

Verification Certificate

This is to certify that: Severn Glocon Limited
Olympus Park
Quedgeley
Gloucester
GL2 4NF
United Kingdom

Holds Certificate Number: VC 688596

In respect of:

Valves as listed on page 2

Concerning verification of the manufacturers reports as detailed in this certificate to the relevant requirements of BS EN 61508-2:2010 Functional safety of electrical / electronic / programmable electronic safety-related systems. Part 2: Requirements for electrical/electronic/ programmable electronic safety-related systems.

For and on behalf of BSI:

Frank Lee, Product Certification Technical and Compliance Director

First Issued: 2018-04-10
Latest Issue: 2021-04-09

Effective Date: 2021-04-09
Expiry Date: 2024-04-08

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Verification Certificate

No. VC 688596

Manufacturer: Severn Glocon Limited

Verification Report Number: 3324940

Product Description

Product Name	Description	Normative References
Series 5000	Pneumatically actuated control valve	BS EN 61508-2:2010
Series 8000	High Performance, Multi offset Butterfly valves	

Verification of SIL levels:

Systematic Capability: Refer to tables on following pages
Random Capability: Type A, Route 1_H devices

Note: These devices have been considered for **Low demand operation** applications.

The safety function(s) of the product is defined as:

Fail Close Type

- The valve moves to the fully closed position via the spring in the pneumatic actuator.

Or

Fail Open Type

- The valve moves to the open position via the spring in the pneumatic actuator.

The figures quoted in this certificate are based on analysis of the following documentation:

Product Reliability Analysis Series 5000 Control Valve (PRA-001) Revision 8 – 04/03/21
Product Reliability Analysis Series 8000 Butterfly valve (PRA-002) Revision 4 – 04/03/21

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Verification Certificate

No. VC 688596

Functional Safety Specification Series 5000 - Standard Service					
Description	Symbol	Value (0% DC)	Value (60% DC)	Value (80% DC)	Comments
Mean Time To Failure (Hours)	MTTF	847,689	847,689	847,689	Based on sample quantity of 1215 installed between 2009 & 2019
Architecture	-	1001	1001	1001	
Failure Rate (Hours)	λ	1.18E-06	1.18E-06	1.18E-06	
Diagnostic Coverage	DC	0	60	80	Diagnostic Coverage to be provided by appropriate 'SMART' positioner.
Proof Test Interval (Hours)	(T_{PT})	17,520	17,520	17,520	
Mean Time To Restore	MTTR	8	8	8	
Dangerous Failure Rate	λ_D	4.5E-07	4.5E-07	4.5E-07	
Undetected Dangerous Failure Rate (Hours)	λ_{DU}	4.5E-07	1.8E-07	9.1E-08	
Detected Dangerous Failure Rate (Hours)	λ_{DD}	0.0E+00	2.7E-07	3.6E-07	
Mean Down Time for Voted Channels (Hours)	t_{CE}	8,768	3,512	1,760	
Probability of Failure on Demand	PFD_{AVG}	4.0E-03	1.6E-03	8.0E-04	
Safe Failure Fraction	SFF	62%	85%	92%	
Hardware Fault Tolerance	HFT	0	0	0	
SIL Capability	SIL	2	2	3	
Hardware Safety Integrity Compliance		1H			By theoretical analysis: FMEDA
Systematic Safety Integrity Compliance		1S			By quality system techniques & measures
Systematic Capability		SC 3			
Restrictions in Use		For use in Low demand safety functions only			Refer to OIM

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Functional Safety Specification Series 5000 - Severe Service					
Description	Symbol	Value (0% DC)	Value (60% DC)	Value (80% DC)	Comments
Mean Time To Failure (Hours)	MTTF	635,767	635,767	635,767	Based on sample quantity of 1215 installed between 2009 & 2019
Architecture	-	1001	1001	1001	
Failure Rate (Hours)	λ	1.57E-06	1.57E-06	1.57E-06	
Diagnostic Coverage	DC	0	60	80	Diagnostic Coverage to be provided by appropriate 'SMART' positioner.
Proof Test Interval (Hours)	(TI_{PT})	8,760	8,760	8,760	
Mean Time To Restore	MTTR	8	8	8	
Dangerous Failure Rate	λ_D	1.2E-06	1.2E-06	1.2E-06	
Undetected Dangerous Failure Rate (Hours)	λ_{DU}	1.2E-06	4.7E-07	2.3E-07	
Detected Dangerous Failure Rate (Hours)	λ_{DD}	0.0E+00	7.0E-07	9.3E-07	
Mean Down Time for Voted Channels (Hours)	t_{CE}	4,396	1,764	886	
Probability of Failure on Demand	PFD_{AVG}	5.1E-03	2.1E-03	1.0E-03	
Safe Failure Fraction	SFF	26%	70%	85%	
Hardware Fault Tolerance	HFT	0	0	0	
SIL Capability	SIL	1	2	2	
Hardware Safety Integrity Compliance		1H			By theoretical analysis: FMEDA
Systematic Safety Integrity Compliance		1S			By quality system techniques & measures
Systematic Capability		SC 3			
Restrictions in Use		For use in Low demand safety functions only			Refer to OIM

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Functional Safety Specification Series 8000 - Standard Service					
Description	Symbol	Value (0% DC)	Value (60% DC)	Value (80% DC)	Comments
Mean Time To Failure (Hours)	MTTF	372,400	372,400	372,400	Based on sample quantity of 1357 installed between 2009 & 2019
Architecture	-	1001	1001	1001	
Failure Rate (Hours)	λ	2.69E-06	2.69E-06	2.69E-06	
Diagnostic Coverage	DC	0	60	80	Diagnostic Coverage to be provided by appropriate 'SMART' positioner.
Proof Test Interval (Hours)	(T_{PT})	17,520	17,520	17,520	
Mean Time To Restore	MTTR	8	8	8	
Dangerous Failure Rate	λ_D	1.2E-06	1.2E-06	1.2E-06	
Undetected Dangerous Failure Rate (Hours)	λ_{DU}	1.2E-06	4.8E-07	2.4E-07	
Detected Dangerous Failure Rate (Hours)	λ_{DD}	0.0E+00	7.2E-07	9.6E-07	
Mean Down Time for Voted Channels (Hours)	t_{CE}	8,776	3,516	1,762	
Probability of Failure on Demand	PFD_{AVG}	1.1E-02	4.2E-03	2.1E-03	
Safe Failure Fraction	SFF	55%	82%	91%	
Hardware Fault Tolerance	HFT	0	0	0	
SIL Capability	SIL	1	2	2	
Hardware Safety Integrity Compliance		1H			By theoretical analysis: FMEDA
Systematic Safety Integrity Compliance		1S			By quality system techniques & measures
Systematic Capability		SC 3			
Restrictions in Use		For use in Low demand safety functions only			Refer to OIM

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Functional Safety Specification Series 8000 - Severe Service					
Description	Symbol	Value (0% DC)	Value (60% DC)	Value (80% DC)	Comments
Mean Time To Failure (Hours)	MTTF	372,400	372,400	372,400	Based on sample quantity of 1215 installed between 2009 & 2019
Architecture	-	1001	1001	1001	
Failure Rate (Hours)	λ	2.69E-06	2.69E-06	2.69E-06	
Diagnostic Coverage	DC	0	60	80	Diagnostic Coverage to be provided by appropriate 'SMART' positioner.
Proof Test Interval (Hours)	(TI_{PT})	17,520	17,520	17,520	
Mean Time To Restore	MTTR	8	8	8	
Dangerous Failure Rate	λ_D	1.4E-06	1.4E-06	1.4E-06	
Undetected Dangerous Failure Rate (Hours)	λ_{DU}	1.4E-06	5.6E-07	2.8E-07	
Detected Dangerous Failure Rate (Hours)	λ_{DD}	0.0E+00	8.4E-07	1.1E-06	
Mean Down Time for Voted Channels (Hours)	t_{CE}	8,776	3,516	1,762	
Probability of Failure on Demand	PFD_{AVG}	1.2E-02	4.9E-03	2.5E-03	
Safe Failure Fraction	SFF	26%	70%	85%	
Hardware Fault Tolerance	HFT	0	0	0	
SIL Capability	SIL	1	2	2	
Hardware Safety Integrity Compliance		1H			By theoretical analysis: FMEDA
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Manufacturing locations:

Severn Glocon Ltd
Olympus Park
Quedgeley
Gloucester
GL2 4NF
UK

Severn Unival Ltd
Heywoods industrial Park
Birds Royd Lane
Brighouse
West Yorkshire
HD6 1NA
UK

Severn Glocon India PVT Ltd
F96/97 Sipcot Industrial Park
Irungattukkottai
Chennai
India



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