# Certificate

SIL/PL Capability

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## No.: V 379.03/17

| | | | |
|---|---|---|---|
| **Product tested** | Hydraulic spring return actuator for gate valves | **Certificate holder** | Cameron, A Schlumberger Company<br>3505 W Sam Houston Parkway N<br>Houston, TX 77043<br>USA |
| **Type designation** | MH70,<br>MHCS70 | | |
| **Codes and standards** | IEC 61508 Parts 1-2 and 4-7:2010 | | |
| **Intended application** | The actuators are suitable for use in a safety instrumented system e. g. acc. IEC 61511-1:2016 in low demand applications up to SIL 2.<br>Under consideration of the minimum required hardware fault tolerance HFT=1 the actuators may be used in a redundant structure 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.

Valid until 2022-02-09

The issue of this certificate is based upon an examination, whose results are documented in Report No. V 379.03/17 dated 2017-02-09.
This certificate is valid only for products which are identical with the product tested. It becomes invalid at any change of the codes and standards forming the basis of testing for the intended application.

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln

Köln, 2017-02-09

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Stephan Häb

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Precisely Right.

**Holder:** **Cameron, A Schlumberger Company**
**3505 W Sam Houston Parkway N**
**Houston, TX 77043**
**USA**

**Product tested:** **Hydraulic spring return actuator**
**Type MH70 & MHCS70**

**Results of Assessment**

| | | | |
|---|---|---|---|
| Route of Assessment | | $2_H$ / $1_S$ | |
| Confidence Level | 1-α | 95 % | |
| Type of Sub-system | | Type A | |
| Mode of Operation | | Low Demand Mode | |
| Hardware Fault Tolerance | HFT | 0 | |
| Lambda Dangerous | $\lambda_D$ | 6.78 E-08 / h | 68 FIT |
| Assumed Test Interval | $T_1$ | 727 h | 1 month |
| Assumed Diagnostic Coverage | DC | 0 % | |
| Assumed β | $\beta_{1oo2}$ | 10 % | |
| Lambda Dangerous Undetected | $\lambda_{DU}$ | 6.78 E-08 / h | 68 FIT |
| Mean Time To Dangerous Failure | $MTTF_D$ | 1.47 E+07 h | 1,684 a |
| **Average Probability of Failure on Demand 1oo1** | **$PFD_{avg}(T_1)$** | **2.46 E-05** | |
| **Average Probability of Failure on Demand 1oo2** | **$PFD_{avg}(T_1)$** | **2.46 E-06** | |

**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 (ensuring of required quality of media, max. temperature, time of impact), and adequate test cycles.

**Origin of values**

The stated values are the result of the analysis of field feedback for the last five years. Random and systematic failures were examined, which are the responsibility of the manufacturer.

**Systematic Capability**

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