



GUIDE BATTERY STORAGE · 7 MIN.

NFPA 855 and Separation Distances: What Siting Design Means for Fire Compartments

Separation distances, energy limits per fire compartment and fire resistance: what NFPA 855 specifies for the siting of stationary battery energy storage systems — and how its logic can be transferred to German fire protection concepts.

Why NFPA 855 Matters for European Projects Too

NFPA 855, the US standard for the installation of stationary energy storage systems, is not legally binding in Germany. In practice it has nevertheless become an established design reference: it is currently the most detailed set of rules for siting battery storage systems, and insurers and assessors increasingly follow its methodology. Anyone who understands the logic behind its separation distances and quantity limits can translate it into a German fire protection concept — supplemented by national guidance such as the property insurers' publications on lithium batteries.

The underlying idea of NFPA 855 is classic fire compartmentation applied to storage technology: divide the energy into limited packages, separate the packages from one another and from the building, and achieve that separation through distance or fire resistance. This is exactly where the standard becomes relevant for refractory and thermal barrier design.

The Core Rules: 50 kWh, 0.9 Metres, Quantity Limits

For lithium-ion systems installed indoors, the baseline rule is: individual ESS units or groups are limited to a maximum of 50 kWh, and a spacing of at least 3 feet (roughly 0.9 m) must be maintained between groups and to walls. In addition, the standard limits the total permissible energy per fire compartment or room depending on occupancy and protection measures; larger energy quantities require dedicated rooms or separate buildings.

- Maximum 50 kWh per unit or group as the baseline for indoor installation
- At least 0.9 m spacing between groups and to walls
- Limited total energy per fire compartment, depending on occupancy, building services and suppression systems
- Separation of dedicated ESS rooms from the rest of the building by elements with at least 2 hours' fire resistance
- For outdoor installations: distances to buildings, property lines and public ways, and between containers

Important in practice: these values are fallback levels. They apply where no better data is available — and that is precisely where the link to UL 9540A comes in.

Reducing Separation Distances: The Route via Large-Scale Fire Testing

NFPA 855 permits smaller spacings and larger groups where large-scale fire testing (typically to UL 9540A) demonstrates that a thermal runaway does not spread to adjacent units — and the authority having jurisdiction (AHJ) accepts this. The methodology familiar from the International Fire Code likewise allows reduced spacings where fire barriers are placed between units or adjoining walls are of non-combustible construction.

Note: Barrier Instead of Distance — Where floor space is scarce, the fire barrier becomes a space gain: a tested, non-combustible partition between storage units can replace or reduce the required clear spacing. The decisive point is that the barrier is designed for the thermal loads documented in the UL 9540A report — heat flux, temperature profile and event duration — and does not merely carry a nominal fire resistance rating.

For thermal barrier design this means: the question is rarely "distance or wall?" but rather "which combination of distance, barrier and verification leads to an approvable and space-efficient layout?".

Thinking Fire Compartments Practically: Wall, Ceiling, Penetration

A fire compartment is only as good as its weakest detail. In battery rooms and container installations, experience shows this is not the wall surfaces but the transitions: cable and pipe penetrations, ventilation openings, doors and the joints between building elements. Every penetration needs an approved seal with the same fire resistance as the element itself.

One peculiarity of battery fires makes this more demanding: the event can last many hours, with re-ignition over a period of days. Separating elements should therefore be designed not only for the classified fire duration but for the real scenario from the test report — including the question of what temperature is permissible on the unexposed side over the entire duration of the event. High-temperature-resistant insulation materials and multi-layer assemblies create reserves here that a classification alone does not capture.

- Execute all penetrations with tested sealing systems matching the fire resistance of the element
- Include doors and access openings in the fire resistance assessment
- Route ventilation and explosion relief openings so that the separating function of the compartment is preserved
- Account for long event durations and re-ignition in the design of building elements

Frequently asked questions

Does NFPA 855 apply in Germany?

No, the standard is not legally binding here. It nevertheless serves many designers, assessors and insurers as a reference, because it currently regulates the siting of stationary storage systems in the greatest detail. The requirements in any specific case follow from building regulations, the fire protection concept and the property insurer's stipulations.

Can a fire wall replace the 0.9 m spacing?

The methodology of NFPA 855 and the International Fire Code allows reduced spacings where fire barriers are in place or large-scale fire testing demonstrates safety — in each case with the approval of the responsible authority. The barrier must then be designed for the actually measured thermal loads from the UL 9540A report.

What fire resistance duration do battery room walls need?

NFPA 855 requires elements with at least 2 hours' fire resistance for separating dedicated ESS areas from the rest of the building. Since battery fires can last considerably longer, designing for the real event scenario with

corresponding reserves in the wall assembly is recommended.

Let us talk about your project

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info@sbs-rs.de

+49 89 541 960 200 Read online: www.sbs-rs.de/batteriespeicher/ratgeber/nfpa-855-aufstellplanung