



## ENGINEERING SAFETY CONSULTANTS

*The Global Provider of Functional Safety Expertise and Technical Consultancy*

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# Random Hardware Reliability Certificate

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### ***Functional Safety of Safety-Related Programmable Electronic Systems***

The **Hochiki Europe (UK) Ltd, CHQ-PCM(SCI), CHQ-PCM/DIN(SCI), CHQ-DIM2(SCI), CHQ-DIM2/DIN(SCI), CHQ-DRC2(SCI) and CHQ-DRC2/DIN(SCI)** for use in fire detection and alarm systems has been assessed and is considered capable for use in a low demand Safety Function up to (and including) SIL 1 or 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: D134\_SV001 rev. 6;**
- **Renewal letter from Hochiki Europe (UK) Ltd, signed by Shane Bartlett, Compliance Manager Engineer, dated: 03/10/2022.**

The following product variants are also covered under this certificate, with the product labels being the only difference:

- CHQ-PCM(SCI)/SIL;
- CHQ-PCM/DIN(SCI)-SIL;
- CHQ-PCM(SCI)/RWY;
- CHQ-PCM/DIN(SCI)/RWY;
- CHQ-DIM2(SCI)/SIL;
- CHQ-DIM2/DIN(SCI)/SIL;
- CHQ-DRC2(SCI)/SIL;
- CHQ-DRC2/DIN(SCI)/SIL;
- CHQ-DRC2(SCI)-RWY;
- CHQ-DRC2/DIN(SCI)-RWY.

The products were assessed against the following failure modes:

- **Failure to send valid signal to controller when end device impedance is between 200  $\Omega$  and 1000  $\Omega$ ;**
- **Failure to initiate a valid output command when requested.**

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The products assessed include the following results:

- SIL 2 SIF suitable – CHQ-PCM(SCI), CHQ-PCM/DIN(SCI), CHQ-DRC2(SCI) and CHQ-DRC2/DIN(SCI) with simplex input (i.e. HFT = 0) and/or duplex output (i.e. HFT = 1) module configuration;
- SIL 2 SIF suitable – CHQ-PCM(SCI), CHQ-PCM/DIN(SCI), CHQ-DRC2(SCI) and CHQ-DRC2/DIN(SCI) with only input;
- SIL 1 SIF suitable – CHQ-PCM(SCI), CHQ-PCM/DIN(SCI), CHQ-DRC2(SCI) and CHQ-DRC2/DIN(SCI) simplex output (i.e. HFT = 0) module configuration;
- SIL 2 SIF suitable – CHQ-PCM(SCI), CHQ-PCM/DIN(SCI), CHQ-DRC2(SCI) and CHQ-DRC2/DIN(SCI) with duplex output (i.e. HFT = 1) module configuration;
- SIL 2 SIF suitable – CHQ-DIM2(SCI) and CHQ-DIM2/DIN (SCI).
- Architectural Constraints:
  - Input Block, (Type A, SFF 90% - 99%);
  - Main Processor Block, (Type B, SFF 90% - 99%);
  - Simplex Output Block, (Type A, SFF <60%).

Device	$\lambda$ Total (/hr) including no-effect	$\lambda_{DU}$ (/hr)	$\lambda_{DD}$ (/hr)	$\lambda_S$ (/hr)	SFF (%)	Device Type
Input (Block 4) one channel	2.6E-08	7.2E-10	8.0E-09	2.6E-09	93.6	A
Main Processor (Blocks 1,2,3,5 & 7)	6.7E-07	1.7E-08	4.4E-07	0.0E-00	96.4	B
Output (Block 6a) (normally close)	2.3E-07	1.2E-07	0.0E-00	5.5E-08	31.9	A
Output (Block 6b) (normally open)	2.3E-07	1.1E-07	0.0E-00	6.8E-08	39.1	A

Note: The PFD or PFH of a complete SIF (inclusive of sensor, logic solver and final element subsystems) must be determined, considering any redundancy, Proof Test Interval (PTI), Proof Test Coverage (PTC), Mission Time and Mean Time To Restoration (MTTR) for all elements. 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: January 2015  
 Renewal Date: October 2022, valid to October 2024  
 Certificate: D134\_CT001 rev. 7

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