

Technical Information Sheet ED013

Light Steel Infill Walls

A G J Way MEng CEng MICE

Infill walling is the generic name given to external walls that are built between the floors of the primary structural frame of a building and which provide support for the cladding system. Infill walls do not support floor loads but they resist wind loads applied to the façade. Light steel infill walls using vertical C section studs are increasingly used within both steel and concrete-framed buildings, and have largely replaced masonry or timber alternatives.

Key benefits

The benefits of light steel infill walls are:

- Rapid installation allows other activities within the building to proceed much earlier than would be possible with block-work infill walls.
- The construction process is 'dry', so that shrinkage and other drying-out problems are eliminated.
- Design flexibility: tall walls up to 5 m can be readily achieved.
- Large windows, parapets and other architectural features can be incorporated within light steel infill walls.
- Excellent fire resistance: periods of up to 120 minutes can be achieved using multiple layers of fire resistant plasterboard.
- Light steel walls can achieve excellent acoustic insulation: over 60 dB when using double layers of plasterboard and insulating quilt between the vertical C sections.
- A high level of thermal insulation is provided by a variety of insulation boards that attach externally to the vertical studs to create a 'warm frame'.
- Light steel infill walls can be used to support a wide range of cladding systems.
- Light steel walls are much lighter and thinner than conventional block work walls; they do not apply heavy line loads to the floor.

Forms of Construction

Light steel infill walls use vertical C sections (referred to as studs) that span between the floors of the primary frame and around openings. The C section size and spacing selected depend on the structural requirements. The spacing is also selected to be compatible with the external façade materials, standard plasterboard widths and sheathing board sizes. Multiple sections or sections with increased thickness may be required to frame around large openings.

Wall panels can be pre-fabricated as storey-high units or, more often, are site assembled from C sections that are delivered cut-to-length. The second approach is often the only feasible solution in renovation applications, where deviations in the original construction have to be accommodated.



Light steel infill walls at Brunel University, with a variety of claddings
(Image courtesy of Metek UK)



Flat and curved light steel infill walls
(Image courtesy of Ayrshire Metal Products)



Pre-fabricated light steel infill panels
(Image courtesy of Kingspan Profiles & sections)

Construction Details

Components

Infill walls consist of a bottom ‘track’ attached to the floor and a top ‘track’ attached to the underside of the floor slab or edge beam above. Vertical studs are fitted between the top and bottom tracks and are designed to resist wind load in bending. The light steel sections are typically 75 to 150 mm in depth and are cold roll formed from galvanized steel strip of 1.0 to 3.2 mm thickness. However, deeper sections and thicker steel are available. Infill wall panels typically span from 2.4 to 5 m between floors. Horizontal C sections are used for lintels and cills, above and below window openings, to transfer loads back to the studs.

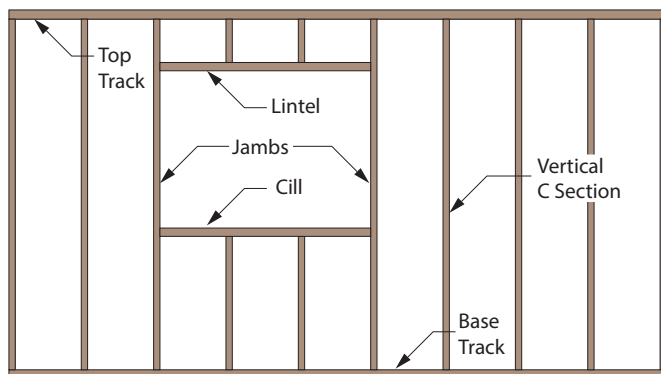


Figure 1 Elements of a light steel infill wall panel

Deflection Head Details

The top track is a U section and allows for movement in service relative to the vertical C section studs. A deflection head detail that allows movement in-service is essential to allow for the 2 to 3 mm shortening per storey that can occur in concrete frames over time as well as normal structural movements that occur in all frames, mainly caused by loading and unloading of floors.

Deflection head details can be constructed using a variety of methods, including connections with slotted holes and proprietary clips and brackets.

Openings

Large windows up to 3 m high and 5 m wide can be created using multiple C sections next to the openings; this is not possible with other forms of infill walls. Wind posts cantilevered from the floor slab may be required to reduce the span length for large windows. The design flexibility and ease of construction of light steel means that the infill wall can easily be constructed around columns and bracing for the primary structural frame.



Figure 2 Large window openings in light steel walling
(Images courtesy of Kingspan Profiles & Sections)



Figure 3 Light steel infill walls in a concrete frame building
(Image courtesy of Metek Building Systems)

Balconies can also be incorporated into light steel external wall systems. Figure 4 shows light steel balconies fixed back to the primary concrete frame and integrated with a panelised light steel wall system.



Figure 4 Light steel external wall system with integrated balconies
(Image courtesy of Kingspan Profiles & Sections)

Applications

Construction Sectors

The versatility of light steel infill walling is demonstrated by its common use across many different construction sectors, including:

- Health
- Education
- Commercial
- Residential
- Leisure.



Figure 5 Light steel external walling used in a mixed use development, The Rock, Bury
(Image courtesy of Kingspan Profiles & Sections)



Figure 6 Light steel external walling at Barnsley College
(Images courtesy of Ayrshire Metal Products)

Cladding Options

Light steel infill walling systems can be used with a range of cladding types including 'heavy' cladding, such as brickwork, or 'light-weight' claddings such as insulated renders and rain-screens.

Cladding Options

Brickwork Cladding

Brickwork can be ground-supported or supported by the primary structural frame at each floor level. The infill walling system provides only lateral support to the brickwork. Lateral support is provided via wall ties connected through the insulation back to the vertical studs of the light steel system. Wall ties must be provided at the correct spacing and additional ties will be required around openings.

Insulated Render

Lightweight insulated render systems can be fully supported by infill walls. Insulated render system can be bonded directly to a sheathing board without a cavity or a small cavity can be included. Render systems vary in detail and application between manufacturers.

Rain-screen Cladding

Rain-screen cladding can be in the form of timber boards, metallic sheets or terracotta tiles attached to horizontal or vertical rails.

In most uses of rain-screen cladding, a sheathing board is attached to the external face of the infill wall to provide weather resistance, both in the construction and in-service conditions.

The sheathing board also adds to the air-tightness of the façade. It may be in the form of cement particle board, calcium silicate board or, for insulated render applications, moisture resistant plasterboard.



Figure 7 Cedar cladding on light steel infill walling
(Image courtesy of Metek Building Systems)

Continuous Walling

Continuous walling is a variant of infill walling. Continuous walling (also known as over-sail) is placed externally to the primary structural frame rather than between the floors as in the case of infill walls.

Continuous walling systems are particularly suited to situations where cladding materials are sensitive to differing movement of the main frame. Adequate base support must be provided to accommodate vertical loading from the cladding. As for the infill system, openings in the building façade and a variety of cladding options can be accommodated.

The continuous external wall system consists of vertical light steel C sections and bracket connections to fix them to the primary frame. Allowance for movement of the primary frame must be incorporated into the connections, usually by use of slotted connections (see Figure 8).



Figure 8 Bracket connection for continuous walling incorporating slotted connections
(Image courtesy of Kingspan Profiles & Sections)

Sources of Information

Other technical information sheets

The following technical information sheets provide further guidance about light steel construction.

- ED010: Light Steel Solutions for All Applications
- ED011: Light Steel Residential Buildings
- ED012: Light Steel Framed Housing
- ED014: Light Steel Modular construction
- ED015: Acoustic Performance of Light Steel Construction
- ED016: Fire Safety of Light Steel Construction

Manufacturers

The following manufacturers are active in the light steel and modular construction sector and may be contacted for further information.

Ayrshire Metal Products Ltd - www.ayrshire.co.uk

BW Industries Ltd - www.bw-industries.co.uk

Fusion Building Systems - www.fusionbuild.com

Kingspan Profiles & Sections - www.kingspanprofiles.com

Metek UK Ltd - www.metek.co.uk



Figure 9 Light steel infill walling used on Victoria Hospital, Kirkcaldy, Fife
(Image courtesy of Ayrshire Metal Products)



The Steel Construction Institute
Silwood Park, Ascot
SL5 7QN

T: 01344 636525
F: 01344 636370

E: publications@steel-sci.com
www.steel-sci.com

www.steelbiz.org – 24×7 online technical information

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