Certificate

SIL/PL Capability

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ID 0000069667

No.: 968/V 1120.00/19

Product tested	Ball Valves Trunnion and Floating	**Certificate holder**	Thermomess S.r.l. Via Eugenio Montale, 6 20020 Robecchetto con Induno (MI) Italy

Type designation

Trunnion ART 130TR
DN 10 ... 500 / NPS 3/8" ... 20" : PN 10 ... PN 100 / Class 150/300/600
DN 10 ... 400 / NPS 3/8" ... 16" : PN 10 ... PN 250 / Class 150/300/600/900/1500
DN 10 ... 200 / NPS 3/8" ... 8" : PN 10 ... PN 420 / Class 150/300/600/900/1500/2500

Floating ART 130, ART 117, ART 118, ART 190
DN 10 ... 300 / NPS 3/8" ... 12" : PN 10 ... PN 20 / Class 150
DN 10 ... 250 / NPS 3/8" ... 10" : PN 10 ... PN 50 / Class 150/300
DN 10 ... 200 / NPS 3/8" ... 8" : PN 10 ... PN 100 / Class 150/300/600
DN 10 ... 80 / NPS 3/8" ... 3" : PN 10 ... PN 150 / Class 150/300/600/900
DN 10 ... 50 / NPS 3/8" ... 2" : PN 10 ... PN 250 / Class 150/300/600/900/1500
DN 10 ... 250 / NPS 3/8" ... 1 1/4" : PN 10 ... PN 420 / Class 150/300/600/900/1500/2500

Codes and standards

IEC 61508 Parts 1-2 and 4-7:2010

Intended application

Safety Functions:
- Open or Close on demand and external tightness
- Close on Demand with allowable leakage acc. EN 12266-1 leak rate A

The assessment comes to the result that the valves fulfil the test criteria of the Certification Body following IEC 61508:2010. No deviations have been found. They are therefore 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 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 2024-07-17

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1120.00/19 dated 2019-07-17.
This certificate is valid only for products which are identical with the product tested.

Köln, 2019-07-17

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

Dr.-Ing. Thorsten Gantevoort

TÜV Rheinland Industrie Service GmbH, Am Grauen Stein, 51105 Köln / Germany
Tel.: +49 221 806-1790, Fax: +49 221 806-1539, E-Mail: industrie-service@de.tuv.com

TÜVRheinland®
Precisely Right.

Holder: Thermomess S.r.l.
Via Eugenio Montale, 6
I – 20020 Robecchetto con Induno (MI)
Italy

Product tested: **Ball Valves**
Trunnion and Floating

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**

		Trunnion Ball Valves		**Floating Ball Valves**	
Close on Demand (FTC) and External tightness					
Dangerous Failure Rate	λ_D	4.78 E-07 / h	**478 FIT**	3.62 E-07 / h	**362 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	2.09 E-03		1.59 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	2.15 E-04		1.62 E-04	
Close on demand with allowable leakage according to EN12266-1 "Leak rate A"					
Dangerous Failure Rate	λ_D	8.24 E-07 / h	**824 FIT**	3.99 E-07 / h	**399 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	3.61 E-03		1.75 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	3.77 E-04		1.78 E-04	
Open on Demand (FTO) and External tightness					
Dangerous Failure Rate	λ_D	3.93 E-07 / h	**393 FIT**	3.19 E-07 / h	**319 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.72 E-03		1.40 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.76 E-04		1.42 E-04	

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

Origin of values
The stated values are the results of a FMEDA for the design and manufacturing process.
They have been verified by field feedback data from the last ten years.
Random and systematic failures which are in the responsibility of the manufacturer were examined.

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.