ENGINEERING SERVICES DEPARTMENT

INSTRUMENT LOOP SPECIFICATION SHEET

Project	PTFE Filter Destruction Project	**Unit Tag Number**	PCV83343B
Datasheet Document No.	ENS-FDP-SPE-24043	**Revision**	1
Description	Pressure regulator on the argon gas supply line to the Plasma Power Supply Y82016 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	Argon	Same as for measurement point
Fluid State	Gas	
P&ID Number	ENS-FDP-PID-24005 [6]	
Line Number	15-833-GAVP-062	
Design Temperature [°C]	93	
Design Pressure [kPa(g)]	21340	
SIL Rating	-	

MEASUREMENT SPECIFICATION

FLUID PROPERTIES	**UNITS**	**MINIMUM**	**NORMAL**	**MAXIMUM**	**REFERENCE**
Molecular Weight	**kg/kmol**	-	39,948	-	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]).
Compressibillity Factor	**Z**	0,97	0,98	0,99	Fig A.9, page 278 [7]
Density (@ min., normal, and max. for both operating pressure and temperature.)	**kg/m^3**	8,3	11,3	19,9	Note 1
Viscosity (@ min., normal, and max. for operating temperature.)	**Pa.s**	1,95E-05	2,75E-05	2,85E-05	Fig.2-32 page 2-321 [1]
Specific Heat Ratio (Cp/Cv)	**-**	-	1,67	-	Table 4.3, Page 165 [8]
Thermal Conductivity	**W/m.K**	0,01523	0,02148	0,02226	Note 2
Required Measured Range (Upstream)	**kPa(g)**	0	-	1500	Page 11 [4]
Required Measured Range (Downstream)	**kPa(g)**	0	-	1500	Page 11 [4]

CONTROL INFORMATION

VALVE SIZING INFO. & SPECIFICATION	**UNITS**	**MINIMUM**	**NORMAL**	**MAXIMUM**	**REFERENCE**
Valve Inlet Pressure	**kPa(g)**	450	600	1000	Minimum (Section 4.2.3 [3]).
Valve Outlet Pressure = Regulator Setpoint Pressure	**kPa(g)**	-	400	-	[6]
Maximum Differential Pressure Allowed Across Control Valve	**kPa**	-	-	600	-
Critical Flow	**-**	-	No	-	-
Mass Flowrate	**kg/h**	0	3	10	Page 11 [4]
P_c - Critical Pressure	**kPa(a)**	-	4900	-	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			-

VALVE MECHANICAL PROPERTIES

MATERIAL 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 CONNECTION

	Flange Spec.	**Flange Rating**	**Pipe Size (NB)**
Inlet	SS, ASTM A182-F316/316L, ASME B16.5 (Supplier shall advise of alternatives)	Class 3000	15
Outlet	SS, ASTM A182-F316/316L, ASME B16.5 (Supplier shall advise of alternatives)	Class 3000	15
Valve rating	Class 3000		

ALARM / SWITCH	**FALLING**		**RISING**		**UNITS**	**INTERLOCKS**
	LowLow	**Low**	**High**	**High High**	**or %**	
LOCAL ALARM	-	-	-	-	-	N/A
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] Sinnot, 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] Rase, H. F. (1963). Piping Design for Process Plant. New York: John Wiley & Sons, Inc.

[8] Joseph F. Louvar, Daniel A Crowl, 2011: Chemical Process Safety Fundamentals with Applications, 3rd edition

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			
2) Thermal conductivity was calculated from Equation 8.13 on Section 8.8.3 page 321 [5]. The specific heat capacity used in the equation was calculated from Equation on Appendix C, Page 939 of [5] at minimum, normal and maximum temperature.			
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