

ERECTING, ALTERING AND DISMANTLING

SCAFFOLDING

PART 1: PREFABRICATED STEEL MODULAR SCAFFOLDING

INDUSTRY SAFETY STANDARD

AUGUST 2008





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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 released for industry-wide implementation. Within 12 months, an evaluation is conducted to determine the effectiveness and practicality of the solutions. If necessary, further refinements, including additional solutions, are included after the evaluation.

The Industry Solutions Program identified that there is limited practical guidance material to assist workers on erecting, altering and dismantling prefabricated steel modular scaffolding – hence this industry safety standard was developed.

Contributors to this industry safety standard include:

- Access Guard Platforms, Scaffolding & Edge Protection
- Boral
- · Bovis Lend Lease
- CFMEU
- Clarendon Residential
- East Coast Scaffolding
- Housing Industry Association
- · Kohinor Pty Ltd
- · Lipman Pty Ltd
- Marron Consultancy
- Master Builders Association NSW
- · SGB Raffia Ptv Ltd
- Southern Cross Construction NSW
- TAFE NSW
- Unions NSW
- Waco Kwikform.

This industry safety standard provides practical guidance for those erecting, altering and dismantling scaffolding, and for principal contractors, employers, suppliers of scaffolds and others involved in using prefabricated steel modular scaffolding. 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. PURPOSE

The purpose of this industry safety standard is to provide guidance to scaffolders to safely erect, alter and dismantle prefabricated steel modular scaffolding where this information is not available from the manufacturer or supplier and the scaffold is of a basic configuration.

There are risks associated with scaffolders falling through and from the scaffold as they engage in these activities. To minimise these risks, this standard requires scaffolders to install and work from fully planked platforms at nominally two metre vertical intervals, and install guardrails and midrails in advance of the decking. However, if it is not practicable to install fully planked platforms at two metre intervals, a larger interval not exceeding three metres may be permitted using alternative safe methods and design limitations. The fully planked platforms are to remain in place until the scaffold is dismantled.

This industry safety standard also provides practical guidance for users of scaffolds on procedures for managing the number of permitted working platforms and their duty ratings to prevent overloading of the scaffold.

3. SCOPE

This industry safety standard covers the erecting, altering and dismantling of prefabricated steel modular scaffolding not exceeding 20 metres high, erected with all standards founded on the ground or another solid surface.

This standard does not cover:

- scaffolds that require specific engineering designs, such as hung scaffolds, cantilevered scaffolds, loading platforms, birdcage scaffolds or scaffolds where the loads from one bay are transferred to the adjoining standards – eg spur scaffolds or scaffolds incorporating an access opening
- scaffolds where the fully planked platforms are installed at greater than three metre vertical intervals.

Note: there may be prefabricated modular steel scaffolding designs that require specific erection methods. In such situations, these alternative methods must provide equivalent safety to those specified in this standard.

4. **DEFINITIONS**

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

Australian Standard a document published by Standards Australia.

base lift the first level of transoms and ledgers above the jacks.

closed platform a platform that is constructed and that is capable of

functioning as a working platform, but is temporarily closed to

any loading or access, in accordance with table 1.

erection platform a temporary platform that is placed on the scaffold or

temporarily constructed as part of the scaffold to assist with the installation (or removal) of the standards, transoms, ledgers, guardrails and mid-rails for the platform above. Figures

2, 3, 4 and 5 show various examples of a temporary erection

platform.

hop-up bracket (platform

bracket)

a bracket that is attached to a scaffold to enable a platform to be placed adjacent to a bay of an independent scaffold.

must indicates that the requirements are mandatory under the NSW

occupational health and safety (OHS) legislation.

principal contractor a person who is, under clause 210 of the OHS Regulation,

for the time being, appointed or taken to be the principal

contractor for the construction work.

safe work method statement

describes how work is to be carried out

· identifies the work activities assessed as having safety risks

• identifies the safety risks

describes the control measures that will be applied to the

work activities

 includes a description of the equipment used in the work, the standards and codes to be complied with, the

qualifications of the personnel doing the work and the training required to do the work.

scaffold standard a vertical structural member of the scaffold that transmits a

load to a supporting structure.

should indicates a recommendation to do something that is not a

mandatory requirement under the NSW OHS legislation.

solid surface a surface with adequate stiffness and strength to sustain

imposed loads from the scaffold.

tie bar a member fixed to the cantilevered end of a pair of hop-up

brackets to prevent the brackets from spreading and the planks

from becoming dislodged.

toeboard a scaffold plank or purpose-designed component fixed on edge

at the edge of a platform to prevent material from falling off

the platform.

working face the face of a building or structure at which the scaffold has

been erected to enable work to be carried out at some stage of

the project.

working platform a platform on a scaffold, positioned at a work location for

supporting personnel, equipment and materials and used to

provide a working area.

5. SCAFFOLD DESIGN LIMITATIONS

The platform duty ratings and generic work sequence recommended in this standard are deemed to comply for a specific range of scaffold design assumptions. Any scaffold that does not meet those assumptions must be specifically-designed to provide equivalent safety.

5.1 DESIGN ASSUMPTIONS

- Standards are manufactured from tube 48.3 mm OD x 4 mm wall thickness and minimum steel grade C250 (minimum yield strength).
- Scaffold is erected nominally plumb and standards are free of bends and damage.
- Maximum height to the top working platform is no more than 20 metres.
- Bay size is not exceeding 2.4 m x 1.3 m approximately.
- Number of fully planked platform levels is not more than 10.
- Number of platform brackets levels is not more than 10 platform brackets may be capable of supporting one or two planks wide (about 450 mm). Three plank brackets must not be used.
- Live load, uniformly distributed over the working platform, must not exceed permissible live load as outlined in table 1.
- Working platforms supported by hop-up brackets are not loaded to more than light duty, regardless of the duty rating of the working platform in the adjoining scaffold bay.
- Number of permitted loaded working platforms and platforms supported by hop-up brackets are not greater than those shown in table 1.
- Where specified, scaffold is sheeted with chain-wire mesh and 20 per cent-porosity (minimum) shade cloth – denser sheeting is not permitted.
- The maximum vertical extension of a clad scaffold above the highest tie must not exceed two metres, with all standards being full standards without any joints.
- Wind load is imposed by a wind speed not exceeding 60 kph (16 m/s) acting at 90 degrees directly onto the scaffold face this design assumption does not allow a scaffold to be erected near a cliff edge or any other area where high winds are likely to occur during the time the scaffold is being erected, used or dismantled (this assumption also applies to incomplete scaffolds).
- Every second standard is tied to a supporting structure of adequate strength, at four metre (maximum) vertical intervals.
- Ties are staggered, as far as reasonably practicable.
- The foundation or footing has adequate bearing capacity to support the imposed load from the scaffold (refer to Australian Standard *AS 4576 Guidelines for scaffolding*).

Variations to the above design assumptions will require a detailed structural analysis by a structural engineer with a sound knowledge of scaffolding.

5.2 PERMITTED SCAFFOLD CONFIGURATIONS

Check that the installed scaffold conforms to the design assumptions before using the information in the table below.

Working platforms of various duty ratings may be provided at various levels so long as the platforms within any bay comply with a row from table 1. An example of staggered working platforms is given in figure 1a.

The full run of the platform does not have to be classified as a working or closed platform.

Closed working platforms must not be used as access to a working platform.

Max height (m) to top platform	Max number of fully planked platforms	Max number of planked hop-up platforms 1 or 2 planks wide		umber of load in the scaffold Medium duty (450 kg)	•	Permitted number of loaded hop-up platforms 1 or 2 planks wide (light duty only)	
20	10	10	1	0	0	1	
20	10	10	0	1	1	1	
20	10	10	0	0	2	1	
16	8	8	1	0	1	1	
16	8	8	0	2	0	2	
16	8	8	0	1	1	2	
12	6	6	1	1	0	2	
12	6	6	1	0	2	2	
12	6	6	0	2	1	2	
12	6	6	0	1	3	2	
6	3	3	2	0	0	2	

Table 1: Permitted number of loaded platforms and hop-up platforms

Note: • Read across the table for each variation of permitted number of loaded platforms and hop-up platforms (for example, see the bold figures).

- Platforms within the bay must not be loaded to greater duty loading than shown in the table.
- Load on hop-up platforms must not be greater than light duty loading.

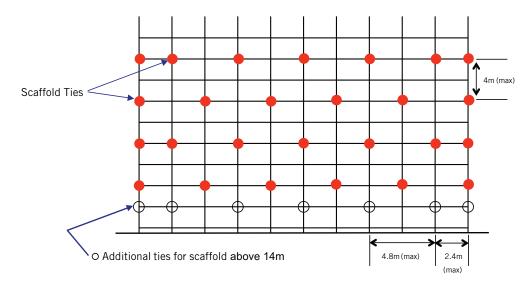


Figure 1: Diagrammatic illustration of a typical tie pattern

Bay No. \rightarrow	1	2	3	4	5	6	etc.
etc.							
5	HD	HD	С	С	С	С	
4	С	С	С	С	HD	MD	
3	С	С	HD	HD	С	С	
2	С	С	С	С	С	LD	
1	С	С	С	С	С	С	
Level 1							

C CLOSED
HD HEAVY DUTY
MD MEDIUM DUTY
LD LIGHT DUTY

Figure 1a: Example of staggered work platforms, based on direct access from the building to each platform.

6. CONTROL MEASURES FOR WORKING PLATFORMS

Procedures should be implemented for managing the number of permitted working platforms where the loading of all platforms would otherwise overload the scaffold.

There should be a system in place to limit the number of platforms permitted as working platforms, and to limit the respective platform ratings, to prevent the scaffold being overloaded. Table 1 outlines the permitted number and ratings of platforms for various scaffold heights.

Possible systems include:

- closing off platforms at the access points by physical means
- placing signs at the access points to each platform, advising if closed or indicating the duty rating of a working platform
- assigning an on-site scaffold coordinator to control the use of various platforms, or sections of platforms, with the relevant contractors
- designating who is to use the scaffold at any given time.

Principal contractors must clearly identify in their site-specific OHS management plan those responsible for implementing the control measures.

The system should also:

- include, in the site induction, the control measures and the names of those persons responsible for implementing the controls
- have means to identify working platforms that are closed this can be discussed at regular toolbox meetings
- have means to monitor and review the control measures regularly if the control
 measures are not effective, they should be modified, and records of the monitoring and
 modifications should be kept.

7. ERECTING, ALTERING OR DISMANTLING

Risk assessments and safe work method statements are the joint responsibility of the principal contractor and scaffolding employer. They must use any information from the scaffold manufacturer, supplier, site management, and any information gleaned from consultation with the workers who undertake the erecting, altering or dismantling of the scaffolds.

For safe completion of the work, consider the following:

- Pass scaffold items do not throw them.
- The scaffolder must work from a safe position when installing edge protection for the platform above eg standing on a purpose-made erection platform with edge protection (see figures 2, 3, 4 and 5 for various examples of a temporary erection platform).
- The scaffolder should be supported on a fully planked platform when installing the platform immediately above, except for platform spacings above two metres where another purpose-made erection platform may be required for platform installation.
- The fully planked platforms should be nominally two metres apart, vertically, and remain in place until the scaffold is dismantled.
- The first platform can be up to three metres above the ground or supporting surface, except for the access bay.
- Safe access must be provided up to the first platform and between platforms on the scaffold.
- Risks from overhead power lines must be assessed and controlled see WorkCover's *Code of practice: Work near overhead power lines.*

7.1 GENERIC WORK SEQUENCE - SCAFFOLD ERECTING AND DISMANTLING

TASK	ACTIVITY
Break the job down into	
steps	
Base out scaffold and	Prevent unauthorised access to scaffold area.
erect base lift and first	One scaffolder holds standards, while another places
lift	transoms and ledgers.
	Adjust screw jacks to level the scaffold.
	Erect transoms and ledgers for the first lift.
	Erect planks from below.
Complete first lift	Install access stairway or ladder to platform above.
	Access each lift by ladder or stairway.
	If access is by stairway, ensure the stair access bay is erected
	with the run of the scaffold.
	Install guardrail, mid-rail and toe board to first lift.

TASK	ACTIVITY
Break the job down into	
steps	
Erect next lift from a platform	 Working from a fully planked platform, install standards (where the standard joint is 1 to 1.5 m above the platform level), transoms, ledgers and hop-ups for the next lift above. Place an erection platform on the scaffold – see figures 2, 3, 4 and 5 for erection platform options. Working from the erection platform, erect standards (where the standard joint is 1 to 1.5 m above the erection platform level) and guardrails for the lift above. Erect mid-rails for the lift above from the erection platform. scaffold should be erected as close as practicable to the working face. Where the scaffold is greater than 225 mm from the working face, install guardrails and mid-rails to the inner face standards. Standing on the working platform, place planks within the
	 transoms to form the above working platform. Access the above working platform. Install mid-rails (if not already erected) and toe boards (or other systems to prevent objects falling).
Erect third and higher lifts from a platform	 Unless a specific engineering design is provided, fix the first row of ties no more than four metres above the ground. Do not allow a scaffold to free stand more than four metres above the ground or a row of ties. Do not leave unsecured objects on the scaffold. Repeat erection sequence as per previous task.
Raise the platform one metre from a fully planked platform (this applies to platforms five planks wide)	 Standing within the scaffold bay and behind the guardrail, install the guardrail for the platform above. If mesh guard is being used, raise the mesh guard to its new location for the one metre work platform. The scaffolder on the work platform removes the internal board from the work platform (the board closest to the building) and places it on the transoms for the lift above. Repeat sequentially until the last two planks remain. The scaffolder accesses the raised deck. A worker positioned on the fully planked platform below lifts the remaining two boards and passes them up to the scaffolder above. The scaffolder places the boards on the transoms, completing the raised platform. Install mid-rails (if not already erected) and toeboards (or other systems to prevent objects falling). Note: if a three board platform is used, an alternative method must be devised.

TASK	ACTIVITY
Break the job down into	
steps	
Lower the one metre	Reverse the raising sequence.
platform (this applies	
to platforms five planks	
wide)	
Install ties	Install ties from a fully planked platform.
	Check with site management that the supporting structure
	has sufficient strength to withstand the forces imposed by
	the scaffold when the tie is connected – ie minimum 615 kg
	push in or pull out per tie.
Fix anchors (where	Install anchors in accordance with the manufacturer's
required)	instructions.
	Check the structure and material to which the drilled-
	in anchors are applied, to confirm its suitability for the
	application.
Erect and move hop-up	Erect or move hop-up brackets, tie bars and planks from
brackets and tie bars	behind a standard on the fully planked platform below.
Install access	Erect stairways and ladders progressively from the base of the scaffold.
	Ensure that the top of any ladder extends not less than
	900 mm above the highest platform served by the ladder,
	otherwise provide a suitable handhold to this height.
	Ensure that suitable edge protection is fitted at the opening
	in each platform served by the ladder within the scaffold bay.
	Secure ladders to prevent movement.
Fix chain wire mesh	Fix chain wire mesh when working from a fully planked
(where specified)	platform with edge protection (eg guardrails and mid-rails).
	Securely fix chain wire mesh to the scaffold at 1200 mm
	centres (maximum), vertically and horizontally.
	Fill all gaps between panels of chain wire mesh with similar
	material.
	Ensure chain wire mesh extends at least one metre above
	the top-most platform. Scaffold must not extend more than
	two metres above top tie if clad with chain wire mesh and/or
	shade cloth.
	Do not allow any sheeted scaffold to free stand more than
	two metres above the highest tie remaining in place.

TASK	ACTIVITY
Break the job down into	
steps	
Fix shade cloth (where specified)	Fix shade cloth from a fully planked platform with edge protection.
	Securely fix the shade cloth to the scaffold or chain wire
	mesh at 1200 mm centres (maximum), vertically and
	horizontally.
	• Fill all gaps in shade cloth with similar material.
	Ensure shade cloth extends at least one metre (but no more)
	than two metres) above the top-most platform.
	Do not allow any sheeted scaffold to free stand more than
	two metres above the highest tie remaining in place.
Erect mesh panels	Erect mesh panels when working from a fully planked
(where specified)	platform with edge protection.
	Gaps between adjoining mesh panels and standards must not
	be greater than 25 mm, measured horizontally.
	Fill any larger gaps between panels with similar material.
	Do not allow any sheeted scaffold to free stand more than
	two metres above the highest tie remaining in place.

Break the job down into steps Dismantle scaffold General precautions Access the scaffold platform from a ladder or stair accession do not climb the standards, ledgers and transoms. Maintain a tidy work area.	
steps Dismantle scaffold General precautions • Access the scaffold platform from a ladder or stair acceded on the company of the standards, ledgers and transoms.	
Dismantle scaffold General precautions Access the scaffold platform from a ladder or stair access to do not climb the standards, ledgers and transoms.	
 Do not overload the scaffold bays; progressively remove scaffolding equipment from platforms and stack it near the ground. Do not leave loose materials on platforms. Do not throw down any materials or scaffolding equipment in Remove chain wire mesh and shade cloth while working a fully planked platform. Work with a guardrail in place when removing and passed mesh panels down. Work from a fully planked platform below when dismand hop-up brackets, tie bars and planks. 	nent. g from sing
 Do not allow an unsheeted scaffold to free stand more four metres or a sheeted scaffold more than two metre above the highest tie remaining in place. Before lifting a toe board, ensure the adjacent plank is in place. Dismantling sequence Access the top platform by stairway or ladder. Start dismantling from an end bay. Remove chain wire mesh and shade cloth, or mesh par from the level to be dismantled, or from the whole scan not required during the dismantling process. Move down to the platform below. Dismantle top platform planks. Working from an erection platform on the fully planked platform, dismantle guardrails, mid-rails, ledgers, transand standards from the level above. Step off the erection platform. Dismantle the hop-up platform above, if in place. Remove not more than three planks (ensure at least two planks remain) to enable the dismantled materials to be passed down to the next level (where they are to be temporarily stacked). 	s held nels, ffold if
 Remove ties progressively as the scaffold is dismantled Progressively repeat this procedure until dismantling c completed from the ground. 	

7.2 ERECTION PLATFORM OPTIONS

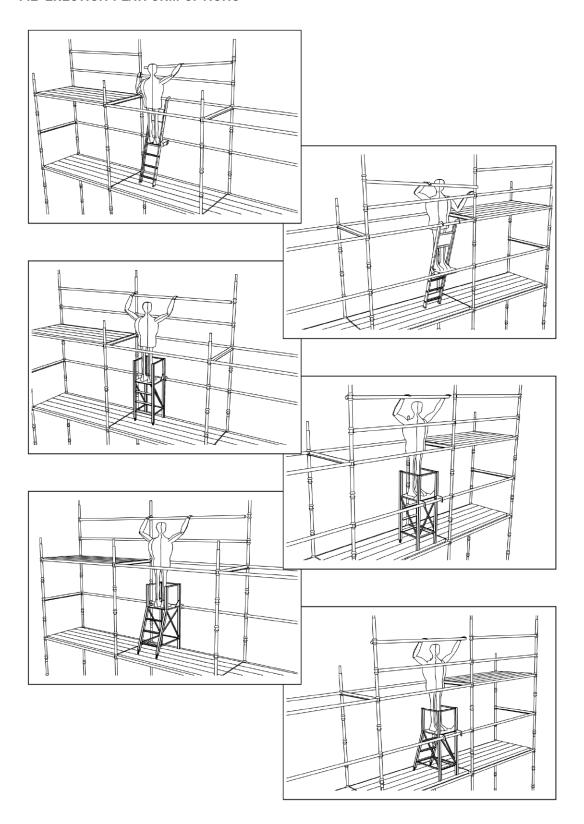


Figure 2: Diagrammatic illustration of erection and dismantling using various erection platform options – one-man operation. Note: scaffold is shown against a building, so guardrails only needed on external face. Toeboards and lower mid-rails omitted for clarity.

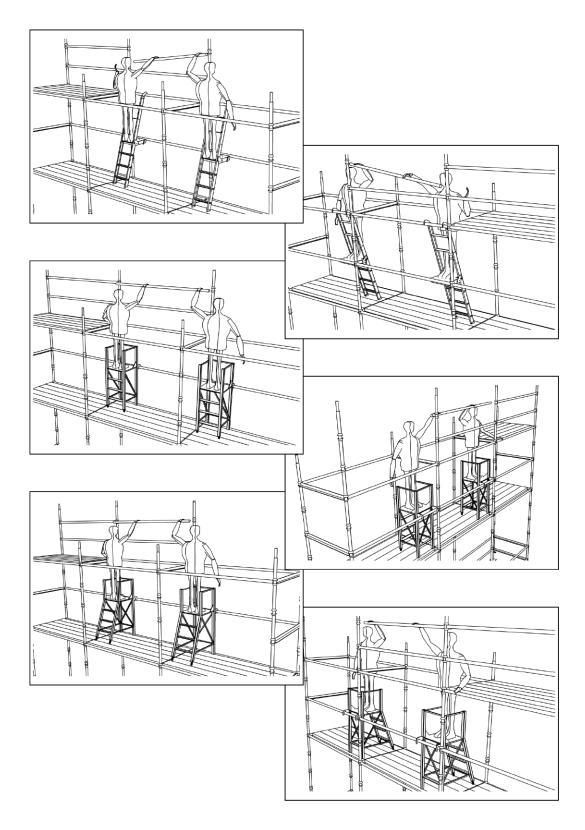


Figure 3: Diagrammatic illustration of erection and dismantling using various erection platform options – two man operation. Note: scaffold is shown against a building, so guardrails only needed on external face. Toeboards and lower mid-rails omitted for clarity.



Figure 4: Diagrammatic illustration of erection and dismantling using platform option for a five plank wide scaffold. Note: scaffold is shown against an existing building, so guardrails only needed on external face. Toeboards and lower mid-rails omitted for clarity.









Figure 5: Photographic illustration of erection and dismantling using two erection platform options for a three plank wide scaffold. Note: scaffold is shown against a building, so guardrails only needed on external face. Toeboards and lower mid-rails omitted for clarity.

APPENDIX A - CHECKLIST

The following checklist can be used by a person in control of preparing for the erection, alteration and dismantling of a scaffold 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.

Tick **yes** or **no** as appropriate against each item.

By reviewing and completing this checklist with all 'yes' answers you will be well on your way to achieving your legal obligations.

Where you answer 'no' to any item, you should ensure that the item is still addressed to meet your safety obligations.

DESIGN	YES	NO
Is the maximum height to the top working platform no more than 20 metres?		
Are standards manufactured from tube 48.3 mm OD x 4 mm wall thickness		
and minimum steel grade C250?		
Is the bay size 2.4 m x 1.3 m (approximately)?		
Is the number of fully planked platforms no more than 10?		
Is the number of available hop-up brackets capable of supporting platforms		
not more than 10?		
Are the hop-up brackets suitable for no more than two planks (about 450 mm		
width)?		
Is live load uniformly distributed over the working platform – ie does not		
exceed permissible live load as outlined in table 1?		
Is there a system in place to limit the number of working platforms and hop-		
up platforms and their associated duty ratings in accordance with table 1?		
Are working platforms supported by hop-up brackets not loaded to more		
than light duty, regardless of the duty rating of the working platform in the		
adjoining scaffold bay?		
Is scaffold sheeting (eg chain wire mesh and shade cloth), if provided, at least		
20 per cent porous?		
Has every second standard been tied to a supporting structure of adequate		
strength at (maximum) four metre vertical intervals?		
For scaffolds greater than 14 metres in height to the top working platform, is		
an extra row of ties fitted near the base of the scaffold as shown in figure 1?		
Are standards with sheeting attached extending no more than two metres		
above the highest ties?		
For standards supporting sheeting, are all the joints below the top working		
platform?		
Are ties staggered, as far as reasonably practicable?		
Have joints in the standards been staggered, as far as reasonably practicable?		
Is the foundation or footing adequate to support the imposed load?		
Note: if in doubt, get expert advice.		

ERECT, ALTER OR DISMANTLE	YES	NO
Are the platforms nominally two metres apart vertically?		
Is the scaffolder able to stand on a fully planked platform when installing the		
deck immediately above?		
Is the scaffolder able to work from a safe position when installing standards,		
ledgers, transoms and guardrails for the platform above – ie standing on an		
erection platform, with edge protection either integral or on the scaffold itself?		
Has safe access been provided between platforms on the scaffold?		
Are guardrails and mid-rails installed if the gap between the working face and platform is greater than 225 mm?		
Is dismantling of scaffolding being undertaken in accordance with general		
precautions and dismantling sequences as specified in the safe work method		
statement?		
SITE MANAGEMENT	YES	NO
Is there an OHS management plan on-site that clearly identifies those		
responsible for implementing control measures in relation to scaffolding?		
Does the site-specific induction include the names of all persons responsible		
for implementing control measures in relation to scaffolding?		
Has a documented site-specific risk assessment been undertaken to ensure		
that scaffolding is not erected near cliff top or other high wind areas?		
Are site-specific hazards – eg proximity to powerlines – and control measures		
included in the scaffolding safe work method statement?		
Is every platform fully decked?		
Does the principal contractor have a system in place to inform workers which		
platforms are working platforms or closed platforms – eg regular toolbox		
meetings?		
Is there adequate supervision to ensure that the control measures are		
monitored for effectiveness and modifications are recommended when		
appropriate – ie closing off platforms at the access points by physical means?		
Are scaffold inspection records available and maintained by the principal		
contractor?		

APPENDIX B - FURTHER INFORMATION

- Visit WorkCover's website at www.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.
- Contact your scaffolding supplier or manufacturer.

APPROVED INDUSTRY CODES OF PRACTICE

• Code of practice: Work near overhead power lines (chapter 6 – scaffolding).

AUSTRALIAN STANDARDS

Australian Standards can be purchased from SAI Global by contacting the Customer Service Centre on 13 12 42 or over the net at www.saiglobal.com/shop

AS 1576 Scaffolding

AS 1577 Scaffold planks

AS/NZS 4576 Guidelines for scaffolding

Catalogue No. WC05651 WorkCover Publications Hotline 1300 799 003



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