Flowserve Gen 6 Production	
Document Status	Issued
Document title	SIL - FlowTop: V726, D726, V738, D738, V740, D740, FlowPro V724, V760, FlowAct 253, 503, 701, 1502, 3002
Document Reference Number	VILFCO-PROD-SIL-044
Document Revision Number	4
Document Type	Certificate
Department	Site Wide
Area	Certificates / Approval
Hard Copy Locations	Quality Department
Issued Date	10/17/2023 6:07:10 AM
Document owner	Grigorova, Miglena
Document Co-Owner	
Approvers	Grigorova, Miglena
Periodic Review Days	1000
Revision comments	new Certificate No 968/V 1291.02.23
Document tags	

Certificate

SIL/PL Capability

www.tuv.com
ID 0600000000

No.: 968/V 1291.02/23

Product tested	Control Valve with FlowAct Actuator	**Certificate holder**	Flowserve Control Valves GmbH Kasernengasse 6 9500 Villach Austria
Type designation	FlowTop: V726, D726, V738, D738, V740, D740 FlowPro: V724, V760 FlowAct: 253, 503, 701, 1502, 3002 (Details see Revisionlist)		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010		
Intended application	Safety Function: Move into closed position (NC) or into opened position (NO) by spring force. The valves are suitable for use in a safety instrumented system up to SIL 2 (low demand mode). Under consideration of the minimum required hardware fault tolerance HFT = 1 for the complete final element the valves may be used up to SIL 3.		
Specific requirements	The instructions of the associated Installation, Operating and Safety Manual shall be considered.		

Summary of test results see back side of this certificate.

The issue of this certificate is based upon an evaluation in accordance with the Certification Program CERT FSP1 V3.0:2020 in its actual version, whose results are documented in Report No. 968/V 1291.02/23 dated 2023-05-24. This certificate is valid only for products, which are identical with the product tested. Issued by the certification body accredited by DAkkS according to DIN EN ISO/IEC 17065. The accreditation is only valid for the scope listed in the annex to the accreditation certificate D-ZE-11052-02-01.

Köln, 2023-06-20

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln
Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. (FH) Wolf Rückwart

TÜV Rheinland Industrie Service GmbH, Am Grauen Stein, 51105 Köln / Germany
Tel.: +49 221 806-1790, Fax: +49 221 806-1539, E-Mail: industrie-service@de.tuv.com

www.fs-products.com
www.tuv.com

DAkkS Deutsche Akkreditierungsstelle D-ZE-11052-02-01

TÜVRheinland®
Precisely Right.

Holder: Flowserve Control Valves GmbH
Kasernengasse 6
A-9500 Villach
Austria

Product tested: ***Valve-Actuator Combination***
Valves FlowTop
(V726/D726/V738/D738/V740/D740)
Valves FlowPro (V724/V760)
Actuators FlowAct (253/503/701/1502/3002)

Results of Assessment

Route of Assessment		2_H / 1_S
Type of Sub-system		Type A
Mode of Operation		Low Demand Mode
Hardware Fault Tolerance	HFT	0
Systematic Capability		**SC 3**

Open or Close on Demand by Spring Force

Dangerous Failure Rate	λ_D	2.74 E-07 / h	**274 FIT**
Safe Failure Rate	λs	1.35 E-07 / h	**135 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.22 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.24 E-04	

Assumptions for the calculations above: DC = 0 %, T_1 = 1 year, MRT = 72 h, β_{1oo2} = 10 %

Origin of failure rates
The stated failure rates for low demand are the result of an FMEDA with tailored failure rates for the design and manufacturing process. Furthermore the results have been verified by qualification tests and field-feedback data.
Failure rates include failures that occur at a random point in time and are due to degradation mechanisms such as ageing. The stated failure rates do not release the end-user from collecting and evaluating application-specific reliability data.

Systematic Capability
The development and manufacturing process and the functional safety management applied by the manufacturer in the relevant lifecycle phases of the product have been audited and assessed as suitable for the manufacturing of products for use in applications with a maximum Safety Integrity Level of 3 (SC 3).

Periodic Tests and Maintenance
The given values require periodic tests and maintenance as described in the Safety Manual.
The operator is responsible for the consideration of specific external conditions (e.g. ensuring of required quality of media, max. temperature, time of impact), and adequate test cycles.

Holder: Flowserve Control Valves GmbH
Kasernengasse 6
A-9500 Villach
Austria

Product tested: ***Valves***
Valves FlowTop
(V726/D726/V738/D738/V740/D740)
Valves FlowPro (V724/V760)

Results of Assessment

Route of Assessment		2_H / 1_S
Type of Sub-system		Type A
Mode of Operation		Low Demand Mode
Hardware Fault Tolerance	HFT	0
Systematic Capability		**SC 3**

Open or Close on Demand

Dangerous Failure Rate	λ_D	1.13 E-07 / h	**113 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	5.03 E-04	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	5.06 E-05	

Assumptions for the calculations above: DC = 0 %, T_1 = 1 year, MRT = 72 h, β_{1oo2} = 10 %

Origin of failure rates

The stated failure rates for low demand are the result of an FMEDA with tailored failure rates for the design and manufacturing process. Furthermore the results have been verified by qualification tests and field-feedback data.
Failure rates include failures that occur at a random point in time and are due to degradation mechanisms such as ageing. The stated failure rates do not release the end-user from collecting and evaluating application-specific reliability data.

Systematic Capability

The development and manufacturing process and the functional safety management applied by the manufacturer in the relevant lifecycle phases of the product have been audited and assessed as suitable for the manufacturing of products for use in applications with a maximum Safety Integrity Level of 3 (SC 3).

Periodic Tests and Maintenance

The given values require periodic tests and maintenance as described in the Safety Manual.
The operator is responsible for the consideration of specific external conditions (e.g. ensuring of required quality of media, max. temperature, time of impact), and adequate test cycles.

Holder: Flowserve Control Valves GmbH
Kasernengasse 6
A-9500 Villach
Austria

Product tested: ***Pneumatic Actuator***
Actuators FlowAct (253/503/701/1502/3002)

Results of Assessment

Route of Assessment		2_H / 1_S
Type of Sub-system		Type A
Mode of Operation		Low Demand Mode
Hardware Fault Tolerance	HFT	0
Systematic Capability		**SC 3**

Move into Safe Position by Spring Force

Dangerous Failure Rate	λ_D	1.61 E-07 / h	**161 FIT**
Safe Failure Rate	λs	1.35 E-07 / h	**135 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	7.17 E-04	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	7.22 E-05	

Assumptions for the calculations above: DC = 0 %, T_1 = 1 year, MRT = 72 h, β_{1oo2} = 10 %

Origin of failure rates
The stated failure rates for low demand are the result of an FMEDA with tailored failure rates for the design and manufacturing process. Furthermore the results have been verified by qualification tests and field-feedback data.
Failure rates include failures that occur at a random point in time and are due to degradation mechanisms such as ageing. The stated failure rates do not release the end-user from collecting and evaluating application-specific reliability data.

Systematic Capability
The development and manufacturing process and the functional safety management applied by the manufacturer in the relevant lifecycle phases of the product have been audited and assessed as suitable for the manufacturing of products for use in applications with a maximum Safety Integrity Level of 3 (SC 3).

Periodic Tests and Maintenance
The given values require periodic tests and maintenance as described in the Safety Manual.
The operator is responsible for the consideration of specific external conditions (e.g. ensuring of required quality of media, max. temperature, time of impact), and adequate test cycles.