

# Certificate

No. V 56 2013 C5

Manufacturer: **Flowserve (Austria) GmbH**  
**Control Valves – Villach Operation**  
**Kasernengasse 6, A 9500 Villach**

Product: **pneumatic safety shut off valves with**  
**control function**

Type series **FlowTop V 726, D726, V 738, D738, V 740, D740**  
**FlowPro V724, V760**  
in combine with actuator of type **FlowAct**

Test result: **The valves of the above mentioned type series**  
**are suitable for use in safety related systems**  
**according to IEC 61508 up to and including SIL 2**  
**in single channel system and up to and including**  
**SIL 3 in multi-channel system.**

**Detailed test results can be drawn from reports**  
V 56 2004 T1, dated 2004-05-19  
V 56 2009 E2, dated 2009-01-29  
V 56 2013 V4, dated 2013-12-16

**The suitability for certain fields of an application**  
**can only be assessed by additional evaluation of**  
**further components of the subsystem.**

**This certificate is valid until 2018-12**

**Cologne, 2013-12-16**  
**Instructor**

  
**M. Eng. C. Li**

**Test Centre for Energy Appliances**  
**Head of Test Centre**

  
**Dipl.-Ing. W. Rückwart**

TÜV Rheinland Energie und Umwelt GmbH, Am Grauen Stein, D-51105 Köln, Germany

Certificate No.	<b>V 56 2013 C5</b>
Manufacturer	<b>Flowserve (Austria) GmbH Control Valves – Villach Operation Kasernengasse 6, A 9500 Villach</b>
series	<b>FlowTop V 726, D726, V 738, D738, V 740, D740 FlowProV724, V760</b>

#### Device specific values:

Probability of Dangerous Failure on Demand	$PFD_{spec}$	Failure / h	4,23 E-06
Test Interval	$T_i$	a	1
Confidence Niveau	$1-\alpha$	%	99 %
Safe Failure Fraction	SFF	%	99 %
Hardware Fault Tolerance	HFT	[ - ]	0
Diagnostic Coverage	DC	%	0
Type of Sub System IEC 61508-2, 7.4.4.1.2/3		[ - ]	Typ A
Mode of Operation IEC 61508-4, 3.5.16		[ - ]	Low demand
Assumed Demands per Year	$f_{np}$	demand / a	1

Derived Values			
Demand / Hour	$f_{np}$	demand / h	1,14E-04
Meantime between Demands		h	8,76 E+03
Dangerous Failure Rate	$\lambda_D$	1/h	4,83E-10
		FIT	0,48
MTBF (Dangerous Failures)	$MTBF_D$	h	2,07 E+09
		a	236282,76
Safe Failure Rate	$\lambda_S$	1/h	4,78 E-08
		FIT	47,83
Total Failure Rate	$\lambda_S + \lambda_D$	1/h	4,83 E-08
		FIT	48,31
MTBF total		h	2,07 E+07
		a	2362,83
Lambda Dangerous Detected	$\lambda_{DD}$	1/h	0,00 E+00
Lambda Dangerous Undetected	$\lambda_{DU}$	1/h	4,83 E-10
Lambda Safe Detected	$\lambda_{SD}$	1/h	0,00 E+00
Lambda Safe Undetected	$\lambda_{SU}$	1/h	4,78 E-08
<b>Average Probability of Failure on Demand</b>	<b><math>PFD_{avg}</math></b>	Failure / demand	<b>2,12E-06</b>

#### Test result

It is the opinion of the Test Laboratory that the devices are suitable for use in safety related systems up to and including SIL 2 in single-channel system and up to and including SIL 3 in multi-channel system. The suitability in safety-related systems up to and including SIL 4 is possible in consideration of the total system and in consideration requirements of DIN EN 61508.

#### Useful life time under operation conditions

Based on the experience up to now with these devices and regarding the corrosion protection and aging behaviour of the materials used in the FMEA a maximum operation time of 7 years is assumed. In the opinion of the test laboratory a storage under the conditions given by the manufacturer of 1.5 years after production before taking into operation will not have a negative influence. The operation time can only be extended under the responsibility of the plant operator regarding the special operation conditions and the employment of suitable intervals for testing and maintenance.

#### Quality Management

These statements are bound to the proven and verified deployment of safety-related quality management of the manufacturer.