

Vanessa Series 30,000 Safety Integrity Level (SIL) Certificate

Introduction

The Series 30,000 Safety Integrity Level (SIL) certificate herein included (no. **968/V 1107.02/24**) attests that the development and manufacturing process, and the functional safety management applied by Emerson Vanessa in the relevant lifecycle phases of the product have been inspected and assessed as suitable for the use in applications with a maximum Safety Integrity Level of 3 (SC 3). First obtained in 2001, the latest SIL certification of the product has been issued by TÜV Rheinland, a worldwide independent test and certification institute which is accredited by the German DAKKS¹.

TÜV Rheinland based their product assessment on route 2H as detailed in IEC 61508:2010 (TÜV Rheinland's position on this topic is reported in their "Position Paper - HFT of final Elements EN", available upon request.) Following route 2H, the Probability of Failure on Demand (PFD) values make Vanessa Series 30,000 suitable for use in a safety instrumented system up to the maximum achievable SIL (SIL 2 for HFT = 0 and SIL 3 for HFT = 1; low demand mode) with a low SIL budget.

Alternatively, based on the route 1H approach, which uses a Safe Failure Fraction (SFF) determination of final elements, the valve may be used up to SIL 3 according to the diagnostic coverage provided by external devices and measures as part of the safety-related overall system. Since SFF is an application-specific value rather than a component-specific value, it is the responsibility of the end user to ensure a sufficient SFF by choosing the appropriate diagnostic measures and intrinsically safe design of the SIS.

According to the application standard for the process industry IEC 61511:2016-1, both routes can be used. The decision on which of the two routes to follow is up to the end user. The achieved Safety Integrity Level of an entire SIF design must be verified by the designer via a calculation of PFD_{avg} considering the system architecture, the proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all components included in the SIF. Each subsystem must be checked to ensure compliance with minimum HFT requirements.

¹ Accredited for "Testing and Certification of quality and safety especially functional safety including safety management of software and systems (with or without software) and their components (electronic components, measuring and control devices, programmable electronic systems)" – see <https://www.dakks.de/en/content/accredited-bodies-dakks?Regnr=D-PL-11052-01-00>

Certificate



No.: 968/V 1107.02/24

Product tested	Triple Offset Valves Vanessa 30,000 series	Certificate holder	Emerson Automation Solutions Final Control Italia S.r.l. Vanessa Manufacturing Plant Via Piacenza 29018 Lugagnano Val d'Arda (PC) Italy
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Type designation	Basic Configuration: DN 80 ... 3150 / ND 3 ... 126; PN 10 ... 250 / ASME Class 150 ... 1500 Cryogenic: DN 80 ... 2800 / ND 3 ... 112; PN 10 ... 160 / ASME Class 150 ... 1500 Cryogenic Top Entry: DN 200 ... 1500 / ND 8 ... 60; PN 10 ... 160 / ASME Class 150 ... 900 High Temperature: DN 80 ... 2400 / ND 3 ... 96; PN 10 ... 250 / ASME Class 150 ... 1500
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Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010
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Intended application	Safety Function: Open or Close 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.
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Specific requirements	The instructions of the associated Installation, Operating and Safety Manual shall be considered.
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Summary of test results see back side of this certificate.


Valid until 2029-07-10

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/INS 824.00/24 dated 2024-06-10. 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, 2024-07-10

Certification Body Safety & Security for Automation & Grid


Dipl.-Ing. (FH) Wolf Rückwart

Holder: Emerson Automation Solutions
Final Control Italia S.r.l.
 Vanessa Manufacturing Plant
 Via Piacenza
 29018 Lugagnano Val d'Arda (PC), Italy

Product tested: Triple Offset Valves
Vanessa 30,000 series, 3" ... 126"

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

Fail to Close - Shaft Side - Cryo and HT

Dangerous Failure Rate	λ_D	2.41 E-07 / h	241 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.06 E-03	

Fail to Close - Shaft Side - Basic

Dangerous Failure Rate	λ_D	1.77 E-07 / h	177 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	7.75 E-04	

Fail to Close - Shaft Side - Leak rate A acc. EN 12266-1 - Cryo and HT

Dangerous Failure Rate	λ_D	4.20 E-07 / h	420 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.84 E-03	

Fail to Close - Shaft Side - Leak rate A acc. EN 12266-1 - Basic

Dangerous Failure Rate	λ_D	3.54 E-07 / h	354 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.55 E-03	

Fail to Open - Disc Side - Cryo and HT

Dangerous Failure Rate	λ_D	2.56 E-07 / h	256 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.12 E-03	

Fail to Open - Disc Side - Basic

Dangerous Failure Rate	λ_D	1.78 E-07 / h	178 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	7.80 E-04	

Fail to Open - Shaft Side - Cryo and HT

Dangerous Failure Rate	λ_D	2.85 E-07 / h	285 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.25 E-03	

Fail to Open - Shaft Side - Basic

Dangerous Failure Rate	λ_D	2.07 E-07 / h	207 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	9.07 E-04	

Assumptions for the calculations above: DC = 0 %, $T_1 = 1$ year

Origin of values

The stated values are the results of a FMEDA for the design and manufacturing process.
 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.