

Certificate

No. V 154 2013 C3

Manufacturer: **Festo Chemical Valve Technology GmbH
Beindersheimer Str. 48
67227 Frankenthal**

Product: **3/2 Way Valves**

Type series: **UV 0532 ...**

Use: **Automatic Solenoid Valve
with safety function**

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 40 2004 S1, dated 2004-01-28
V 154 2008 T1, dated 2008-09-26
V 157 2013 V3, dated 2013-10-16

**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 2018-09

Cologne, 2013-11-08
Instructor


M. Eng. C. Li

Test Centre for Energy Appliances
Head of Test Centre


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series	UV 0532 ...

Device specific values:

Probability of dangerous failure on demand	PFD _{spec}	Failure/demand	7,00E-06
Confidence niveau	1- α	%	95
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		Type A
Mode of Operation	IEC 61508-4, 3.5.16		Low Demand Mode
Assumed demands per year	f _{np}	demand/y	10
Derived Values			
Demand/hour	f _{np}	demand/h	1,14E-03
Meantime between demands		h	8,76E+02
Dangerous failure rate	λ_D	1/h	7,99E-09
		FIT	7,99
MTBF dangerous failures	MTBF _D	h	1,25E+08
		y	14285,71
Safe failure rate	λ_S	1/h	7,91E-07
		FIT	791,10
Total failure rate	$\lambda_S + \lambda_D$		7,99E-07
		FIT	799,09
MTBF total		h	1,25E+06
MTBF total		y	142,86
Dangerous detected	λ_{DD}	1/h	0,00E+00
Dangerous undetected	λ_{DU}	1/h	7,99E-09
Safe detected	λ_{SD}	1/h	0,00E+00
Safe undetected	λ_{SU}	1/h	7,91E-07
Test interval	T _i	y	1
Average probability of failure on demand	PFD_{avg}	Failure/demand	3,50E-05

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 5 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.