



ENGINEERING SAFETY CONSULTANTS

The Global Provider of Functional Safety Expertise and Technical Consultancy

Random Hardware Reliability Certificate

Functional Safety of Safety-Related Programmable Electronic Systems

The **Patol Ltd, Digital Linear Heat Detection Interface LDM-519-DIM-28** has been assessed and is considered capable for use in a low demand Safety Function up to (and including) SIL 2, with respect 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: K155_FM001 rev. 3.**

The product was assessed against the following failure mode:

- **A fault causing a failure of the fire detection unit to identify a genuine high temperature alarm.**

The system assessed comprises the following modules:

- LDM-519-DIM module (Part No. 700-442);
- Linear heat detecting cable:
 - 700-070LS0H Digital LHDC. Standard 70°C max switching temperature.
 - 700-071LS0H Digital LHDC. As above, but with additional exterior stainless-steel wire over braid, referred to as “Armoured” Digital LHDC.
 - 700-090LS0H Digital LHDC. Standard 90°C max switching temperature.
 - 700-091LS0H Digital LHDC. Armoured version.
 - 700-070 Digital LHDC. Standard 70°C max switching temperature.
 - 700-071 Digital LHDC. As above, but with additional exterior stainless-steel wire over braid, referred to as “Armoured” Digital LHDC.
 - 700-090 Digital LHDC. Standard 90°C max switching temperature.
 - 700-091 Digital LHDC. Armoured version.
 - 700-140 Digital LHDC. Standard 140°C max switching temperature.
 - 700-141 Digital LHDC. Armoured version.
 - 700-180 Digital LHDC. Standard 180°C max switching temperature.
 - 700-181 Digital LHDC. Armoured version.

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

- SIL 2 with a HFT = 0 via Route 1_H;
- Random Hardware Failure with Achieved PFH = 7.9E-08;
- Random Hardware Failure with Achieved $\lambda_{DD} = 1.5E-07$ (/hr);
- Random Hardware Failure with Achieved $\lambda_{DU} = 7.9E-08$ (/hr);
- Architectural Constraint (Type A, SFF 60-<90%).

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| Device | λ_{DU} (/hr) | λ_{DD} (/hr) | λ_S (/hr) | SFF (%) | Device Type | Estimated SIL Capability |
|----------------|----------------------|----------------------|-------------------|---------|-------------|--------------------------|
| LDM-519-DIM-28 | 7.9E-08 | 1.5E-07 | 2.3E-07 | 83 | A | SIL 2 |

Note: The entire SIL of an entire 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.

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
Assessment Date: November 2020
Renewal Date: October 2022, valid to October 2024
Certificate: K155_CT001 rev. 3

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