

Certificate



SIL/PL
Capability

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ID 060000000

No.: V 381.03/17

Product tested	Linear hydraulic spring return gate valve actuators	Certificate holder	Cameron, A Schlumberger Company 3505 W Sam Houston Parkway N Houston, TX 77043 USA
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Type designation	MHW70, MHWCS70
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Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010
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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. Under consideration of the minimum required hardware fault tolerance HFT=1 the actuators may be used in a redundant architecture up to SIL 3.
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Specific requirements	The instructions of the associated Installation, Operating and Safety Manual shall be considered.
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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 381.03/17 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 Hüb

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

Product tested: Hydraulic spring return actuator
 Type MHW70 & MHWCS70

Results of Assessment

Route of Assessment		$2_H / 1_S$	
Confidence Level	$1-\alpha$	95 %	
Type of Sub-system		Type A	
Mode of Operation		Low Demand Mode	
Hardware Fault Tolerance	HFT	0	
Lambda Dangerous	λ_D	4.04 E-07 / h	404 FIT
Assumed Test Interval	T_1	727 h	1 month
Assumed Diagnostic Coverage	DC	0 %	
Assumed β	β_{1002}	10 %	
Lambda Dangerous Undetected	λ_{DU}	4.04 E-07 / h	404 FIT
Mean Time To Dangerous Failure	$MTTF_D$	2.47 E+06 h	282 a
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.47 E-04	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.47 E-05	

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).