Certificate

No.: 968/V 1205.00/21

Product tested	Ball Valves for cryogenic and non-cryogenic use	**Certificate holder**	AMPO POYAM Valves Division Valvulas Poyam Barrio Katea Auzoa S/N 20213 Idiazabal (Guipuzcoa) Spain
Type designation	Floating Ball Valves: Types: 1A, 1AC, 7A, 9AC, 16A, 16AC, 17A, 17AC, 18A, 18AC Trunnion Ball Valves: Types: 12A, 12AC, 14A, 14AC, 20A, 20AC, 21A		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010		
Intended application	Safety Functions: - Safe closing upon demand - Safe opening upon demand The valves are suitable for use in a safety instrumented system up to SIL 2. Under consideration of the minimum required hardware fault tolerance HFT=1 the valves 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 2026-01-15

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1205.00/21 dated 2021-01-15.
This certificate is valid only for products which are identical with the product tested.

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

Köln, 2021-01-15	Certification Body Safety & Security for Automation & Grid	Dipl.-Ing. (FH) Wolf Rückwart

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Holder: AMPO POYAM Valves
Division Valvulas Poyam
Barrio Katea Auzoa S/N
20213 Idiazabal (Guipuzcoa)
Spain

Product tested: **Floating Ball Valves (cryogenic / non-cryogenic)**
1A, 1AC, 7A, 9AC, 16A, 16AC, 17A, 17AC, 18A, 18AC
Trunnion Ball Valves (cyogenic / non-cryogenic)
12A, 12AC, 14A, 14AC, 20A, 20AC, 21A

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**

Floating Ball Valves: Close on Demand

Dangerous Failure Rate	λ_D	5.01 E-07 / h	**501 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	2.23 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	2.28 E-04	

Floating Ball Valves: Open on Demand

Dangerous Failure Rate	λ_D	4.27 E-07 / h	**427 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.90 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.94 E-04	

Trunnion Ball Valves: Close on Demand

Dangerous Failure Rate	λ_D	5.33 E-07 / h	**533 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	2.37 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	2.43 E-04	

Trunnion Ball Valves: Open on Demand

Dangerous Failure Rate	λ_D	4.93 E-07 / h	**493 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	2.19 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	2.25 E-04	

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 qualification tests and 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.