


ENGINEERING SERVICES DEPARTMENT						 <small>We're in your world</small> <small>South African Nuclear Energy Corporation</small>	
INSTRUMENT LOOP SPECIFICATION SHEET							
Project		PTFE Filter Destruction Project			Unit Tag Number		PCV83345B
Datasheet Document No.		ENS-FDP-SPE-24036			Revision		1
Description		Pressure regulator on the oxygen gas 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-3(C).					
Quality Classification		Non-classified(N) and QC-3(C).					
PROCESS CONDITIONS		UNITS	MINIMUM	NORMAL	MAXIMUM	ACCURACY	
Measurement Range		kPa(g)	450	600	1000	Medium	
Controlled Range		kPa(g)	-	400	-	Medium	
GENERAL		MEASUREMENT POINT			CONTROL POINT		
Process Fluid		Oxygen			Same as for measurement point		
Fluid State		Gas					
P&ID Number		ENS-FDP-PID-24005 [6]					
Line Number		15-833-GSVP-064					
Design Temperature [°C]		93					
Design Pressure [kPa(g)]		21340					
SIL Rating		-					
MEASUREMENT SPECIFICATION							
FLUID PROPERTIES		UNITS	MINIMUM	NORMAL	MAXIMUM	Reference	
Molecular Weight		kg/kmol		32		Table 2-164, page 2-139 [1]	
Operating Temperature		°C	-2.6	25	40	[2]	
Operating Pressure (upstream)		kPa(g)	450	600	1000	Minimum (Section 4.2.3 [3]). Maximum [4]	
Density (@ min., normal, and max. for both operating pressure and temperature.)		kg/m³	6.61	8.88	15.48	Note 1	
Viscosity (@ min., normal, and max. for operating temperature.)		cP	0.019	0.0205	0.021	Table 2-364, page 2-321 [1]	
Compressibility Factor		Z	1	1	1	Fig A.9, page 278 [8]	
Specific Heat Ratio (Cp/Cv)		-	-	1.4	-	Table 4.3, page 165 [7]	
Thermal Conductivity		W/m.K	0.023	0.025	0.026	Note 2	
Required Measured Range (upstream)		kPa(g)	0	-	1500	[4]	
Required Measured Range (downstream)		kPa(g)	0	-	1500	[4]	
CONTROL INFORMATION							
VALVE SIZING INFO. & SPECIFICATION		UNITS	MINIMUM	NORMAL	MAXIMUM		
Valve Inlet Pressure		kPa(g)	450	600	1000	Minimum (Section 4.2.3 [3]). Maximum [4]	
Valve Outlet Pressure = Regulator Setpoint Pressure		kPa(g)	-	400	-	[6]	
Maximum Differential Pressure Allowed Across Control Valve		kPa	-	-	600	Maximum [4]	
Critical Flow		-	-	No	-	-	
Mass Flowrate		kg/h	0	12.5	25	[4]	
P _c - Critical Pressure		kPa(a)	-	5020	-	Table 2-164, page 2-139 [1]	
Fail Action		-	N/A			-	
Seat Leakage Class		-	Supplier to advise			-	
Maximum Shut - Off Differential Pressure		kPa(g)	1000			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 on 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)	
REMOTE ALARM		-	-	-	-	kPa(g)	
SWITCH ONLY		-	-	-	-	kPa(g)	N/A
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.			
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