



# Light Steel Framing Technical Updates

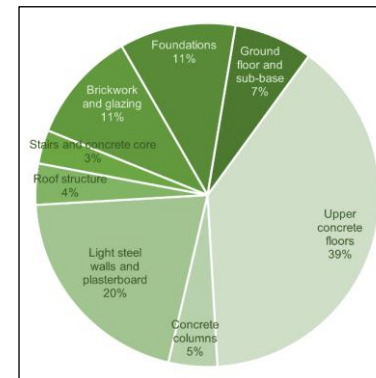
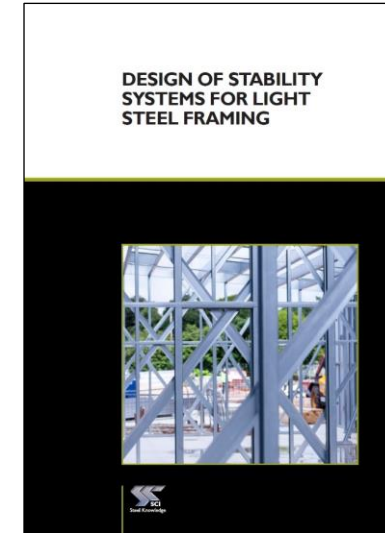
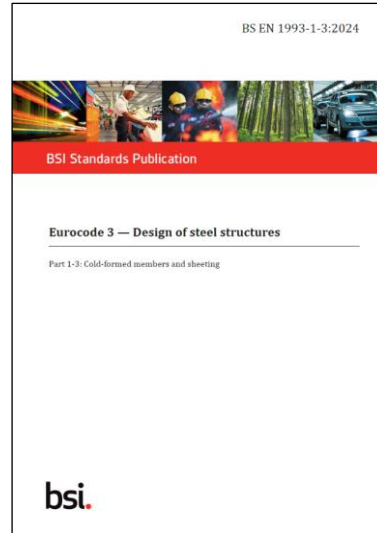
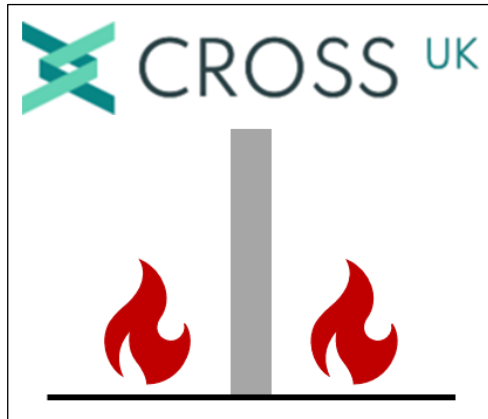
Andrew Way  
Focus on Framing 2024

# SCI - Steel Construction Institute

- Membership
- Assessment and certification
- Tedds modules
- Specialist guidance
- Advanced analysis
- Industry guidance
- Training courses

- Publications
- Advisory service
- Online information portal
- Stage 1 System Certification
- Bespoke design software
- Industry technical groups
- Light Steel Forum

# Technical Updates



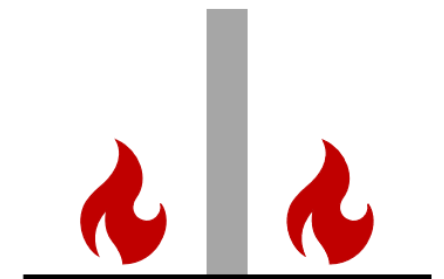
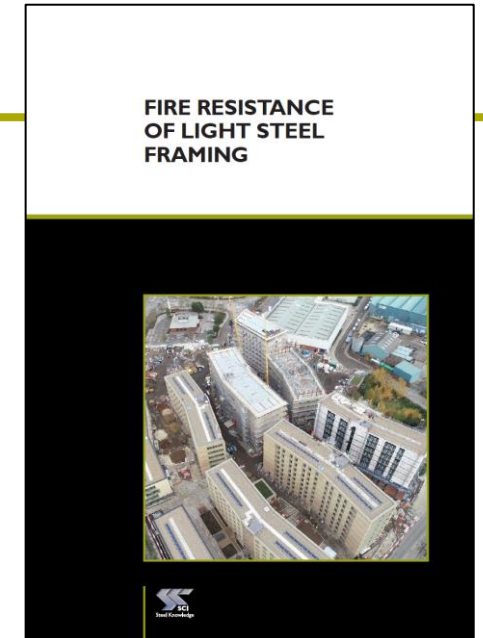
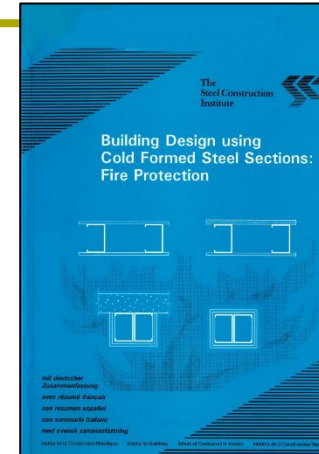
# Fire resistance of LSF

## ■ SCI Guidance

- P129 - 1993
- ED016 - 2012
- P424 – 2021

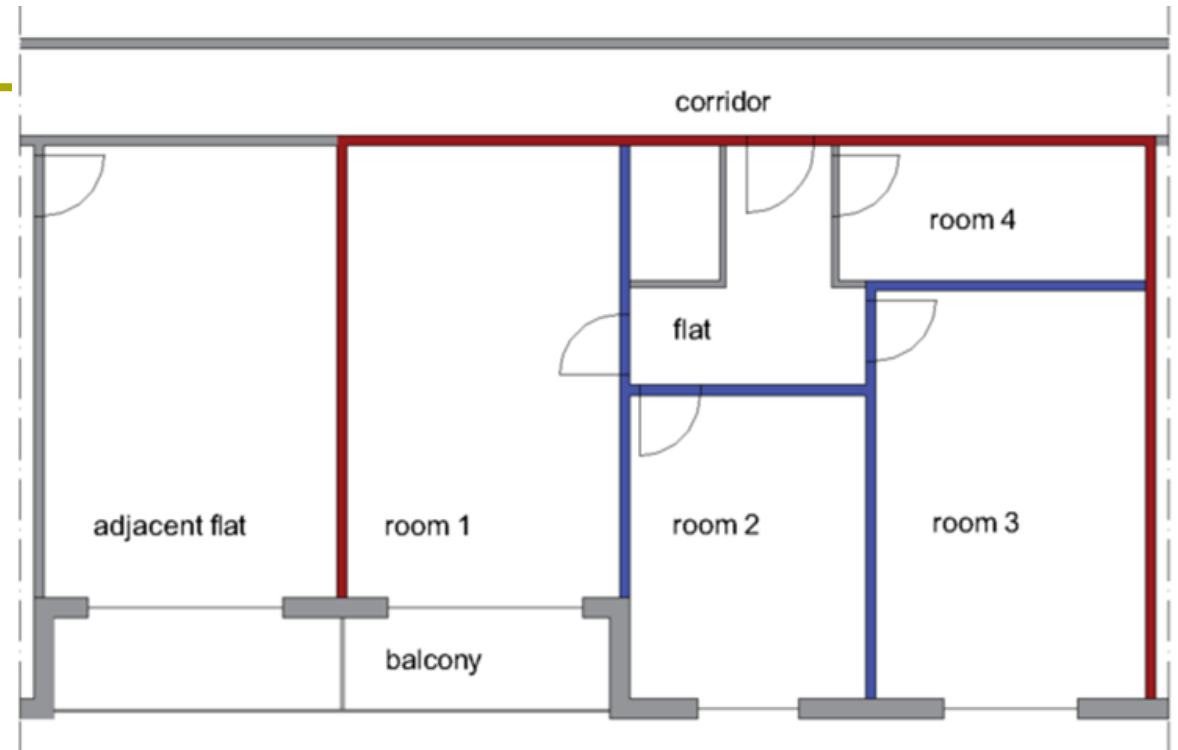
## ■ CROSS Report

- June 2022
- Loadbearing walls within fire compartment
- Potential for two-sided fire exposure



# Two-sided fire exposure

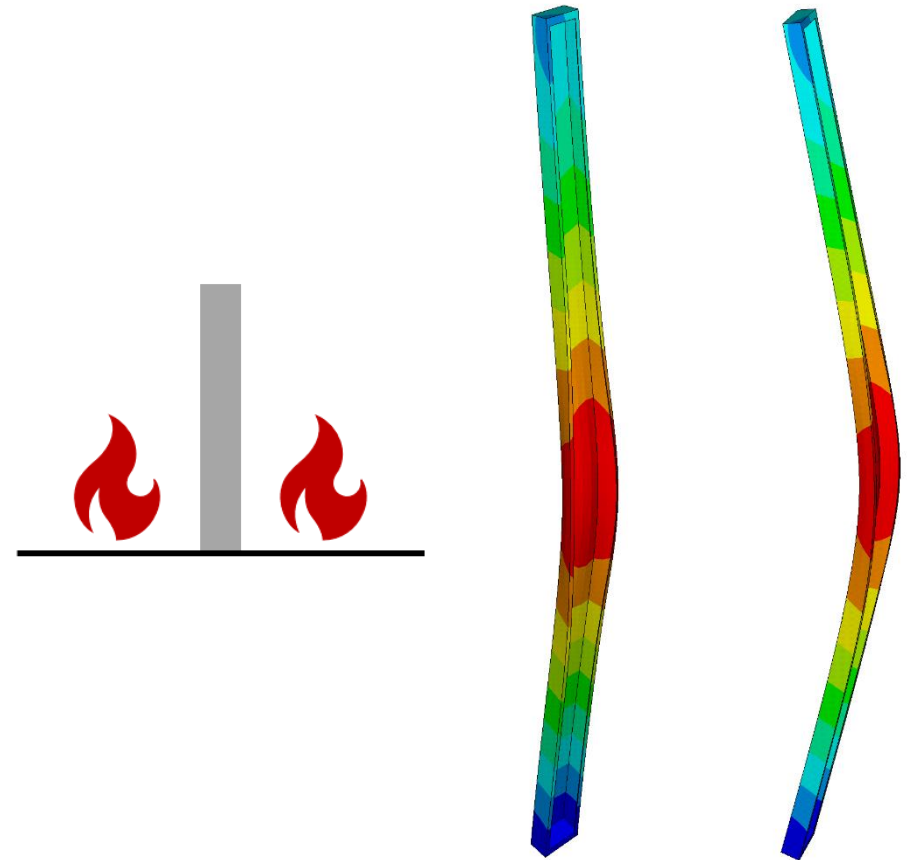
- Potential for two-sided exposure
- Tested for fire on 1 side
- SCI response to CROSS
- Two-sided possibility should be considered in design
  
- No standard test available
  - Loaded walls - BS EN 1365-1 = 1 sided
  - Columns - BS EN 1365-4 = 4 sided
  - Column labs limited width



- Light Gauge Steel (LGS) frame would be exposed to fire on one side only - test evidence for these separating walls evidences fire resistance performance with exposure to fire from one side only
- Light Gauge Steel (LGS) frame would be exposed to fire on more than one side simultaneously. No testing of LGS appears to have been undertaken with exposure to fire from more than one side - fire resistance performance not evidenced.

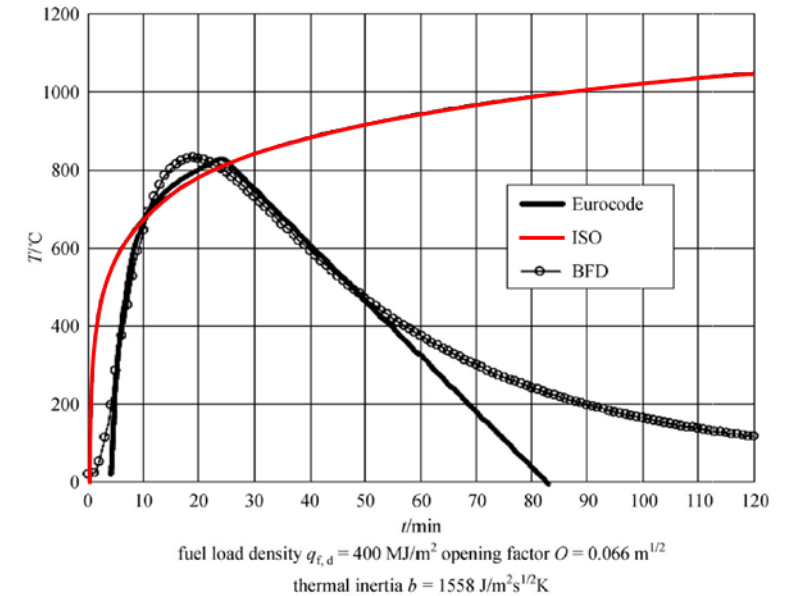
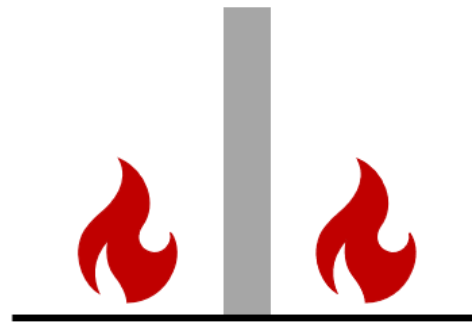
# Two-sided fire exposure

- Design method
  - Flange temperatures
  - Thermal curvature
  - Material properties
  - Buckling resistance
  - Design load for fire case
- Ad-hoc two-sided test
  - Based on BS EN 1365-1
  - Adapted for furnace
  - Load and heat all round



# Ad-hoc tests

- Supported by industry
- CROSS, DLUHC, HSE, BSR
- Fire scenarios
  - Standard and natural (parametric)
  - Time lag sides



# Ad-hoc tests

- Typical 90-minute wall
  - 100 x 50 x 1.2 mm Lipped C sections
  - S450 steel
  - 2 x 15 mm BG Fireline on both sides
  - Height 3.0 m
  - Width 2.2 m
  - 14 kN per stud
- Test Programme
  - Test 1 = Two sided – No insulation
  - Test 2 = Two sided – with insulation
  - Test 3 = Single sided – No insulation



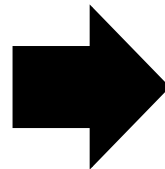
- Results
  - Test 1 & 2: 80 to 90 mins
  - Test 3:  $\geq 90$  mins



# Two-sided fire resistance

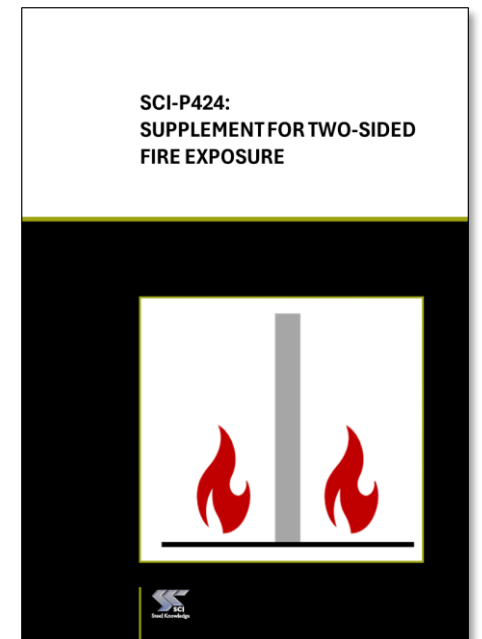
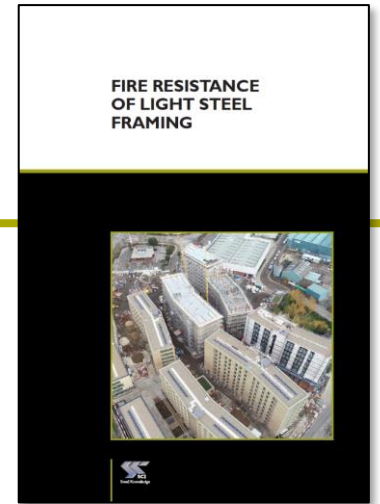
- Design method

- Single sided fire test
- Adjust for design case (P424)
- Thermal numerical model
- Two-sided temperatures
- Buckling reduction factors



Design load for  
double sided fire

*Expected to be published early summer 2024*



# Independent Validation

- Changes to 'traditional' service
  - ISO 17065 → ISO 17020
  - ISO 17065: Certification products
    - Standard scope
    - Defined product requirements (Pass/Fail)
  - ISO 17020: Inspection
    - Judgement on fit for purpose
    - Inconsistent approach



# SCI Assessment & Certification

## ■ Stage 1 System Certification



## ■ SCI Assessed



## ■ SCI Product Certification

- UKAS accredited
- ISO 17065
- Cat 1. Volumetric modules
- **Cat 2. Panelised system**



10414

Accredited to ISO/IEC  
17065:2012 to provide  
product conformity  
certification

# Design Standards

- Eurocode 3 - Steel
  - Part 1.3 Cold formed
  - + UK National Annex
  
  - BS EN 1993-1-3: 2006 + UK NA
  - BS EN 1993-1-3: 2024
- SCI AD Note 516
  - For information, Not for design
  - Wait until 2028



The first two second-generation Eurocodes were published by BSI without advance notice on 31 August 2023.

'not precluded, it should be undertaken with care.' The National foreword in each standard states that mixing the standards should not result in a lower level of reliability than previously achieved.

BS EN 1993-1-1:2022 and BS EN 1990:2023 have been published – SCI has already received several questions about their status and use. BS EN 1993-1-1:2022 will be of particular interest to steel designers, and BS EN 1990:2023 will be of wide interest. The purpose of this Note is to alert SCI members to the National foreword which sets out BSI's reasons for publishing the documents and the timetable for their adoption.

BSI note in the National foreword that they are available 'to enable users to prepare for the transition' and that until 30 March 2028 'the first-generation documents should be considered as the applicable standards for buildings and civil engineering works constructed in the UK'. The first-generation Eurocodes will be withdrawn on 30 March 2028.

The National foreword also notes that whilst use of the provisions of second-generation documents in conjunction with the first-generation Eurocodes is

Somewhat confusingly, the newly-published BS EN 1993-1-1:2022 is described as "current" in the BSI shop and at BSI Online. The first-generation version (BS EN 1993 1-1: 2005 +A1:2014) is described as "current, under review" in the BSI shop, and "current, superseded" at BSI Online. The first-generation version should be used, not the 2022 version, despite the mention of it being "superseded" or "under review".

Each of the newly-published documents requires a National Annex, which is not yet available. With no National Annex it will be impossible in practice for users to apply the rules in a way that satisfies UK requirements, nor to demonstrate levels of reliability. Cross-references to other Eurocodes relate to second generation documents that are not yet available.

SCI advises against using the second-generation documents for design prior to the publication of their associated National Annex. The second-generation documents have been published at this time to give opportunity to prepare for the change in 2028, which will involve significant revisions to software, design data (such as the Blue Book) and many other resources.

Designers may wish to check the wording of their professional indemnity insurance policy for any reference to the use of "current" or "latest" versions of design standards and clarify that until March 2028 the first-generation Eurocodes should be used.

SCI has commenced issuing updates – "Eurocode nuggets" - (currently at number 5) summarising the more significant changes in EN 1993-1-1, EN 1994-1-1 and EN 1993-1-8, which are available on Steelbiz.

**Contact**  
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Email: [advisory@steel-sci.com](mailto:advisory@steel-sci.com)

To view resources in Steelbiz register for the SCI Information Portal. Some resources are available to specific SCI Member categories only.

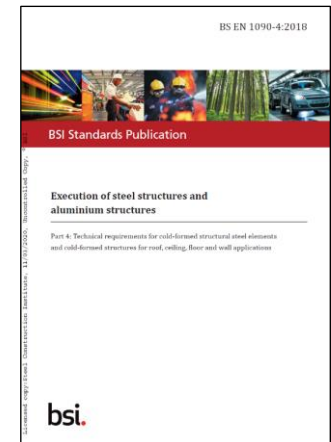
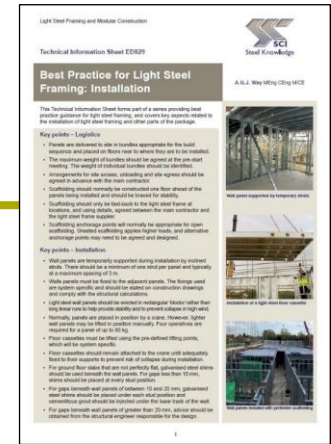
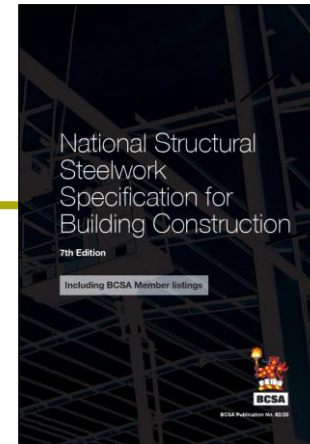
<http://portal.steel-sci.com>

For Membership costs and benefits contact [membership@steel-sci.com](mailto:membership@steel-sci.com)

Telephone: +44 (0)1344 636525

# Execution Standards

- Hot-rolled structural steel
  - NSSS – National Structural Steelwork Specification (BCSA)
- Light steel framing
  - SCI Guides P402, ED029
  - EN 1090-4
- National Light-gauge Steelwork Specification
  - NLSS
  - BCSA & SCI



# Execution Standards

- NLSS – National Light-gauge Steelwork Specification

1. Information required
2. Materials
3. Information provided
4. Workmanship – general
5. Workmanship – welding
6. Workmanship – fastening
7. Workmanship – accuracy of manufacture
8. Workmanship – installation
9. Workmanship – accuracy of erected steelwork
10. Protective treatment – corrosion
11. Protective treatment – fire
12. Quality management



*Expected to be published summer 2024*

# Embodied carbon study



- 6 storey residential
  1. Light steel frame, joisted floors
  2. Light steel frame, composite floors
  3. RC frame, LSF infill walls
  4. RC frame, blockwork walls

- P446: compares 1, 3
- P447: compares 2, 3
- P448: compares 2, 4



Published  
Feb 2024

Technical Information Sheet P446

### Embodied Carbon of Light Steel Framing with Joisted Floors

**Introduction**  
This Technical Information Sheet compares the process and findings of a study into the embodied carbon of 6-storey residential buildings. The schemes are considered and compared: a light steel frame structure with joisted floors and a reinforced concrete frame structure with light steel infill walls.

**Key Results**

- The gross weight of the light steel frame scheme with joisted floors is 23% of the gross weight of the concrete scheme with light steel infill walls (excluding foundations in each case).
- The embodied carbon of the light steel frame scheme with joisted floors is 10% of the embodied carbon of the concrete scheme with light steel infill walls.
- The embodied carbon value of the light steel frame scheme with joisted floors compared to the concrete scheme with light steel infill walls is 20% of the embodied carbon value of the concrete scheme with light steel infill walls.

**Building Parameters**  
A building form was chosen which is suitable for efficient design in both light steel framing and reinforced concrete with infill walls. The residential building is 6-storey high with 4 apartments per floor, accessed from a central lobby and carport.

Technical Information Sheet P447

### Embodied Carbon of Light Steel Framing with Composite Floors

**Introduction**  
This Technical Information Sheet compares the process and findings of a study into the embodied carbon of 6-storey residential buildings. The schemes are considered and compared: a light steel frame structure with composite floors and a reinforced concrete frame structure with light steel infill walls.

**Key Results**

- The gross weight of the light steel frame scheme with composite floors is 10% of the gross weight of the concrete scheme with light steel infill walls (excluding foundations in each case).
- The embodied carbon of the light steel frame structure with composite floors is 10% of the embodied carbon of the concrete scheme with light steel infill walls.
- The embodied carbon value of the light steel frame structure with composite floors compared to the concrete scheme with light steel infill walls is 20% of the embodied carbon value of the concrete scheme with light steel infill walls.

**Building Parameters**  
A building form was chosen which is suitable for efficient design in both light steel framing and reinforced concrete with infill walls. The residential building is 6-storey high with 4 apartments per floor, accessed from a central lobby and carport.

Technical Information Sheet P448

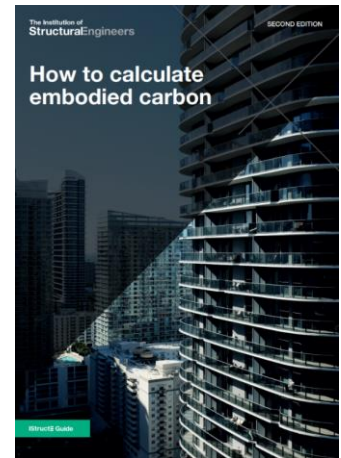
### Embodied Carbon of Light Steel Frame Infill Walls

**Introduction**  
This Technical Information Sheet compares the process and findings of a study into the embodied carbon of 6-storey residential buildings. The schemes are considered and compared: a reinforced concrete frame structure with light steel infill walls and a reinforced concrete frame structure with blockwork infill walls.

**Key Results**

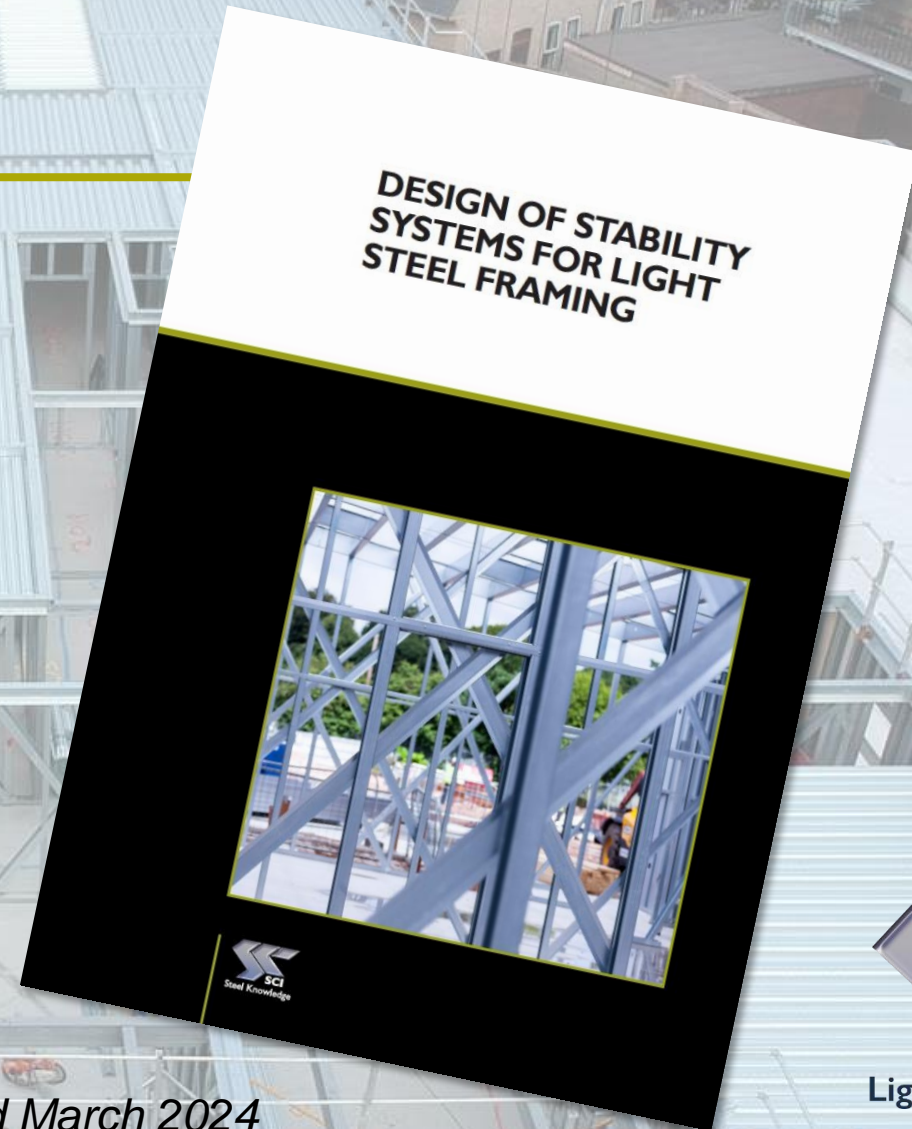
- The gross weight of the blockwork walls is 27% of the gross weight of the light steel frame with light steel infill walls, with a reduction of 40% for the scheme with light steel frame infill walls.
- The embodied carbon of the light steel frame with light steel infill walls is 10% of the embodied carbon of the concrete scheme with light steel infill walls.
- The embodied carbon value of the light steel frame with light steel infill walls compared to the concrete scheme with light steel infill walls is 20% of the embodied carbon value of the concrete scheme with light steel infill walls.

**Building Parameters**  
A building form was chosen which is suitable for efficient design in both light steel framing and reinforced concrete with infill walls. The residential building is 6-storey high with 4 apartments per floor, accessed from a central lobby and carport.



# Stability systems

- Common design issues:
  - Diaphragm action of walls
  - Derivation of design values
  - Second-order effects
  - Sway stability
  - Uplift at brace positions
- SCI publication P437



*Published March 2024*



**LSF**  
Light Steel Forum

The logo for the Light Steel Forum (LSF) features a stylized, metallic-looking 'S' and 'F' symbol to the left of the text 'LSF' and 'Light Steel Forum'.





Thank you

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