

# Certificate of Inspection

## Certificate n° SVF.SIL48/OR155/22\_093/23

(Page 1/3)

Issued on 2023 December 14th

Object of Inspection	STRAHMAN Piston valves with sealing type METAL TO METAL						
Applicant Engineering Manufacturing	STRAHMAN UNITED PROCESS VALVES SAVOIE HEXAPOLE, 136, RUE GERMAIN SOMMEILLER 73420 MÉRY - FRANCE						
Equipment type	MECHANICAL EQUIPMENT						
System Architecture	As per example drawing 136S0008 Rev. B and Safety Manual "Strahman Piston Valves with sealing type METAL TO METAL or DUAL SEAL" Rev.00						
Inspection Requirements	IEC 61508:Ed. 2 - 2010 Functional safety of electrical/electronic/programmable electronic safety-related systems						
Inspection Result	<p>Bureau Veritas Italia S.p.A. states that STRAHMAN Piston valves series with sealing type METAL TO METAL or DUAL SEAL, Type "A", comply with requirements for use up to SIL 2 in low demand rate and of up to SIL 3 Instrumented Safety Functions configuration under the constraints as reported into the Safety Manual "Strahman PISTON VALVES with sealing type METAL TO METAL or DUAL SEAL Safety Manual"</p> <p>STRAHMAN Piston Valves series with sealing type METAL TO METAL or DUAL SEAL failure rates are shown in Table 1 to Table 6 as follow:</p> <p>FTC (Fail To Close) /FAIL LAST/NO TIGHT SHUT OFF and FTC TIGHT SHUT OFF – On-line diagnostics, No on-line diagnostics, No diagnostics).</p> <p>STRAHMAN Piston Valves series with sealing type METAL TO METAL or DUAL SEAL failure rates are shown in Table 7 to Table 9 as follow:</p> <p>FTO (Fail To Open) – On-line diagnostics, No on-line diagnostics, No diagnostics</p> <p>Architectural constraints Route 1H, 2H apply</p> <p>Systematic capability (SC) 3; 1S, 2S apply</p> <p>Architectural constraints Route 1H, 2H apply</p> <p>Systematic capability (SC) 3; 1S, 2S apply</p>						
Restrictions/ Conditions	As per Safety Manual "Strahman PISTON VALVES with sealing type METAL TO METAL or DUAL SEAL Safety Manual" and Safety Assessment Report SVF.SIL48/OR155/22 AS03 v1.0 issued by Bureau Veritas Italia S.p.A.						
Inspection Report	This assessment has been performed by the evaluation of conformity of the specific documents as reported in the Safety Assessment Report SVF.SIL48/OR155/22 AS03 v1.0, issued by Bureau Veritas Italia S.p.A. This certificate is valid for the STRAHMAN Piston Valves series with sealing type METAL TO METAL or DUAL SEAL.						
List of Evaluated Documents	The reference List is contained in the Safety Assessment Report SVF.SIL48/OR155/22 AS03 v1.0 The report issued by Bureau Veritas Italia S.p.A. is an integral part of this Inspection Certificate.						

$\lambda_t$ [1/h]	$\lambda_d$ [1/h]	$\lambda_{du}$ [1/h]	$\lambda_{dd}$ [1/h]	$\lambda_s$ [1/h]	Architectural Constraints	HFT	SIL
4.11E-07	4.11E-07	1.91E-07	2.20E-07	0.0	Route 1H/2H (low demand mode)	0 1	2 3

Table 1: PISTON VALVES Series with sealing type METAL TO METAL or DUAL SEAL, FTC / FAIL LAST / NO TIGHT SHUT OFF failure rates  
- NO online automatic diagnostics



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(Page 2/3)

Issued on 2023 December 14th

$\lambda_t$ [1/h]	$\lambda_d$ [1/h]	$\lambda_{du}$ [1/h]	$\lambda_{dd}$ [1/h]	$\lambda_{ddfs}$ [1/h]	$\lambda_s$ [1/h]	Architectural Constraints	HFT	SIL
6.93E-07	6.93E-07	2.82E-07	2.20E-07	1.91E-07	0.0	Route 1H/2H (low demand mode)		0 2
								1 3

Table 2: PISTON VALVES Series with sealing type METAL TO METAL or DUAL SEAL FTC / TIGHT SHUT OFF failure rates

- NO online automatic diagnostics

$\lambda_t$ [1/h]	$\lambda_d$ [1/h]	$\lambda_{du}$ [1/h]	$\lambda_{dd}$ [1/h]	$\lambda_s$ [1/h]	Architectural Constraints	HFT	SIL
4.11E-07	4.11E-07	1.13E-07	2.99E-07	0.0	Route 1H/2H (low demand mode)		0 2
							1 3

Table 3: PISTON VALVES with sealing type METAL TO METAL or DUAL SEAL FTC / FAIL LAST / NO TIGHT SHUT OFF failure rates

- On-line automatic diagnostics

$\lambda_t$ [1/h]	$\lambda_d$ [1/h]	$\lambda_{du}$ [1/h]	$\lambda_{dd}$ [1/h]	$\lambda_{ddfs}$ [1/h]	$\lambda_s$ [1/h]	Architectural Constraints	HFT	SIL
6.93E-07	6.93E-07	2.82E-07	2.99E-07	1.13E-07	0.0	Route 1H/2H (low demand mode)		0 2
								1 3

Table 4: PISTON VALVES with sealing type METAL TO METAL or DUAL SEAL FTC/TIGHT SHUT OFF failure rates

- On-line automatic diagnostics

$\lambda_t$ [1/h]	$\lambda_d$ [1/h]	$\lambda_s$ [1/h]	Architectural Constraints	HFT	SIL
4.11E-07	4.11E-07	0.0	Route 1H	0	1
			Route 2H	0	2
			(low demand mode)	1	3

Table 5: PISTON VALVES Series with sealing type METAL TO METAL or DUAL SEAL FTC / FAIL LAST / NO TIGHT SHUT OFF failure rates

- NO diagnostics

$\lambda_t$ [1/h]	$\lambda_d$ [1/h]	$\lambda_s$ [1/h]	Architectural Constraints	HFT	SIL
6.93E-07	6.93E-07	0.0	Route 1H	0	1
			Route 2H	0	2
			(low demand mode)	1	3

Table 6: PISTON VALVES with sealing type METAL TO METAL or DUAL SEAL FTC / TIGHT SHUT OFF failure rates

- NO diagnostics

$\lambda_t$ [1/h]	$\lambda_d$ [1/h]	$\lambda_{du}$ [1/h]	$\lambda_{dd}$ [1/h]	$\lambda_s$ [1/h]	Architectural Constraints	HFT	SIL
5.48E-07	5.19E-07	4.76E-08	4.72E-07	2.89E-08	Route 1H/(2H (low demand mode)	0	3

Table 7: PISTON VALVES Series with sealing type METAL TO METAL or DUAL SEAL FTO failure rates

- Online automatic diagnostics



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(Page 3/3)

Issued on 2023 December 14th

$\lambda_t$ [1/h]	$\lambda_d$ [1/h]	$\lambda_{du}$ [1/h]	$\lambda_{dd}$ [1/h]	$\lambda_s$ [1/h]	Architectural Constraints	HFT	SIL
5.48E-07	5.19E-07	1.72E-07	3.48E-07	2.89E-08	Route 1H/2H (low demand mode)	0 1	2 3

Table 8: PISTON VALVES Series with sealing type METAL TO METAL or DUAL SEAL FTO failure rates  
- NO online automatic diagnostics

$\lambda_t$ [1/h]	$\lambda_d$ [1/h]	$\lambda_s$ [1/h]	Architectural Constraints	HFT	SIL
5.48E-07	5.19E-07	2.89E-08	Route 1H	0	1
			Route 2H	0	2
			(low demand mode)	1	3

Table 9: PISTON VALVES with sealing type METAL TO METAL or DUAL SEAL FTO failure rates  
- NO diagnostics

(\*) Type "A", Low demand mode, Route 2H

**Validity** This certificate is valid until 2026 December 13<sup>th</sup> as long as the Object of Inspection and the relevant technical documentation are not modified. BVI must be informed about any modifications without delay.

**Date of first issue** 2023 December 14th



**Signature**

Name: Cristian Veglia

Title: General Manager

On behalf of Bureau Veritas Italia S.p.A. – Viale Brigata Bisagno, 2 - 16129 Genova, Italy



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