Steel Framing

This training package provides information on steel framing, including materials, posts, bracing, welding and bolting, for village infrastructure and houses common in South-East Asia and the South Pacific region.

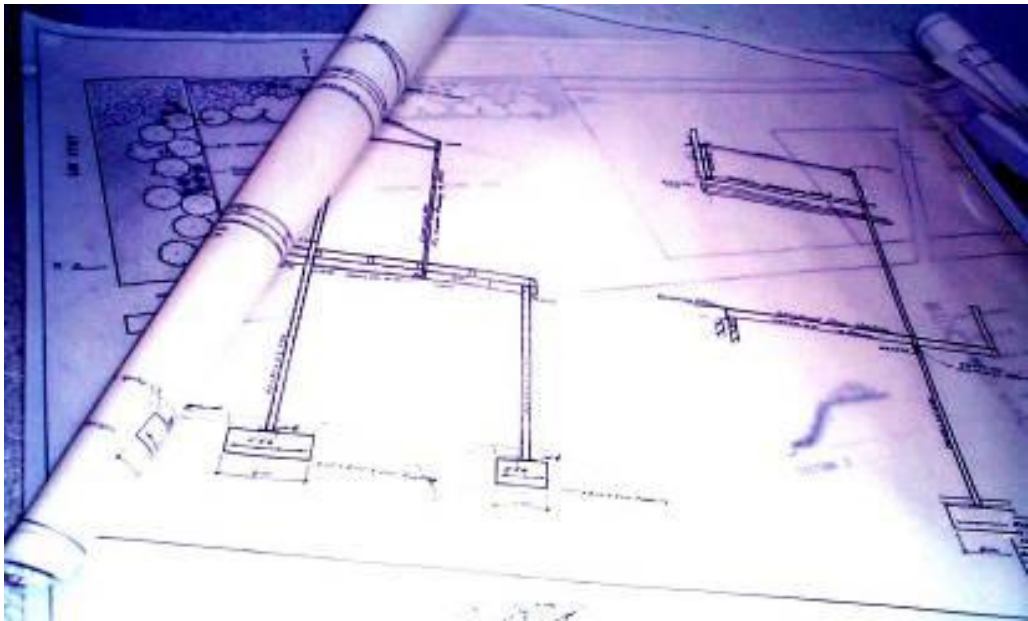
It also includes specifications and checklists that are suitable for the fabrication and erection of structural steelwork for larger structures.

Shop Drawings

Because structural steelwork is usually prefabricated and bolted together on site, small changes in the building details at either design or construction stages can result in the inability of the steelwork to fit together.

Steel fabricators, working in a workshop remote from the site, require sufficient information to accurately produce the steelwork.

Prepare shop drawings showing all dimensions of sections, holes, bolts etc from the engineers and architects details.



Interface With Other Materials

Structural steelwork must support, and be supported by, other parts of the building in close contact.

A failure to visualize the superposition of each component can lead to construction that is not in accordance with the designer's intention, or could necessitate modifications to the steelwork.

Prepare details of how the brickwork, timber, windows and flashings are to be built around the steelwork.

Before erection commences, inspect and confirm the location in the building, particularly provision for supporting columns.

Site Modifications

When erecting prefabricated steelwork, errors in previous construction will become apparent and it will be necessary to make modifications.

On completion of repairs, the weld spatter and dags must be removed, welds chipped and the steelwork paint system repaired to achieve the original protection.

In the case of galvanized steelwork, a suitable cold-galvanizing paint system must be used.

Column Support

On completion of erection, tighten all holding-down bolts.

Where appropriate, grout under column bases.

If a concrete slab is to be constructed, it may be advisable to isolate the concrete adjacent to the columns to prevent cracking due to movement in the steelwork.

Protection against corrosion

Steel sections must be protected against corrosion originating from ground water or the atmosphere. They should be galvanized where possible, or painted.

Welds (including site-welding) must be chipped and wire-brushed to remove slag, and painted with a cold-galvanizing or corrosion resisting paint.

Steel posts must be supported clear of the ground. If steel posts are embedded in concrete footings, the concrete must be built up clear of the surrounding ground level to prevent attack by ground water.

Case Study – Corrosion of welds at Phru Tieow, Thailand

The welded connections are not cleaned or painted and will most likely deteriorate. Corrosion is already visible

Case Study – Concrete Protection of Steel Posts, Mt Hagen, PNG

The steel posts are protected from corrosion at the base by the mounded concrete in the footings.

Anchorage

Ensure that there is adequate anchorage of the structure by holding-down bolts, set deep into a reinforced concrete slab or deep concrete footings

Case Study - Anchorage failure of light steel framed house in Latoka, Fiji.

Cyclonic wind caused the anchor bolts to pull out of the concrete topping, leading to total collapse of the house.

1. The anchors were too short and placed to close to the edge of the concrete.
2. The anchors were into an unreinforced concrete topping rather than fully engaged into the reinforced concrete slab.

Prevention of Side-Sway and Use of Diagonal Bracing

It is necessary to prevent side-sway of structures due to the movement of people in small structures, vehicles or equipment in large structures and wind or earthquake loading on all structures

This is commonly achieved by one of the following (or a combination of both)

- Portal frames
- Diagonal roof and wall bracing.

Even small structures, such as steel posts for houses, should incorporate diagonal bracing to prevent side sway.

Fire Resistance

Systems with that enhance fire resistance include:

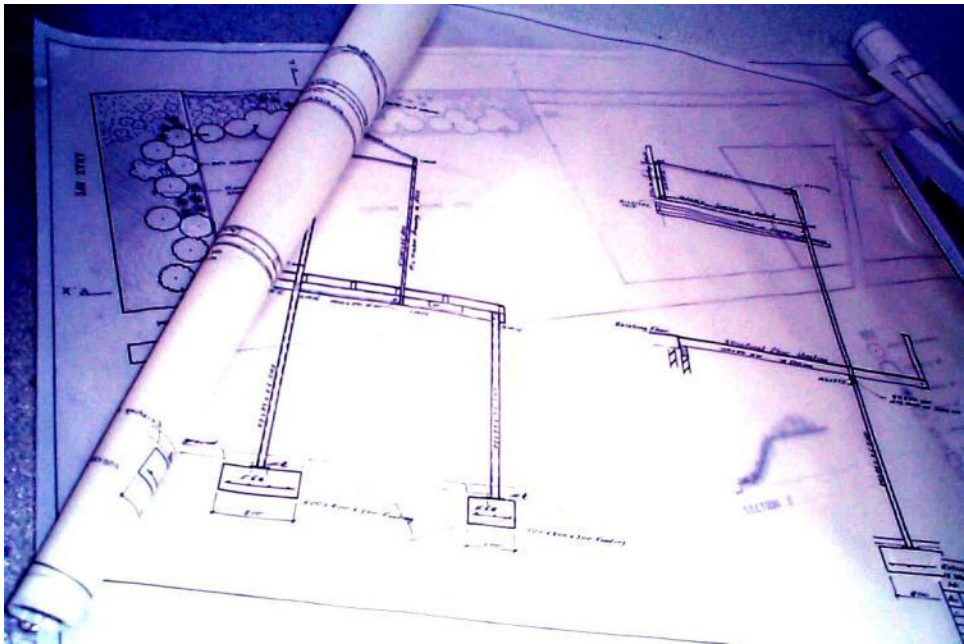
- Solid calcium-silicate masonry
- Solid clay masonry
- Solid concrete masonry
- Solid gypsum blocks
- Hollow terracotta blocks with 13 mm plaster

In some circumstances, the fire resistance of components may enhanced by various systems, including the following (subject to the Building Regulations)

- Intumescent spray with fire protection blanket wrap
- Cementitious spray
- Intumescent paint

Details

The following slides show some typical details applicable for single dwellings and similar buildings. They are intended to demonstrate the principles relevant to this common form of construction. However, the details included are not intended to be a complete list of all requirements. Specifications and details for other common applications are available on www.electronicblueprint.com

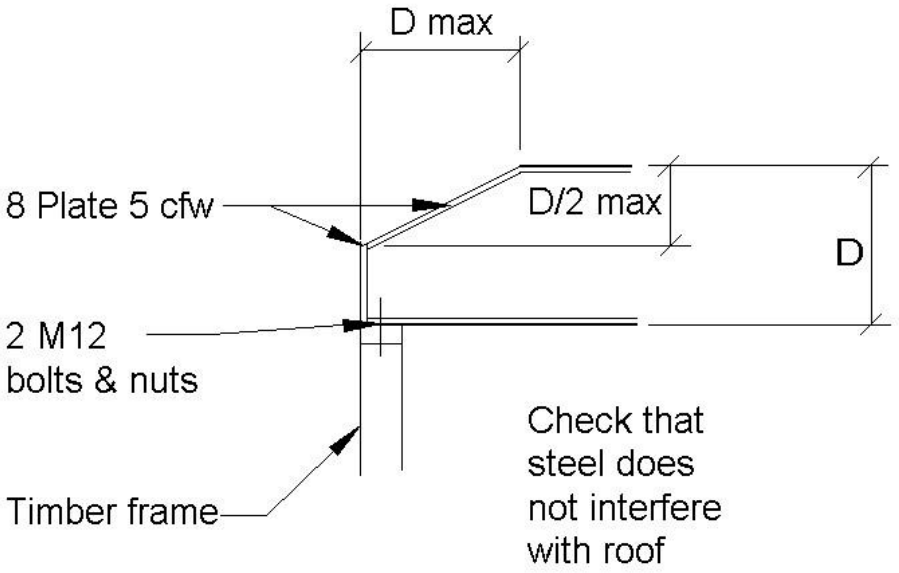


Typical Details for Single Dwellings - Beam at Eaves

It may be necessary to taper the end of a roof beam to fit into a hip or gable roof space.

However, there is a limit to how much steel can be removed, since the beam must still have sufficient shear capacity at the ends to support the vertical loads. The cut section should be “plated” as shown, to ensure that this end shear can be adequately transmitted.

The architect should check that the cut section does not interfere with the roof structure, and the structural engineer must check the structural capacity.



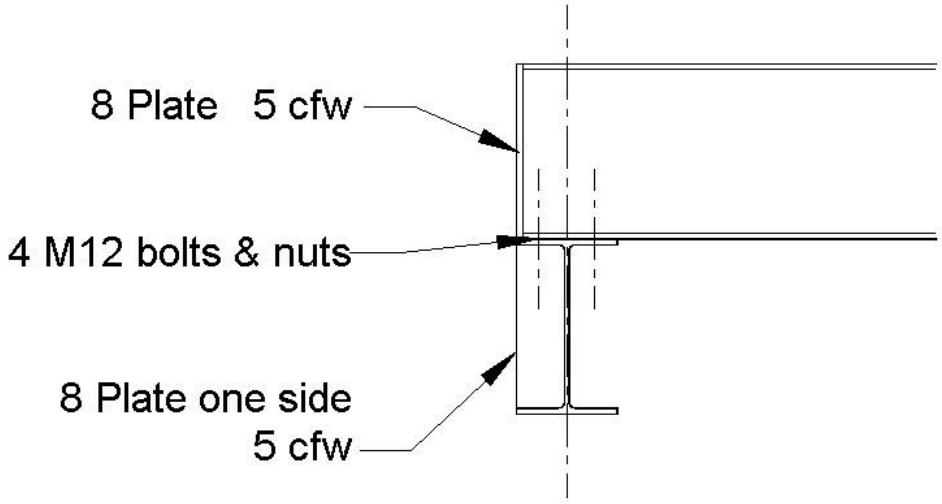
Beam at Eaves

Typical Details for Single Dwellings – Beam-to-Beam Connection

There are many ways to connect horizontal beams in a “beam-to-beam” connection.

This detail shows the simplest of these, where one beam is supported at the end by a beam below. For other arrangements, the designer should refer to standard details on www.electronicblueprint.com

The structural engineer must check the structural capacity.

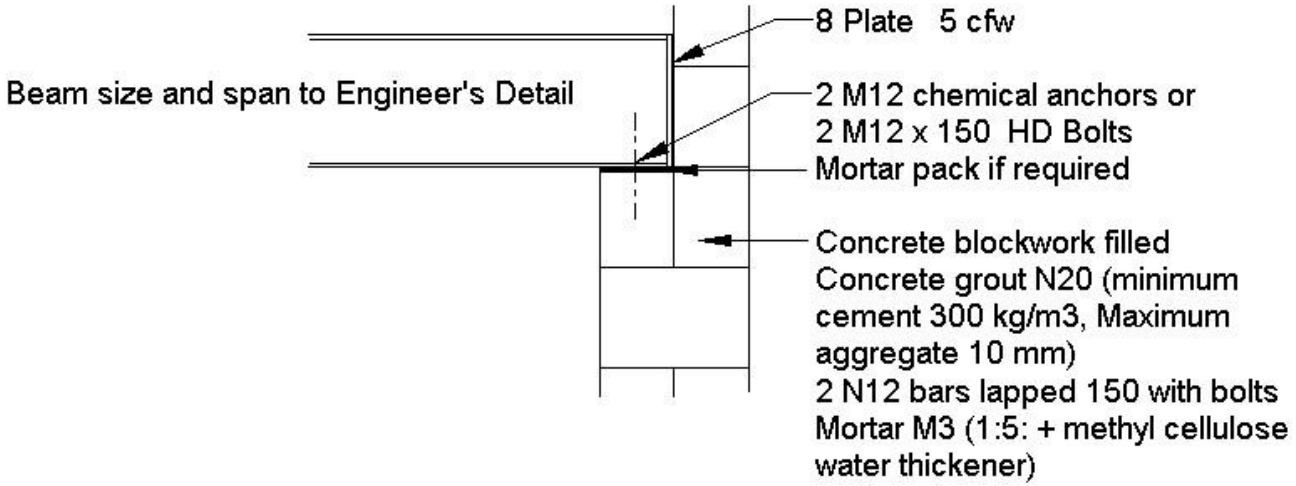


Beam to Beam Connection

Typical Details for Single Dwellings – Beam on Concrete Blockwork Pilaster

This detail shows a simple support for a steel beam on a concrete blockwork pilaster, with chemical anchors or holding down bolts, and a mortar pack. The end of the beam should have a welded end plate stiffener.

The structural engineer must check the structural capacity, including the capacity of the blockwork.



Beam on Concrete Blockwork Pilaster

Typical Details for Single Dwellings – SHS Post Supporting a Beam

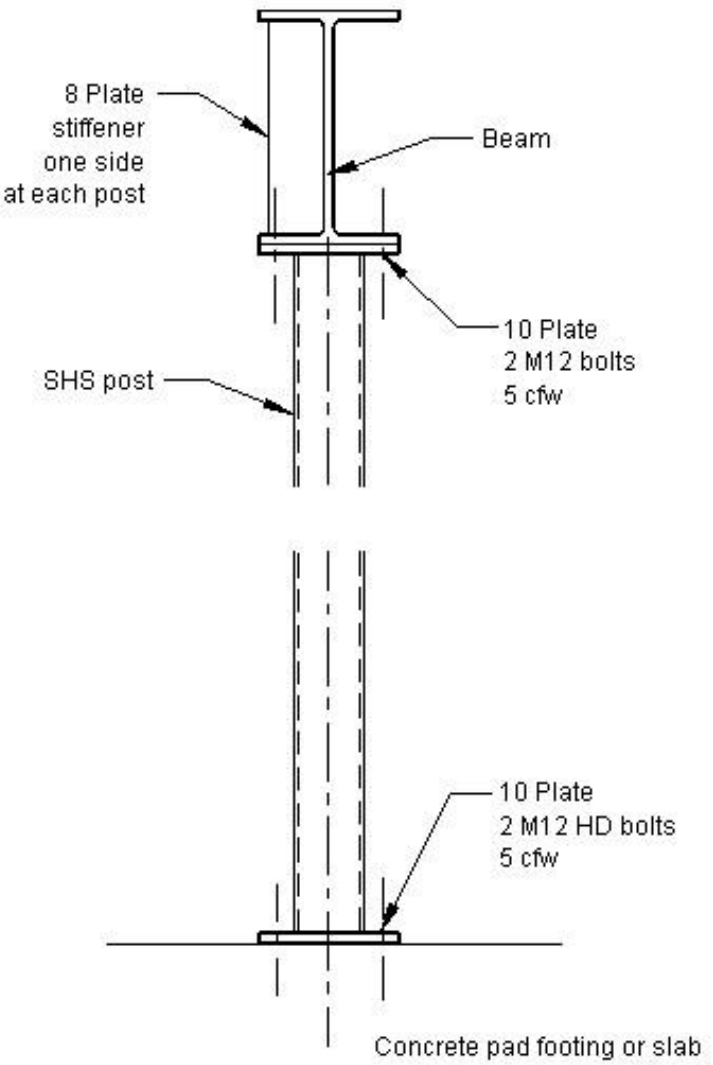
This detail shows a Square Hollow Section (SHS) post supporting a steel beam.

The same detail could be used for posts fabricated from Circular Hollow Sections (CHS) .

The post must have a suitable top plate, drilled for a bolted connection tot the beam. Alternatively, the top connection may be site welded, although this is less common.

The post must also have a suitable base plate with at least two holding down bolts into the footing or slab below. Alternatively, chemical anchors may be substituted.

The structural engineer must check the structural capacity, including the capacity of the blockwork.



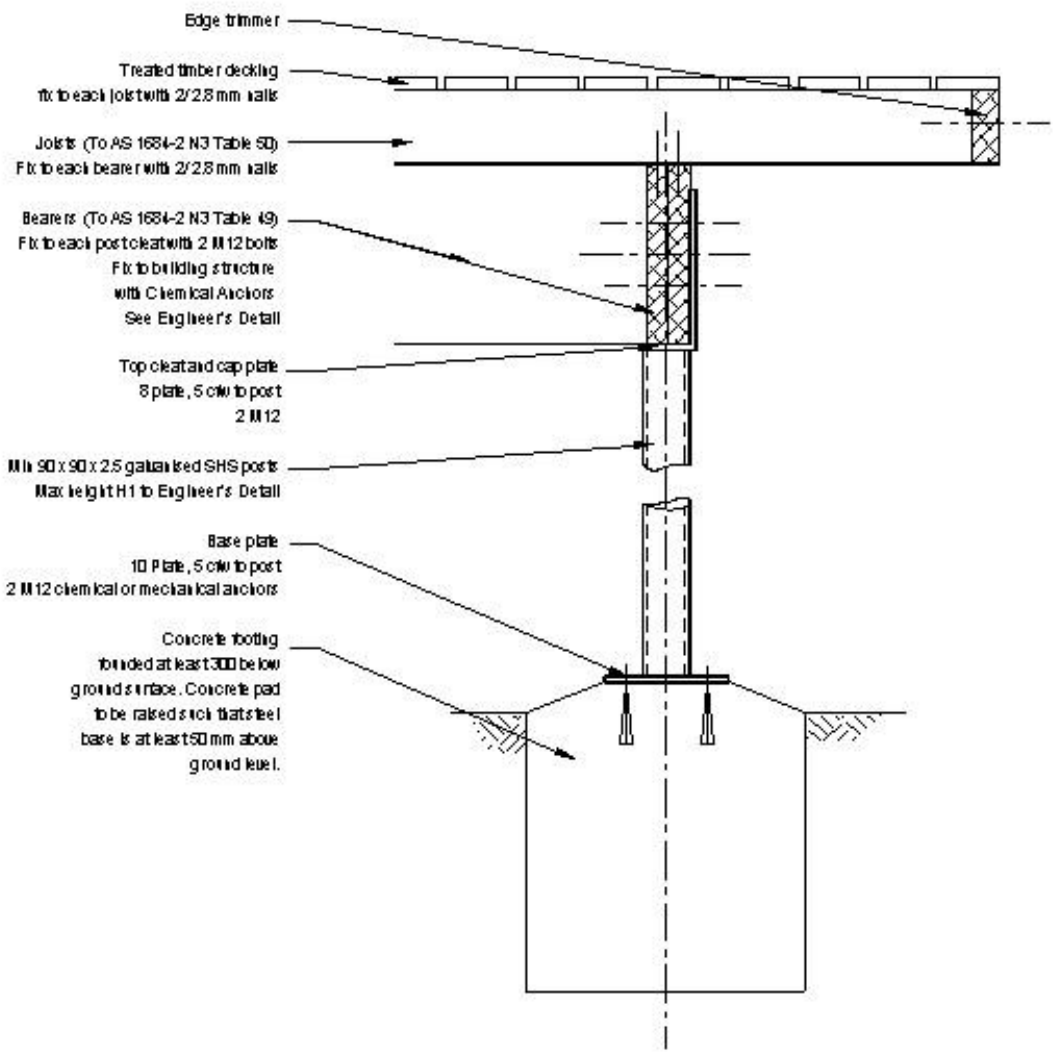
SHS Post with Beam Detail

Typical Details for Single Dwellings – Post and Deck Framing

This detail shows a simple arrangement for steel posts supporting a timber deck

In order to avoid corrosion at the bottom of the steel posts, the concrete at the top of the footings should be raised above the surrounding ground level and sloped, as shown.

The structural engineer must check the structural capacity.



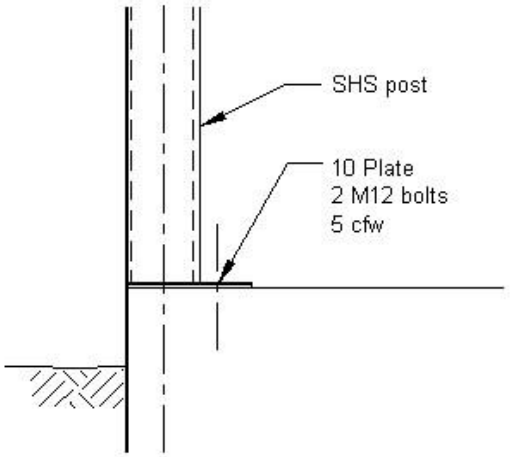
Typical Post and Deck Framing

Corner Post

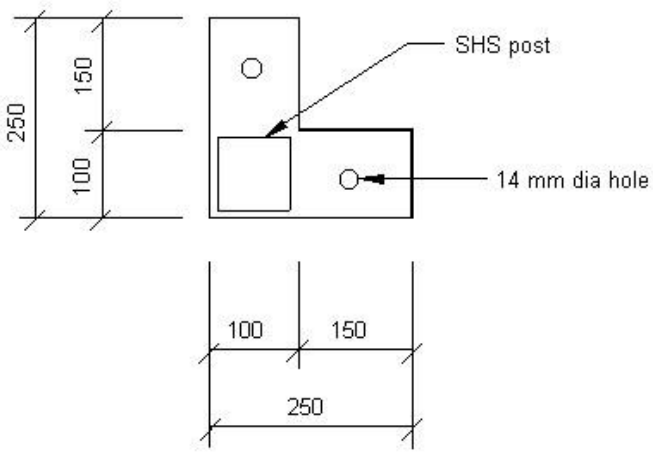
When a post is required to be positioned within a wall cavity, and is supported on a concrete slab, the base plate and holding down bolts may protrude beyond the wall space and into the room. This problem may be overcome in one of two ways:

- The concrete slab supporting the post may be rebated by sufficient depth to accommodate the base plate , the nut and bolt, and space for a mortar or grout pack (to adjust the height of the post). The depth of such a rebate should be not less than 40 mm.

- The base plate can be reduced to fit within the cavity as shown below. The structural engineer must check the structural capacity, including the reduced prying resistance of the base plate.



Corner Post Detail



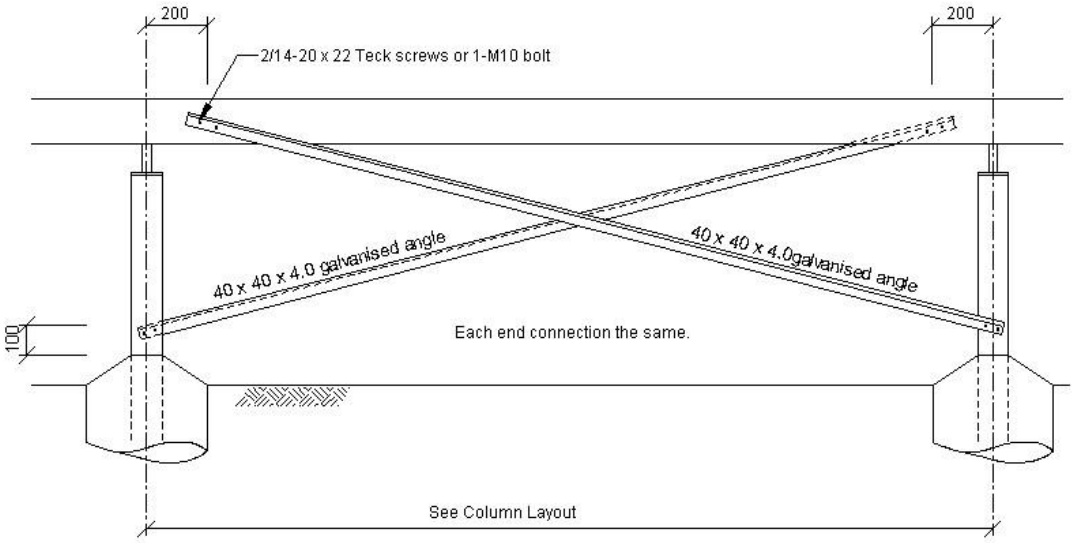
Corner End Plate

Typical Details for Single Dwellings – Diagonal Bracing

It is necessary to prevent horizontal movement of houses with suspended floors. Such movement is caused by people moving about inside the house. This prevention may best be achieved by the incorporation of diagonal steel bracing.

The detail below is considered suitable for houses on steel posts, with either steel or timber floor framing. In order to avoid corrosion at the bottom of the steel posts, the concrete at the top of the footings should be raised above the surrounding ground level and sloped, as shown.

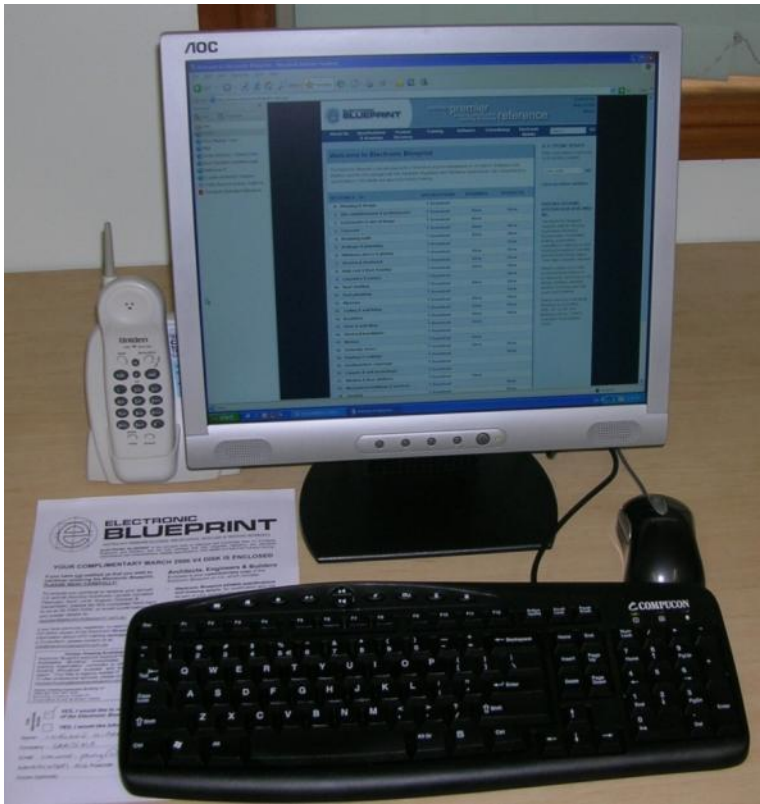
The structural engineer must check the structural capacity.



Diagonal Bracing

Specifications

This module provides typical specifications, summarised from the Electronic Blueprint.



Specifications – Structural Steelwork

The following specifications should be considered as a guide only, and must be edited by the designer to ensure that the intent of the particular design is fully reflected.

The specification document must clearly spell out its scope , to ensure that there is no confusion as what is applicable. The sample "scope" given here should be amended to reflect the requirements for the particular project.

All building work must be designed and constructed in accordance with any appropriate regulations and standards.

Scope

This section covers structural steelwork and cold-rolled steel purlins and girts.
For light gauge steel framing for domestic houses, refer to Specification for Wall, Roof & Floor Framing.

Building Regulations and Standards

All materials and construction shall comply with the most recent version of:

- the relevant parts of the Building Regulations;
- the Standards referred to therein;
- other Standards nominated in this specification; and
- other relevant Regulations.

Specifications – Structural Steelwork

The following standards are applicable to this specification, and provide the information upon which the design and construction should be based. However, the Building Regulations may override parts of these standards. So too, the drawings and this specification may apply additional requirements, and the Builder must be aware of potential conflicts.

Relevant Standards

AS 4100 Steel structures
AS/NZS 4600 Cold-formed steel structures
AS 2327.1 Composite structures – Simply supported beams

AS 1163 Structural steel hollow sections
AS/NZS 1594 Hot-rolled steel flat products
AS/NZS 3678 Structural steel - Hot-rolled plates, floorplates and slabs
AS/NZS 3679.1 Structural steel Part 1: Hot-rolled bars and sections
AS/NZS 3679.2 Structural steel Part 2: Welded I sections

AS 1110 ISO metric hexagon precision bolts and screws
AS 1111 ISO metric hexagon commercial bolts and screws
AS 1112 ISO metric hexagon nuts, including thin nuts and washers for structural engineering
AS/NZS 1252 High strength steel bolts with associated nuts and washers for structural engineering

…….. Continued on next slide

Specifications – Structural Steelwork

AS/NZS 1559 Hot-dip galvanised steel bolts with associated nuts and washers for tower construction
AS/NZS 1554 Structural steel welding
AS 1275 Metric screw threads for fasteners
AS 1237.1 Plain washers for metric bolts, screws and nuts for general purposes
AS/NZS 4291.1 Mechanical properties of fasteners, made of carbon steel and alloy steel - Part 1: bolts, screws, studs
AS/NZS 4291.2 Mechanical properties of fasteners, Part 2: Nuts with specified proof load values – coarse thread
AS 1397 Steel sheet and strip

AS 1627 Metal finishing - preparation and pre-treatment of surfaces
AS/NZS 4680 Hot-dip galvanised (zinc) coatings on fabricated ferrous articles
AS/NZS 2312 Guide to the protection of structural steel against exterior atmospheric corrosion by use of protective coatings
AS 1627.4 Metal finishing - Abrasive blast cleaning
AS 1627.5 Metal finishing - Pickling, descaling and oxide removal
AS/NZS 3750.1 Paints for steel structures - Part 1 Epoxy mastic (two-pack)
AS/NZS 3750.13 Paints for steel structures - Part 13 Epoxy primer (two-pack)
AS/NZS 3750.14 Paints for steel structures - Part 14 High-build epoxy (two-pack)
AS/NZS 3750.15 Paints for steel structures - Part 15 Inorganic zinc silicate paint

Specifications – Structural Steelwork

The provision of environmentally sustainable solutions, which are credible and designer-friendly, represents one of the most significant challenges facing building product-suppliers.

There is a real danger that the ecolabels may fail to provide enough precise data on the in-service performance for each product, under a range of applications and climates.

Therefore, Environmental Declarations and Environmental Benchmarking should account for the sustainability impacts of the manufacture, transport, construction, demolition and re-use of building products, together with their in-service performance.

They should comply with ISO 14044 and ISO/DIS 2193. If appropriate, edit this specification to achieve this end. For more details, refer to the ENVIROSPEC Protocol, www.electronicblueprint.com

Sustainability and Energy Efficiency

Where possible, products that meet Sustainability Specifications should be used, including energy efficient lighting and appliances.

Specifications – Structural Steelwork

To ensure that the work can be carried out in an efficient manner, it is important to ensure that all necessary preparatory construction has been carried out.

This should be clearly defined in the specification, and the designer should amend this sample inspection to detail the specific requirements for the particular project. It may be necessary to prescribe particular requirements for various structures.

Commencement

Work shall commence as soon as practical after, but not before,

(a) the Builder has issued:

- a written order
- the relevant contract drawings, specifications and schedule of work
- written approval of any details provided by the Contractor

(b) Erection shall commence as soon as practical after, but not before the supporting structure has been constructed.

Specifications – Structural Steelwork

The specification should direct the Builder and Contractor to obtain and adhere to all relevant statutory requirements for approvals and certificates, including those related to safety. The specification must provide sufficient detail to ensure that the intent of the design is fully understood by all construction personnel. There should be no confusion of the part of those who order the materials, and those who install them. The drawings must include standard notes, which reflect the requirements of the particular design. Where necessary, amend this specification, nominating the requirements for weld type and size; and types of bolted connections, to be consistent with the drawings and design assumption

Approvals
The Contractor shall obtain all relevant approvals and provide to the Builder the appropriate certificates.

Safety
Safety regulations shall be observed at all times.

Column bases must be uniformly supported at the correct height on the concrete footings or concrete slabs beneath. To achieve this, a gap should be left between the concrete and the underside of the steel base plate, and this gap subsequently filled with grout or mortar.

Mortar, to the specification shown here, is suitable for relatively small building, although high- strength non-shrink grout should be used for larger highly loaded structures.

Specifications – Structural Steelwork

Fabrication and Erection

All fabrication and erection of structural steelwork shall comply with AS 4100 and the standards referred to therein.

Welding shall be SP and comply with AS/NZS 1554. All welds shall be 6 mm continuous fillet unless noted otherwise. Full penetration butt welds are required on all plates over 12 mm in thickness.

All bolts and nuts, except high strength friction grip bolts, shall be snug tightened as per AS/NZS 1252.

High strength friction grip bolts shall be tensioned to the recommended values as per AS/NZS 1252.

All seal plates on hollow sections shall be provided with a breather hole to permit hot dip galvanising.

All purlins, girts, fascias, associated bridging and accessories shall be installed in accordance with the manufacturer's recommendations.

Mortar Packs

Mortar packs under base plates shall be 1 part portland cement to 2 parts sand.

Specifications – Structural Steelwork

The nominated surface treatment must be appropriate for the risk of corrosion resulting from:

- Proximity to the sea or atmospheric pollution
- Exposure to weather
- Degree of damage expected during service.

Surface Preparation and Treatment

On completion of all fabrication, all dags and weld spatter shall be removed from the surfaces exposed in the completed structure. Structural steelwork shall be prepared, painted or galvanized in accordance with the Drawings and, where appropriate, the following schedule.

Painting Systems For Steel		
Treatment	Internal	External
Not painted after erection	MP 1-A Table 7.4	LP 1-A Table 7.5
Painted after erection	SP 1-A Table 7.3	SP 1-A Table 7.3

Surface preparation shall comply with AS 1627.4 and AS 1627.5.

Painting shall comply with AS/NZS 2312.

Hot-dip galvanising shall comply with AS 4680 to not less than 300 g/m^2.

Shop painting shall comply with AS/NZS 2312 and the following table.

Specifications – Structural Steelwork

The requirements for the appropriate level of fire resistance must be set out on the drawings and in the specification. The detailing must make provision for the thickness of any fire protection material to be incorporated.

Fire Resistance

When Fire Resistance Levels for fire separation or structural performance under fire load are specified, the components shall be designed, tested, constructed and protected in accordance with the appropriate parts of Building Regulations and relevant Standards and AS 1530.4, AS 4100.

When materials used in the construction are required to achieve specified fire hazard properties, they shall comply with the appropriate parts of Building Regulations and relevant Standards and AS/NZS 1530.3. The fire resistance requirements of each member shall be noted on the drawings in the following format.

Fire Resistance							
		Required Fire Resistance Levels			**Required Fire Hazard Properties**		
Member	Description	FRL Structural Adequacy minutes	FRL Integrity minutes	FRL Insulation minutes	Spread of Flame Index	Smoke Developed Index	Ability to prevent ignition & screen core material from free air

Specifications – Structural Steelwork

This specification covers the appropriate standards for the design and construction of structural steelwork, and the supply of various components (universal beams and columns, parallel flange channels, angles, welded sections, hot rolled plates, floor plates and slabs, hollow sections, cold formed purlins and girts. The critical issues are strength, ductility, tolerance and weldability.

Structural Steelwork

Structural steelwork shall comply with the Drawings, Building Regulations and relevant Standards (AS 4100).

Structural Steel Plates and Sections

Structural steel plates and sections shall comply with the Drawings, Building Regulations and relevant Standards (AS/NZS 3679.1, AS/NZS 3679.2, AS 3678, AS 1163, AS1397). Unless stated otherwise, minimum grade of steel shall be as follows:

Sections	Minimum Grade MPa (N/mm^2)
Universal beams and columns, parallel flange channels, angles to AS/NZS 3679.1	300
Welded sections to AS/NZS 3679.2	300
Hot rolled plates, floor plates and slabs to AS/NZS 3678	250
Hollow sections to AS 1163	C350
Cold formed purlins and girts to AS1397	G450, Z350

Specifications – Structural Steelwork

Cold-Rolled Purlins, Fascias, Bridging and Accessories provide the wall and roof members to which the cladding is fixed. Although usually part of the structural steelwork supply and erection contract, they are normally fabricated and delivered directly to the job site from specialist suppliers.

Cold-Rolled Purlins, Fascias, Bridging and Accessories

Cold-rolled purlins, fascias and bridging comply with the Drawings, Building Regulations and relevant Standards (AS/NZS 4600), and the following:

Sections shall be manufactured from galvanised steel complying with AS 1397, with a zinc coating not less than 350 g/m^2.

Bridging shall consist of prefabricated components compatible with the purlin system.

Specifications – Structural Steelwork

The strength and rigidity of bolted connections vary greatly. Bearing connections rely on the bearing strength of the plates and the shear strength of the bolts, at the mating surfaces, to transmit forces. Friction connections rely on the bolts tightly pulling the steel plates together so force is transferred by friction. The grade and tightening method must be appropriate for the application, as indicted on the drawings: 4.6/S, 8.8/S, 8.8/TB, 8.8/TF.

Bolts and Nuts

Bolts and nuts shall comply with the Drawings, Building Regulations and relevant Standards, and the following. Tightening to the following methods:

- 4.6/S commercial bolts, Grade 4.6 complying with AS/NZS 1111 - snug tightened
- 8.8/S high strength structural bolts, Grade 8.8 complying with AS/NZS 1252 - snug tightened
- 8.8/TB high strength structural bolts, Grade 8.8 complying with AS/NZS 1252 - bearing joint fully tensioned as per AS 4100
- 8.8/TF high strength structural bolts, Grade 8.8 complying with AS/NZS 1252 - friction joint fully tensioned as per AS 4100 (Faying surfaces shall be uncoated.)

Bolts shall be as noted on the drawings, but not less than:

- M20 8.8/S.
- Two bolts per joint
- Bolts and washers shall be treated against corrosion, not less than galvanised.
- /TB and /TF bolt categories shall be installed by the direct-tension indicator method or part-turn method.

Sample Inspection Schedules

Two Inspection Schedules are detailed in the following slides:

1. Structural Steelwork Fabrication checklist intended for use in a steel fabrication workshop to plan, cut, fabricate, weld and protect structural steelwork.

2. Structural Steelwork Erection checklist intended for use on a construction site to plan, erect and fix in place structural steelwork.

Sample Inspection Schedules – Structural Steelwork Fabrication

Construction Checklist

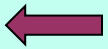
Builder:
Site:
Activity: Structural Steelwork Fabrication

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

The most recent controlled copies of drawings and specifications that clearly show the requirements must always be available and accessible to relevant workers in the fabrication workshop.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

Check marked length before cutting of all principal steel sections.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

Check marking of position and diameter of all holes in steel sections.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

Check marking of dimensions of all plates and cleats before cutting, cropping or guillotining.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

Check marking of position and diameter of holes and cut-outs in plates and cleats.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

Fabricate all items . Check the length of sections and check the orientation of all plates and cleats while they are tack welded.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

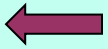
When fabrication is satisfactory, complete the welding. Visually check welds for completeness. Carry out more rigorous weld inspections (e.g. dye or radiograph) if required by the specification.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

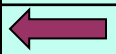
Visually check the surface treatment for the number of coats and completeness of coverage.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

Check that all fabricated steelwork has suitable identification marks to assist in the erection.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

Visually check that the Holding-Down Bolt kits are correctly fabricated and included for delivery with the rest of the structural steelwork.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

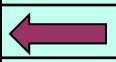
Visually check that all chipped paintwork and scratches have been repaired during touch-up painting.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

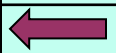
Record the dispatch of all fabricated items, bolts, nuts, washers, HD bolt kits and purlin sections during the loading of transport for delivery to site.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

Record the unloading of all fabricated items, bolts, nuts, washers, HD bolt kits and purlin sections during the unloading of transport at site.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Fabrication

Any deviations for the tolerance permitted by AS 4100 should be recorded.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Steel section	Check marked length before cutting	+,- 2 mm *	Hold			
Holes in steel sections	Check marking of position & diameter	+,- 2 mm * Holes to be 2 mm larger than nominal bolt size.	Hold			
Plates	Check marking of dimensions	+,- 2 mm *	Hold			
Holes, cut-outs in plates	Check marking of position & diameter	+,- 2 mm *	Hold			
Fabricate all items	Check length, check orientation	+,- 2 mm *	Hold			
Welding	Visual	Continuous or as specified	Hold			
Surface treatment	Visual	As specified, no unpainted areas	Hold			
Identification marks	Visual	Clear & as specified	Hold			
HD Bolt kits	Visual	Bolts, nuts, washers included	Witness			
Touch up painting	Visual	No chipped or damaged paint	Witness			
Loading of transport for delivery to site	Count of all items	All items loaded	Hold			
Delivery and unloading on site	Count of all items	All items unloaded	Hold			

Notes: All tolerances shall be in accordance with AS 4100. The general tolerance is +,- 2 mm (*), although there are some specific tolerances including cross section, compression members, beams and tension members.

Sample Inspection Schedules – Structural Steelwork Erection

Construction Checklist

Builder:
Site:
Activity: Structural Steelwork Erection (Page 1 of 2)

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression	Witness			

Construction Checklist

Builder:
Site:
Activity: Structural Steelwork Erection **Page 2 of 2**

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			

Notes: All tolerances shall be as shown, except where overridden by AS 4100.

Sample Inspection Schedules – Structural Steelwork Erection

The most recent controlled copies of drawings and specifications that clearly show the requirements must always be available and accessible to relevant workers on the construction site.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			

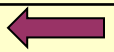
Sample Inspection Schedules – Structural Steelwork Erection

The Builder should visually inspect and confirm that the principal steel sections, delivered to site ready for erection, are indeed the same as the sections specified on the drawings.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			

Sample Inspection Schedules – Structural Steelwork Erection

The Builder should check visually that the workshop surface treatment coverage is complete, without major blemishes, before erection.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			

Sample Inspection Schedules – Structural Steelwork Erection

The Builder should spot check that the holding down bolts (anchor bolts) are the correct grade, diameter and length; and that they are grouped in the correct centres (best done using a template) and in position.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			

Sample Inspection Schedules – Structural Steelwork Erection

The Builder should spot check that the column base positions are within tolerance. This is usually (but not always) governed by the positioning of the HD bolts (discussed above).

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			

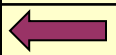
Sample Inspection Schedules – Structural Steelwork Erection

The building height is governed by the levels of the steel column bases. The Builder should spot check that the levels to the underside of the steel column base plates, do not deviate by more than the tolerance.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			

Sample Inspection Schedules – Structural Steelwork Erection

Full contact between the steel column bases and the concrete footings is achieved by grout packed into this gap. The Builder should spot check visually that adequate gaps and shims are provided.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			

Sample Inspection Schedules – Structural Steelwork Erection

Compression members (columns) must be vertical (within tolerances). The Builder should spot check that the compression members are plumb from base position.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			

Sample Inspection Schedules – Structural Steelwork Erection

For buildings over 60 m high, there are different requirements for compression members plumb from the base position.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			

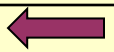
Sample Inspection Schedules – Structural Steelwork Erection

Apart from questions of plumb, there are tolerances on the position of the top of a compression member, relative to the bottom of the member from one storey to the next.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			

Sample Inspection Schedules – Structural Steelwork Erection

Columns should only be spliced in positions that do not cause buckling under vertical load. The Builder should spot check the level of column splices for compliance with the drawings.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold			
Principal steel sections	Spot check	As specified	Witness			
Shop surface treatment	Visual before erection	No major blemishes	Witness			
Holding down bolts	Bolt grade Bolt diameter Bolt length Bolt centres in each group Bolt group centres distance to centres of adjacent groups Accumulated length Bolt group centres to column centre line	As specified As specified +,- 3 mm +,- 3 mm +,- 6 mm +,- 6 mm/30 m, +,- 25 mm +,- 6 mm	Hold			
Column base position	Spot check	+,- 6 mm	Witness			
Column base level	Spot check	+,- 10 mm	Witness			
Column base contact	Spot check	Full contact	Witness			
Compression member plumb from base position (Up to 60 m high)	Spot check	Height/500, 25 mm	Witness			
Compression member plumb from base position (Over 60 m high)	Spot check	25 + (H-60)/3000, 50 mm	Witness			
Compression member storey deviation	Spot check	Height/500	Witness			
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			

Sample Inspection Schedules – Structural Steelwork Erection

The position of column splices should comply with the plumb requirements discussed above.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			
Notes: All tolerances shall be as shown, except where overridden by AS 4100.						

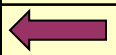
Sample Inspection Schedules – Structural Steelwork Erection

At any column splice, correctly align the two members being joined, to avoid bending moments being induced in the splice. The Builder should spot check that alignment is within the required tolerance.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			
Notes: All tolerances shall be as shown, except where overridden by AS 4100.						

Sample Inspection Schedules – Structural Steelwork Erection

The Builder should spot check visually that the beam connections have been properly completed.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			
Notes: All tolerances shall be as shown, except where overridden by AS 4100.						

Sample Inspection Schedules – Structural Steelwork Erection

The Builder should spot check that the sweep of beams, between the points of effective bracing or restraint, do not exceed the specified tolerance.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			
Notes: All tolerances shall be as shown, except where overridden by AS 4100.						

Sample Inspection Schedules – Structural Steelwork Erection

The Builder should spot check that the positions of beams, at connections to other supporting members, are within tolerance.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			
Notes: All tolerances shall be as shown, except where overridden by AS 4100.						

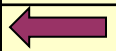
Sample Inspection Schedules – Structural Steelwork Erection

The webs of beams should be vertical, to avoid buckling under loads. The Builder should spot check that the connections are such that the beam web positions are within tolerance.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			
Notes: All tolerances shall be as shown, except where overridden by AS 4100.						

Sample Inspection Schedules – Structural Steelwork Erection

Tension members should not deviate from their correct position, relative to the other members to which they are connected, by more than the stated tolerance. The Builder should spot check that this is achieved.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			
Notes: All tolerances shall be as shown, except where overridden by AS 4100.						

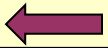
Sample Inspection Schedules – Structural Steelwork Erection

The structural steelwork must be erected such that the overall building dimensions are within the tolerances specified in the standard. The Builder should spot check that these tolerances are achieved.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			
Notes: All tolerances shall be as shown, except where overridden by AS 4100.						

Sample Inspection Schedules – Structural Steelwork Erection

All bolted connections must be made in accordance with the procedures on the drawings and in the standard. The Builder should spot check that this is being achieved.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			
Notes: All tolerances shall be as shown, except where overridden by AS 4100.						

Sample Inspection Schedules – Structural Steelwork Erection

The Builder should visually check that all chipped paintwork and scratches have been repaired during touch-up painting after erection.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			
Notes: All tolerances shall be as shown, except where overridden by AS 4100.						

Sample Inspection Schedules – Structural Steelwork Erection

The Builder should spot check that the grout packs under the steel column bases are correctly installed.

Item or Product	Inspection Required	Accept Criteria	Hold Witness	Date	Inspector	Comment
Column splice level	Spot check	+,- 10 mm	Witness			
Column splice position	Spot check	See compression member plumb	Witness			
Column splice plan position	Spot check	+,- 2 mm	Witness			
Beam connections	Spot check	Completed	Witness			
Beam sweep	Spot check	Braced length/500	Witness			
Beam position at connection	Spot check	+,- 10 mm	Witness			
Beam web	Spot check	+,- 3 mm	Witness			
Tension member position	Spot check	+,- 3 mm	Witness			
Overall building dimensions	Spot check	AS 4100	Witness			
Connections	Spot check	As specified	Witness			
Touch up surface treatment	Visual	No visible defects or chipping	Witness			
Grout packs at supports	Visual	In place. Material complies to AS 3600	Witness			
Notes: All tolerances shall be as shown, except where overridden by AS 4100.						

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