ENGINEERING SERVICES DEPARTMENT

OXYGEN PRESSURE REGULATOR PCV1602D SPECIFICATION SHEET

Project	Contaminated Waste Oil Plasma Gasification Project	**Unit Tag Number**	PCV1602D
Datasheet Document No.	ENS-OWPVR-SPE-25032	**Revision**	2
Description	Pressure regulator on the oxygen gas supply line to the Plasma Reactor R1205 in the Contaminated Waste Oil Plasma Gasification Facility.		
Plant Location	Necsa, Pelindaba, North-West Province.		
Equipment Location	Contaminated Waste Oil Plasma Gasification Facility - Outside Laboratory 150, 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)**	400	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-OWPVR-PID-24003 [6]	
Line Number	25-16-GSVP-005 [6]	
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)**	400	600	1000	Minimum from [4] Normal from [6]
Compressibillity Factor		0,9976	0,9956	0,9892	Table 2-180 [1]
Density (@ min., normal, and max. for both operating pressure and temperature.)	**kg/m^3**	6.01	8.92	15,65	Note 1
Viscosity (@ min., normal, and max. for operating temperature.)	**cP**	0.019	0.0205	0.021	Table 2-364, page 2-321 [1]
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	-
Required Measured Range (downstream)	**kPa(g)**	0	-	1500	-

CONTROL INFORMATION

VALVE SIZING INFO. & SPECIFICATION	**UNITS**	**MINIMUM**	**NORMAL**	**MAXIMUM**	
Valve Inlet Pressure	**kPa(g)**	400	600	1000	Minimum from [4] Normal from [6]
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	42,93	-	[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**	1000			-

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VALVE MECHANICAL PROPERTIES

Materials of Construction

Body	**Bellows**	**Spring**	**Seat**	**Disk and STEM**
304/304L SS	Supplier to advise	NA	Die-formed flexible graphite with anti-extrusion rings (Supplier to advise)	304/304L Stainless Steel
Bonnet/Cap		**Type**	**Wetted parts**	**Non-wetted parts**
304/304L SS		Two-stage	304/304L SS	304/304L SS

Process Connections

	Flange Spec.	**Flange Rating**	**Pipe Size (NB)**
Inlet	Female Threading NPT, ASME B1.20.1	Class 1500	25
Outlet	Female Threading NPT, ASME B1.20.1	Class 1500	25
Valve rating	Class 1500		

ALARM / SWITCH	**FALLING**		**RISING**		**UNITS**	**INTERLOCKS**
	Low Low	**Low**	**High**	**High High**	**or %**	
LOCAL ALARM	-	-	-	-	**kPa(g)**	N/A
REMOTE ALARM	-	-	-	-	**kPa(g)**	
SWITCH ONLY	-	-	-	-	**kPa(g)**	

DISPLAY	**LOCAL**	**REMOTE**	**RECORDING**
	Yes (Note 3)	-	-

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-OWPVR-CLC-24002, Mass & Energy Balance Calculations for the Basic Engineering Design of the Uranium Contaminated Waste Oil Plasma Gasification Project

[4] ENS-OWPVR-CLC-24005, Gas Requirement for the Uranium Contaminated Waste Oil Plasma Gasification Demonstration System

[5] Sinnot, R. K. (2005). Coulson & Richardson's CHEMICAL ENGINEERING, Chemical Engineering Design, Volume 6, 4th Edition.

[6] ENS-OWPVR-PID-24003, Uranium Contaminated Waste Oil Plasma Gasification - P&ID: Gas Supply System

[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 [7].

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) Pressure regulator to be supplied c/w local pressure indicators on the inlet and outlet side of the valve.

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