FUNCTIONAL SAFETY CERTIFICATE

This is to certify that the

HD1 Heat Detector

manufactured by

Eaton MEDC Ltd
Unit B
Sutton Parkway
Oddicroft Lane
Sutton In Ashfield
NG17 5FB
UK

has been assessed by CSA Group Testing with reference to the CASS methodologies and found to meet the requirements of

IEC 61508-2:2010

The Product and its associated data contained herein can be considered for use in the design of safety functions up to and including

SIL 2*

when used in accordance with the scope and conditions of this certificate.

* The Product that has been certified is not implicit of the achieved Safety Integrity Level (SIL) of the safety related system

Certification Decision: James Lynskey

Initial Certification: 17th July 2012
This certificate issued: 16th July 2024
Renewal date: 6th June 2029

UKAS PRODUCT CERTIFICATION 0011

CSA Group Testing UK Ltd
Unit 6 Hawarden Industrial Park,
Hawarden, CH5 3US, United Kingdom
Tel: +44 (0) 1244 670900
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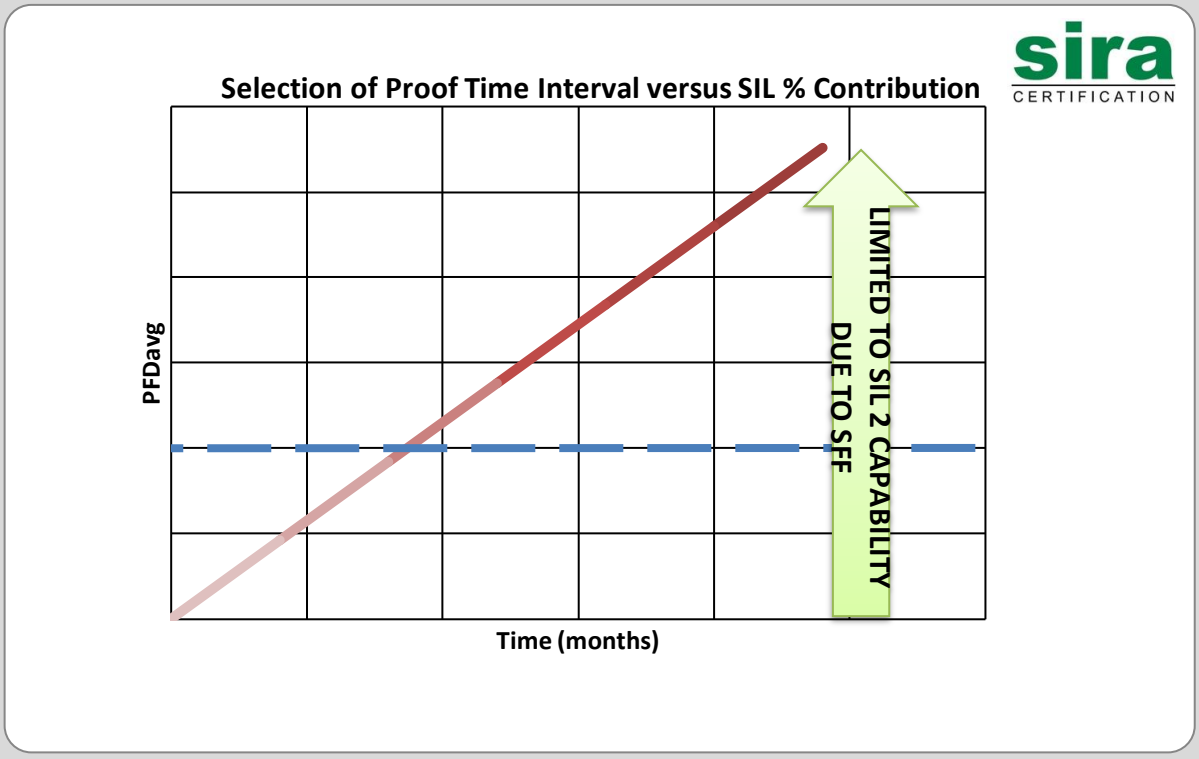
Table 1: Summary Table of HD1 Heat Detector

Product Identification: HD1 Heat Detector			
SAFETY FUNCTION: *'To detect when the device reaches a predefined temperature'*			
Architectural constraints:	Type A HFT=0 SFF = 78%		SIL 2
Random hardware failures:	λ_{DD} = 0 λ_{DU} = 3.15E-07		λ_{SD} = 0 λ_{SU} = 1.18E-06
Probability of failure on demand:	PFD_{AVG}=1.38E-03 (Low Demand Mode)	Assuming: - PTI = 8760 Hrs[4] MTTR = 8Hrs[4]	SIL 2
Probability of failure per Hour:	PFH = 3.15E-07		SIL 2
Hardware safety integrity compliance[1]		Route 1_H	
Systematic safety integrity compliance[1]		Route 1_S	
Systematic Capability[2]		SC 2 (Ref to 56A24816B)	
Overall SIL-capability achieved[3]		SIL 2 (Low Demand) SIL 2 (High Demand)	



[1] These are new parameters used in IEC61508 Part 2 Sections 7.4.2 & 7.4.4.
[2] This is a new measurable scale for the systematic safety integrity level; refer to IEC61508 Part 4 Section 3.5.9.
[3] This is determined by the lowest SIL indicated by each of the parameters given above.
[4] These figures are used only for demonstration purposes.

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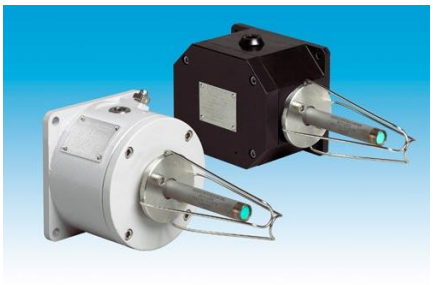
Product description and scope of certification

The HD1 heat detector has been designed for use in the offshore and onshore oil, gas and petrochemical industries.

The HD1 Heat Detector uses a Fenwal heat detector contact which is encased in either a marine grade alloy SM87 enclosure or a JB10 GRP corrosion free enclosure.



Certified Data in support of use in safety functions

The assessment has been carried out with reference to the *Conformity Assessment of Safety-related Systems* (CASS) methodology using the Route 1_H approach.

Element Safety Function(s)

'To detect when the device reaches a predefined temperature'.

The *Safe State* of the *EUC* is to be achieved when the product provides an indication that the temperature within the vicinity of the device is above a predefined temperature setting.

The element safety function is intended for use in low demand *Mode of Operation* as indicated by the certified failure data overleaf.

Identification of certified equipment

The certified equipment and its safe use are defined in the manufacturer's documentation listed in Table 2 below.

Table 2: Certified drawings

Document no.	Pages	Rev	Date	Document description
465-109	1	B	01/07/2003	Production GA SM87 JB Heat Detector
465-110	1	A	01/07/2003	EExd Heat Detector Wiring Diagram
196-189	1	E	27/06/2003	JB10 Heat Detector Production GA
196-190	1	A	27/06/2003	JB10 Heat Detector Wiring Diagram
06-127373-002	1	BD	09/03/1981	Fenwal Detector, Assy – Element
06-1220127-001	1	AA	28/11/1967	Fenwal Bellows and Shell End Assembly

The failure data above is supported by the base information given in Table 3 below.

Table 3: Information supporting the failure rate data

TOE #	Description	Supporting Evidence
1	Product identification:	HD1 Heat Detector
2	Functional specification:	Refer to product data sheet DSMC0020.
3-5	Random hardware failure rates:	Refer to table 1
6	Environment limits:	Temperature range:

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		-55°C to +125°C operational within ATEX +60°C to +385°C for all environments
7	Lifetime/replacement limits:	Refer to the technical manual (IOM manual) • TM159 (Exd, Exem & Exia) • TM228 (Exd IIC)
8	Proof Test requirements:	Refer to table 1
9	Maintenance requirements:	Refer to the technical manual (IOM manual) • TM159 (Exd, Exem & Exia) • TM228 (Exd IIC)
10	Diagnostic coverage:	N/A the HD1 has no form of Diagnostics
11	Diagnostic test interval:	
12	Repair constraints:	Refer to the technical manual (IOM manual) • TM159 (Exd, Exem & Exia) • TM228 (Exd IIC)
13	Safe Failure Fraction:	Refer to table 1
14	Hardware fault tolerance (HFT):	
15	Highest SIL (architecture/type A/B):	
16	Systematic failure constraints:	For instructions and constraints on use of the device refer to the technical manual (IOM manual) • TM159 (Exd, Exem & Exia) • TM228 (Exd IIC)
17	Evidence of similar conditions in previous use:	Compliance Route 2_H (proven-in-use) not used
18	Evidence supporting the application under different conditions of use:	
19	Evidence of period of operational use:	
20	Statement of restrictions on functionality:	
21	Systematic capability:	This assessment is based on an element which is to be used in a SRS and is not a full SRS design related assessment.
22	Systematic fault avoidance measures:	
23	Systematic fault tolerance measures:	
24	Validation records:	

Conditions of Certification

The validity of the certified base data is conditional on the manufacturer complying with the following conditions:

1. The manufacturer shall analyse failure data from returned products on an on-going basis. CSA Certification Service shall be informed in the event of any indication that the actual failure rates are worse than the certified failure rates. (A process to rate the validity of field data should be used. To this end, the manufacturer should co-operate with users to operate a formal field-experience feedback programme).
2. CSA shall be notified in advance (with an impact analysis report) before any modifications to the certified equipment or the functional safety information in the user documentation is carried out. CSA may need to perform a re-assessment if modifications are judged to affect the product's functional safety certified herein.
3. On-going lifecycle activities associated with this product (e.g., modifications, corrective actions, field failure analysis) shall be subject to surveillance by CSA in accordance with 'Regulations Applicable to the Holders of CSA Certificates'.

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Conditions of Safe Use

The validity of the certified base data in any specific user application is conditional on the user complying with the following conditions:

1. The user shall comply with the requirements given in the manufacturer's user documentation (referred to in Table 3 above) in regard to all relevant functional safety aspects such as application of use, installation, operation, maintenance, proof tests, maximum ratings, environmental conditions, repair, etc;
2. Selection of this equipment for use in safety functions and the installation, configuration, overall validation, maintenance and repair shall only be carried out by competent personnel, observing all the manufacturer's conditions and recommendations in the user documentation.
3. All information associated with any field failures of this product should be collected under a dependability management process (e.g., IEC 60300-3-2) and reported to the manufacturer.
4. The unit should be tested at regular intervals to identify any malfunctions; in accordance with the safety manual.

General Conditions and Notes

1. This certificate is based upon a functional safety assessment of the product described in CSA Test & Certification Assessment Report R56A27746A and any further reports referenced in that report (under previous CSA projects).
2. If certified product or system is found not to comply, CSA Certification Service should be notified immediately at the address shown on this certificate.
3. The use of this Certificate and the CSA Certification Mark that can be applied to the product or used in publicity material are subject to the 'Regulations Applicable to the Holders of CSA Certificates' and 'Supplementary Regulations Specific to Functional Safety Certification'.
4. This document remains the property of CSA and shall be returned when requested by the issuer.

Certificate History

Issue	Date	Project No.	Comment
03	20/02/2017	70105191	Certificate re-issued after successful recertification.
04	07/06/2019	R80000491A	Certificate updated to align all Eaton MEDC certificate expiry dates.
05	16/07/2024	R80213231B	Certificate re-issued after successful recertification audit.

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