temp. out (Deg F)	18.6		

Recirculated pressure drop calculated with 20% allowance for liquid volume, valid for 2:1 to 5:1, per R/S and Hansen