



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 **Linesense Fire Detection Ltd, Digital Linear Heat Detection Interface 52101-001-28** 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_FM002 rev. 2.**

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:

- 52101-001-28 digital interface module;
- Linear heat detecting cable:
 - 51100-068 Model H8040N Digital Linear Heat Detection Cable (LHDC). Alarm temperature 68°C, max ambient 45°C. Black nylon outer sheath;
 - 51100-085 Model H8045N Digital Linear Heat Detection Cable (LHDC). Alarm temperature 85°C, max ambient 45°C. Black nylon outer sheath;
 - 51100-105 Model H8028 Digital Linear Heat Detection Cable (LHDC). Alarm temperature 105°C, max ambient 70°C. Black PVC outer sheath;
 - 51100-176 Model H8069 Digital Linear Heat Detection Cable (LHDC). Alarm temperature 176°C, max ambient 105°C. Red PVC outer sheath;
 - 51100-240 Model H9650 Digital Linear Heat Detection Cable (LHDC). Alarm temperature 240°C, max ambient 200°C. White fluoropolymer outer sheath.

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 λ_{DD} = 1.5E-07 (/hr);
- Random Hardware Failure with Achieved λ_{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
52101-001-28	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_CT002 rev. 2

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