

ENGINEERING SERVICES DEPARTMENT



CONTROL VALVE FV1501C SPECIFICATION SHEET

Project	NW PlasGas Demonstration Facility	Unit Tag Number	FV1501C
Datasheet Document No.	ENS-NWPVR-SPE-25005	Revision	1.0
Description	Flow control valve FV1501C is installed on scrubbing solution recycle line 25-15-KOVP-029 to regulate liquid flowrate into scrubber S1501 in the NW PlasGas Demonstration Facility.		
Plant Location	Necsa, Pelindaba, North-West Province		
Equipment Location	NW PlasGas Demonstration Facility - Process area inside Laboratory-150, Building V-H2		
Controlling Instrument No.	FICA1501C		
Safety Classification	SC-2(C) and SC-3(N) ^{Note 1}		
Quality Classification	QC-2(C) and QC-3(N) ^{Note 2}		
Fluid	Liquid mixture consisting of H ₂ O, KOH, KCl, K ₂ CO ₃ , and/or KHCO ₃ ^{Note 3}		
Fluid state	Liquid		
Corrosive due to	KOH (aq) and K ₂ CO ₃ (aq) .		

FLUID PROPERTIES

Mass flow rate ^[1]	kg/h	2960
Volume flow rate	m³/h	2,32
Inlet temperature ^[2]	°C	35
Fluid density ^[3]	kg/m³	1276,15
Viscosity ^[3]	Pa.s	1,40E-03
Inlet pressure ^[4]	bar (a)	1,54
Outlet pressure ^[4]	bar (a)	0,8
Control valve design pressure drop ^[6]	bar	0,74
Cv-value ^[4]	-	10,2
Liquid vapour pressure ^[4]	bar (a)	0,91
Specific heat capacity (Cp) ^[3]	kJ/kg.K	2,95

MECHANICAL PROPERTIES

Nominal valve size	in.	3/2 ^{Note 4}
Port diameter	in.	3/4
Pipeline Size	25 NB, Sch 40 ^{Note 5}	
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 the NW PlasGas Demonstration Facility
[3] Oxychem: Caustic Potash Handbook
[4] ENS-NWPVR-REP-24029: Control Valve Sizing for the NW PlasGas System
[5] Fisher Controls International, 2005: Control Valve Handbook, 4th Edition
[6] ENS-NWPVR-REP-24030:Centrifugal Pumps Sizing Report for NW PlasGas Facility

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NOTES

Note 1: SC - Safety Class

Note 2: QC - Quality Class

Note 3: 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 CO₂ 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% K₂CO₃. At the end of the second phase, the solution composition is 59.6% water, 1.9% KCl, and 38.5% KHCO₃. At the end of the third phase, the solution composition is 63.8% water, 4.4%KCl, and 31.8% KHCO₃. At this point, the solution is considered to be spent and is replaced with a fresh batch of aqueous 30% KOH solution.

Note 4: Supplier to advise on impact of valve size exceeding pipeline size and to propose better alternatives, if available.

Note 5: 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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