

# Certificate

No. V 153 2013 C3

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

Product: **3/2 Way Valves**

Type series **CP 0632.... oH, CP 0632... oHi**

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 11 2003 S2, dated 2003-05-08  
V 153 2008 T1, dated 2008-09-26  
V 156 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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|-----------------|--|
| Certificate No. | <b>V 153 2013 C3</b>   |
| Manufacturer    | <b>Festo Chemical Valve Technology GmbH<br/>Beindersheimer Str. 48<br/>67227 Frankenthal</b> |
| series          | <b>CP 0632.... oH, CP 0632... oHi</b>  |

#### Device specific values:

|   |                               |                       |                 |
|---|-------------------------------|-----------------------|-----------------|
| Probability of dangerous failure on demand      | $PFD_{spec}$                  | Failure/demand        | 2,00E-07        |
| Confidence niveau                               | $1-\alpha$                    | %                     | 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              |
| <b>Derived Values</b>                           |                               |                       |                 |
| Demand/hour                                     | $f_{np}$                      | demand/h              | 1,14E-03        |
| Meantime between demands                        |                               | h                     | 8,76E+02        |
| Dangerous failure rate                          | $\lambda_D$                   | 1/h                   | 2,28E-10        |
|   |                               | FIT                   | 0,23            |
| MTBF dangerous failures                         | $MTBF_D$                      | h                     | 4,38E+09        |
|   |                               | y                     | 500000,00       |
| Safe failure rate                               | $\lambda_S$                   | 1/h                   | 2,26E-08        |
|   |                               | FIT                   | 22,60           |
| Total failure rate                              | $\lambda_S + \lambda_D$       |                       | 2,28E-08        |
|   |                               | FIT                   | 22,83           |
| MTBF total                                      |                               | h                     | 4,38E+07        |
| MTBF total                                      |                               | y                     | 5000,00         |
| Dangerous detected                              | $\lambda_{DD}$                | 1/h                   | 0,00E+00        |
| Dangerous undetected                            | $\lambda_{DU}$                | 1/h                   | 2,28E-10        |
| Safe detected                                   | $\lambda_{SD}$                | 1/h                   | 0,00E+00        |
| Safe undetected                                 | $\lambda_{SU}$                | 1/h                   | 2,26E-08        |
| Test interval                                   | $T_i$                         | y                     | 1               |
| <b>Average probability of failure on demand</b> | <b><math>PFD_{avg}</math></b> | <b>Failure/demand</b> | <b>1,00E-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 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.