Certificate

No.: 968/V 1113.01/24

Product tested	Ball Valves
Type designation	Floating and Guided Designs Trunnion Designs see Revision List
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010

Certificate holder

Pekos Europe Group
Pekos Fabricacion S.L.U.
Polígono Industrial
Bildosola, K3
E-48142 Artea (Vizcaya)
Spain

Intended application

Safety Functions:
- Close on Demand and External Tightness
- Close on Demand with Leakage Class IV acc. IEC 60534-4 and External Tightness
- Open on Demand and External Tightness

The valves are suitable for use in a safety instrumented system up to SIL 2 (low demand mode). Under consideration of the minimum required hardware fault tolerance HFT = 1 for the complete final element 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 pages 2 and 3 of this certificate.

Valid until 2029-02-06

The issue of this certificate is based upon an evaluation in accordance with the Certification Program CERT FSP1 V3.0:2020 in its actual version, whose results are documented in Report No. 968/V 1113.01/24 dated 2024-01-30. This certificate is valid only for products, which are identical with the product tested. Issued by the certification body accredited by DAkkS according to DIN EN ISO/IEC 17065. The accreditation is only valid for the scope listed in the annex to the accreditation certificate D–ZE–11052–02–00.

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

Köln, 2024-02-06

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. (FH) Wolf Rückwart

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Holder: PEKOS FABRICACION SLU
Polígono Industrial Bildosola, K3
48142 Artea (Vizcaya)
Spain

Product tested: Ball Valves
Floating and Guided Design

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
Systematic Capability	**SC 3**

Close on demand and external tightness

		Standard Design		Top Entry Design	
Dangerous Failure Rate	λ_D	2.55 E-07 / h	**255 FIT**	1.92 E-07 / h	**192 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.14 E-03		8.55 E-04	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.15 E-04		8.63 E-05	

Close on demand with leakage class IV acc. IEC 60534-4 and external tightness

Dangerous Failure Rate	λ_D	3.23 E-07 / h	**323 FIT**	2.76 E-07 / h	**276 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.44 E-03		1.23 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.46 E-04		1.25 E-04	

Open on demand and external tightness

Dangerous Failure Rate	λ_D	2.36 E-07 / h	**236 FIT**	1.63 E-07 / h	**163 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.05 E-03		7.26 E-04	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.06 E-04		7.31 E-05	

Assumptions for the calculations above: DC = 0 %, T_1 = 1 year, MRT = 72 h, β_{1oo2} = 10 %

Origin of failure rates
The stated failure rates for low demand are the result of an FMEDA with tailored failure rates for the design and manufacturing process. Furthermore the results have been verified by field-feedback data. Failure rates include failures that occur at a random point in time and are due to degradation mechanisms such as ageing. The stated failure rates do not release the end-user from collecting and evaluating application-specific reliability data.

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.

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).

Holder: PEKOS FABRICACION SLU
P.I. Bildosola, K3
48142 Artea (Vizcaya)
Spain

Product tested: Ball Valves
Trunnion Design

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
Systematic Capability	**SC 3**

Close on demand and external tightness

		Standard Design		Top Entry Design	
Dangerous Failure Rate	λ_D	2.55 E-07 / h	**255 FIT**	2.64 E-07 / h	**264 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.14 E-03		1.18 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.15 E-04		1.19 E-04	

Close on demand with leakage class IV acc. IEC 60534-4 and external tightness

		Standard Design		Top Entry Design	
Dangerous Failure Rate	λ_D	3.41 E-07 / h	**341 FIT**	3.42 E-07 / h	**342 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.52 E-03		1.52 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.54 E-04		1.55 E-04	

Open on demand and external tightness

		Standard Design		Top Entry Design	
Dangerous Failure Rate	λ_D	2.26 E-07 / h	**226 FIT**	2.16 E-07 / h	**216 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.01 E-03		9.62 E-04	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.02 E-04		9.72 E-05	

Assumptions for the calculations above: DC = 0 %, T_1 = 1 year, MRT = 72 h, β_{1oo2} = 10 %

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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).