



ENGINEERING SAFETY CONSULTANTS

The Global Provider of Functional Safety Expertise and Technical Consultancy

Random Hardware Reliability Assessment Certificate

Functional Safety of Safety-Related Programmable Electronic Systems

The **Patol Ltd, LDM-519-LP Monitor/Controller** has been assessed and is considered capable for use in a low demand Safety Function up to (and including) SIL 2 with regards to random hardware failures and architectural constraints.

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

- **Engineering Safety Consultants Ltd Report: C050_SV001_(4.0);**
- **Renewal Letter from Patol Ltd, signed by Mark Lewis, Product Development Engineer, Dated 5th July 2022.**

The system was assessed against the following failure mode:

- **The unit fails to provide an alarm when there is a high temperature at the sensing element.**

The system assessed comprises the following modules:

- LDM-519-LP Module (Part No. 700-201);
- Analogue (Resettable) Linear Heat Detecting Cables:
 - Red PVC 700-001;
 - Red PVC S.S 700-005;
 - Black Nylon 700-003;
 - Black Nylon S.S 700-004;
 - Red LS0H FRPE 700-001LS0H;
 - Red LS0H FRPE S.S 700-005LS0H.

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

- Random Hardware Failures (Predicted PFD as shown in Table below) with a Mean Down Time (MDT) of 168 hours, a Proof Test Interval (PTI) of 1 year (8760 hours), as Proof Test Coverage (PTC) of 100% or 95% and an Overhaul Interval of 10 years (87600 hours);
- Random Hardware Failure with Achieved PFH = 3.4E-08;
- Random Hardware Failure with Achieved $\lambda_{DD} = 1.8E-07$ (/hr);
- Random Hardware Failure with Achieved $\lambda_{DU} = 3.4E-08$ (/hr);
- Architectural Constraints (Type A, 60%-90%).

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The assessment results are as follows:

Device	Proof Test Interval (hrs)	Proof Test Coverage (PTC)	Estimated PFD	Max Allowable SIL (Architectural Constraints)	Overall Achieved SIL
LDM-519-LP-LHDC	8760	95%	2.4E-04	2	2
		100%	1.7E-04	2	2

IMPORTANT: It should be noted that this assessment does not include confirmation of the response time of the device. 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.

Managing Director: Simon Burwood
Member of IEC 61508 (MT61808-1-2) & IEC 61511 (MT61511) Maintenance Committees
Assessment Date: April 2013
Renewal Date: July 2022, valid to July 2024
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