

**ENGINEERING SERVICES DEPARTMENT**



**ARGON PRESSURE REGULATOR PCV1601D SPECIFICATION SHEET**

<b>Project</b>	Contaminated Waste Oil Plasma Gasification Project		<b>Unit Tag Number</b>	PCV1601 D	
<b>Datasheet Document No.</b>	ENS-OWPVR-SPE-25033		<b>Revision</b>	1	
<b>Description</b>	Pressure regulator on the main argon gas supply line 15-16-GAVP-007 to the various plasma gasification facilities housed in Building V-H2 [4]. Its function is to control and maintain the argon supply pressure to the facilities at a pressure of 600 kPa(g) by reducing the argon inlet pressure from 200 bar(g) [4].				
<b>Plant Location</b>	Necsa, Pelindaba, North-West Province.				
<b>Equipment Location</b>	Contaminated Waste Oil Plasma Gasification Facility - Outside Laboratory 150, Building V-H2.				
<b>Safety Classification</b>	Non-classified(N) and SC-3(C)				
<b>Quality Classification</b>	Non-classified(N) and QC-3(C)				
<b>PROCESS CONDITIONS</b>	<b>UNITS</b>	<b>MINIMUM</b>	<b>NORMAL</b>	<b>MAXIMUM</b>	<b>ACCURACY</b>
<b>Measurement Range</b>	kPa(g)	600	20000	22000	Medium
<b>Controlled Range</b>	kPa(g)	-	600	-	Medium
<b>GENERAL</b>	<b>MEASUREMENT POINT</b>			<b>CONTROL POINT</b>	
<b>Process Fluid</b>	Argon			Same as for measurement point	
<b>Fluid State</b>	Gas				
<b>P&amp;ID Number</b>	ENS-OWPVR-PID-24003 [4]				
<b>Line Number</b>	15-16-GAVP-007				
<b>Design Temperature [°C]</b>	50 °C				
<b>Design Pressure [kPa(g)]</b>	23910				
<b>SIL Rating</b>	-				
<b>MEASUREMENT SPECIFICATION</b>					
<b>FLUID PROPERTIES</b>	<b>UNITS</b>	<b>MINIMUM</b>	<b>NORMAL</b>	<b>MAXIMUM</b>	<b>REFERENCE</b>
<b>Molecular Weight</b>	kg/kmol	-	39,948	-	Table 2-164 page 2-139 [1]
<b>Operating Temperature</b>	°C	-2.6	25	40	[2]
<b>Operating Pressure (upstream)</b>	kPa(g)	600	20000	22000	[4]
<b>Compressibility Factor</b>		0,98	0,98	0,97	Fig A.9, page 278 [5]
<b>Density (@ min., normal, and max. for both operating pressure and temperature.)</b>	kg/m <sup>3</sup>	9,2	11,3	13,7	Note 1
<b>Viscosity (@ min., normal, and max. for operating temperature.)</b>	Pa.s	1,95E-05	2,75E-05	2,85E-05	Fig.2-32 page 2-321 [1]
<b>Specific Heat Ratio (Cp/Cv)</b>		-	1,67	-	Table 4.3, Page 165 [6]
<b>Thermal Conductivity</b>	W/m.K	0,01523	0,02148	0,02226	Note 2
<b>Required Measured Range (Upstream)</b>	kPa(g)	0	-	25000	
<b>Required Measured Range (Downstream)</b>	kPa(g)	0	-	1500	
<b>CONTROL INFORMATION</b>					
<b>VALVE SIZING INFO. &amp; SPECIFICATION</b>	<b>UNITS</b>	<b>MINIMUM</b>	<b>NORMAL</b>	<b>MAXIMUM</b>	<b>REFERENCE</b>
<b>Valve Inlet Pressure</b>	kPa(g)	600	20000	22000	[4]
<b>Valve Outlet Pressure = Regulator Setpoint Pressure</b>	kPa(g)	-	600	-	[4]
<b>Maximum Differential Pressure Allowed Across Control Valve</b>	kPa	-	-	21400	-
<b>Critical Flow</b>	-	-	No	-	
<b>Mass Flowrate</b>	kg/h	0	7,19	10	Page 88 [3]
<b>P<sub>c</sub> - Critical Pressure</b>	kPa(a)	-	4900	-	Table 2-164 page 2-139 [1]
<b>Fail Action</b>	-	N/A			-
<b>Seat Leakage Class</b>		Supplier to advise			-
<b>Maximum Shut - Off Differential</b>	kPa	22000			-

**RESTRICTED**

**ENGINEERING SERVICES DEPARTMENT**

**ARGON PRESSURE REGULATOR PCV1601D SPECIFICATION SHEET**



<b>Project</b>	Contaminated Waste Oil Plasma Gasification Project	<b>Unit Tag Number</b>	PCV1601 D
<b>Datasheet Document No.</b>	ENS-OWPVR-SPE-25033	<b>Revision</b>	1

**VALVE MECHANICAL PROPERTIES**

**MATERIAL 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		Valve Type	Wetted parts	Non-wetted parts
304/304L SS		Two-stage	304/304L SS	304/304L SS

**PROCESS CONNECTION**

	Flange Spec.	Flange Rating	Pipe Size (NB)
<b>Inlet</b>	Female Threading NPT, ASME B1.20.1	Class 1500	15
<b>Outlet</b>	Female Threading NPT, ASME B1.20.1	Class 1500	15
<b>Valve rating</b>	Class 1500		

ALARM / SWITCH	FALLING		RISING		UNITS or %	INTERLOCKS
	LowLow	Low	High	High High		
LOCAL ALARM	-	-	-	-		N/A
REMOTE ALARM	-	-	-	-		
SWITCH ONLY	-	-	-	-		
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-PID-24003, P&ID - Gas Supply System (O2 & Ar) - Uranium Contaminated Waste Oil Plasma Gasification
- [5] Rase, H. F. (1963). Piping Design for Process Plant. New York: John Wiley & Sons, Inc.
- [6] Joseph F. Louvar, Daniel A Crowl, 2011: Chemical Process Safety Fundamentals with Applications, 3rd edition
- [7] Sinnott, R. K. (2005). Coulson & Richardson's CHEMICAL ENGINEERING, Chemical Engineering Design, Volume 6, 4th Edition. Elsevier Butterworth-Heinemann.

**NOTES**

- 1) Minimum density was calculated from the largest temperature and smallest pressure, normal density at normal conditions, and maximum density at the lowest temperature and largest pressure
- 2) Thermal conductivity was calculated from Equation 8.13 on Section 8.8.3 page 321 [7]. The specific heat capacity used in the equation was calculated from Equation on Appendix C, Page 939 of [7] at minimum, normal and maximum temperature.
- 3) Pressure regulator to be supplied c/w local pressure indicators on the inlet and outlet side of the valve.

	Name	Signature	Date
<b>Compiled by</b>	B. Khumalo (Senior Process Engineer)		
<b>Process</b>	N. Mokoena (Process Engineer)		
<b>Process</b>	M. Correia (Senior Process Engineer)		
<b>Mechanical</b>	M. Mokgohloa (Mechanical Engineer)		
<b>Mechanical</b>	S. Mngoma (Chief Mechanical Engineer)		
<b>Instrumentation</b>	G. Manuel (Chief C&I Engineer )		
<b>Electrical</b>	W. Van Den Berg (Chief Electrical Engineer)		
<b>Approved by</b>	K. Moodley (Chief Process Engineer)		