



Erection of timber roof trusses

Industry safety standard

March 2009

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This publication may contain work health and safety and workers compensation information. It may include some of your obligations under the various legislations that WorkCover NSW administers. To ensure you comply with your legal obligations you must refer to the appropriate legislation.

Information on the latest laws can be checked by visiting the NSW legislation website legislation.nsw.gov.au

This publication does not represent a comprehensive statement of the law as it applies to particular problems or to individuals or as a substitute for legal advice. You should seek independent legal advice if you need assistance on the application of the law to your situation.

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1. Introduction

The Industry Solutions Program is a research and development initiative undertaken by WorkCover NSW, which has worked with industry to devise practical solutions to problematic issues in an industry. It recognises the need for assistance in some industry sectors to overcome particular difficulties or challenges in order to improve workplace safety.

Solutions to safety issues are developed in partnership with industry within a three month period and then released for industry-wide implementation. Within 12 months an evaluation is conducted jointly with industry to determine the effectiveness and practicality of the solutions. If necessary, further refinements, including additional solutions, are included after the evaluation.

Erecting roof trusses requires workers to work at heights so as to erect and secure the roof trusses. There was no specific practical guidance available to assist these workers to undertake this work in a safe manner, hence this industry safety standard was developed and published in April 2007. A review of this standard was completed in March 2009.

Contributors to this industry safety standard include:

- Allcastle Homes
- Australand
- CFMEU
- Clarendon Residential Group
- Colson Construction
- Housing Industry Association Limited
- Master Builders Association NSW
- MiTek Australia Ltd.

This industry safety standard provides practical guidance for principal contractors, persons erecting trusses, suppliers of trusses, crane operators, owner builders and other building contractors. Clause 5 of the *Occupational Health and Safety Regulation 2001* (OHS Regulation), requires the control of risk to health and safety. Following this industry safety standard is a means to achieve such compliance.

2. Scope

This industry safety standard covers the preparation and erection of prefabricated timber roof trusses where spacing of the trusses is up to 600mm centres. It also provides general guidance for the erection of other prefabricated trusses spaced at larger centre distances.

3. Definitions

For the purpose of this industry safety standard, the following definitions apply:

competent person	for any task means a person who has acquired through training, qualifications or experience, or a combination of them, the knowledge and skills to carry out that task.
must	indicates that the requirements are mandatory under the NSW occupational health and safety (OHS) legislation.
should	indicates a recommendation to do something that is not a mandatory requirement under the NSW OHS legislation.

4. Roof truss pre-erection issues

4.1 Planning and preparation

Before commencing work on site, the principal contractor should consult with the persons erecting trusses to ensure work is planned and scheduled to minimise disruptions and situations that could affect safety.

This consultation should cover issues such as:

- the loading and unloading sequence of the trusses at the factory and on site
- the size and type of crane required to lift the trusses
- access and safe positioning of the crane (and use of a dogger if required)
- the availability of the perimeter scaffolding on site
- weather and site conditions
- overhead power lines
- manual handling risks
- preparation of safe work method statements.

All persons erecting trusses must have undertaken:

- OHS general induction for construction work
- work activity induction (including training in safe work method statements)
- site-specific induction.

4.2 Assessment of work site

The principal contractor, in consultation with persons erecting trusses, should undertake a site risk assessment prior to commencing work, and all significant hazards should be identified, assessed and controlled.

These include hazards such as:

- fall from heights
- manual handling
- working in proximity to powerlines.

4.3 Use of plant and equipment

4.3.1 Electrical plant

Power supply to the site should comply with the WorkCover code of practice *Electrical practices for construction work* (catalogue no. WC01420).

An electrical generator can be used if no power is supplied to the site. The generator should be:

- operated in accordance with the manufacturer's specifications
- fitted with an RCD unit
- inspected and serviced on a scheduled regular basis
- repaired by the manufacturer or qualified personnel, if required.

Fuel for the generator must be appropriately stored in a suitable container.

4.3.2 Ladders and ramps

When using a ladder, ensure that:

- it is fit for the purpose for which it is intended
- it is for industrial use and complies with Australian Standard AS 1892.5 *Portable ladders – selection, safe use and care*
- it is maintained in good working condition
- it is positioned on a stable, flat surface
- three points of contact are made with the ladder at all times when ascending and descending
- it is firmly secured or 'tied off'
- user's feet are no higher than the third highest rung, or the waist is no higher than the wall frame top plate – ie the wall frame top plate is between 900mm and 1100mm from the feet
- it is never 'walked' by the person standing on the ladder
- it is at a slope of approximately 4 to 1
- the nature of the work allows the person to lean forward towards the ladder
- the nature of the work, and the position of the ladder, do not require the person to overstretch
- the work does not cause fatigue – ie it is of short term duration and conducted in an ergonomic manner.

When using a ramp, ensure that it is constructed and set up according to Australian Standard AS 4576 *Guidelines for scaffolding*.

4.3.3 Power tools (including pneumatic tools)

When using a power tool, ensure that:

- it is inspected and maintained on a regular basis
- it is suitably guarded before use
- workers are trained in its safe operation as per the manufacturer's instructions
- workers are provided with the appropriate personal protective equipment, such as:
 - eye protection or face shields
 - appropriate footwear
 - ear plugs, muffs.
- electrical leads are:
 - tested and tagged in accordance with the WorkCover code of practice *Electrical practices for construction work* (catalogue no. WC01420)
 - visually inspected for damage before use
 - repaired by a competent person, where damage is observed
 - located where damage can be avoided and where they do not introduce a trip hazard
 - not located in wet places or places where they are subject to damage by liquids.

4.3.4 Cranes

When using a crane, ensure that:

- the operator holds a valid certificate of competency to operate such a crane – ie C2, C6, C1 or C0 for slewing cranes, CN for non-slewing mobile cranes over three tonne capacity (including the telehandlers) or CV for vehicle loading cranes. Note: Where the truss is held in position for installation with a vehicle loading crane, the operator needs a slewing crane certificate of competency
- where reasonably practicable and for ease of crantage, the person planning for the erection of roof trusses liaises with the truss supplier regarding the packing and unloading sequence of the trusses on site
- prior to operating the crane, the person erecting trusses organises the sequence of lifting roof trusses and ancillaries onto the top plates of wall frames
- prior to operating the crane, the operator undertakes a risk assessment of the crane operation at the site, which includes an assessment of:
 - weather conditions
 - overhead powerlines
 - crane stability
 - site conditions – eg excavations, subsidence, trees
 - traffic management
 - loads
 - surrounding structures and personnel
 - working areas and 'no go zones'.

4.3.5 Craning of roof trusses

The crane operator and the person erecting trusses should not lift or erect roof trusses if their risk assessment identifies any adverse wind conditions that present a risk to safe handling.

A certified dogger must direct the crane operator if the load is out of sight of the crane operator or where slinging techniques are required.

When craning roof trusses, ensure that all lifting and slinging:

- equipment is inspected by the crane operator, or a certified dogger, prior to use
- equipment meets (and is used in accordance with) the manufacturer's specification, and is in safe working condition
- of roof trusses is undertaken as per the Australian Standard AS 4440 *Installation of nail-plated timber roof trusses* Appendix E, and/or according to the manufacturer's specifications.

Other than those involved in the placement of the trusses, no-one is to stand within the operating area of the crane and load.

Instructions from the crane operator or dogger should be adhered to.

The person erecting trusses should ensure that all wall frames are adequately braced to withstand the weight of trusses that are temporarily placed on them.

4.3.6 Scaffolding and roof edge protection

Where scaffolding is used, it must comply with the appropriate part of the Australian/New Zealand Standard AS/NZS 1576 *Scaffolding*, in particular Part 1: General requirements, Part 3: Prefabricated and tube-and-coupler scaffolding, Part 5: Prefabricated splitheads and trestles and Part 6: Metal tube-and-coupler scaffolding – Deemed to comply with AS/NZS 1576.3.

In addition, scaffolding should be erected, used and removed in accordance with the Australian/New Zealand Standard AS/NZS 4576 *Guidelines for scaffolding*.

Where edge protection is used, it should comply with Australian/New Zealand AS/NZS 4994 *Temporary roof edge protection for housing and residential buildings* Part 1: General requirements, and should be erected in accordance with Part 2: Installation and dismantling.

5. Erection of roof trusses

5.1 Preparing for roof truss erection

Prior to commencing work, ensure that all work areas have safe paths of access and egress at all times, and are free of obstructions.

When working near window penetrations and balconies, ensure all open gaps and penetrations from which a person can fall are protected. Use any of the following methods:

- first floor edge protection system
- timber railings installed at point of manufacture
- temporary stud installed by person erecting roof trusses
- guard railing system
- full perimeter scaffold.

The first floor perimeter edge protection should not be removed until all openings and penetrations are otherwise protected. Temporary timber handrails should be checked for their quality and their effectiveness to prevent falls.

5.2 void areas

Where a void – eg stairs or atrium - exists, no-one is to install roof trusses unless a void protection platform system is installed at the floor below.

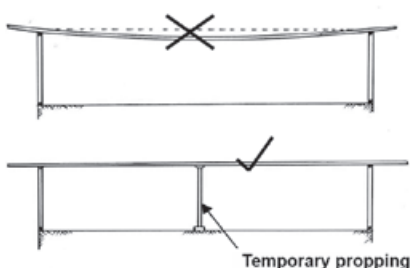
5.3 Lifting roof trusses onto wall frame top plates for erection

The person erecting trusses should assess the team's capability to handle the roof trusses. If the size, weight and positioning of the roof trusses pose a risk to the health and safety of the person erecting trusses, then a crane with a certificated operator must be employed to help undertake this task.

Method 1: Where craning is used

- Where trusses are craned into position, they should be laid flat and suitably supported prior to erection. This may require temporary props or internal walls for support (see figure 1).

Figure 1 – Method of supporting long trusses



- The person erecting trusses should ensure that all wall frames are adequately braced to withstand loads during construction.

Method 2: Where craning is not used

- Smaller trusses for single-storey roofs can be separated from the pack and lifted individually into position along the top plates.
- If the truss needs to be repositioned, the person erecting trusses should do this from below to avoid working at heights.

5.4 Safe erection methods for roof trusses

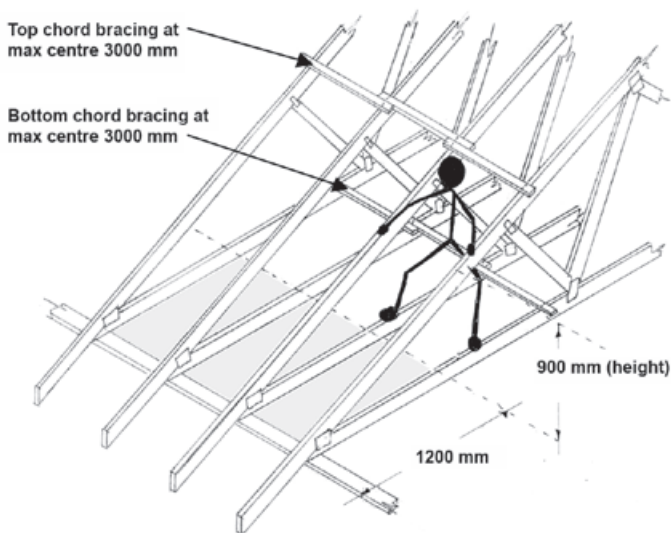
5.4.1 General

At no time is any person to stand on or work from an external wall top plate without suitable fall protection.

When trusses are erected at up to 600mm centres, persons working between the trusses to fix or brace them can use the erected trusses as a form of fall protection under controlled conditions as described in 5.4.2. When trusses are erected at greater than 600mm centres, see section 6 for advice on suggested methods of working safely at heights.

At no time is any person to work between the erected trusses or on the internal wall plates without a side protection formed by truss members of at least 900mm above the top plate or bottom chord of the truss, or within 1200mm of the outside wall top plate (see figure 2).

Figure 2 – NO GO ZONE for persons erecting trusses



Note: Truss bottom chords are considered a safe working area for a competent person if all the below conditions are met.

5.4.2 Working from bottom chords of roof trusses

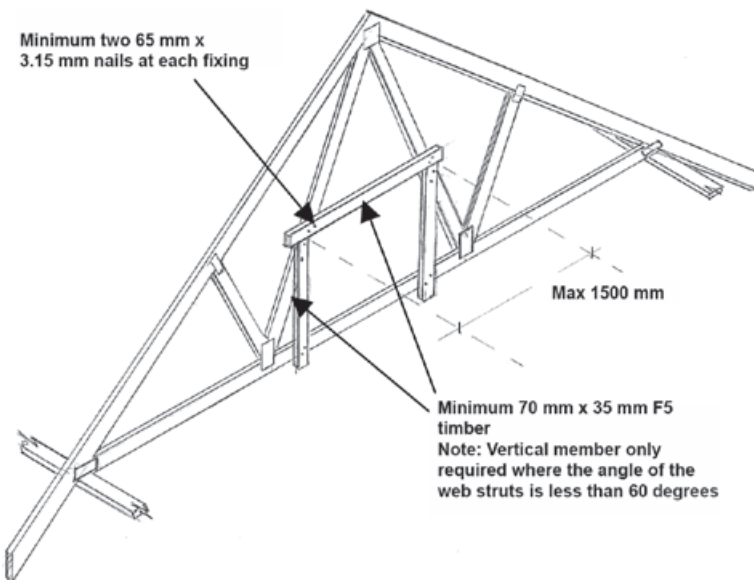
If the person erecting trusses is to walk or work from the bottom chords of the trusses, the following conditions should be applied:

- Trusses are adequately braced to stabilise the structure – bracing should be no more than 3000mm apart if the bottom chord is used to support the person erecting trusses (see figure 2).
- Only a competent person, who is suitably trained, is to work at heights.
- Suitable footwear that provides good foothold is to be worn.
- A nominated competent person from the truss erection team is to oversee the work.
- The bottom chord is visually checked by a nominated competent person for defects that may compromise the chord's structural integrity – ie knots, splits, cracks and rotting timber – before anyone walks on it. If a defect is found it should not be walked upon until rectified (rectification details should be obtained from the truss manufacturer). The principal contractor should be notified.

If the apex or other high bracing points cannot be reached whilst standing on the bottom chord, use the following method (or an alternative safe method):

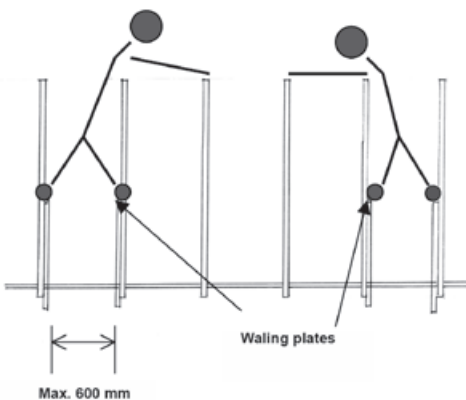
- Fix temporary waling plates for standing on or supporting a scaffold plank of 225mm width (minimum) at an appropriate height.
- The waling plate should be fixed to the face of the truss according to the truss manufacturer’s recommendations to ensure the load is transferred to the bottom chord.
- The waling plate should be timber of 70mm x 35mm F5, or equivalent, to a maximum of 1500mm long, fixed at each end by a minimum of two 65mm x 3.15mm nails (see figure 3).

Figure 3 – Suggested method of fixing temporary waling plate



- The web strut to support the waling plate should be a minimum 70mm x 35mm F5, or equivalent, fixed at each end by a minimum of two 65mm x 3.15mm nails.
- Waling plates should be erected in pairs every fourth truss, or as required, to enable adequate access to fixing points for bracing (see figure 4).
- Temporary waling plates and struts should be removed once no longer required.

Figure 4 – Showing the positions for pairs of waling plates



5.4.3 Erecting first and second standard trusses

Erect the first truss at the location specified by the roof manufacturer. This may be repeated a number of times for each common span series of trusses, depending on the roof layout design.

The person erecting trusses should erect, fix and brace the first and second truss as follows:

- Set up an appropriate working platform with a platform height not greater than two metres from the floor level at each end where the truss is to be fixed to the top plate. Alternatively, use a ladder in accordance with section 4.4.2. If a perimeter scaffold system is installed this work can be done from the outside rather than using internal working platforms or ladders.
- Fix temporary braces to solid fixing points ready for connection to the truss. The braces can be timber of adequate size and length fixed by nails.
- The person erecting trusses should inspect the temporary bracing materials for obvious defects that may compromise the material's structural integrity – ie knots, splits, cracks and rotting timber.

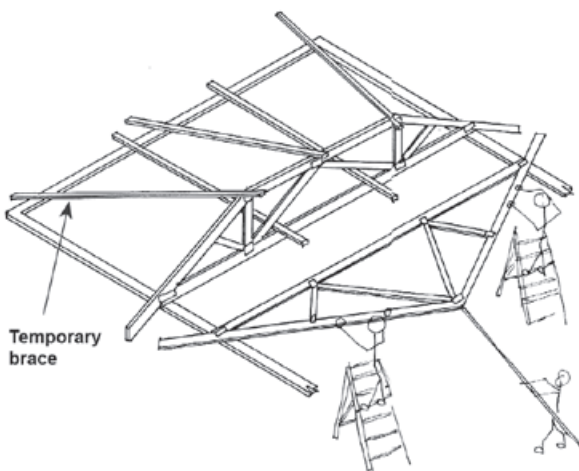
Method 1: Where craning is used

- Guide the first truss into position while supported by the crane.
- Use a minimum of two people, one at each end, to fix the truss to top plates and to the temporary braces. At this point, the first truss should be in a stable condition.
- Erect the second truss using the same procedure as above.
- Temporarily brace the second truss to the first truss according to section 5.4.4.

Method 2: Where craning is not used

- Fix skid blocks to top plate at first truss position to prevent the truss from slipping during standing.
- Use a minimum of two people, one at each end, to stand the first truss; a third person may be required at mid-span to assist in stabilising a long span truss (see figure 5).

Figure 5 – Recommended method of manually standing trusses with a high apex



- After standing the first truss to the vertical position, secure it to temporary braces. At this point, the first truss should be in a stable condition.
- Erect the second truss using procedure above.
- Temporarily brace the second truss to the first truss according to section 5.4.3.

5.4.4 Erecting subsequent trusses

Trusses should be taken from the stockpile and moved into position, by crane or by the persons erecting them. Additional trusses are not to be erected unless the prescribed fixing, bracing and any additional support requirements have been undertaken for the first and second trusses.

Once the first and second trusses are fixed and temporarily braced in accordance with section 5.4.3, the bottom chord may be used for the person erecting further trusses to stand on or to support temporary working platforms.

Each subsequent truss is placed with each end of the truss controlled by a person on the working platform or ladder. A third person at the apex may be required to assist.

Each subsequent truss is also fixed and braced according to the manufacturer's specifications using safe methods for working at heights (see sections 5.4.1 and 5.4.2).

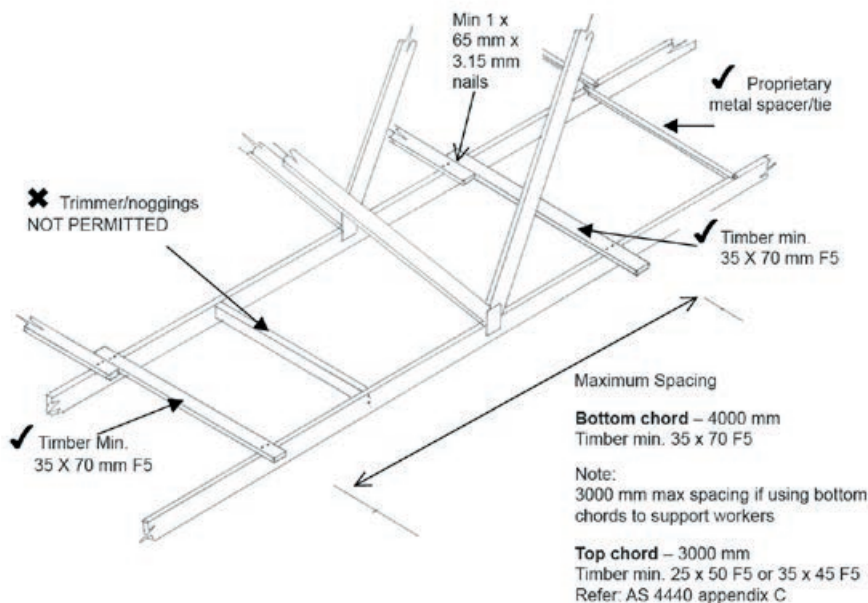
5.4.5 Fixing of top and bottom chord temporary bracing

Temporary ties or bracing for truss erection should be fixed according to Australian Standard AS 4440 *Installation of nail-plated timber roof trusses*. This requires that temporary ties be used on the top chords at spacings no greater than 3000mm and on the bottom chord at spacings no greater than 4000mm.

If the person erecting trusses is to be supported by the bottom chords of the roof trusses, the ties or bracing must be at spacings no greater than 3000mm.

Bracing and fixing should take into consideration all imposed loads during the course of construction. As such, flat strapping or equivalent, or trimmers nailed to the face of trusses where the nailing is from the outer face of the truss, should not be used (see figure 6).

Figure 6 – Temporary bracing/ties to bottom chord of trusses. Note: Bracing to top chord similar



5.4.6 Erection of gable roof assembly and verge truss assembly (diminishing truss, verge truss, verge trimmers, gable studs/droppers)

The erection should be done using appropriate safe work methods.

Where practicable, elements of the roof structure, such as a verge sprocket and outriggers, should be pre-assembled on the ground as a complete unit and lifted onto the supporting structure.

5.4.7 Erection of ancillary items

Girder boots, hangers and the like should be installed to the manufacturer's specifications prior to working in the truss space.

The erection should be done using the appropriate safe work methods described in sections 5.4.2 and 5.4.3.

5.4.8 Valley (Saddle) trusses

Erection of valley (otherwise known as saddle) trusses may be carried out by persons standing on the top or bottom chords of the existing trusses, provided that:

- the girder truss (or largest span valley truss where there is no girder truss) is installed at the lower end and braced
- the valley trusses are installed from the girder truss towards the apex and progressively braced
- they stay outside the valley truss no go zone.

6. Erecting trusses at greater than 600mm centres

In certain situations, the spacing of the truss may exceed 600mm centres, in which case other fall protection should be provided when working at heights to fix and brace the trusses. Such fall protection may include:

- mobile scaffolding system complying with Australian Standard AS 1576 *Scaffolding* Part 1: General requirements and Part 3: Prefabricated and tube-and-coupler scaffolding, and Australian Standard AS 4576 *Guidelines for scaffolding*
- mesh or netting installed to the manufacturer's specifications
- fencing and handrails within adjacent trusses, installed to the designer's or manufacturer's specifications
- elevating platforms, including motorised single person lift platforms complying with Australian Standard AS1418.10 (Int) *Cranes, hoists and winches* Part 10: Elevating work platforms.

Appendix A – Checklist

The following checklist can be used by a person preparing for the erection of timber roof trusses to ensure the important safety features and procedures specified in this industry safety standard are in place. It should be used prior to work being undertaken.

By reviewing and completing this checklist as needed you will be well on your way to meeting your legal obligations.

Item	Yes	No	Comment
Pre-start checklist:			
Has the worksite been assessed for all significant hazards affecting the roof truss erection? See section 4.3	<input type="checkbox"/>	<input type="checkbox"/>	
Has all plant and equipment used for the roof truss erection been checked for safe use, including electrical and pneumatic tools, working platforms and ladders? See section 4.4	<input type="checkbox"/>	<input type="checkbox"/>	
If required, is the crane correctly selected for its appropriate size and set up for the worker? See section 4.3.4	<input type="checkbox"/>	<input type="checkbox"/>	
Do the crane operator and dogger (if required) hold the appropriate certificate of competency? See section 4.3.4	<input type="checkbox"/>	<input type="checkbox"/>	
Has the craning of trusses onto the wall frames been appropriately assessed and planned before work commences? See section 4.3.5	<input type="checkbox"/>	<input type="checkbox"/>	
Have all foreseeable risks of fall been assessed and addressed before working at heights? See section 4.3	<input type="checkbox"/>	<input type="checkbox"/>	
If the roof truss centres are greater than 600mm, are alternative safe work methods suitably selected and used? See section 6	<input type="checkbox"/>	<input type="checkbox"/>	
Working checklist:			
Are workers working at heights within the roof trusses and not in the 'no go zone'? See figure 2 section 5.4.1	<input type="checkbox"/>	<input type="checkbox"/>	
Has an assessment been carried out to ensure all temporary bracing of trusses is in place? See section 5.4.1	<input type="checkbox"/>	<input type="checkbox"/>	
Have the bottom chords been checked for any defects and does the truss meet the requirements in the standard for allowing a person to walk and work from the bottom chord? See section 5.4.2	<input type="checkbox"/>	<input type="checkbox"/>	
Is the person working from the bottom chords of the trusses experienced and trained? See Section 5.4.2	<input type="checkbox"/>	<input type="checkbox"/>	
If required, have waling plates used for gaining extra height to secure permanent bracing been suitably designed, installed and used? See section 5.4.1	<input type="checkbox"/>	<input type="checkbox"/>	
Are the procedures in this industry safety standard for erecting the first and second trusses understood and followed? See section 5.4.3	<input type="checkbox"/>	<input type="checkbox"/>	
Is the spacing and fixing of top and bottom chord temporary bracing done in accordance with Australian Standard AS 4440 and this standard? See section 5.4.4	<input type="checkbox"/>	<input type="checkbox"/>	

Appendix B – For further information

- Go to WorkCover’s website at workcover.nsw.gov.au
- Call the WorkCover Assistance Service on 13 10 50
- Call the WorkCover Publications Hotline on 1300 799 003
- Visit your nearest WorkCover office
- For technical specifications about erecting roof trusses, contact your local truss manufacturer.

Approved industry codes of practice

- Code of practice on *Electrical practices for construction work* (catalogue no. WC01420).

WorkCover position papers

- Working off stepladders
- Requirements for trestle ladders in NSW.

Australian Standards

Australian Standards can be purchased from SAI Global by contacting the Customer Service Centre on 131 242 or visiting saiglobal.com/shop

AS 2550.1	<i>Cranes, hoists and winches – Safe use</i> Part 1: General requirements
AS 2550.5	<i>Cranes, hoists and winches – Safe use</i> Part 5: Mobile cranes
AS 2550.10	<i>Cranes, hoists and winches – Safe use</i> Part 10: Elevating work platforms
AS 2550.11	<i>Cranes, hoists and winches – Safe use</i> Part 11: Vehicle loading cranes
AS/NZS 1576.1	<i>Scaffolding</i> Part 1: General requirements
AS/NZS 1576.3	<i>Scaffolding</i> Part 3: Prefabricated and tube-and-coupler scaffolding
AS 1576.5	<i>Scaffolding</i> Part 5: Prefabricated splitheads and trestles
AS/NZS 1576.6	<i>Scaffolding</i> Part 6: Metal tube-and-coupler scaffolding – Deemed to comply with AS/NZS 1576.3
AS 4576	<i>Guidelines for scaffolding</i>
AS 6001	<i>Working platforms for housing construction</i>

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