Certificate

No.: 968/V 1334.00/24

Product tested	Ball Valves	**Certificate holder**	Transworld Steel Enterprise Co., Ltd. No. 34, Gongya 14th Rd., Renhua Vil., Dali Dist. Taichung City 412038 Taiwan, (R.O.C.)
Type designation	Soft seal One-Piece Floating Flanged Ball Valve (Type designation: F301, F303) Soft seal Two-Piece Floating Flanged Ball Valve (Type designation: F501, F502) Soft seal Two-Piece Floating Ball Valve (Type designation: R301, R502, R701) Soft seal Three-Piece Floating Ball Valve (Type designation: S300, S303, S304, S305, S320, S400, S600, S603, S604, S605, S701, S704, S711, S802, S900, S904, T531, T801) Soft seal Multi-Port Ball Valve (Type designation: M202, M203, M302, M304, M602) Soft seal Three-Piece Floating Ball Valve T801 (double ball valve)		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010		
Intended application	Safety Functions: 1. close on demand and external tightness, 2. close on demand with leakage criteria according to API 598, and external tightness, 3. 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 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 2029-10-31

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 1334.00/24 dated 2024-10-31. 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, 2024-10-31

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. (FH) Wolf Rückwart

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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

Holder / Manufacturing plant:
Transworld Steel Enterprise Co., Ltd.
No. 34, Gongya 14th Rd., Renhua Vil., Dali Dist.,
Taichung City 412038
Taiwan, (R.O.C.)

Second manufacturing plant:
Transworld Steel Enterprise Co., Ltd.
No. 15, Aly. 26, Ln.198, Minsheng Rd., Wufong Dist.,
Taichung City 413006
Taiwan, (R.O.C.)

Product tested:
Type 1: Soft seal One-Piece Floating Flanged Ball Valve F301, F303
Type 2: Soft seal Two-Piece Floating Flanged Ball Valve F501, F502
Type 3: Soft seal Two-Piece Floating Ball Valve R301, R502, R701 (with double seals on the stem)
Type 4: Soft seal Two-Piece Floating Ball Valve R301, R502, R701 (with single seal on the stem)
Type 5: Soft seal Three-Piece Floating Ball Valve S300, S303, S304, S305, S320, S400, S600, S603, S604, S605, S701, S704, S711, S802, S900, S904, T531 (with double seals on the stem)
Type 6: Soft seal Three-Piece Floating Ball Valve S300, S303, S304, S305, S320, S400, S600, S603, S604, S605, S701, S704, S711, S802, S900, S904, T531 (with single seal on the stem)
Type 7: Soft seal Multi-Port Ball Valve M202, M203, M302, M304, M602 (with double seals on the stem)
Type 8: Soft seal Multi-Port Ball Valve M202, M203, M302, M304, M602 (with single seal on the stem)
Type 9: Soft seal Three-Piece Floating Ball Valve T801 (double ball valve)

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**

Dangerous Failure Rate (λ_D) for Closing on Demand and external Tightness

Type 1	2.78 E-07 / h	**278 FIT**	Type 2	3.61 E-07 / h	**361 FIT**
Type 3	2.75 E-07 / h	**275 FIT**	Type 4	3.83 E-07 / h	**383 FIT**
Type 5	4.59 E-07 / h	**459 FIT**	Type 6	5.67 E-07 / h	**567 FIT**
Type 7	5.21 E-07 / h	**521 FIT**	Type 8	6.29 E-07 / h	**629 FIT**
Type 9	3.83 E-07 / h	**383 FIT**			

Dangerous Failure Rate (λ_D) for Tight Shut Off acc. API 598 and external Tightness

Type 1	3.06 E-07 / h	**306 FIT**	Type 2	3.97 E-07 / h	**397 FIT**
Type 3	3.03 E-07 / h	**303 FIT**	Type 4	4.83 E-07 / h	**483 FIT**
Type 5	4.97 E-07 / h	**497 FIT**	Type 6	6.77 E-07 / h	**677 FIT**
Type 7	5.79 E-07 / h	**579 FIT**	Type 8	7.59 E-07 / h	**759 FIT**
Type 9	5.73 E-07 / h	**573 FIT**			

Dangerous Failure Rate (λ_D) for Open on Demand and external Tightness

Type 1	1.74 E-07 / h	**174 FIT**	Type 2	2.56 E-07 / h	**256 FIT**
Type 3	1.71 E-07 / h	**171 FIT**	Type 4	2.79 E-07 / h	**279 FIT**
Type 5	3.55 E-07 / h	**355 FIT**	Type 6	4.63 E-07 / h	**463 FIT**
Type 7	2.71 E-07 / h	**271 FIT**	Type 8	3.79 E-07 / h	**379 FIT**
Type 9	5.04 E-07 / h	**504 FIT**			

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.