



ENGINEERING SAFETY CONSULTANTS

The Global Provider of Functional Safety Expertise and Technical Consultancy

Certificate of Conformity to IEC 61508 Safety Integrity Level (SIL) 1/2

Functional Safety of Safety-Related Programmable Electronic Systems

Pneumatrol Solenoid Valves Series C, E and T

The PNEUMATROL Solenoid Valves Series C, E and T has been assessed for its ability to move the valve to the designated safe state within the specified time for both de-energise to trip (DETT) and energise to trip (ETT) low demand applications with regard to systematic (assessed under Prior Use route), random failure rate and architectural constraint.

Based on the assumptions, data provided, and recommendations given in ESC Ltd report: F127_SV001 rev. 2, the assessed devices achieved the following results:

Model Series	Failure Mode	λ_{DU} (/hr)	PFD Achieved	SFF	Type	Architecture (HFT=0)	Architecture (HFT=1)
C Series	De-energised to Trip	7.2E-08	3.1E-04	85%	A	2	3
	Energised to Trip	3.7E-07	1.6E-03	2%	A	1	2
E Series	De-energised to Trip	7.2E-08	3.1E-04	85%	A	2	3
	Energised to Trip	3.7E-07	1.6E-03	2%	A	1	2
T Series	De-energised to Trip	7.2E-08	3.1E-04	85%	A	2	3
	Energised to Trip	3.7E-07	1.6E-03	2%	A	1	2

The assessment was carried out to determine compliance with IEC 61508 with regards to:

- Random Hardware Failures (Predicted Probability of Failure on Demand (PFD) was based on a 1 year proof test;
- Architectural Constraints;
- Systematic Capability of SIL 2 against IEC 61511 (2016 Edition) Prior Use.

Note 1: The sensing, logic solver and reaming final element sub-system have been excluded for the analysis and subsequently 80% of the SIL band has been allocated for their inclusion (e.g. SIL 2 band is modified to $\geq 0.2E-03$ to $< 0.2E-04$).

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Certificate: F127_CT001 rev. 4

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