



Choose certainty.  
Add value.

# CERTIFICATE

**Hanne Kaloinen**

Has successfully completed the Functional Safety  
Certification Program requirements for

***Functional Safety Engineer***

In accordance with  
IEC 61508:2010

Date issued: 08-March-2024  
ID number: TS24050624  
Field: Functional Safety Industry  
Subject: Safety-Related Systems

A handwritten signature in blue ink, appearing to read "G. Greil".

G. Greil  
Certifier

A handwritten signature in blue ink, appearing to read "Dr. Michel Houtermans".

Dr. Michel Houtermans  
Trainer

# CURRICULUM

- **Functional safety management:**  
Life cycle concept, documentation requirements, verification, validation, assessments and audits, modifications <sup>[L]</sup><sub>[SEP]</sub>
- **Hazard & Risk Analysis:**  
Hazard identification, hazard analysis, risk reduction, safety function definition using FMECA, FTA, ETA, LOPA, risk matrix, risk graph
- **Planning the safety system:**  
Planning for end users, integrators, and realization of safety systems, safety plan, verification plan, validation plan, safety requirement specification, requirements for suppliers, FAT, SAT
- **Hardware design:**  
Hardware lifecycle, energize vs de-energize, low demand, high demand, demand mode, continuous mode, redundancy, diversity, voting, hardware fault tolerance, safe failure fraction, type A/B, architectural constraints, proof testing, diagnostic tests, measures to avoid and control failures, compliant items, compliance routes
- **Hardware reliability:**  
Reliability modeling, FMEDA, simplified equations, block diagrams, FTA, Markov, failure data, HFT, SFF, DC, CCF, SIL, PFH, PFD
- **Software design:**  
Software lifecycle, embedded software, application software, utility software, fixed programming languages, limited variability languages, full variability languages, software architecture, V-model, measures to avoid failures, compliance routes <sup>[L]</sup><sub>[SEP]</sub>
- **Operation and maintenance:**  
Installation and commissioning, safety validation, operation, maintenance and repair, modification and retrofit, maintenance override <sup>[L]</sup><sub>[SEP]</sub>
- **Experience:**  
The holder of this certificate has more than 6 years experience in more than 2 functional safety projects