

AD 536:

In-plane member buckling lengths for portal frames

The verification of members in portal frames leads to a common question about in-plane buckling lengths, especially when designers are using general software. General software requires an effective length factor or buckling length in both axes, leading designers to question what the in-plane buckling length is. The subject was covered in *New Steel Construction* of June 2020^[1] so this AD serves as a summary reminder and a commentary on other potentially misleading guidance.

The in-plane verification of members in a portal frame is completed by verifying the in-plane stability of the entire frame. BS 5950 provided clear advice in 5.2.3.1 (2nd para) and 5.5.2. Once frame stability is verified and second-order effects are allowed for if necessary – by calculating $\alpha_{cr,est}$, the only in-plane verification is the resistance of the cross-section.

Out-of-plane verifications are of course necessary, using expression 6.62 of BS EN 1993-1-1.

Comprehensive guidance on stability verifications is given in P399.

P397, also covering portal frame design, was written before Eurocode guidance had been fully developed. P397 includes guidance and an example covering the in-plane verification of portal frame members, which clearly conflicts with the above advice and should be ignored. A warning in the foreword to P397 points out that the guidance relating to in-plane buckling was likely to change – it did, and is clarified in P399.

SCI members have pointed out that SN031a (available on Steelbiz) and Table 6.2 of P360, both refer to buckling lengths in portal buildings. It's likely that the original guidance in SN031a referred to the widespread continental practice of “portalised” frames with columns and flat roof beams (perhaps with pinned ends), rather than the pitched roof portals that dominate UK practice. The guidance in

SN031a and Table 6.2 of P360 is not appropriate for pitched roof portals.

Sometimes, buildings with roof trusses are “portalised” by connecting both top and bottom chords to the column, thus providing in-plane stability. Designers should note that the buckling lengths of the columns in these frames may be well over twice the system length, depending on the depth of the truss and clear height of the column. The Steel Designers' Manual contains helpful charts to determine the appropriate factor.

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[1] D. G. Brown: In-plane stability of portal frames, *New Steel Construction*, June 2020

New and revised codes and standards

From BSI Updates November 2024

UPDATED BRITISH STANDARDS

BS EN ISO 9013:2017+A1:2024

Thermal cutting. Classification of thermal cuts. Geometrical product specification and quality tolerances.
amendment, October 2024

BS EN ISO 19443:2022+A1:2024

Quality management systems. Specific requirements for the application of ISO 9001:2015 by organisations in the supply chain of the nuclear energy sector supplying products and services important to nuclear safety (ITNS).
amendment, September 2024; Corrigendum, August 2022

BS EN PUBLICATIONS

BS EN 1998-1-1:2024

Eurocode 8. Design of structures for earthquake resistance. General rules and seismic action.
supersedes BS EN 1998-1:2004+A1:2013

BS EN 1998-5:2024

Eurocode 8. Design of structures for earthquake resistance. Geotechnical aspects, foundations, retaining and underground structures.
supersedes BS EN 1998-5:2004

BS EN 10088-2:2024

Stainless steels. Technical delivery conditions for sheet/plate and strip of corrosion resistant steels for general purposes.
supersedes BS EN 10088-2:2014

BS EN ISO 544:2024

Welding consumables. Technical delivery conditions for filler materials and fluxes. Type of product, dimensions, tolerances and markings.
supersedes BS EN ISO 544:2017

BS EN ISO 636:2024

Welding consumables. Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine-grain steels. Classification.
supersedes BS EN ISO 636:2017

BS EN ISO 14344:2024

Welding consumables. Procurement of filler materials and fluxes.
supersedes BS EN ISO 14344:2010

BS EN ISO 18563-2:2024

Non-destructive testing. Characterisation and verification of ultrasonic phased array equipment. Array probes.
supersedes BS EN ISO 18563-2:2017

NEW WORK STARTED

CEN/TS WI 00250294

Eurocode 8. Design of structures for earthquake resistance. Characterisation and qualification of structural components for seismic applications by means of cyclic tests.

EN ISO 18275

Welding consumables. Covered electrodes for manual metal arc welding of high-strength steels. Classification.

IEC/TR 30138

Digital Twin. Fidelity metric of digital twin system.

ISO 14077

Environmental management. Life cycle assessment. Requirements and guidelines for application of Chain of Custody (CoC) approaches in Life Cycle Assessment (LCA).

ISO PUBLICATIONS

ISO 636:2024

Welding consumables. Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine-grain steels. Classification.

ISO 14344:2024

Welding consumables. Procurement of filler materials and fluxes.

ISO 18893:2024

Mobile elevating work platforms. Safety principles, inspection, maintenance and operation.

ISO 23779:2024

Shot blasting machinery. Safety and environmental requirements.

BRITISH STANDARDS REVIEWED AND CONFIRMED

BS EN ISO 19650-3:2020

Organisation and digitisation of information about buildings and civil engineering works, including building information modelling (BIM). Information management using building information modelling. Operational phase of the assets.

BS EN ISO 945-1:2019

Microstructure of cast irons. Graphite classification by visual analysis.

BS EN ISO 6506-4:2014

Metallic materials. Brinell hardness test. Table of hardness values.

BS ISO 945-4:2019

Microstructure of cast irons. Test method for evaluating nodularity in spheroidal graphite cast irons.

BS EN 358:2018

Personal protective equipment for work positioning and prevention of falls from a height. Belts and lanyards for work positioning or restraint.

BS EN 363:2018

Personal fall protection equipment. Personal fall protection systems.

BS EN 1497:2007

Personal fall protection equipment. Rescue harnesses.

PD ISO/TS 16733-2:2021

Fire safety engineering. Selection of design fire scenarios and design fires. Design fires.