Certificate

SIL/PL Capability

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No.: 968/V 1014.00/17

Product tested	Ball Valves Floating & Trunnion Design	**Certificate holder**	JC Fábrica de Válvulas, S.A.U. Av. Segle XXI 75, Pol. Ind. Can Calderon 08830 Sant Boi de Llobregat, Barcelona Spain
Type designation	Ball Valve Floating Figures: 300, 3300, 400/40000, UDV, 410, 500, 3500, 600, 3600, 700, 3700, 800/81500, 900, 3900 Ball Valve Trunnion Figures: 1900, 1500, 1600, 1700, 2500, 2600, 6000, 7000		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010		
Intended application	Safety Function: Open or Close on Demand The valves are suitable for use in a safety instrumented system e.g. acc. to IEC 61511-1 up to SIL 2 (low demand mode). Under consideration of the minimum required hardware fault tolerance HFT = 1 the valves may be used in a redundant architecture 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 2022-10-20

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1014.00/17 dated 2017-10-20.
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.

Köln, 2017-10-20

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln
Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Stephan Häb

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Holder: **JC Fábrica de Válvulas, S.A.U.**
Av. Segle XXI 75, Pol. Ind. Can Calderon
08830 Sant Boi de Llobregat- Barcelona
Spain

Product tested: **Ball Valves Floating & Trunnion Designs**
• Floating Figures:
300, 3300, 400/40000, UDV, 410, 500, 3500,
600, 3600, 700, 3700, 800/81500, 900, 3900
• Trunnion Figures:
1900, 1500, 1600, 1700, 2500, 2600, 6000, 7000

Results of Assessment

Route of Assessment		2_H / 1_S
Type of Sub-system		Type A
Mode of Operation		Low Demand Mode
Hardware Fault Tolerance	HFT	0

Floating Design

Lambda Dangerous confidence level of calculation 1-α = 95 %	λ_D	1.09 E-07 / h	109 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	λ_{DU}	1.09 E-07 / h	109 FIT
Mean Time To Dangerous Failure	$MTTF_D$	9.15 E+06 h	1,044 a
Average Probability of Failure on Demand 1oo1 assumed Proof Test Interval T_1 = 1 year	**$PFD_{avg}(T_1)$**	**4.79 E-04**	
Average Probability of Failure on Demand 1oo2 assumed Proof Test Interval T_1 = 1 year assumed β_{1oo2} = 10 %	**$PFD_{avg}(T_1)$**	**4.82 E-05**	

Trunnion Design

Lambda Dangerous	λ_D	2.10 E-07 / h	210 FIT
Lambda Dangerous Undetected	λ_{DU}	2.10 E-07 / h	210 FIT
Mean Time To Dangerous Failure	$MTTF_D$	4.75 E+06 h	542 a
Average Probability of Failure on Demand 1oo1 assumed Proof Test Interval T_1 = 1 year	**$PFD_{avg}(T_1)$**	**9.22 E-04**	
Average Probability of Failure on Demand 1oo2 assumed Proof Test Interval T_1 = 1 year assumed β_{1oo2} = 10 %	**$PFD_{avg}(T_1)$**	**9.32 E-05**	

Origin of values

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

Systematic Capability

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

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