ENGINEERING SAFETY CONSULTANTS
The Global Provider of Functional Safety Expertise and Technical Consultancy

Random Hardware Reliability and Systematic Assessment Certificate

Functional Safety of Safety-Related Programmable Electronic Systems

The **Apollo Fire Detectors Ltd, Fire Detectors** have been assessed and are considered capable for use in a low demand Safety Function up to (and including) SIL 2, with respect to random hardware failures, architectural constraints and systematic capability.

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

- **Technis Report No. T594 Issue 3.0;**
- **Engineering Safety Consultants Ltd Report: E046_PU002 rev. 5;**
- **Renewal Letter from Apollo Fire Detection Ltd for products with PCB / component changes with no impact to safety function, signed by Billy Blakeman, Head of Conformance, Dated 23rd August 2022.**

The certified devices can only achieve SIL 2 if used in conjunction with a fire alarm control panel that supports all elements of the Apollo protocol, including full fault diagnostics.

The Safety Manual for each product covered by this certificate should provide a reference to the ESC assessment report: E046_PU002 rev. 5.

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

- Probability of Failure on Demand (PFD) with a proof test interval (T_p) of one year, a proof test coverage (PTC) of 95% or 100%, an Overhaul Interval of 10 years and a repair time of a detected failure of 24 hours against IEC 61508 (2010 Edition) and IEC 61511 (2016 Edition);
- Architectural Constraints (SFF) for Type B equipment against IEC 61508 (2010 Edition);
- Systematic Capability against IEC 61511 (2016 Edition), prior use, suitable up to SIL 2.

Products Assessed	PFD (T_p = 1 year, PTC = 100%)	PFD (T_p = 1 year, PTC = 95%)	SFF
58000 – 700 SIL / mar Discovery / Marine Multisensor Smoke Detector	4.3E-05	6.1E-05	90% to <99%
58000 – 400 SIL / mar Discovery / Marine Heat Detector	3.1E-05	4.4E-05	90% to <99%
58000 – 600 SIL / mar Discovery / Marine Optical Smoke Detector	4.1E-05	5.9E-05	90% to <99%

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: May 2016
Renewal Date: September 2022, valid to September 2024
Certificate: E046_CT001 rev. 10

ENGINEERING SAFETY CONSULTANTS LTD
2nd Floor, Exchequer Court, 33 St. Mary Axe,
London, EC3A 8AA UK
Telephone/Fax: +44 (0)20 8542 2807
E-Mail: info@esc.uk.net Web: www.esc.uk.net
Registered in England and Wales: 7006868
Registered Office: 33 St. Mary Axe, London, EC3A 8AA