

ENGINEERING SERVICES DEPARTMENT				 <small>We're at your service</small> South African Nuclear Energy Corporation SOC Limited	
CONTROL VALVE TV1406 SPECIFICATION SHEET					
Project	NW PlasGas Project			Unit Tag Number	TV1406
Datasheet Document No.	ENS-NWPVR-SPE-25006			Revision	1
Description	Temperature control valve TV1406 is installed in line 15-15-KOVP-030 to control the flow of liquid to the quench H1406 for direct cooling of the product gas stream exiting plasma reactor R1403 in the NW PlasGas Demonstration Facility.				
Plant Location	NECSA, Pelindaba, North-West Province.				
Controlling Instrument No.	TICA1406				
Equipment Location	NW PlasGas Facility - Inside the process area of Laboratory 150, Building V-H2.				
Safety Classification	SC-2(C) and SC-3(N) <sup>Note [b]</sup>				
Quality Classification	QC-2(C) and QC-3(N) <sup>Note [c]</sup>				
FLUID PROPERTIES					
Process Fluid <sup>[1]</sup>	Liquid mixture consisting of H <sub>2</sub> O, KOH, KCl, K <sub>2</sub> CO <sub>3</sub> , and/or KHCO <sub>3</sub> <sup>Note [a]</sup>				
Fluid state	Liquid				
Corrosive Due To	KOH (aq) and K <sub>2</sub> CO <sub>3</sub> (aq) .				
PARAMETERS	UNITS	MINIMUM	NORMAL	MAXIMUM	
Operating Temperature <sup>[2]</sup>	°C	-	35	-	
Viscosity <sup>[3]</sup>	Pa.s	-	0,002	-	
Cv-value <sup>[4]</sup>	-	-	4,91	-	
Inlet density <sup>[3]</sup>	kg/m <sup>3</sup>	-	1276,15	-	
Specific heat capacity (Cp) <sup>[3]</sup>	kJ/kg.K	-	2,95	-	
Liquid vapour pressure <sup>[4]</sup>	bar (a)	-	0,91	-	
HYDRAULIC PROPERTIES					
PROPERTIES	UNITS	MINIMUM	NORMAL	MAXIMUM	
Flowrate <sup>[1,4]</sup>	m <sup>3</sup> /h	-	0,79	0,91	
Inlet pressure <sup>[4]</sup>	bar (a)	-	1,54	-	
Outlet Pressure <sup>[5,6]</sup>	bar (a)	-	82,00	-	
MECHANICAL PROPERTIES					
Nominal valve size <sup>[4]</sup>	in.	1			
Port size <sup>[4]</sup>	in.	1/2			
Pipeline Size	15 NB, Sch 40 <sup>Note [d]</sup>				
Process Connections	Class 150, RF, SS,ASTM A182-F304/304L, ASME B16,5 if flanged				
Gasket (if flanged)	Class 150, 1/16" thick flexible graphite w/ 304 or 316 SS corrugated insert, ASME B16.21				
Bolting (if flanged)	ASTM A193, Gr B7 stud w/ 2 heavy hex nuts ASTM A194, Gr 2H				
Valve rating	150#				
Materials of Construction					
Wetted parts	304/304L Stainless Steel				
Non-wetted parts	Supplier to advise				
Valve type	Globe valve				
Valve fail position	Fail open (FO)				
Control characteristics	Equal percentage				
Positioner					
Style	Electrical				
Input Signal	4-20 mA				
REFERENCE DRAWINGS AND DOCUMENTS					
[1] ENS-NWPVR-REP-24015: Mass Balance Report for NW PlasGas Demonstration Facility					
[2] ENS-NWPVR-REP-24017: Energy Balance Report for NW PlasGas Demonstration Facility					
[3] Oxychem: Caustic Potash Handbook					
[4] ENS-NWPVR-REP-24029: Control Valve Sizing for the NW PlasGas System					
[5] ENS-NWPVR-DES-24002: Process description for the Nuclear Waste Plasma Gasification Demonstration Facility					
[6] SHEQ-2011-REP-01017 (2011): Site Description: Pelindaba Site Rev 2, NECSA.					
NOTES AND ABBREVIATIONS					
[a] The scrubbing process commences with aqueous 30% KOH solution, however, the solution composition changes over time due to the chemical reactions taking place in the scrubber S1501. The process is divided into three phases. During the first phase, KOH in the scrubbing solution reacts with HCl and CO <sub>2</sub> in the gas entering the scrubber, until all the KOH is consumed. At the end of this phase, the composition of the scrubbing solution is 68% water, 1% KCl, and 31% K <sub>2</sub> CO <sub>3</sub> . At the end of the second phase, the solution composition is 59.6% water, 1.9% KCl, and 38.5% KHCO <sub>3</sub> . At the end of the third phase, the solution composition is 63.8% water, 4.4%KCl, and 31.8% KHCO <sub>3</sub> . At this point, the solution is considered to be spent and is replaced with a fresh batch of aqueous 30% KOH solution.					
[b] SC - Safety Class					
[c] QC - Quality Class					
[d] This represents the line size before the valve connection point and not necessarily the size of fitting on which the valve is to be connected.					

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