Certificate

No.: 968/V 1187.00/20

Product tested	Butterfly Valves	**Certificate holder**	JDV CONTROL VALVES Co., Ltd. No. 6-1, Qingnian Rd. Yangmei City Taoyuan County 326 Taiwan, R.O.C.
Type designation	Triple Offset Butterfly Valve (type: JTEM)		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010		
Intended application	Safety Function: - close on demand and external tightness - close on demand with leakage criteria according to API 598 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 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 2025-12-14

The issue of this certificate is based upon an evaluation in accordance with the Certification Program CERT FSP1 V1.0:2017 in its actual version, whose results are documented in Report No. 968/V 1187.00/20 dated 2020-12-11. 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, 2020-12-14	Certification Body Safety & Security for Automation & Grid	Dipl.-Ing. (FH) Wolf Rückwart

www.fs-products.com
www.tuv.com

TÜVRheinland®
Precisely Right.

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: JDV CONTROL VALVES Co., Ltd.
No.6-1, Qingnian Rd., Yangmei City,
Taoyuan County 326,
Taiwan, R.O.C.

Product tested: Triple Offset Butterfly Valve (type: JTEM)

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

Dangerous Failure Rate	λ_D	3.99 E-07 / h	**399 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.78 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.81 E-04	

Close on demand acc. API 598 and external tightness

Dangerous Failure Rate	λ_D	6.61 E-07 / h	**661 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	2.94 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	3.04 E-04	

Open on demand and external tightness

Dangerous Failure Rate	λ_D	2.92 E-07 / h	**292 FIT**
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.30 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	1.32 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 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.