CERTIFICATE

Product Certificate
K-0222650/01

Issued	*2025/01/31*
Replaces	*N/A*
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Specific Certification Program 05 for Fire Protection of Lithium-ion batteries storage

STATEMENT BY KIWA
With this product certificate, issued in accordance with the Kiwa Regulations for Certification, Kiwa declares that legitimate confidence exists that the products supplied by

Armorgard UK - Powerstor™

as specified in this product certificate and marked with the Kiwa®-mark in the manner as indicated in this product certificate may, on delivery, be relied upon to comply with the international Kiwa TIC - scheme **BRL-K21045** "Fire protection Systems" dated 30-03-2021.
inclusive Specific Certification Program 05 for Fire Protection of Lithium-ion batteries storage dated[22-09-2022.

Ron Scheepers
Kiwa

Publication of this certificate is allowed.
Advice: consult www.kiwa.nl in order to ensure that this certificate is still valid.

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Certification process consists of initial and regular assessment of:
- **quality system**
- **product**

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PRODUCT SPECIFICATION WITH LIMITED SCOPE

The International Kiwa Testing, Inspection and Certification Scheme K21045/02 for “Fire Protection Systems” dated [30-03-2021] and Specific Certification Program 05 for Fire Protection of Lithium-ion batteries storage dated [22-09-2022].

This scheme and program have several scopes fire protection systems.
Is in application of this Specific Certification Program has the scope – E - been applied for Aerosol systems.

Field of application / scope for this specific certification program

The performance of the fire protection system is determined for a typical lithium-ion batterie(s) fire(s). The performance of the fire protection system depends heavily on the typical situation. This certification program requires an test protocol per typical situation motivated on the safety chain consists of five phases, namely pro-action, prevention, preparation, repression and aftercare of the process end-to-end.
The situational performance of the fire protection system shall be declared based on:
- The type of batteries with the maximum level of electrical energy and the typical containment / casing;
- How high the batteries are / can be electrically loaded;
- How the batteries are stored / moved / used.

The type of mitigation performance (ToMP) of the fire protection system shall be declared based on the type of protection such as:
- Fire Control;
- Fire Prevention;
- Fire Repression;
- Fire Suppression.

The effective mitigation performance time (EMPT) of the fire protection system shall be declared based on the time of the of protection is effective. For example are these hold time for total flooding systems or the time fire protection media is supplied by surface protection systems.
Based on the results of this test program in this specific certification program is additional listing possible.

Application and use

It is important that the fire protection of a building or plant be considered as a whole. Fire protection systems form only a part, though an important part, of the available facilities, but it should not be assumed that their adoption necessarily removes the need to consider supplementary measures, such as the provision of portable fire extinguishers or other mobile appliances for first aid or emergency use, or to deal with special hazards.

Advice on these matters can be obtained from the approved supplier of this manufacturer of the fire protection system according to scheme K21045. Information may also be sought from the appropriate fire authority, the health and safety authorities and insurers. In addition, reference should be made as necessary to other national standards and statutory regulations of the particular country.

It is essential that firefighting equipment be carefully maintained to ensure instant readiness when required. Routine maintenance is liable to be overlooked or given insufficient attention by the owner of the system. It is, however, neglected at peril to the lives of occupants of the premises and at the risk of crippling financial loss. The importance of maintenance cannot be too highly emphasized. Installation and maintenance should only be carried out by qualified personnel according to scheme K21045.

Inspection should include an evaluation that the fire protection system continues to provide adequate protection for the risk (protected zones as well as state of the art can change over time).

Where fire protection systems are used in a potentially explosive application, the suitability of the generator to the atmosphere for the determined life shall be assessed.

Conditions for application

The detail engineering and installation of the extinguishing system shall to be determined in conformity with the guidelines and calculation methods of the manufacturer.
The user of the extinguishing system is instructed by an instructor for this system authorized by the supplier on behalf of the manufacturer.
The detail engineering, installation and maintenance of the fire extinguishing components have to take place according to the specifications of the manufacturer and certification scheme K21045.

Point of interest during use

The fire protection systems and components should not be used on fires involving the following unless relevant testing by approved testing laboratories has been carried out to the satisfaction of the Authority.

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Design, Installation and Operation Manual

At delivery the product should be accompanied by an operation manual in the English language, known and authorized by Kiwa.
Following minimum items shall be described:

- Type of media and the fire protection generators;
- Design application density in relation to Fire Class according to EN2;
- Description of occupancies and hazards to be protected against;
- Specification of the fire protection generators;
- Equipment schedule or list of materials for each piece of equipment or device, showing device name; supplier, model or part number and description;
- System calculation;
- Enclosure pressurization and venting calculations;
- Description of fire detection, actuation and control systems.
- Requirements for inspection, maintenance and testing of an fire protection system and for the training of inspection and maintenance personnel.

For specific details regarding the owner's manual, see scheme K21045 and the Specific Certification Program 05.

Marking

The products should be marked with the Kiwa®-mark.

Place of the mark:

- On Fire Protection System

Required specifications:

- Name of the product and supplier
- Supplier's type designation
- Production date and serial number
- Fire protection media and generators
- Temperature range
- Storage humidity range
- Service life
- Safety distances as specified in certification
- Reference to the application instructions
- Certification mark
- Specific certification Program 05

Method of marking

- Non-erasable and non-detachable;
- Non-flammable;
- Permanent an legible

RECOMMENDATIONS FOR CUSTOMERS

Check at the time of delivery whether:

- the supplier has delivered in accordance with the agreement;
- the mark and the marking method are correct;
- the products show no visible defects as a result of transport etc.

If you should reject a product on the basis of the above, please contact:

- Armorgard UK.

and, if necessary,

- Kiwa Nederland B.V.

Consult the supplier's processing guidelines for the proper storage and transport methods.

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Product specifications / configuration

S	Situational	Information
1	Type of batterie(s)	*Powerstor FR100-P* *18650 Cylindrical cells creating 500Wh fuel pack* *Powerstor FR200-P* *18650 Cylindrical cells creating 500Wh fuel pack* *Powerstor FR200-P* *21700 Cylindrical cells creating 4kWh fuel pack*
2	Maximum level of electrical energy of the batteries	*2.5AH x50 → 504Wh* and *5AH x190 → 4000Wh*
3	Casing material of the batteries	*ABS Plastic casing*
4	Containment of the batteries in a compartment.	
4a	The maximum compartment volume and height.	*Powerstor FR100-P* *Enclosure 4m³ and 2m Compartment: 1m³ and 0.3m* *Powerstor FR200-P* *Enclosure 8m³ and 2m Compartment: 1m³ and 0.3m*
4b	The physical characteristic of the compartment such as for example 10 cm concrete of 6 mm steel with a view on the escalation process.	*1.5mm for the walls and 2.0mm steel shelves construction with perforations within 1mm steel surroundings.*
4c	Resistance to fire penetration and/or fire spread compartment. This with a view on the escalation process. EN13501-2 classifications.	*Cannot be defined based on the material used.* *The Powerstor has been tested to demonstrate that over a period of 60 minutes there is a controllable situation and there is no propagation of fire to adjacent batteries with a minimum distance of 20cm between the batteries* *The container is for outdoor use only.*
4d	The packages of the batteries for examples in pallet arrangements with for example with carton or plastic.	*Representative "tool battery" placed with a charging dock*
4e	The storage arrangements of the batteries in maximum height and distance. This with a view on the escalation process.	*Description;* *On every shelf with a distance between battery's of minimal 20 cm.*
4f	The batteries are stored / loaded / repaired in the compartment.	*Stored and Charged*
ToMP		**Type of Mitigation Performance**
a. Fire Control b. Fire Prevention c. Fire Repression d. Fire Suppression This with a view on the escalation process.		*Fire Control* *&* *Fire Suppression*
EMPT		**Effective Mitigation Performance Time**
a. Hold time total flooding systems required based of the fire protection media or; b. Supply time fire protection media for surface protection. This with a view on the escalation process.		*a. Up to 30 minutes. The Powerstor has leakage points so it's not able to define a longer hold time.* *The DSPA aerosol generator has a hold time of 30 minutes declared in its product certificate. This is always in relation to a sufficiently airtight space.*
FPM		**Fire Protection Media**
Specification, classification and initial approval and certification of the FPM.		*Aerosol according to scheme K23001 from Kiwa Certification.* *DSPA11-6 Aerosol Generator* *EN15276-1* *ISO 15779* *Disk , radial, double shaped plate* K86591-09 DSPA 2020 K23001 def.pdf *Design density 102.7 grams/m³ incl. 30% safety*
FPS		**Fire Protection System**

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Configuration of the FPS This with a view on the escalation process.	*Based on Kiwa K23003 Aerosol scheme;* K23003: Certification Fire Extinguishing Systems based on Dry Aerosol (kiwa.com)
FDS	**Fire Detection System**
Configuration of the FDS based on 2 depend detector independence with a minimal of 2 fire phenomena. This with a view on the escalation process.	*Duel (2) detectors* *Smoke and Thermal detection.* *EN 54-7* *EN 54-5* *The components used for fire detection and alarm transmission must be certified in accordance with;* *Alarm panel: 12094-1 – EN54-2* *Alarm transmisión: EN50518*
IM	**Initiation Method of a cell in the batteries**
a. Electrical overload creating shortcut between cathode and anode of the cell in the batteries. b. External heating (element) damaging the isolation creating shortcut between cathode and anode of the cell in the batteries. c. Blunt external mechanical force (axe) damaging the isolation creating shortcut between cathode and anode of the cell in the batteries. d. Other method applicable for the typical situation.	*b.External Heating Element*
C	**Closing of the compartment after activation**
Procedure of closing the compartment. Focal points in this procedure are: a. having sufficient oxygen in the compartment when the batteries are activated; b. the function and performance of the fire protection system (for example self-closing); c. the follow mitigation process.	*Registration* *The doors were closed just before heating the cells with the thermal element. The compartment was ventilated during the heating of the cells with the thermal element.* *The ventilation is switched off during the second fire / smoke detection.*
FMP	**Follow-up Mitigation Process**
The method used after the test used to finally mitigate the risk of fire of the batterie(s).	*After fire detection, the electrical automatic control and delay devices (EN12094-1) will activate an alarm system that can be relayed to the responsible person or fire department. The fire suppression buys a window for the Fire services to arrive and prepare the battery extraction. The Powerstor can be opened from an emergency release lever and the battery can be cooled (CO2 extinguisher) and submerged in a metal container filled with salt water. This until the chemical reaction inside the battery stops and all energy is dispersed. (up to 4 weeks).* *The alarm transmission to the 24-hour receiving station goes either through a stand-alone alarm transmission or the fire alarm control panel must be connected to the main fire alarm center of the building with an alarm transmission.* *-EN12094* *-EN54* *-EN50518*

Table 1 – configuration setup based on Kiwa report Initial type test report V1, 7 and 8 February 2024.