

Certificate

No. V 383 2011 C2

Manufacturer: **Schischek Produktion technischer Geräte GmbH
Mühlsteig 54 – Gewerbegebiet Süd 5
90579 Langenzenn
Germany**

Test item: **Spring Return Electrical Quarter Turn Actuators**

Type: **ExMax, RedMax, InMax**

Use/
Safety function: **Return connected appliance to it's design
required position on the demand of a safety
function**

Test results: **The devices of the above mentioned series are suitable
for use in safety related systems in low demand mode of
operation as a safety related subsystem according to
IEC 61508 up to and including SIL 2.**

**For detailed results see test report
No. V382 2011 S1 dated 2011-05-10**

**A short summary of test results is filed up on the backside of this
certificate.**

**The suitability for certain fields of application can only
be assessed by the evaluation of the complete safety
related system incorporating the test item in regard to
the requirements of the IEC 61508.**

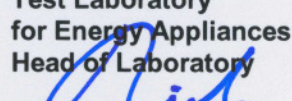
This certificate remains valid until April 2016

Cologne 2011-05-10

Inspector


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|------------------------|---|
| Certificate No. | V 383 2011 C2 |
| Manufacturer: | Schischek Produktion technischer Geräte GmbH |
| Type series | ExMax, RedMax, InMax: ..Max-.-.F.-. (for details see test report V383 2011 C2) |

Appliance-specific values determined:

| | | | |
|---|-------------------------------|-----------------------|-----------------|
| Probability of dangerous failure on demand | PFD_{spec} | Failure/demand | 1.73E-04 |
| Test interval | T_i | y | 1 |
| Confidence niveau | $1-\alpha$ | % | 90 |
| Safe failure fraction | SFF | % | 92.5 |
| 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 undetected failure rate | λ_{DU} | 1/h | 1.97E-07 |
| | | FIT | 197.49 |
| MTBF dangerous failures | $MTBF_D$ | h | 5.06E+06 |
| | | y | 578.03 |
| Safe failure rate | λ_S | 1/h | 2.44E-06 |
| | | FIT | 2435.69 |
| Total failure rate | $\lambda_S + \lambda_D$ | | 2.63E-06 |
| | | FIT | 2633.18 |
| MTBF total | | h | 3.80E+05 |
| MTBF total | | y | 43.35 |
| Dangerous detected | λ_{DD} | 1/h | 0.00E+00 |
| Dangerous undetected | λ_{DU} | 1/h | 1.97E-07 |
| Safe detected | λ_{SD} | 1/h | 0.00E+00 |
| Safe undetected | λ_{SU} | 1/h | 2.44E-06 |
| Average probability of failure on demand | PFD_{avg} | Failure/demand | 8.65E-04 |

Test results

It is the opinion of the test laboratory that the test item is suitable for use in safety related systems in low demand mode of operation as an element of a safety related subsystem according to IEC 61508 up to and including SIL 3. The appliance-specific values determined apply to the test item. The actuated appliances and the means necessary to control the actuator are not covered by this test statement.

Useful life time under operation conditions

Based on the experience up to now with these devices and regarding the corrosion protection and aging behavior of the materials used in the FMEA, a maximum operation time of 5 years can be assumed if the test item is operated according to the specifications of the manufacturer. In the opinion of the test laboratory storage under the conditions given by manufacturer of 1.5 years after production and before taking into operation will not have a negative influence. To ensure constant failure rates as requested by IEC 61508, the statement of this report regarding failure probability is limited to a maximum of 5.000 cycles.

Assessment of the safety related system incorporating the test item

The requirements of IEC 61508 apply to complete safety related systems. For a final assessment whether a specific component can be used in a specific safety related system, the complete safety related system has to be assessed. For this assessment the appliance specific values of the test item can be used. The remarks of the report V379 2011 S1-1 shall be considered.

Quality management

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