



IEC 61508 Safety Integrity Level Capability Certificate

Functional Safety of Safety-Related Programmable Electronic Systems

The **Pneumatrol Ltd, Redundant Valve Manifold (RVM) Auto Isolation High Flow variant** has been assessed and is considered capable for use in a low demand Safety Function up to (and including) SIL 2, with regard to random failure rate and architectural constraints.

Systematic Capability (SC) was not addressed as part of this analysis.

The function of the RVM is to allow the pneumatic solenoid valves connected to the block to remove the pneumatic supply at the output of the of the block within the specified time. The function applies to use of pneumatic solenoid valves operating as De-Energise To Trip (DETT) or Energise To Trip (ETT).

The assessment was based on the assumptions, data provided, and recommendations given in:

- **Environmental Resources Management Ltd Report L011_FM001 rev. 3;**
- **Renewal Letter from Pneumatrol signed by Jamie Dummer, Managing Director, dated: 17/11/2023.**

The product was assessed against the following failure modes:

- **RVM Block with 4x solenoid valves in a DETT mode of operation (High Flow variant);**
- **RVM Block with 4x solenoid valves in an ETT mode of operation (High Flow variant).**

The proposed configuration of the RVM block is in a 2oo3 voting arrangement therefore it is recommended that reliability calculations for the entire final element configuration (i.e. inclusive of RVM Block, Auto Isolation Valve and SXH / SxD solenoid or E series range solenoid) is conducted to ensure that the target SIL and PFD required it met. This should also be conducted based on whether the loop is configured as DETT or ETT.

The assessment was carried out to determine compliance with IEC 61508 (2010 Edition) with regards to:

- Random Hardware:
 - o RVM Block – Auto Isolation Variant (High Flow): SIL 2 with a HFT = 0 via Route 1_H;
 - o Auto Isolation Valve (DETT): SIL 2 with a HFT = 0 via Route 1_H;
 - o Auto Isolation Valve (ETT): SIL 1 with a HFT = 0 via Route 1_H.
- Architectural Constraints:
 - o RVM Block (Type A, SFF >60% <90%);
 - o Auto Isolation Valve (DETT) (Type A, SFF >60% <90%);
 - o Auto Isolation Valve (ETT) (Type A, SFF <60%).

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Note 1: The SIL of a complete SIF (sensor, logic solver and final element subsystems) must be verified to calculate the required PFD / PFH, considering any redundancy, Proof Test Interval (PTI), Proof Test Coverage (PTC), Mission Time and Mean Time To Restoration (MTTR) for all elements included in the SIF. Each subsystem should be verified to ensure compliance with the minimum HFT requirements.

Description	λ_{DU} (/hr)	λ_{DD} (/hr)	λ_s (/hr)	SFF	Type	Achieved SIL (Arch. Constraints, HFT = 0)
RVM Block – Auto Isolation Variant (High Flow)	1.4E-08	0.0E+00	6.2E-08	82.2%	A	SIL 2
Auto Isolation Valve (DETT)	6.3E-08	0.0E+00	2.1E-07	76.9%	A	SIL 2
Auto Isolation Valve (ETT)	2.7E-07	0.0E+00	7.2E-09	2.6%	A	SIL 1

Reference should be made to the respective SIL certificates for the SXH / SXD and E Series Solenoid Valve Ranges.

IMPORTANT: It should be noted that this assessment does not include confirmation of the response time of the devices. For response times (along with any relevant assumptions) reference should be made to the Safety Manual of each device and the total SIF response time **MUST** be compared against the process safety time for the specific application.

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Renewal Date: November 2023, valid to November 2025
Certificate: L011_CT001 rev. 3

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