

ENGINEERING SERVICES DEPARTMENT					
METHANE PRESSURE REGULATOR SPECIFICATION SHEET PCV83344B					
Project	PTFE Filter Destruction Project		Unit Tag Number	PCV83344B	
Datasheet Document No.	ENS-FDP-SPE-24035		Revision	2	
Description	Pressure regulator on methane gas supply line to the Depolymerisation Reactor R82014 in the PTFE Filter Destruction Facility.				
Plant Location	Necsa, Pelindaba, North-West Province.				
Equipment Location	PTFE Filter Destruction Facility - Outside Laboratory 131, Building V-H2.				
Safety Classification	Non-classified(N) and SC-3(C).				
Quality Classification	Non-classified(N) and QC-3(C).				
PROCESS CONDITIONS	UNITS	MINIMUM	NORMAL	MAXIMUM	ACCURACY
Measurement Range	kPa(g)	450	20000 <sup>Note3</sup>	23000	Medium
Controlled Range	kPa(g)	-	100	-	Medium
GENERAL	MEASUREMENT POINT			CONTROL POINT	
Process Fluid	Methane			Same as for measurement point	
Fluid State	Gas				
P&ID Number	ENS-FDP-PID-24005 [6]				
Line Number	15-833-MGVP-063				
Design Temperature [°C]	93				
Design Pressure [kPa(g)]	24820				
SIL Rating	-				
MEASUREMENT SPECIFICATION					
FLUID PROPERTIES	UNITS	MINIMUM	NORMAL	MAXIMUM	Reference
Molecular Weight	kg/kmol		16.00		Table 2-164, page 2-136 [1]
Operating Temperature	°C	-2.6	25	40	[2]
Operating Pressure (upstream)	kPa(g)	450	20000 <sup>Note3</sup>	23000	Minimum (Section 4.2.3 [3]). Maximum [4]
Density (@ min., normal, and max. for both operating pressure and temperature.)	kg/m <sup>3</sup>	3.90	162.48	228.67	Note 1
Viscosity (@ min., normal, and max. for operating temperature.)	cP	0.0098	0.011	0.012	Table 2-364, page 2-321 [1]
Compressibility Factor	Z	0.85	0.80	0.72	Fig A.9, page 278 [8]
Specific Heat Ratio (Cp/Cv)	-	-	1.32	-	Table 4.3, page 165 [7]
Thermal Conductivity	W/m.K	0.0271	0.0315	0.035	Note 2
Required Measured Range (upstream)	kPa(g)	0	-	25000	[4]
Required Measured Range (downstream)	kPa(g)	0	-	25000	[4]
CONTROL INFORMATION					
VALVE SIZING INFO. & SPECIFICATION	UNITS	MINIMUM	NORMAL	MAXIMUM	
Valve Inlet Pressure	kPa(g)	450	20000 <sup>Note3</sup>	23000	Minimum (Section 4.2.3 [3]). Maximum [4]
Valve Outlet Pressure = Regulator Setpoint Pressure	kPa(g)	-	100	-	[6]
Maximum Differential Pressure Allowed Across Control Valve	kPa	-	-	22900	Maximum [4]
Critical Flow	-	-	No	-	-
Mass Flowrate	kg/h	0	0.64	10	[4]
P <sub>c</sub> - Critical Pressure	kPa(a)	-	4590	-	Table 2-164, page 2-136 [1]
Fail Action	-	N/A			-
Seat Leakage Class	-	Supplier to advise			-
Maximum Shut - Off Differential Pressure	kPa(g)	23000			Maximum [4]
VALVE MECHANICAL PROPERTIES					
Materials of Construction					
Body	Bellows	Spring		Seat	Disk and STEM
316 SS	Supplier to advise	NA		Die-formed flexible graphite with anti-extrusion rings	316 SS
Bonnet/Cap		Type		Wetted parts	Non-wetted parts
316 SS		Two-stage		SS	SS
Process Connections					
	Flange Spec.		Flange Rating		Pipe Size (NB)
Inlet	SS, ASTM A182-F316/316L, ASME B16.5 (Supplier shall advise of alternatives)		Class 1500		15
Outlet	SS, ASTM A182-F316/316L, ASME B16.5 (Supplier shall advise of alternatives)		Class 1500		15
Valve rating	Class 1500				
ALARM / SWITCH		FALLING		RISING	UNITS or %
		Low Low	Low	High	High High
LOCAL ALARM		-	-	-	-
REMOTE ALARM		-	-	-	-
SWITCH ONLY		-	-	-	-
DISPLAY		LOCAL		REMOTE	RECORDING
		Yes		-	-
REFERENCE DRAWINGS / DOCUMENTS					
[1] Perry, R. H., & Green, D. W. (1997). Perry's Chemical Engineers Handbook 7th Edition. McGraw-Hill Company.					
[2] SHEQ-2011-REP-01017, 2011 : Pelindaba Site, Site Description Rev 2, NECSA.					
[3] ENS-FDP-CLC-24014, Mass Balance Calculation for the PTFE Filter Destruction System					
[4] ENS-FDP-LST-24003, PTFE Filter Destruction Plant Instrumentation List					
[5] Sinnott, R. K. (2005). Coulson & Richardson's CHEMICAL ENGINEERING, Chemical Engineering Design, Volume 6, 4th Edition.					
[6] ENS-FDP-PID-24004, PTFE Filter Destruction Project - P&ID Diagram: Gas Supply System 833					
[7] Joseph F. Louvar, Daniel A Crowl, 2011: Chemical Process Safety Fundamentals with Applications.					
[8] Rase, H. F. (1963). Piping Design for Process Plant. New York: John Wiley & Sons, Inc.					

NOTES			
1) Minimum density was calculated from the highest temperature and lowest pressure, normal density at normal conditions, and maximum density at the lowest temperature and highest pressure using the compressibility chart Z values read from Fig A.9 on page 278 [8].			
2) Thermal conductivity was calculated using Equation 8.13 in Section 8.8.3 on page 321 [5]. The specific heat capacity used in the equation was calculated from Equation in Appendix C, Page 939 of [5] at minimum, normal, and maximum temperatures.			
3) The supplier should advise whether a one or two-stage pressure reduction is required for the cylinder supply pressure of 20000 kPa(g).			
	Name	Signature	Date
Compiled by	N. Mokoena (Process Engineer)		
Process	M. Mashaya (Process Engineer)		
Process	M. Correia (Senior Process Engineer)		
Mechanical	M. Msane (Mechanical Engineer)		
Mechanical	S. Mngoma (Chief Mechanical Engineer)		
Instrumentation	G. Manuel (Chief C&I Engineer )		
Electrical	W. Van Den Berg (Chief Electrical Engineer)		
Approved by	K. Moodley (Chief Process Engineer)		