GUIDE BATTERY STORAGE · 7 MIN.

Battery storage for project developers and EPC contractors: anchor fire protection early instead of retrofitting at a premium

How project developers and EPC companies define the passive fire protection of a large-scale battery storage system as early as the preliminary design stage. From evaluating the UL 9540A report to a thermal barrier that will pass permitting.

Situation

Project developers and EPC companies are bringing large-scale battery storage systems to grid connection under considerable time pressure. Site control, connection approval and supplier selection run in parallel, and fire protection often only comes into focus once the permitting authority asks about it. By that point the layout grid, the container type and the foundation design have usually already been awarded. Changes to the structural concept then meet a schedule that no longer holds any buffer.

Battery storage systems are structural installations within the meaning of the Landesbauordnung (the building code of the respective German federal state). Whether a building permit is required, and which supporting documents belong with it, is decided by the applicable Landesbauordnung, supplemented by the Industriebaurichtlinie (industrial building guideline) and by immission control requirements. The fire protection concept is almost always part of the application package. Incomplete documents and patchy fire protection concepts are a common cause of delay, not the technical feasibility of the storage system itself.

The standards landscape is spread out. UL 9540A supplies the test data on behaviour under forced thermal runaway, NFPA 855 governs siting, separation distances and separations, VdS 3103 sets out the property insurers' view of lithium batteries, and EN IEC 62619 addresses the safety requirements for cells and battery systems. No single document answers the question of how a specific site has to be separated by thermal barriers.

Anyone who retrofits the structural thermal barrier only after installation pays twice. By then the space between the units is occupied, cable routes and ventilation openings are fixed, and every upgrade means shutting down the blocks concerned. A separating wall that was a position on the site plan during preliminary design becomes, in an existing installation, an intervention with downtime, documentary evidence and renewed acceptance.

Our approach

Put fire protection at the start of site planning, not at the end. The site assessment itself can already clarify whether plot boundaries, neighbouring buildings and access routes permit separation distances at all, or whether structural separations have to take their place. That decision determines foundation loads, servicing and the space required. Reversing it later pushes the entire schedule back.

Ask for the complete UL 9540A test report for the system offered, not just the cover sheet or a declaration of conformity. What matters are the measured surface temperatures on the test assemblies, the propagation behaviour between units and the volumes of gas released. From these values you derive the thermal load a separating structure has to withstand and the duration over which it has to hold.

Draw a clean line in the tender between active and passive fire protection. Detection, suppression technology and smoke extraction are one thing; the structural thermal barrier is another. Passive fire protection needs no actuation, no power supply and no maintenance in the sense of an active system. It takes effect precisely when the chain of events is already running and active systems are reaching their limits.

Set out in writing the performance required of every separating structure: fire resistance duration, the exposed side, the permissible temperature rise on the unexposed side and the route to demonstrating compliance. EN 1366-3 is the relevant test framework for penetration seals. Without this specification you will be comparing products at the bid stage that are designed for completely different loads, and the authority will later assess evidence that nobody has produced.

Plan the penetrations along with everything else. Cable entries, cooling lines and ventilation openings are the points at which an otherwise correct thermal barrier loses its effect. If electrical design, cooling design and fire protection design only meet on site, openings arise that have to be sealed after the fact. A shared penetration register, kept jointly by electrical, cooling and fire protection design, prevents that as early as the detailed design stage.

Sequence

1. Site and feasibility review

We review the site plan, the plot boundaries and the neighbouring properties with you against the fire protection boundary conditions. This clarifies whether the planned layout can be resolved with separation distances or whether structural separations become necessary. The result is a reliable statement on the space required, before you commit to the site.

2. Evaluation of the system documentation

The UL 9540A report for the intended system is read for the variables relevant to construction: temperatures at adjacent surfaces, propagation between units, gas release and test set-up. In addition, we place the EN IEC 62619 data in context. This produces the thermal load profile against which the structural thermal barrier is designed.

3. Thermal barrier concept

On the basis of the load profile we define the position, build-up and required fire resistance duration of the separations. Siting requirements to NFPA 855 and the property insurers' requirements to VdS 3103 are taken into account. The concept is documented so that it can be submitted to the fire protection designer and the permitting authority without follow-up questions.

4. Detailed design and penetrations

The separating structures are transferred into the detailed design, including the connections to floor, ceiling and adjoining components. All penetrations for cables, cooling media and ventilation are recorded and provided with penetration seals to EN 1366-3. This establishes before construction starts who seals which opening and how.

5. Installation, acceptance and documentation

Installation is carried out by trained personnel, with photographic documentation of every penetration seal before it is closed. At handover you receive an ordered evidence file with certificates of usability, installation records and as-built drawings. That file is at the same time the basis for acceptance and for later inspections in operation.

Frequently asked questions

At what point in a project should passive fire protection be defined?

By the time the site decision is taken at the latest, and preferably as early as the site assessment. Whether you work with separation distances or with structural separations determines the space required, the foundations and the servicing. Changing that course after the fact reaches into the whole design and costs time that is hard to make up in the grid connection process.

Is a UL 9540A report sufficient as fire protection evidence for the authority?

No. UL 9540A is a test method describing how a system behaves under forced thermal runaway. It does not replace a fire protection concept under the Landesbauordnung (state building code). The report supplies the input data from which separation distances, separations and protection objectives are derived. The assessment for the specific site remains the task of the project design.

How are NFPA 855 and VdS 3103 to be classified in a German project?

Neither is directly binding law in Germany. NFPA 855 serves as a recognised technical benchmark for siting and separation, VdS 3103 reflects what property insurers expect. What is binding is the applicable Landesbauordnung (state building code). In practice both sets of rules are drawn on to give a traceable justification for the protection objectives.