Steel Building Solutions

KINGFRAME SFS

SFS | Steel Framing System

Installation Manual

Version 4.1 | FEBRUARY 2014

Kingspan Insulated Panels


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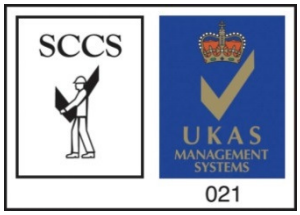
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Preamble

This document has been compiled to give installation trade contractors guidance on how the Kingframe Steel Framing System (SFS) is installed and what services Kingspan offer for this product.

This document does not form a specification and responsibility for the quality of any SFS installation rests wholly with the contractor and not with Kingspan Steel Building Solutions.

This document should be read alongside the following other Kingspan Steel Building Solutions publications which can be found at www.kingspanpanels.co.uk/sbs

SFS Designers' Risk Assessment
Identified risks associated with general installation of Infill and Oversail SFS
(for project specific guidance, please consult the Kingspan design service)

Product Brochure
Product overview & system applications

Technical Manual
Guide to technical application of both Infill & Oversail SFS framing

British Board of Agrément (BBA) Certificate
Product summary and guidance on specification, installation, maintenance and durability

Design Service Guide
Detailed and Basic Design Services, an overview of the services offered by Kingspan Steel Building Solutions

In addition to the guidance contained in these documents, Kingspan Steel Building Solutions offer an installer training course. The course gives the attendee a better understanding of SFS, its applications, benefits and installation principles - helping to increase productivity, reduce costs and minimise SFS related health and safety issues. Kingspan also offer a site inspection and report service. Further information can be found on the Kingspan Steel Building Solutions web site – www.kingspanpanels.co.uk/sbs

Contents

External References

Publications

- BS5950 Structural Use of Steelwork in Building - Part 5; Code of Practice for Design of Cold Formed Thin Gauge Sections
- BS6399 Series; Loading for Buildings
- BS-EN-1990 Series; Basis for structural design
- BS-EN-1991 Series; Actions on structures
- BS-EN-1993 Series; Design of steel structures
- National Structural Steelwork Specification (NSSS) Fifth Edition, The British Constructional Steelwork Association (BCSA)
- SCI Guide P125; Building design using cold formed steel sections: Worked examples to BS 5950: Part 5: 1987
- SCI Guide P301; Building design using cold formed steel sections: Light steel framing in residential construction
- SCI Guide P262; Building design using cold formed steel sections: Durability of Light Steel Framing in Residential Building
- BS 7364:1990 Specification for galvanized steel studs and channels for stud and sheet partitions and linings using screw fixed gypsum wallboards
- BS8000 Series; Workmanship on building site; Codes of practice
- BS EN 10346; Continuously hot-dip coated steel flat products. Technical delivery conditions
- BS EN 10162; Cold rolled steel sections – Technical delivery conditions – Dimensions and cross-sectional tolerances
- Building Regulations; Approved Documents

Industry/Regulatory Bodies

Steel Construction Institute (SCI)
http://www.steel-sci.org/

Federation of Plastering & Drywall Contractors (FPDC)
http://www.fpdc.org/

British Construction Steelwork Association (BCSA)
http://www.steelconstruction.org/

Building Research Establishment (BRE)
http://www.bre.co.uk/

British Board of Argrément (BBA)
www.bbacerts.co.uk

The National House Building Council (NHBC)
http://www.nhbc.co.uk/

Communities & Local Government – Building Regulations
http://www.communities.gov.uk/planningandbuilding/

Unauthorised Distribution & Liability

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Liabilities

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Unauthorised Distribution

This document is provided in good faith to Kingspan customers to assist in the design of the SFS product. It should not be distributed to third parties without the prior written consent of Kingspan Steel Building Solutions.

1 SYSTEM OVERVIEW

The Kingframe Steel Framing System (SFS) is a component supply structural stud façade system commonly used in two main methods: Infill and Oversail. The system consists of C shaped studs and U shaped tracks designed on a project specific basis to form the inner leaf of an external façade.

Both systems are constructed on-site and must be designed and installed to relevant codes and standards. Liability for the quality and accuracy of the installation rests with the installation contractor and not Kingspan Steel Building Solutions.

SFS has been extensively used in construction projects covering residential flats, apartments, healthcare and educational developments, commercial developments, public buildings and industrial properties.

Sections are supplied to site as individual components and fully assembled in-situ. This is an advantage where site access/craneage is restricted. Components can be supplied in final required lengths or standard lengths cut to suit on site. By cutting to length on site, construction tolerances in structures can be fully accommodated.

1.1 Infill Systems

Typically supported at the slab edge between hot-rolled steel or concrete. This allows insulation and external finishes to be installed outside the main structural frame if the correct tolerance scheme is adopted. The system is suitable for both low and high-rise construction. A deflection allowance is required at each floor level.

1.2 Oversail Systems

Fitted outside the line of the structural frame using support cleats at each floor level with connections designed to allow slab deflection. It is particularly suited to situations where cladding materials are sensitive to differing movement of the mainframe. Adequate base support must be provided to accommodate vertical loading.

Both systems achieve early weather protection of the building allowing other internal fitting trades to work inside the structure and removing external cladding from the critical path. Furthermore, these systems also provide lateral support to most cladding materials including masonry, profiled metal sheets, proprietary panels, insulated render systems, terracotta and timber rain screen systems. It should be noted that SFS is not intended to provide vertical support for masonry facades.

It is also possible to design Kingspan SFS sections to form the primary load bearing structural framing for low rise buildings. This is beyond the scope of this manual but information is available on request from Kingspan Steel Building Solutions.

2 CDM REGULATIONS

The Construction (Design and Management) Regulations of 2007 have redefined the responsibilities and guidance for system suppliers and designers on all construction projects in the UK. Wherever possible, Kingspan Steel Building Solutions will take measures to design out any risk to the installer during construction of the SFS. Kingspan Steel Building Solutions will identify potential CDM risks to the CDM coordinator within the project team. It is the responsibility of the Installer to provide the contact details of this individual to Kingspan Steel Building Solutions. If this is not forthcoming, Kingspan Steel Building Solutions will notify the project design team.

Kingspan Steel Building Solutions has compiled this document to inform Main Contractors and Installers of the system as to its correct use and method of installation. By receiving this document, the reader it obliged to ensure that all personnel undertaking design, specification, procurement, installation and checking of Kingspan Steel Building Solutions SFS structures have read and understood its contents.

2.1 Obligations of the Installer

The design and specification given by Kingspan Steel Building Solutions is a structural minimum and must be observed at all times. It is the responsibility of the Installer to site measure and confirm the exact stud lengths required due to “as built” tolerances, to comply with site specific tolerances and to check and approve each area of SFS prior to any boarding or cladding treatments being applied.

2.2 Site Visits

Kingspan Steel Building Solutions can visit sites where our system is being installed to check that the installation is being carried out in accordance with our specification. These visits do not form a warranty or approval of the installation. A formal report will be written by the Inspector and issued to the installation company, as part of this chargeable service. To arrange an inspection, please contact (contact details are available at the end of this document).

2.3 Remedial Works Arising from the Site Report

If the Kingspan Steel Building Solutions Inspector has made recommendations to the installation company, it is the responsibility of the installation company to ensure the recommendations are carried out in a full and efficient manner. In the event that the Inspector returns to find no remedial works have been undertaken, Kingspan Steel Building Solutions will raise the matter with either the Main Contractor or the client to ensure the works are carried out. In the event of a continual failure to undertake remedial works, Kingspan Steel Building Solutions will remove all drawings, associated insurances and any Collateral Warranty agreements from the project.

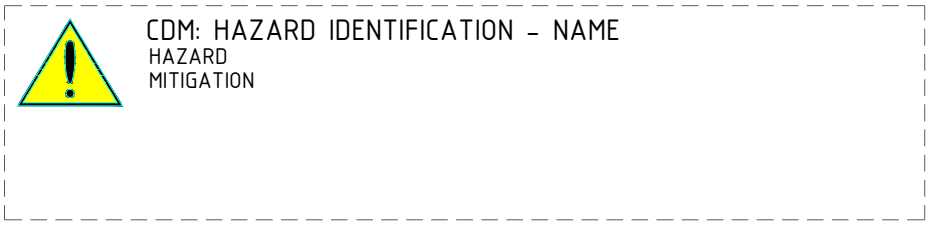
2.4 Competency of the Installer and Training

The competency of the Installer remains in whole the responsibility of the installation company. If Kingspan Steel Building Solutions has any reason to question the competency of installers, this will be raised with the installation company in the first instance. If the competency of installers remains in doubt, Kingspan Steel Building Solutions will raise concerns with either the Main Contractor or the client. Kingspan Steel Building Solutions now offer an Installer Training program to instruct installers in the correct and safe installation of SFS systems. The course can also be tailored to main contractors and Site Managers or Supervisors upon specific request.

2.5 Notification of CDM Risk to the Installer

Kingspan take both a product specific and project specific approach to installation risks on SFS. At the product level, all standard risks of installation are included in our product risk assessment which is available on our web site – www.kingspanpanels.co.uk/sbs. This should be read and understood by the Installer and the design team prior to commencing any works on site. The risks identified should be notified accordingly and compiled into the project risk register by the CDM coordinator as appropriate.

At a project specific level, when Kingspan Steel Building Solutions recognises a risk to health and safety that cannot be avoided through design, the hazard is identified on the drawings using the following symbol:



A description of the hazard is also included together with any suggested measures which the Installer or Design Team can take to mitigate the risk.

2.6 Notification of CDM Risk to the Designer

If an Installer identifies a potential CDM risk, it is their responsibility to notify Kingspan Steel Building Solutions. Once communicated, the designer will reassess the area in question and propose an alternative solution if possible. If an alternative solution is not available, the Installer is responsible for communicating the risk to the named individual within the project team.

3 Tolerance

It is important to consider tolerance schemes for SFS on a project specific basis. Some aspects of the system tolerance are generic but the architect or client may have special requirements which will need to be agreed with the installation contractor who should check to determine if the SFS system can accommodate them.
The following gives summary guidance on the different tolerance schemes which affect the design and installation of SFS.

3.1 Manufacturing Tolerance

Kingspan SFS components are rolled in accordance with BS EN 10162:2003.

3.2 Primary Frame Tolerance

When placing orders for studs and brackets, it is important to realise that the primary frame will not be set out, cast or installed exactly as detailed in the design. There will be variation in line and level on all beams, slabs and columns which will impact on the requirements for the SFS. Installers should pay particular attention to the following:

3.2.1 Beam and slab level variation

Kingspan design drawings will show the nominal distance between structural elements as given by the relevant designer's drawings but these MUST be checked on site by the Installer for an accurate material schedule to be produced. See section 5.2 for further guidance on calling off and ordering from either site measures or design dimensions.

3.2.2 Beam and slab line variation

Again, Kingspan design drawings will show the nominal setting out of the slab or beam edge. Variation in this line can cause issues for SFS:

- Infill SFS requires 2/3 bearing onto the primary structural frame. If variation in the line of the frame reduces this bearing, additional ancillary components may be required to correct it and the installer should be aware that they may incur additional costs for these. Please contact Kingspan design for a solution if this occurs on site.
- Oversail SFS brackets will be designed to accommodate some tolerance in the line of the edge which they will be fixed to (typically +/- 15mm). Any variation outside of the allowed tolerance may cause the bracket to extend outside the face of the SFS and foul the boarding. Alternatively, it may leave the bracket too short. It is the responsibility of the installation contractor to advise what tolerance is required on brackets. In the absence of specific information, Kingspan will assume +/- 15mm to be sufficient.

3.3 Installation Tolerance

3.3.1 Structural requirements

In order to satisfy structural requirements, the SFS must be installed in accordance with the guidance provided in the National Structural Steelwork Specification available from the British Construction Steelwork Association[1].

Specific requirements which should be followed for SFS installation are:

- Maximum deviation in position at column (stud) base (i.e. track setting out)
  - 10mm in either axis
- Maximum deviation of single storey columns from plumb
  - Height / 600 or 5mm – whichever is the greater to a maximum of 25mm in either axis
- Maximum deviation of multiple storey columns from plumb (oversail applications)
  - Individual storey height / 600 or 5mm – whichever is the greater to a maximum of 50mm in either axis over the total height

3.3.2 Additional requirements

The project design team may have more onerous requirements than those presented in 3.3.1 in order to achieve the required finish. Kingspan recommend that the installation contractor agrees a specific tolerance scheme with the design team prior to undertaking the works.

[1] BCSA web site – http://www.steelconstruction.org/bcsa.html

4 DESIGN INFORMATION

Design information is submitted to the Architect and the client for approval prior to construction. The drawings serve a number of different purposes; approval by the Architect, estimating by the client QS, installation by the Site Team and co-ordination with other sub contract designers (window suppliers, M&E services, principal structural designers etc).

All drawn information submitted is a structural MINIMUM and must not be deviated from without prior written consultation between the client and Kingspan Steel Building Solutions.

4.1 Drawing Submissions

You will receive the following sets of information when you undertake detailed design with Kingspan Steel Building Solutions:

Elevation Drawings

These drawings provide plan, elevation and section information for a given area of a building structure. Each component is individually drawn to allow for accurate setting out of the framework, though the 'general' studs depicted are indicative only. The installer may choose to alter the setting out of this indicative grid to suit the internal or external finishes, whilst maintaining the stated maximum spacing of studs at all times.

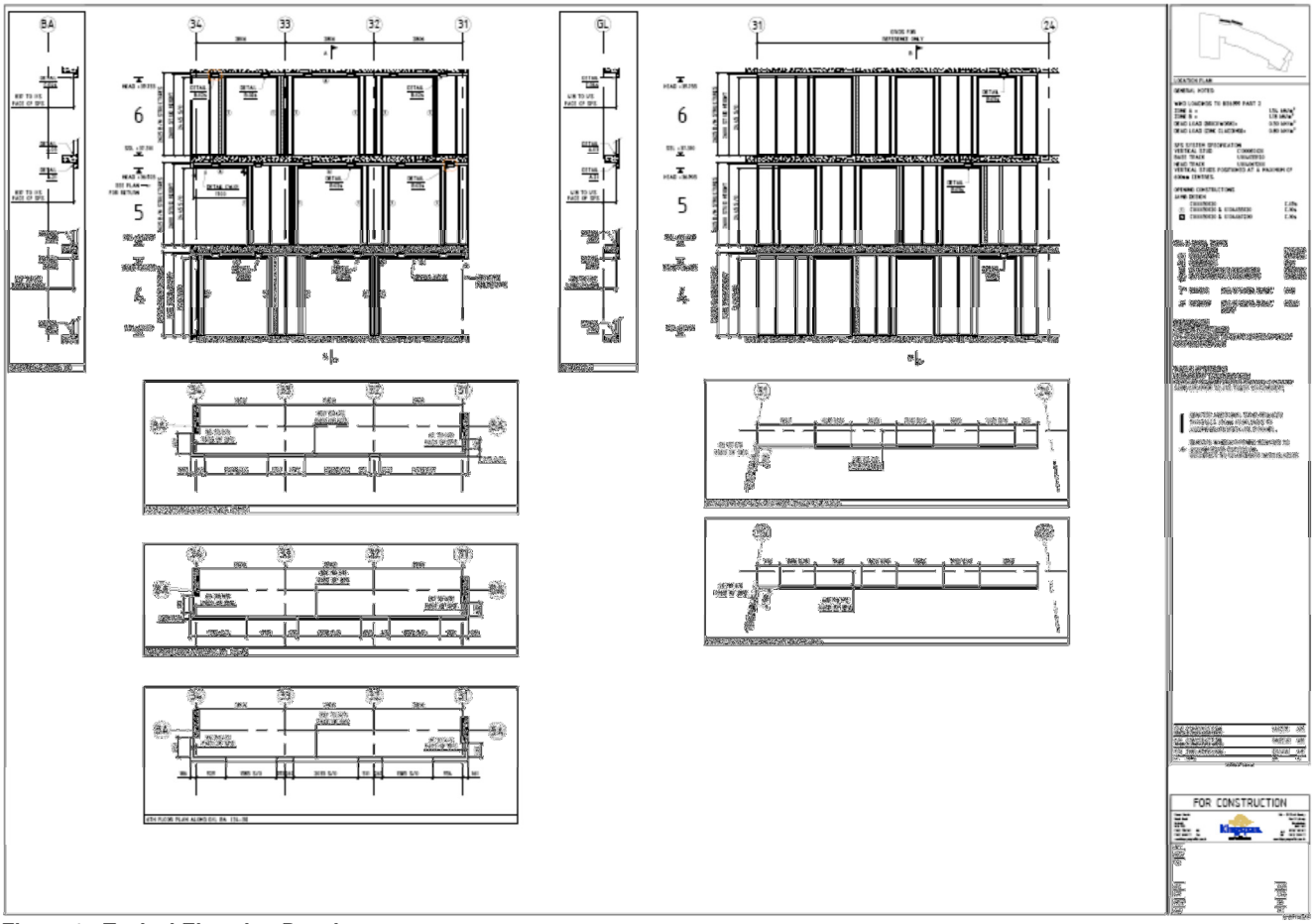


Figure 1 - Typical Elevation Drawing

Detail Drawings

These drawings provide enlarged construction details of specific connections or constructions on the project. Details are referenced on the elevation drawings to show where each is relevant. If fixing information is not provided in the legend of the elevations, it can be found in the relevant detail drawing.

Fabrication Drawings

Where Kingspan Steel Building Solutions have agreed to undertake the design of specialist bracketry (especially evident in oversail applications) a fabrication drawing for the bracket(s) specified will be provided. The brackets can be supplied by Kingspan (on 2-3 weeks' notice) but also hold enough information for a third party steel fabricator to supply if desired.

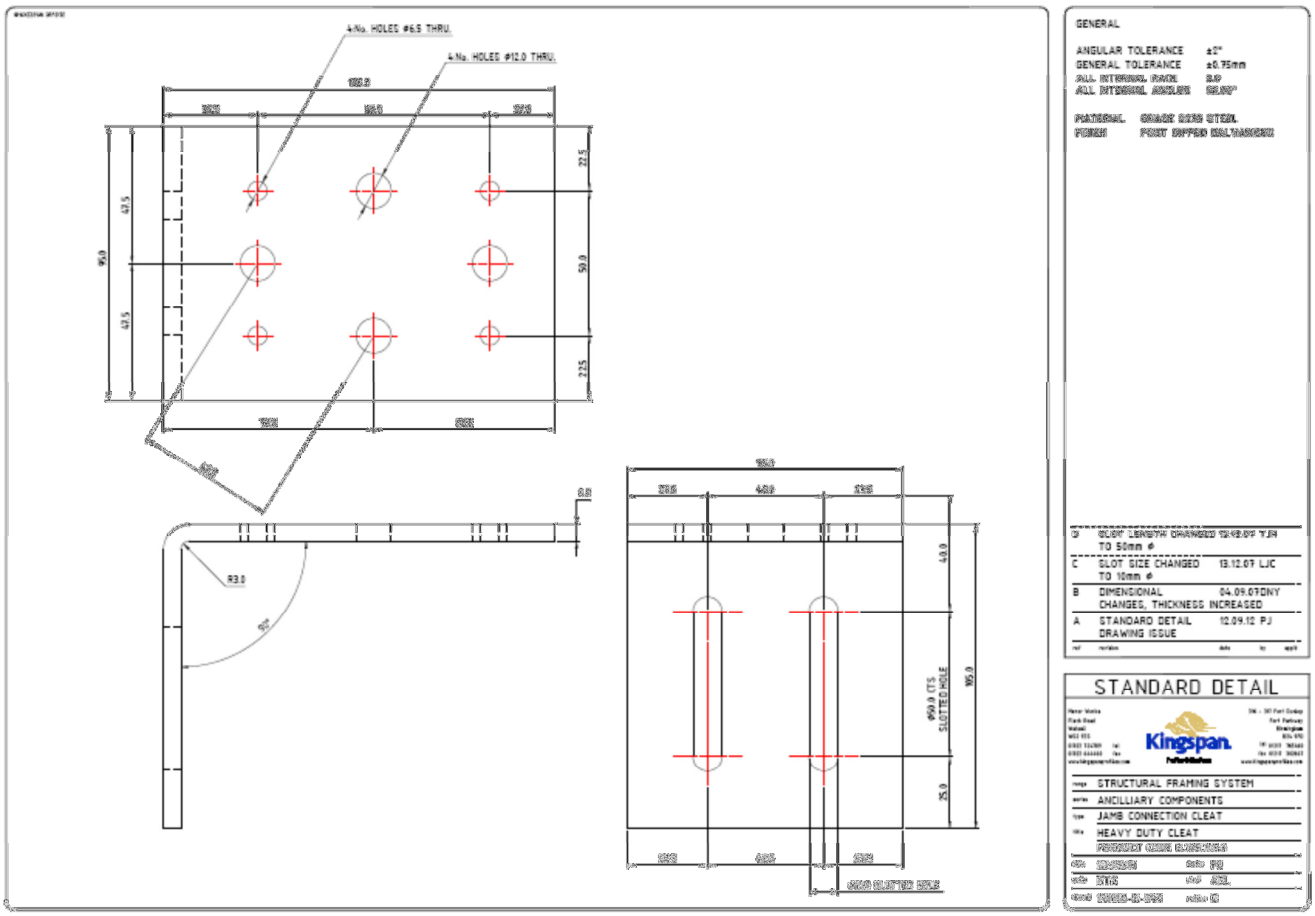
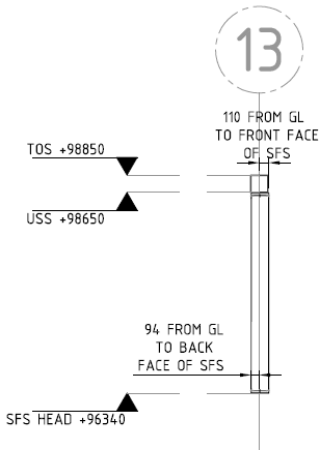


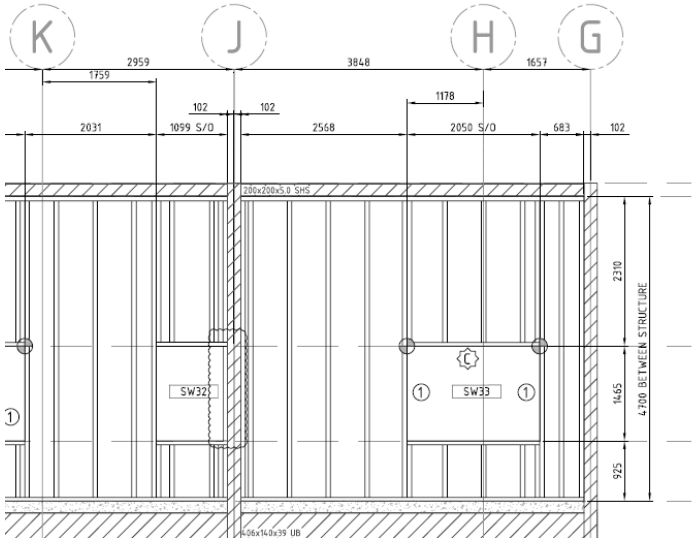
Figure 2 - Typical Fabrication Drawing

4.2 Reading Design Drawings

Setting Out from Gridlines
The section detail on the elevation drawing gives the setting out from gridline to either inside or outside face of the SFS. This information may also be shown on plan details if the line of the SFS varies between areas.

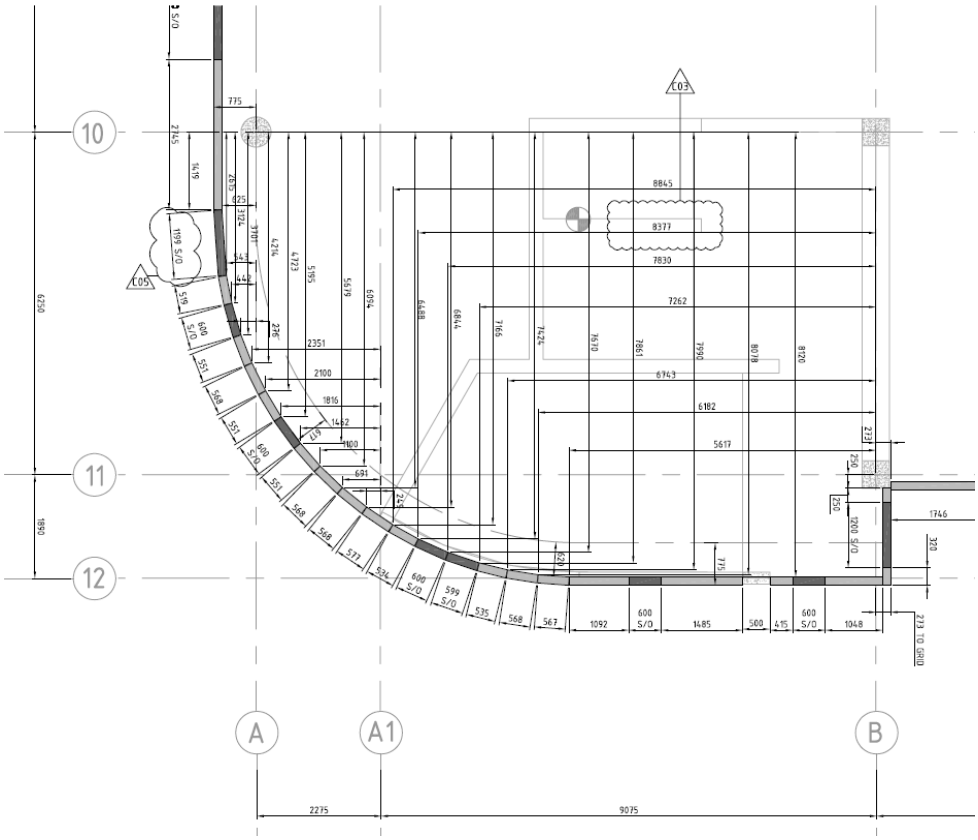


Setting Out Structural Openings
Structural openings are set out from a given gridline to the inside face of the opening. The width of the structural opening is given in either the plan or elevation detail with the head and cill heights given as datum levels on the elevation detail. Dimensions are given from notional slab/steel level to the underside of heads and cills but these must be carefully checked against the datum levels in case of any irregularities in the primary structure.



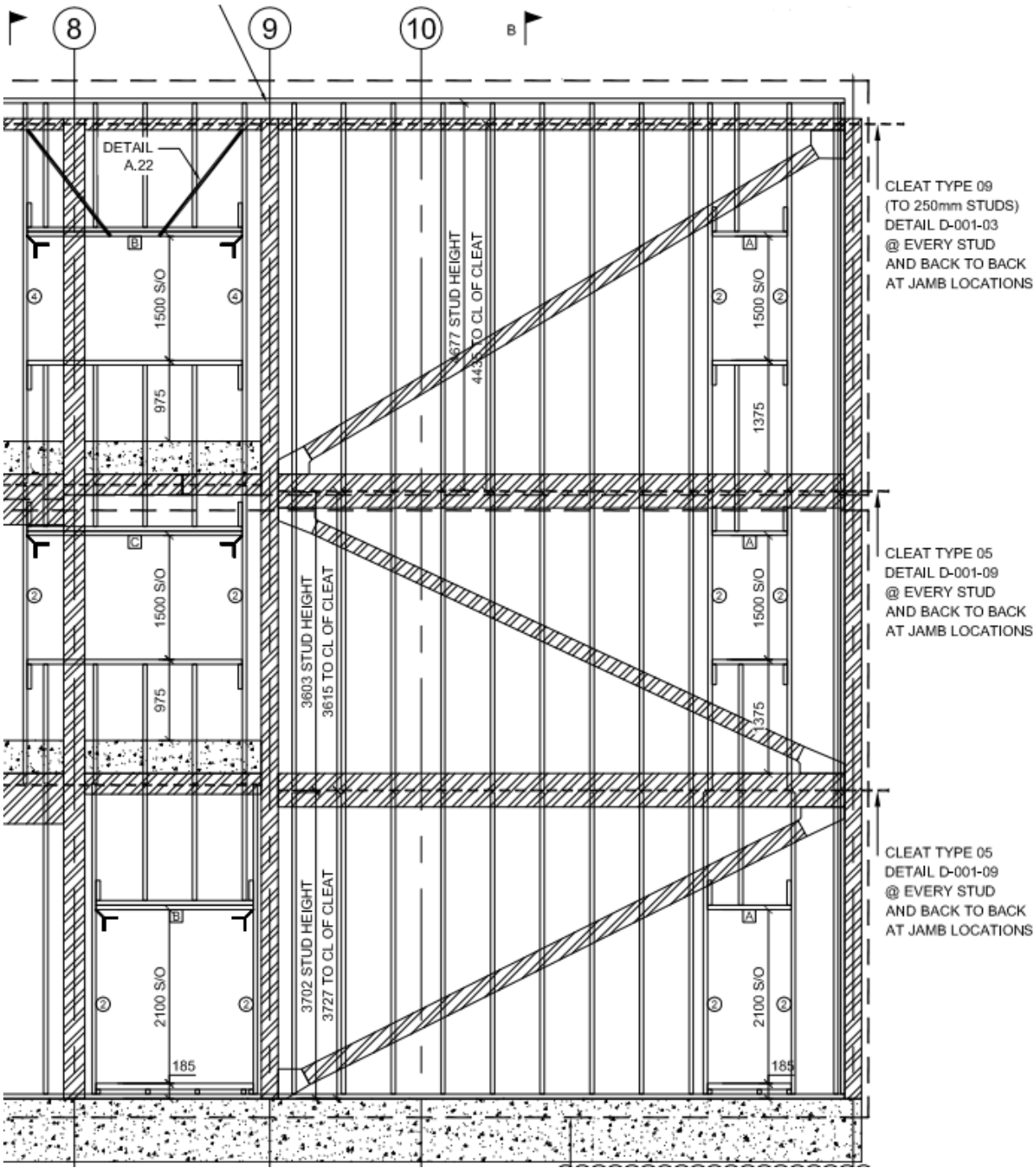
Curved Walls

Curved walls are shown in plan for setting out. Dimensions from parallel and perpendicular grids are given on the drawings as an X, Y co-ordinate to allow accurate setting out. In some cases, a radius from a central point will be given if plywood templates are used to set the curve.



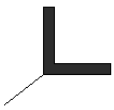
Bracket Positions

In oversail applications, specific locations, heights and type of brackets is given on the elevation drawings. This allows accurate setting out of the support bracketry prior to installation of the SFS. Brackets are shown as dashed lines and the bracket type is referenced on the drawing.



Cleats

Where additional stiffening cleats are required to either jambs or cills/lintels, they are denoted by a symbol. The standard symbols are as below:

Description	Symbol	KSBS Standard Detail[2]
Heavy Duty Cleat		C.13 & C.14
Lintel/Cill Cleat		C.02, C.05, C.06, C.07 & C.08

Fixing specifications for cleats are either given in the legend or the standard detail.

Opening Construction Specifications

Product codes for sections are given in the legend of the drawing. Special constructions (nested jambs, cills and lintels) are shown as symbols or annotated directly on the elevation drawing. The list of standard symbols is given below:

Jamb Description	Symbol	Specification	Detail
Single Jamb Stud	①	2mm Stud	(C.09s)
Single Stud and Single Track	②	2mm Stud & 1.2mm Track	(C.10s)
Single Stud and Single Track	③	2mm Stud & 1.8mm Track	(C.10s)
Double Stud and Single Track	④	2 x 2mm Stud & 1.8mm Track	(C.11s)
Double Stud and Single Track	⑤	2 x 2mm Stud & 2 x 1.8mm Track	(C.12s)

Cill & Lintel Description	Symbol	Specification	Detail
Single Track		1.2mm Track	(C.01/04s)
Single Track (Heavy)	A	1.8mm Track	(C.01/04s)
Double Track	B	2 x 1.2mm Track & General Stud	(C.02/05s)
Double Track (Heavy)	C	2 x 1.8mm Track & General Stud	(C.02/05s)
Treble Track	D	3 x 1.8mm Track & 2 x General Stud	(C.06s)

All these constructions are shown on elevation drawings as standard constructions with a standard description and reference.[3]

Fixing Specifications

The general fixing specification is given in the legend. Special fixing conditions are described in the legend or in the specific details provided for the job. Under no circumstances can the specified fixing be deviated from without prior written consultation with Kingspan Steel Building Solutions engineers.

[2] Please refer to the Kingspan Steel Building Solutions SFS Technical Manual for details
[3] Please refer to the Kingspan Steel Building Solutions SFS Technical Manual for details

5 MATERIAL ORDERING

5.1 Price Lists & Order Requirements

Your Area Sales Manager (ASM) will be able to provide a current price list. This list covers the standard supplied items for SFS. Below is a checklist of what is required by Kingspan Steel Building Solutions when placing an order with us;

Requirement	**Description / Reference**
Product References	As price list
Quantity	As required by Installer call off
Length	In millimetres
Project Name	Name
Delivery Address/Gate	Postcode and Site Access Requirements
Delivery Schedule/Time	Time Slot/Packing Sequence[4]
Order Number	Your official order number
Transport Cost	The agreed transport cost
Transport / Offload Method	HIAB, Flat Bed or Curtain Sider

5.2 Call Offs

It is the responsibility of the Installer to call off the required material from Kingspan Steel Building Solutions drawings. Kingspan Steel Building Solutions do not provide a call off or material estimating service. There are two methods of call off; cut to length and over length.

Cut To Length

Kingspan Steel Building Solutions can roll and cut 'C' section studs to your requirements with a minimum individual length of 600mm. The advantage of this is the reduced amount of waste and cost while minimising the need for cutting on site. Accuracy of cut lengths is not assured when ordering from Kingspan Steel Building Solutions drawings due to construction tolerances in the primary structure. This is particularly important in infill applications. The Installer is advised to survey the areas of installation prior to placing a cut to length order.

Over Length

Ordering material over length reduces the risk of wasted material due to construction tolerances but introduces an inevitable amount of waste and also the requirement for re-treating cut ends with Zinc rich paints. It also requires cutting on site to the accurate length required. An example over length order for 'C' sections would take the overall height of a particular area and add 100-200mm. 'U' sections must be ordered in stock lengths of 3.0 and 4.0m and cut in situ to suit a given area. Special lengths of 'U' sections are available in instances where lintel, cill and jamb constructions require lengths greater than 4.0m. These items require special ordering (Track sections for constructing openings should **not** be spliced).

[4] The provision of sequenced packing and the advance booking of delivery slots may attract additional charges – please contact Kingspan Steel Building Solutions if in doubt

5.3 Scope of Supply

Kingspan Steel Building Solutions limits their scope of material supply to the items on the price list. An overview of what is and is not supplied is given below:

Kingspan Steel Building Solutions Supply	Supply by Installer
'C' Sections	Special Bracketry[5]
'U' Sections	Fixings
Standard Cleats	Hot Rolled Steel
Heavy Duty Cleats	Any other component
'Z' Bars	
Flat Strap	

5.4 Building Regulation Requirements

The Installer should refer to the Main Contractor and the Architect to ensure that the requirements under Building Regulations for air tightness, thermal bridging and acoustic protection are met before construction begins. The most common requirements that may be required are listed below:

Thermal Bridging
The adequate insulation of 'nested' SFS constructions; this involves the filling of boxed or nested sections of SFS with a mineral wool insulator to prevent possible heat loss at the junction with structural openings. Installer to gain confirmation from the main contractor if insulation is required within closed sections.

Air Tightness
The Installer may be required to apply sealant between the SFS and interfacing elements such as the primary structure. This may be a secondary defence as the board linings provide the majority of air tightness.

Acoustic Protection
To reduce the risk of flanking sound transmission between units, the Installer may be required to provide an acoustic mat between the track elements and the primary structure. The Installer will also be required to observe robust detailing when installing façades with party wall abutments.

Fire Protection
The protection of the primary structure from fire may have an effect on the design of the SFS. The cloaking of primary steel beams with performance boards will affect the design of the fixings to the beam. Additionally, any intumescent paint finish applied to steelwork requires room to expand in the event of a fire which may also affect the design of the SFS. The Installer is advised to clarify any special fire protection treatments and consult any implications with Kingspan Steel Building Solutions.

[5] The Installer may wish Kingspan Steel Building Solutions to price and supply these items. Please ask your ASM or contact the Material Ordering & Production Department for more details

5.5 Pre-Order Checks

To minimise waste and cost, the Installer is advised that the following checks should be made prior to placing an order with Kingspan Steel Building Solutions;

1. Check drawings are all at Construction status
2. Check if there are any CDM notifications raised by Kingspan Steel Building Solutions and discuss mitigation with the main contractor CDM coordinator and design team
3. Survey the areas of the primary structure, the order is intended for, to ensure;
   a. *The main structure is not out of tolerance*
   b. *The given dimensions on Kingspan Steel Building Solutions drawings are correct or the Installer should take out any discrepancies pre-order after discussing with Kingspan*
   c. *There is adequate access to the area*
   d. *There are no scaffolding ties or similar that 'foul' the area of work*
4. Check production lead time with Kingspan Steel Building Solutions
5. Check supply lead times for brackets, cleats and fixings
6. Check delivery schedule requirements with the main contractor
7. Check transport method is appropriate to the site including any offloading requirements
8. Check the equipment required to offload the deliveries is available on site
9. Check that there is an adequate area to store the goods prior to use (refer to Section 8.3)

The Installer is advised that the accuracy of any order is undertaken at the sole risk of the Installer and not of Kingspan Steel Building Solutions. If Kingspan Steel Building Solutions does offer guidance on material lengths and quantities, this does not constitute an acceptance of liability in any form.

6 TOOLS & FIXINGS

6.1 Hand Tools & Accessories

The Installer may find a requirement for other or additional hand tools than the list given below. However, this list is a guide to new Installers of the system of what basic tools may be required;

- Steel Hand Clamps
- Hammers, Lump Hammer, Claw Hammer
- Screwdrivers (various)
- Hacksaw, Stanley Knife,
- Spanners, Ratchets, Socket Set
- Drill Fixing Attachments, Hex Head Bit Holders, 5/16 SDS Bit Holders
- Drill Bits For Steel And Masonry (Various Sizes), PH2, PH3 Bits Etc
- Cutting Discs
- Cone Cutter
- Holesaws (Various Sizes According To Service Penetrations, Up To 22mm)
- Lifting Straps/strops (Various Weight Ratings And Lengths)
- Spray Paint, Markers, Carpenters Pencils.
- 110v Transformer
- Generator / drip tray and fuel containers
- Splitter Box
- Extension Leads

6.2 Measuring & Setting Out Tools

All items used in measuring should be calibrated to the relevant British Standard, cleaned and checked on a regular basis and audited at predetermined intervals. The following may be of use:

- Laser level and staff
- Magnetic tape measure (various lengths)
- String lines
- Spirit Levels, various sizes

6.3 Cutting Tools

Grinders

Two types of hand grinders will be used, primarily to notch or adapt steelwork but also to clean up sharp edges of cut material. Care must be taken to ensure that guards and handles are properly fitted and that there are plenty of blades available on the cutting disc, operatives must use the specified PPE according to the manufacturers' specification. As an example, see the product specification sheets for grinders in Section 14.

Metal Cutting Saws

For cutting stud and track in any quantity it is advisable to use a Metal Cutting (Chop) Saw.

These come in two types.

Type A – Metal Cutting Discs

These are metal cutting saws that can be table or bench mounted – they have an integral vice and use a 14" metal cutting disc, similar to a hand grinder. Care must be taken when cutting to ensure a clean cut, when cutting through the open edges of channels and studs it may be necessary to double up the materials to prevent the steel springing as the blade cuts the edges. This type of saw will leave a burr on the cut edge of the steel and may remove the galvanised surface of the edge, this may leave the steel exposed to corrosion. The cut edges will need recoating with a galvanised spray or a galvanised paint. As an example see the product specification sheets for a Metal Cut-off Saw in Section 14.

Type B – Carbide/Titanium Blade Saws

As above, metal cutting saws table or bench mounted, the difference is in the blade. The carbide tips act to fold the galvanised coating back over the cut edge of the steel, thus removing the need to recoat the edges. This type of saw will also keep a cleaner cut than the traditional cutting disc blades. Cost of blades is more expensive than the disc cutting saws, but the blades can be reground and reused.

6.4 Fixing Tools

SDS Drill

Designed for drilling into concrete and masonry the SDS drill will be fitted with the specified SDS bit and will drill down to a specific depth that can be set using a depth gauge attached to the drill, before the specified fixing is driven into the hole. As an example see the product specification sheet for an SDS Drill in Section 14.

Impact Screwdriver / TEK Gun / Single Fix Systems (110v corded or Cordless Type)

For screw fixing applications a SDS screwdriver may be used, adapted from plasterboard screwdrivers, when fitted with the correct end bit it will fix hex head, wafer and pan head types of fixings to and through steel and will also drive some concrete fixing types. As an example see the product specification sheet for a metal construction screwdriver in Section 14.

Note that impact drivers should **NOT** be used for fixing tek screws into hot rolled beams. TEK guns are preferable for all framing connections.

Powder Actuated Fasteners (Shot Firing)
Shot firing involves the use of a powder-actuated tool. It involves the loading of strips of shots and nails into the tool before firing into the structural steelwork. Structural steelwork is generally between 8mm and 20mm thick and requires great effort to fix a specific SDS type fixing, often leading to pre-drilling of the steel. These operations are costly in terms of time taken and health and safety (vibration white finger). Shot firing is quicker though, under obligatory structural calculation, it will be necessary to increase the amount of fixings used. The specification, location and quantity of shot fired fixings must under all circumstances be checked with Kingspan Steel Building Solutions engineers.

Before any powder actuated system is used, operatives will need specific operator training and certification in the safe system of work using these tools and the safe disposal of the used strips of shots, as these shots are classified as explosive materials. The Installer should carry out his own site specific risk assessment before using a shot firing tool. As an example see the product specification sheet for a powder-actuated tool in Section 14.

Power Drills / Mag Drills
110V Power Drill
A commonly used item for pre-drilling into steel, either light gauge or structural steel, with a 110v connection back to the power source supplied by 110v leads. A 110v power drill can also be used for drilling through brackets and cleats. As an example see the product specification sheet for a High Speed Drill in Section 14.

Sidewinder Drill
Used when there are fixings or holes required in tight locations, can be cordless or 110V. Often the heads can rotate and lock at odd angles to get over tricky details. As an example see the product specification sheet for an Angle Drill in Section 14.

7 HEALTH & SAFETY

This section should be read in conjunction with the SFS Design Risk Assessment available on the Kingspan Steel Building Solutions web site.

7.1 Edge Protection

Under no circumstances shall persons be exposed to working at height without suitable control measures in place. Also see section 7.6 for access equipment. When there is no scaffold present at the edge of the slab the main contractor will have installed some form of edge protection. A common method of protecting the exposed edges of a building is to fix a proprietary fencing frame to the structure; attached to posts fixed into the structural slab, to the face of the structure or fixed to the soffit of the floor below. As works progress these will be stripped out. The external wall will provide a satisfactory barrier to falls from the building once completed. However, this may lead to areas above or below the works having an exposed edge, other forms of barrier will be needed, such as standalone Heras fencing. At the exposed edge operatives will need to be harnessed to the structure to prevent the possibility of falls. The method of edge protection will depend on the type of access equipment used:

- Temporary or permanent barriers
- Scaffolding
- Netting
- Harness / Lanyard – *only when the options above are not possible*

7.2 PPE

When attending any construction site, everyone must abide by the mandatory PPE requirements that are set by the main contractor or developer. As a minimum the following should be used by operatives when handling SFS and installation of light gauge steel walling:

- Hard hat/ Safety helmet
- Safety Boots
- Hi-Vis Vest
- Gloves
- Safety Glasses/Goggles
- Ear Defenders

As part of the on-site induction the following should be provided:

- Details Of Safe Access/Egress
- Location Of Nearest First Aid Point
- Identity Of Appointed First Aider
- Route To Nearest A&E Department
- Fire Rules And Assembly Point
- PPE Requirements

7.3 Manual Handling

For any given site a specific plan and risk assessment should be developed by the Installer that will evaluate the risks attached with handling SFS sections and equipment. Seek guidance from the HSE on reducing the risk of manual handling injuries and further specialist training. Some general guidelines in management of manual handling:

- Workers should receive training in kinetic lifting
- Plan material use and adopt good practice when stacking materials
- Use mechanical lifting equipment where practicable
- Use team lifting for awkward and heavy loads
- Good housekeeping standards should be maintained in all work areas
- All spillages or general rubbish should be cleared in a timely fashion

7.4 Method Statements

The method statement is the Installer's interpretation of how the installation is actually going to happen. Usually a simple, brief document it demonstrates competence to the main contractor and is a guide to the individual operatives, who should all read, sign and date to signify their understanding and acceptance of the document. It should also form part of a checklist/handover document that the main contractor can use to check that the installation has been carried out correctly.

The method statement will contain many of the elements that will be found in the Infill SFS, Section 8 and Oversail SFS, Section 9 of this document.

7.5 Risk Assessments

The following is a list of risk assessments, from which any that are relevant to the project should be carried out before the installation of the SFS system. It is not an exhaustive list and the site should be examined for any specific risks not mentioned within this list. Any actions to reduce risk that are identified should be carried out and documented before site works commence.

- Use Of Abrasive Wheels
- Crane Operations
- Deliveries And Collections Of Plant, Equipment Or Materials To Site
- Use Of Electrically Operated Power Tools
- Use Of A Gin Wheel
- Using General Hand Tools

- Manual Handling
- Use Of MEWP's
- Summer Working
- Winter Working
- Working At Height
- Employing A Foreign Operative On Site With A Lack Of Knowledge Of The English Language
- Use Of Stepladders
- Use Of An Alloy Tower
- Refurbishing An Occupied Building
- Maintenance And Repair Of Plant
- Using A Waste Chute
- Use Of A Trestle Scaffold
- Use Of Vibrating Plant Or Equipment

Used in conjunction with Method Statement, all operatives involved on site should read and understand the information within these documents. The site operatives should then sign and date their acceptance of these documents. The risk assessment system should be backed up with a series of health and safety toolbox talks about a specific site related issue or a general health and safety concern

7.6 Access Equipment

The following is a list of types of access to the working edge of the building with a brief description of issues that need to be considered before installation of SFS.

Scaffold
A series of steel poles, brackets and planks that have been designed under calculation to provide scaffold lifts that can be worked off. Generally set with 2m working heights along the outside of the elevations, nearly always used on tall structures. Used when the footprint of site allows. (Scaffold should not take lateral restraint from the SFS system)

The cost of scaffold is expensive, prolongation and delay can cause massive overspend on scaffold; it requires careful planning and coordination with other trades. Progressive build and strip method; there are problems with tying into the building through the external wall that can prevent completion of works at the first visit. When set up correctly scaffold provides good access to the outside of the wall and good storage of materials, however other trades may also use scaffold which can create obstacles to progress of SFS installation.

Dependant on finishes and external wall build up, there is a potential for unsafe working conditions due to gaps between scaffold edge and the wall, individuals often pull back boards making work areas unsafe - requires careful coordination with scaffolders. Scaffold can provide excellent defence against damage to the wall, can be sheeted and canopied to provide a barrier to wind, rain and general poor weather conditions.
Risks to be considered when working off a scaffold include:

- Men falling from height through excessive gaps between the working platform and the structure
- Materials or tools falling through excessive gaps between the working platform and the structure
- People on the ground being struck by materials or men
- Men or materials falling while being carried up or down the access ladders to the various working platforms
- Scaffold collapse due to excessive loads or incorrect erection

Scissor Lift
Scissor lifts are moving platforms that have a bed on which to work. They are often extendable platforms that can reach out to 60' plus and are generally diesel fuelled. It is considered a cheaper alternative to scaffold, the decision to use is often a financial one which can lead to contractors specifying the use where it is inappropriate or dangerous (ground conditions).

Operators working from scissor lifts need to be qualified (IPAF). Untrained operators will cause accidents and damage. Ground conditions are crucial – often where landscaping is required the contractor does not want to pay to put down hard standing materials. Combined with poor weather this can cause the ground to turn muddy with forklifts and scissor lifts churning up the ground, getting stuck and causing delay.

Scissor lifts are generally slow to manoeuvre and slow to lift and drop. Any deviations in the ground level will prevent the lift and they are limited in extent of height that can be achieved. Diesel/battery powered and there are often fuelling difficulties, flat batteries and flat tyres.

With scissor lifts there are often delays getting to the point of work in comparison with scaffold. Scissor lifts do not provide any protection to the workface or the workers. Risks to be considered when working from scissor lifts include:

- Men falling out of the working platform while at height through overstretching out of the basket/platform when at height

- The scissor lift coming into contact with existing services or the structure
- People being trapped in the moving parts of the scissor lift while it is being raised or lowered
- People being hurt or property damage by the scissor lift overturning due to unstable ground
- Material or tools falling from the platform while aloft and hitting people or property at ground level
- The scissor lift striking or being struck by other vehicles manoeuvring at ground level
- The scissor lift malfunctioning while at height

Cherry Picker

A cherry picker is a small man basket on an extendable arm that is fixed to a movable base (diesel powered), it is not suitable for general SFS installation but can be used for small remedial works or the installation of oversail brackets to a slab face. Operatives will need specific training (IPAF registration) and will be required to wear harnesses. Risks involved are generally the same as working from a scissor lift.

Mast Climber

A mast climber is generally elevation sized with bed of up to 20m in width, they are generally pushed and fixed into place through the external wall. It has limited mobility and is fairly slow to lift and lower. It doesn't provide any protection to the workers or working edge. Risks involved are generally the same as working from a scissor lift.

Mobile Towers

When working off the slab that has a structural soffit at storey level it will be necessary to work off some form of equipment to get to the top of the steelwork. There are three types of equipment used:

- Hop-up – an individual platform that provides a base of up to 1 metre. There are safety rails integral within the hop-up, however more than one may be required when handling long lengths of steel
- Mobile Tower – a clip together scaffolding tower that can provide a base level that is adjusted to the height required. A mobile tower will have a larger sizes platform, however this can lead to accidents as tools and materials are stored on the platform. Must be erected and signed off by a competent person that holds a PASMA certificate.
- Stepladders – not allowed on many sites as there is an increased risk of accidents

Risks involved when working from these types of equipment include:

- Men / Materials Falling From Height
- Collapse Of The Equipment
- Overturning
- Misuse

Site specific as part of Method Statement including elements of the following:

- Crane - Suitable Design For Lifting Operations As Part Of Lifting Plan.
- MEWP's (Scissor Lifts)
- Telehandler Forklift
- Genie Boom Lift (Cherry Picker)
- Mobile Scaffold Towers
- Hop-Up Personal
- Towers
- Trolley Jack

8 MATERIAL INSPECTION & OFFLOADING

8.1 Method of Delivery

Steel will be delivered to site in packs or bundles that have plastic banding to hold the steel in place during transit. They will be placed on bearers and generally delivered on open-sided flatbed vehicles. The bearers will assist in passing through chains or slings for lifting with a crane or to provide access for the forks of a telehandler. However there may be requirements for curtain sided vehicles or self-offloading (HIAB) vehicles. It is entirely the Installer's responsibility to communicate the site specific offloading method to Kingspan, along with any deviation from the above for consideration, evaluation and agreement.

8.2 Safe Handling

For any given site, a specific manual handling plan and risk assessment should be developed by the Installer that will evaluate the risks attached with handling SFS sections and equipment. Specifically, care must be taken when snipping the bands from a pack of steel as the material is likely to spring apart as the band is removed. SFS stud and track will always have sharp edges, so gloves must be worn and care taken when moving product around.

The steel lengths will be supplied as ordered in lengths up to 10m, any longer by prior arrangement only. This can lead to instability in handling with an uneven centre of gravity and difficulty in handling through restricted spaces. An assessment should be made before any material is ordered to determine the optimum size that can be safely handled. Smaller sections can be spliced together on site (must be designed as such by a Kingspan Engineer), preventing unsafe handling conditions.

8.3 Safe Storage

Steel sections can be stacked either flat or on edge and should be supported along their length and width.

- All sections should be stored in clean, dry conditions, protected from inclement weather
- No sections should be stored next to or in contact with dry cement, lime, plaster, mortar or salt.
- Full bundles of sections should not be stacked more than two high with each bundle adequately separated by timber batons of equal sizes placed at regular intervals along the length of the pack
- Avoid unnecessary movement of packs. Each time the material is moved from one place to another, the risk of damaged sections is increased

8.4 Component Identification & Marks

Each individual section will have an inkjet reference printed on it that will state:

- The type of material, product code – e.g. U104055120, 104mm wide track (web), 55mm high (leg), 1.2mm gauge
- The length – e.g. 3000mm

Each pack will have a label attached detailing the quantity of parts and the same information as above.

8.5 Damaged Material

In cases of damaged material that has been delivered to site, notification must be sent to Kingspan Steel Building Solutions within 24hours of receipt. If material has been damaged during movement or loading into position, an evaluation of the extent may lead to the sections being cut down to be used as smaller infill pieces around openings. If the material is unusable then it should be removed to the waste steel skip that should be provided by others.

The disposal of steel or other associated waste/scrap must be carried out by an authorized and qualified disposal agent and in any case at a site suitable for the re-cycling of the steel section.

In cases of damage to installed material, Kingspan Steel Building Solutions should be contacted immediately to provide advice on remedial, repair or replacement works.

9 INFILL SFS

9.1 Site Preparation

Structural Level Checks

Before commencing installation, Kingspan Steel Building Solutions drawings should be checked for approved status, if the drawings are not at A (construction) status (passed off by the project Architects) then the Installer/client takes a risk of remedial works or changes after the steelwork has been installed. The working area should be checked to ensure that there is clear access to the workface, that the structure is as drawn and that there are no major deviations from the drawn dimensions of the structural bays. The quality and integrity of the substrate should be checked and the alignment of the structural elements assessed to ensure that the SFS can be put in with the requisite bearing on the substrate. Checks to ensure that there is nothing to impede fitting the SFS should be carried out. If there are any issues with the above, the main contractor should be notified before commencing installation.

Gridline Set Out

The Main Contractor's site engineer will be responsible for providing gridlines across the slab that will directly relate to the Kingspan Steel Building Solutions elevation drawings. These grids will generally be sprayed on marks at regular intervals that can be connected using string lines and spray paint. The grids will not necessarily be on the drawn position but may be off-set by a nominated dimension (usually 1 metre). This is done to avoid obstacles or to avoid being masked as the steel is placed on the external edge. The position of the SFS can then be identified as it sits to the edge of the structure, using measurements from the centre of a structural opening (dimensioned to the edge of the jamb) within the bay to align to grid.

The Installer will set-out the rear or the front of the SFS according to the drawing on the floor slab and will create a chalk line along the edge. Using a laser, the Installer will then transfer the line onto the structural soffit. This will provide position for base and head track.

9.2 Basic Installation Principles[6]

Head and Base Tracks

Tracks are supplied in 3 or 4m lengths. As specified by Kingspan Steel Building Solutions structural engineers, normally the base track will be of a specified width with a 55mm equal leg and 1.2mm gauge (thick), and the head track will be the same width with a 67mm equal leg and 1.8/2.0mm gauge. The head track has this length of leg to accommodate deflection and is more substantial to cope with the increased structural loads at this point.

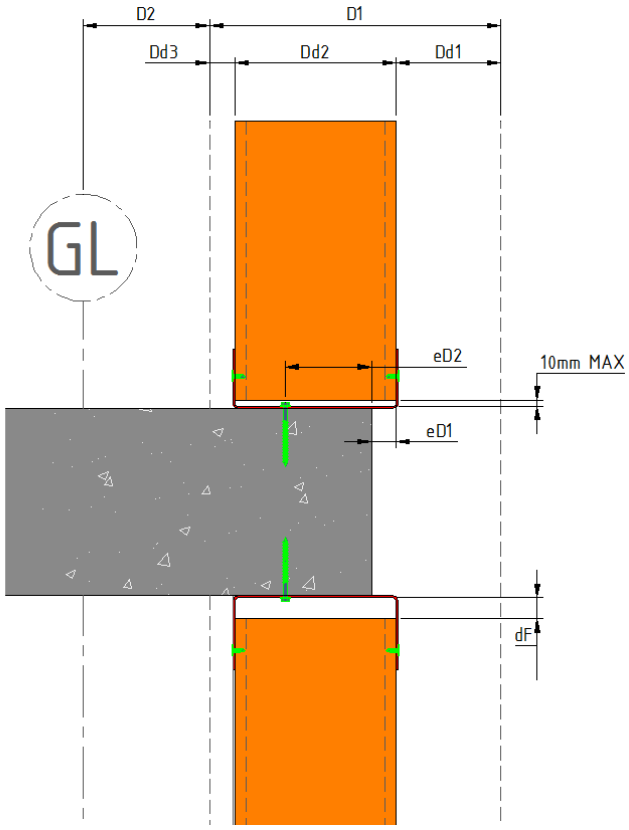
It is advisable to set up a cutting area and identify it as a Hearing Protection Zone. Proper setup of a work bench to site the metal cutting equipment and to support the individual sections will help to avoid accidents and manual handling risks. The base and head tracks can be cut using the metal cutting equipment to the required bay width and re-treated with Zinc rich paint as required. Checks may be needed to ensure that track is not fitted across the base of a doorway section, unless shown on the Kingspan Steel Building Solutions drawings; the contractor should be able to confirm this.

The base track should be aligned to the lines provided and then fixed to the substrate using the specified fixings at the required centres. Care should be taken to ensure that the track does not move out of place as the initial fixings are drilled through the steel. In some cases the steel may need to be predrilled with a High Speed Steel drill before fixing. The head track can be fitted using the same methodology with the track suitably propped and held against the underside of the soffit to ensure safe installation. However the alignment of the two tracks should be checked using a length of stud cut to size and a spirit level. This will ensure that the tracks are in line and the wall will not lean out of plumb. Final fixing (adjacent to stud positions) should only occur after these checks, or time and cost will be incurred if either track has to be moved.

Ensure that there are the specified fixings in proximity to track ends and split points (avoiding stud positions) and at Jamb studs, generally this will require double the amount of fixings at these points, and within 100mm of the track edges. Check that there is plenty of bearing on the substrate at both base and head, there will be a

[6] Details for all practices mentioned in this section are available in the Kingspan Steel Building Solutions SFS Technical Manual

specific dimension for each situation on site, as a general rule of thumb SFS can overhang the edge of the structure by up to 1/3rd of its width.



Key to Figure;

D1 Total depth of external wall build up
D2 Setting out line from grid to internal finishes
Dd1 Depth of finish to interface with SFS
Dd2 Depth of SFS system
Dd3 Depth of internal finishes
eD1 Distance from structural element to outside face of SFS
eD2 Minimum required edge distance to fixing (as specified by the fixing manufacturer)
dF Max. anticipated live load deflection experienced at the mid span between vertical columns

General Stud Installation – Please refer to Kingspan Steel Building Solutions' Technical Manual for all Installation Standard Details.

Initial stud position should be measured from grid using a tape measure and should be determined from the centre of a structural opening. If there are no openings within the bay then the Kingspan Steel Building Solutions elevation drawing may specify the position of the first stud and provide stud centres across the rest of the bay.

The bay height should be checked and the studs cut to size with allowance for deflection and the head track web, e.g. 2400mm measured height with a 25mm specified deflection gap and 1.8mm head track and 1.2mm base track = studs at 2372mm. In many cases where the structure has been built closely to tolerance and drawing the stud height will be repetitive and the studs can be brought in made to length.

The studs should be placed (twisted) into position and fixed with the specified fixings through the base track – in the centre of the track and the web of the stud (minimum distance from any edge 15mm). (Ensure that jamb studs are oriented with the web of the studs providing the sides of the structural opening). There may be occasions when it is not practical to reach one or other face of the wall. The fixings must be installed before any boards or finishes cover the studs.

Simplest method of stud installation is to set out the studs at the edge of the structural opening, then measure off the required centres of the rest of the studs within the bay (generally 600mm), or use a block cut to size as a template. However, attention should be paid to the installation of the internal dry lining – they may require the studs to be set out from specific grids from one end of an elevation to the other. Check that each stud is vertical and plumb using a minimum 6' spirit level and that each stud is not twisted prior to final fixing.

Deflection Conditions

Kingspan Steel Building Solutions system will accommodate a maximum deflection of 25mm, any requirement in excess of this dimension is to be referred to our Engineering team. Our Technical team will default to Type 1 deflection method in all instances where a fixing can be practically made on both sides of the SFS wall. If the Installer has a preference for a different method, their preference must be communicated to Kingspan Steel Building Solutions before design works commence.

Type 1 – Slotted Stud (Detail A21)
As a value engineering exercise, Kingspan have removed the need for the DHB bracket by slotting the tops of the studs to allow for live load deflection of the primary structure. Refer to the detail for more information but, fixings are driven through the head track to pass through the slots in the stud, holding it in position horizontally. **Both sides must be fixed** – no fixings should attach the stud to the head track as this will compromise the deflection zone and cause deflection failure.
Type 2 – Deflection Head Bracket (DHB) (Detail A14)
Fixings are driven through the head track to fix into the DHB, holding it in position horizontally. **Both sides must be fixed.** The stud is then slotted into the DHB and gripped by the edge folds – no fixings should attach the stud to the head track as this will compromise the deflection zone and cause deflection failure.
Type 3 – Block and Bracing (Detail A15)
There may be areas of the build that it is impractical to fix the stud to both flanges of the head track. Quite often this can be found where something is obstructing the inside of the track, preventing access. Below the obstruction, the studs will receive flat strap fixed on either side with a noggin section tightly fitted and fixed between every third stud.
Type 4 – Head Track Blocking (Detail A16)
An Installer may choose a fourth method of creating an allowance for deflection with agreement from Kingspan Steel Building Solutions engineer, by placing blocking sections of stud within the top track, tightly fitting between studs. This will prevent the studs from racking or twisting and allow the track to move freely over the studs.

Setting out Structural Openings
The jamb studs either side of an opening will have been set to provide the width of the structural opening and a bearing surface as a fixing point. The contractor's engineer is responsible for putting datum lines on the structural columns. These marks will have an offset to the structural slab, usually 1metre from structural slab level (SSL). A simple calculation can be made to work out the position of the window cill from the datum mark. The position of the cill height can be marked on the column before transferring the mark across the studs to the relevant structural opening using a laser. On occasion the datum mark will be given offset to finished floor level, (FFL). Care must be taken to take into account the possibility of screed sitting on the structural slab. The dimensions of the screed must be made known and the Kingspan Steel Building Solutions drawn cill positions can be checked.

Cill construction will consist of cripple studs fitted to the jamb studs with a minimum of four fixings, dependant on drawings. These will be the full length between base track and cill height or 150mm cut sections aligned to the cill level. The cill track (either a section of base or head track, as specified) will then fit above these studs, fixed at each end and at any studs that will fall in the zone under the cill (according to the stud centres in the bay).
The lintel position can then be ascertained from the cill using the structural opening dimension shown on the Kingspan Steel Building Solutions drawings. The lintel is fitted in much the same way as the cill except the same method of accommodating deflection as the general stud must be adopted.

The installer must check Kingspan Steel Building Solutions drawings for cill and lintel constructions and make provision for any compound constructions required by design.

Mid Span Restraint (Noggins)
Mid span restraint is also known as noggins; this consists of a section of stud that is cut and inserted between two vertical studs. It is fixed and fastened in place using a section of flat strap fixed both sides with fixings into both stud and noggin. The flat strap will come in 3m lengths and will serve to tie together a run of studs that have mid-point restraints. As the name implies the restraints will be at the mid-height point of the structural bay, but will not run across any structural openings. There may be occasions to use solid noggins in each bay. Such instances will be as noted on Kingspan Steel Building Solutions drawings.

Boarding Conditions
There are many variants of boarding types that will be fitted to the SFS on either side to create the final finishes of the building. Board installation must not damage the SFS and boarding material must not be installed with fixings going through into the deflection zone of the steel. In both cases the main contractor should be notified in order to assess the situation and order any remedial works required. There should be careful consideration given to the type of board used as to its air tightness abilities and its acoustic protection.

9.3 Detailed Installation – Worked Example

This scenario is based on a Kingspan 150mm system fitted to edge of substrate with a 20mm overhang over edge of substrate. There is a drawn offset from the gridline at that edge that is equal to front edge of steel + 20mm. Height of structural bay is 2.5m, width of the bay between structural columns is 8m. There are two structural openings 1m x 1m with a cill height of 850mm. The method of head blocking is slotted stud. For a rectangular building, over two storeys, the information given will be for a structural bay of the building covering both storeys. The structure may be any combination of structural steel or concrete.

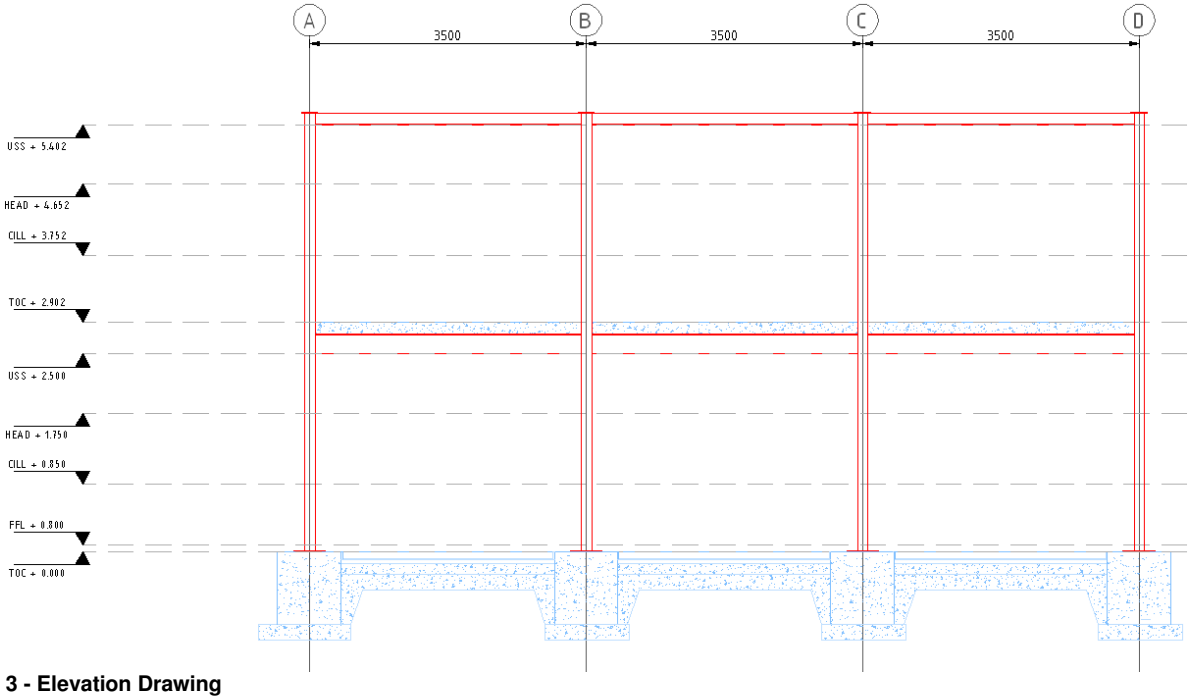


Figure 3 - Elevation Drawing

Gridlines

A sample of gridline provision in a rectangular building is given in Fig 4. Gridline references are applied to drawings to pinpoint a particular component or area, in this case the position of the SFS frame. The site engineer will be responsible for either step 1 or step 1 and 2 of the following:

Step 1

The site engineer will provide gridline marks/ points on the slab, usually a spray mark that has the gridline letter or number by the side. The perimeter gridline (from which the Kingspan drawing will identify the position of the SFS) will require a series of grid points marked with an agreed offset, usually 1m. This is because the edge grid may be covered by the steel or may even exist outside of the primary frame. The engineer will acquire these positions using dumpy level measuring equipment. The site engineer will also calculate and mark a datum point on the structural columns; the point will provide a measurement either to SSL, structural slab level or FFL, finished floor level. From this a calculation can be made to position the cills and heads of any structural openings.

Step 2

The gridline points can be connected, a temporary fixing can be inserted into the points and a string line can be tied to each end. When sprayed with a marking spray paint it will leave a straight clear line that can be used to measure to the SFS.

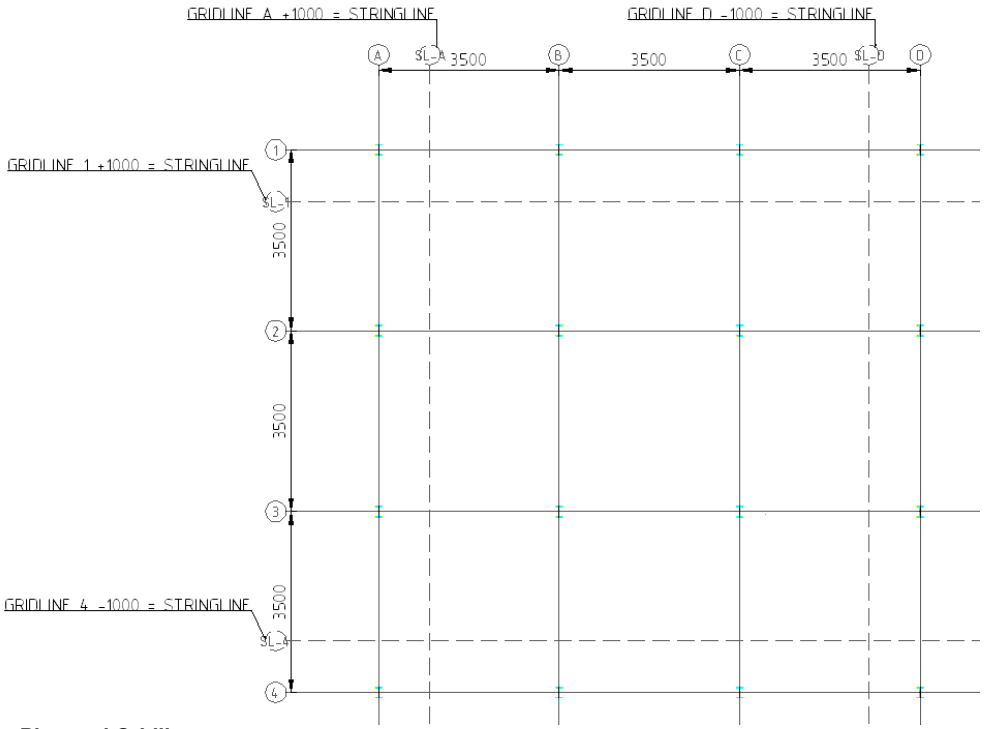


Figure 4 - Building Plan and Gridlines

Step 3

Calculate dimension from the offset grid parallel to the slab edge to the inside face of the SFS wall. Using a measuring tape, make marks of the position across the bay. Then connect the marks using a string line and spray paint or a Chalk line, depending on which provides best results on the substrate.

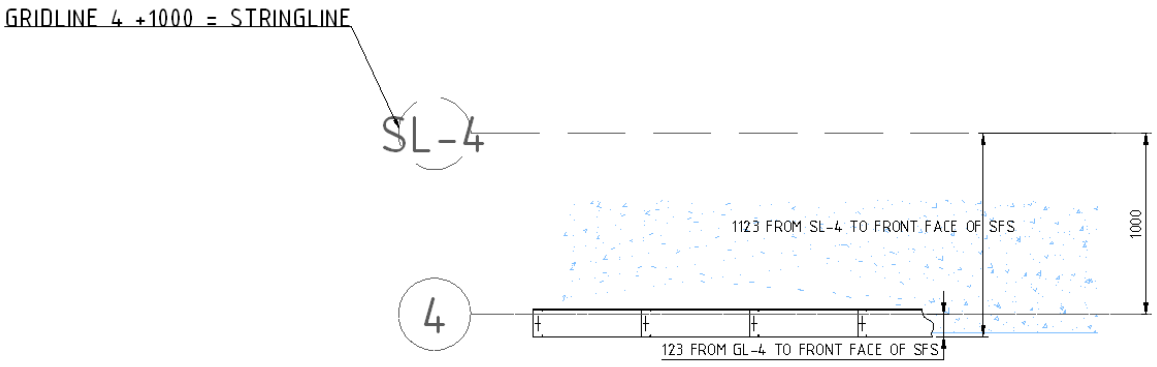


Figure 5 - Position of SFS from Grid

Step 4
Prepare floor track – acoustic mat – if using a neoprene strip it needs to be fixed to the underside of the track. The track should be turned over, the neoprene stretched out and cut to fit the track. The neoprene should be fixed with pan head or wafer head fixings at 1m centres to hold it in position. If using acoustic mastic, 2 beads should be run along the underside of the track at 1/3rd points across the track. This will then squeeze out to the edge of the track when the track is fixed to the substrate.

If fixing to ground floor slab, a damp proof membrane may be required under the base track. This should be agreed between the installer and main contractor prior to commencing work.

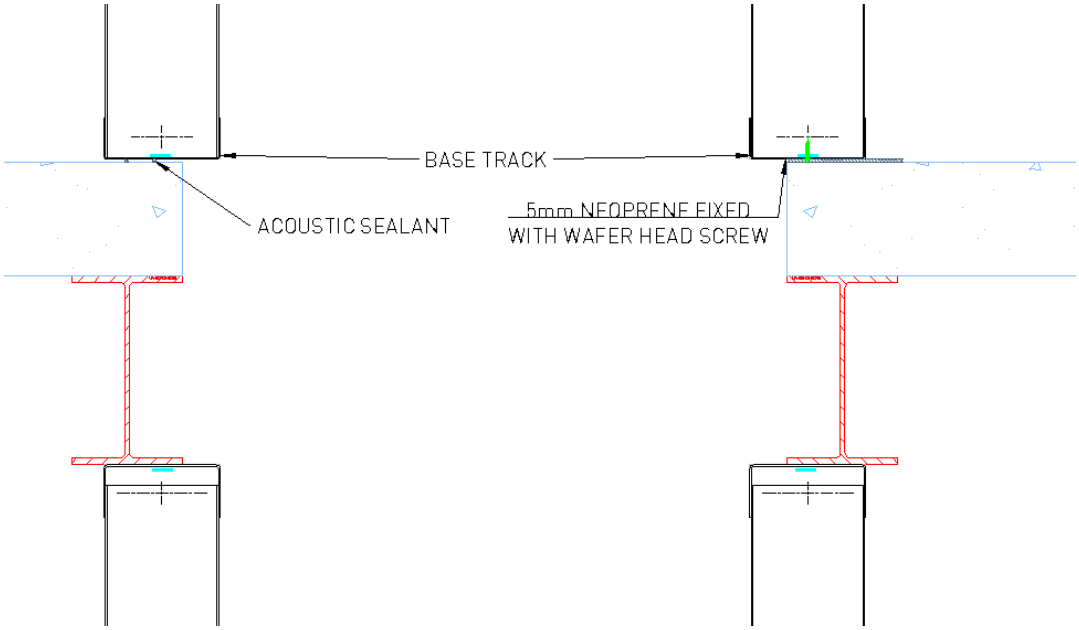


Figure 6 - Acoustic Mat

Step 5
Place floor track with the inside face of the track along the Chalk line – fix with the Kingspan specified fixings, 1 at each end of the track section (within 100mm of the track edge) and 1 in the middle. Check that the track has sufficient bearing on the substrate. Fully fix at specified centres adjacent to stud positions

Fixings into concrete will normally be a Tapcon masonry screws. This will require the concrete to be drilled out with an SDS drill and bit before the fixing is installed using SDS gun and suitable hex head bit. Fixings into steel will either be a fine thread hex head tek screw fixed using a tek gun and suitable hex head bit, or a shot fired fixing (check with Kingspan engineers for fixing specifications, locations and quantities). It may be preferable to temporary fix tracks to steel with gas nails but these must not be used for the final fit.

Size and cut (if required) then fit further track sections to complete the bay.

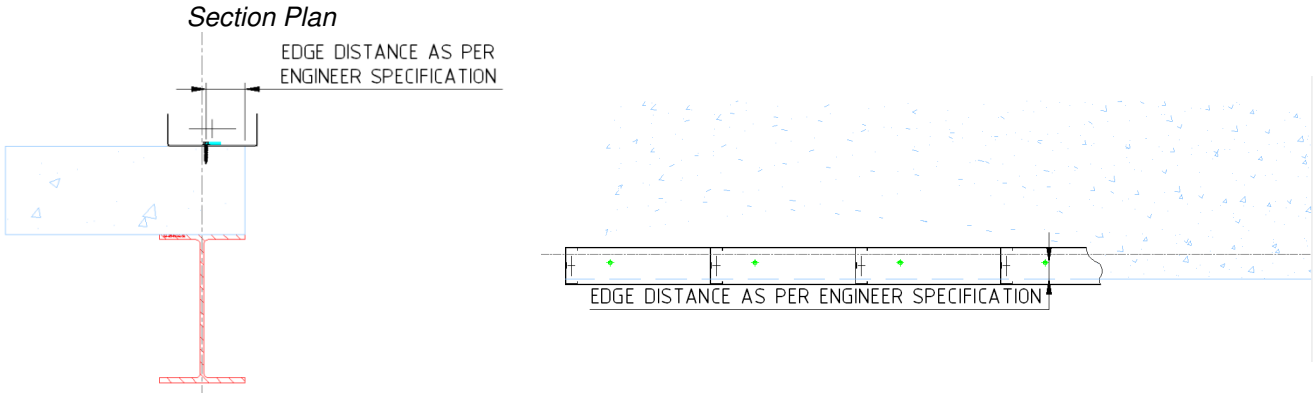


Figure 7 - Track Fixing

Step 6
Use a small section of stud or a block within or against the track to form a bed that can site the laser level, take care to ensure that the bed is level before siting the laser. The level can be positioned on the back edge of the track and will fire up to the underside of the substrate/ slab above. A series of points can be marked along the tracks in the bay and a string/ chalk line can provide a line to fit the head track, as in Step 3.

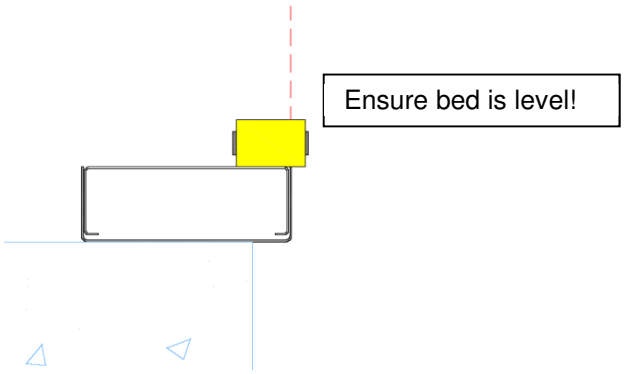


Figure 7 - Positioning Laser

Step 7
Offer up the head tracks to the soffit ensuring that they are adequately propped and held using mechanical assistance, as required, to ensure safe installation and fixing of head tracks. Fix at specified centres adjacent to stud positions – acoustic mat may be required as in Step 4. Fixing as in Step 5.

Step 8
Measure the dimensions between the webs of the tracks in a few places along the bay. Deduct the deflection tolerance as specified by Kingspan and cut some stud sections. If an accurate survey has been done then studs may be delivered to the correct size. Place stud inside web of track and twist into position. Using a 6' spirit level it will be possible to check that the tracks are in line by placing the level against the leg of the stud. If the stud is out of plumb (see Section 3 for guidance on tolerance) then the track positions may need to be adjusted. Undertake final check of track position back to engineer's gridline.

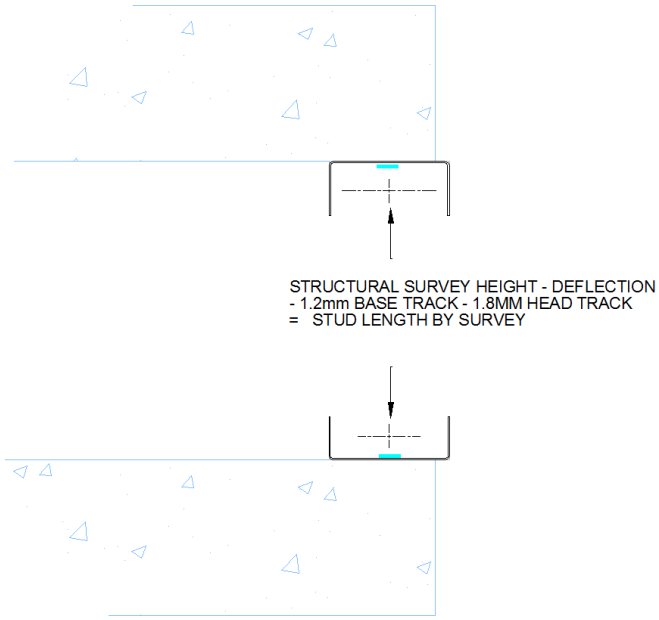


Figure 8 - Cut Size of Stud

Step 9

Calculate and prepare all full height studs, check that structural height is not out of tolerance. From gridline at edge of bay perpendicular to slab edge, using Kingspan drawing dimension, measure to edge of nearest structural opening and mark on track. Twist jamb stud into position, orient the stud so that the web of the stud provides the edge of the window/ door. Measure across the structural opening and fit the stud at the other side of the window.

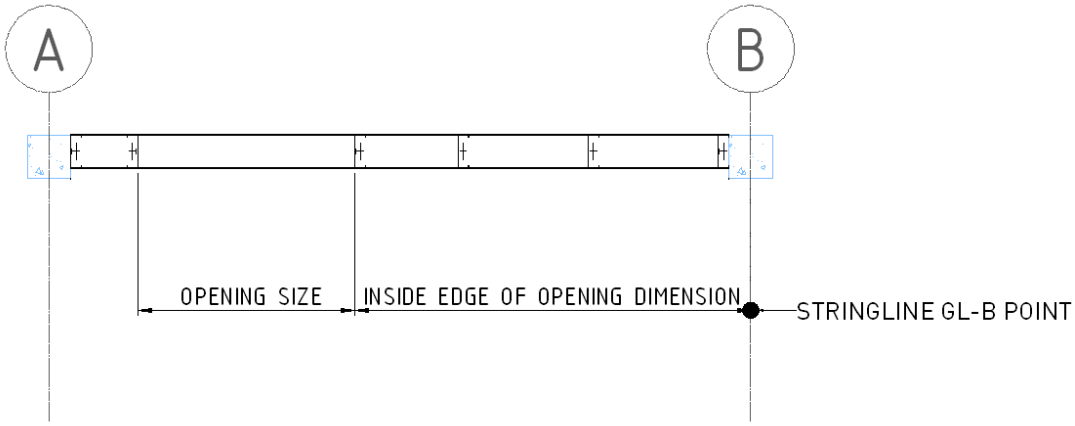


Figure 9 - Positioning Studs

Step 10

From the edge of the structural bay twist the full height studs into approximate position, according to the Kingspan set out positions (normally 600mm centres). Mark stud position then complete track fixings into substrate top and bottom according to Kingspan specification. Where lengths of track abut each other there will be a requirement for extra fixings within 100mm of either edge of track. (Avoid positioning studs where tracks abut, it is good practise is to fix the stud 150mm away from the cut end).

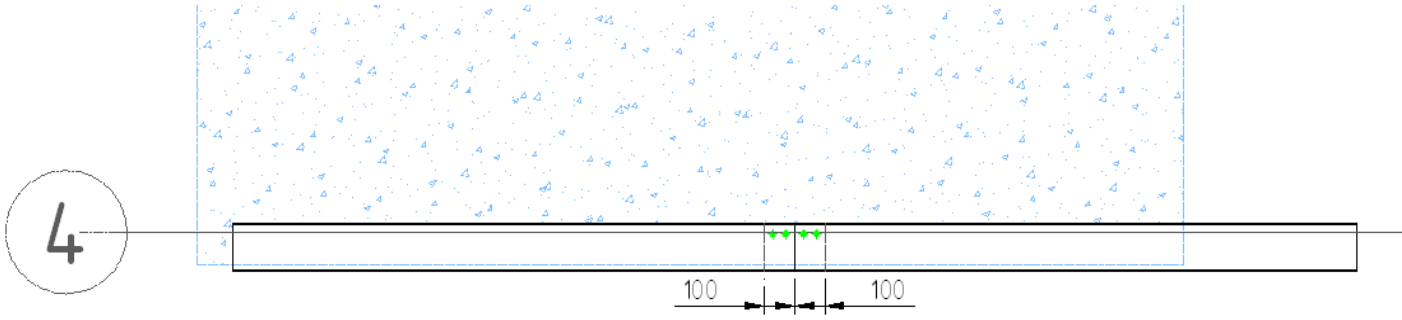


Figure 10 - Head & Base Track Connections

Step 11
Move the studs into the final positions, ensure that the base of the stud is within 10mm of the web of the base track.

a. Check position of studs
b. Check that studs are plumb
c. Check the required amount of deflection
d. Fix through both sides of the head track, ensuring that fixings go through the slots in the stud as per detail A21

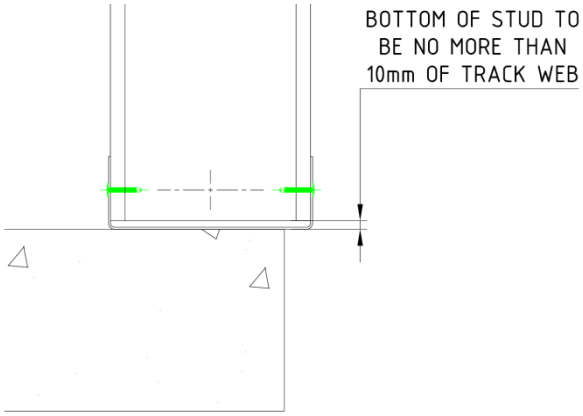


Figure 11 - Stud Bearing

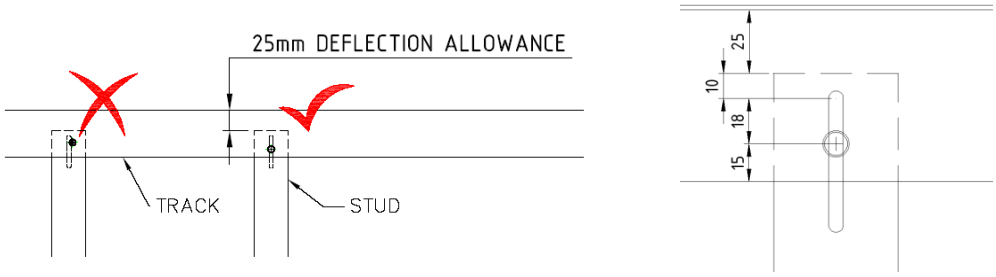


Figure 12 - Slotted Stud

Step 12
Repeat with all standard studs and jamb studs. Fix all studs into the base track with specified wafer/ pan head fixings, in the middle of both track and stud leg, fix on both sides.

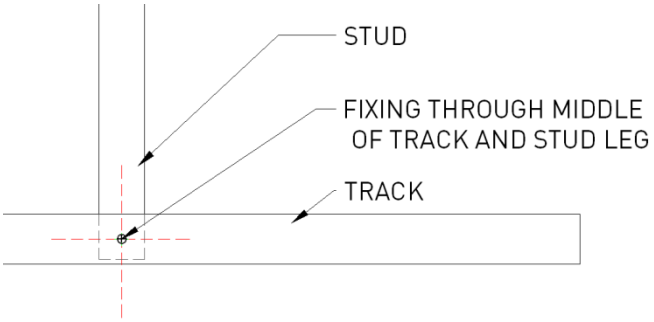


Figure 13 - Stud to Track Fixing

Step 13
Openings – nesting (when required)

a. Fill jamb stud with Rockwool inside the web (when required)
b. Cut track section (as specified on KINGSPAN drawing) 50mm short of the exposed stud length (exposed means the clear dimension between the head and base track)
c. Slide the track over the stud edges, ensure that there is the minimum 25mm gap at the top of the track, this will allow the top track to maintain deflection.
d. Fix the track to the stud at 300mm centres on both sides with specified wafer/ pan head fixings. Ensure that track edges do not protrude into the opening

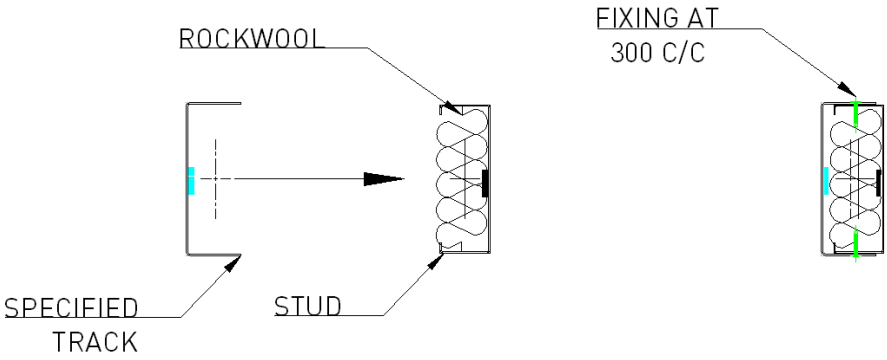


Figure 14 - Jamb Insulation (check requirement with Main Contractor)

Step 14
Cill construction
Site engineer will provide a series of datum points on the structural columns. These will give an offset to either SSL structural slab level or FFL finished floor level, usually 1m. Kingspan drawing will show a dimension from SSL to cill of opening, e.g. 850mm. The Installer will calculate the dimension and mark the structural column at the cill point. The laser level can be set up on a tripod with the laser point fixed at the level of the mark, the point can be then transferred to the jamb studs and to further openings and columns.

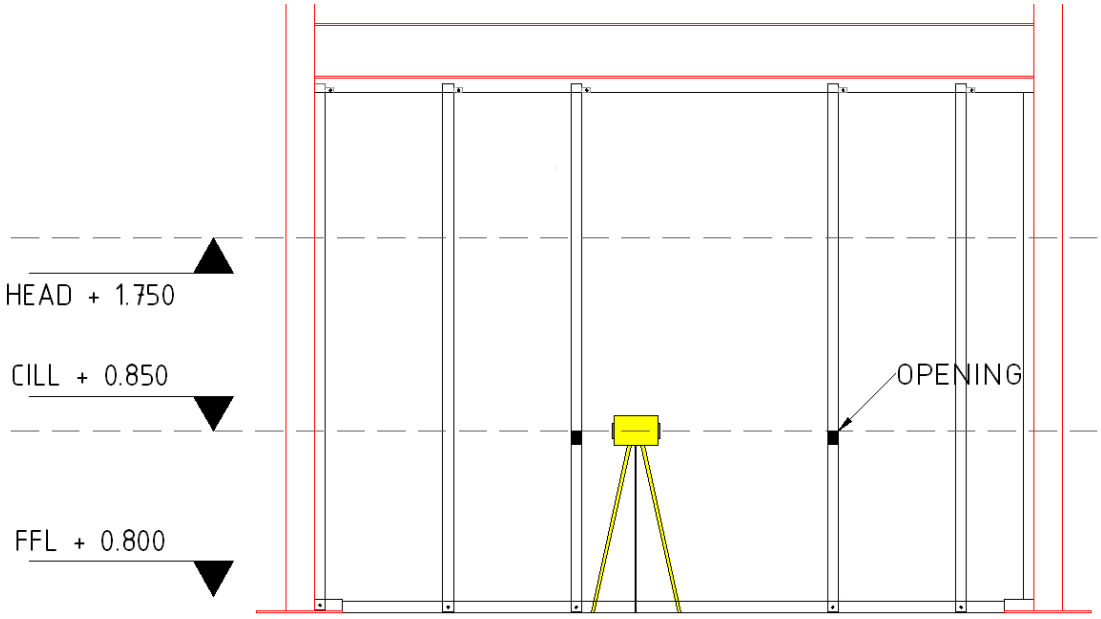


Figure 15 - Setting Out Cill Level

Step 15

Mark web of jamb studs inside opening with position of cill.

a. Fit full length cripple studs (or 150mm cut sections) – cut a section of stud and fix into jamb stud and base track, 2-3mm below the mark, repeat at other side. 4 wafer/pan head fixings to connect cripple stud to jamb stud. Refer to standard details.
b. Fit full height studs– from 2-3mm below mark down to web of base track, similar fixing regime plus fixings into either side of base track.

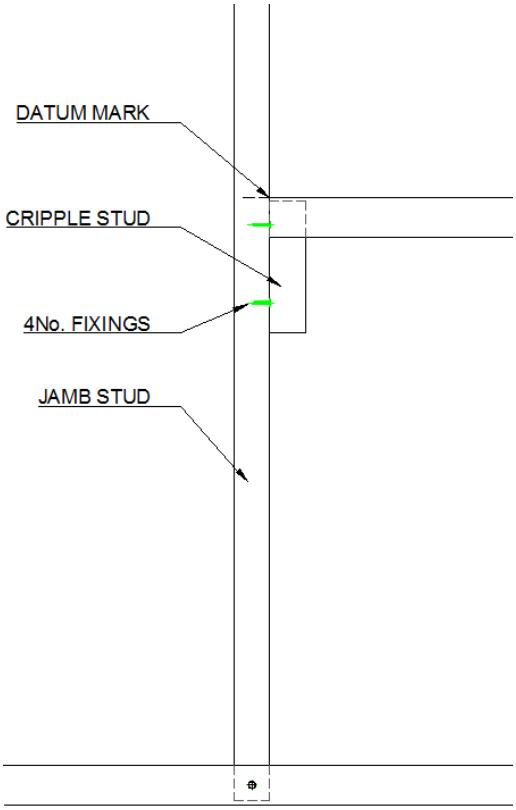


Figure 16 - Full Height Cripple Studs

Step 16
Using specified cill track – cut to the width of the structural opening less 5mm. Slide over the cripple studs and fix on both sides with specified fixings. Ensure that track is square and that there is no tilt in cill position, use spirit level to check.

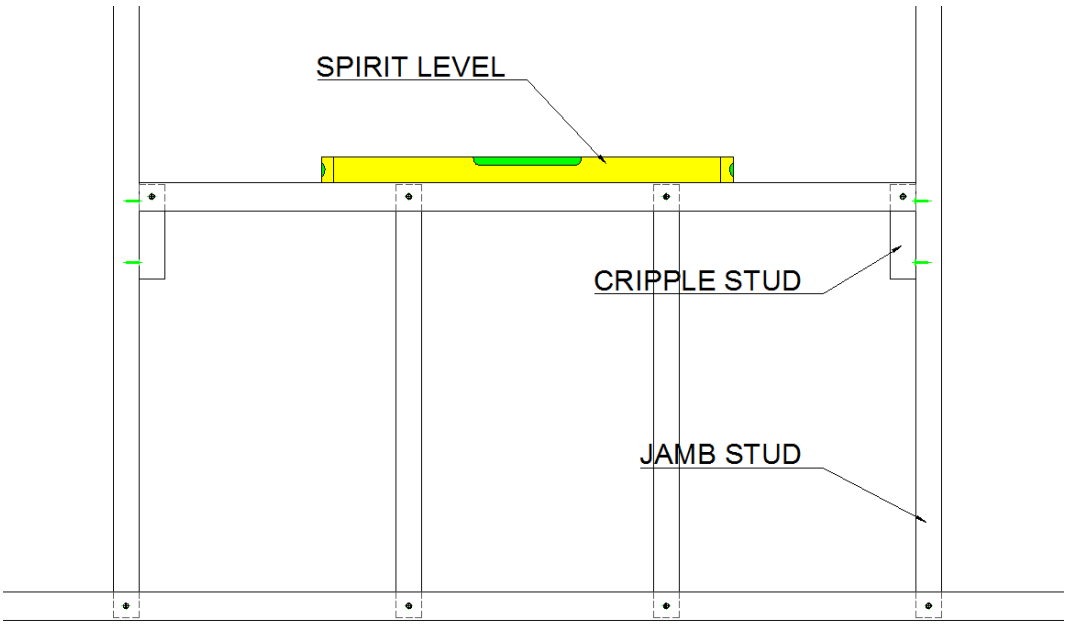


Figure 17 - Setting Cill Member

Step 17
Follow stud centre regime from main studs and fit studs between the cill and the base track, ensure that the studs are a tight fit between. Use specified fixings and fix on both sides of tracks.

Step 18
Head construction – Measure given height of structural opening from cill position and mark web of studs. Follow Step 15A – ensure that the studs do not foul the deflection zone, or that there are any fixings that may foul the deflection zone. Follow Step 16.

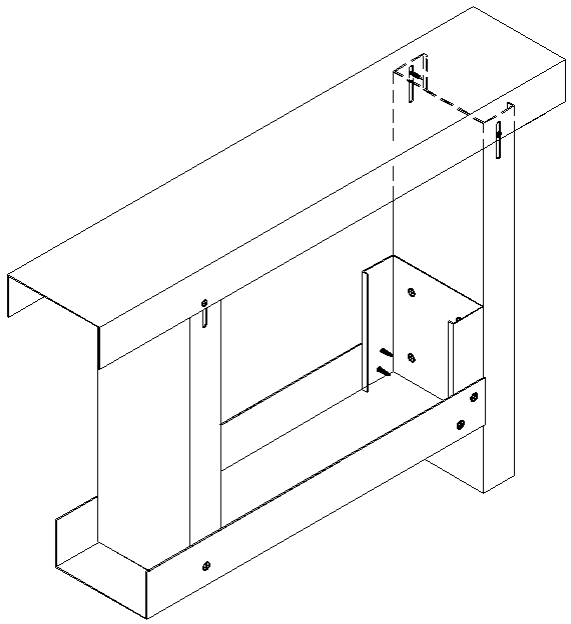


Figure 18 - Construction at Head

Step 19
Studs within the head section – cut them to size allowing for deflection. If there is room (over 600mm) then fit slotted studs, if not, double fix at head track of window, ensure that studs are vertical and will not foul deflection. Board fixings will hold the studs in place. Refer to guidance in the technical manual for further information.

10 OVERSAIL SFS

10.1 Site Preparation

Slab/Steel Checks

Before commencing installation, Kingspan Steel Building Solutions drawings should be checked for 'CONSTRUCTION' status, if the drawings are not at this status then the Installer takes a risk of remedial works or changes after the steelwork has been installed. The working area should be checked to ensure that there is clear access to the workface, that the structure is as drawn and that there are no major deviations from the drawn dimensions of the structural bays. The quality and integrity of the substrate should be checked and the alignment of the structural elements assessed to ensure that the SFS can be installed properly. Checks to ensure that there is nothing to impede fitting the SFS should be carried out. If there are any issues with the above, the main contractor should be notified before commencing installation, to avoid any abortive works or remediation costs.

Understanding and mapping of deviations in the slab and position of the columns are critical to the oversail system as these will provide the fixing points for the oversail brackets. The alignment of the brackets and the studs is vital to ensure a plumb, correctly aligned façade. Mapping the workface can be achieved by the use of string lines both horizontally and vertically which can be set to provide a grid. If any issues arise from the variations within the substrate provided, the main contractor and Kingspan Steel Building Solutions should be notified to receive advice and instruction. Localised packing, shimming or alteration of any bracketry is strictly prohibited and may only take place on approval from Kingspan Steel Building Solutions.

Gridline Set Out

The contractor's site engineer will be responsible for providing gridlines across the slab that will directly relate to the Kingspan Steel Building Solutions elevation drawings. These grids will be sprayed on marks at regular intervals that can be connected using string lines and spray paint. The grids will not necessarily be on the drawn position but may be off-set by a nominated dimension (usually 1 metre). The grids that are required are the parallel gridline to the edge of the slab, the intersecting gridlines that will provide positions of brackets, studs and structural openings and datum marks on the structural columns that can be used to ascertain cill and head heights.

Bracket Identification

Kingspan Steel Building Solutions will provide a bracket set-out drawing showing where and how the bracketry will be fitted. Generally the brackets will be face fixed to the front of the primary structure or fixed onto the structural edge. If the structural position or vertical span in between structural levels changes from floor to floor then the size and type of bracket may also need to change. The sizes and types of bracket will also be drawn.

10.2 Basic Installation Principles

Bracket Installation

Using the Kingspan Steel Building Solutions bracket set-out drawing the positions of the brackets can be measured off the gridline marks provided by the site engineer. The external string line grid will have determined whether there is a need for packing the bracket. If a need is identified, the condition must be reported to Kingspan Steel Building Solutions engineers to assess the effects on the fixing and bracket design. Attention must be paid to the width of the stud and the amount of lateral adjustment allowed while still retaining the ability to get fixings into stud and bracket. The outside edge of the stud section will be the critical dimension from grid and will be the key alignment point for the oversail SFS system.

The start point will be from one end of the elevation and at the first structural level. The first bracket should be positioned and the hole centres marked on the face of the primary structure. Using the required drill type the substrate is drilled as marked according to the fixing manufacturers' recommendations. It is the responsibility of the Installer to ensure that all fixings are installed following the manufacturer's guidelines. In cases where resin anchors are to be used, the Installer is advised to ensure that each fixing is checked for suitability and compliance prior to loading.

The next bracket positions can be determined and brackets fitted in the same way, checking that the front edges of the brackets are in line and that the brackets are perpendicular to the slab edge, if they are not then it may cause the studs to kick out of line. It is advisable to fit a small area of brackets and then to fit some vertical studs. This will help to determine the proper sequence of fitting without having to remove brackets etc.

If brackets have to be fitted close together, around structural openings for example, there may not be enough room to properly fit and fix the studs, a practical sequence of working must be devised.

Also the brackets may need to align themselves in different ways around structural openings. The brackets on upper floors can be offered into position, aligned using a stringline and then fixed into place.

General Stud Installation
It is advisable to set up a cutting area and identify it as a Hearing Protection Zone. Proper setup of a work bench to site the metal cutting equipment and to support the individual sections will help to avoid accidents and manual handling risks. One of the advantages of Oversail systems is that section pieces can be accurately determined, rolled and provided to the correct size. This will limit the amount of on site cutting and waste. Piece parts should be referenced in a sequential simple method, when marked on the sections it should be simple to select the required pieces.

The first stud from the end of the elevation should be selected and offered into position; an operative should be in place at each bracket slab position to manage the section. If the section is very long and heavy, it may be necessary to pre-drill a hole through one end and fix a rope that can be tied off at the top position. When the stud is approximately in place it should be clamped to each bracket using hand clamps. The dimension at each bracket point to gridline should be checked. The stud should be eased into the correct position and checked at points with a 6' spirit level to ensure that it is level and plumb.

When the stud is properly aligned it should be fixed to the brackets using the specified fixings in the correct pattern and methodology as detailed on Kingspan Steel Building Solutions drawings.

Further studs should be installed working along the elevation, up to the first jamb opening. Care must be taken around structural openings to ensure that both bracket and stud are orientated in the correct manner to avoid fouling.

Tracks
There may be track sections fitted to the top and bottom of the system, the bottom position of the studs should have been predetermined. When enough of the studs are in position a full length of track can slide over the stud ends and fixed at each stud position. Alternatively, one stud can be installed at 3 or 4m intervals and the track can be fitted to both, providing an easy base housing for the studs in between, saving time in aligning the bottom of the studs.

Setting Out Structural Openings
The jamb studs will have been set from the engineers' gridlines to provide the width of the structural opening. The contractor's engineer is responsible for putting datum lines on the structural columns. These marks will have an offset to the structural slab usually 1metre from structural slab level, (SSL). A simple calculation can be made to work out the position of the window cill from the datum mark. The position of the cill height can be marked on the column before transferring the mark across the studs to the relevant structural opening using a laser. On occasion the datum mark will be given offset to finished floor level, (FFL).

Cill construction will consist of studs fitted to the jamb studs with a minimum of four fixings; these will be the full length between base track and cill height. The specific cill and lintel studs may need to be of such a length that they will require their own bracketry to support them. The cill track (either a section of base or head track, as specified) will then be fixed to these studs and at the cripple studs at each end.

The lintel position can then be ascertained from the cill level using the structural opening dimension shown on the Kingspan Steel Building Solutions drawings. The lintel is fitted in much the same way as the cill except that the studs will be fitted to the top brackets or housed by a piece of track.

Deflection Conditions
The provision for deflection within an oversail system is within the bracket fixed to the studs. The face of the bracket that fits to the stud will be slotted to accommodate deflection and the face of the bracket that goes to the substrate will be hard fixed. The studs will be fitted with the locking nut washered (or tek screwed) and fixed in the middle of the slot, turning back the pressure on the nut by ¼ turn. This will allow the slab to deflect independently of the SFS. DO NOT OVERTIGHTEN BOLTS THROUGH DEFLECTION SLOTS.

Mid Span Restraint

In many oversail situations, to prevent racking of the system it is prudent to use mid-span restraint (also known as noggins or dwangs). The use of mid-span restraint will be determined under structural calculation and shown on the Kingspan Steel Building Solutions elevation drawings. This consists of a section of stud that is cut and inserted between two vertical studs. It is fixed and fastened in place using a section of flat strap fixed either side with fixings into both stud and noggin. The flat strap will come in 3m lengths and will serve to tie together a run of studs that have mid-point restraints. With the oversail system, multiple noggins may be required. The specification and setting out of these noggins will be given in Kingspan Steel Building Solutions drawings.

Boarding Conditions

There are many variants of boarding types that will be fitted to the SFS on either side, to create the final finishes of the building, including Kingspan K15 insulation and cement particle board. Board installation must not damage the SFS and boarding materials cannot be fixed across vertical studs which may be operating independently of each other in deflection. There should be careful consideration given to the type of board used and the methodology of fixing as to its air tightness abilities and its acoustic protection.

11 CLEATS, BRACKETS & ANCILLARIES

11.1 Jamb Cleats

When required under structural calculation, stiffening cleats may be required at the top and bottom of a jamb stud. Kingspan Steel Building Solutions supplies a generic cleat for both top and bottom conditions. These should be ordered at the same time as the steel as post fixing may not be possible. The position of the cleat should be checked with Kingspan Steel Building Solutions drawings prior to installation.

Top Cleat

The cleat will have slots in one face that will be fixed through the stud with an M8 bolt, nut and washers or three tek screws depending on the cleat. The requirement and position of the cleat will be denoted by a specific symbol on the elevation drawings. An isometric at the foot of the elevation drawing will display pictorially how the cleat is fitted. Once the jamb stud is fitted into position in the correct position, the cleat can be offered into position and a mark can be made at the midpoint of the slot to identify the position of the moving connection.

Drill the clearance hole in the stud, then position the cleat and fix the top leg of the cleat through the top track into the substrate with the specified fixings. Fasten the cleat through the clearance hole into the stud using the M8 bolt, nuts and washers on either side (or three tek screws depending on the cleat). Repeat the process on the other side of the structural opening.

Bottom Cleat

Bottom cleats are fixed to the jamb stud using standard SDS fixings. They will be fixed through the base track into the substrate using the specified fixings.

11.2 Lintel & Cill Cleats

When required under structural calculation, cleats may be required at the connections from jambs to lintels and cills. These will be generally 50x50x2mm cleats and to suit the system size or, supplied in stock lengths of 3 or 4m and cut to size on site.

Lintel Cleat

When a lintel track is fixed into position to the cripple studs at the sides of the opening, it can be given extra support by fixing cleats at the corners of the structural opening. The cleats can either be fixed above or below the tracks according to Kingspan details. Fixings will be as specified on the Kingspan elevation drawing.

Cill Cleat

Cill cleats are fitted in the same way as the lintel cleats under the cill track. Care taken to fix the cleat from the opening side (cleat can be clamped in place with a hand clamp or a prop), to prevent the fixings fouling the window/door.

11.3 Flat Strap

'V' Bracing Above Windows

When specified there may be a requirement for bracing above structural openings. This will take the form of diagonal flat strap fixed at the top of the jamb studs and to the lintel track section (typically at 45 degrees), forming a "V" shape. Under no circumstances can the flat strap be fixed to the head track. This will be required on each side of the SFS and will use fixings as specified. The use of V Bracing will be detailed and set out on Kingspan drawings.

11.4 'Z' Bars

If it has been identified that the structural frame (concrete or steel work) will not provide the required bearing surface for the SFS system, a potential solution is to mount the SFS system on Z bars. This must be considered by Kingspan engineers before a detailed solution is suitable for construction. The Z bar will act as a bearing/ fixing point for the SFS and will be fixed back into the substrate with the specified fixings.

The Z bar is supplied in 3m lengths to be cut to size on site. Attention must be paid to Kingspan drawings to assess quantities of sections, lengths of section and the quantity and arrangement of fixings required.

Face Fix Angles

Where supporting angles fixed to the slab edge are specified, a specific fixing arrangement and angle specification will have been provided by Kingspan. This method of supporting tracks is generally not recommended due to the conditions of the slab edge. Any instance where this may be required must be communicated to Kingspan for calculation prior to material procurement or construction. Remedial works may be required if the adequacy of the detail is not checked by Kingspan.

12 INTERFACING ELEMENTS

12.1 External Sheathing Board

When specified, a sheathing board may be fitted to the external face of the SFS. There will be project specific details and issues that the Installer must be familiar with. In all boarding conditions, the installer must fit the board to the manufacturer's recommendations. The guidance given below is for general fitting where no specification or alternative method has been made known;

General Guidance

1. Leave a 3-5mm gap between boards – cover joints with a foil tape or fill with an acoustic sealant.
2. Fixings should be at 300mm centres around perimeter of board section, 600mm centres along the vertical studs.
3. First fixing should be 80mm from board end and 15mm from edge of board to centre of the fixing.

Installation

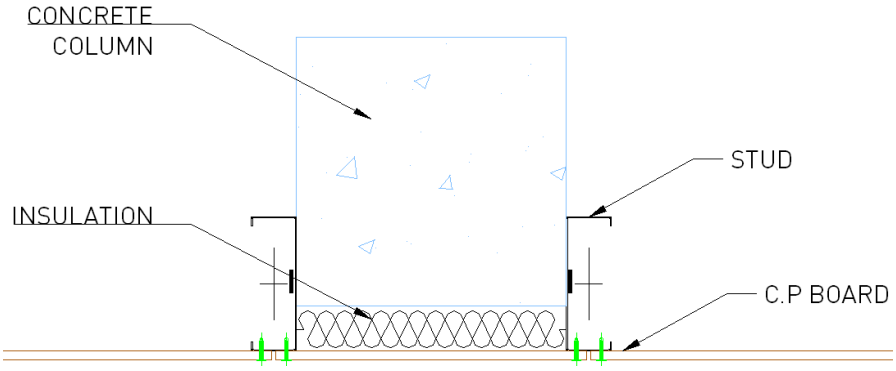
1. Read and understand method statements and risk assessments before commencing installation. It will be necessary to set up a safe system of work and potentially enclose the board cutting area. Appropriate signage must be used to divert traffic from these areas. Also, check any specific detailing through Architect's drawings.
2. Measure from edge of structural column to the centre of the appropriate stud or opening edge. Work out best orientation of board – board size is 2400mm x 1200mm, boards can be fitted horizontally. Ensure that the maximum area can be covered, this will prevent waste.
3. Cut the board using a circular saw with extraction. Note any specific health and safety issues relating to the task and ensure that all PPE required is in use.
4. If there is no slab to rest the board, temporary fixings that are fixed 60% of the way into the substrate will provide a platform to rest the board on. However 1 operator should hold the board in place until sufficient fixings have fully held the board in place.
5. Fix a fixing at each corner of board using a SDS gun or battery drill, usual fixings are a wing-tipped self-drilling screw, these fixings will have a ribbed and countersunk head that will enable them to bed into the board leaving a flush finish.
6. Repeat process for second section of board, where possible try to brick course bond boards ensuring that joints do not travel along several boards. Prior to fitting second board put temporary fixings tight to the top of the first board 60% of the way into the steel. These will act as a platform to rest the second board on and will provide a line and gap for board expansion. When the second board is fitted these fixings must be removed.

Repairs

Should there be any boards that get damaged or broken while in situ, they can be easily removed and a new section of board cut and refitted.

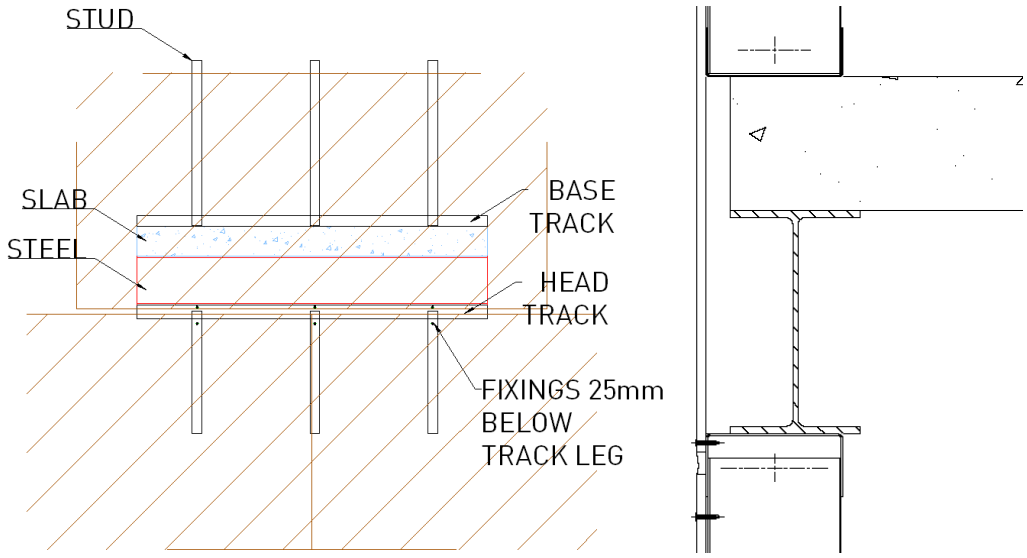
Bridging Across Columns and Edges
Column Interface
The sheathing board should span a maximum of 600mm, the normal column is 200-300mm wide. There will be an SFS stud on either side of the column so the sheathing board can be fixed to both studs. However where a structural column meets a structural slab there may not be a fixing point, some form of angle/ top hat section may be needed to provide a fixing point.

Note; where there will be a cavity behind the sheathing board, then insulation should be installed to prevent a cold bridge.



Slab/Steel Edge Interface
Assuming covering a 1st floor slab with SFS tracks on both sides of substrate. Generally the head track will have a 67mm leg. The initial piece of board will be cut to size with 25mm of board onto the 67mm leg of track. However, no fixings should go into the track. The last fixing up the board should be into the stud below the leg of the track by at least the deflection distance.

There should then be a gap left of equal or greater than the deflection allowance before the next board is fitted. This board should then be fitted above this gap with fixings only into the top track in between the stud areas. The board can then span upwards with the next fixings into the base track on the slab above. The gap between boards can be filled with a compressible sealant or with foil tape.



When a sufficient area of board has been positioned and checked for line then final fixing can take place. Sealant or foil tape should be applied to assist in the production of a thermally performing, airtight system. The sealant will be provided in a cartridge that can be applied using a mastic gun, the foil tape will generally be provided on a 50m roll with adhesive to one face.

12.2 Masonry

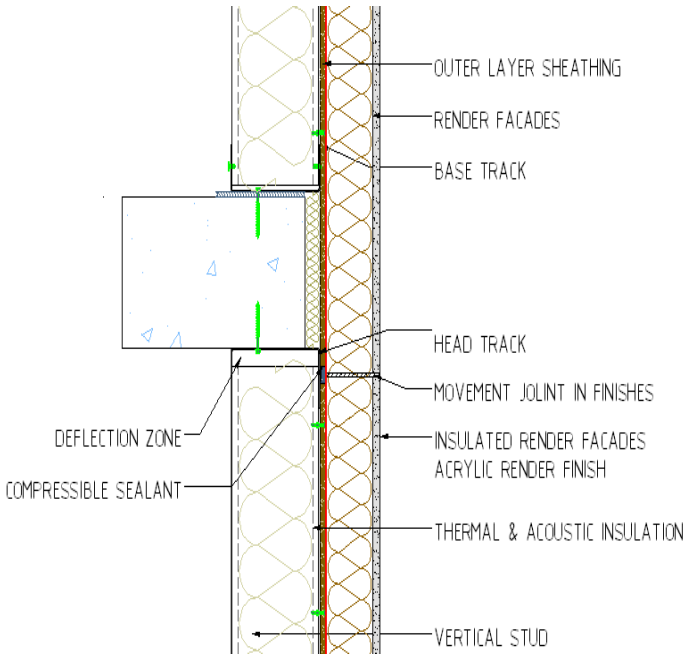
When the external finish to the building is masonry, the brick work will be tied back into the SFS system. General masonry detail when fixed to SFS is using a stainless brick tie channel fixed through required insulation (type and thickness according to performance specification). The brick ties can then be twisted into place to tie into the brickwork, leaving a cavity of the required depth between brick and insulation.

Typical components are a stainless type brick channel 25mm width with 14mm legs, supplied in 3m lengths. These are fixed back into the SFS using a stand-off threaded fixing and rubber washer to the required dimension usually fixed at 450mm centres along the vertical studs. The insulation will generally be a rigid board foil faced on both sides, joints in the boards will be covered with a foil tape.

1. Cut insulation board using a hand saw if required. The insulation boards need to meet at stud positions.
2. Installer must ensure that there will be channel correctly fitted to enable the required amount of brick ties to be twisted into position.
3. Installer must take care not to fit a brick tie channel to the jambs of any openings. The SFS will have been designed to provide a specific stud within 70-225mm of the opening for brick tie fixing.
4. 1st erector holds board in place and brick tie channel in position, 2nd erector will push the stand-off screw through a predrilled hole in the brick tie channel and through the insulation before fixing into the steel with a SDS gun. This will be repeated at required centres along the brick tie channel.
5. Use small off cuts of channel above and below openings, try to ensure that full lengths of channel are used between slabs.

6. Care must be taken to ensure that there is adequate drainage above structural openings; this is dependent on the position of the frame of the window/ door within the wall system. Where required a collector track should be fitted diagonally above the opening extending past each side to the nearest SFS stud. Water will then run off and be carried away from the opening. Alternatively, the insulation can be cut short of the head and a cavity tray can be fitted.
7. There may be a requirement for firebreaks at each slab. These will be fixed back through the system and will fill the cavity behind the brick according to the performance specification.
8. Foil tape across all board joints to help seal the system.

12.3 Render

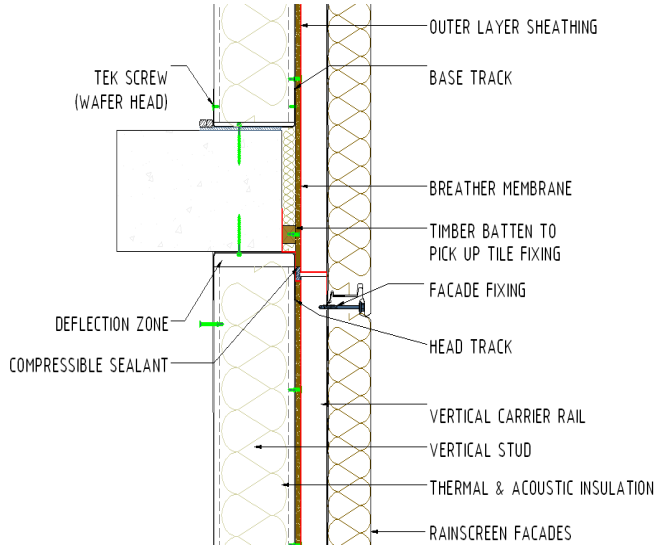


Insulated Render systems – applied directly to the sheathing board covering the SFS. The type of insulant will be an EPS (Polystyrene), Mineral Wool (Rockwool) or a rigid board phenolic. The thickness of material will be determined by the project performance specification, according to the size of the wall zone and the required "U" value (thermal performance). The insulation will come as a board, generally 1m x 0.5m in size; the boards can easily be cut to any specific requirements.

Each render system will have its own specific details and methods of application, generally bags of powder will be mixed with water to form a liquid adhesive. This will be spread across the back of the board before pushing the board into place. Often the adhesive will be supplemented with fixings in a specified pattern, these fixings will go through into the sheathing board and do not need to fix through the SFS. The fixings will be a SDS screw type that can be fixed with a SDS gun.

NHBC require a cavity based render system that requires specific arrangements of top hat sections to form the cavity. The system supplier should be contacted for specific details on these systems.

12.4 Rainscreen



A rainscreen system will be fixed back to the steel using a form of bracket and rail. There are several types of finishes that are available to be fixed in this ventilated system including hung slates, terracotta tiling, high pressure laminates, zinc panels and aluminium panels. Generally, the installation will consist of the SFS framework with a cement board as previously detailed.

A series of brackets (commonly known as helping hand brackets) will be fixed through the cement board into the vertical SFS studs at specified centres with SDS screws.

A carrier rail will be fitted to the brackets, checked and adjusted with a string line to ensure that the

front line of the rail is perfectly aligned. Kingspan insulation will then be fitted according to the specification requirements.

Depending on the type of finish, a horizontal batten may be fitted to the carrier rails before final fixing of the finish.

The arrangement of the carrier rails, horizontally or vertically, will have an effect on the design and specification of the SFS. The Installer is advised that specific reference to the specification of the cladding system and Kingspan Steel Building Solutions Designers & Engineers is required in these conditions

13 QUALITY CONTROL

13.1 Area Sign Off

As each section of works is completed, the area should be inspected and signed off using a site specific inspection and handover sheet, example below. The size of the area will be determined at site level; it may be one floor of one elevation, or a complete elevation or a complete floor. There are many variants that should be examined in conjunction with the main contractor to ensure that the critical elements are properly inspected and signed off.

Project		**Area Inspected**	
Installer		**Approved By**	
Inspector		**Date**	
Date			

Item	Pass	Comment	Action Required
SFS Setting Out Checks			
Dimension from Grid			
Line & Level			
Structural Opening Setting Out			
Line & Level of Opening			
Fixing Checks			
SFS Fixings to KSBS Standard			
Track Fixings to KSBS Design			
Jamb Fixings to KSBS Design			
Cleat/Bracket Fixings to KSBS Design			
Edge Distances Observed			
Special Constructions Fixings to KSBS Standard			
SFS Construction Checks			
Deflection Tolerance at Head constant & to KSBS Design			
Deflection not compromised by Fixings/Boards/Other			
Edge Bearing			
Jamb Construction to KSBS Design			
Lintel Construction to KSBS Design			
Cill Construction to KSBS Design			
Brick Tie Studs (if required)			

13.2 Remedial Works

This section looks at what can be done when there are problems on site. It covers four areas; damage, incorrect installation Installer error, incorrect installation drawing error and Architect/ contractor changes.

- Damage – if there has been damage to SFS in any way, the Installer needs to assess the extent and take steps to return the area to the drawn situation. If there has been significant follow on works then it may be possible to add in extra studwork adjacent to the damaged studs, this may save costly stripping out and replacing. In any damage situation where direct replacement of materials would be difficult contact Kingspan for assistance/ advice. If possible, e-mail digital pictures of the damaged area to the Kingspan representative, if necessary a site visit can be arranged to inspect and offer advice.
- Incorrect installation Installer error – necessary remedial work may require stripping out and replacing incorrect materials, an assessment should be made in conjunction with the main contractor and Kingspan.
- Incorrect installation drawing error – contact Kingspan immediately.
- Architect/ contractor changes – the Installer should receive and agree an instruction to amend the SFS and Kingspan should be notified in writing of the proposed changes. Should drawings require revision an instruction should be forwarded by the Installer to Kingspan.

It is often a difficult task to strip out SFS as follow on trades may prevent access to fixing points, e.g. screed covers access to base tracks and boarding may cover screw heads. Where possible the inclusion of extra studs may suffice, however this will not work if a structural opening needs to move. Most fixings will easily unscrew, if this is not possible they will need to be ground out using a 4 1/2" hand grinder, this will cause damage to the Kingspan stud and track, any damaged materials should be replaced and not reused. In all cases contact Kingspan for advice and assistance on best practice.

13.3 Kingspan Steel Building Solutions Site Support

Kingspan, as part of its commitment to quality construction, can undertake site visits and inspections to look at the adherence of the installation to the Kingspan specification and details. This service is generally chargeable. Kingspan accepts no responsibility or liability for the quality and performance of the installation. Kingspan is limited in their liabilities to the design and engineering of the Steel Framing System (SFS) and the fixing specification of the SFS to the primary structure. The drawings submitted to the client constitute a minimum performance specification which must be adhered to.

It is the responsibility of the Installer to ensure the SFS is installed to Kingspan drawings. It is the responsibility of the Main Contractor to ensure that all Kingspan drawings have been approved by the project design team and are issued for installation at Construction status. Kingspan will accept no responsibility for works carried out to drawings which are not at construction status.

Kingspan technical representatives will attend site to inspect the installation of the SFS and to liaise directly with the Installer on the adherence of the installation to the Kingspan. They are also able to advise on best practice principles and to educate and inform project teams on the subtleties of the system as provided by Kingspan. As part of this inspection a report will be compiled; this will be sent to the Installer for action and review.

Before attending site the Kingspan Steel Building Solutions Technical Representative will require

- An agreed inspection date and time
- Clear and unobstructed access to the areas to be inspected, and any local issues which may obstruct the inspection
- Notification of any special requirements with regards to site specific health and safety policies
- Confirmation of person(s) to attend the Kingspan Steel Building Solutions Technical Representative on site.
- Confirmation of the specific area that requires inspection

These requirements are a minimum requirement before any inspection work can be undertaken. If any of these items are not completed, it may result in the Kingspan Technical Representatives being unable to carry out the works as required.

14 COSHH & TECHNICAL DATASHEETS

14.1 General Specification Notes

PRODUCTS:
Steel Framing System 'U' Track and 'C' Stud cold formed steel galvanised profiles
SUPPLIER:
Kingspan Steel Building Solutions, Sherburn, Malton, North Yorkshire, YO17 8PQ
Tel; +44 (0) 1944 712 000 Fax; +44 (0) 1944 7105 55
www.kingspanpanels.co.uk/sbs
Products
Cold rolled components are manufactured from pre-hot dipped galvanised steel, Z275 coating, guaranteed yield strength 390 N/mm². All studs, joists, tracks and accessories shall be of a type, size, gauge and spacing determined by structural calculation and as shown on the drawings, and shall be supplied by Kingspan Steel Building Solutions. Unless stated otherwise in the calculations, all structural members are designed in accordance with UK codes of practice.
Procurement
It is the Installer's responsibility to produce a cutting list and order Kingspan Steel Building Solutions materials. This should be co-ordinated to suit the desired construction programme.
Drawing Approval
All drawings must be approved by the main contract Engineer and project Architect prior to construction works.
Erection of Components
All systems are constructed on-site and must be installed to British Standard BS5950, BS8000 and NSSS (National Structural Steelwork Specification). Liability for the quality and accuracy of the installation rests with the Contractor and not Kingspan Steel Building Solutions. Care must be taken when site cutting components square where they are to be used in right angled connections and all cut edges should be protected. Fixing of components shall be with self-tapping screws. Screw type and size shall be as typical details or to a project specific design. All screw fixings must be installed perpendicular to the surface wherever possible. All bolt fixings are to be Grade 8.8. No holes are to be cut or formed in Kingspan Steel Building Solutions SFS without prior reference to Kingspan Steel Building Solutions. Service slots can be provided 600mm from each end of studs when requested and if deemed acceptable by Kingspan Steel Building Solutions Design Department. Track members shall be securely anchored to the supporting structure as shown on the drawings. Complete, uniform and level bearing support shall be provided to upper and lower tracks. Abutting lengths of track shall be securely anchored to a common structural element and spliced, all as determined by structural calculations. Studs shall be plumbed, aligned and securely attached/located within upper and lower tracks. Framing of wall openings shall include headers, lintels and supporting studs as shown on the drawings. Temporary bracing shall be provided where required until completion of erection. The erection contractor is responsible for the temporary stability of the structure during construction. Joists shall be located directly over load bearing studs or a load distribution member shall be provided at the top of the wall as determined by structural calculation. Web stiffeners are to be provided at reaction/or at points of concentration loads where indicated on the drawing. All apertures (doors, windows, louvers) in panels are to be set out to structural sizes from Architects details.
External Walls
Insulation should be provided over the external face of the stud walling that is sufficiently robust to remain in place during and post construction, and should be adequate thermal resistance to prevent cold bridging and interstitial condensation. Insulation should be fixed in accordance with manufacturer's instructions. Consideration should be given to joints in insulation boards and the repair of damage to prevent ingress e.g. taping of joints or provision of a breather membrane. Internal linings should be fixes in accordance with the manufacturer's instructions and selected to achieve the specified performance for fire, thermal, and acoustic. Where masonry cladding forms the external envelope, this should be tied back to the Kingspan Steel Building Solutions studs using stainless steel wall ties and continuous channels fixed with standoff screws as specified in the structural calculations. Additional studs are to be fitted at all jambs and brickwork control joints to provide support for wall ties.

14.2 COSHH Datasheet

PRODUCTS:
Steel Framing System 'U' Track and 'C' Stud cold formed steel galvanised profiles
SUPPLIER:
Kingspan Steel Building Solutions, Sherburn, Malton, North Yorkshire, YO17 8PQ
Tel; +44 (0) 1944 712 000 Fax; +44 (0) 1944 710 555
/www.kingspanpanels.co.uk/sbs
USE
Steel Sections – form internal/external, structural/non-structural walls, floors and ceilings. They may be supplied partially or fully assembled.
TYPICAL COMPOSITION
Steel panels are assembled from cold rolled steel sections manufactured from hot dip, zinc-coated / iron zinc coated slit steel coil to BS EN 10143:1993. The profiles are rolled in accordance with the specification for cold rolled steel profiles to BS EN 10162:2003. Cold rolled profiles are manufactured as suitable for use in the specification of galvanised steel stud and track partitions and linings using screw fixed gypsum walling board to BS 7364:1990 or other boards depending on the application.
Boards, Fastenings and Fittings may be of various proprietary materials each of which will have its own safety Information Sheet supplied by the manufacturer.
STEEL
All steel is hot dip iron zinc galvanised to a coating thickness typically of 275g/m^2.
HANDLING OF PRODUCT
Steel sections are either handled individually or banded into bundles for ease of transportation depending on size, shape and weight.
Steel sections are loaded onto transport in a way that enables easier mechanical off-loading.
In most cases the manufacturer will explain handling methods to the contractor.
Any distortion or damage to the sections must be avoided during handling as this could affect structural integrity.
It is important that sufficient space is available for moving sections from the unloading point to any intermediate storage area and/or the final assembly location.
Where banded sections require lifting by hoists and cranes then ropes and slings should be used together with a suitable trailing tie to stop uncontrolled swinging.
STORAGE OF PRODUCT
All steel sections can be stacked either flat or on edge and must be supported along their length and width. A number of recommendations are made:
i) All sections should be stored in clean, dry conditions, protected from inclement weather.
ii) No sections should be stored next to or in contact with dry cement, lime, plaster or mortar.
iii) Full bundles of sections should not be stacked more than two high with each bundle adequately separated by timber batons of equal sizes placed at regular intervals along the length of the pack.
DISPOSAL OF PRODUCT
The disposal of steel, panel or other associated waste/scrap must be carried out by an authorised and qualified disposal agent and in any case at a site suitable for the re-cycling of the steel section, or an authorised land fill site. The sharp edges could present a danger and must be kept out of reach.
HEALTH HAZARDS, PRECAUTIONS & FIRST AID
Steel sections are designed to be structurally sound according to each application and are structurally capable in the assembled designed condition only. The integrity of the assembled panel/module must not be reduced by unauthorised dismantling and/or removal of material whether steel, board or fastenings. Panel/module assemblies are not designed to support any structure other than the finished product so must neither be used, nor relied upon, as supports during storage or assembly.
It is the responsibility of all personnel working on or with the panels and modules to support themselves safely and, if necessary, form an independent support system.

HEALTH HAZARD – EYE CONTACT

Extreme care must be taken when releasing and breaking open bundle strapping. When bundle strapping is cut tension is released, causing the strapping to spring freely from the bundle which can result in eye injury. The use of tools (especially power cutting tools) on steel sections generates potentially hazardous shavings and sparks.

Precautions

Packs and bundles must be opened whilst on the ground to avoid the possibility of their contents falling over and causing injury. A number of protective measures are also recommended:

1. Safety footwear should be worn.
2. Suitable eye protection should be used (a) when cutting the strapping; (b) when cutting the profile and c) when using tools of any sort.
3. Safety gloves capable of protecting the skin form steel shavings and sharp edges should be worn.
4. Strapping should be restrained from springing freely whilst being cut.

First Aid

In the event of eye injury, cuts or abrasions, seek immediate medical attention. It is also recommended that if a cut is received requiring medical or first aid attention, professional advice should be attained regarding the possible need for a Tetanus injection.

HEALTH HAZARD – SKIN CONTACT:

Lacerations of the skin can occur from sharp corners and edges or when breaking open strapping. Foot injuries could also be sustained when walking over discarded steel debris on site (e.g. re-cut edges of sections). Steel shavings and sparks are produced when using tools (particularly power tools).

Precautions:

1. Hand and Power tools – should be used only by those wearing suitable protection.
2. Lifting – recommended techniques must be adhered to and manual lifting should be limited to acceptable weights. Never lift any packs that are not within the method limits.
3. Loading and Unpacking – suitable gloves and protective clothing should be worn.
4. General Handling – persons with skin problems, grazes and those known to be sensitive to mineral oils should protect hands and exposed skin with a barrier cream or suitable gloves.

First Aid:

In the event of skin irritation or injury, immediate medical attention must be sought by an appropriately qualified person.

HEALTH HAZARD - INHALATION:

Steel sections at atmospheric temperatures do not emit any fumes or gasses.

PRECAUTIONS:

(As stated above).

Health Hazard – Ingestion:	(not applicable)
Health Hazard – Exposure limits:	(not applicable)
Health Hazard – Fire and Explosion hazards:	(not applicable)

FURTHER INFORMATION:

Please contact the Kingspan Steel Building Solutions Technical Team on 01944 712000.

This information is provided in good faith on the assumption that the person carrying out the task of using the product is experienced and/or has been fully trained in the handling and use of the particular product and application.

The reader must be satisfied that they (or the person carrying out the application) are suitably responsible and that these recommendations have been thoroughly read and understood by that person.

Kingspan Steel Building Solutions does not accept responsibility for any claims of consequential loss or injury to the user or third party if the recommendations of this safety sheet are not adhered to.

14.3 Cutting Tools

Steel Cut Off Saw

Evolution EVO355 RAPTOR 355mm TCT Steel Cut Off Saw

Disc Grinder

Hilti DEG 125-D Angle Grinder

14.4 Drilling Tools

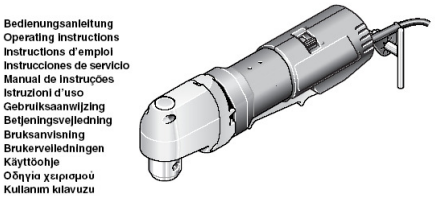
SDS Drill

Hilti TE 7-C Rotary hammer drill

SDS Cordless Drill

Hilti TE 4-A22 Cordless rotary hammer drill

Angle Drill



14.5 Fixing Tools

TEK Guns

Hilti ST 1800 Metal Screw Driver

Hilti ST 1800-A22 Cordless Metal Screw Driver

Impact Driver

Hilti SID 14-A Cordless Impact Screwdriver
NOTE – Impact drivers should NOT be used to fix tek screws to hot rolled steel.

Powder actuated fixing tools ("Shot firing")

Hilti DX460 MX Powder-actuated tool with magazine

Spitfire P370 Disc Cartridge Tool

15 SUPPORT SERVICES

Kingspan Steel Building Solutions offers a range of design and supply services operating from a number of sites in the UK. To serve our customers with the maximum efficiency, we would be grateful if you could direct your question to the following contacts:

15.1 Material Ordering & Production Enquiries

Shalina Begum - Customer Services
Kingspan Steel Building Solutions
Pleck Road
Walsall
WS2 9ES

Tel: 01922 728 312
Fax: 01922 644 460
Email: shalina.begum@kingspan.com

15.2 Technical Enquiries

SFS Technical Manager
Kingspan Steel Building Solutions
2 & 3 Progress Works
Heath Mill Lane
(Access via Bromley Street)
Birmingham
B9 4AL
Tel: 0121 753 7050
Fax: 0121 753 5187

15.3 Sales & Commercial Enquiries

Gaynor Phillips
Project Co-ordinator
Kingspan Steel Building Solutions
2 & 3 Progress Works
Heath Mill Lane
(Access via Bromley Street)
Birmingham.
B9 4AL
Tel: 0121 753 7071
Fax: 0121 753 5187

15.4 Site Support Enquiries

Contracts Manager
Kingspan Steel Building Solutions
2 & 3 Progress Works,
Heath Mill Lane
(Access via Bromley Street)
Birmingham
B9 4AL
Tel: 0121 753 7050
Fax: 0121 753 5187

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