


ENGINEERING SERVICES DEPARTMENT						 <small>South African Nuclear Energy Corporation SOC. LTD.</small>	
INSTRUMENT LOOP SPECIFICATION SHEET							
Project	PTFE Filter Destruction Project			Unit Tag Number	PCV83346B		
Datasheet Document No.	ENS-FDP-SPE-24037			Revision	1		
Description	Pressure regulator on the LPG supply line to the Plasma Reactor R82018 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-2(C).						
Quality Classification	Non-classified(N) and QC-2(C).						
PROCESS CONDITIONS	UNITS	MINIMUM	NORMAL	MAXIMUM	ACCURACY		
Measurement Range	kPa(g)	450	500	800	Medium		
Controlled Range	kPa(g)	-	100	-	Medium		
GENERAL	MEASUREMENT POINT			CONTROL POINT			
Process Fluid	LPG (Propane)			Same as for measurement point			
Fluid State	Gas						
P&ID Number	ENS-FDP-PID-24005 [6]						
Line Number	15-833-PGVP-065						
Design Temperature [°C]	93						
Design Pressure [kPa(g)]	21340						
SIL Rating	-						
MEASUREMENT SPECIFICATION							
FLUID PROPERTIES	UNITS	MINIMUM	NORMAL	MAXIMUM	Reference		
Molecular Weight	kg/kmol		44		Table 2-164, page 2-136 [1]		
Operating Temperature	°C	-2.6	25	40	[2]		
Operating Pressure (upstream)	kPa(g)	450	500	800	Minimum (Section 4.2.3 [3]). Maximum [4]		
Density (@ min., normal, and max. for both operating pressure and temperature.)	kg/m³	9.11	10.46	17.41	Note 1		
Viscosity (@ min., normal, and max. for operating temperature.)	cP	0.0078	0.0084	0.0085	Table 2-364, page 2-321 [1]		
Compressibility Factor	Z	1	1	1	Fig A.9, page 278 [8]		
Specific Heat Ratio (Cp/Cv)	-	-	1.15	-	Table 4.3, page 165 [7]		
Thermal Conductivity	W/m.K	0.0138	0.0160	0.0169	Note 2		
Required Measured Range (upstream)	kPa(g)	0	-	1000	[4]		
Required Measured Range (downstream)	kPa(g)	0	-	1000	[4]		
CONTROL INFORMATION							
VALVE SIZING INFO. & SPECIFICATION	UNITS	MINIMUM	NORMAL	MAXIMUM			
Valve Inlet Pressure	kPa(g)	450	500	800	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	-	-	700	Maximum [4]		
Critical Flow	-	-	No	-	-		
Mass Flowrate	kg/h	0	1.44	10	[4]		
P _c - Critical Pressure	kPa(a)	-	4210	-	Table 2-164, page 2-136 [1]		
Fail Action	-	N/A			-		
Seat Leakage Class	-	Supplier to advise			-		
Maximum Shut - Off Differential Pressure	kPa(g)	800			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 %	INTERLOCKS	
	Low Low	Low	High	High High			
LOCAL ALARM	-	-	-	-	kPa(g)	N/A	
REMOTE ALARM	-	-	-	-	kPa(g)		
SWITCH ONLY	-	-	-	-	kPa(g)		
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&I Diagram: Gas Supply System 832.							
[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.

	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)		