

CROSS Safety Report

Fire protection of light-gauge steel frames

CROSS-UK was expanded to cover fire safety reporting following recommendations by Dame Judith Hackitt in her post-Grenfell report *Building a Safer Future*. This month we present a fire safety report illustrating the implications of substituting a product within a tested system without further testing or justification.

Overview

A reporter is concerned that there is a lack of understanding regarding system testing and associated procedures, the purpose of fire assessments, and the role of materials that contribute to the structure's fire protection.

Report

A reporter is concerned that there is a lack of understanding in regard to system testing and associated procedures, the purpose and utility of fire assessments, and the role of materials that contribute to the structure's fire protection; in this case, a light-gauge steel framing (LGSF) structure.

LGSF is a form of construction in which the structural elements are comprised of thin, cold-formed steel, usually C-sections for loadbearing walls and sigma sections, lattice trusses, or composite solutions for floors. As with every construction method, they have their benefits when used in appropriate situations.

When it comes to structural fire protection and compartmentation, it is through system performance that the necessary fire resistance rating is achieved. This is usually done with layers of sheathing; traditionally gypsum-based, cement particle, or magnesium silicate boards. This boarding is part of the protection to the frame, which is the actual loadbearing structure of the building.

Certain walls may not need to be fire resisting for compartmentation

reasons (e.g. a wall between two bedrooms within an apartment) but in an LGSF building they would need to be fire resisting in order to protect the structural framing within the walls. That level of complexity is often missed, meaning that certain walls are not designated as being fire resisting when in fact they should all be fire resisting for structural reasons.

A whole floor or wall assembly is tested in a furnace according to standards such as:

- | BS EN 1364-1 Non-loadbearing elements – Walls
- | BS EN 1365-1 Loadbearing elements – Walls
- | BS EN 1365-2 Loadbearing elements – Floors.

This list is indicative and non-exhaustive. It follows that once a system is tested and achieves a certain fire resistance rating, it has to be constructed in the field according to the certified product assembly. Deviations in element dimensions, applied loads, and products used as part of the system (sheathing, fixings, and finishes) are not allowed without an assessment. Guidance available from the Steel Construction Institute (P424) can assist designers in making assessments when it comes to transitioning to a thicker steel profile, or deviating in the whole element size by a certain bound, on the condition that a valid test report and corresponding data are available for that product.

'Like for like' assumptions causing concern

During a meeting regarding an LGSF for a residential scheme, plasterboard specifications were discussed. A reporter was alarmed when a question was raised about using branded boards different than the ones tested, followed by the suggestion that the various plasterboard products available are 'much the same as each other'. The reporter is of the mind that this is not necessarily the case, especially without sufficient test data to support

Key learning outcomes

For designers:

- | Ensure that a fire safety engineer is consulted in the interpretation of test reports, and the conduction of any assessments
- | Do not proceed with any alteration or substitution of products in a tested system without the appropriate documentation and justification

For suppliers and manufacturers:

- | Make sure that the original test report is available and presents all the necessary data to the end users of the report

For site engineers and managers:

- | Make sure that the installation of products on site follows the design
- | Substitution of construction elements and materials should not be made without design team verification

“ ANYONE PROMOTING OR SUGGESTING MODIFICATIONS IS TAKING ON THE ROLE OF A DESIGNER ALONG WITH THE CORRESPONDING RESPONSIBILITIES

such claims, and is worried that a change in the products of a tested system can affect its fire performance significantly.

Gypsum plasterboards are covered in BS EN 520:2004+A1:2009, and Annex B of that document provides some limits that can guide designers on the expected fire classification, depending on the plasterboard properties and dimensions. While this might be helpful in some cases when substituting products, it is also indicative of the possible impact that different plasterboard properties can have on the fire classification, and by extension to the performance of the system.

Expert Panel comments

This is another example of phenomena that were recognised in the Hackitt review. The substitution of materials with less expensive alternatives was recognised as a core component in the value engineering approach, which aims to lower the cost of the project. In the final report, it was explicitly suggested in Recommendation 7.1.b to provide clear statements on the use of systems products to ‘ensure significantly reduced scope for substitution of any products used in a system without further full testing’. Any change considered that can invalidate a test result should be reviewed by a competent fire engineer, and ideally, the alternate specification is fire tested.

Practitioners should also bear in mind the definition of a ‘designer’ under The Construction (Design and Management) Regulations 2015:

“designer” means any person (including a client, contractor or other person referred to in these Regulations) who in the course or furtherance of a business—
 →| prepares or modifies a design; or
 →| arranges for, or instructs, any

person under their control to do so, relating to a structure, or to a product or mechanical or electrical system intended for a particular structure, and a person is deemed to prepare a design where a design is prepared by a person under their control.’

Anyone promoting or suggesting modifications is taking on the role of a designer along with the corresponding responsibilities.

This event also highlights the need for appropriate fire safety information to be available throughout the life of the building. If a structural wall component is not designated in the drawings as fire resistive, then later modifications or works that go contrary to the manufacturer’s guidance could compromise the whole structural fire integrity inadvertently; for example, the improper installation of an electric socket.

While this incident was reported for LGSF construction, the possible implications are extended to any form of construction that involves the use of tested system products.

Frames such as these often have a structural function as part of the frame of a building. Fire considerations, therefore, have to be dealt with in association with a chartered structural engineer.

The full report, including links to guidance mentioned, is available on the CROSS website (report ID: 1030) at www.cross-safety.org/uk/safety-information/cross-safety-report/fire-protection-light-gauge-steel-frames-1030.

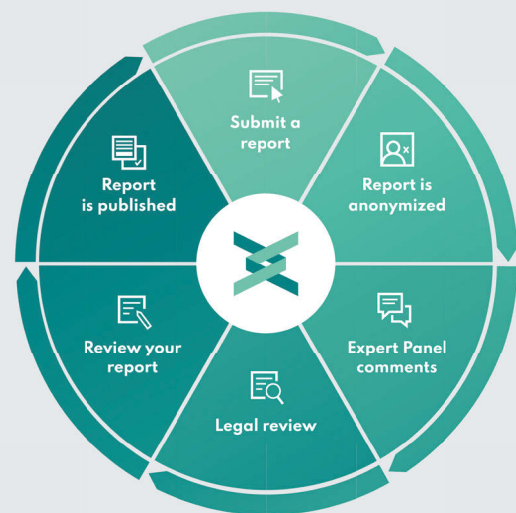
FURTHER READING

Lawson R.M. and Way A.G.J. (2021)
P424: Fire Resistance of Light Steel Framing, Ascot: SCI

What is CROSS?

Collaborative Reporting for Safer Structures (CROSS) helps professionals to make structures safer by publishing safety information based on the reports it receives and information in the public domain.

CROSS operates internationally in the UK, US, and Australasia. All regions cover structural safety, while CROSS-UK also covers fire safety.



SCAN ME

How reporting to CROSS works

The secure and confidential safety reporting system allows professionals to share their experiences to help others.

Professionals can submit reports on safety issues related to buildings and other structures in the built environment. Reports typically relate to concerns, near misses or incidents. Find out more, including how to submit a safety report, at <https://bit.ly/cross-safety>. Your report will make a difference.



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