Functional Safety Engineer

The Functional Safety Engineer ensures that automotive systems and components meet international functional safety standards (IEC 61508, ISO 26262, ISO 13849). This role is central to identifying hazards, defining safety goals, deriving safety requirements, and validating compliance with Automotive Safety Integrity Levels (ASIL).

Main activities include conducting hazard analyses and risk assessments, designing and verifying hardware and software safety mechanisms, calculating hardware safety metrics, and ensuring reliability engineering principles are integrated into product development. The engineer develops and validates safety-critical tests, manages confirmation measures, and supports legal compliance throughout the product lifecycle.

Responsibilities also cover integrating safety into production and maintenance processes, applying fault tolerance methods in hardware, implementing diagnostic coverage in software, and ensuring supplier and tool qualification. Essential competences include sector-specific competences (hazard analysis, safety concept design, safety-critical HW/SW, V&V methods), transversal competences (reliability engineering, compliance with standards), and other competences (legal aspects, liability, tool qualification, confirmation measures).

ESCO Mapping

https://esco.ec.europa.eu/select-language?destination=/node/1

ID	NAME	Concept URI
2149.3	Autonomous driving specialist	http://data.europa.eu/esco/occupation/e8fca903-6590-48a8-8902-094bb41ee90c
2151.4	Battery system engineer	http://data.europa.eu/esco/occupation/7648d5d9-cfab-4981-ba82-b66a9a41d37e

Context

EQF Level	7

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Departments	Production and Maintenance R&D (Research and Development)

Sector Specific

ID	Name	Type	Description	Level	ESCO
C29 1	Engineering and V&V methods	Knowledge	Approaches required by functional safety standards, including validation and verification. ▪ Describe ISO 26262 method tables ▪ Explain V&V methods (fault injection, diagnostic coverage, equivalence class testing) ▪ Apply safety integrity level criteria ▪ Support V&V documentation	3	
C29 2	Design safety tests	Skill	Design tests for safety-related components and items. ▪ Create test plans for diagnostic coverage ▪ Design fault injection scenarios ▪ Apply load and stress tests ▪ Document and review results	3	
C29 3	Ensure compliance to functional safety norms	Skill	Demonstrate compliance with functional safety standards and methods. ▪ Develop compliance maps ▪ Verify use of qualified tools ▪ Document compliance evidence ▪ Support audits for ISO 26262	3	
C29 4	System hazard analysis	Knowledge	Hazard and risk analysis principles in IEC 61508, ISO 26262, ISO 13849. ▪ Define hazard and harm concepts ▪ Describe severity, exposure and controllability ▪ Perform hazard analysis and risk assessment ▪ Support derivation of safety goals	3	
C29 5	Identify hazards in safety-related systems	Skill	Identify hazards and conduct workshops for hazard identification. ▪ Moderate hazard analysis sessions ▪ Record potential hazardous events ▪ Classify risks by severity and controllability	3	

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ID	Name	Type	Description	Level	ESCO
			▪ Document workshop outcomes		
C296	Establish safety concepts	Skill	Derive functional safety requirements and prepare technical safety concepts. ▪ Define signal paths and system reaction times ▪ Design system-level state machines ▪ Allocate timing for subsystems ▪ Translate hazards into safety requirements	3	
C297	Integrate safety in hardware design	Skill	Apply fault tolerance and hardware safety design concepts. ▪ Explain failure, fault and error ▪ Describe FIT, MTTF, failure rates ▪ Select fault tolerance models ▪ Implement HW redundancy strategies	3	
C298	Apply and evaluate hardware safety metrics	Skill	Calculate and evaluate safety metrics for hardware designs. ▪ Calculate SPFM/LFM metrics ▪ Analyse random hardware failures ▪ Document safety architecture metrics ▪ Support compliance reviews	3	
C299	Verify safety-relevant hardware	Skill	Conduct hardware tests based on chosen safety design. ▪ Plan HW test campaigns ▪ Execute diagnostic and fault injection tests ▪ Analyse results ▪ Provide verification reports	3	
C300	Design and implement safety-critical software	Skill	Apply principles of safety-critical software architecture and diagnostics. ▪ Implement diagnostic coverage via E-Gas model ▪ Define diagnosis matrices ▪ Apply plausibility checks, voting, redundancy ▪ Ensure required diagnostic coverage	3	
C301	Verify safety-relevant software	Skill	Select and execute software tests at unit, integration, and system levels. ▪ Plan SW test strategies ▪ Perform unit/integration tests ▪ Validate diagnostic coverage	3	

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ID	Name	Type	Description	Level	ESCO
			▪ Document SW verification		
C302	Safety in production, operation and maintenance	Knowledge	Incorporate safety analysis into production and maintenance processes. ▪ Explain ASIL impact on production ▪ Map qualification methods to safety-critical steps ▪ Integrate safety in assembly and maintenance ▪ Document compliance in production	2	
C303	Reliability engineering	Knowledge	Principles of reliability models in safety design. ▪ Explain FIT rate modelling ▪ Apply reliability models in design ▪ Predict component failures ▪ Support design optimisation	3	
C304	Apply reliability engineering principles	Skill	Use reliability measurements in design decisions. ▪ Collect and analyse reliability data ▪ Apply measurements in component selection ▪ Document reliability analysis ▪ Recommend design improvements	3	

Other Competences

ID	Name	Type	Description	Level	ESCO
C329	Legal aspects and liability	Knowledge	National and international product liability aspects. ▪ Explain principles of liability ▪ Describe engineer's personal responsibility ▪ Identify applicable EU directives ▪ Support compliance training	1	
C330	Assess legal compliance in product development	Skill	Assess residual risk of a product before release. ▪ Check conformity with standards ▪ Validate residual risk ▪ Document compliance reports ▪ Support release decisions	1	

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ID	Name	Type	Description	Level	ESCO
C33 1	Perform confirmation measures	Knowledge	Independent confirmation measures for functional safety. ▪ Explain safety management audits ▪ Describe confirmation reviews ▪ Support functional safety assessments ▪ Document ASIL-related reviews	1	
C33 2	Perform tool qualification	Skill	Evaluate and qualify software tools used in safety-relevant systems. ▪ Determine tool confidence level ▪ Select qualification method ▪ Document qualification process ▪ Ensure traceability and justification	1	

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