

Certificate



SIL/PL
Capability

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ID 0600000000

No.: 968/V 1037.00/18

Product tested	Ball valves for high pressure applications and severe service	Certificate holder	Metso Flow Control Oy Vanha Porvoontie 229 01301 Vantaa Finland
Type designation	T2, XH, S6 and XU Series		
Codes and standards	IEC 61508 Parts 1-2 and 4-7:2010		
Intended application	Safety Function: When de-energised, the complete valve assembly goes to its fail safe position. The safety position of the valve can be either fully close or fully open. Hence the safety function of bare shaft valve is quarter turn action (full stroke) either to close the fluid flow through valve or open the fluid flow. The valves are suitable for use in applications (e.g. acc. IEC 61511-1) up to SIL 3 under consideration of the minimum required hardware fault tolerance (HFT).		
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 2023-01-19

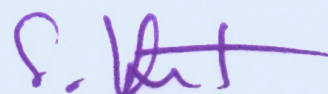
The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1037.00/18 dated 2018-01-19.

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, 2018-01-19

Certification Body Safety & Security for Automation & Grid


Dipl.-Ing. Stephan Hüb

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 **TÜVRheinland®**
Precisely Right.

Holder: Metso Flow Control Oy
Vanha Porvoontie 29
0880 Helsinki - Vantaa
Finland

Product tested: Ball valves for high pressure applications and severe service
T2, XH, S6 and XU series

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	
Lambda Dangerous confidence level of calculation $1-\alpha = 95\%$	λ_D	3.65 E-07 / h	365 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	λ_{DU}	3.65 E-07 / h	365 FIT
Mean Time To Dangerous Failure	MTTF _D	2.74 E+06 h	313 a
Average Probability of Failure on Demand 1001 assumed Proof Test Interval $T_1 = 1$ year	PFD_{avg}(T₁)	1.60 E-03	
Average Probability of Failure on Demand 1002 assumed Proof Test Interval $T_1 = 1$ year assumed $\beta_{1002} = 10\%$	PFD_{avg}(T₁)	1.63 E-04	

Origin of values

The stated values are the results of the analysis of field feedback of the last seventeen (17) years. Random and systematic failures which are the responsibility of the manufacturer were examined.

Systematic Capability

The development and manufacturing process and the functional safety management applied by the manufacturer in the relevant lifecycle phases of the product have been audited and assessed as suitable for the manufacturing of products for use in applications with a maximum Safety Integrity Level of 3 (SC 3).

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.