CODE OF PRACTICE

FORMWORK

Contents

Foreword

The SafeWork NSW Code of Practice Formwork (the Code), on how to manage the risks associated with formwork, is a code of practice under section 274 of the *Work Health and Safety Act* (the WHS Act). An approved code of practice provides practical guidance on how to achieve the standards of work health and safety required under the WHS Act and the Work Health and Safety Regulation (the WHS Regulation) and effective ways to identify and manage risks.

A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would help achieve compliance with the health and safety duties in the WHS Act, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks that may arise. The health and safety duties require duty holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the WHS Act and WHS Regulation. Courts may regard a code of practice as evidence of what is known about a hazard, risk, risk assessment or risk control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code of practice relates. For further information see the Safe Work Australia Interpretive Guideline: The meaning of reasonably practicable.

Compliance with the WHS Act and WHS Regulation may be achieved by following another method, if it provides an equivalent or higher standard of work health and safety than the code.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice.

Scope and application

The Code is intended to be read by persons conducting a business or undertaking (PCBU) that has management or control of formwork in the workplace. It includes information about specific control measures required under the WHS Regulation for formwork generally. Other approved codes of practice and manufacturers recommendations may also be referenced in the Code.

The Code may be a useful reference for other persons interested in the duties under the WHS Act and WHS Regulation that relate to construction work.

The Code includes references to the legal requirements under the WHS Act and WHS Regulation. These are included for convenience only and should not be relied on in place of the full text of the WHS Act or WHS Regulation. The words ‘must’, ‘requires’ or ‘mandatory’ indicate that a legal requirement exists and must be complied with.

The word ‘should’ is used in the Code to indicate a recommended course of action, while ‘may’ is used to indicate an optional course of action.

1. Introduction

1.1. Purpose

The Code provides information on how to manage formwork and falsework risks at a workplace. It is supported by specific information on formwork, falsework, slip, jump and travelling forms (available on Safe Work Australia's website).

What is formwork?

Formwork means the surface of the form and framing used to contain and shape wet concrete until it is self-supporting.

Formwork includes the forms on or within which the concrete is poured and the frames and bracing that provide stability during the curing process. Although commonly referred to as part of the formwork assembly, the joists, bearers, bracing, foundations and footings are technically referred to as falsework.

Falsework includes the foundations, footings and all structural members supporting the permanent structural elements. Falsework can be used to support formwork for in-situ concrete, prefabricated concrete elements, steel sections or stone arches, for example during bridge construction.

Slip and jump forms

Slip forms and jump forms are the terms given to self-climbing formwork systems designed to construct lift and stair cores in high rise buildings and other concrete structures like silos, stacks, chimneys or tunnels, and ventilation shafts.

The term 'climb form' is sometimes used to describe both slip or jump forms. The power for the climbing operation can be provided in a variety of ways, usually by hydraulic rams or electric motors connected to climbing feet or screw feet or screw shafts.

Jump forms climb in steps following each concrete pour. This type of construction is more suited to high rise building cores where there are regular levels (floors) and joints will not be seen.

Travelling formwork moves horizontally allowing the repeated construction of structural elements, for example in-situ concrete bridge spans. The formwork is generally supported by the permanent structure as it is progressively completed so has the advantage that no falsework is required over the length of the bridge.

Travelling forms are useful where there is limited capacity to construct supporting falsework, for example, over rivers and operating roads or railways.

1.2. Who should use the Code?

You should use the Code if you design, construct, erect, alter, maintain, dismantle or remove formwork and falsework.

You should read the Code in conjunction with the Code of Practice Construction Work.

1.3. Who has duties under the law?

Everyone in the workplace has a work health and safety duty. A range of people have specific responsibilities for formwork and falsework including:

- a person conducting a business or undertaking (PCBU)
- an officer of a PCBU
- designers, manufacturers, suppliers and importers of formwork, falsework, footings and foundations
- formwork and falsework contractors and workers who carry out formwork and falsework activities
- other workers and persons at the workplace, who are directly or indirectly involved with the formwork process e.g. electricians roughing in conduits, plumbers roughing in pipes or the installation of post tension cables.
- principal contractors.

1.4. How can formwork and falsework risks be managed?

WHS Regulation clause 297 - Management of risks to health and safety

WHS Regulation clause 32 - Application of part 3.1

WHS Regulation clause 33 - Specific requirements must be complied with

WHS Regulation clause 34 - Duty to identify hazards

WHS Regulation clause 35 - Managing risks to health and safety

WHS Regulation clause 36 - Hierarchy of control measures

WHS Regulation clause 37 - Maintenance of control measures

WHS Regulation clause 38 - Review of control measures

The Code provides guidance on how to manage the risks associated with formwork and falsework in the workplace using the following systematic process:

- Identify hazards—find out what could cause harm.
- Assess risks, if necessary—understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening. (This step may not be necessary if you are dealing with a known risk with known controls.)
- Control risks—implement the most effective control measures that are reasonably practicable in the circumstances, in accordance with the hierarchy of control measures, and ensure they remain effective over time.

- Review control measures to ensure they are working as planned.

The WHS Regulation requires duty holders to work through the hierarchy of control measures when managing risks associated with construction work; however, it can be applied to any risk. The hierarchy ranks control measures from the highest level of protection and reliability to the lowest. You must, eliminate a hazard, which is the most effective control. If this is not reasonably practicable you must minimise the risk so far as is reasonably practicable which could include one or more of the following:

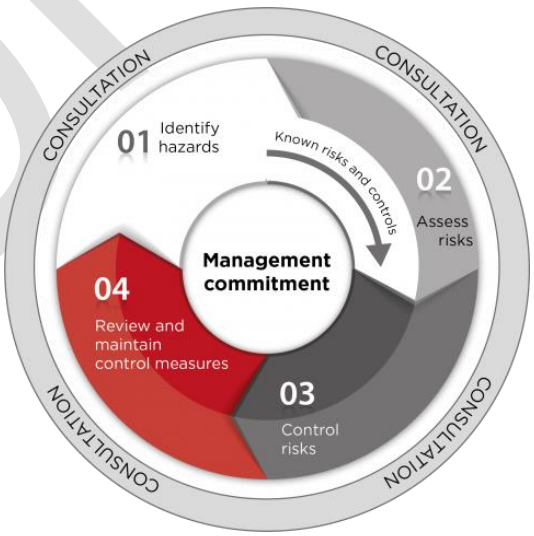
- Substitute hazards with something safer, e.g. using precast columns and beams instead of constructing formwork and pouring concrete on site.
- Isolate the hazard from people, e.g. by using barricades and signs to create an exclusion zone in the area where formwork is to be erected and stripped to prevent other workers entering.
- Use engineering controls, e.g. handrails and edge protection to prevent falls from heights.

If a risk remains after implementing the above control measures, consider the following controls in the order below to minimise the remaining risk, so far as is reasonably practicable:

- administrative controls to minimise any remaining risks, and
- then use personal protective equipment (PPE) to minimise any risks that remain.

A combination of the controls set out above may be used if a single control does not adequately minimise the risks.

Duty holders must ensure control measures are maintained so they remain effective. A duty holder must regularly review and revise the control measures, so far as reasonably practicable, to ensure they are working as planned to eliminate and minimise risks to work health and safety in the work environment. Duty holders need to take into consideration changes, such as the nature and duration of work, to ensure that each control measure is working as planned.



Further guidance on the risk management process and the hierarchy of control measures is contained in the Code of Practice How to Manage Work Health and Safety Risks.

1.5. Consultation and communication

Consulting workers

Consultation involves sharing information, giving workers a reasonable opportunity to express views and taking those views into account before making decisions on health and safety matters, and advising workers of the outcome of the consultation in a timely manner.

WHS Act section 46 - Duty to consult with other duty holders

WHS Act section 47 - Duty to consult workers

WHS Act section 48 - Nature of consultation

A PCBU must consult, so far as is reasonably practicable, with all workers who are likely to be affected, along with their health and safety representatives (if any) or health and safety committee (if any) when deciding how to initiate methods used to manage the hazards and risks of formwork and falsework activities on site.

For example: toolbox talks or pre-start meetings can be used by both the builder and sub-contractors to provide information on how formwork and falsework can be carried out in a safe and healthy manner.

If more than one person has a duty in relation to the same matter, each person with the duty must, so far as is reasonably practicable, consult, cooperate and coordinate activities with all other persons who have a duty in relation to the same matter.

Examples of where a PCBU will have a health and safety duty, include but are not limited to workers and persons at the workplace, who are directly or indirectly involved with the formwork process e.g. electricians roughing in conduits, plumbers roughing in pipes or the installation of post tension cables.

When the formwork deck is ready for other PCBUs to work on, a Formwork Deck Handover Certificate may be used to facilitate consultation.

Further information is contained in the Code of Practice Work Health and Safety Consultation, Cooperation and Coordination.

2. Planning formwork and falsework

Careful planning and preparation is the first essential step in ensuring work is done safely. Planning and preparation should involve consultation with everyone engaged in the work and include identification of hazards using the risk assessment and control process.

Further guidance should be obtained from Australian Standard (AS) series AS 3610 for formwork and the manufacturer's recommendations.

2.1. Designer of formwork structure

WHS Regulation clause 294 - Person who commissions work must consult with designer

WHS Regulation clause 295 - Designer must give safety report to person who commissions design

WHS Regulation clause 296 - Person who commissions project must give information to principal contractor

PCBUs who design a structure to be used or could reasonably be expected to be used as or at a workplace, have specific WHS duties.

Formwork structures should be designed before being erected. The designer must undertake, or arrange for, sufficient calculations, analysis, testing or examination of the design to determine if it is safe for the intended loads. Formwork structures should be capable of supporting the loads specified in AS 3610.

The designer should consider the work practices necessary to carry out safe erection and dismantling of the formwork. Matters to be considered should include at least the following:

- formwork system or combination of systems to be used (e.g. brand/model)
- specific components to be used (e.g. prop size, bearer size, drop heads, special adapters)
- configuration (e.g. prop extension, maximum beam spans, minimum bracing)
- positioning and layout of frames and props
- conditions to ensure stability during construction (e.g. lateral restraint, ground conditions)
- conditions to ensure stability during concrete pour (e.g. pour sequence, flow rate)
- conditions to ensure stability during dismantling (e.g. minimum stripping time, back propping)
- possibility of using designs that do not require in-situ formwork, such as structures that may be constructed at ground level and lifted into position (e.g. concrete girders formed on site or delivered to site are then lifted into position by crane)
- development of a construction methodology and sequencing appropriate for the building design
- minimising working heights for persons erecting and dismantling formwork
- providing fall protection measures, such as edge protection, penetration covers, false decks, catch decks and temporary work platforms
- providing guardrail systems (including toe boards), perimeter safety screens, scaffolding or other means that are able to be installed when working at heights

- providing fall arrest systems including safety lines be installed, if required
- advice and information (such as drawings and or scope of work instructions) provided to the principal contractor and the formwork contractor regarding the use of multiple level frames or high strutting where additional safety precautions may be required
- considering that sloping surfaces on formwork are slip hazards and identifying appropriate control measures to prevent injury
- manual handling risks associated with the erection and dismantling of the formwork required by the design.

For detailed guidance on designer duties refer to the Code of Practice Safe Design of Structures.

2.2. The designer's safety report

WHS Regulation clause 295 – Designer must give a safety report to persons who commission design.

WHS Regulation clause 297

A designer must provide a written report to the PCBU who commissioned the design that specifies the hazards relating to the design of the structure that, so far as the designer is reasonably aware:

- create a risk to persons who are to carry out the construction work, and
- are associated only with the particular design and not with other designs of the same type of structure.

The safety report applies to designs of structures that have unusual or atypical features which present hazards and risks during the construction phase that are unique to the particular design.

The safety report should include information about:

- any hazardous materials or structural features and the designer's assessment of the risk of injury or illness to construction workers arising from those hazards
- the action the designer has taken to control those risks, for example changes to the design.

The client must provide a copy of the safety report to the principal contractor (cl 296 of WHS Regulation).

What hazards must be included in the designer's report?

The report must identify the hazards the designer is aware of and that will create a risk to the health or safety of persons who will carry out any construction work on the structure (cl 295 of the WHS Regulation).

The designer will recommend ways to control the risks associated with the hazards identified. This may be done in consultation with duty holders carrying out the work by evaluating the hazards through a risk assessment process. The report may include the following:

- a reference to specific Australian Standards for specific requirements

- recommendation for the contractor to prepare a safe work method statement for work that involves a risk of falls
- nomination of a structural engineer for the principal contractor to seek advice
- recommendation on the use of appropriate edge protection and fall protection (particularly where a person can fall from one level to another level that is reasonably likely to cause an injury to a person)
- nominate for the party responsible to implement risk control measures identified in the report (this may include the designer, principal contractor, structural engineer or contractor).

Person that commissions construction work

The WHS Regulation requires a PCBU who commissions construction work to:

- Consult with the designer of the whole or any part of the structure so far as is reasonably practicable, about how to eliminate risks to health and safety arising from the design during the construction work, or if it is not reasonably practicable to eliminate the risks, minimise them so far as reasonably practicable. Such consultation must include giving the designer any information that the person has in relation to the hazards and risks at the workplace where the construction work is to be carried out.
- Take reasonable steps to have a copy of the designer's safety report if they did not themselves commission the design of the structure, and
- Give the principal contractor any information they have in relation to hazards and risks at or in the vicinity of the workplace where the construction project is to be carried out.

While there may be persons who represent the person that commissions the construction work or a construction project and coordinates the commissioning (for example, project managers, construction managers, architects or engineers), the person who commissions the work will remain the duty holder for the above duties.

Examples of persons that commission construction work include:

- a builder engaging a designer to design a large spanning roof truss system for a project
- property developers
- clients
- owner builders
- a subcontractor engaging an engineer to design precast and tilt-up panels for a project.

2.3. Planning by the principal contractor

The principal contractor has a statutory duty imposed by the WHS Act. The principal contractor must ensure, so far as is reasonably practicable, that the health and safety of workers and others is not put at risk from work carried out as part of the conduct of the business or undertaking.

To fulfil these obligations, the principal contractor must plan for the work to be done safely.

When planning the sequence of work, the PCBU, including a PCBU that is also the principal contractor, must consult with other duty holders and workers, including contractors, and should review the work method statement provided by the contractor describing how the work is to be done safely.

Before formwork operations start, the principal contractor, in consultation with the contractor carrying out the work, must carry out at least the following steps:

- Use the information from the designer's safety report to identify the hazards specifically affecting formwork.
- Assess the risks involved in carrying out the work.
- Identify the most appropriate methods to control any risk of injury to workers and others. These include safeguards such as guardrail systems (including toe boards), perimeter safety screens and barriers, and fall arrest systems.
- Provide suitable and safe access to and from the construction site including each place of work.
- Ensure that all persons carrying out the work have received appropriate training, information and instruction.
- Ensure that the base on which formwork is placed is adequate to support the weight of the formwork and concrete and any additional live loads such as pumps, workers, mixers, pouring of concrete and so on.
- Ensure that unauthorised persons are prevented from entering the work area. This should include physical barriers and hazard warning signs clearly displayed around formwork activities to warn other persons/trades on site.
- Ensure the formwork complies with AS 3610.

2.4. Planning by the formwork contractor

The contractor carrying out the work has duties under the WHS Act, including those of a PCBU, to ensure, so far as is reasonably practicable:

- that the health and safety of workers and / or other persons is not put at risk from work carried out as part of the conduct of the business or undertaking.
- to provide and maintain a workplace that is safe and without risks to health for their workers.

In addition to consultation with the principal contractor in the overall job planning, the contractor erecting, altering and dismantling the formwork must carry out at least the following:

- Assess the risk in carrying out the work.
- Identify the most appropriate methods of preventing the risk of injury including falls, slips and trips.
- Provide a documented work method statement describing the sequence of work tasks and activities and how the work is to be done safely.
- Design the sequence of work tasks to increase safety.
- assessing hazardous manual handling tasks that could lead to musculoskeletal disorders
- Consider the level of a worker's experience when allocating tasks.
- Minimise the working heights for persons erecting and dismantling formwork.
- Secure single props to prevent accidental dislodgement, so far as reasonably practicable
- Mixing of formwork and / or falsework components from different manufacturers must be assessed by a competent person.
- Ensure all proprietary formwork components and formwork materials such as joists, bearers, plywood, support frames, jacks and U heads are used in accordance with manufacturer's specifications.
- Ensure the formwork is inspected and certified in writing for compliance in accordance with AS 3610 requirements prior to pouring concrete

- Strip formwork in accordance with certified formwork and structural engineer's guidance or with guidance available from AS 3610.
- Dismantle formwork in a safe manner (this should generally be a reverse of the erection procedure and follow the work method statement and any site-specific instructions - drop stripping is an unsafe practice and must not be carried out).
- Secure partially erected or dismantled formwork against overturning during high winds.
- Provide suitable and safe access to and from the formwork deck (this should include planning the position of frames to ensure safe access such as when persons walk between frames).
- Ensure that all persons carrying out the work are provided with appropriate training and instruction which also covers the work method statements.
- Regularly inspect and maintain formwork components for evidence of damage and cycling out damaged components.

2.5. Preparation

When preparing for the commencement of work the PCBU with control of the work being undertaken must manage the risks associated with the work (refer to WHS Regulation cl. 297). They should also check to ensure, so far as reasonably practicable, that all control measures identified to manage the risks have been put in place and that no new hazards exist.

Preparation should include but not be limited to the following:

- assessment of climatic / environmental conditions including lighting levels
- access to and from the workplace
- personal protective equipment on site (e.g. safety helmets, eye protection)
- specific instructions for workers
- provision of formwork drawings certified by the formwork engineer or competent person
- equipment required for lifting materials is available and suitable
- residual current devices (safety switches) protecting the user of portable electric powered tools
- emergency and evacuation procedures in the event of an incident, injury or other emergencies.

2.6. Conventional / modular systems

Formwork and falsework are designed to provide support to newly poured concrete slabs during the structural phase of a build. Structural designers are responsible for the permanent structure design and / or the design of formwork, formwork decks, falsework, supporting structures, integrated access and work platforms and structural connections.

To minimise risk, the principal contractor in conjunction with the designers of the permanent structure should:

- Develop a construction method appropriate to the structure's design.
- Minimise the number of columns and cantilevered floor sections.
- Reduce variations in the floor depth, and steps in formwork soffits.
- Allow sufficient clearance to adjacent structures and safe methods for moving large and heavy components, materials and equipment i.e. making allowances for a crane

and other mechanical lifting devices to be used.
- Provide the formwork contractor / formwork designer with all relevant information that may impact the formwork design, for example, if the concrete design mix and the concrete plasticiser admixtures are to be used then this may be included in a safety report.

Lifting and placing loads is a common practice in formwork and falsework work. Designers should consider the work systems that may be used so that formwork and false work structures are designed to withstand the load.

Formwork and falsework designers should also:

- Determine the vertical pour rates for walls, columns and other vertical concrete elements before completing the formwork and falsework installation design.
- Consider the method and sequence of erecting and dismantling the designed formwork and falsework and the related risks e.g. manual tasks and working at height
- Allow for perimeter protection screens when fixed to the formwork.

For standard formwork / falsework elements, for example conventional or raft slabs and band beam structures, standard formwork details or manufacturer's publications should be referenced to provide guidance and may be used for the formwork and falsework layout.

2.7. Slip and jump form

The design of slip, jump and travelling forms may be more complex than the design of traditional formwork systems. The work systems and layout of some crane-lifted forms may also be similar to those associated with slip and jump forms that often require the coordination and cooperation of numerous trades. This may be the case for crane-lifted forms provided for the inside of lift shafts or stairwells.

When designing these complex formwork systems, duty holders, including the designer must comply with the risk assessment methodology outlined in Part 3.1 of the WHS Regulation.

Due to building characteristics and weight limitations it may not always be practicable to provide an access system and working environment on a jump form or slip form to the same standard as elsewhere. A designer must minimise the risks, so far as is reasonably practicable with respect to access and egress by ensuring that a suitable system be included as part of the design.

The jump form or slip form designer should be involved both in the initial design of the form and in addressing ongoing design issues that will occur during form erection and the life of the building project. The designer should therefore inspect the form at the workplace and work closely with people involved in its operation including the principal contractor, to determine if any difficulties are being encountered and how they will be managed.

The designer should consider:

- minimum concrete strength to be reached (and the minimum cure time) before climbing.
- allowance for live loads that may be applied to the form
- allowance for the effects of eccentric loading on the form, both during climbing and at other times
- maximum degree to which the form can be out-of-level during climbing and the procedure required both to minimise the likelihood of this occurring and how to remedy

the situation if the form becomes out-of-level
- rescue procedure requirements that may affect the design of the form—the rescue procedure may require entry to all levels of the form and cells, either through providing gates or removal of panels on the form, and providing an operating manual that includes any procedures or limitations required for safe use and note an alternative means of egress.

2.8. Loading

Formwork and falsework should be designed for the most adverse combination of dead and live loads that can reasonably be expected during the period it is in use.

Dead loads relate to the self-weight of the structure and components including deck, catch or access platforms, stairways, ladders, screens, sheeting, tie assemblies, scaffolding hoists or electrical cables that are likely to act continuously.

Live loads include:

- the weight of people, materials, debris, plant, tools and equipment that are not continually in place
- environmental loads (e.g. wind, rain and snow).

Dead and live loads should be calculated during the design stage to ensure the supporting structure is capable of supporting the loads that will be applied at the workplace. Loads should then be assessed during formwork and falsework erection, use, alteration and dismantling to make sure the design loads specified by the designer, manufacturer or supplier are not exceeded.

If the formwork and falsework is to be altered at the workplace, consider any new loads that may apply and consult the designer. For example, wind and rain loads may increase if perimeter protection screens, shade cloth or signs are attached to the formwork and / or falsework.

Scaffolding should not be used to support formwork and plant unless the scaffold installation is specifically designed for this purpose in consultation with a structural engineer.

2.9. Plant design

Structural components, including formwork frames specifically intended to support formwork, do not require design registration. However, if traditional prefabricated scaffolding is used as part of the supporting structure, these components require design registration.

The formwork and falsework designer will be responsible for selecting the appropriate components and preparing a design specifically for the job. Different types of formwork and falsework components should not be mixed unless they are identified as compatible in the manufacturer's instructions or by the owner of the design or their representative.

The formwork and falsework components are plant and may be purchased, hired or supplied, for example by a formwork and falsework contractor.

An importer of prefabricated formwork and falsework who is unable to source the necessary information from the original designer has a duty to demonstrate that the plant satisfies health and safety requirements. This can be achieved by providing test reports from a testing facility

registered by National Association of Testing Authorities (NATA) to conduct such testing and having a competent person develop the information for the supplier that complies with the relevant Australian Standard(s).

Further information about the safe design of plant is in the WHS Regulation and Code of Practice Managing the Risks of Plant in the Workplace.

2.10. Formwork modification

A formwork and falsework designer includes anyone who modifies the design. For example, if the capacity of formwork and falsework is to be increased by adding more components, a designer must complete additional calculations to ensure the modified structure is capable of supporting the extra load. The person designing the addition has designer duties and if they are not the original designer, they should consult the original designer to ensure the new configuration does not compromise the existing design specifications or safety factors.

If changes are made beyond the manufacturers' specifications to a construction design, the designer must be consulted and the relevant drawing or other documents be updated to clearly show the revisions. Provisional updating by marking up or preparing hand drawn detail and signing and dating the mark-up or new detail should be countersigned by the designer where applicable.

For changes to formwork design within the manufacturers' specifications, a competent person may make the change without consulting the designer.

Designers should always consider the life-cycle of the designed item and seek to eliminate or minimise health and safety risks through design.

Further information on safe design is in the Code of Practice Safe Design of Structures and the Guide for Safe Design of Plant (available on Safe Work Australia's website).

3. The system of work

WHS Regulation 36 – Hierarchy of control measures

WHS Regulation 39 – Provision of information, training and instruction

Systems of work should be clear but flexible to meet changing circumstances as the work progresses. The system of work should provide for the assessment and control of any new risks arising from proposed changes to the work before they are implemented.

A documented safe system of work can be an administrative control that complements higher level controls. This could include the following:

- communication and consultation
- a project risk assessment
- safe work method statements for high risk construction work
- access and egress
- exclusion zones
- permit-to-work systems
- fall arrest / restraint systems
- inspection and maintenance (cl. 36 of the WHS Regulation)
- emergency evacuation arrangements
- changes to the work arrangements.

3.1. Information, instruction and training

WHS Regulation clause 39 - Provision of information, training and instruction

WHS Regulation clause 316 – General construction induction training requirements.

Information, instruction and training must cover the nature of the work, the associated risks and the control measures to be implemented.

Training, instruction and information must be provided in a form that can be understood by all workers. Where a person undertakes construction work they must have successfully completed general construction induction training.

In some cases, a person will need to hold the appropriate high-risk work licence, for example when undertaking scaffolding work or operating cranes, hoists, forklifts or elevating work platforms to construct formwork and falsework.

A person who erects or dismantles formwork and falsework should be provided with all necessary information, instruction and training to ensure they are competent to do the work safely.

Training should require workers to demonstrate that they are competent in performing the tasks required. It is insufficient to simply give a worker a procedure and ask them to acknowledge that they understand and are able to perform it.

Most control measures depend on workers and supervisors having the appropriate competencies to do the job safely. Training should be provided to maintain competencies and to ensure new workers are capable of working safely. Training can include:

- completion of formal qualification CPC31511 – Certificate lll in Formwork/Falsework
- verification of competency by industry recognised regimes which give consideration to all or some of the units of competency contained in CPC31511
- work under direct supervision of a suitably qualified or a competent person.

3.2. Safe work method statement

WHS Regulation clause 291 - Meaning of "high risk construction work"

WHS Regulation clause 299 - Safe work method statement required for high risk construction work

The construction of formwork and falsework or working on the resulting structure may involve activities defined as 'high risk construction work' under the WHS Regulation.

For more details on 'high risk construction work' classifications see clause 291 of the WHS Regulation.

An example of high risk construction work involves the risk of a person falling more than two metres or where the structure is near energised electrical installations or services.

A safe work method statement (SWMS) must be prepared for high risk construction work before the work starts. The SWMS must:

- identify the type of high risk construction work being done
- specify the health and safety hazards and risks arising from the work
- describe how the risks will be controlled
- describe how the control measures are to be implemented, monitored and reviewed.

The SWMS must be developed in consultation with workers and their representatives who are carrying out the high-risk construction work.

Further information on high risk construction work, SWMS and a SWMS template is contained in the Code of Practice Construction Work.

3.3. Emergency plan

WHS Regulation clause 43 - Duty to prepare, maintain and implement emergency plan

An emergency plan must be prepared and maintained so it remains effective for the workplace.

The emergency plan should provide emergency procedures for an effective response to an emergency, evacuation procedures, notifying emergency service organisations at the earliest opportunity, medical treatment, assistance, and effective communication with emergency service organisations and others at the workplace.

Workers must be provided with information and training on the emergency procedures for the workplace and the procedures must be tested.

Responses to an emergency should be coordinated. The formwork and falsework contractor should consult with the principal contractor who prepares the broader workplace emergency plan so that unexpected incidents such as formwork collapse or people falling from height are included in the broader emergency plan.

Emergency arrangements for evacuating an injured worker should consider how to safely remove an immobilised or unconscious person. This may include predesigned points of entry for emergencies and doorways through decks, screens, jump forms or slip forms. (See part 2.1 Designer of formwork structure)

3.4. Developing emergency procedures for jump forms or slip forms

Fire extinguishers, hoses and other means of fire prevention should be provided on the slip or jump form in accordance with advice provided by a competent person.

Emergency procedures for the slip or jump form should be documented and implemented and include training and instruction for workers in these procedures.

The emergency procedures should include, but not be limited to:

- the method for alerting workers in an emergency
- the method of extracting workers from each location or cell that people have entry to or could fall into
- when to evacuate workers from the form
- evacuation muster points both on and off the form
- training in using fire extinguishers
- identifying workers responsible for ensuring evacuation takes place
- rescue procedures for severe medical conditions
- damaged componentry/components
- notifying emergency service organisations at the earliest opportunity
- establishing communication protocols between relevant workers
- testing emergency procedures for their effectiveness in dealing with an emergency
- frequency of emergency drill testing
- providing information, instruction and training to workers who may be affected by an emergency.

Response to emergency situations should be considered during formwork design and during construction. Emergency arrangements for evacuating an injured worker from a formwork ‘cell’ should consider how to inform emergency services to safely remove an immobilised or unconscious person. This may include creating emergency entry holes and doorways through decks and screens.

Procedures should identify how to enter lift-voids and other areas including cells within the core which may have limited entry.

Emergency services contacts should be clearly identified and available. For further information see the Fact Sheet: Emergency Plans (available on Safe Work Australia’s website), and Code of Practice Managing the Work Environment and Facilities.

4. Types of formwork

The safety of workers erecting, altering and dismantling formwork should be considered when choosing a formwork system for a job. In particular consider stability, strength and the risk of falls, falling objects and manual tasks. Proprietary systems may have integrated safety features to help control the risk of falls and hazardous manual tasks.

4.1. Conventional formwork systems

Conventional formwork systems are typically constructed on-site from timber and plywood with supporting elements such as frames, props and bracing.

Conventional formwork systems should be constructed in accordance with pre-determined standard designs to include bearers, spacing plywood spans, frame spacing, adjustable bases and post head types and extensions, suitable footings and foundations.

When using a conventional system, a standard formwork frame with a known tested loading capacity should be used wherever possible. Standard frames can minimise the risk to workers erecting and dismantling the formwork and handling and storing materials. (see Figure 1)

4.2. Modular formwork systems

Modular formwork systems are specially designed and manufactured off-site. Modular systems usually have proprietary formwork components and rated load calculations set out by the manufacturer and are often made from hardboard, plastics, steel and aluminium.

Most formwork systems use two or more materials, for example plywood facing steel frames for wall panels. (see Figure 2)

4.3. Shoring / falsework (scaffold)

Shoring / falsework systems are specifically designed to support formwork structures including components that transmit all or part of the loads to a lower level. This term includes undisturbed supports, back props, props and shoring.

Scaffolding equipment may be used as falsework to support formwork but is not considered scaffolding unless the installation is designed to be a working platform.

Therefore, as formwork/falsework is not specifically erected to support working platforms (acting as a secondary function, to allow it to be constructed), and has been designed and erected to support concrete it does not always require a person to hold a high risk work licence.

Scaffold –temporary access platforms and stairways constructed of scaffolding components should comply with AS/NZS 1576.1 and AS/NZS 1576.3 or AS/NZS 1576.6. Portable ladders should be single ladders complying with the industrial grade requirements of AS/NZS 1892.1. Other means of access should comply with the performance requirements of AS 1657.

Other means of access can be access that is attached to formwork assemblies such as jump forms and slip forms and should comply with the dimensional and performance requirements of AS 1657.

Figure 1: Formwork (conventional frames)

Figure 2: Proprietary modular formwork

4.4. Slip and jump forms

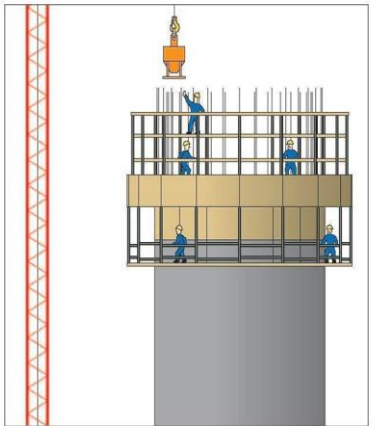
Slip forms and jump forms are the terms given to self-climbing formwork systems designed to construct lift and stair cores in high rise buildings and other concrete structures like silos, stacks and chimneys.

The term ‘climb form’ is sometimes used to describe both slip or jump forms. The power for the climbing operation can be provided in a variety of ways, usually by hydraulic rams or electric motors connected to climbing feet or screw feet or screw shafts.

Slip forms and jump forms usually consist of a number of platforms or decks for workers and may also be fitted with trailing screens suspended from the form.

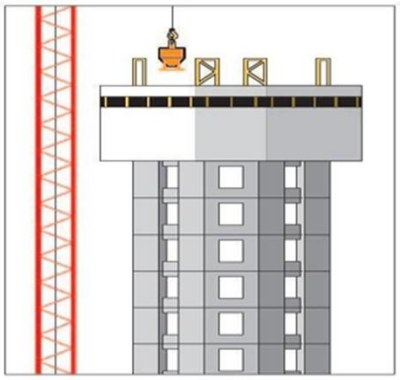
Slip forms usually climb slowly and continuously during the concrete pour. This allows high smooth concrete structures like chimneys in building cores to be constructed without obvious joints (see Figure 3).

Figure 3: Slip form chimney construction



Jump forms (see Figure 4) climb in steps following each concrete pour. This type of construction is more suited to high rise building cores where there are regular levels (floors) and joints will not be seen.

Figure 4: Jump form construction

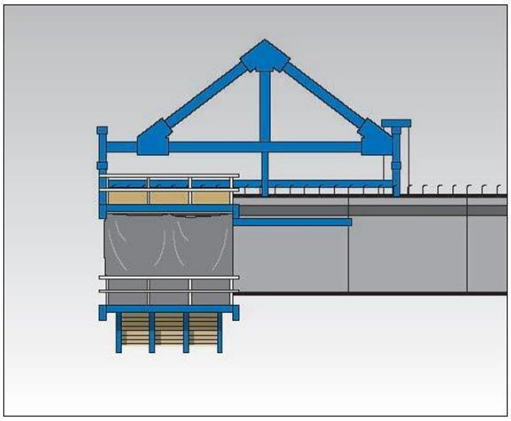


4.5. Travelling forms

Travelling formwork (Figure 5) moves horizontally allowing the repeated construction of structural elements, for example in-situ concrete bridge spans. The formwork is generally supported by the permanent structure as it is progressively completed so has the advantage that no falsework is required over the length of the bridge. Travelling forms are useful where

there is limited capacity to construct supporting falsework, for example over rivers and operating roads or railways.

Figure 5: Travelling formwork for bridge construction



5. Common hazards and controls

5.1. Ground conditions

Ground conditions must be stable and maintained in a stable condition while supporting loads.

Principal contractors must provide information on any factors that may affect ground stability before the formwork and falsework is erected or during its use.

Ground conditions should be assessed by a competent person (for example geotechnical engineer), engaged by the principal contractor, in accordance with the required loads to check that the ground is able to bear the most adverse combination of dead, live and environmental loads that can reasonably be expected during the period of time that the formwork and falsework or scaffold is to be erected, in use and dismantled.

Water and nearby excavations may lead to ground subsidence and the collapse of formwork and falsework. Any likely watercourse, for example storm water run-off, that has the potential to create a wash out under the structure should be diverted away from the formwork and falsework.

Where foundations and footings are located on batters, these should be protected against scour by directing drainage away from the base of any supports and frames.

Following any adverse weather condition that may potentially impact the ground conditions, the foundations should be inspected by a geotechnical engineer engaged by the principal contractor and any rectifications / modifications should be undertaken as soon as practicable.

5.2. Adjacent buildings or structures

Where the formwork and falsework activity is likely to reduce the security or stability of any part of an adjacent structure, the work must not start or continue unless steps are taken to control the risk to a person from the:

- collapse of the formwork and falsework and the permanent structure it supports onto the adjacent building or structure
- collapse of the adjacent building or structure, or a part of the building or structure.

5.3. Collapse

Formwork and falsework collapse can occur before, during and after loading, for example when placing the concrete or the structural members to be supported. The risk of collapse can be minimised by:

- designing the formwork and falsework to suit the specific workplace requirements including loads and environment
- constructing the formwork and falsework as designed
- not adding to or altering the formwork and falsework unless authorised by the designer
- a competent person inspecting the formwork and falsework before loading of materials to ensure it is complete

- an engineer or competent person with the appropriate qualification certifying formwork and falsework before the concrete pour
- regularly inspecting and maintaining the formwork and falsework during its life
- avoiding ‘point’ loading on any part of the formwork including by placing concrete evenly
- having sound and level foundations under props and frames or any other type of supporting member or structure and not placing props or frames close to the edges of excavations
- not exceeding the working load limit (WLL) of props, frames or any other supporting member or structure
- using proprietary pins in props or other systems requiring such specific connecting device, not improvised bolts or reinforcing steel.

5.4. Electrical power lines

WHS Regulation clause 166 - Duty of person conducting a business or undertaking

Electrical power lines whether overhead or underground can be a significant hazard.

Construction work carried out on or near energised electrical installations or services is ‘high risk construction work’ and must not commence until the service provider responsible for the power lines has been consulted.

A risk assessment must be conducted by the PCBUs directly involved, to determine safe working distance and other control measures. Control measures must be implemented that are consistent with the risk assessment and any specific requirements of an electricity supply authority.

5.5. Access and egress

WHS Regulation clause 40 - Duty in relation to general workplace facilities

Workers must, so far as is reasonably practicable, be provided with safe entry to and exit from the formwork and falsework.

Common ways of providing safe entry and exit for formwork and falsework structures include:

- fit for purpose temporary ramps (cleated)
- secured planks on top of steel reinforcement to provide safe access and egress from completed formwork deck
- using the existing floor level of a building, where entry is safe
- installing temporary stairs or portable ladder access systems for use when erecting the formwork and falsework
- personnel hoists—non-mechanical forms of exit (e.g. a ladder or stair tower should also be provided in case of power failure or another emergency)
- appropriate safe access to safely remove injured and ill workers, which needs to be provided by the principal contractor.

5.6. Working areas for following trades

Steel fixers, plumbers and electricians often follow closely behind the formwork erection. The formwork zone should be large enough to ensure these people are clearly separated from the formworkers.

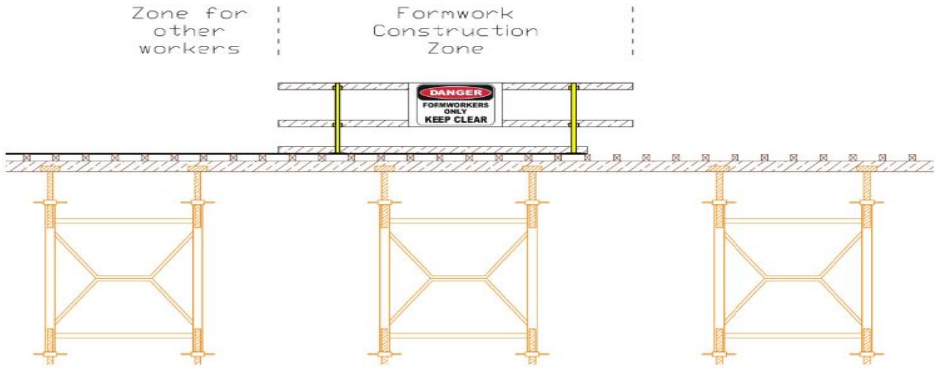
A ‘formwork only’ zone should be maintained behind the leading edge. This zone should be clearly marked by signs and a barrier. Figure 6 shows the work zone for ‘other workers’ behind the ‘formwork’ working zone.

The zone for other trade workers will only be handed over for productive work once the formworker PCBU has deemed the working deck as complete.

Further information is contained in the Code of Practice Managing the Risk of Falls at Workplaces.

Figure 6: Example of defining work zones for other trade workers and formwork construction.

Note: guardrails removed for clarity



5.7. Falling objects

WHS Regulation clause 54 - Management of risk of falling objects

WHS Regulation clause 55 - Minimising risk associated with falling objects

In managing the risk of falling objects the following risk control measures can be considered which include overhead protective structures, perimeter protection screens, catch platforms and providing exclusion zones as a buffer to eliminate or minimise the risk of a falling object striking workers or other persons.

For example: for larger items, a reasonably practicable control measure would be to install an industrial safety net below the working deck and around the perimeter of the structure or establish an exclusion zone below.

Before using perimeter protection screens, consider other risks like conductivity of electricity and additional dead and live loads. For example, the extra wind loading on the formwork and falsework should be considered in consultation with the principal contractor and structural engineer when selecting a screening material and the framework supporting a screen needs to be able to support loads from the screen.

Note: containment netting will be significantly heavier and less permeable to wind when wet, so both dead and wind load will increase and need to be accounted for.

5.8. Lifting plant and materials

Crane-lifted loads should be slung and secured by a high risk work licence holder (for example DG- dogger) so the load or any part of it cannot fall.

The following should be considered when carrying out formwork and falsework:

- Tare mass of wall, lift or column forms should be provided with formwork and falsework documentation and made available for inspection.
- Formwork and falsework frames should either be tied together or lifting slings should be wrapped around the load.
- Loads of joists or bearers should be strapped together before lifting.
- Form ply-loads should be strapped together and lifted in a flat position and strapped in bundles with a full sheet supporting the bottom of the load.
- Loading materials during construction.
- Stacked materials create point loadings that the formwork and falsework structure may not be designed to bear.
- Off cuts of form ply are to be put in a bin or cage.
- Plant and materials should only be stored on formwork and falsework where allowed for by the design specifications and when the structure or deck has been completed to the point that it is able to bear the load, approved by a structural engineer responsible for designing the supporting structure.

Formwork is not suitable for full loading until it is fully secured – that is, when the deck is complete with tie-ins and back-propping. In practice, some loading often occurs before the deck is completed, for example unloading pallets of plywood and joists used to construct the deck.

To minimise the risk of collapse and other hazards:

- Formwork and falsework design drawings should clearly identify the maximum point loadings for the temporary structure or deck.
- Point loadings should not exceed the maximum weight specified by a designer.
- Consultation between the formworker and other work groups should take place to consider placement of materials that may compromise the structural integrity of the design.
- Avoid placing loads on the temporary structure or deck if the designer's documentation prohibits loading.
- Crane crews should not lift plant or materials onto the temporary structure or deck until there is an agreed landing zone that is clearly communicated.
- Fall protection such as handrails or scaffold should be provided before personnel access the deck.
- Delivery of materials to the workplace should be planned so loads are not lifted onto an

incomplete or unsecured temporary structure.
- Before people leave the workplace, plant and materials should be secured to prevent them being moved by wind loads.

5.9. Lifting points

Slings attached to lugs or holes cut into part of the load are often used to lift formwork and falsework components instead of wrapping the lifting slings around the load.

Where lugs or holes are used, designer information verifying the structural adequacy of the lifting points should be available including:

- the structural adequacy of the lifting lug or hole
- any instructions on its use.

Note: this includes lifting helicopters (powered concrete trowels) which are not to be lifted by any part of the machine that is not designed as a lifting point.

5.10. Mixing components

Plant components from different manufacturers or suppliers may sometimes look compatible but are often of different dimensions and tolerances.

Mixing incompatible formwork and falsework components can significantly affect the structural integrity of the formwork and falsework. This could result in the collapse of the structure. It can also lead to increased wear on components, resulting in more difficult assembly which in turn may increase the risk of injury to workers.

A competent person must assess whether it is safe to mix formwork and / or falsework components from different manufacturers. They must determine:

- components are of compatible size and strength
- components have compatible deflection characteristics
- fixing devices are compatible; and
- mixing does not lessen the strength, stability, rigidity or suitability of the structure.

5.11. Plant and collision

WHS Regulation clause 203 - Management of risks to health and safety

WHS Regulation clause 214 - Powered mobile plant – general control of risk

WHS Regulation clause 215 - Powered mobile plant – specific control measures

A PCBU must eliminate risks arising from plant in the workplace, or if that is not reasonably practicable, minimise the risks so far as is reasonably practicable.

A person with management or control of plant at a workplace must manage risks to health and safety associated with plant, in accordance with part 3.1.

The person with management or control of powered mobile plant must manage risks to health and safety associated with the following:

- the plant overturning
- things falling on the operator of the plant
- the operator being ejected from the plant
- the plant colliding with any person or thing
- mechanical failure of pressurised elements of plant that may release fluids that pose a risk to health and safety.

A person with management or control of powered mobile plant at a workplace must ensure, so far as is reasonably practicable, that a suitable combination of operator protective devices and warning devices for the plant is provided, maintained and used.

Some examples of suitable warning devices that may be used are: flashing lights, audible warning alarms, air horns and percussion alarms.

For further information refer to the Code of Practice Managing the Risks of Plant in the Workplace.

6. Falls

WHS Regulation clause 78 - Management of risk of fall

WHS Regulation clause 79 - Specific requirements to minimise risk of fall

The risk of falls by a person from one level to another are a major cause of death and serious injury in Australian workplaces. Such hazards should be managed before and after formworkers are present on site.

Hazards that may increase the risk of a fall when erecting or using formwork and falsework include:

- poor environmental (inclement weather) conditions (e.g. strong winds or rain)
- materials, equipment or protruding objects below, or in adjoining work areas (e.g. tools, reinforcing steel, loose materials)
- penetrations and void areas not identified or protected (e.g. ladder access voids, column voids)
- incomplete formwork decks, scaffolds or loose components where work is being done, or is likely to be done
- inadequate training, instruction and supervision of workers
- unsafe access / egress on completed deck prior to concrete placement.

Engineering controls like handrails, edge protection and perimeter protection screens can minimise the risk of a fall from one level to another.

Perimeter protection screens are protective structures fixed to the permanent structure or working platform to prevent objects and people falling outside the work area. This significantly minimises the risk of injury to workers and the public.

Temporary catch platforms or industrial safety nets can be used to minimise the distance a person could fall during work at height and to catch falling objects.

Fall arrest systems should only be used where other risk controls are not reasonably practicable.

Further information on falls is contained in the Code of Practice Managing the Risk of Falls at Workplaces.

6.1. Fall protection from the formwork deck

During formwork construction, the structure is constantly changing so continual modification and monitoring of fall protection measures is necessary.

Edge protection means a barrier to prevent a person or object falling from the edge of:

- a building or other structure
- an opening in a surface of a building or other structure
- a fall arresting platform (e.g. a catch platform),
- the surface from which work is to be done (e.g. a formwork deck).

Examples where edge protection should be installed include:

- when a leading edge is to be left unattended and entry onto the deck by persons other than formworkers is required (i.e. the formwork deck has not been barricaded and provided with 'keep out' signs)
- at openings in stairwells or lift shafts
- open voids such as ventilation shafts or service risers
- balconies waiting for balustrade installation
- penetrations
- intermediate working decks.

Types of edge protection which can be considered at the planning phase before the formwork commences in preventing the risk of workers falling include:

- handrails
- guardrails
- scaffolding
- perimeter protection screens
- intermediate working decks
- catch platforms
- temporary working decks
- penetration or void covers.

Industrial fall arrest (harness) systems should not be used as a practical control for the risk of a fall from height from the perimeter of formwork.

6.2. Perimeter protection screens

Perimeter protection screens are effective means of edge protection on a completed formwork deck. Perimeter protection screens may be installed on the formwork as it is constructed, in which case the formwork must be designed to support the screens.

In some situations, it may not be reasonably practicable to provide perimeter protection screens or scaffolding. Use a work system to install perimeter edge protection on the deck which eliminates or minimises the risk of a fall.

Screens may be supported by the building or structure. The screens can also act as perimeter fall protection on a top working platform and should extend at least 900mm above the finished floor level to provide protection for workers and other persons outside the contained work area.

When selecting protection screens the PCBU need to consider the following:

- the ability to support or contain imposed impact loads including building materials, equipment and waste materials
- resistance to wind loads on the supporting structure
- frequency of inspection
- chemical reactivity including flammability
- ventilation requirements
- light transmission requirements
- degree of protection provided from rain or washing down operations
- pattern and frequency of fixing points
- gaps created by a fixing method.

Perimeter protection screens should be assembled, installed and operated by the holder of a rigging high risk work licence who has received training from the screen manufacturers/suppliers.

Protection screens should remain in position from the start of the formwork being erected until soffit stripping is complete to prevent objects falling throughout the process.

Gaps between perimeter screens and the formwork deck or floor should not exceed 50mm.

Where the gap between screens exceeds 50mm, additional temporary measures should be adopted such as a flexible flap that will not be damaged when one of the screens is being lifted.

6.3. Scaffolding

Scaffolding complete with guardrails (including top and mid rails), toe boards and containment netting can provide effective protection against the risk of falls at the perimeter of a building, providing the guardrail of the scaffolding extends at least 900 mm in height above the finished concrete slab.

If the gap between the slab and scaffold is greater than 225mm horizontally or 300mm vertically then hop-ups should be included.

The scaffold platform should be positioned or constructed to prevent persons or materials falling between the scaffold platform and the edge of the formwork. For additional information on scaffolds refer to clause 225 of WHS Regulation.

6.4. Guardrails and handrails

Framing timber has been commonly used by the construction industry for many years to create temporary edge protection systems or guardrails to prevent falls from height. However, these timber guardrails are not always made adequately and are reliant on the standard of materials used, the spacing of supports and rails, and the method of fixing which has varied widely.

Conventional type systems in almost all cases, have been done without having an engineer verify the design.

Use guardrails and handrails that have been designed and engineered as edge protection systems in accordance with AS 4994: Temporary edge protection - general requirements.

Guardrails and handrails generally incorporate a top rail between 900mm and 1100mm above the working surface and also incorporate a mid-rail and a toe board (except where it may be impractical to do so) and alternative control measures, such as exclusion or ‘no go’ zones, to ensure no one is at risk of being hit by falling objects from the work above.

They must be of robust construction and designed in accordance with the relevant Australian Standard. Refer to the list at the end of the Code.

Fixings used to secure posts to the deck should be fit for purpose and take into account that it must be able to withstand the force of a worker falling into the rail (Figure 7).

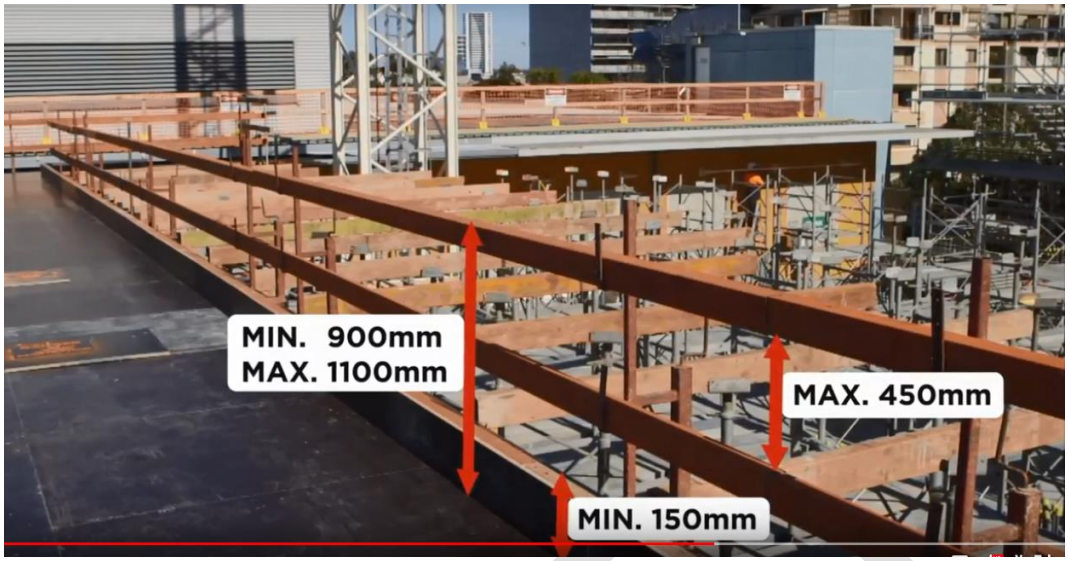


Figure 7 – Guardrails for prevention of falls

6.5. Falls through penetrations

Penetrations on the formwork deck needs to be covered by fit for purpose material and secured in position, clearly visible and identified or have leading or perimeter edge protection.

Open penetrations like stairwells or access for services create hazards, for example a fall through a larger penetration, stepping into a smaller penetration, or an object falling through the opening onto people below. Where a person or object could fall through a penetration, guarding must be installed.

Protect open penetrations with edge protection like handrails or by securely covering them so no one can fall through them.

Penetrations in concrete slabs can include cast-in-mesh as a back-up system. The mesh should be of a small aperture, for example 50 x 50 mm mesh size or smaller and made of material capable of withstanding the potential imposed loads. Where mesh or other physical fall protection material is to be provided for larger penetrations this should be included in the slab design specifications to ensure it can withstand potential loads including those applied by people, equipment and material.

Penetration covers using plywood material should be structurally graded and identified using a bright colour paint. The cover must be firmly secured to the concrete or formwork deck and designed for potential loads that may be applied.

Before stripping formwork, cover the penetration that will be exposed as the formwork is stripped or protect the penetration before starting the stripping operation.

Penetrations are also hazardous before the deck is laid. Joists placed up to the edge of the penetration should be secured so the timbers cannot spread if a person falls on them.

6.6. Falls from ladders

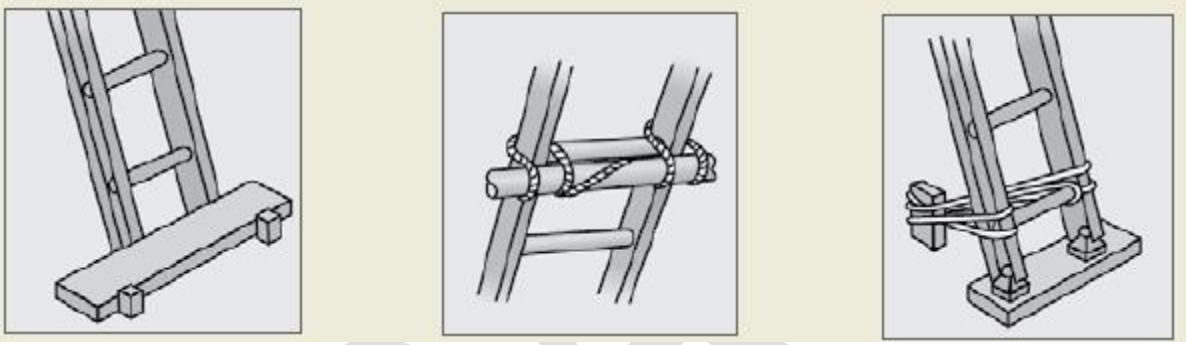
Ladders can be the primary means of access and egress onto a formwork deck. Many falls take place when workers access formwork deck from ladders.

A safer method of accessing the formwork deck should be provided (e.g. scaffold or scaffold stairs). When using a ladder at a workplace the ladder must be set up on a solid and stable surface and set up to prevent the ladder from slipping. Single and extension ladders can be prevented from slipping by:

- placing ladders at an angle of 4:1 to the wall

  securing ladders at the top or bottom (Figure 8).

Figure 8 – ladder prevention methods



In setting up fixed or extension ladders for access or egress, check that:

- there is a firm, stable work platform, free from obstructions, to step onto from the ladder
- the ladder extends at least one metre above the stepping-off point on the working platform
- fall protection is provided at the stepping-off point where people access the working platform.

Ladders should be regularly inspected by a competent person in accordance with the manufacturer's recommendations. Ladders with any of the following faults may also be removed from service and replaced or repaired:

- fibreglass stiles cracked, chipped or severely faded with fibres exposed
- metal stiles twisted, crushed or with cracked welds or damaged feet
- rungs, steps, treads or top plates that are missing, damaged or loose
- tie rods missing, broken or loose
- ropes, braces, or brackets that are missing, broken or worn
- missing, loose, bent or worn fasteners, (e.g. rivets, bolts and pins)
- worn or damaged feet, including non-slip material.

7. Erecting, altering and dismantling formwork and falsework

7.1. Foundations and footings

Foundations and footings should be designed and constructed to carry and distribute the full weight of the formwork and falsework including dead and live loads. Ground conditions and weather effects— particularly wind and rain—should be considered when designing and preparing the foundation.

7.2. Conventional and modular formwork systems

Formwork, falsework, jump forms, slip form and travelling forms should be systematically erected and dismantled by a competent person and tied in progressively to stabilise the structure in accordance with the designer's or manufacturer's instructions.

Prefabricated formwork, falsework jump forms, slip form and travelling forms should be erected and used in accordance with the manufacturer's instructions.

Where scaffolding is specifically used to support formwork and falsework it should comply with AS 3610 (formwork for concrete) and the manufacturer's requirements. Licensed scaffolders are not required in this application.

Safe systems of work should be developed depending on the type and complexity of the formwork and falsework design.

The system of work should seek to eliminate or minimise risks, for example to:

- minimise working at height by assembling components on the ground
- provide safe temporary work platforms where work at height is required
- provide for the safe handling and operating of plant and equipment—large structures may require scaffolding or mobile plant to be located on suspended floors
- provide suitable plant and material handling, placement and storage arrangements to minimise manual tasks, and
- include regular inspection and maintenance of individual components.

7.3. Wall and column forms

Wall and column forms should be designed to withstand wind loading before, during and after the concrete pour. The bracing and forms should not be removed from the cast element until it can safely withstand potential impact loads and wind loads.

Lateral support can be provided to vertical elements in a variety of ways including horizontal and angled braces and structural connections to other parts of the building. A bracing element design should be completed by a competent person.

The bracing element should also be able to resist both tensile and compressive loads that may be applied by the wind as well as the pressure of the fluid concrete as it is placed in the form. Anchors for braces should preferably be cast-in type anchors to a supporting structure or 'through-bolts' extending through both sides of the form. Drill-in anchors connecting to an existing concrete structure may be used provided they are installed in accordance with the manufacturer's instructions.

7.4. Trailing access system

The designer is to ensure a trailing access system must support the loads that will be applied to it and wind conditions. Both the system itself and the form needs to be able to withstand applied loads from the access system.

7.5. Wall and column shutters

Wall and column shutters should only be lifted from the engineer's designed lifting points.

Where slings are used to lift wall or column forms the lifting slings are to be attached to prevent the form from slipping out of the sling or the load becoming inadvertently disconnected from the crane's hook.

Wall and column shutters need to be provided with engineer designed lifting points, e.g. lifting lugs. Design drawings need to confirm this. Cutting holes in the form in-situ is not recommended as this can damage the form, make it difficult to safely attach lifting gear and be inadequate for lifting purposes.

Where fabricated lifting lugs are attached to the form they should be attached in accordance with the manufacturers design.

As the height of formwork frames increase there is a greater need to provide lateral stability to the frames. Ensure framing, including bracing, is carried out in accordance with on-site design documentation and manufacturers' instructions.

Workers erecting formwork must be provided with the necessary information, training and instruction to erect formwork using safe methods.

7.6. Wall and column form access

Suitable access should be provided for wall and column forms and can include:

- mobile scaffolding
- purpose built access platforms
- elevating work platforms.

Edge protection should be provided on the access platforms. Preferred methods of entry to platforms include stair access systems or if this is not practicable secured industrial ladders.

Platforms should also be designed to resist loading that may be applied during a concrete pour to ensure the platform does not collapse or overturn. They may need to be tied in or counter weighted, particularly aluminium scaffolding which may not have the self-weight to prevent overturning.

Mobile work platforms should have their castors locked, except when relocating the mobile platform.

7.7. Erecting formwork frames

Formwork frames should be erected progressively to ensure the installers' safety and the stability of the overall structure.

Braces should be attached to the frames as soon as practicable and designated access ways should be indicated by using bunting or by other means.

If side bracing or other edge protection is installed progressively on formwork frames other control measures to prevent a fall occurring may not be required.

Many conventional formwork frames consist of diagonal braces that cross in the middle. While these braces are not considered to be suitable edge protection for a completed formwork deck, they may provide reasonable fall protection during frame erection. This is only the case where braces are installed in a progressive manner as soon as the frames are installed.

As the height of formwork frames increase there is a greater need to provide lateral stability to the frames.

Ensure framing, including bracing, is carried out in accordance with on-site design documentation and manufacturers' instructions.

Workers erecting formwork must be provided with the necessary information, training and instruction to erect formwork using safe methods. When erecting or dismantling formwork frame towers that require people to stand at heights of two (2) metres or more above a level below, a formworker can work within the formwork frame tower provided there is fall protection provided within the frame tower structure.

Controlling the risk of falls while erecting or dismantling frames can be achieved by:

- Providing fall protection within the frame structure during erection by positioning an internal full deck, consisting of scaffolding planks or other suitable decking installed at a distance no greater than two (2) metres below a temporary working deck platform level.
- Providing fall protection to all four sides of a frame structure using the formwork frame along with the side bracing or temporary handrails as means of fall protection.

7.8. Formwork false decks

When erecting the formwork requires people to stand at heights of two (2) metres or more above a level below, to install bearers and joists for the next formwork deck, a formworker can work within the formwork frame provided there is fall protection provided within the frame. An example of this would be to construct a temporary platform within the frames tower with the cross bracing or handrail installed to the sides enclosing the frame on four sides.

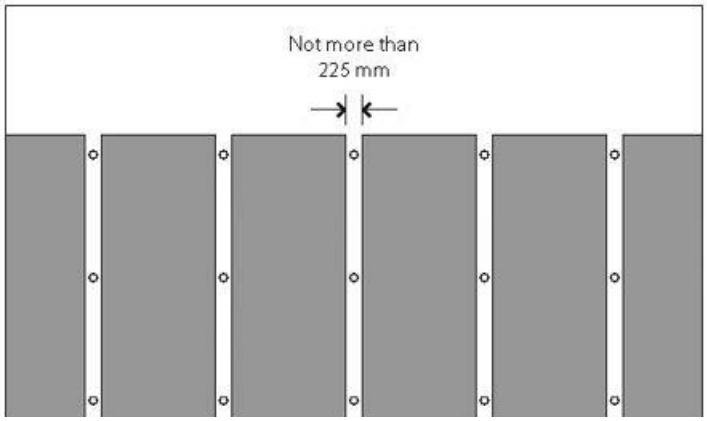
Where the above controls cannot be provided, then a false deck should be erected to provide fall protection to the person installing the formwork.

This deck should be provided both inside and between formwork frames and typically consist of form ply, scaffold planks or modular platform sections.

A protected entry (barricade/handrail) opening can be left in the deck to enable materials to be lifted. Using a captive platform system is preferable to lapped planks because a captive system cannot be accidentally dislodged. Lapped planks may only be used if secured against uplift and slipping.

The false deck should be constructed so there are no large gaps and gaps only exist where a vertical member of a frame passes through the deck (Figure 9). Gaps should not exceed 225mm in width.

Figure 9: Plan view of a false deck with gaps at vertical framing members



A false deck should be able to support the expected load of workers and materials during construction and people or objects that could fall onto the deck. Access should be provided to each of the false decks.

When considering the design of the deck for erecting, altering or dismantling formwork, the weight of the false deck and live load should be applied to the formwork support structure.

The height between the false deck and the pouring deck should allow entry for a person during stripping. Workers must take reasonable care for their own safety by not climbing the framework.

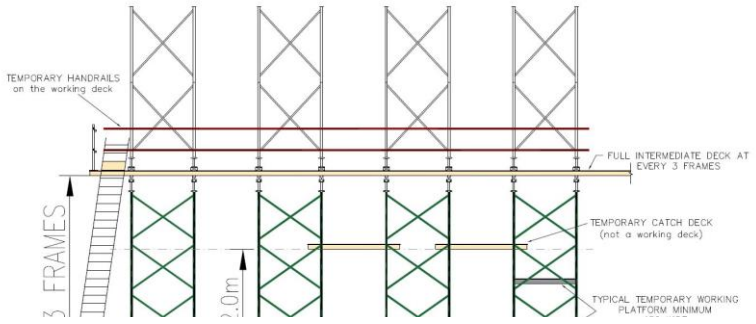
7.9. Intermediate work deck

Installation of intermediate working decks should be provided when the height between floors exceeds three (3) standard frames (height of one standard frame is 1.8 metres) with end fittings and at each three standard frames (or equivalent) with end fittings thereafter (see Figure 10).

Fall protection should be progressively installed to a leading edge or opening provided the intermediate working deck below is extended at no less than a ratio of 1:1.

Where the potential fall distance is less than two metres, a catch platform or catch deck can be provided that is at least 450mmwide, which is not a working deck (Figure 10).

Figure 10



7.10. Installing bearers

Bearers are the primary horizontal support members for a formwork deck that are placed on top of formwork frames or props. They are usually timber but are sometimes metal. They should be placed in position by people located on a secure platform no more than two metres below them.

Bearers should be positioned so they will not fall off the top of the frames. The usual method to do this is by placing the bearers in U-heads on top of the frames and by minimising cantilevers. U-heads should be used where two bearers abut.

Where only single bearers are placed in the U-head, the bearer should be placed centrally in the U-head unless a formwork designer, engineer or other competent person states otherwise. This can be achieved by rotating the U-head or by using timber wedges. (Figures 11,12 and 13)

Figures 11 and 12

Where the top of the supporting member consists of a flat plate, the bearer should be nailed or otherwise effectively secured to the plate. Flat plates should only be used where specified by a formwork designer, engineer or competent person.

Figure 13

7.11. Installing joists

If the height of the formwork deck being constructed is more than two metres above a continuous deck or surface below it, joists should be spread from a platform located within two metres of that surface, underneath the deck being constructed. This work platform should be a false deck but an intermediate platform may be used.

If installation of joists is not possible from below and where a catch platform is provided at two metres or less below a worker, joists may be spread on the bearers with the worker standing on top at bearer level.

A working platform at least 450mm wide (e.g. two scaffold planks) should be used when the potential fall distance is less than two metres. It is not acceptable for a person to work from a single plank or bearer.

The platform below the deck should be positioned at a suitable height for handling joists without introducing manual task risks and not greater than 2 metres above the continuous deck or surface below.

7.12. Laying out form-ply on the deck

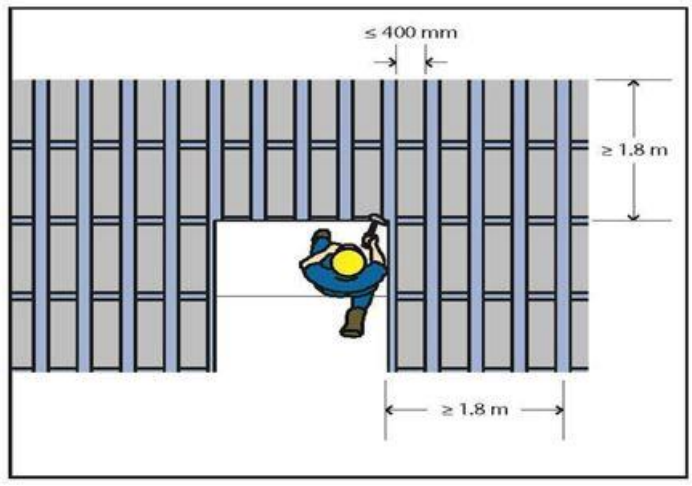
A formwork deck should be laid in a progressive way so that workers will be provided with a method to prevent them from falling below the deck.

This control measure is particularly important in situations where a temporary catch deck has not been provided within two metres below the level of the deck to be laid. In this situation form ply may only be spread on the joists provided:

- A minimum of four joists at 450mm centres—400mm gaps, totalling 1.8 metres—are located on bearers next to the person and in the other direction joists extend for at least 1.8 metres (Figure 14). Therefore, if a person falls they will fall onto the joists and should be prevented from falling further. In some situations, there may be a possibility of a person falling through the joists if the joists spread as the person's body makes contact. This is more likely to be a potential hazard when the person falls onto the joists in the same direction as the joists. Implementing controls to minimise sideways movement of joists will minimise this possibility.

- Workers should lay the form ply in front of their bodies so if they stumble they are likely to fall on top of the sheets being laid.
- Where a leading edge is involved and the distance below the deck being constructed is greater than two metres the SWMS should detail how work will be completed to control the risk.
- The gap between modular tableform and deck panel systems to be covered with wrecking strips, should be limited to nominally 400mm. Therefore, should a person fall, they will fall onto the adjacent tableform or deck panel in front or to the side of them which are already covered by form sheeting/lining material.
- Installation and fixing of the infill strips covering the gaps should be carried out in such managed manner and in accordance with appropriate SWMS to control and minimise the possibility of a fall through such gaps.
- Workers should lay and fix the infill strips in front of their bodies so if they stumble, they are likely to fall on top of the table forms or deck panels and the wrecking strips being laid.
- Where a leading edge is involved and the distance below the table forms or deck panels where wrecking strips are being laid is greater than two (2) metres, the SWMS must detail how work will be completed to control the risk of fall. For example, use of catch decks.
- Workers should start laying the form ply sheets from the perimeter scaffolding or other edge protection provided on the perimeter of the formwork.

Figure 14: Maximum spacing of timbers where deck height is over more than two (2) metres in height from deck below.



7.13. Cantilevers

Cantilevered bearers, joists and ply sheets can be hazardous when left unsecured. The weight of material or a person standing on the cantilever may make the timber pivot and cause the person or material to fall.

When designing the formwork system, the use of cantilevers should be kept to a minimum. In some situations, using cantilevered sections is unavoidable. In these cases, a formwork

designer should consider the potential for people and stored materials to cause cantilevers to pivot.

Wherever the weight of a person will cause a cantilever to pivot, the formwork design should include measures to secure the cantilevers so this will not occur. This may include temporary propping, nailing, bolting or another effective method. If nailing is used the formwork design should specify the nailing detail to be followed. This may include the use of purpose designed or proprietary brackets.

Materials should not be stacked or stored on a cantilever section unless the section has been designed to carry the load.

7.14. Changing floor levels

Formwork decks are rarely flat across the entire floor, generally due to deep beams or ‘drop downs’ sometimes called ‘capitals’ around columns. Uneven floors introduce fall hazards.

These hazards are most effectively managed by ensuring formwork supports and the deck are progressively constructed for the lower parts of the deck before work starts on the higher-level areas of the deck.

7.15. Pre-pour inspection and certification

Inspection and certification processes each contribute to controlling risks during the construction of formwork and falsework. Formwork should comply with AS 3610 (formwork for concrete).

Inspections and clearance to load should occur at key stages during the construction of formwork including when formwork is being loaded, for example with formwork components, equipment or pre-stressed tendons and prior to its completion by a competent person.

A separate certification process should occur when the formwork is complete and prior to concrete being poured.

A structural engineer or competent person with the appropriate qualification, should inspect and confirm installed formwork and falsework meets the design specification and is structurally sound before it is loaded with concrete. The scope of any certification work should be documented so there is no confusion or doubt about what has been inspected and certified.

7.16. Altering formwork and falsework

When altering formwork and falsework outside design parameters, you must:

- consult the formwork designer before making alterations
- complete the alterations in a safe manner
- ensure alterations do not compromise the structural integrity of the formwork and falsework
- ensure systems are in place to identify unauthorised interference with the formwork and falsework (e.g. regular inspections).

7.17. Monitoring

A competent designated observer should continuously monitor the formwork assembly during concrete placing operations and be provided with an appropriate communication system to alert others in case an emergency arises.

No person should be underneath a formwork deck during concrete placement so far as reasonably practicable. An observer should not stand directly underneath an area where wet concrete is being placed into the forms. Equipment such as CCTV or remote mounted cameras can be used to safely assess the pour

Competent persons should be available during concrete placement to carry out any emergency adjustments or repairs. The concrete placement should cease during adjustments and repairs at the discretion of a competent person.

7.18. Concrete placement

A concrete pour should not commence until the structural integrity of the entire form has been inspected by a competent person (e.g. structural engineer).

To maintain stability of the forms the placement of concrete should not exceed the maximum calculated pour rate and the inboard part of formwork should be placed before proceeding to any cantilever section.

Hoisting, pumping and other equipment should not be attached to the formwork unless specifically allowed for in the formwork design as vibration under load may weaken the formwork structure and may lead to failure.

Formwork should be monitored as it is loaded to check for indications of potential failure or collapse, and that vertical and horizontal movements do not exceed specifications, and visually remain as per the intent of the design.

The observer should continuously monitor the formwork and falsework assembly during loading and be provided with an appropriate communication system to alert others in case an emergency arises.

Competent persons should be available to carry out any emergency adjustments or repairs. The observer should not stand directly under an area where loading is occurring, for example where wet concrete is being placed onto formwork.

7.19. Pre-stripping authorisation

Before starting the stripping operation, the structural engineer responsible for the design must provide written confirmation of back propping / reshoring design in conjunction with the formwork engineer to the formwork contractor verifying that the permanent structure is self-supporting and the formwork can be removed.

The authorisation should be based on the design specifications for the structure, the verification of the strength of the concrete mix and the time period elapsed since the pour to enable the concrete to reach an adequate strength as per the design to carry its own weight including the relevant construction live loads.

Back propping should be installed as per the structural engineer's detail responsible for the design. Specific installation of the props should be done strictly in accordance with the manufacturer's / designer's specifications.

Documentation from the concrete supplier verifying the concrete specification should be available on request. A concrete sampling and testing procedure should be in place to verify the concrete meets its design specification.

A competent person should also provide input into the methodology on formwork stripping to ensure the permanent concrete element will not fail and result in structural collapse.

7.20. Stripping formwork

As with formwork erection, the stripping operation should be carried out in an orderly, systematic and progressive manner, considering the risks of falls, falling objects and manual task hazards in the now enclosed space.

In conventional tableform and most hybrid systems, safe sequential removal practices involve:

- unwinding jacks and the removal of formwork sections individually
- keeping the removal area free of trip hazards
- common heights issues such as perimeter falls through penetrations and voids (e.g. service risers, shafts lift shafts stair voids) are managed by rails, scaffold, secured and marked covers or other forms of fall protection
- protection for appropriate task lighting.

Note: drop stripping (uncontrolled release of formwork components) is not permitted at any time.

When assessing the risks from stripping formwork consider:

- the number of people in the stripping crew
- the sequence of stripping activities – this should detail how the frames and other supports should be removed (i.e. how far U-heads are to be lowered)
- whether the support system will be completely removed in a zone before removing the formwork deck or whether the supports will be lowered slightly but remain under the formply while it is being removed
- removing nails and sharp fixings before stacking the components
- minimising damage to the components
- stacking the formwork components – do not obstruct access ways or work areas
- formwork components are not dropped or thrown from a building or structure
- flatheads are not supporting the ends of bearers
- when back-propping is required or only part of the support system is to be removed, how the structural members will remain in place and the type and layout of members that will replace the formwork system
- other special requirements involved in the stripping and or building process e.g. checking of back-propping after post-tensioning
- providing lighting for the work area and surroundings
- maintaining housekeeping, removing nails and rejected materials, stacking stripped formwork and removing tripping hazards e.g. concrete nails and brace anchor inserts from the floor.

Formwork removal should be carried out in a systematic way so the deck is gradually removed as the support system.

Form ply may be removed by partially lowering the support system and then dropping the segment of the deck (sheet) onto the support system. This eliminates the need to manually lift sheets of ply from ground level.

Bond reduction

Stripping formwork is easier when the strength of the bond between the form material and the concrete is reduced. The bond will be dependent on the material characteristics and the smoothness of the form material. A liquid bond breaker can be used on wall and column forms to reduce the strength of the bond but use on floor forms is not encouraged because it can cause a slip hazard.

8. Slip and jump forms

8.1. Entry and exit

Entry to the form may be provided in a variety of ways including one or more of the following:

- personnel hoists on the building
- permanent stair systems in the building
- a trailing stair system suspended from the slip form or jump form
- a trailing ladder system.

The use of a trailing stair system should be considered instead of a ladder system because it minimises the risk of a fall. Emergency evacuation is also generally easier on a stair system.

The entry area between the trailing access system and the building should be clear of trip hazards and there should be no gaps between platforms.

A formwork designer should ensure a trailing access system is designed for the loads that could be applied in an emergency evacuation situation. Both the system itself and the form should be able to withstand applied loads from the access system.

Where the designer of the formwork specifies a lesser live load than 2.5 kPa (250kg/m2), the formwork contractor should:

- fix a sign in a visible position stating the maximum load that can be applied to the stairs
- implement written procedures to ensure the maximum number of people on the form is not exceeded.

Entry ladders should be secured in place (refer to part 6.6 of this document).

Further information on using ladders safely is in the Code of Practice Managing the Risk of Falls at Workplaces.

Entry openings for ladders on working decks should be provided with guardrails and trapdoors that are closed except when being used. Trapdoors should be provided with a device so they can be easily opened from above. This device should not pose a trip hazard for people on the deck.

Access ways should be kept free of materials and rubbish to prevent objects falling to the levels below.

Workers must be provided with safe entry to and exit from the formwork, falsework, jumpform, slipform or travelling form during erection, use and dismantling. This includes for people slinging or unslinging loads.

Common ways of providing safe entry and exit for large or complex formwork and falsework structures include:

- installing permanent stairs, platforms or ramps
- installing temporary stairs, with temporary treads and landings, or portable ladder access systems for use when erecting the formwork and falsework, and
- personnel hoists—non-mechanical forms of exit (e.g. a ladder or stair tower should also be provided in case of power failure or another emergency).

Stair towers secured to scaffold bays provide suitable and flexible entry. Fixed industrial single ladders, not extension ladders may be used for entry to and exit from a scaffold. Ladders should not be used as a work platform.

8.2. Trailing screens and platforms

Trailing screens can provide edge protection, a means of preventing falling objects and be designed to incorporate working platforms. Where platforms are provided these are usually for the purpose of patching the building or carrying out minor repairs and for entry for people climbing the form.

A designer of formwork should specifically address all issues for which the trailing screen system is designed. The following issues should be addressed in the design:

- A suitable design loading for platforms on the trailing system. Signs should be fixed to the platforms stating the maximum load permitted in kilograms where the design load is less than 2.5 kPa (250kg/m2). People at the workplace should be aware of the maximum loading that may be applied to the trailing platform and this should be stated in documentation kept at the workplace.
- The risk of falling objects must be controlled. (see clause 54 of WHS Regulation)
- Platforms should be secured to prevent uplift or other movement.
- People should not be located on trailing platforms while the platforms are lifted or suspended by a crane.

If a person is located on a platform while it is being lifted or suspended by a crane, the following controls should be implemented:

- A person should be prevented from falling down a gap that may exist on the inside edge of the platform, for example between the platform and the wall being constructed. It is preferable to provide edge protection on the inside edge. Fall arrest harnesses may be provided for workers as long as they are trained in their safe use and a rescue procedure for retrieving workers following a fall has been prepared. Use heavy duty containment netting rather than small aperture mesh with edge protection to prevent objects from falling.
- People on the platform should hold at least a dogman or rigger license or a person with such a licence should be supervising on the platform as it is lifted.

Use a clear method of communication between the crane operator and the dogman or rigger responsible for directing the lift, for example a whistle or two-way radios.

8.3. Climbing the form

It is important that the different parts of the form remain level during the climbing process. Climbing is usually carried out using a series of climbing devices set up to lift at the same time and at the same rate.

If the lifting system is not properly synchronised the form may become wedged on the structure or structural members may be overloaded. There should be a system in place to prevent the form going out- of-level during the climbing procedure. This system may be automated or may rely on operators stopping the climbing process.

To climb the form safely:

- Only allow people directly involved in climbing to be located on the form during the climbing process.
- Identify and control potential nip or shear points where a person could be injured during the climb.
- Remove obstructions on the form before the form is climbed. This includes the removal of ‘Z- bars’, ferrule bolts and other material that would snag on the structure if they were not removed. A ‘sign-off’ procedure for this should be completed.
- design services including electrical cable and water pipes so they will not snag or rupture as the form is climbed.

When removing a form from a vertical element, support the form so it never relies on suction for support.

Serious incidents occur when it is assumed a form is supported from above when it is relying on ‘through bolts’ through the wall for support. When the bolts are removed the form falls with the people still standing on a platform attached to the form. This hazard can apply both to crane lifted forms and jump forms.

Appendix A – Glossary

Term	Description
Builder	A person conducting a business or undertaking (PCBU) that commissions the construction work and is authorised to manage, control and coordinate the construction work at the workplace. A builder may also be referred to as the principal contractor.
Catch platform or catch deck	A catch platform is a temporary platform located below a work area to catch a worker in the event of a fall.
Competent person	A person who has acquired through training, qualification or experience, the knowledge and skills to carry out the task.
Construction work	Defined as any work carried out in connection with the construction, alteration, conversion, fitting-out, commissioning, renovation, repair, maintenance, and refurbishment, demolition, decommissioning or dismantling of a structure. See clause 289 of the WHS Regulation
Containment netting	Containment netting may also be referred to as containment sheeting or screening or scaffolding mesh or shade cloth.
Conventional frame	Conventional frame means a component comprising two vertical members braced by horizontal and or diagonal members that are used in pairs when separated by bracing members to support formwork.
Control measure	An action taken to eliminate or minimise health and safety risks so far as is reasonably practicable. A hierarchy of control measures is set out in the WHS Regulation to assist duty holders to select the highest control measures reasonably practicable. Note: The WHS Regulation also refer to a control measure as a risk control measure or a risk control. In the Code, control measure is used throughout.
Dead and live loads	A dead load is defined as a permanent action and live loads is defined as imposed action.
Designer	A designer is a person conducting a business or undertaking that designs a structure that is to be used or could reasonably be expected to be used, as or at, a workplace, including during construction, maintenance, renovation or demolition of the structure. Designers can include for example; draftspersons, building designers, architects and engineers. A builder could be a designer if they design a structure themselves or are involved in altering the design for a building, even after construction work has commenced.

Term	Description
Designer's safety report	A report identifying the hazards relating to the design of a structure that create a risk to the health or safety of persons who are to carry out any construction work on the structure. The designer's safety report provides recommended ways to control the risks associated with the hazards identified throughout the life cycle of the structure. This may be done in consultation with other duty holders carrying out the work.
Duty holder	Any person who owes a work health and safety duty under the WHS Act including a person conducting a business or undertaking, a designer, manufacturer, importer, supplier, installer of products or plant used at work (upstream duty holder), officer or a worker.
Engineer	A competent person that has tertiary qualifications in an engineering discipline relevant to the design activity they are undertaking, for example, civil engineer.
Falsework	The temporary structure used to support a permanent structure, material, plant, equipment and people until the construction of the permanent structure has advanced to the stage where it is self-supporting. Falsework includes the foundations, footings and all structural members supporting the permanent structural elements. Falsework can be used to support formwork for in-situ concrete, prefabricated concrete elements, steel sections or stone arches, for example during bridge construction.
Formwork	The surface of the form and framing used to contain and shape wet concrete until it is self-supporting. Formwork includes the forms on or within which the concrete is poured and the frames and bracing which provide stability, during the curing process. Although commonly referred to as part of the formwork assembly, the joists, bearers, bracing, foundations and footings are technically referred to as falsework.
Formwork plan	Drawings that include all details of formwork, size and spacing of framing and details of any proprietary fittings or systems proposed to be used. Where special requirements such as external vibration are involved, the formwork design should include any additional structural loads to be applied.
Formwork and falsework design	A design that considers the work practices necessary to carry out the erection and dismantling of the formwork/falsework as designed and identify health and safety risks and controls at the design stage.
Formwork deck handover certificate	A document that may be used to consider the completed work areas of formwork / falsework as designed that allows other trades to commence their work. This allows other trades to identify health and safety risks and input controls.

Term	Description
Hazard	A source or a situation that has the potential to harm a person, property and or the environment. Hazards at work may include: noisy machinery, a moving forklift, chemicals, electricity, working at heights, a repetitive job, bullying and violence at the workplace.
Health	Includes both physical and psychological health.
Health and safety committee	A consultative body established under the WHS Act. The committee's functions include facilitating cooperation between workers and the person conducting a business or undertaking to ensure workers' health and safety at work, and assisting to develop work health and safety standards, rules and procedures for the workplace.
Health and safety representative	A worker who has been elected by their work group under the WHS Act to represent them on health and safety matters.
High risk construction work	WHS Regulation clause 291 provides a list of construction work that is considered to be high risk for the purposes of the WHS Regulation. It is construction work for which a safe work method statement (SWMS) is required.
Intermediate working deck	Constructed using joists and sheeting or metal planks.
Managing risk	This is a process set out in the WHS Regulation to eliminate health and safety risks so far as is reasonably practicable, or if this is not reasonably practicable, minimise the risks so far as is reasonably practicable. It includes identifying hazards, assessing and implementing control measures, and reviewing and maintaining the control measures to ensure their ongoing effectiveness.
Officer	An officer under the WHS Act includes: – an officer under section 9 of the *Corporations Act 2001* (Cth) – an officer of the Crown within the meaning of section 247 of the WHS Act, and – an officer of a public authority within the meaning of section 252 of the WHS Act. A partner in a partnership or an elected member of a local authority is not an officer while acting in that capacity.
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Term	Description
Person conducting a business or undertaking (PCBU)	A PCBU is an abbreviated term which intends to capture all types of working arrangements or relationships. A PCBU includes a: – company – unincorporated body or association – sole trader or self-employed person. Individuals who are in a partnership that is conducting a business will individually and collectively be a PCBU. A volunteer association (defined under the WHS Act, see below) or elected members of a local authority will not be a PCBU.
Plant	Includes machinery, equipment, appliances, containers, implements and tools and components or anything fitted or connected to those things. Formwork examples are items of plant designed as a structural component or are assembled to form a structure.
Proprietary systems	Formwork components that are mass-produced and where the manufacturer provides technical information on the load carrying capacities of the components and information on the erection and dismantling methods.
Reasonably practicable	In relation to a duty to ensure health and safety, means that which is, or was at a particular time, reasonably able to be done to ensure health and safety, taking into account and weighing up all relevant matters including: (a) the likelihood of the hazard or the risk concerned occurring (b) the degree of harm that might result from the hazard or the risk (c) what the person concerned knows, or ought reasonably to know, about the hazard or risk, and ways of eliminating or minimising the risk (d) the availability and suitability of ways to eliminate or minimise the risk, and (e) after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.
Risk	The possibility harm (death, injury or illness) might occur when exposed to a hazard.
Scaffold	A temporary structure erected to support access or working platforms.

Term	Description
Slip form / jump form	Terms given to self-climbing formwork systems specifically intended to contain concrete in walls and columns in high rise buildings and other concrete structures.
Structure	Anything that is constructed, whether fixed or moveable, temporary or permanent, and includes: (a) buildings, masts, towers, framework, pipelines, transport infrastructure and underground works (shafts or tunnels), and (b) Any component of a structure, and (c) Part of a structure. Formwork example of a ***structure*** includes; Formwork, falsework or any other structure designed or used to provide support, access or containment during construction work.
Subcontractor	A PCBU that enters into a contract with a builder or principal contractor to undertake specified construction work.
Safe work method statement (SWMS)	A written document that sets out the high-risk construction work activities to be carried out at a workplace, the hazards and risks arising from these activities and the measures to be put in place to control the risks. Its primary purpose is to help supervisors and workers implement and monitor the control measures established at the workplace to ensure high risk construction work is carried out safely.
Traditional formwork (conventional formwork)	Traditional formwork also known as conventional formwork means a formwork system typically constructed on-site from timber or plywood and supporting elements such as supporting frames.
Travelling formwork	Formwork which moves horizontally allowing the repeated construction of structural elements such as in-situ concrete bridge spans. The formwork is generally supported by the permanent structure as it is progressively completed and therefore has the advantage that no falsework is required over the length of the bridge.
White card	An industry term for a 'general construction induction training card'.
Work group	A group of workers established to facilitate the representation of workers in the work group by one or more health and safety representatives. A work group may be all workers at a workplace but it may also be appropriate to split a workplace into multiple work groups where workers share similar work conditions or are exposed to similar risks and hazards. For example, all workers on night shift.

Term	Description
Worker	Any person who carries out work for a person conducting a business or undertaking, including work as an employee, contractor or subcontractor (or their employee), self-employed person, outworker, apprentice or trainee, work experience student, employee of a labour hire company placed with a 'host employer' or a volunteer.
Workplace	Any place where work is carried out for a business or undertaking and includes any place where a worker goes, or is likely to be, while at work. This may include offices, factories, shops, construction sites, vehicles, ships, aircraft or other mobile structures on land or water.