FSL:2025 Fire Safety Level Standard for EVSE

INTRODUCTION

Electric Vehicle Supply Equipment (EVSE) is rapidly becoming a core component of the global transport infrastructure. However, with increased deployment comes growing concern over fire risks, especially in enclosed or unattended locations. EVSE combines high-voltage electronics, constant exposure to the elements, and potential user tampering. Traditional standards focus on electrical and ingress protection but do not adequately define or enforce fire safety measures.

FSL:2025 MISSION

EVnoX develops advanced fire safety systems dedicated to the EVSE industry. Our mission is to reduce fire risk through engineering, standardization, and advocacy. We provide both passive and active fire mitigation technologies tailored to the specific environmental and operational needs of electric vehicle charging equipment. The FSL framework is a cornerstone of our initiative to establish clear industry-wide benchmarks.

OPEN ADOPTION AND INDUSTRY COLLABORATION

EVnoX invites industry stakeholders, safety bodies, and EVSE manufacturers to adopt the FSL:2025 standard. This system is proposed as an open benchmark that can coexist with existing IEC and UL norms. By creating a common language around fire safety in EVSE, the FSL system drives transparency, trust, and innovation.

EVnoX is committed to publishing technical criteria, supporting test methods, and helping others adopt this framework. We believe EV charging should be not only fast and smart, but fundamentally safe.

DOCUMENT CONTROL AND INTERPRETATIVE NOTICE

STATUS FSL:2025 is a privately proposed technical framework and working draft for future standardisation. It is not itself a published IEC, ISO, EN or NEN standard, a statutory approval, a CE conformity assessment route or an accredited product certificate.

The document intentionally addresses fire safety within and immediately around electric vehicle supply equipment. Electrical product safety remains an independent prerequisite and is linked to the applicable IEC product and installation references rather than replaced by this framework.

SCOPE LIMIT A charger enclosure fire test does not establish control of an electric vehicle traction battery fire, prevention of battery thermal runaway, room fire compartmentation, firefighter operational safety or automatic emergency service notification.

CONTENTS

1 STATUS, PURPOSE AND DEVELOPMENT PRINCIPLES

1.1 Purpose of the document

This framework establishes a consistent technical language for identifying, comparing and assessing enhanced fire protective features within electric vehicle supply equipment. It defines five cumulative classification levels intended to distinguish ordinary electrical conformity from additional fire prevention, passive containment, automatic suppression and supervised event reporting.

The immediate purpose is to support engineering development, manufacturer declarations, informed procurement and structured stakeholder discussion. The longer term purpose is to provide an evidence based starting point from which a formal technical specification, industry scheme or consensus standard may be developed.

The document does not claim that all charging equipment creates an equivalent fire risk. Instead, it requires assessment of the actual energy source, fault mechanisms, materials, operating environment, enclosure geometry and intended mitigation architecture.

1.2 Status and authority

FSL is a proposed classification framework. Formal standardisation requires a separate governance process, participation by relevant stakeholders, review of technical evidence and any necessary adoption by an appropriate standards organisation. The use of standards inspired language does not confer official status.

A manufacturer may make a truthful first party declaration when all applicable evidence is available. Independent laboratory testing or third party certification may improve confidence but shall not be claimed unless it has actually occurred within an appropriate and identified scope.

The scheme administrator, approval authority, artwork ownership, complaints process and any licensing terms shall be confirmed in writing before external release of a controlled scheme.

1.3 Core design principles

The protective hierarchy is prevention of ignition, rapid reduction of available energy, limitation of propagation, automatic local suppression and timely awareness of a hazardous event. A higher level adds protection rather than replacing a lower level.

The document is technology neutral. It defines the intended performance, evidence and safety constraints without reserving a class for one commercial supplier, agent chemistry, sensor brand or proprietary communication platform.

No protective measure is accepted solely because it is present. The product and its protective features shall be evaluated as an integrated assembly under the conditions actually claimed.

2 SCOPE AND EXCLUDED CLAIMS

2.1 Equipment within scope

The framework applies to conductive electric vehicle supply equipment and directly associated enclosures when the manufacturer seeks a product level fire classification. Eligible equipment may include permanently connected AC charging stations, DC charging equipment, portable mode 2 control and protection devices, charging equipment cabinets and integrated assemblies.

The assessment boundary may include fixed cable connections, charging connectors, power conversion stages, contactors, terminal blocks, protective devices, thermal monitoring, passive barriers, suppression modules, alarm interfaces and supporting control software where those items influence the claimed fire response.

A protective accessory or retrofit module may be assessed only for a specifically identified host configuration. A stand alone component does not inherit a complete FSL class when the host enclosure, protected volume, electrical integration and failure response have not been validated.

2.2 Fire scenarios addressed

The framework focuses on fire or potentially ignitable overheating originating from resistive terminals, contact degradation, relay or contactor faults, power electronics, internal wiring, auxiliary supplies, moisture related tracking, contamination and related failures within the defined product boundary.

External heat exposure, propagation to a mounting surface and ignition of adjacent materials may be evaluated when the manufacturer makes a specific claim. Such performance shall be identified as a separate assessed scenario and may not be inferred from an internal suppression test.

The risk assessment shall account for the amount of electrical energy available before and after the protective response, possible backfeed and the ability of a failed contactor or separate auxiliary source to sustain a fire.

2.3 Explicit exclusions

The classification does not certify the electric vehicle, its traction battery, a building fire compartment, an entire parking garage, firefighting operations, the public electrical network or an emergency call service.

The framework does not replace mandatory electrical safety, electromagnetic compatibility, radio equipment, building regulations, chemical restrictions, pressure equipment requirements or obligations arising from the actual market and installation.

A statement that a charger has an integrated extinguishing function shall not be expanded into a claim that it extinguishes lithium ion battery thermal runaway, protects every adjacent vehicle or guarantees that fire cannot occur.

3 NORMATIVE LANGUAGE AND REFERENCE ARCHITECTURE

3.1 Requirement wording

The word shall identifies a mandatory requirement for a claimed classification. The expression shall not identifies prohibited behaviour or an impermissible claim. The word should identifies a recommendation. The word may identifies a permitted option, while can is reserved for a factual possibility.

A mandatory requirement shall be capable of objective evaluation through inspection, measurement, calculation, representative testing or a documented combination of methods. Undefined expressions such as suitable, safe, fireproof or sufficient require a declared technical basis before they can support acceptance.

Where a requirement references a threshold, the applicable value and its derivation shall appear in the controlled product dossier or in an adopted scheme annex. A provisional draft value is not a substitute for technical validation.

3.2 Reference categories

References are divided into applicable EVSE electrical product standards, installation standards, component and environmental standards, fire test methods, suppression system references, building alarm interface references, conformity assessment references and legal instruments.

A standard is applicable only when its published scope covers the relevant product, component or activity. A room total flooding standard, for example, is not by itself proof that a miniature local application module is approved for a ventilated charging enclosure.

The verified references in Annex K were checked against official IEC, ISO, NEN, European Union or public authority sources as of the reference date. Editions and corrigenda shall be confirmed again for the actual market before a claim is issued.

3.3 Relationship between product, installation and site

The product manufacturer controls the design and validated performance of the EVSE. The installer controls the correct supply protection, mounting, wiring and integration. The site operator controls maintenance, event response, occupancy, environmental conditions and connection to any building systems.

An FSL class is a product claim, but its continuing usefulness depends on installation and maintenance conditions. A site specific fire assessment remains necessary for locations with unusual occupancy, restricted ventilation, vulnerable escape routes or large concentrations of charging points.

4 TERMS AND DEFINITIONS

For the purposes of this framework, the following terms apply. Where a term is also defined in an applicable electrical product or installation standard, the official definition governs its use within that standard and this document does not alter it.

active suppression: An automatic function that releases, generates or applies a fire control medium into a defined protected volume after initiation.

approved means: A specific component, material, method or combination that has completed the FSL approval process for a defined product, enclosure, configuration and service environment.

assessment boundary: The physical and functional limits of the EVSE configuration included in a classification claim.

automatic isolation: Removal of controlled electrical energy from the affected charging circuit without a human command after a defined hazardous condition.

automatic reset: Restoration of the charging function without a deliberate maintenance or operator action.

baseline conformity: Demonstrated compliance with the electrical product and installation requirements that apply independently of this fire safety framework.

building alarm interface: An input, output or communication function by which an EVSE event is presented to a building fire detection or other engineered safety system.

charging enclosure: The assembly of housing, covers, openings, seals and mounting surfaces that defines the physical boundary of the protected equipment.

charging interface: A plug, socket outlet, vehicle connector, vehicle inlet or permanently wired interface involved in energy transfer.

classification claim: A statement that an identified EVSE configuration satisfies all applicable requirements of one FSL class.

common cause failure: Failure of multiple protective functions due to the same event, component, environmental exposure, software defect or power supply interruption.

compartment: A defined subdivision of an enclosure intended to limit thermal transfer, flame propagation, contamination or unintended migration of a suppression medium.

concentration retention: The ability of a protected volume to maintain an effective fire control medium for the minimum validated period.

critical temperature: The declared temperature at which continuation of charging is no longer acceptable for a defined component, conductor, interface or surrounding material.

declared ambient range: The environmental temperature range for which normal operation and claimed fire protective functions have been validated.

declared service life: The period during which a component is expected to remain suitable under its defined installation and maintenance conditions.

derating: A controlled reduction of charging current or power used to reduce heat generation before an unsafe operating condition is reached.

detection zone: A defined internal location or volume for which a thermal, smoke, gas or other fire event detection function is claimed.

diagnostic coverage: The proportion and nature of relevant failures that a monitoring or diagnostic arrangement is capable of identifying.

electrical baseline: The collection of applicable electrical safety requirements that shall be satisfied before an enhanced FSL class may be claimed.

eligible means: A technology category that may be submitted for assessment but has not, by that fact alone, been approved for a specific EVSE application.

end of line supervision: Monitoring of a circuit using a defined end element, coded signalling or equivalent technique capable of identifying more than a simple open circuit.

end product fire test: A fire exposure or ignition challenge performed on a representative assembled product rather than solely on an isolated material sample.
event memory: The retained record of a thermal event, suppression release, fault condition, isolation action or external alarm transmission.
external fire exposure: A fire or severe heat source originating outside the equipment assessment boundary.
fail aware: An architecture that detects specified loss of a protective function and presents an actionable fault indication.
fail safe state: A defined condition in which a detected failure prevents or limits charging and preserves the safest practicable alarm or isolation response.
false activation: Unintended operation of a suppression device in the absence of a fire condition requiring its release.
fire containment: The demonstrated limitation of flame, hot particles or hazardous heat transfer from one defined region to another for a specified challenge.
fire event: An event involving ignition, sustained flame, smouldering, excessive thermal decomposition or activation of a fire suppression function.
fire resistance: Performance of an identified assembly under a specified fire exposure for a stated period. The term shall not be used without the corresponding test basis.
fire suppression: A demonstrated reduction or termination of combustion by a dedicated protective mechanism under defined test conditions.
flame retardant material: A material with demonstrated reduced ignition or flame propagation in a specified material test. It is not automatically an extinguishing agent.
FSL class: One of the defined fire safety classification levels FSL0, FSL1, FSL2, FSL3 or FSL3+.
hazardous residue: A solid, liquid, particulate or gaseous byproduct capable of harming persons, electrical insulation, electronics, the environment or subsequent maintenance activities.
hot spot: A location whose temperature is elevated relative to its surroundings and that can contribute to ignition or degradation.
ignition scenario: A documented combination of fault, energy availability, combustible material, ventilation and time that could initiate combustion.
independent protective path: A protective function that is not defeated by the same single fault that produces or prevents detection of the relevant hazardous condition.
installation context: The site, mounting position, surrounding materials, occupancy, ventilation and emergency arrangements in which the equipment is used.
local application: A suppression arrangement intended to act within or near a specific component or enclosure rather than to protect an entire room.
manual recovery: A documented and deliberate action by an authorised person after the cause of a fault or event has been investigated.
material traceability: The ability to connect an installed material to its supplier, grade, thickness, colour, formulation and supporting test evidence.
maximum permissible component temperature: The lowest temperature limit applicable to a component, conductor, termination or adjacent material after considering service conditions and measurement uncertainty.
monitoring circuit: A connection or communication path used to detect the status of a sensor, protective function or alarm output.
normally closed contact: A contact that is closed in its defined nonalarm state. It does not by itself demonstrate supervision against short circuit, bypass or power failure.
passive protection: A fire protective feature that functions without the release of an extinguishing agent and without a powered command or actuator.
post activation state: The condition of the product after a suppression device has discharged or a protective event has latched.

pre alarm: An early warning condition that precedes the critical isolation threshold and permits an operator or control system to react.

protected volume: The internal volume for which an active suppression device has been specifically sized and validated.

reasonably foreseeable misuse: Use or installation that is not intended but can reasonably arise from predictable human behaviour.

reignition: Renewed combustion after apparent initial extinguishment while residual heat, fuel or electrical energy remain present.

representative specimen: A test sample containing production representative materials, geometry, components, openings, firmware and safety functions.

routine test: A production or commissioning verification applied to every identified product or a justified production sample.

safe electrical interface: An interface whose rating, isolation, contact arrangement and fault behaviour are appropriate to the connected safety system.

safety critical change: A change to material, supplier, software, enclosure, wiring, sensor, medium or geometry that can affect a claimed fire protection function.

secondary hazard: A new hazard created by a protective measure, including toxic exposure, overpressure, hot discharge, contamination or electric shock.

single fault condition: A condition in which one protective component, control element or connection becomes defective while the remaining product is otherwise as specified.

smouldering: Slow, flameless combustion or thermal decomposition capable of generating smoke, toxic products and later ignition.

suppression medium: A substance or physical mechanism intended to control a fire, such as condensed aerosol, inert gas or a validated encapsulated clean agent.

thermal margin: The difference between a protective threshold and the maximum permissible component temperature after measurement, response and ageing effects are considered.

thermal runaway: Self accelerating internal heat generation in a battery cell or other component. A claim for EVSE fire protection shall not be represented as verified traction battery suppression.

type test: A design verification performed on representative specimens of a defined product configuration.

validated configuration: The exact product arrangement, bill of materials, firmware and installation conditions supported by objective assessment evidence.

5 FIRE SAFETY PRINCIPLES AND CLASSIFICATION PHILOSOPHY

5.1 The fire progression chain

A charging equipment fire generally requires an initiating fault, accessible energy, a material capable of ignition and conditions that allow the fault to continue or the fire to spread. Effective protection can interrupt the chain at several points rather than depending on a single response.

Electrical baseline controls reduce the probability and consequences of overcurrent, insulation failure, residual current and unsuitable connections. Thermal detection targets developing faults that may not create enough overcurrent to trip a protective device. Passive barriers reduce propagation. Active suppression limits a fire that has nevertheless developed. A supervised external interface makes the event visible to the responsible site.

The layers are complementary. Detection does not guarantee containment, flame retardant plastic does not extinguish a separate flame, an extinguishing module does not repair a welded contactor and a cloud message does not isolate electrical energy.

5.2 Prevention before suppression

The preferred engineering response is to identify abnormal heat early and remove the relevant energy source before ignition occurs. This reduces heat release, contamination, downtime and dependence on an extinguishing medium.

A suppression module is not a substitute for correct terminal design, appropriately rated connectors, protective conductor continuity, suitable residual current protection, proper electrical separation or a reliable thermal cutout.

Suppression remains valuable where a credible fault can progress despite the preventive controls, especially in unattended, confined, high value or difficult to access installations.

5.3 Product performance rather than component marketing

Material classifications, supplier declarations and component certificates provide useful input but do not establish the fire performance of an assembled EVSE. Openings, airflow, component spacing, mounting, wiring and firmware may determine whether an event remains confined.

The class therefore attaches to a specific validated configuration. An identical extinguishing cartridge used in a different enclosure, at a different volume or with a different airflow does not automatically inherit the same result.

6 BASELINE ELECTRICAL SAFETY INTERFACES

6.1 Conductive charging equipment

IEC 61851-1:2017 is the primary general product reference for conductive electric vehicle supply equipment within its scope [R01]. Where a product is a DC charging station, IEC 61851-23:2023 provides the additional DC equipment framework and is considered together with the applicable general requirements [R02].

Portable mode 2 in cable control and protection devices shall instead be assessed against the applicable scope of IEC 62752:2024 [R04]. An accessory, protective housing or retrofit component does not replace the conformity of the complete mode 2 charging device.

Where digital control of a DC charging session is safety relevant, the applicable communication reference is considered without allowing network availability to replace a required autonomous fire response [R03].

6.2 Interfaces, protection and installation

The relevant IEC 62196 references address the applicable connector, vehicle interface and cable assembly configuration [R06 to R08]. The current, duty cycle, contact condition and temperature rise of an interface remain directly relevant to ignition prevention.

Installation coordination shall address IEC 60364-7-722:2018 and the applicable national implementation [R09]. In the Netherlands, the verified publication NEN 1010:2020+C1:2024 provides the relevant national installation context, including the EV charging section where applicable [R10].

Where applicable, residual direct current detection for permanently connected AC charging equipment is assessed against IEC 62955:2018 [R05]. Assemblies and power converter systems shall also be reviewed against IEC 61439-7:2022 and IEC 62477-1:2022 when the actual equipment falls within those scopes [R11 and R12].

6.3 Electrical provisions are prerequisites

The FSL document references electrical safety to preserve the integrity of the fire safety claim. It does not rewrite electrical product standards, reproduce licensed clauses or create an alternative route to compliance with electrical legislation.

A protective housing, internal barrier, detector, suppression medium or alarm interface shall not compromise residual current protection, protective bonding,

insulation, connector rating, contactor operation, emergency isolation or any other required electrical protective measure.

7 FIRE HAZARD IDENTIFICATION AND RISK ASSESSMENT

7.1 Ignition sources and fault energy

The manufacturer shall map each credible high energy node and identify how a fault at that node can generate heat. This includes terminals, plug contacts, internal splices, relays, contactors, semiconductors, filters, auxiliary supplies, cable transitions and moving or removable connections.

A particularly important case is increased contact resistance at normal charging current. The upstream circuit can remain below its overcurrent threshold while a small local connection dissipates enough power to degrade insulation or ignite nearby material.

The risk assessment shall also consider insulation tracking due to moisture, conductive contamination, damaged insulation, corrosion, mechanical impact, loose installation connections and foreseeable unauthorised modification.

7.2 Exposure and escalation

The consequence of an internal event depends on combustible material, air exchange, enclosure openings, mounting surface, adjacent cable routing, occupancy and the time before isolation or response.

A wall mounted unit above combustible storage creates different consequences from a freestanding outdoor unit on a noncombustible pedestal. An unattended garage may require a different external reporting arrangement from a continuously staffed industrial yard.

The product claim shall not assume that a site has additional protection unless the required site measure is explicitly identified as an installation condition.

7.3 Failure dependencies

The assessment shall examine whether the same fault can disable the thermal sensor, charging controller, isolation device, agent initiation and alarm output. Common power supplies, common circuit boards, shared firmware and neighbouring wiring routes can create dependent failures.

A normally closed loop is useful for identifying an open connection, but does not inherently identify a short circuit, a deliberate bypass, a failed receiving input or a missing supply. FSL3+ therefore requires a documented supervised or otherwise demonstrably fail aware interface.

8 FSL CLASSIFICATION AND CUMULATIVE REQUIREMENTS

The classification is cumulative. FSL0 describes the absence of demonstrated enhanced product specific fire protection; it does not remove applicable electrical compliance duties. FSL1 is the first enhanced class. FSL2 builds on FSL1. FSL3 builds on FSL2. FSL3+ builds on FSL3.

Class	Protective intent	Essential performance	Assessment basis
FSL0	Electrical baseline only	No dedicated enhanced fire mitigation is demonstrated.	Applicable electrical conformity and truthful absence of enhanced controls.
FSL1	Ignition prevention and basic containment	Validated enclosure behaviour, critical hot spot monitoring and automatic energy limitation or isolation.	Electrical baseline plus all FSL1 requirements.
FSL2	Dedicated passive fire mitigation	All FSL1 measures plus validated passive protection against propagation or heat transfer.	Electrical baseline plus all FSL1 and FSL2 requirements.
FSL3	Automatic integrated suppression	All FSL1 measures plus an application validated automatic internal suppression function.	Electrical baseline plus all FSL1 and FSL3 requirements.
FSL3+	Suppression with supervised external awareness	All FSL3 measures plus a monitored external event and fault interface.	Electrical baseline plus all FSL1, FSL3 and FSL3+ requirements.

8.1 FSL0

FSL0 is assigned when the applicable electrical product and installation baseline exists but no dedicated enhanced fire protective architecture has been demonstrated under this framework. The class is a transparent reference point rather than a claim that the equipment is unsafe or legally noncompliant.

An FSL0 product may contain features required by an applicable electrical standard. Such features do not automatically support an enhanced FSL classification without the additional product specific fire evidence defined here.

8.2 FSL1

FSL1 requires an enclosure and critical construction features with documented application appropriate fire behaviour, mapped internal thermal detection and an automatic response that reduces or removes energy before a defined component limit is exceeded.

The requirement is not limited to metal housings. A polymer or composite assembly may be eligible when the actual material, construction and assembled product performance are objectively demonstrated.

8.3 FSL2

FSL2 retains every FSL1 measure and adds a dedicated passive fire protective function such as a validated thermal barrier, protected compartment, appropriately applied intumescent system or another proven propagation control architecture.

The passive measure must contribute measurable assembly level protection. Halogen free formulation, low smoke generation or a supplier statement that a plastic is self extinguishing do not independently establish the FSL2 performance.

8.4 FSL3

FSL3 retains all FSL1 measures and adds an automatic internal suppression function validated for the actual enclosure, agent quantity, ignition zones, ventilation condition and credible operating environment.

Eligible technology may include a qualified condensed aerosol module, inert gas system, validated clean agent device or another independently demonstrated local application technology. No generic family or commercial product is approved solely because it appears in this framework.

8.5 FSL3+

FSL3+ retains all FSL3 measures and adds an externally usable event and fault interface with supervision appropriate to its actual connection. The architecture shall detect relevant wiring and supply failures and preserve a local safety response without dependence on cloud availability.

An ordinary normally closed output may form part of the design, but a simple contact without short circuit, bypass or power loss supervision is not by itself sufficient evidence of the required fail aware architecture.

9 GOVERNANCE AND FOUNDATIONAL REQUIREMENTS

Foundational requirements apply across every declared class and establish truthfulness, configuration control and the assessment boundary.

GOV01 Defined assessment boundary

Applicable level: All classes

Requirement: The manufacturer shall identify the complete enclosure, power path, connection interfaces, protection devices, relevant software, suppression medium and external alarm interface included in the claim.

Verification: Review drawings, product photographs, configuration records and the installation boundary.

Acceptance: Every safety relevant component and excluded external item is explicitly identified.

Technical rationale: A claim cannot be assessed when the protected product and the excluded vehicle or building systems are undefined.

GOV02 Electrical conformity prerequisite

Applicable level: All classes

Requirement: A classified EVSE shall satisfy the applicable electrical product and installation interface requirements before an enhanced fire class is declared.

Verification: Review applicable IEC assessment evidence, electrical test records and installation instructions.

Acceptance: Applicable baseline requirements are evidenced; a fire feature does not replace an electrical protective function.

Technical rationale: Electrical faults are a primary ignition initiating mechanism and cannot be addressed by labelling alone.

GOV03 Correct class designation

Applicable level: All classes

Requirement: The manufacturer shall state only the highest FSL class for which every applicable cumulative requirement is fulfilled by the assessed configuration.

Verification: Review the requirements matrix, configuration identity and signed declaration.

Acceptance: No class is claimed when an applicable mandatory requirement is missing or unresolved.

Technical rationale: A cumulative classification is misleading if a higher class is used to mask absent lower level protections.

GOV04 Risk assessment

Applicable level: All classes

Requirement: The product dossier shall contain a documented fire risk assessment covering credible ignition sources, available energy, combustible materials, fault progression and affected persons.

Verification: Inspect the hazard register and compare it with the actual product architecture.

Acceptance: All credible product specific scenarios have an owner, protective response and verification route.

Technical rationale: A generic list is insufficient because the relevant ignition mechanisms depend on enclosure design and power architecture.

GOV05 Representative configuration control

Applicable level: All classes

Requirement: Fire classification evidence shall correspond to the production enclosure, material grade, colour where relevant, thickness, power rating, firmware and protective components supplied.

Verification: Compare the bill of materials, revision history, test sample and released product.

Acceptance: Safety relevant deviations have been evaluated and, where necessary, revalidated.

Technical rationale: Material substitution, revised ventilation or changed firmware can invalidate earlier fire tests.

GOV06 Accurate scope statement

Applicable level: All classes

Requirement: The classification shall identify whether it applies to AC equipment, DC equipment, portable mode 2 equipment, a fixed charging assembly or a defined accessory.

Verification: Review the declaration, rating plate, instructions and product literature.

Acceptance: The product category and limitations are stated consistently in all claim locations.

Technical rationale: Different product standards, power paths and enclosure geometries require different verification.

GOV07 No traction battery extinguishment claim

Applicable level: All classes

Requirement: An FSL claim shall not imply prevention, control or extinguishment of a vehicle traction battery event unless that separate claim is supported by a dedicated vehicle level programme.

Verification: Review packaging, sales claims, diagrams, declarations and public documentation.

Acceptance: Product information clearly distinguishes an internal EVSE event from a vehicle battery incident.

Technical rationale: Protection of a charger enclosure is not evidence of control over a battery cell undergoing thermal runaway.

GOV08 No implied official certification

Applicable level: All classes

Requirement: A manufacturer declaration or scheme label shall not be described as an accredited certification, governmental approval, notified body approval or published IEC or NEN standard unless that status is independently true.

Verification: Inspect labels, websites, declarations and any claimed certification documentation.

Acceptance: The assessment route and actual status are represented accurately.

Technical rationale: A privately developed framework and a formal standard or accredited certificate are distinct legal and technical instruments.

GOV09 Environmental declaration

Applicable level: All classes

Requirement: The product shall declare the ambient temperature range, installation orientation, ventilation assumptions, humidity exposure and applicable environmental limitations for the claimed class.

Verification: Inspect instructions and environmental type test records.

Acceptance: Each declared condition is covered by relevant verification or is explicitly excluded.

Technical rationale: A protective arrangement validated indoors may perform differently in sunlight, frost, salt mist or a sealed cabinet.

GOV10 Accessible evidence

Applicable level: All classes

Requirement: The manufacturer shall maintain an identifiable technical dossier and provide relevant classification evidence to authorised assessors, customers or authorities as appropriate.

Verification: Review the dossier index, retention arrangements and ownership of third party evidence.

Acceptance: Each claim can be traced to current and retrievable objective records.

Technical rationale: Unverifiable claims undermine both procurement decisions and incident investigation.

10 ELECTRICAL PREREQUISITE REQUIREMENTS

Electrical provisions are included only to preserve the prerequisite safety functions upon which a fire classification depends.

ELE01 Product standard selection

Applicable level: All classes

Requirement: The electrical product baseline shall be selected according to the actual equipment architecture, including IEC 61851-1, IEC 61851-23 or IEC 62752 where applicable.

Verification: Review the applicability matrix and product standard reports.

Acceptance: Every applicable product family is identified without presenting inapplicable standards as compliance evidence.

Technical rationale: Correct selection avoids applying a fixed mode 3 reference to a portable mode 2 assembly or vice versa.

ELE02 Connection interface suitability

Applicable level: All classes

Requirement: The charging connector, vehicle coupling and cable assembly shall be appropriate to the declared current, voltage and charging mode and assessed against the relevant IEC 62196 reference where applicable.

Verification: Review component approvals, ratings, contact materials and temperature rise records.

Acceptance: The actual connector family and duty cycle are covered by objective evidence.

Technical rationale: Contact degradation or an unsuitable interface can produce local heat without a conventional overcurrent trip.

ELE03 Installation protection coordination

Applicable level: All classes

Requirement: Instructions shall specify the required supply circuit, overcurrent protection, residual current protection and installation conditions in accordance with the applicable local electrical installation regime.

Verification: Review installation instructions and coordination calculations against IEC 60364-7-722 and local implementation where applicable.

Acceptance: Protection assumptions are explicit, compatible and not delegated to an unspecified installer choice.

Technical rationale: An otherwise protected enclosure may still be supplied by a circuit unable to disconnect a dangerous upstream fault.

ELE04 Residual current protection integrity

Applicable level: All classes

Requirement: The fire protection arrangement shall not impair the residual current detection or protective disconnection functions required by the applicable EVSE product or installation standard.

Verification: Perform an electrical functional review before and after integration of fire protective components.

Acceptance: Residual protection remains functional for the complete assembled product and applicable fault conditions.

Technical rationale: Added sensors, suppression modules or external interfaces must not defeat established electrical safety.

ELE05 Protective conductor continuity

Applicable level: All classes

Requirement: The protective conductor path and bonding of relevant conductive enclosure parts shall remain intact before and after installation of internal barriers, suppression devices and alarm interfaces.

Verification: Review assembly design and perform the applicable electrical continuity and bonding verification.

Acceptance: No modification introduces an interrupted, loose or inaccessible protective conductor connection.

Technical rationale: A metal enclosure can reduce one fire contribution while creating a separate shock hazard if bonding is compromised.

ELE06 Insulation and spacing preservation

Applicable level: All classes

Requirement: Internal fire protective additions shall preserve the required electrical insulation, creepage, clearance and separation relevant to the assessed product.

Verification: Review drawings and inspect representative assemblies before and after fire component installation.

Acceptance: Protective materials or mounting hardware do not bridge live conductors or reduce required separation.

Technical rationale: Conductive supports, expanded intumescent material or residue can create new ignition and shock risks.

ELE07 Stored energy consideration

Applicable level: All classes

Requirement: The assessment shall identify stored electrical energy, power converter capacitors, auxiliary supplies and possible backfeed that may remain after the normal charging contactor opens.

Verification: Review schematics, fault sequences and post isolation measurements.

Acceptance: The response sequence accounts for every credible remaining source of ignition energy.

Technical rationale: Opening one contactor does not necessarily remove hazardous energy from all internal regions.

ELE08 Control circuit segregation

Applicable level: All classes

Requirement: Fire detection, alarm and suppression control circuits shall have electrical ratings and separation appropriate to adjacent power circuits and connected external systems.

Verification: Inspect circuit design, insulation records, terminal ratings and interface drawings.

Acceptance: A fault in a power circuit cannot introduce an uncontrolled hazardous voltage onto an external alarm interface.

Technical rationale: A fire alarm output must not expose building systems or responders to a dangerous electrical condition.

ELE09 Emergency response compatibility

Applicable level: All classes

Requirement: A fire protective response shall not prevent operation of an existing emergency stop, upstream isolation device or required vehicle charging control function.

Verification: Exercise protective and emergency commands in relevant combinations.

Acceptance: The safest required command remains effective under each tested interaction.

Technical rationale: Additional control logic can unintentionally override or delay an existing electrical safety response.

ELE10 Electrical baseline is not a class substitute

Applicable level: All classes

Requirement: Compliance with an electrical product standard alone shall not be represented as fulfilment of an enhanced FSL class without the additional dedicated fire controls specified here.

Verification: Compare the electrical assessment scope with the claimed fire requirements.

Acceptance: Electrical baseline evidence and incremental fire evidence are listed separately.

Technical rationale: The scheme adds product specific fire mitigation rather than relabelling ordinary electrical conformity.

11 FIRE SCENARIO AND RISK REQUIREMENTS

Product specific hazard scenarios determine which parts of the charging equipment must be monitored, contained or protected.

RSK01 Ignition source mapping

Applicable level: All classes

Requirement: The risk assessment shall identify power terminals, relay or contactor connections, conversion stages, filters, power supplies, connectors, cable entries and any other credible internal hot spots.

Verification: Inspect thermal maps, schematics and the physical assembly.

Acceptance: All credible high energy and high resistance locations are mapped.

Technical rationale: Fire protection must address actual ignition locations rather than only the geometric centre of an enclosure.

RSK02 Contact resistance fault

Applicable level: All classes

Requirement: The assessment shall consider a resistive connection or deteriorated terminal capable of heating without drawing enough current to operate an upstream overcurrent device.

Verification: Review connection design and conduct a representative local heating challenge.

Acceptance: The selected protective architecture responds before the declared protected component limit is exceeded.

Technical rationale: A loose or contaminated connection can generate severe local heat under otherwise normal load.

RSK03 Component failure

Applicable level: All classes

Requirement: Credible failures of a contactor, semiconductor, auxiliary supply, filter, printed circuit board and protection device shall be assessed for their ability to initiate or sustain combustion.

Verification: Review component failure analysis and representative fault injection.

Acceptance: Each relevant failure has prevention, containment or automatic isolation evidence.

Technical rationale: A compliant component can still fail in a manner that creates a product level fire scenario.

RSK04 Ingress and contamination

Applicable level: All classes

Requirement: The assessment shall address moisture, condensation, dust, conductive contamination, insects and corrosion where these exposures can create tracking or abnormal heating.

Verification: Review declared IP protection, installation context and environmental conditioning records.

Acceptance: The declared environment and ingress related fault responses are adequately supported.

Technical rationale: Ingress is relevant to fire because it can create tracking, leakage and deteriorating electrical contact.

RSK05 Mechanical damage

Applicable level: All classes

Requirement: Reasonably foreseeable impact, cable pull, enclosure damage and installation stress shall be assessed where damage can expose live parts or create a hot connection.

Verification: Inspect mechanical design and applicable impact or cable retention evidence.

Acceptance: Credible damage modes and resulting fire pathways are identified and controlled.

Technical rationale: A displaced conductor or cracked housing can defeat both electrical protection and fire containment.

RSK06 External combustible surroundings

Applicable level: All classes

Requirement: The instructions shall identify any required separation from combustible storage, wall finishes, coverings and obstructed ventilation based on the validated product configuration.

Verification: Review installation instructions, mounting tests and thermal clearance assessment.

Acceptance: Site restrictions are clear enough to maintain the tested fire protective behaviour.

Technical rationale: A low contribution enclosure can still ignite adjacent combustible material if installed against an unsuitable surface.

RSK07 Ventilation dependence

Applicable level: All classes

Requirement: The design shall identify whether normal cooling, fire containment or suppression effectiveness depends on vent openings, fans or pressure relief features.

Verification: Compare airflow analysis, open area calculations and suppression tests.

Acceptance: Critical ventilation assumptions are declared and protected against foreseeable obstruction or alteration.

Technical rationale: Ventilation can both reduce operating temperature and accelerate agent loss or fire propagation.

RSK08 Common cause assessment

Applicable level: All classes

Requirement: The architecture shall identify common dependencies between the charging controller, thermal sensors, contactors, alarm output and suppression activation.

Verification: Perform a dependency review and inject representative single faults.

Acceptance: A credible common fault cannot silently remove every protective layer required for the claimed class.

Technical rationale: A sensor, actuator and alarm powered by the same failed board can create an illusion of independent protection.

RSK09 Foreseeable misuse

Applicable level: All classes

Requirement: The product assessment shall address blocked openings, unsupported cables, unsuitable wall mounting, unauthorised modification, neglected maintenance and operation outside declared conditions.

Verification: Review misuse scenarios against instructions and construction details.

Acceptance: Relevant misuse cases are prevented, detected, warned against or excluded with a justified rationale.

Technical rationale: Real installations commonly differ from laboratory ideal conditions.

RSK10 External fire limitation

Applicable level: All classes

Requirement: The documentation shall distinguish resistance to a defined external exposure from protection against an internal fault and shall not claim both without separate evidence.

Verification: Review the fire scenario matrix and advertising claims.

Acceptance: Each declared scenario has its own test evidence and stated limitations.

Technical rationale: An enclosure can behave differently when heat originates from outside rather than from an internal terminal.

12 ENCLOSURE DESIGN AND CONSTRUCTION REQUIREMENTS

Enclosure performance is established at the assembly level rather than inferred from a single material description.

CON01 Defined material performance

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: The enclosure and relevant internal supports shall use materials with traceable and application appropriate evidence of ignition resistance, flame propagation behaviour and mechanical stability.

Verification: Review material certificates, exact grade and thickness, and relevant finished assembly fire tests.

Acceptance: The production materials match documented evidence and the assembled enclosure satisfies the relevant product level challenge.

Technical rationale: A metal description or polymer marketing claim does not establish the behaviour of openings, coatings, seals and joints.

CON02 Assembly level enclosure assessment

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Fire containment performance shall be assessed for the complete assembled housing, including seams, doors, vents, glands, windows, cable entries and mounting penetrations.

Verification: Perform a representative assembled product fire challenge.

Acceptance: No unassessed opening or joint allows hazardous external flame, burning droplets or uncontrolled propagation under the declared challenge.

Technical rationale: Material specimen ratings do not prove the performance of an enclosure as installed.

CON03 Seam and opening control

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Openings required for cooling, drainage, connectors or maintenance shall be designed so that the claimed fire protective behaviour is maintained.

Verification: Inspect construction and challenge worst case openings and orientation.

Acceptance: The validated assembly controls flame escape and medium loss according to the claimed class.

Technical rationale: A small uncontrolled opening can bypass an otherwise robust housing.

CON04 Mounting surface compatibility

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: The mounting arrangement shall not transfer unacceptable heat to a wall, pedestal, cable duct or other adjacent combustible element during the declared fault challenge.

Verification: Measure the relevant mounting interface during representative fire and thermal tests.

Acceptance: Measured temperatures and observed effects remain within the documented material specific safe limits.

Technical rationale: Fire can spread through the rear of an enclosure without a visible front panel failure.

CON05 Retention under thermal stress

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Covers, internal barriers, cable glands and safety components shall remain retained for the duration of the relevant thermal or fire challenge.

Verification: Inspect specimens during and after the relevant end product challenge.

Acceptance: No component displacement exposes a new ignition route or removes a required protection.

Technical rationale: A heat weakened clip or adhesive can invalidate an apparently suitable material selection.

CON06 Flaming particle control

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: The assembled enclosure shall not release flaming droplets, burning particles or fragments capable of igniting a defined external indicator during the applicable challenge.

Verification: Use a documented indicator and collection arrangement beneath and adjacent to the representative product.

Acceptance: No external indicator ignition attributable to material expelled from the assessed enclosure.

Technical rationale: Burning debris can initiate a secondary fire below a wall mounted charging unit.

CON07 Cable entry integrity

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: External cable entries and internal cable transitions shall maintain their fire relevant positioning and shall not channel flame or hot discharge into an adjacent combustible region.

Verification: Inspect cable routing and perform representative flame propagation or assembly challenges.

Acceptance: Cable and gland behaviour supports the claimed containment boundary.

Technical rationale: Cables often provide a direct propagation path through an otherwise protected enclosure.

CON08 Documented material substitutions

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Changes to resin grade, filler, coating, colour, thickness, gasket, adhesive or supplier shall be assessed before release when they can alter ignition or propagation behaviour.

Verification: Review change control and compare the released materials with type test specimens.

Acceptance: Every relevant substitution has an impact assessment and any necessary retest.

Technical rationale: A generic material name does not identify the tested formulation or its fire performance.

CON09 No unsupported noncombustible claim

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: A material or enclosure shall not be described as noncombustible, fireproof or fire resistant without a defined standard, exposure, assembly and acceptance basis.

Verification: Review technical literature and the supporting evidence.

Acceptance: Terminology is limited to the actual measured performance and application scope.

Technical rationale: Flame retardant, self extinguishing and fire resistant are different performance concepts.

CON10 Service access protection

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: The enclosure shall remain in a defined safe state during authorised maintenance and shall provide warnings for installed suppression devices or residual fire hazards.

Verification: Inspect access procedures, interlocks and service instructions.

Acceptance: Maintenance personnel can identify and manage the protective components before opening the assembly.

Technical rationale: A hidden pressurised device or hot aerosol generator can injure a person opening the enclosure.

13 THERMAL MONITORING AND AUTOMATIC ISOLATION REQUIREMENTS

Thermal protection is evaluated at the credible ignition locations and includes detection, control, uncertainty and safe behaviour on failure.

THM01 Hot spot based sensor placement

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Thermal detection shall cover the credible high risk locations identified by thermal mapping and fault analysis rather than relying solely on a convenient enclosure air temperature.

Verification: Compare sensor locations with loaded thermal mapping and representative local fault challenges.

Acceptance: Every critical ignition region is detected directly or covered by a validated equivalent thermal path.

Technical rationale: A distant sensor may remain cool while a loose terminal reaches an ignition temperature.

THM02 Declared protective threshold

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Each critical detection function shall have a documented activation threshold derived from the lowest applicable component or adjacent material temperature limit.

Verification: Review component ratings, threshold configuration and measured activation.

Acceptance: The measured response occurs before the declared limiting temperature is exceeded.

Technical rationale: A fixed generic temperature cannot be assumed safe for every connector, conductor or enclosure.

THM03 Thermal margin

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: The protection threshold shall include a justified margin for sensor error, spatial offset, response delay, overshoot, ageing, contamination and component tolerance.

Verification: Review the thermal margin calculation and verify with rising temperature tests.

Acceptance: The complete uncertainty and response budget leaves a positive margin to the limiting component temperature.

Technical rationale: A sensor reading below a material limit is not sufficient if the actual hot spot is hotter or continues rising.

THM04 Automatic response

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: When a critical internal temperature is reached the EVSE shall reduce charging energy or isolate the affected power path in time to remain within validated safe operating limits.

Verification: Apply a controlled local thermal challenge under representative electrical load.

Acceptance: The protective response occurs within the declared response time and prevents exceedance of the limiting temperature.

Technical rationale: Detection without effective reduction of available energy does not prevent escalation.

THM05 Derating limitations

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Current derating may be used only when verification shows that the reduced load arrests the temperature rise before the critical limit; otherwise isolation shall occur.

Verification: Challenge the control system at maximum ambient and representative fault resistance.

Acceptance: The product isolates if temperature continues to rise, if derating fails or if the fault is not load responsive.

Technical rationale: A damaged connection can remain hazardous even after a moderate current reduction.

THM06 Sensor failure detection

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: An open, shorted, disconnected or implausibly fixed critical temperature sensor shall produce a safe charging limitation or isolation and an identifiable fault indication.

Verification: Inject open circuit, short circuit, disconnected sensor and frozen value conditions.

Acceptance: Every relevant fault produces the declared safe response before unsafe charging can continue.

Technical rationale: A failed sensor must not make a product appear protected while leaving the charging path energised.

THM07 Maximum declared ambient operation

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Thermal protection shall remain effective at the highest declared ambient temperature, relevant solar or enclosed mounting conditions and the maximum declared continuous current.

Verification: Perform loaded thermal stabilisation and local fault testing at the declared high ambient condition.

Acceptance: Thresholds are not defeated by ambient heating and nuisance operation remains appropriately controlled.

Technical rationale: Protection that functions at room temperature may be ineffective in a sun exposed or enclosed installation.

THM08 Power supply interruption

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Loss of power to an electrically dependent thermal detection or charging control function shall place the affected charging path in its declared safe state.

Verification: Interrupt auxiliary power during normal charging and during an emerging thermal event.

Acceptance: The equipment does not continue uncontrolled charging after loss of the protective control supply.

Technical rationale: A protective sensor cannot provide safety if the controller loses power while a contactor remains energised.

THM09 Latched critical condition

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: A critical overtemperature event shall not result in repeated automatic energisation while the fault, hot spot or damaged component remains present.

Verification: Cycle ambient conditions and supply power after triggering a critical event.

Acceptance: Charging remains inhibited until documented recovery conditions have been fulfilled.

Technical rationale: Repeated resets can restart the same ignition sequence without investigation.

THM10 Verification after ageing

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Critical detection and isolation functions shall remain effective after the declared environmental conditioning, mechanical exposure and representative service ageing.

Verification: Repeat functional checks after relevant cold, dry heat, damp heat, vibration or salt exposure.

Acceptance: Activation remains within the validated tolerance and no required safety function is lost.

Technical rationale: Corrosion, drift and thermal cycling can cause a protective design to degrade after commissioning.

14 PASSIVE FIRE MITIGATION REQUIREMENTS

Passive measures must provide a defined and verifiable contribution beyond the FSL1 enclosure and temperature response.

PAS01 Dedicated passive function

Applicable level: FSL2

Requirement: A product claiming FSL2 shall include a dedicated passive fire protective feature beyond the minimum enclosure and thermal response required for FSL1.

Verification: Inspect the design and review the product level comparative fire test.

Acceptance: The passive feature has a defined protective function and measurable contribution.

Technical rationale: A higher classification requires more than relabelling the same enclosure material.

PAS02 Protected risk zones

Applicable level: FSL2

Requirement: Passive measures shall be located between credible ignition sources and vulnerable adjacent components, cable exits, external openings or mounting surfaces.

Verification: Review zone mapping and inspect representative assemblies.

Acceptance: All declared protected pathways are physically covered by the validated passive arrangement.

Technical rationale: A passive barrier is ineffective if placed away from the actual propagation path.

PAS03 Validated flame limitation

Applicable level: FSL2

Requirement: Passive protection shall limit flame propagation, hot particle release and damaging heat transfer in the assembled product under the defined ignition challenge.

Verification: Perform the relevant end product internal fire or local heat challenge.

Acceptance: The declared containment outcome and minimum duration are achieved without prohibited propagation.

Technical rationale: Material datasheets alone cannot demonstrate assembly level containment.

PAS04 Intumescent activation suitability

Applicable level: FSL2

Requirement: An intumescent material shall activate within a temperature range compatible with the protected hazard and shall expand without defeating electrical spacing or required ventilation.

Verification: Inspect the application and test activation in the representative enclosure.

Acceptance: The material activates where needed and creates no new electrical, pressure or overheating hazard.

Technical rationale: Expansion can unintentionally bridge conductors or obstruct cooling in an unrelated compartment.

PAS05 Barrier continuity

Applicable level: FSL2

Requirement: A thermal or flame barrier shall retain its protective continuity at seams, cable penetrations, mounting points and component interfaces.

Verification: Inspect the production arrangement and challenge representative discontinuities.

Acceptance: The validated barrier does not permit a direct uncontrolled propagation pathway.

Technical rationale: A nominally rated sheet can be bypassed by an unsealed cable entry.

PAS06 Retention throughout service life

Applicable level: FSL2

Requirement: Passive protection shall remain fixed and functional during installation, vibration, temperature cycling, humidity exposure and foreseeable maintenance.

Verification: Apply environmental conditioning and mechanical handling before functional challenge.

Acceptance: No detachment, shrinkage, delamination or displacement defeats the declared protection.

Technical rationale: Adhesives and soft foams can lose their protective position before a fire occurs.

PAS07 Chemical compatibility

Applicable level: FSL2

Requirement: Passive materials shall be compatible with cable insulation, electronics, metallic parts, cleaning agents and any installed suppression medium.

Verification: Review material compatibility information and inspect conditioned assemblies.

Acceptance: No identified material interaction creates corrosion, conductive contamination or premature degradation.

Technical rationale: A chemically aggressive barrier can increase the probability of the electrical fault it was intended to mitigate.

PAS08 No confusion between low smoke and suppression

Applicable level: FSL2

Requirement: Halogen free, low smoke or self extinguishing material claims shall not be represented as active suppression or as automatic proof of successful product level fire containment.

Verification: Review material descriptions, classification rationale and test evidence.

Acceptance: Each property is described only within the limits established by its actual test.

Technical rationale: Reduced smoke toxicity and flame propagation do not demonstrate extinguishment of an external ignition source.

PAS09 Vent and drainage functionality

Applicable level: FSL2

Requirement: Passive protection shall not block drainage, required normal cooling or pressure relief unless the revised system has been validated for all operating conditions.

Verification: Review thermal performance, ingress protection and the full product fault response.

Acceptance: The added protection does not create unacceptable normal operating heat or trapped moisture.

Technical rationale: A barrier can unintentionally increase the likelihood of overheating during ordinary charging.

PAS10 Comparative contribution

Applicable level: FSL2

Requirement: The manufacturer shall demonstrate how the dedicated passive arrangement improves a relevant outcome compared with an otherwise representative configuration without that arrangement.

Verification: Review paired tests, validated simulation or another justified comparative assessment.

Acceptance: The claimed benefit is identifiable and repeatable for the relevant product configuration.

Technical rationale: A measurable contribution distinguishes purposeful engineering from decorative or incidental material use.

15 AUTOMATIC SUPPRESSION REQUIREMENTS

Active suppression is accepted only when the integrated local application is effective, electrically compatible, serviceable and safe for its surroundings.

APPLICATION LIMIT A standard or approval for room flooding, a portable extinguisher or an aerosol generator does not automatically approve a local discharge application within a ventilated electrical enclosure.

SUP01 Automatic integrated suppression

Applicable level: FSL3 and FSL3+

Requirement: A product claiming FSL3 or FSL3+ shall incorporate an automatic suppression device or system specifically validated for the actual protected EVSE enclosure.

Verification: Inspect the physical installation and conduct representative application specific discharge tests.

Acceptance: The device is permanently associated with the declared protected volume and operates without an emergency human action.

Technical rationale: A separate hand extinguisher or building level system does not provide integrated product level suppression.

SUP02 Effective hazard coverage

Applicable level: FSL3 and FSL3+

Requirement: The selected medium, discharge geometry and protected volume shall cover the credible ignition zones identified in the product fire risk assessment.

Verification: Review enclosure volume calculations, nozzle or outlet positions and representative multi location tests.

Acceptance: Every claimed high risk region receives adequate validated exposure to the medium.

Technical rationale: A module positioned near one terminal may not protect a separated converter compartment.

SUP03 Independent activation path

Applicable level: FSL3 and FSL3+

Requirement: Suppression shall activate through a sufficiently independent path that is not defeated by the same credible controller or auxiliary power failure that initiates the fire.

Verification: Review the activation architecture and inject relevant controller and supply failures.

Acceptance: The declared initiation function remains available under the defined single fault conditions.

Technical rationale: Automatic protection is unreliable when the fault destroys the only circuit capable of releasing the medium.

SUP04 Activation temperature and timing

Applicable level: FSL3 and FSL3+

Requirement: The suppression activation point shall be compatible with the credible ignition scenario, component limits, sensor location and expected fire growth.

Verification: Challenge the device using representative local ignition and high ambient conditions.

Acceptance: The medium is released within the validated time window for the relevant fire scenario.

Technical rationale: A nominal thermal trigger is ineffective if the ignition zone develops outside its sensing location.

SUP05 Validated extinguishing outcome

Applicable level: FSL3 and FSL3+

Requirement: The assembled product shall demonstrate effective suppression or another precisely defined fire control outcome for each declared ignition scenario.

Verification: Perform repeatable representative fire challenges with documented ignition energy and observation.

Acceptance: The declared flame control, containment and absence of prohibited propagation are achieved for every required specimen.

Technical rationale: Presence of an extinguishing component is not equivalent to verified suppression effectiveness.

SUP06 Reignition control

Applicable level: FSL3 and FSL3+

Requirement: Following suppression, the protected assembly shall remain isolated or otherwise controlled for the validated observation period so that residual heat cannot reignite the same hazard.

Verification: Observe the product after discharge under the declared worst credible residual heat condition.

Acceptance: No renewed flame or prohibited propagation occurs during the documented observation period.

Technical rationale: An agent may extinguish visible flame while a terminal or component remains hot enough to reignite.

SUP07 Electrical medium compatibility

Applicable level: FSL3 and FSL3+

Requirement: The suppression medium and its residues shall be compatible with the relevant electrical voltage, insulation system, electronic components and post event access conditions.

Verification: Review manufacturer data and perform the required application specific compatibility checks.

Acceptance: No unacceptable conductive deposit, insulation failure or exposed electrical hazard results from discharge.

Technical rationale: A fire protective medium must not create a new electric shock or short circuit hazard.

SUP08 Human exposure assessment

Applicable level: FSL3 and FSL3+

Requirement: The product assessment shall evaluate hot discharge, aerosol particles, oxygen displacement, pressure, decomposition products and toxic or irritating substances that can reach an occupied area.

Verification: Review safety data sheets, enclosure leakage, worst case release quantity and installation context.

Acceptance: Exposure remains within a justified and legally acceptable risk profile for the actual site and product.

Technical rationale: A small enclosure can release a locally concentrated medium into a confined occupied space.

SUP09 Pressure and mechanical integrity

Applicable level: FSL3 and FSL3+

Requirement: Any pressurised device, release mechanism or gas generating system shall be suitable for its declared pressure, ambient range, installation orientation and applicable legal regime.

Verification: Review pressure data, component assessment, mounting and representative discharge tests.

Acceptance: The release does not rupture the enclosure, dislodge components or exceed the documented design limits.

Technical rationale: Agent storage or rapid discharge can introduce a secondary overpressure hazard.

SUP10 Medium quantity and retention

Applicable level: FSL3 and FSL3+

Requirement: The available quantity of suppression medium and its retention in the actual enclosure shall account for openings, leakage, orientation, temperature and manufacturing tolerance.

Verification: Perform application specific sizing and validate the worst credible ventilation condition.

Acceptance: The installed charge and protected volume remain inside the verified operating envelope.

Technical rationale: A building system rating cannot be transferred to an EVSE enclosure without accounting for leakage and geometry.

SUP11 End of service life control

Applicable level: FSL3 and FSL3+

Requirement: An agent container, thermal initiator, generator or other limited life component shall have a documented replacement interval or condition monitoring method.

Verification: Inspect traceability, expiry data, service instructions and routine inspection records.

Acceptance: The product cannot silently retain a valid claim after the suppression component has expired.

Technical rationale: Loss of agent, pressure or activation sensitivity can make an installed device ineffective.

SUP12 Post activation charging lockout

Applicable level: FSL3 and FSL3+

Requirement: After release of a suppression medium the affected equipment shall be prevented from returning to normal charging until inspection, remediation and replacement are completed.

Verification: Trigger a real or representative release signal and cycle mains and control power.

Acceptance: Charging remains inhibited until the documented authorised restoration process is completed.

Technical rationale: A discharged single use device cannot provide further fire protection if operation resumes automatically.

SUP13 Legal and environmental screening

Applicable level: FSL3 and FSL3+

Requirement: The selected suppression technology shall be assessed against applicable pressure, chemical, fluorinated gas, firefighting foam and transport requirements in its intended market.

Verification: Review legal applicability, safety data sheets and supply chain documentation.

Acceptance: No restricted or improperly classified substance is used outside its lawful conditions.

Technical rationale: A technically effective medium can still be unsuitable because of environmental restrictions or pressure equipment rules.

SUP14 No automatic transfer of building approval

Applicable level: FSL3 and FSL3+

Requirement: Evidence for room flooding, portable extinguishers or another protected application shall not be treated as approval for a local EVSE enclosure without dedicated local application validation.

Verification: Compare the source approval scope with the actual protected volume and discharge arrangement.

Acceptance: Any transferred evidence is supplemented by application specific testing and documented acceptance.

Technical rationale: A total flooding standard and a small ventilated charging enclosure address materially different systems.

SUP15 Service warning and handling

Applicable level: FSL3 and FSL3+

Requirement: The enclosure and maintenance documentation shall identify any installed automatic agent, activation mechanism, pressurised component and precautions after operation.

Verification: Inspect marking, product instructions and service access arrangements.

Acceptance: A competent service person can identify the device and manage its hazards before maintenance.

Technical rationale: An unseen automatic device can discharge during disassembly or create hazardous exposure after a fire.

16 SUPERVISED ALARM AND EXTERNAL INTERFACE REQUIREMENTS

Enhanced event awareness requires a monitored local interface that remains meaningful under foreseeable wiring, supply and network faults.

SUPERVISION A normally closed contact alone can detect loss of continuity but does not inherently detect a short circuit, bridging, failed receiving input or loss of output power. The complete circuit shall therefore be supervised or otherwise validated for the specific failure modes.

ALM01 Event output provision

Applicable level: FSL3+ only

Requirement: A product claiming FSL3+ shall provide a dedicated local event output capable of presenting an identified fire protective activation or safety relevant fault to an external system.

Verification: Inspect the interface and perform end to end functional tests.

Acceptance: The declared local output changes to its alarm or fault state for every required event.

Technical rationale: Remote awareness requires an actual usable interface rather than only a theoretical software capability.

ALM02 Supervised circuit

Applicable level: FSL3+ only

Requirement: A required external alarm path shall detect open circuit, short circuit, disconnected wiring and, where relevant, loss of interface power through end of line supervision, coded signalling or an equivalent validated method.

Verification: Inject each wiring and supply fault at representative points in the circuit.

Acceptance: Each fault produces a distinguishable or otherwise actionable fault state within the declared response time.

Technical rationale: A normally closed contact detects an open circuit but can remain falsely healthy when wiring is shorted or bypassed.

ALM03 Distinct fire and fault states

Applicable level: FSL3+ only

Requirement: The external interface shall distinguish a suppression release or confirmed fire event from a monitored circuit fault where the connected safety architecture requires that distinction.

Verification: Exercise event, fault, normal and restored states with the intended receiving equipment.

Acceptance: The receiving system identifies each required state unambiguously.

Technical rationale: A maintenance fault and an actual release can require different emergency actions.

ALM04 Loss of power reporting

Applicable level: FSL3+ only

Requirement: Loss of the power source required to present or transmit an alarm shall generate an external fault indication or another validated fail aware response.

Verification: Interrupt interface and auxiliary supply power while monitoring the receiving system.

Acceptance: The external system does not display normal status while the required reporting path is unavailable.

Technical rationale: Cloud connectivity cannot compensate for an unreported local interface power failure.

ALM05 Local independence from cloud

Applicable level: FSL3+ only

Requirement: A cloud connection, mobile network or internet service shall not be the sole path for a mandatory local fire event or fault indication.

Verification: Disconnect every remote communications path and operate the fire protective functions.

Acceptance: Local isolation and the required external interface remain functional during network loss.

Technical rationale: Fire protection must remain effective when the communications network is unavailable.

ALM06 Output electrical rating

Applicable level: FSL3+ only

Requirement: The alarm output shall state its contact arrangement, maximum voltage, maximum current, isolation characteristics and required interface equipment.

Verification: Review terminal data, schematics and the actual building system integration.

Acceptance: The output is used only within its declared electrical and functional rating.

Technical rationale: An incompatible input can fail to register an alarm or damage the connected safety system.

ALM07 Event persistence

Applicable level: FSL3+ only

Requirement: A fire activation and a critical safety fault shall remain locally indicated or recorded after interruption and restoration of the normal supply until authorised acknowledgement.

Verification: Trigger an event, remove supply and restore operation.

Acceptance: The required fire or fault information is not lost through a simple power cycle.

Technical rationale: A transient event can otherwise disappear before an operator or emergency responder arrives.

ALM08 Interface response time

Applicable level: FSL3+ only

Requirement: The time between the detected event and the externally observable alarm or fault state shall be declared, validated and appropriate to the connected emergency response.

Verification: Measure end to end response under normal and adverse communications or power conditions.

Acceptance: Every required event is presented within the declared maximum response time.

Technical rationale: An alarm that appears only after substantial delay may not support effective intervention.

ALM09 Building system compatibility

Applicable level: FSL3+ only

Requirement: Connection to a building fire detection installation shall be designed and accepted within the rules applicable to that installation and its responsible maintainer.

Verification: Review the interface design against the actual building system documentation and approval process.

Acceptance: The building system owner or competent installer has accepted the proposed interface configuration.

Technical rationale: An EVSE alarm output is not automatically an approved EN 54 system component.

ALM10 No automatic emergency service claim

Applicable level: FSL3+ only

Requirement: Documentation shall not state that a product notifies emergency services unless the complete transmission route, receiving organisation and contractual arrangement have been verified.

Verification: Review service agreements, integration records and event transmission tests.

Acceptance: Claims describe only the notification destinations actually available.

Technical rationale: Sending data to a cloud platform does not itself create a monitored fire brigade connection.

ALM11 Periodic functional test

Applicable level: FSL3+ only

Requirement: A means shall be available to verify the required alarm and fault signalling path without discharging a single use suppression medium.

Verification: Exercise a dedicated simulation, test input or monitored equivalent at commissioning and maintenance.

Acceptance: The receiving system sees the correct states and normal operation can be restored safely after the test.

Technical rationale: The interface must be testable throughout service life without destroying the installed protective component.

ALM12 Cyber and configuration resilience

Applicable level: FSL3+ only

Requirement: Where software or network configuration participates in the fire notification path, unauthorised or accidental changes shall not silently disable the required local protective response.

Verification: Review access controls, configuration change records and operation with communications disabled.

Acceptance: Safety relevant configuration changes are controlled and local mandatory functions remain effective.

Technical rationale: A remote settings change must not remove a protection that the label continues to advertise.

17 INSTALLATION AND OPERATING ENVIRONMENT REQUIREMENTS

Site and installation conditions must preserve the tested configuration without turning a product label into a building fire safety certificate.

INS01 Installation instructions

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: The manufacturer shall provide product specific mounting, clearance, orientation, ambient, cable routing and supply protection instructions relevant to the claimed fire class.

Verification: Review the released instructions against the validated test arrangement.

Acceptance: A competent installer can reproduce the verified protective configuration.

Technical rationale: Correct product behaviour can depend on installation conditions that are invisible to the end user.

INS02 Mounting material restrictions

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Any mounting surface restriction arising from heat transfer, enclosure openings or suppression discharge shall be clearly declared.

Verification: Inspect the product level thermal assessment and installation manual.

Acceptance: Prohibited or conditional surfaces are identified before installation.

Technical rationale: The same enclosure may behave differently on masonry, timber or an insulated facade.

INS03 Cable management

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Cable routing shall prevent sustained mechanical loading, trapped heat, contact with hot surfaces and obstruction of vents or suppression outlets.

Verification: Inspect the representative installation and installation instructions.

Acceptance: The cable arrangement maintains the validated operating and fire protective configuration.

Technical rationale: A wrapped or unsupported cable can create both local heating and mechanical stress.

INS04 Site coordination

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Where an installation presents unusual occupancy, limited access, confined ventilation or high asset concentration, site specific emergency procedures shall be coordinated with the product limitations.

Verification: Review the site risk assessment and operator instructions.

Acceptance: The site does not rely on the product label as a substitute for building fire design.

Technical rationale: A product level classification cannot by itself establish the safety of a whole parking structure.

INS05 Suppression replacement access

Applicable level: FSL3 and FSL3+

Requirement: An installed suppression component shall be accessible for authorised inspection and replacement without damaging the enclosure or defeating electrical safety.

Verification: Review service drawings and perform a representative service procedure.

Acceptance: Replacement can be completed safely and the validated configuration can be restored.

Technical rationale: A device that cannot be serviced may remain expired or be replaced with an unsuitable part.

INS06 Occupancy and exposure restriction

Applicable level: FSL3 and FSL3+

Requirement: The installation manual shall state any restrictions relating to enclosed occupied spaces, ventilation and access after discharge of the installed medium.

Verification: Review the medium safety information and installation conditions.

Acceptance: Persons responsible for the installation can maintain safe exposure and access conditions.

Technical rationale: The acceptability of a medium depends on the volume and occupancy of the surrounding site.

INS07 Alarm destination identification

Applicable level: FSL3+ only

Requirement: An FSL3+ installation shall identify the responsible recipient, receiving system and response procedure for fire and fault notifications.

Verification: Inspect commissioning records and conduct an end to end signal test.

Acceptance: Each mandatory output reaches a documented receiving point and responsible party.

Technical rationale: An unconnected alarm contact does not deliver the operational benefit implied by enhanced reporting.

INS08 Incident response instructions

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: The user and operator documentation shall describe immediate isolation, restricted access, emergency notification and prohibition of reuse after a fire event.

Verification: Review product and site emergency instructions.

Acceptance: Actions are clear, proportionate and consistent with the actual product architecture.

Technical rationale: A discharged or damaged charger can remain dangerous even after visible flame has stopped.

18 INSPECTION, MAINTENANCE AND INCIDENT RESPONSE REQUIREMENTS

Protection must remain available throughout the declared service life and after changes to equipment, components or site infrastructure.

MNT01 Maintenance schedule

Applicable level: All classes

Requirement: The manufacturer shall define the inspection, test and replacement actions necessary to preserve the claimed fire classification throughout the declared service life.

Verification: Review the maintenance programme and compare it with component limitations.

Acceptance: Every safety relevant component has an identified inspection or maintenance route.

Technical rationale: A classification at delivery does not automatically remain valid after years without inspection.

MNT02 Thermal function inspection

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Periodic verification shall address critical sensor connection, fault indication, protective threshold operation or an equivalent diagnostic capability.

Verification: Inspect service records or exercise the documented functional test.

Acceptance: The required detection and isolation path remains available and within declared limits.

Technical rationale: Sensor drift or disconnected wiring can otherwise remain hidden.

MNT03 Passive protection inspection

Applicable level: FSL2, FSL3 and FSL3+

Requirement: Where accessible, service procedures shall verify the presence, position and condition of passive barriers, seals and protected cable entries.

Verification: Inspect the installed assembly using the documented service procedure.

Acceptance: No relevant barrier is missing, detached, damaged or bypassed.

Technical rationale: A single maintenance intervention can remove a protective layer that is not externally visible.

MNT04 Suppression component status

Applicable level: FSL3 and FSL3+

Requirement: The inspection programme shall verify agent charge or other status indication, expiry, mounting, initiation connection and absence of discharge or physical damage.

Verification: Review service records, component markings and any available monitoring signal.

Acceptance: The device is within its declared service interval and in the validated installed condition.

Technical rationale: A depleted, expired or previously discharged unit cannot support the claimed class.

MNT05 Alarm path test

Applicable level: FSL3+ only

Requirement: The maintenance programme shall periodically test the normal, alarm and fault states of the required external reporting path.

Verification: Conduct an end to end simulation with the actual receiving system.

Acceptance: Every required state is received, identified and acknowledged as documented.

Technical rationale: Changes to building equipment or site wiring can silently disconnect the reporting function.

MNT06 Configuration change review

Applicable level: All classes

Requirement: Any repair, firmware update, enclosure modification or replacement component that can affect the fire protective design shall be reviewed before the classification claim is continued.

Verification: Inspect maintenance records, firmware revisions and replacement part traceability.

Acceptance: Only approved equivalent configurations remain in service under the existing label.

Technical rationale: A repair can change a protected volume, thermal threshold or supervision logic.

MNT07 Post discharge quarantine

Applicable level: FSL3 and FSL3+

Requirement: Equipment that has experienced a suppression discharge or internal fire shall be isolated, identified and prevented from reuse until assessed by an authorised competent person.

Verification: Review the physical lockout and service procedure after an activation.

Acceptance: Charging cannot resume until all damaged and single use components are properly addressed.

Technical rationale: Residue, damaged insulation and hidden heat can remain after an apparently successful extinguishment.

MNT08 Incident record

Applicable level: All classes

Requirement: A fire, near miss, false discharge or protective failure shall be documented with product identity, operating conditions, sequence of events and corrective action.

Verification: Inspect incident reporting and trend review arrangements.

Acceptance: The organisation can identify recurrence and assess whether the classification remains justified.

Technical rationale: Field incidents provide essential evidence for updating protective design and service intervals.

19 TECHNICAL DOCUMENTATION AND CLAIM CONTROL REQUIREMENTS

Classification claims require reproducible technical evidence, controlled artwork and procedures for suspension or withdrawal.

DOC01 Unique product identification

Applicable level: All classes

Requirement: The declaration shall identify manufacturer, model, rating, hardware revision, firmware where relevant and the precise assessed class.

Verification: Inspect the label, declaration and technical dossier.

Acceptance: The claimed configuration can be linked unambiguously to production and test records.

Technical rationale: A class assigned to one variant must not migrate automatically to a different power rating or enclosure.

DOC02 Classification rationale

Applicable level: All classes

Requirement: The technical dossier shall include a complete requirements matrix showing applicability, evidence, assessment result and unresolved deviations.

Verification: Review the signed matrix against underlying records.

Acceptance: Every mandatory row has a justified status and traceable evidence.

Technical rationale: The matrix makes the basis for the class visible to reviewers and future manufacturers.

DOC03 Fire test report

Applicable level: All classes

Requirement: Each fire relevant test report shall describe the specimen, ignition challenge, instrumentation, ambient conditions, observations, acceptance criteria and final result.

Verification: Inspect reports and compare them with product configuration records.

Acceptance: A competent reviewer can reproduce the test logic and understand the scope of the conclusion.

Technical rationale: A photograph or unsupported statement of successful extinguishment is insufficient technical evidence.

DOC04 Material records

Applicable level: All classes

Requirement: The dossier shall identify the exact material grade, supplier, thickness and relevant fire behaviour evidence for enclosure, barriers, wiring and safety critical supports.

Verification: Review bill of materials, supplier data and incoming inspection records.

Acceptance: The production configuration is traceable to the assessed material evidence.

Technical rationale: A broad polymer family or steel description does not uniquely establish fire behaviour.

DOC05 Thermal response records

Applicable level: FSL1, FSL2, FSL3 and FSL3+

Requirement: Thermal maps, sensor locations, threshold settings, calibration assumptions and automatic isolation behaviour shall be recorded in the product dossier.

Verification: Review thermal reports, circuit diagrams and software configuration.

Acceptance: Every critical detection location has measurable supporting evidence.

Technical rationale: The effectiveness of a sensor depends on placement, response and configuration.

DOC06 Passive design records

Applicable level: FSL2, FSL3 and FSL3+

Requirement: The dossier shall include drawings and application details for each passive barrier, intumescent feature, protected compartment and relevant attachment method.

Verification: Review manufacturing drawings and assembly instructions.

Acceptance: The documented construction can be reproduced consistently in production.

Technical rationale: A general statement that a device contains protective foam does not define the validated design.

DOC07 Suppression dossier

Applicable level: FSL3 and FSL3+

Requirement: The dossier shall identify the suppression manufacturer, exact model, agent, quantity, protected volume, activation method, service life and application specific test evidence.

Verification: Review component records, safety data, enclosure calculations and activation tests.

Acceptance: The complete installed suppression arrangement is traceable and supported by appropriate evidence.

Technical rationale: Approval of an agent family is not equivalent to approval of the integrated product.

DOC08 Alarm interface records

Applicable level: FSL3+ only

Requirement: An FSL3+ dossier shall include the interface circuit, normal and alarm states, supervision method, power dependency, event list and commissioning test method.

Verification: Review drawings and measured functional test results.

Acceptance: Every required external event and fault path has a documented and tested implementation.

Technical rationale: Simple marketing references to remote monitoring do not establish a supervised life safety interface.

DOC09 Label artwork integrity

Applicable level: All classes

Requirement: Only the authorised artwork corresponding to the actually achieved class shall be used, with the declared minimum reproduction size and legibility requirements.

Verification: Compare installed or published artwork with the controlled annex files.

Acceptance: The class, proportions, colours and identifying context remain accurate.

Technical rationale: A recognisable label is useful only when its class and provenance are preserved.

DOC10 Declaration review and withdrawal

Applicable level: All classes

Requirement: The manufacturer shall review the declaration after a safety critical design change, relevant field incident, evidence expiry or change in applicable restrictions.

Verification: Inspect governance procedures and the change or incident record.

Acceptance: A claim is updated, suspended or withdrawn when its supporting conditions no longer exist.

Technical rationale: A classification cannot remain credible when contradictory evidence becomes available.

20 PERFORMANCE THRESHOLDS AND ENGINEERING MARGINS

20.1 Derivation of component temperature limits

The maximum permissible operating temperature at a critical location shall be derived from the lowest relevant limit of the conductor insulation, terminal, connector, relay, printed circuit board, suppression component and nearby enclosure or barrier material.

The declared limit shall account for the actual continuous duty cycle, rated current, mounting condition and maximum ambient environment. A material melting point is not an acceptable substitute for its electrical, mechanical or long term service temperature.

Where an installed temperature sensor is spatially separated from the critical component, the measured temperature difference between the sensor and the actual hot spot shall be included in the threshold calculation.

20.2 Protective margin calculation

The critical activation threshold should be established by subtracting the complete uncertainty budget from the maximum permissible component temperature. Relevant contributors are measurement error, calibration uncertainty, sensor placement offset, response delay, thermal overshoot, production tolerance, service ageing and foreseeable contamination.

A positive thermal margin shall remain under the worst validated ambient condition and fault heating rate. Where the required margin cannot be demonstrated, the sensor position or isolation architecture shall be changed rather than accepting an unsupported nominal threshold.

A pre alarm threshold may be placed below the critical isolation threshold. A pre alarm is supplementary and shall not postpone an isolation action once the critical response criterion has been reached.

20.3 Response time and fault energy

The relevant response time begins at the instant the monitored physical condition crosses the validated threshold and ends when the affected energy path reaches its declared safe state. Sensor processing time, software delay, relay actuation, stored energy and any communication latency must be included.

A maximum response time shall be defined for the actual architecture. The time shall be demonstrated by measurement and shall not be represented as an IEC mandated figure when it originates from the proposed FSL scheme.

Opening a contactor is insufficient where a welded contact, backfeed, charged capacitor or auxiliary supply can continue feeding the affected ignition zone. The fault assessment shall identify the remaining energy and the available independent response.

20.4 Draft quantitative pilot criteria

For pilot comparability, the scheme may provisionally evaluate event output transmission within 10 seconds after confirmation of a fire protective event and critical charging isolation within 5 seconds after crossing a validated thermal threshold, provided the architecture can safely meet those values.

These numbers are proposed FSL pilot criteria only. They are not transcribed from an IEC product standard and shall be revised if laboratory evidence, DC discharge behaviour, site integration or a consensus process justifies another value.

A minimum post suppression observation period of 15 minutes and a minimum series of three representative successful fire challenges may be used as pilot defaults. Both remain subject to product category, residual heat, measurement uncertainty and independent technical review.

20.5 Acceptance by function

Core acceptance outcomes are absence of uncontrolled external flame, absence of external indicator ignition by burning droplets, maintenance of the declared isolation state, preservation of an actionable event indication and absence of an unacceptable secondary hazard.

A reported pass shall identify the precise ignition scenario, number of specimens, orientation, protected volume, applied power, opening arrangement and observation period. A result obtained in one configuration cannot be silently generalised to all product variants.

21 TYPE TESTING AND SPECIMEN SELECTION

21.1 Selection of representative specimens

Type test specimens shall represent released production construction, the highest relevant power rating, the most unfavourable enclosure volume, critical component arrangement, actual ventilation, suppression charge and safety relevant firmware.

Where multiple variants share a design, the manufacturer shall justify the selected worst case or test each distinct configuration. Changes to cable entry position, enclosure depth, suppression module size or sensor location can create separate families.

A specimen prepared only for demonstration, with sealed vents or substituted materials, is not representative unless those exact conditions also apply to every product covered by the declaration.

21.2 Test laboratory and instrumentation

Measurements shall be carried out using suitable, calibrated instrumentation with known accuracy, sampling interval and traceability. Independent laboratory work may follow the competence principles associated with ISO/IEC 17025 [R38].

Temperature sensors shall be installed at the identified hot spot, the protective sensor location, relevant enclosure surfaces, cable entries and the mounting interface. Where appropriate, video, current, voltage, smoke behaviour, pressure and alarm state shall also be recorded.

The report shall describe uncertainty, thermocouple attachment, data sampling, ambient condition, stabilisation method and the safety precautions taken to conduct the fire challenge.

21.3 Environmental preconditioning

Where relevant, representative samples shall be conditioned according to the principles of the applicable cold, dry heat, damp heat and salt exposure references [R22 to R25]. The selected exposure must correspond to the environment actually claimed.

The protective function shall be assessed after conditioning and, where practical, at the operating temperature limit itself. Environmental conditioning must not be treated as a separate pass when it disables or materially shifts the fire response.

21.4 Failure mode testing

Single fault testing shall consider an open thermal sensor, shorted sensor, implausibly static measurement, loss of auxiliary power, controller failure, welded contactor, interrupted alarm loop, shorted alarm loop, disconnected end element and loss of network service.

The product shall enter the declared safe or fail aware state for faults relevant to the claimed class. A fault that silently disables all protective functions is inconsistent with the intended classification.

22 FIRE CHALLENGE AND ENVIRONMENTAL VERIFICATION

22.1 Material and finished product evidence

Glow wire apparatus and common procedure may be referenced to IEC 60695-2-10:2026 [R14]. The distinction between finished product assessment, material flammability index and material ignition temperature shall be maintained using the respective references [R15 to R17].

The 50 W horizontal and vertical flame methods may provide additional material or small scale evidence where applicable [R18]. Cable propagation performance may be assessed using the relevant current IEC 60332 reference [R19].

None of these material or component tests automatically establishes the fire behaviour of the fully assembled EVSE. Assembly level evidence remains necessary whenever the class depends on containment or suppression.

22.2 Internal ignition challenges

A relevant challenge should reproduce a realistic local resistive terminal fault, a failing electrical component or another documented ignition source. Applied energy, duration, position, normal ventilation and available combustible material must be controlled and recorded.

The test sequence should establish normal operation, create the defined fault, observe detection or isolation, observe passive containment, verify suppression when present and monitor the post event period.

If a standardized challenge source is chosen for comparability, its use shall be described as an FSL scheme method rather than represented as a mandatory procedure from another copyrighted standard.

22.3 External exposure and mounting interface

An external fire or heat exposure claim requires a separate representative challenge applied to the declared enclosure surface or installation arrangement. Relevant outcomes include penetration, internal ignition, rear surface heat transfer and loss of component retention.

Where a product is mounted against a combustible or temperature sensitive substrate, the actual support or a justified worst case equivalent shall be included in the assessment.

22.4 Suppression performance

Suppression tests shall evaluate all declared ignition zones, enclosure orientation, maximum credible vent opening, highest relevant ambient condition, discharge coverage and post event reignition.

Safety evaluation shall also address medium concentration, hot discharge, residue, visibility, corrosion, electrical insulation, occupancy exposure and possible pressure rise. Successful flame control does not automatically mean the application is safe for an occupied indoor site.

23 ROUTINE PRODUCTION AND COMMISSIONING VERIFICATION

23.1 Routine production verification

Routine checks should confirm the presence of critical sensors, correct wiring, correct safety firmware, enclosure materials or controlled supplier identity, installation of the specified passive parts, and the identity and expiry of any suppression module.

Every production unit should undergo the applicable electrical routine tests required by its product family. These tests remain separate from the enhanced fire scheme and should include the relevant continuity, insulation and functional checks under the actual product standard.

A destructive fire test is not expected on every unit. Production confidence is achieved by configuration control, validated manufacturing instructions, functional simulation, traceability and an appropriate sampling or audit plan.

23.2 Commissioning

Installation commissioning shall confirm supply protection, correct mounting, ventilation, connection integrity, the state of fire protective components and, for FSL3+, the complete external alarm and fault path.

The commissioning record shall identify the installation location, installer, product serial number, class, receiving alarm system where applicable and any restrictions needed to preserve the declared protection.

23.3 Revalidation triggers

Revalidation shall be considered after a change to enclosure geometry, vent area, polymer supplier, barrier adhesive, suppression charge, thermal sensor location, current rating, connector, firmware, alarm interface or declared environmental condition.

A field fire, failed protective response, recurring false activation, change in legal restrictions or expired supplier evidence can also require suspension and reassessment of the classification.

24 ASSESSMENT, DECLARATION AND INDEPENDENT REVIEW

24.1 First party declaration

A manufacturer may make a first party declaration when it controls the configuration and possesses a complete evidence dossier. ISO/IEC 17050-1 provides a useful reference for the structure of supplier declarations [R40].

The declaration shall identify the product, revision, class, applicable requirements, evidence, assessment date, responsible signatory and any installation limitation. A declaration is not equivalent to independent certification.

24.2 Independent evidence

Testing by a competent independent laboratory can support credibility where the laboratory scope covers the relevant measurements or fire methods [R38]. Independent product certification can be described only where an actual certification body has completed the relevant certification process [R39].

Neither this draft nor the FSL artwork may be described as accredited unless the scheme, assessment body and certificate scope have been formally established.

24.3 Nonconformity, suspension and appeal

A missing mandatory requirement, expired suppression device, incompatible product change or unsupported claim shall prevent continued use of the affected class. The manufacturer shall identify, contain and investigate the nonconformity.

A mature scheme should include documented complaint handling, technical review, a right to respond, conditions for reinstatement and transparent criteria for removal from any public register.

25 LABEL CONTROL, USE AND WITHDRAWAL

25.1 Correct use of artwork

The FSL artwork reproduced in Annex A is derived from the supplied scheme source. Only the artwork associated with the verified class may be displayed for a specific assessed product.

The preferred minimum physical reproduction height is 30 mm, subject to maintenance of legibility and sufficient contrast. Where product size prevents that dimension, a controlled alternative may be used on the packaging or documentation if the label remains legible and cannot be confused.

25.2 Placement and context

A label may be applied to the product, product data sheet, technical declaration, packaging or approved digital listing. The displayed class shall remain associated with the correct model and assessed revision.

The artwork must not be distorted, recoloured or combined with language that implies IEC approval, governmental certification, insurer endorsement or protection of an electric vehicle battery without separate substantiation.

25.3 Withdrawal

When evidence is withdrawn, an essential protective device expires, a critical change is introduced or a misleading claim is identified, the label shall be suspended or removed for the affected products and communications.

Control of the artwork, ownership of any registered marks and the conditions for permission to use a scheme mark shall be addressed through a separate confirmed governance and intellectual property arrangement.

ANNEX A OFFICIAL FSL LABEL ARTWORK AND REPRODUCTION RULES

This annex reproduces the source FSL classification artwork extracted from the supplied scheme document. The combined strip and individual label files are provided for identification of the five classes. Actual ownership and permission to use the artwork shall be confirmed by the scheme administrator.

REPRODUCTION Use the artwork corresponding to the supported class only. Maintain the original proportions and colours. The preferred minimum physical label height is 30 mm, provided the result remains legible. The mark shall never imply public authority approval or accredited certification.

A.1 FSL0 official class artwork

Electrical baseline without a demonstrated dedicated enhanced product level fire protection claim.

A.2 FSL1 official class artwork

Documented enclosure behaviour, mapped thermal detection and automatic reduction or isolation of hazardous energy.

A.3 FSL2 official class artwork

Equipped with a dedicated and validated passive fire mitigation function.

A.4 FSL3 official class artwork

Equipped with an application validated automatic integrated fire suppression function.

A.5 FSL3+ official class artwork

All FSL3 measures together with a supervised local interface for alarm events.

A.6 Controlled use conditions

- Display only the exact class supported by the identified product dossier.
- Associate digital artwork with a clearly identified model and product variant.
- Preserve the graphic proportions, red flame, blue outline and class text.
- Use the preferred minimum height of 30 mm where physical product space permits.
- Do not present a component label as certification of an unassessed complete charging station.
- Remove or suspend the mark when the supporting class becomes invalid.
- Confirm artwork ownership, scheme administrator authority and any licensing terms before external publication.

ANNEX B CONSOLIDATED CLASSIFICATION REQUIREMENTS MATRIX

The following class comparison summarises the minimum required protective architecture. A check indicates that the feature is required for that class when applicable. The word baseline means that applicable electrical conformity remains required independently of enhanced fire classification.

Protective function	FSL0	FSL1	FSL2	FSL3	FSL3+
Applicable electrical baseline	Required	Required	Required	Required	Required
Product specific fire risk dossier	Required	Required	Required	Required	Required
Assembly assessed enclosure	Not claimed	Required	Required	Required	Required
Mapped critical thermal detection	Not claimed	Required	Required	Required	Required
Automatic energy reduction or isolation	Not claimed	Required	Required	Required	Required
Dedicated passive fire mitigation	Not claimed	Not required	Required	Not required	Not required
Automatic integrated suppression	Not claimed	Not required	Not required	Required	Required
Application specific medium validation	Not claimed	Not required	Not required	Required	Required
Supervised external fire and fault output	Not claimed	Not claimed	Not claimed	Not claimed	Required
Defined inspection and service plan	Required	Required	Required	Required	Required

B.1 Complete mandatory requirement register

ID	Minimum class	Mandatory requirement	Required verification
GOV01	FSL0	Defined assessment boundary	Review drawings, product photographs, configuration records and the installation boundary.
GOV02	FSL0	Electrical conformity prerequisite	Review applicable IEC assessment evidence, electrical test records and installation instructions.
GOV03	FSL0	Correct class designation	Review the requirements matrix, configuration identity and signed declaration.
GOV04	FSL0	Risk assessment	Inspect the hazard register and compare it with the actual product architecture.
GOV05	FSL0	Representative configuration control	Compare the bill of materials, revision history, test sample and released product.
GOV06	FSL0	Accurate scope statement	Review the declaration, rating plate, instructions and product literature.
GOV07	FSL0	No traction battery extinguishment claim	Review packaging, sales claims, diagrams, declarations and public documentation.
GOV08	FSL0	No implied official certification	Inspect labels, websites, declarations and any claimed certification documentation.
GOV09	FSL0	Environmental declaration	Inspect instructions and environmental type test records.
GOV10	FSL0	Accessible evidence	Review the dossier index, retention arrangements and ownership of third party evidence.
ELE01	FSL0	Product standard selection	Review the applicability matrix and product standard reports.
ELE02	FSL0	Connection interface suitability	Review component approvals, ratings, contact materials and temperature rise records.
ELE03	FSL0	Installation protection coordination	Review installation instructions and coordination calculations against IEC 60364-7-722 and local implementation where applicable.
ELE04	FSL0	Residual current protection integrity	Perform an electrical functional review before and after integration of fire protective components.
ELE05	FSL0	Protective conductor continuity	Review assembly design and perform the applicable electrical continuity and bonding verification.
ELE06	FSL0	Insulation and spacing preservation	Review drawings and inspect representative assemblies before and after fire component installation.
ELE07	FSL0	Stored energy consideration	Review schematics, fault sequences and post isolation measurements.
ELE08	FSL0	Control circuit segregation	Inspect circuit design, insulation records, terminal ratings and interface drawings.
ELE09	FSL0	Emergency response compatibility	Exercise protective and emergency commands in relevant combinations.

ID	Minimum class	Mandatory requirement	Required verification
ELE10	FSL0	Electrical baseline is not a class substitute	Compare the electrical assessment scope with the claimed fire requirements.
RSK01	FSL0	Ignition source mapping	Inspect thermal maps, schematics and the physical assembly.
RSK02	FSL0	Contact resistance fault	Review connection design and conduct a representative local heating challenge.
RSK03	FSL0	Component failure	Review component failure analysis and representative fault injection.
RSK04	FSL0	Ingress and contamination	Review declared IP protection, installation context and environmental conditioning records.
RSK05	FSL0	Mechanical damage	Inspect mechanical design and applicable impact or cable retention evidence.
RSK06	FSL0	External combustible surroundings	Review installation instructions, mounting tests and thermal clearance assessment.
RSK07	FSL0	Ventilation dependence	Compare airflow analysis, open area calculations and suppression tests.
RSK08	FSL0	Common cause assessment	Perform a dependency review and inject representative single faults.
RSK09	FSL0	Foreseeable misuse	Review misuse scenarios against instructions and construction details.
RSK10	FSL0	External fire limitation	Review the fire scenario matrix and advertising claims.
CON01	FSL1	Defined material performance	Review material certificates, exact grade and thickness, and relevant finished assembly fire tests.
CON02	FSL1	Assembly level enclosure assessment	Perform a representative assembled product fire challenge.
CON03	FSL1	Seam and opening control	Inspect construction and challenge worst case openings and orientation.
CON04	FSL1	Mounting surface compatibility	Measure the relevant mounting interface during representative fire and thermal tests.
CON05	FSL1	Retention under thermal stress	Inspect specimens during and after the relevant end product challenge.
CON06	FSL1	Flaming particle control	Use a documented indicator and collection arrangement beneath and adjacent to the representative product.
CON07	FSL1	Cable entry integrity	Inspect cable routing and perform representative flame propagation or assembly challenges.
CON08	FSL1	Documented material substitutions	Review change control and compare the released materials with type test specimens.
CON09	FSL1	No unsupported noncombustible claim	Review technical literature and the supporting evidence.

ID	Minimum class	Mandatory requirement	Required verification
CON10	FSL1	Service access protection	Inspect access procedures, interlocks and service instructions.
THM01	FSL1	Hot spot based sensor placement	Compare sensor locations with loaded thermal mapping and representative local fault challenges.
THM02	FSL1	Declared protective threshold	Review component ratings, threshold configuration and measured activation.
THM03	FSL1	Thermal margin	Review the thermal margin calculation and verify with rising temperature tests.
THM04	FSL1	Automatic response	Apply a controlled local thermal challenge under representative electrical load.
THM05	FSL1	Derating limitations	Challenge the control system at maximum ambient and representative fault resistance.
THM06	FSL1	Sensor failure detection	Inject open circuit, short circuit, disconnected sensor and frozen value conditions.
THM07	FSL1	Maximum declared ambient operation	Perform loaded thermal stabilisation and local fault testing at the declared high ambient condition.
THM08	FSL1	Power supply interruption	Interrupt auxiliary power during normal charging and during an emerging thermal event.
THM09	FSL1	Latched critical condition	Cycle ambient conditions and supply power after triggering a critical event.
THM10	FSL1	Verification after ageing	Repeat functional checks after relevant cold, dry heat, damp heat, vibration or salt exposure.
PAS01	FSL2	Dedicated passive function	Inspect the design and review the product level comparative fire test.
PAS02	FSL2	Protected risk zones	Review zone mapping and inspect representative assemblies.
PAS03	FSL2	Validated flame limitation	Perform the relevant end product internal fire or local heat challenge.
PAS04	FSL2	Intumescent activation suitability	Inspect the application and test activation in the representative enclosure.
PAS05	FSL2	Barrier continuity	Inspect the production arrangement and challenge representative discontinuities.
PAS06	FSL2	Retention throughout service life	Apply environmental conditioning and mechanical handling before functional challenge.
PAS07	FSL2	Chemical compatibility	Review material compatibility information and inspect conditioned assemblies.
PAS08	FSL2	No confusion between low smoke and suppression	Review material descriptions, classification rationale and test evidence.
PAS09	FSL2	Vent and drainage functionality	Review thermal performance, ingress protection and the full product fault response.

ID	Minimum class	Mandatory requirement	Required verification
PAS10	FSL2	Comparative contribution	Review paired tests, validated simulation or another justified comparative assessment.
SUP01	FSL3	Automatic integrated suppression	Inspect the physical installation and conduct representative application specific discharge tests.
SUP02	FSL3	Effective hazard coverage	Review enclosure volume calculations, nozzle or outlet positions and representative multi location tests.
SUP03	FSL3	Independent activation path	Review the activation architecture and inject relevant controller and supply failures.
SUP04	FSL3	Activation temperature and timing	Challenge the device using representative local ignition and high ambient conditions.
SUP05	FSL3	Validated extinguishing outcome	Perform repeatable representative fire challenges with documented ignition energy and observation.
SUP06	FSL3	Reignition control	Observe the product after discharge under the declared worst credible residual heat condition.
SUP07	FSL3	Electrical medium compatibility	Review manufacturer data and perform the required application specific compatibility checks.
SUP08	FSL3	Human exposure assessment	Review safety data sheets, enclosure leakage, worst case release quantity and installation context.
SUP09	FSL3	Pressure and mechanical integrity	Review pressure data, component assessment, mounting and representative discharge tests.
SUP10	FSL3	Medium quantity and retention	Perform application specific sizing and validate the worst credible ventilation condition.
SUP11	FSL3	End of service life control	Inspect traceability, expiry data, service instructions and routine inspection records.
SUP12	FSL3	Post activation charging lockout	Trigger a real or representative release signal and cycle mains and control power.
SUP13	FSL3	Legal and environmental screening	Review legal applicability, safety data sheets and supply chain documentation.
SUP14	FSL3	No automatic transfer of building approval	Compare the source approval scope with the actual protected volume and discharge arrangement.
SUP15	FSL3	Service warning and handling	Inspect marking, product instructions and service access arrangements.
ALM01	FSL3+	Event output provision	Inspect the interface and perform end to end functional tests.
ALM02	FSL3+	Supervised circuit	Inject each wiring and supply fault at representative points in the circuit.
ALM03	FSL3+	Distinct fire and fault states	Exercise event, fault, normal and restored states with the intended receiving equipment.
ALM04	FSL3+	Loss of power reporting	Interrupt interface and auxiliary supply power while monitoring the receiving system.

ID	Minimum class	Mandatory requirement	Required verification
ALM05	FSL3+	Local independence from cloud	Disconnect every remote communications path and operate the fire protective functions.
ALM06	FSL3+	Output electrical rating	Review terminal data, schematics and the actual building system integration.
ALM07	FSL3+	Event persistence	Trigger an event, remove supply and restore operation.
ALM08	FSL3+	Interface response time	Measure end to end response under normal and adverse communications or power conditions.
ALM09	FSL3+	Building system compatibility	Review the interface design against the actual building system documentation and approval process.
ALM10	FSL3+	No automatic emergency service claim	Review service agreements, integration records and event transmission tests.
ALM11	FSL3+	Periodic functional test	Exercise a dedicated simulation, test input or monitored equivalent at commissioning and maintenance.
ALM12	FSL3+	Cyber and configuration resilience	Review access controls, configuration change records and operation with communications disabled.
INS01	FSL1	Installation instructions	Review the released instructions against the validated test arrangement.
INS02	FSL1	Mounting material restrictions	Inspect the product level thermal assessment and installation manual.
INS03	FSL1	Cable management	Inspect the representative installation and installation instructions.
INS04	FSL1	Site coordination	Review the site risk assessment and operator instructions.
INS05	FSL3	Suppression replacement access	Review service drawings and perform a representative service procedure.
INS06	FSL3	Occupancy and exposure restriction	Review the medium safety information and installation conditions.
INS07	FSL3+	Alarm destination identification	Inspect commissioning records and conduct an end to end signal test.
INS08	FSL1	Incident response instructions	Review product and site emergency instructions.
MNT01	FSL0	Maintenance schedule	Review the maintenance programme and compare it with component limitations.
MNT02	FSL1	Thermal function inspection	Inspect service records or exercise the documented functional test.
MNT03	FSL2	Passive protection inspection	Inspect the installed assembly using the documented service procedure.
MNT04	FSL3	Suppression component status	Review service records, component markings and any available monitoring signal.
MNT05	FSL3+	Alarm path test	Conduct an end to end simulation with the actual receiving system.

ID	Minimum class	Mandatory requirement	Required verification
MNT06	FSL0	Configuration change review	Inspect maintenance records, firmware revisions and replacement part traceability.
MNT07	FSL3	Post discharge quarantine	Review the physical lockout and service procedure after an activation.
MNT08	FSL0	Incident record	Inspect incident reporting and trend review arrangements.
DOC01	FSL0	Unique product identification	Inspect the label, declaration and technical dossier.
DOC02	FSL0	Classification rationale	Review the signed matrix against underlying records.
DOC03	FSL0	Fire test report	Inspect reports and compare them with product configuration records.
DOC04	FSL0	Material records	Review bill of materials, supplier data and incoming inspection records.
DOC05	FSL1	Thermal response records	Review thermal reports, circuit diagrams and software configuration.
DOC06	FSL2	Passive design records	Review manufacturing drawings and assembly instructions.
DOC07	FSL3	Suppression dossier	Review component records, safety data, enclosure calculations and activation tests.
DOC08	FSL3+	Alarm interface records	Review drawings and measured functional test results.
DOC09	FSL0	Label artwork integrity	Compare installed or published artwork with the controlled annex files.
DOC10	FSL0	Declaration review and withdrawal	Inspect governance procedures and the change or incident record.

B.2 Assessment status codes

Status	Meaning	Consequence
PASS	Objective evidence demonstrates the full applicable requirement.	May support the declared class.
FAIL	The requirement is not fulfilled or the evidence contradicts the claim.	The affected class shall not be declared.
OPEN	Evidence is missing or a technical question remains unresolved.	The affected class shall not be declared until resolved.
N/A	The requirement does not apply to the documented product configuration.	Acceptable only with written product specific justification.
SUSPENDED	Previously accepted evidence has become questionable or expired.	Remove or suspend the affected claim until reassessed.

ANNEX C ELIGIBLE MEANS AND APPROVED PRODUCT REGISTER

APPROVAL LIMIT No commercial component or extinguishing product can truthfully be listed as approved without an identified product dossier, application specific test evidence, an authorised review decision and a controlled approval identifier.

This annex therefore distinguishes eligible technology categories from approved specific products. An eligible category is a candidate for assessment, not a blanket approval. A product approved for one enclosure, protected volume, orientation or environment is not automatically approved for another.

C.1 Eligible materials, protective methods and media

ID	Technology or medium	Function	Eligibility	Mandatory limitations
P01	Steel or aluminium enclosure	Passive containment	Eligible for FSL1 or above	Assess complete assembly, openings, coatings, electrical bonding and heat transfer. Metal alone is not automatic containment.
P02	Validated flame resistant polymer	Passive containment	Eligible for FSL1 or above	Exact grade, thickness, colour, finished product behaviour and retention under heat shall be evidenced.
P03	Mineral, ceramic or mica thermal barrier	Passive protection	Eligible for FSL2 or above	Assess retention, dust, electrical spacing, moisture uptake, mounting and measurable reduction of propagation.
P04	Intumescent seal or insert	Passive protection	Eligible for FSL2 or above	Assess activation temperature, expansion, ageing, conductive contamination and normal operating ventilation.
P05	Protected internal compartment	Passive protection	Eligible for FSL2 or above	Assess seam continuity, penetrations, mounting, thermal transfer and representative fire behaviour.
P06	Encapsulation or fire protective coating	Passive protection	Conditionally eligible	Assess exact application thickness, component temperature, repairability, chemical compatibility and production repeatability.
A01	Condensed aerosol generator	Automatic suppression	Conditionally eligible for FSL3	Assess local application efficacy, protected volume, discharge heat, residue, electrical compatibility, occupancy exposure and relevant component scope.
A02	Inert gas module	Automatic suppression	Conditionally eligible for FSL3	Assess agent quantity, enclosure leakage, pressure, retention, oxygen displacement, installation environment and legal pressure requirements.

ID	Technology or medium	Function	Eligibility	Mandatory limitations
A03	Engineered clean agent module	Automatic suppression	Conditionally eligible for FSL3	Assess exact chemistry, electrical compatibility, toxic decomposition, environmental restrictions, agent retention and application specific evidence.
A04	Thermally activated microencapsulated agent	Automatic suppression	Conditionally eligible	Demonstrate reliable release, coverage, effective quantity, activation temperature, ageing and successful representative product fire tests.
A05	Carbon dioxide device	Automatic suppression	Restricted candidate	Assess asphyxiation, pressure, cooling, leakage and occupied location. Do not assume safe use in a confined or occupied environment.
A06	ABC or other dry powder device	Automatic suppression	Restricted candidate	Assess conductive deposits, corrosion, contamination, inhalation, compaction, insulation integrity and post event cleaning.
A07	Water mist or aqueous device	Automatic suppression	Restricted candidate	Assess isolation timing, live electrical exposure, conductivity, corrosion, freezing, pressure and application specific safety.
A08	Fluorinated firefighting foam	Automatic suppression	Not generically eligible	Assess Regulation (EU) 2025/1988 and all relevant transition arrangements; do not list as generally approved.
A09	Other novel medium	Automatic suppression	Application required	Submit complete chemistry, exposure, electrical compatibility, discharge, reliability and product level fire evidence before approval.
D01	Thermal sensor or thermal link	Detection	Eligible as a component	Assess hot spot placement, threshold, drift, open and short failure, isolation response and independence. A detector alone is not an FSL class.
D02	Smoke or combined detector	Detection	Conditionally eligible	Assess contamination, airflow, nuisance alarms, environmental exposure and the actual boundary of any building alarm certification.
D03	Supervised output interface	Event reporting	Eligible for FSL3+	Validate open, short, disconnection, loss of power, alarm state, response time and compatibility with the receiving system.

C.2 Prohibited or restricted assumptions

- A low smoke or halogen free material is not automatically noncombustible and does not by itself extinguish a separate ignition source.
- A plastic marked as self extinguishing under a material specimen test does not automatically contain an assembled EVSE fire.
- A condensed aerosol product assessed for room flooding is not automatically approved for local use in a ventilated charging enclosure.

- An inert gas or carbon dioxide medium is not automatically safe for an occupied, confined or poorly ventilated location.
- Dry chemical powder is not automatically suitable for live or sensitive electronics because of contamination, corrosion and electrical residue.
- A water based or conductive medium shall not be assumed suitable for energised electrical equipment.
- A fluorinated agent or firefighting foam shall not be approved without screening the exact chemistry against current European restrictions.
- A handheld extinguisher, building sprinkler or fire blanket does not constitute automatic integrated FSL3 product suppression.
- A basic normally closed relay does not by itself meet the FSL3+ supervision requirement.
- A supplier brochure or CE marking alone does not constitute approval of an integrated FSL application.

C.3 Specific commercial product approval register

Register status at issue: no specific commercial product is approved by this document because no manufacturer submitted an application specific evidence dossier for assessment. The controlled register shall be populated only after the approval conditions in C.4 are satisfied.

Register ID	Manufacturer and product	Approved host and volume	Decision	Evidence and validity
Not assigned	No approved commercial products at issue	Not applicable	NO APPROVAL	A completed dossier and authorised technical decision are required.
Application	EVnoX TUBE or another nominated module	To be specified by applicant	PENDING EVIDENCE	Not approved. Submit exact model, agent, host enclosure and application test results.
Application	Alternative third party product	To be specified by applicant	PENDING EVIDENCE	Not approved. Apply the same supplier neutral assessment process.

C.4 Mandatory approval dossier

1. Manufacturer identity, exact commercial model, revision, batch traceability and responsible technical contact.
2. Agent or material identity, safety data, chemical restrictions and transport or storage classification.

3. Electrical ratings, residue behaviour, insulation compatibility and any relevant pressure or pyrotechnic assessment.
4. Activation principle, activation tolerance, independent initiation and performance under power or controller failure.
5. Protected enclosure identity, internal volume, openings, airflow, orientation, temperature range and risk zone map.
6. Application specific fire tests covering representative ignition locations and worst credible ventilation.
7. Observation of discharge temperature, pressure, human exposure, external propagation and reignition.
8. Environmental conditioning, service life, expiry, inspection interval and replacement instructions.
9. Production configuration control, authorised assessment decision, approval identifier and validity period.
10. Conditions for suspension, withdrawal, incident notification and reevaluation after product changes.

C.5 Approval decision categories

Decision	Definition	Permitted statement
ELIGIBLE	A technology family may be assessed.	The technology may be submitted for FSL evaluation.
UNDER REVIEW	A specific application has been submitted but assessment is incomplete.	The product is under technical review; it is not approved.
APPROVED	A named configuration has completed all applicable testing and authorised review.	Approved only for the host, rating, environment and period stated in the register.
CONDITIONAL	Use is allowed only under expressly stated installation or operating restrictions.	Approval is valid exclusively within the listed conditions.
SUSPENDED	An approval is temporarily invalid pending investigation.	No new classification claim may rely on the affected approval.
WITHDRAWN	The product or evidence no longer supports the claim.	The approval and associated label claim shall not be used.

ANNEX D DETAILED TEST PROTOCOLS AND REPORT REQUIREMENTS

The protocols below define the purpose, preparation, method, acceptance and reporting required for a structured assessment. They are proposed FSL methods and shall not be misrepresented as verbatim IEC, ISO, EN or NEN test procedures.

LABORATORY SAFETY Only suitably competent personnel using an appropriately controlled test environment shall perform live electrical fault injection, fire challenges, agent discharge, pressure tests or hazardous substance exposure.

TP01 Baseline electrical interface review

Purpose: Confirm that the appropriate electrical product references were selected for the actual AC, DC or mode 2 architecture.

Preparation: Representative product dossier, wiring diagram, rating information and applicable electrical test evidence.

Method: Identify the actual product category. Check applicable IEC 61851, IEC 62752, IEC 62196, installation and residual protection references. Verify that added fire components do not alter the electrical conformity assumptions.

Acceptance: Every applicable electrical prerequisite has documented evidence; no enhanced class substitutes for electrical protection.

Required record: Product identity, standard applicability, evidence identifiers, exclusions and reviewer.

TP02 Continuous load thermal mapping

Purpose: Identify critical hot spots during sustained charging at the highest declared operating current.

Preparation: Production representative equipment, rated supply, appropriate load, calibrated sensors and declared maximum ambient condition.

Method: Install sensors at terminals, contactors, connectors, converter stages, cable entries, housing and the mounting surface. Operate until a documented stable condition or worst case temperature trend is reached.

Acceptance: Measured component temperatures remain within their documented limits and all critical regions are covered by the protective detection strategy.

Required record: Current, voltage, ambient, sensor positions, temperatures, stabilisation criterion and photographs.

TP03 Resistive terminal fault challenge

Purpose: Verify protection against local contact heating that may not activate an upstream overcurrent device.

Preparation: Representative powered assembly with a controlled and safely instrumented local resistance or equivalent heating simulation.

Method: Introduce a reproducible fault at a credible power terminal while maintaining an otherwise representative charging current. Record the actual hot spot, sensor response, isolation time and any signs of ignition.

Acceptance: The affected energy path is reduced or isolated before the documented component or adjacent material limit is exceeded.

Required record: Fault method, local dissipation, thermal traces, sensor offset, protective threshold and final state.

TP04 Connector contact heating challenge

Purpose: Confirm that a deteriorated or thermally stressed charging interface is addressed when included in the assessment boundary.

Preparation: Representative vehicle connector or supply plug, suitable load and calibrated contact region instrumentation.

Method: Operate the interface under the validated charging current and create a controlled representative high resistance or thermal challenge where safe and permissible.

Acceptance: The product responds according to its declared design before the validated connector and cable insulation limits are exceeded.

Required record: Connector model, current, contact location, test setup, thermal limit and response.

TP05 Thermal threshold calibration

Purpose: Verify that the actual activation point matches the documented temperature setting and margin calculation.

Preparation: Calibrated thermal reference, accessible sensor location, production software and declared component limits.

Method: Apply a controlled temperature rise to each critical detection path. Record pre alarm, derating, critical isolation and reset thresholds with appropriate measurement uncertainty.

Acceptance: Every measured threshold remains within the declared tolerance and preserves a positive margin to the limiting component temperature.

Required record: Reference calibration, rise rate, measurement uncertainty, thresholds, hysteresis and specimen identity.

TP06 Sensor open and short fault

Purpose: Confirm safe behaviour when a critical temperature sensor becomes disconnected or shorted.

Preparation: Production representative charging equipment and accessible sensor circuit.

Method: Operate at representative load. Introduce an open circuit, short circuit and disconnected plug separately. Observe the charging state, local fault indication and any external interface.

Acceptance: Each relevant fault causes the documented safe charging limitation or isolation and a recognisable fault state.

Required record: Fault location, fault duration, detection time, energy state, reset behaviour and alarm output.

TP07 Frozen sensor and implausible reading

Purpose: Assess whether a software dependent measurement can silently remain fixed while a real hot spot develops.

Preparation: Equipment with an observable sensor input or controlled simulation facility.

Method: Hold the measured value constant or inject an implausible reading while introducing a representative thermal change. Review plausibility checks and independent protection.

Acceptance: The system detects the fault or maintains an independent protection capable of preventing unsafe heating.

Required record: Injection method, actual temperature, displayed temperature, diagnostic response and residual risk.

TP08 Controller power interruption

Purpose: Verify safe behaviour when an auxiliary power supply or safety controller fails.

Preparation: Operating product, controlled isolation of the auxiliary supply and monitoring of power contacts.

Method: Interrupt each relevant supply during normal charging and during an emerging thermal event. Restore the supply and observe restart and event memory behaviour.

Acceptance: The affected charging path reaches its declared safe state and does not restart unsafely after power restoration.

Required record: Interrupted supply, power circuit state, remaining energy, restoration sequence and event record.

TP09 Contactor or switching failure

Purpose: Assess whether a welded or otherwise failed switching device defeats the fire protective response.

Preparation: Representative switching device, safe fault injection arrangement and alternative isolation path if present.

Method: Simulate a switch that remains conducting after a thermal trip. Observe feedback, upstream control, suppression and external fault reporting.

Acceptance: The product detects or otherwise mitigates the failure in accordance with the validated risk assessment.

Required record: Fault method, energy source, current after command, secondary response and maintenance lockout.

TP10 Finished enclosure ignition challenge

Purpose: Evaluate the behaviour of the assembled housing rather than a separate material sample.

Preparation: Production housing with its actual seams, seals, cable entries, ventilation and internal components.

Method: Apply the defined representative internal ignition or hot component scenario at the most unfavourable location. Monitor flame escape, hot debris, mounting surface temperature and component retention.

Acceptance: No prohibited external propagation, indicator ignition, uncontrolled cover release or loss of the declared containment function occurs.

Required record: Ignition energy, location, duration, orientation, external indicator, video and final condition.

TP11 Glow wire and material evidence review

Purpose: Connect material and finished part evidence to the exact production configuration.

Preparation: Material grade records, supplier certificates, relevant glow wire or flame test reports and sample thickness information.

Method: Verify that the evidence identifies the exact formulation, colour where relevant, thickness and applicable test method. Distinguish material index data from end product behaviour.

Acceptance: Each cited material result applies to the installed component and is not used beyond its legitimate scope.

Required record: Material supplier, grade, thickness, method, report date, relevant result and limitations.

TP12 Flaming droplet and particle assessment

Purpose: Determine whether an internal event can ignite material beneath or around the enclosure.

Preparation: Representative mounted assembly and a defined external indicator appropriate to the documented method.

Method: Expose the assembly to its representative fault or ignition scenario. Place indicators at credible downward and lateral escape locations and observe expelled particles.

Acceptance: No external indicator ignites due to flaming droplets, fragments or particles from the equipment.

Required record: Indicator description, placement, specimen orientation, exposure, video and observations.

TP13 Mounting surface heat transfer

Purpose: Verify the behaviour of the rear mounting surface and adjacent building material.

Preparation: Representative mounting substrate or a justified worst case equivalent with calibrated thermal sensors.

Method: Mount the product according to the declared instructions. Operate under normal thermal load and then apply the relevant representative fire or overheating challenge.

Acceptance: The mounting interface remains within its documented material specific acceptance condition and does not exhibit prohibited ignition.

Required record: Substrate identity, mounting gap, sensor layout, temperatures, exposure and observed damage.

TP14 Passive barrier comparative challenge

Purpose: Demonstrate a measurable protective contribution from a dedicated FSL2 passive measure.

Preparation: Matched representative assemblies with and without the specific passive barrier, or another justified comparative arrangement.

Method: Apply the same documented ignition source and observe propagation, rear surface temperature, time to exposure and component damage for both conditions.

Acceptance: The protected arrangement shows the declared repeatable improvement and satisfies the relevant containment outcome.

Required record: Specimen comparison, barrier identity, challenge energy, propagation observations and measured improvement.

TP15 Intumescent activation and spacing

Purpose: Assess the behaviour of an expanding protective material within an electrical enclosure.

Preparation: Production representative intumescent installation and measurement of neighbouring electrical clearances.

Method: Apply the declared temperature or local flame scenario. Observe expansion, location, retention, pressure, normal vent obstruction and proximity to live conductors.

Acceptance: The material activates as intended without creating unacceptable bridging, blocked cooling or mechanical displacement.

Required record: Material identity, activation temperature, expansion, electrical geometry and final retained position.

TP16 Cable propagation and entry challenge

Purpose: Evaluate whether an internal fault can propagate through the connected cable or entry.

Preparation: Representative internal wiring, external cable, cable gland and relevant IEC 60332 evidence.

Method: Apply the product specific challenge near the entry and observe flame travel, gland retention, external sheath behaviour and any external indicator.

Acceptance: The assembly maintains its declared propagation boundary and the cable does not create an uncontrolled external fire path.

Required record: Cable identity, conductor size, entry construction, exposure, observed propagation and relevant material evidence.

TP17 Suppression activation without control power

Purpose: Confirm that the automatic suppression function remains available when a credible electronics fault removes normal control power.

Preparation: Production representative suppression module and safe provision for isolating the relevant controller or auxiliary supply.

Method: Remove the declared failed supply or simulate the controller fault. Apply the documented local thermal or ignition condition to the protected zone.

Acceptance: The suppression arrangement initiates through its validated independent path or the alternative architecture achieves an equivalent verified response.

Required record: Removed supply, initiation mechanism, activation time, energy state and resulting fire behaviour.

TP18 Application specific suppression challenge

Purpose: Demonstrate actual fire control in the finished EVSE protected volume.

Preparation: Complete production representative enclosure, declared agent charge, normal vents, worst relevant orientation and representative ignition source.

Method: Initiate the defined internal fire at each required hazard zone. Record detection, charging isolation, agent release, visible flame, external propagation and residual heat.

Acceptance: Every required specimen achieves the declared control outcome without prohibited flame escape, external ignition or unacceptable secondary effects.

Required record: Agent model, quantity, enclosure volume, opening area, ignition zone, time series and specimen status.

TP19 Suppression coverage by zone

Purpose: Confirm that compartment boundaries or internal obstructions do not leave credible ignition locations unprotected.

Preparation: Representative finished enclosure with the maximum internal obstruction and declared module position.

Method: Repeat the relevant suppression challenge or validated distribution measurement at distinct terminals, switching components and power electronics locations.

Acceptance: Each claimed risk zone receives the validated protective effect and no compartment is silently excluded.

Required record: Zone map, outlet position, obstructions, medium behaviour and result by location.

TP20 Post discharge reignition observation

Purpose: Identify renewed combustion from residual component heat or remaining electrical energy.

Preparation: Specimen following a representative successful suppression event and continuous observation equipment.

Method: Maintain the declared post event condition for at least the adopted scheme observation period or longer where the hazard assessment requires. Observe temperatures and all flame indications.

Acceptance: No renewed flame, prohibited propagation or automatic restoration of charging occurs during the documented observation period.

Required record: Observation duration, residual temperature, power state, smoke, event record and any reignition.

TP21 Agent residue and electrical compatibility

Purpose: Determine whether the discharged medium creates a dangerous electrical or chemical condition.

Preparation: Representative discharged product, residue samples where applicable and appropriate electrical safety inspection.

Method: Inspect the affected circuit boards, terminals, insulation and enclosure. Review residue conductivity, corrosion potential, cleaning requirements and safe access limitations.

Acceptance: No uncontrolled secondary electrical exposure is created and the required post event service actions are defined.

Required record: Medium identity, affected regions, visible residue, inspection findings and required remediation.

TP22 Occupancy, toxicity and pressure assessment

Purpose: Evaluate secondary hazards from discharge into the surrounding installation environment.

Preparation: Agent safety data, maximum charge, enclosure vent geometry, installation room assumptions and pressure or gas assessment where needed.

Method: Assess worst credible release, hot outlet exposure, oxygen displacement, decomposition products, pressure rise and proximity of occupants or maintenance staff.

Acceptance: The installation is permitted only where the residual exposure risk is justified and all applicable restrictions are met.

Required record: Charge quantity, room assumption, ventilation, data sources, restrictions and assessment signatory.

TP23 Alarm path open circuit

Purpose: Verify that a disconnected or interrupted external event path is detected.

Preparation: Installed FSL3+ interface connected to its representative receiving equipment.

Method: Open the circuit at the product terminal, intermediate wiring and receiving end separately while observing the normal and fault states.

Acceptance: Each interruption produces the required actionable fault indication within the declared response time.

Required record: Fault position, supervision arrangement, receiving indication, response time and reset behaviour.

TP24 Alarm path short circuit and bypass

Purpose: Verify that an external alarm path cannot remain falsely healthy under a short or bridge.

Preparation: Representative monitored loop, end element or equivalent coded communication path.

Method: Introduce a short circuit at credible wiring positions and, where relevant, bridge the output contact or end element.

Acceptance: The receiving system detects the abnormal condition or the architecture maintains a justified equivalent protective response.

Required record: Short location, normal state, monitored value, receiving response and documented limitations.

TP25 Alarm power failure

Purpose: Confirm fail aware behaviour when the signal output or receiving interface loses power.

Preparation: Operating FSL3+ output, its supply and the intended receiving equipment.

Method: Remove output power, receiving interface power where applicable and product auxiliary supply in separate steps.

Acceptance: The required loss of supervision is externally visible and no mandatory path falsely remains in a normal state.

Required record: Removed supply, interface state, receiving indication, restoration behaviour and time.

TP26 Remote communications loss

Purpose: Prove that mandatory local protection does not depend on cloud or mobile connectivity.

Preparation: Operating product with network, cloud or mobile communications available and a monitored local safety interface.

Method: Disconnect the internet, wireless link or cellular route. Trigger the representative thermal, suppression or interface event.

Acceptance: Local detection, isolation and the required external wired or local interface continue to function.

Required record: Disconnected service, local protective outcome, queued remote event and recovery behaviour.

TP27 Cold and high temperature conditioning

Purpose: Validate protective components at the declared environmental temperature limits.

Preparation: Representative specimens and appropriate cold and dry heat conditioning equipment.

Method: Condition the equipment at the declared limits using an appropriate documented method. Repeat critical sensor, suppression status and output function checks.

Acceptance: No essential protective function is lost and activation remains within the declared tolerance.

Required record: Conditioning profile, specimen state, exposure duration, functional checks and any drift.

TP28 Damp heat and corrosion conditioning

Purpose: Assess degradation caused by moisture, condensation or coastal exposure.

Preparation: Representative sensors, wiring, enclosure and suppression components under the declared installation environment.

Method: Apply justified damp heat conditioning and, where relevant, cyclic salt exposure. Inspect for corrosion and repeat the critical protective functions.

Acceptance: The declared protection remains available and no new tracking, loosened connection or disabled alarm is present.

Required record: Exposure method, material changes, corrosion, electrical observations and functional result.

TP29 Routine production simulation

Purpose: Confirm that a production unit contains and operates the intended protective architecture without destructive fire testing.

Preparation: Finished production unit, controlled product configuration and non destructive simulation equipment.

Method: Confirm part identity and assembly. Simulate a thermal event, required protective fault and alarm state. Check suppression component identity and expiry without discharging it.

Acceptance: The unit matches the approved configuration and each routine protective simulation produces the documented result.

Required record: Serial number, operator, simulation steps, component identifiers, result and release decision.

TP30 Commissioning end to end verification

Purpose: Demonstrate that the installed product and any connected site system preserve the claimed protective function.

Preparation: Installed equipment, final supply protection, mounting arrangement and actual receiving alarm system where applicable.

Method: Inspect mounting and cable conditions, verify the supply interface, test the local protective simulation and exercise the connected fire and fault indications.

Acceptance: The installed configuration matches the approved conditions and every mandatory external event reaches its intended destination.

Required record: Site address, installer, serial number, supply details, receiving system, results and handover.

ANNEX E MANUFACTURER DECLARATION AND TECHNICAL DOSSIER TEMPLATE

The following model supports a first party declaration. It does not create an accredited certificate and does not replace any statutory European declaration of conformity.

E.1 Manufacturer and product identity

Required field	Entry to be completed
Manufacturer legal name	[Insert responsible legal entity]
Registered address	[Insert full address and country]
Product trade name	[Insert product family and model]
Hardware revision	[Insert controlled hardware identifier]
Firmware revision	[Insert safety relevant firmware identifier or not applicable]
Rated electrical configuration	[Insert charging mode, AC or DC, voltage, current and power]
Serial number or covered range	[Insert unique production identification]
Claimed classification	[Insert FSL0, FSL1, FSL2, FSL3 or FSL3+]
Assessment reference date	[Insert controlled assessment date]
Installation limitations	[Insert mounting, ambient, occupancy and alarm interface limitations]

E.2 Model declaration wording

The undersigned manufacturer declares, under its own responsibility, that the identified product configuration has been assessed against the applicable mandatory requirements of the FSL:2025 working framework and that the specified classification is supported by the evidence listed in the controlled technical dossier.

The manufacturer confirms that the applicable electrical product and installation interface requirements remain independently applicable, that the claim is limited to the identified product configuration, and that the declaration does not imply official standardisation, accredited certification, building approval or traction battery extinguishment.

The manufacturer undertakes to review or withdraw this declaration following a relevant safety critical product change, expired protective component, contradictory field incident, invalid supporting evidence or applicable legal restriction.

Declaration item	Entry
Responsible signatory	[Name and function]
Location and date	[Place and issue date]
Signature	[Signature]
Technical dossier identifier	[Controlled dossier number and revision]
Independent laboratory evidence	[Report reference or no independent assessment]
Third party certification	[Certificate reference and actual scope, or not certified]

E.3 Mandatory dossier index

Section	Required record	Minimum content
01	Product identity and controlled variant list	Model, hardware, firmware, electrical rating and production locations.
02	Applicable standards and legislation matrix	Product, installation, component, environmental, chemical and pressure applicability.
03	Electrical prerequisite evidence	Relevant product tests, connector evidence, protection coordination and electrical construction.
04	Fire risk assessment	Ignition map, failure scenarios, energy sources, consequences and controls.
05	Construction drawings	Enclosure, openings, cable entries, mounting and protected volumes.
06	Material evidence	Supplier, grade, thickness, colour, relevant fire data and change controls.
07	Thermal detection evidence	Sensor map, thermal traces, threshold calculation, fault response and software configuration.
08	Passive protection evidence	Barrier drawing, material identity, application instructions and comparative challenge results.
09	Suppression evidence	Exact device, agent, volume, activation, compatibility, exposure and service interval.
10	Alarm supervision evidence	Circuit, end element, power dependency, fault tests and receiving interface.
11	Type test reports	Representative specimens, methods, records, results, uncertainties and conclusions.
12	Routine production and inspection plan	Production simulations, component checks, traceability and acceptance criteria.
13	Installation and user information	Mounting restrictions, ambient limits, event response and operator responsibilities.
14	Maintenance and incident management	Intervals, replacement, reporting, corrective action and class suspension.
15	Signed classification declaration	Responsible signatory, class, limitations and controlled revision.

ANNEX F INSTALLATION SCENARIOS AND APPLICATION LIMITATIONS

F.1 Private outdoor residential wallbox

Fire relevant context: Relevant issues include sunlight, rain, mounting surface, cable support, local socket or supply limitations and the absence of continuous supervision. A documented FSL1 or FSL2 arrangement can address internal thermal initiation and propagation; the final class remains determined by the installed product rather than by the building type.

Engineering and operating consideration: The owner should receive clear instructions for periodic visual inspection, abnormal heat, isolation and the prohibition of reuse after an incident.

F.2 Enclosed domestic garage

Fire relevant context: Consider proximity to vehicles, stored combustible materials, limited ventilation, adjacent living accommodation and restricted escape routes. Suppression byproducts and gas release can be more consequential in a small enclosed volume than outdoors.

Engineering and operating consideration: Product placement, local isolation, occupant awareness and any agent exposure restriction should be reviewed together. The label alone does not establish the fire safety of the garage.

F.3 Underground or enclosed shared parking

Fire relevant context: Relevant factors include occupancy, smoke spread, ventilation, multiple adjacent vehicles, escape routes, restricted access for responders and connection to existing building fire safety systems.

Engineering and operating consideration: FSL3+ may provide valuable local event awareness when properly connected, but any connection to a building fire alarm system remains subject to the responsible designer, maintainer and applicable building system requirements.

F.4 Fleet depot and unattended charging yard

Fire relevant context: Multiple simultaneous charging sessions, overnight unattended operation, business continuity and the concentration of assets can increase the consequence of a local product fire.

Engineering and operating consideration: Consider grouping, event destination, site isolation, maintenance discipline, remote monitoring and a local alarm route that remains available without internet connectivity.

F.5 Commercial public charging location

Fire relevant context: The assessment should consider vandalism, impact, contamination, user turnover, outdoor exposure and uncertain response ownership. Public accessibility can also alter the acceptability of hot discharge or exposed agent residue.

Engineering and operating consideration: The operator should identify inspection responsibility, fault communication, site isolation and arrangements for securing equipment after a suppression event.

F.6 High power DC charging equipment

Fire relevant context: DC power conversion can create distinct fault energy, stored energy, liquid cooling dependencies, multiple compartments and more complex isolation behaviour.

Engineering and operating consideration: The applicable DC electrical product requirements remain fundamental. A small suppression module validated only for a low power AC wallbox cannot be assumed suitable for a larger converter cabinet.

F.7 Portable mode 2 charging device

Fire relevant context: The product may be used at changing locations with household or industrial supply connections, uncertain mounting, coiled cables, weather exposure and an external control box.

Engineering and operating consideration: IEC 62752 applicability, the actual supply connector, temperature monitoring, enclosure size, mechanical support and portable use restrictions should be assessed. A protective external case does not automatically classify every charger placed inside it.

F.8 Marine or corrosive environment

Fire relevant context: Salt, humidity, condensation and corrosion can affect terminals, sensor wiring, protective bonding, enclosure seals and suppression components.

Engineering and operating consideration: Declared marine or coastal use requires environmental conditioning and service arrangements appropriate to the actual exposure. A normal indoor approval cannot automatically be transferred.

F.9 Retrofit enclosure or protective housing

Fire relevant context: A retrofit combination contains at least two relevant elements: the existing charging product and the added enclosure or protective module. Available volume, cooling, cable entry, suppression coverage and control integration may change.

Engineering and operating consideration: The complete combination should be assessed as a named configuration. Approval of a housing or module alone cannot demonstrate the class of every compatible charger.

F.10 Multiple units and shared alarm gateway

Fire relevant context: A shared gateway, cloud connection or interface can create a common failure that removes visibility for several charging points at once.

Engineering and operating consideration: Each product should maintain its own local fire response. The site assessment should address power failure, wiring faults, event identification, gateway availability and continued safe operation when remote services fail.

F.11 Installation acceptance record

Inspection point	Required confirmation	Result
Location and occupancy	Installation matches the validated indoor or outdoor and occupancy conditions.	[PASS / FAIL]
Electrical supply	Circuit, protection and connection conform to the applicable product and local installation requirements.	[PASS / FAIL]
Mounting	Orientation, wall material, clearances and mechanical support match the approved configuration.	[PASS / FAIL]
Ventilation	Cooling openings, drainage and suppression discharge paths are unobstructed.	[PASS / FAIL]
Fire protective components	Sensors, barriers and any suppression module are present and within service life.	[PASS / FAIL]
External interface	Where FSL3+ is claimed, the monitored event and fault interface has passed an end to end check.	[PASS / FAIL]
Handover	Operator receives emergency, maintenance and service contact information.	[PASS / FAIL]

ANNEX G MAINTENANCE AND COMMISSIONING CHECKLISTS

Inspection frequency shall be defined by the manufacturer and adjusted to the installation environment, component service life, site occupancy and incident history.

5 Suggested intervals are operational proposals, not mandatory IEC intervals.

G.1 Commissioning checklist

Item	Commissioning action	Record
C01	Verify product model, serial number, claimed FSL class and approved configuration.	[Result / evidence]
C02	Verify the supply circuit, protective devices and installation instructions.	[Result / evidence]
C03	Inspect enclosure, mounting, wall surface, cable entry and ventilation.	[Result / evidence]
C04	Check visible temperature sensors, associated connectors and fault indication.	[Result / evidence]
C05	Confirm the presence and positioning of FSL2 passive protective features.	[Result / evidence]
C06	Record FSL3 suppression module model, charge or status, expiry and installation orientation.	[Result / evidence]
C07	For FSL3+, test the normal, event, open circuit and short circuit interface states.	[Result / evidence]
C08	Confirm the responsible event recipient and site emergency response procedure.	[Result / evidence]
C09	Record handover of user instructions, maintenance intervals and restricted conditions.	[Result / evidence]
C10	Sign and retain the final commissioning record.	[Result / evidence]

G.2 Periodic visual inspection

Item	Visual inspection action	Result
V01	Check for discolouration, burning odour, deformation, residue or signs of previous overheating.	[PASS / FAIL]
V02	Inspect plug, cable sheath, connector and gland for damage, contamination or loose support.	[PASS / FAIL]
V03	Verify that vents, drainage openings and suppression outlets remain unobstructed.	[PASS / FAIL]
V04	Inspect the mounting surface for heat damage, new combustible storage or enclosure movement.	[PASS / FAIL]
V05	Check the local display or indicator for unresolved thermal, safety or alarm faults.	[PASS / FAIL]
V06	Confirm the suppression module status and expiry where accessible to authorised personnel.	[PASS / FAIL]
V07	Check that the correct class label and product identification remain readable.	[PASS / FAIL]

Item	Visual inspection action	Result
V08	Escalate any modification, impact, water ingress, recurring trip or unexplained temperature event.	[PASS / FAIL]

G.3 Functional service inspection

Item	Functional maintenance action	Result
F01	Exercise the documented thermal protective simulation without exposing the unit to an unsafe live fault.	[PASS / FAIL]
F02	Verify the required automatic isolation, fault indication and controlled restoration.	[PASS / FAIL]
F03	Check passive barrier retention and cable entry integrity where authorised access is possible.	[PASS / FAIL]
F04	Verify suppression component identity, service interval, mounting and condition.	[PASS / FAIL]
F05	Test external event, open circuit, short circuit and loss of power states for FSL3+.	[PASS / FAIL]
F06	Confirm that local protective functions remain available during remote communications loss.	[PASS / FAIL]
F07	Review firmware and replacement part changes against the approved configuration.	[PASS / FAIL]
F08	Record incidents, corrective actions and the next inspection or replacement date.	[PASS / FAIL]

G.4 Immediate removal from service

- Evidence of visible flame, smoke, melting, burning odour or unexplained severe heating.
- Any suppression discharge, depleted medium, expired component or damaged activation device.
- Repeated thermal shutdown, damaged connector, compromised protective housing or water ingress.
- Missing or displaced passive fire barrier where the class depends on that barrier.
- An unresolved supervised alarm path fault where FSL3+ functionality is required.
- Any uncontrolled modification or replacement that cannot be matched to the validated configuration.

ANNEX H FIRE EVENT AND CORRECTIVE ACTION REPORT

This form supports consistent event reporting and technical feedback into the FSL scheme. The equipment shall be isolated and the site emergency procedures followed before investigation.

H.1 Event identification

Required field	Recorded information
Incident reference	[Insert unique incident identifier]
Date and time	[Insert local time and time zone]
Site and exact location	[Insert address, building area and charger position]
Reporter and contact	[Insert responsible person and contact details]
Manufacturer and model	[Insert product identity]
Serial number and revision	[Insert equipment and firmware identification]
Claimed FSL class	[Insert declared class or unknown]
Installation environment	[Describe indoor or outdoor, occupancy and ventilation]
Charging state	[State charging current, duration and vehicle connection if known]

H.2 Event sequence and protective response

Response topic	Recorded observation
Initial indication	[Heat, smell, smoke, alarm, visual flame or another observation]
Suspected origin	[Terminal, connector, converter, cable, external exposure or unknown]
Thermal protection response	[Pre alarm, derating, isolation, no response or unknown]
Suppression response	[Activated, did not activate, not installed or unknown]
External event transmission	[Destination, time, received status or communication failure]
Electrical isolation	[Product, upstream breaker, emergency stop or other method]
Visible flame and smoke	[Observed location, duration, extent and surrounding impact]
Reignition	[No, yes, suspected or not observed]
Injury or exposure	[Describe without unnecessary personal data]
Property or environmental impact	[Describe affected equipment, wall, cable, vehicle or residue]

H.3 Evidence preservation

11. Secure the electrical supply and restrict access in accordance with the site emergency procedure.
12. Retain photographs, video, event logs, alarm records, charging records and any upstream protection status.
13. Record the position of sensors, barriers, suppressants, connectors and damaged components before moving them.
14. Preserve the discharged or undischarged suppression module, batch number and service life information.
15. Document environmental conditions, unusual site activities and recent maintenance or firmware changes.
16. Do not restore charging or discard relevant components before an authorised safety review.

H.4 Root cause and corrective action

Investigation item	Required result
Immediate cause	[Identify the initiating technical event or state unresolved.]
Underlying cause	[Identify design, production, installation, service or operator factors.]
Protective function performance	[Assess each required layer against the actual evidence.]
Affected products	[Identify batches, variants, sites or related protective components.]
Immediate containment	[Document isolation, customer notification and service restrictions.]
Corrective action	[Identify design change, service instruction, replacement or retest.]
Classification decision	[Continue, suspend, reduce or withdraw the claimed FSL class.]
Approval and closure	[Record responsible reviewer, date and verification of effectiveness.]

ANNEX I FIRE RISK REGISTER AND FAILURE SCENARIOS

This risk register is an engineering starting point. Manufacturers shall add product specific hazards, consider combined events and document the significance of each scenario for the actual configuration.

ID	Scenario	Initiating condition	Potential consequence	Expected risk control
SC01	Loose supply terminal	Normal load with increased contact resistance	Local heating, insulation degradation and ignition	Torque control, sensor placement, thermal isolation and local containment
SC02	Corroded charging plug contact	Outdoor moisture and repeated connection cycles	Hot contact and cable entry fire	Connector suitability, inspection, local monitoring and replacement
SC03	Welded contactor	Protective controller commands isolation but contacts remain closed	Continued energy supply to an emerging fire	Feedback, independent isolation or justified residual risk control
SC04	Auxiliary power supply fault	Internal converter overheating	Printed circuit board ignition	Component selection, thermal mapping, passive compartment and local suppression
SC05	Semiconductor short	Power converter failure in DC equipment	High fault energy, local flame and residual stored energy	Applicable DC product protection, isolation, enclosure design and validated suppression
SC06	Moisture tracking	Condensation across contaminated insulating surfaces	Progressive leakage, carbonisation and ignition	Ingress control, drainage, environmental design and maintenance
SC07	Blocked enclosure vent	Cable or covering obstructs airflow	Elevated continuous operating temperature	Instructions, thermal detection, derating and critical isolation
SC08	Damaged protective barrier	Maintenance removes or displaces an internal separator	Fire propagates to cable exit or adjacent compartment	Controlled service instructions and passive barrier inspection
SC09	Suppression module expired	Agent cartridge or initiator exceeds service life	Active protection unavailable during a fire	Expiry tracking, service replacement and claim suspension
SC10	Suppression medium leaks	Container degradation or valve leakage	Insufficient quantity for protected volume	Status monitoring, inspection and replacement
SC11	Thermal sensor disconnected	Vibration or service error	Charging continues without critical hot spot monitoring	Open circuit diagnostics and fail safe isolation
SC12	Thermal sensor shorted	Damaged wiring or moisture	False plausible reading and loss of detection	Short diagnostics and independent protective path
SC13	Thermal input frozen	Firmware fault or communication failure	Displayed temperature remains normal while fault develops	Plausibility monitoring and independent thermal protection
SC14	Alarm cable disconnected	Site maintenance or mechanical damage	Remote event not received	Loop supervision and commissioning verification

ID	Scenario	Initiating condition	Potential consequence	Expected risk control
SC15	Alarm cable shorted	Wiring damage or intentional bypass	Normally closed contact falsely appears healthy	End element, coded supervision or equivalent fault detection
SC16	Cloud unavailable	Internet or cellular service disruption	Remote dashboard remains unaware of local event	Independent local protective response and mandatory local output
SC17	Aerosol hot discharge	Generator outlet near polymer or service opening	Secondary ignition or burn exposure	Outlet positioning, application testing and maintenance warnings
SC18	Powder residue contamination	Dry chemical module discharges into electronics	Conductive deposits, corrosion and unsafe reuse	Application restriction, compatibility evidence and post event quarantine
SC19	Gas release in occupied space	Inert or carbon dioxide medium escapes enclosure	Oxygen displacement or local exposure	Occupancy assessment, quantity control and site restriction
SC20	Suppression module overpressure	Pressurised cartridge overheats or is incorrectly mounted	Enclosure rupture and projectile hazard	Pressure assessment, rated components and protected mounting
SC21	Intumescent expansion bridges conductors	Protective material expands toward live terminals	Short circuit or reduced electrical separation	Controlled positioning and electrical spacing validation
SC22	Combustible rear mounting surface	Internal event transfers heat to wall	Ignition outside the product enclosure	Mounting restrictions, rear thermal barrier and representative test
SC23	Cable sheath propagation	Flame escapes along external cable	Fire spreads beyond charging unit	Cable suitability, entry protection and assembly challenge
SC24	Repeated automatic restart	Thermal event cools briefly before fault remains	Recurring heating and eventual ignition	Latched critical event and authorised fault investigation
SC25	Incorrect replacement module	Service technician installs superficially similar cartridge	Wrong activation, insufficient agent or unsafe residue	Controlled part identification and approved register
SC26	Unapproved polymer substitution	Supplier changes resin, filler or thickness	Different flame propagation and mechanical behaviour	Material traceability, change review and retest
SC27	Building interface incompatible	Dry contact connected incorrectly to monitored alarm input	Missed event or repeated nuisance signal	Interface design, responsible system approval and end to end testing
SC28	Unintended manual bypass	Operator bridges a fault contact to restore service	Permanent silent loss of event reporting	Supervision, access control and visible fault persistence
SC29	Cooling fan failure	Forced ventilation stops under high electrical load	Converter or contactor hot spot	Fan monitoring, thermal detection and automatic derating or isolation
SC30	External fire exposure	Adjacent object or vehicle ignites	Penetration or secondary ignition inside EVSE	Separate exposure assessment and clear claim limitations

ID	Scenario	Initiating condition	Potential consequence	Expected risk control
SC31	Solar exposure	Dark housing heats under direct summer radiation	Reduced thermal operating margin and nuisance or delayed protection	Declared ambient and solar consideration, thermal mapping and control thresholds
SC32	Subzero installation	Trigger, battery or agent exposed to frost	Delayed activation or loss of status reporting	Cold conditioning, component selection and installation restrictions
SC33	Salt contaminated enclosure	Coastal atmosphere reaches terminals and sensors	Corrosion, tracking and unavailable protective functions	Material selection, sealing, conditioning and inspection
SC34	High occupancy location	Charger installed near an occupied escape route	Exposure to smoke or suppression byproducts	Site fire assessment, local restrictions and coordinated event response
SC35	Incorrect protected volume	Same module fitted to larger product variant	Insufficient agent concentration or coverage	Configuration specific sizing and separate variant assessment
SC36	Backfeed from vehicle or converter	Electrical energy remains after upstream isolation	Sustained local fault or reignition	Energy path review, discharge management and appropriate isolation
SC37	Discharged device left in service	Suppression operates without maintenance follow up	No remaining active protection during a second event	Latched lockout, event output and mandatory replacement
SC38	Multiple separated compartments	One module protects only a local section	Unprotected ignition in another energy dense compartment	Zone coverage analysis and additional validated protection
SC39	False suppression activation	Trigger exposed to normal exhaust or sunlight	Unexpected discharge, contamination and service disruption	Activation margin, location validation and environmental testing
SC40	Unverified emergency call claim	Marketing states automatic fire brigade notification	Operator expects a response that is not contractually provided	Accurate claim control and verified external notification pathway

I.1 Risk evaluation method

A product specific risk assessment should assign consequence, credible frequency, detectability and residual risk using a documented internal method. Numerical scores may assist comparison but shall not replace engineering analysis or mandatory protective requirements.

The assessment should consider normal operation, single fault conditions, installation errors, maintenance activity, external environmental exposure, common cause failures and the possibility that the first protective response does not operate as intended.

Any scenario that could result in uncontrolled external flame, hazardous electrical exposure, serious occupant exposure or silent loss of a claimed protective

function should be reviewed by a competent fire and electrical safety specialist before release.

ANNEX J PROVISIONAL ACCEPTANCE CRITERIA AND RESEARCH AGENDA

PROPOSED VALUES The following values are draft FSL pilot proposals for discussion and repeatable development testing. They are not represented as IEC, ISO, EN, NEN or statutory limits. Final values require laboratory data, product category review and stakeholder approval.

Performance item	Proposed pilot criterion	Validation and limitation
Critical thermal response	Proposed maximum 5 seconds after confirmed critical threshold	Validate for the product architecture, safe discharge behaviour and thermal overshoot.
External event indication	Proposed maximum 10 seconds after confirmed protective event	Measure the complete local interface path; a cloud path is supplementary.
Post suppression observation	Proposed minimum 15 minutes	Extend when residual energy, component temperature or the agent requires a longer interval.
Representative fire challenge specimens	Proposed minimum 3 successful specimens per material configuration	Increase sample size for significant variability, multiple zones or family variants.
Assembly flame escape	No uncontrolled sustained external flame under the defined challenge	Define the exact challenge, observation and allowable nonhazardous transient phenomena.
Burning droplet indicator	No ignition of the documented external indicator	Define the indicator, distance, mounting orientation and observation period.
Critical event reset	No uncontrolled automatic restart	Require documented authorised recovery or an independently justified equivalent.
Suppression device service state	Within declared service life and valid installation envelope	Expiry, agent loss, previous discharge or an unapproved substitute invalidate the claim.
Alarm wiring faults	Detect open, short and disconnected path	Validate additional bypass and loss of power modes where they are credible.
Environmental coverage	All declared ambient, humidity and exposure conditions	Do not use an unverified universal temperature range for every product.
Thermal margin	Positive component specific margin after uncertainty and overshoot	Derive from the lowest relevant component or material limit rather than an invented generic temperature.
Suppression application	Successful control of every declared ignition zone	Repeat for worst relevant enclosure opening, orientation and airflow.

J.1 Topics requiring consensus development

Development topic	Question for future technical committee
Ignition source definition	Agree representative resistive fault, component ignition and assembly challenge methods for AC, DC and portable equipment.
Challenge severity	Define repeatable heat input, fault duration, current, ventilation and specimen orientation without disconnecting from realistic product risks.
Sample size	Develop a statistically defensible sample plan for material variation, manufacturing spread and different enclosure families.
Pass and failure outcomes	Agree how to interpret transient flame, smoke, residue, external temperature, hot particle release and post event condition.
Agent application metrics	Determine how protected volume, leakage, airflow, agent charge and ignition location should be compared across technologies.
Human exposure	Develop consistent assessment of toxic products, aerosol particles, oxygen displacement, pressure and post discharge access.
Alarm supervision	Agree minimum detectable faults, time limits, event persistence and building system integration requirements.
Ageing and service life	Establish relevant accelerated exposure and field inspection criteria for sensors, barriers, initiators and suppression devices.
Class boundary	Confirm whether particular high risk applications require stricter product controls or only site specific supplementary measures.
Independent oversight	Decide whether higher classes should require accredited laboratory evidence, external assessment or periodic market surveillance.
Legal and environmental tracking	Maintain a process for updated fluorinated gas restrictions, PFAS limitations, pressure rules and changing standard editions.
Terminology and mark governance	Define ownership, open adoption conditions, approval authority, complaint process and withdrawal rights.

J.2 Proposed pilot evidence package

- At least one representative AC wallbox with a polymer enclosure.
- At least one representative AC wallbox with a metallic enclosure.
- At least one portable mode 2 charging control assembly.
- At least one relevant high power or DC enclosure where the programme scope includes DC charging.
- A matched passive protection comparison for each FSL2 architecture.
- Multiple suppression technologies tested under the same defined local ignition scenarios.
- An FSL3+ supervised interface challenged by open circuit, short circuit and loss of supply.

- Independent review of electrical safety, fire testing, human exposure and legal applicability.

ANNEX K VERIFIED REFERENCE DOCUMENTS AND SOURCE LINKS

The following references were checked against official publisher or authority sources on 22 August 2026. Applicability depends on product scope, jurisdiction, market date and actual edition. Titles below are independently summarised rather than reproducing licensed standards content.

ISO UPDATE ISO 15779:2011 remained the published current edition on the reference date. A replacement edition was under development or publication and is therefore not presented here as an already effective published standard.

[R01] IEC 61851-1:2017, including COR1:2023

Electric vehicle conductive charging system. General requirements. Primary product baseline for conductive EV supply equipment and charging control.

Official source: https://webstore.iec.ch/en/publication/33644

[R02] IEC 61851-23:2023

Electric vehicle conductive charging system. DC electric vehicle supply equipment. Additional baseline for DC supply equipment, power conversion and DC safety functions.

Official source: https://webstore.iec.ch/en/publication/32973

[R03] IEC 61851-24:2023

Digital communication between a DC EV supply equipment and an electric vehicle for control of DC charging. Applicable where communication participates in safe control of DC energy transfer.

Official source: https://webstore.iec.ch/en/publication/32582

[R04] IEC 62752:2024

In-cable control and protection device for mode 2 charging of electric road vehicles. Primary product baseline for portable mode 2 control and protection devices.

Official source: https://webstore.iec.ch/en/publication/66220

[R05] IEC 62955:2018

Residual direct current detecting device to be used for mode 3 charging of electric vehicles. Applicable residual DC detection product reference for permanently connected AC charging.

Official source: https://webstore.iec.ch/en/publication/32963

[R06] IEC 62196-1:2025

Plugs, socket-outlets, vehicle connectors and vehicle inlets. General requirements. Connector and cable assembly baseline affecting contact integrity and heating.

Official source: https://webstore.iec.ch/en/publication/86313

[R07] IEC 62196-2:2025
Dimensional compatibility requirements for AC pin and contact-tube accessories. Applicable AC vehicle coupling reference.

Official source: https://webstore.iec.ch/en/publication/86317

[R08] IEC 62196-3:2026, including COR1:2026 where applicable
Dimensional compatibility requirements for DC and AC/DC pin and contact-tube vehicle couplers. Applicable DC and combined vehicle coupling reference.

Official source: https://webstore.iec.ch/en/publication/86314

[R09] IEC 60364-7-722:2018
Low-voltage electrical installations. Supplies for electric vehicles. Installation interface, dedicated supply and protection coordination.

Official source: https://webstore.iec.ch/en/publication/29958

[R10] NEN 1010:2020+C1:2024
Electrical installations for low voltage. Dutch implementation of the HD-IEC 60364 series. Dutch installation context, including the EV charging section where applicable.

Official source: https://www.nen.nl/en/nen-1010-2020-c1-2024-nl-325089

[R11] IEC 61439-7:2022
Low-voltage switchgear and controlgear assemblies for specific applications including electric vehicle charging stations. Applicable to assemblies within the scope of the low-voltage assembly series.

Official source: https://webstore.iec.ch/en/publication/67983

[R12] IEC 62477-1:2022, including COR1:2024 where applicable
Safety requirements for power electronic converter systems and equipment. Power converter safety reference where applicable to the assessed architecture.

Official source: https://webstore.iec.ch/en/publication/28936

[R13] IEC 60691:2023
Thermal-links. Requirements and application guide. Component reference for non-resettable temperature operated protective links.

Official source: https://webstore.iec.ch/en/publication/65529

[R14] IEC 60695-2-10:2026
Fire hazard testing. Glow-wire apparatus and common test procedure. Apparatus and common methodology for glow-wire assessment.

Official source: https://webstore.iec.ch/en/publication/92434

[R15] IEC 60695-2-11:2021
Fire hazard testing. Glow-wire flammability test method for end-products. Relevant finished part or end-product glow-wire behaviour.

Official source: https://webstore.iec.ch/en/publication/63552

[R16] IEC 60695-2-12:2021
Fire hazard testing. Glow-wire flammability index test method for materials. Material specimen glow-wire flammability index evidence.

Official source: https://webstore.iec.ch/en/publication/62845

[R17] IEC 60695-2-13:2021
Fire hazard testing. Glow-wire ignition temperature test method for materials. Material specimen glow-wire ignition temperature evidence.

Official source: https://webstore.iec.ch/en/publication/62846

[R18] IEC 60695-11-10:2013, including COR1:2014 where applicable
Fire hazard testing. 50 W horizontal and vertical flame test methods. Flame exposure and material burning behaviour when relevant.

Official source: https://webstore.iec.ch/en/publication/2938

[R19] IEC 60332-1-2:2025
Tests on electric and optical fibre cables under fire conditions. Test for vertical flame propagation for a single insulated wire or cable. Cable flame propagation evidence for relevant wiring and external cable routes.

Official source: https://webstore.iec.ch/en/publication/80873

[R20] IEC 60529:1989+AMD1:1999+AMD2:2013 CSV
Degrees of protection provided by enclosures. Ingress protection interface where moisture or contamination influences ignition risk.

Official source: https://webstore.iec.ch/en/publication/2452

[R21] IEC 62262:2002+AMD1:2021 CSV
Degrees of protection provided by enclosures against external mechanical impacts. Impact resistance interface where damage can create or expose an ignition source.

Official source: https://webstore.iec.ch/en/publication/71109

[R22] IEC 60068-2-1:2025
Environmental testing. Tests. Cold. Conditioning of fire safety components at the declared low temperature limit.

Official source: https://webstore.iec.ch/en/publication/82354

[R23] IEC 60068-2-2:2025
Environmental testing. Tests. Dry heat. Conditioning of fire safety components at the declared high temperature limit.

Official source: https://webstore.iec.ch/en/publication/82355

[R24] IEC 60068-2-30:2025
Environmental testing. Tests. Damp heat, cyclic. Humidity exposure relevant to sensors, wiring and suppression media.

Official source: https://webstore.iec.ch/en/publication/82356

[R25] IEC 60068-2-52:2017

Environmental testing. Tests. Salt mist, cyclic. Corrosive environment conditioning when a coastal or aggressive environment is claimed.

Official source: https://webstore.iec.ch/en/publication/30839

[R26] NEN-EN 15276-1:2019

Fixed firefighting systems. Condensed aerosol extinguishing systems. Requirements and test methods for components. Relevant component evidence for condensed aerosol technology, subject to application scope.

Official source: https://www.nen.nl/en/nen-en-15276-1-2019-en-257838

[R27] NEN-EN 15276-2:2019

Fixed firefighting systems. Condensed aerosol extinguishing systems. Design, installation and maintenance. Design principles for qualifying an aerosol application; building total flooding approval is not automatically transferable to local EVSE use.

Official source: https://www.nen.nl/en/nen-en-15276-2-2019-en-257544

[R28] ISO 15779:2011

Condensed aerosol fire extinguishing systems. Published aerosol reference. Local applications require dedicated application specific evidence; the replacement edition was not yet published on the reference date.

Official source: https://www.iso.org/standard/52016.html

[R29] ISO 14520-1:2023

Gaseous fire-extinguishing systems. Physical properties and system design. General requirements. Reference principles for gaseous extinguishants, concentration and safe application.

Official source: https://www.iso.org/standard/79444.html

[R30] NEN-EN 15004-1:2025

Fixed firefighting systems. Gas extinguishing systems. Design, installation and maintenance. European gas extinguishing design reference where its actual scope applies.

Official source: https://www.nen.nl/nen-en-15004-1-2025-en-332613

[R31] NEN-EN 54-1:2021

Fire detection and fire alarm systems. Introduction. Building fire alarm terminology and interface context, not automatic certification of embedded EVSE sensors.

Official source: https://www.nen.nl/en/nen-en-54-1-2021-en-284747

[R32] NEN-EN 54-5:2017+A1:2018

Fire detection and fire alarm systems. Heat detectors. Potential reference for a detector that is actually part of a building alarm system.

Official source: https://www.nen.nl/nen-en-54-5-2017-a1-2018-en-249644

[R33] NEN-EN 54-7:2018

Fire detection and fire alarm systems. Smoke detectors. Potential reference for a smoke detector that is actually part of a building alarm system.

Official source: https://www.nen.nl/en/nen-en-54-7-2018-en-250238

[R34] NEN-EN 54-18:2005, including C1:2007 where applicable

Fire detection and fire alarm systems. Input and output devices. Relevant reference where an interface is incorporated into a building fire alarm system.

Official source: https://www.nen.nl/nen-en-54-18-2005-en-104246

[R35] NEN 2535:2017

Fire safety of buildings. Fire detection systems. System and quality requirements and application guidelines. Dutch building fire alarm context when an EVSE signal is connected to that system.

Official source: https://www.nen.nl/en/nen-2535-2017-nl-236752

[R36] NEN-EN 13501-1:2019

Fire classification of construction products and building elements. Building material reaction to fire reference only where the assessed item is within the relevant construction product scope.

Official source: https://www.nen.nl/nen-en-13501-1-2019-en-254374

[R37] ISO 5660-1:2015, including Amd 1:2019 where applicable

Reaction-to-fire tests. Heat release, smoke production and mass loss rate. Optional comparative evidence for heat release and smoke behaviour.

Official source: https://www.iso.org/standard/57957.html

[R38] ISO/IEC 17025:2017

General requirements for the competence of testing and calibration laboratories. Competence benchmark for laboratories and calibration traceability.

Official source: https://www.iso.org/standard/66912.html

[R39] ISO/IEC 17065:2012

Conformity assessment. Requirements for bodies certifying products, processes and services. Applicable only when an independent product certification route is actually used.

Official source: https://www.iso.org/standard/46568.html

[R40] ISO/IEC 17050-1:2004

Conformity assessment. Supplier's declaration of conformity. General requirements. Structure for truthful manufacturer or supplier declarations.

Official source: https://www.iso.org/standard/29373.html

[R41] Directive 2014/35/EU

Low Voltage Directive. European legal context for electrical equipment where the product is within scope.

Official source: https://eur-lex.europa.eu/eli/dir/2014/35/oj/eng

[R42] Directive 2014/30/EU

Electromagnetic Compatibility Directive. European legal context for electromagnetic compatibility where applicable.

Official source: https://eur-lex.europa.eu/eli/dir/2014/30/oj/eng

[R43] Directive 2014/53/EU

Radio Equipment Directive. European legal context where wireless or radio functionality is incorporated.

Official source: https://eur-lex.europa.eu/eli/dir/2014/53/oj/eng

[R44] Directive 2014/68/EU

Pressure Equipment Directive. Pressure equipment assessment where the assembly and its maximum allowable pressure are within scope.

Official source: https://eur-lex.europa.eu/eli/dir/2014/68/oj/eng

[R45] Directive 2013/29/EU

Pyrotechnic Articles Directive. Potential regulatory interface for relevant aerosol generators or initiating devices, subject to product classification.

Official source: https://eur-lex.europa.eu/eli/dir/2013/29/oj/eng

[R46] Regulation (EU) 2024/573

Fluorinated greenhouse gases. Environmental and placing on the market restrictions for relevant fluorinated substances.

Official source: https://eur-lex.europa.eu/eli/reg/2024/573/oj/eng

[R47] Commission Regulation (EU) 2025/1988

Restriction of per- and polyfluoroalkyl substances in firefighting foams. Substance and use restrictions for firefighting foams, including applicable transition arrangements.

Official source: https://eur-lex.europa.eu/eli/reg/2025/1988/oj/eng

[R48] NIPV research: fire safety of parking garages

Public fire service research relating to parking structures and electric vehicles. Context for installation risk; it is not an EVSE product approval or automatic prohibition.

Official source: https://nipv.nl/onderzoek/parkeergarages/