CONSTRUCTSAFE TIER 2 HEALTH AND SAFETY COMPETENCY TEST – SCAFFOLDER FRAMEWORK

Scaffold and Access Riggers, New Zealand
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Version 1.2

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1. Introduction

This framework document allows those who design and contribute to construction health and safety training content to align with ConstructSafe Tier 2 Health and Safety Competency assessment for Scaffolders requirements. The intent is to make it easy for training content to meet the knowledge and aptitude requirements that candidates need to pass the test.
The framework was developed by a collaboration between CHASNZ and XXXX.
The framework has been divided into module headings that match the ConstructSafe Tier 2 test structure.

1.2 Candidate minimum required knowledge

Candidates undertaking a ConstructSafe Tier 2 Scaffolder Health and Safety Competency Assessment must have the ConstructSafe Tier 1 Foundation Health and Safety competency to access this assessment.

1.3 Test framework

The framework for the ConstructSafe Tier 2 Health and Safety Competency Assessment for Scaffolders is outlined on the following pages and was created by representatives of Scaffold & Access riggers New Zealand (SARNZ)

1.4 Test summary

The test for this framework has 60 number of questions, which will cover all aspects of the framework.

To achieve this competency, a candidate must get 90% or more.

1.5 Additional components

Following the theory assessment, this competency requires successful candidates to be assessed at work across all of the framework elements at least once every three years.

Where candidates cannot demonstrate ongoing competency through at work assessment over this period, a candidate is required to undertake this ConstructSafe assessment again.

Risk Area	Identified risk	Expected knowledge outcome (Candidate can…)	Learning outcome
Managing risks	Identify hazards and identify the controls before the work commences; • An edge where a person could fall; • A falling object; • A live power line; • hazardous material; • nature of scaffolding work; • the range of possible methods of carrying out the work;	Identify Hazards	1.1
	Identify hazards by: • Physical inspections; • Consider hazards that may be created by other site users, or if the scaffolding activities could create hazards for others (e.g. traffic management) • Safe work method: identify the hazards involved in each task. Some workplaces use job safety analysis (JSA) or task analysis (TA) to do this; • Engaging with workers; • Process analysis: identify hazards at each stage of the work plan; • Guidance and standards consideration; • Hazard and operability analysis (HAZOP); • Accident investigation analysis – identify hazards and causes of harm from investigations involving similar types of work.		
	Carry out a risk assessment when; • It is uncertain whether a hazard may cause injury or illness; • A work activity involves different hazards and do these produce new or greater risks; • Workplace changes that impact on effectiveness of controls;	Assess Risks	1.2

	• New or different risks that are associated with a change in work systems/location.		
	To decide what is 'reasonably practicable', PCBUs must weigh up all relevant matters; • how likely the hazard or risk is to happen; • what degree of harm the hazard or the risk might cause; • how much the PCBU knows, or ought reasonably to know, about the hazard or risk and how to eliminate it; • what ways are available to eliminate or minimise the risk; • what ways are suitable to eliminate or minimise the risk;	Assess Risks	
	A risk assessment will help to; • identify which workers or others are at risk; • determine what sources and processes are causing that risk; • determine the severity of the risk; • identify if and what kind of controls should be implemented; check the effectiveness of existing controls.	Assess Risks	
	PCBU's must minimise the risk so far as reasonably practicable by one or a combination of the following: • Substitution; • Isolation; • Engineering Controls; • If risk remains, it must be minimised by implementing administrative controls, so far as is reasonably practicable, e.g. installing warning signs; • Minimise any remaining risk with suitable PPE;	Control Risks	1.3

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- Administrative controls, including PPE, rely on human behaviour and supervision. Used on their own, they tend to be the least effective in minimising risks.

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Regularly review controls on site to make sure they're still effective by;

- When the control is not effective in controlling the risk (e.g. an incident/ near miss);
- Before a change at the workplace that is likely to give rise to a new or different risk that the control may not effectively control;
- If a new hazard or risk is identified;
- If the results of consultation with workers or other PCBUs indicate that a review is necessary, or if a health and safety representative or committee recommends a review.

</td><td>Review controls</td><td>1.4</td></tr>
<tr><td>Training and Certification</td><td>

HEIGHT OF SCAFFOLD *Measured from the highest component*	PERSON PERMITTED TO ERECT THE SCAFFOLD
Up to 5 m	**Competent person**: someone who has the knowledge and skills to carry out a particular task. Skills and knowledge may be acquired through training, qualification, or experience, or a combination of these. NZQA registered unit standards may assist in fulfilling the qualification requirement.
5 m and above	Holder of appropriate class of certificate of competence

Table 3: Competency requirements based on height of scaffold

</td><td>Competency requirements based on height of scaffold</td><td>2.1</td></tr>
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Knowledge of when a CoC is needed;

- Anyone who carries out scaffolding work including erection, alteration, repair or dismantling of a scaffold of which any part is 5 m or more above the ground, must hold the appropriate class of certificate of competence (COC) for that type of scaffold.
- The HSE Regulations split different types of scaffolding into Basic, Advanced and Suspended.

</td><td>Certificates of competence</td><td>2.2</td></tr>
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	• COCs are issued by SARNZ (Scaffolding, Access and Rigging Association of New Zealand) under the delegated authority of WorkSafe and are valid for four years.		
	Knowledge and experience can be obtained by: • training to a NZ Certificate Level. International qualifications may contribute to gaining the NZ Certificate via a recognition of prior learning process, recent relevant industry experience. • renewing a current certificate of competence that meets the requirements of the HSE Regulations, regulations 31 and 35. To renew a certificate of competence, the holder must apply to SARNZ detailing recent work experience and up to date knowledge of good practice.	Certificate of competence structure	2.3
	A trainee (worker) who does not yet hold a certificate of competence but is training to do so can be involved in scaffolding work, as long as they are under the direct supervision (see below) of someone who holds a certificate of competence of the relevant type.	Responsibilities when working with trainees	2.4
	This applies to all scaffolding, regardless of height or whether a certificate of competence is required: • Knowledge of the basic rules of physics and mathematics as they apply to scaffolding. For example, an ability to make simple calculations of dead load and live load is often needed; • Ability to read and understand suppliers' information, general site plans, design drawings and specifications for scaffolds; • Thorough knowledge of the scaffolding equipment being used; • Thorough knowledge of the assembly methods and design requirements associated with scaffolding equipment;	Expected competencies of everyone involved in the scaffolding process	2.5

	• Ability to identify the common hazards of scaffolding work and take effective precautions to control the risks resulting from the hazards; • Competency to visually inspect scaffolding equipment for faults; • The physical skills needed for scaffolding construction; • Competency in manual lifting techniques; • Ability to work safely and confidently at heights; • Ability to use scaffolding tools and equipment correctly; • Ability to erect and dismantle scaffolding in the correct sequence; • Knowledge of the prevention of falling objects.		
Site Management	A safe system of work should include: • engaging workers; • assigning responsibilities; • a safe work method statement; • consulting a competent person regarding any temporary works design; • identifying any health and safety hazards and risks; • carrying out a risk assessment; • describing how you will control any identified risks; • describing how controls will be implemented, monitored and reviewed; • communication systems; • accident investigation and reporting methods; • emergency procedures.	Safe system of work	3.1
	To undertake a site assessment, consider the following: • What is the purpose of the scaffold, and who will be using it? • What is the nature of the ground, surface or structure on which the scaffold is to be erected? Does it need to be verified for load-bearing capacity? • How will the scaffold be stabilised from overturning? If it will be tied to a structure, how will this be done?	Site assessment before work begins	3.2

	• Will the scaffold be subject to environmental loads such as funnelling wind, vehicle impact, or snow? • How will workers and vehicles access the site and the area for storage of material and equipment? • Does the scaffolding create risk for workers on or around it? • Are there electrical conductors or cables in the vicinity of the scaffold? Could the scaffold or workers come into contact with them at any stage of the scaffolding process? That could include delivering scaffolding equipment to the site, erection, associated scaffolding use and work activity, and eventual dismantling /removal from site. • Is there sufficient space to erect the scaffold and store scaffold materials? • Is the scaffold to be erected on a public roadway or footpath, and what are the local authority requirements? • How will the site be protected from unauthorised access? • Is pedestrian access through the site required? How will this be managed? • Is a specific traffic management plan required? • Are there any other potential hazards specific to the site? • Does the work need to be notified to WorkSafe? Should anyone else be notified?		
	• Services include gas, water, storm water, sewerage, telecommunications and electricity supply, or fuel and refrigerant in pipes or lines. • Minimum Approach Distances (MADs) near power lines or electrical conductors: • Do not erect scaffold or handle anything closer than: • 4 m from overhead power lines or electrical conductors, unless you have written consent from the local electricity network company or power line owner • 6 m for 220 kV and above, under any circumstances.	Utilities and other services	3.3

	When materials arrive on site: • Examine all equipment on arrival at the site. • Stack scaffold components in an appropriate and secure location on site, particularly when work is above or near to a public thoroughfare. • Do not use defective or damaged items. Remove any found from the site as soon as possible. • Confirm that foundations and ground conditions are adequate for the load of the scaffold. • Examine the building or structure. If there are concerns about tie positions etc., obtain advice before continuing. • Equipment Inspection: Used scaffolding equipment should be inspected before use to identify items that are unsuitable or that fail to comply with relevant standards or supplier's or manufacturer's guidelines.	Arrival of materials on site	3.4
	When organising site security and site access, consider: • warning or hazard signs; • supervising authorised visitors; • the risk of unauthorised access occurring (consider schools, parks, shops or other public places, or amenities and events nearby); • pedestrians and other members of public; • other workers and mobile plant on site; • vehicle traffic control within and near the site; • delivery points, including vehicle access and egress; • immobilising/locking vehicles; • safe and secure storage of materials (e.g. stacked equipment); • control of energy sources (e.g. temporary mains service boxes); • suitably designed and constructed physical barriers (e.g. safety fences, lockable gates, or covers).	Securing the work area	3.5

	Work near roads must always be approved by the local authority or road owner. Manage traffic, including all road users, while the work takes place with a temporary traffic management plan (TMP). On busy roads or motorways, scaffolding should be erected behind approved barriers, or alternatively in a position where there is no possibility of impact. Scaffolding near roadways must have suitable lighting to illuminate all potential hazards (but avoid distracting motorists).	Managing traffic	3.6
	• It may require the erection of: • temporary hoardings; • warning lights, or external lighting if the diversion is at night; • warning signs; • barricades; • ramps over obstacle areas etc.	Managing traffic (cont'd)	
	Mobile plant, machinery and vehicles can cause serious injury or death. • Isolate plant and machinery from people working on the site and from pedestrians; • Ensure vehicles and plant are maintained and log books and maintenance records are up to date; • Secure loads and plant.	Mobile plant and machinery	3.7
	The hazard identification and risk assessment can identify whether part of the work site is a confined space. • an oxygen concentration outside the safe oxygen range; • a concentration of airborne contaminant that may cause impairment, loss of consciousness or asphyxiation; • a concentration of flammable airborne contaminant that may cause injury from fire or explosion;	Confined spaces	3.8

	• engulfment in a stored free flowing solid or a rising level of liquid that may cause suffocation or drowning.		
	If the scaffolding is partly or completely within a confined space, make sure; • workers are trained in confined space entry and enough workers are available to carry out a rescue in the event of an emergency; • an entry permit system is established • a permit is completed and approved by the PCBU in charge of the confined space; • pre-entry tasks are established and understood by all; • the atmosphere is tested before entry and continuously monitored during entry, if necessary; • ventilation is installed and adequate where deemed necessary; • an emergency plan is established and tested; • suitable standby person/s are present, trained and aware of their specific tasks in the event of an emergency; • communication is established with the standby person/s; • all equipment is suitable and operational, within current inspection dates, and used by workers trained in the use of the equipment.	Confined spaces	
	Scaffolds are often used to provide access for work involving substances such as asbestos, lead and silica dust. Exposure to these substances can cause harm. Exposure may occur; • while the scaffold is being erected • during alteration or inspection of the scaffold while in use • during removal of encapsulation and dismantling of scaffold.	Hazardous substances	3.9
	Should include; • competent personnel available to carry out a rescue;	Emergency planning	3.10

	• first aid and medical provisions and who is trained to administer first aid; • where the nearest emergency centre is; • location of alarms, fire extinguishers and escape routes. If working with fall arrest equipment or on a suspended scaffold, also include; • the rescue method when someone falls from height (e.g. use of a crane or elevating work platform) for different situations; • the equipment necessary for a rescue; • information on suspension trauma; • first aid training.		
	As well as the regulations for providing, using, and maintaining PPE, there are standards that the PPE should meet, and expectations about when and where to use it. Remember that elimination is the preferred risk control, and PPE is a minimisation control. • Hard Hats; • Safety Footwear appropriate to task; • Hi-Viz; • Harnesses; • Hearing Protection; • Eye Protection; • Gloves; • Respiratory Protection; • Life Jackets/ Personal Floatation Device.	PPE	3.11
	A safe system of work must include effective communication. This could be verbal if workers are within hearing distance. Where that is not possible, or where a worker is alone, communication could involve RT contact with the rest of the crew, or established phone calls to a contact person at set intervals.	Communication	3.12

	The system should allow workers to regularly communicate that they are safe.		
	A number of things can impact on a worker's competence. Sleep deprivation, poor diet, relationship problems, money problems, alcohol and drug abuse, health problems and the uncertainty about the continuity of work are examples of issues that can affect people's ability to work safely. There should be a fatigue policy covering hours of work, roster patterns, and days of work/time off between shifts. PCBUs should also have a policy in place to constructively prevent alcohol and other drug-related issues.	Fitness for work	3.13
	Planning considerations should include discussions on: • permits/consents/notifications • service mark-outs and locations • site-specific documentation which could include; • health and safety policy; • summary worksite safety plan; • worksite emergency procedures; • worksite safety induction card; • visitor and worksite induction register; • accident/incident register, including near misses; • injury/ill-health/incident reporting; • hazard identification; • site-specific risk assessment; • safe or standard operating procedures; • quality plan; • overhead services and underground service plans; • construction plans;	Other planning considerations	3.14

	• nature or condition of the ground; • weather conditions (e.g. time of year, expected conditions etc.) • interaction with other PCBUs; • site access and security; • traffic management and public safety; • type of plant and equipment to be used; • provision of adequate facilities for workers.		
Fall Protection systems	Risks associated with using fall arrest equipment; • Lanyards that are too long can result in the worker swinging down or back or striking the ground (pendulum effect); • The worker can be too heavy or too light for the shock absorber; • A fall arrest system can fail if inappropriate anchor points (not strong or high enough or too close to an edge) are used; • A worker who has fallen and is suspended in a harness can develop a condition in which blood pooling in the legs can lead to loss of consciousness and death; • People rescuing a worker who has fallen face risks to their own safety; • A worker disconnects from the anchor points because their movement is restricted, exposing them to the risk of a fall; • A worker is not correctly connected to the attachment and the connection fails under the load; • A slack horizontal line suddenly pulled by a worker who has overbalanced may pull others off balance.	Common risks	4.1
	Types of Fall Protection Systems: • Personal fall protection systems allow a worker to be protected while a task is undertaken while working at height. They must be appropriate for the intended task.	Types of fall protection systems	4.2

	• Fall restraint prevents the worker from getting too close to somewhere they could fall from. • Collective fall arrest systems include industrial safety nets and soft-landing systems. They protect more than one person at a time from falling. • Work positioning systems enable a worker to be stable while working hands free. • Fall arrest systems catch a worker if they fall. They can be used with horizontal lifeline and life rail systems, which allow horizontal movement while being hooked on. • Industrial safety nets are sometimes used where it is not practicable to provide scaffolds or temporary guard railing. They are attached to perimeter cords.		
	Using fall arrest systems: • Harnesses; • Lanyards; • Fall Arrest Devices - Type 1 (Inertia Lock Rope Grab), Types 2 and 3 (Inertia Reels). When choosing a fall arrest device, consider: • whether work is at different heights with workers moving up and down frequently; • the nature of a fall if it occurs; • the adequacy of anchorages (particularly with type 1 devices); • whether the fall is sloping; • whether the fall is over an edge, as this can lead to failure of the lanyard; • whether the anchor point above the user is offset by more than 30 degrees from the vertical (for type 2 and 3 devices).	Using fall arrest systems	4.3

	Selecting a Fall Arrest Device: When choosing a fall arrest device, consider: • whether work is at different heights with workers moving up and down frequently; • the nature of a fall if it occurs; • the adequacy of anchorages (particularly with type 1 devices); • whether the fall is sloping; • whether the fall is over an edge, as this can lead to failure of the lanyard; • whether the anchor point above the user is o set by more than 30 degrees from the vertical (for type 2 and 3 devices).		
	Where there is a risk of a fall, scaffolders should hook onto the first available anchor point when they are: • working on a platform without a guardrail; • climbing up and down the scaffold structure; • working on unplanked scaffolding; • hemping; • working over a void; • working on a hanging scaffold; • working on a cantilever scaffold; Suitable anchor points for hooking onto include: • Putlogs supported by the ledgers of the lift above and fixed at both ends by single couplers; • Ledgers and transoms supported with load bearing couplers (right-angle couplers); • Guardrails supported with load bearing couplers (right-angle couplers); • Standards can be used as anchor points if there are no joins in the section of tube or if the manufacturer states the component can withstand the load imposed by a fall;	Anchor points	4.4

	• Tube and coupler scaffolding can provide safe anchor points for a scaffolder wearing a full body harness and attached to a lanyard with an energy absorber; • For proprietary scaffolding, refer to the manufacturer's specifications.		
	How to prevent the Pendulum Effect: • Select an anchorage point at a right angle to the position of the line at the perimeter edge. If a right angle to the work position is not possible to achieve, the anchor point should be no more than 30 degrees to the work position. A mobile anchorage may be used; • Use a secondary anchor point and/or an anchor line; • Use a perimeter guardrail to prevent the possibility of a fall; • Use a work positioning system, or some other means of access such as an elevating work platform.	Anchor points	
	Bags or containers will help protect equipment being transported. All equipment should be stored when not in use to protect equipment from exposure to; • sunlight/UV light; • heat; • moisture; • chemicals; • sharp edges and abrasives; • heavy objects. All inspections should be carried out by a suitably qualified person. All inspections should be documented. Inspection Frequency: • Before and after use;	Inspection and maintenance of fall arrest equipment	4.5

	• Six-monthly (or more often according to manufacturer's or supplier's recommendation); • 12 monthly (or more often according to manufacturer's or supplier's recommendation); • On entry or re-entry into service; • After a fall arrest and before further use.		
	When working over or near water, assess the hazards and risks to decide what control measures should be in place and what PPE should be worn and what control measures should be in place. Personal protective equipment includes life jackets and harness systems. Have a rescue plan in place and take into account the extra risks working near water can create (e.g. drowning). When operating a swing platform above water, persons in the platform may replace the safety harness and lanyard with an approved life jacket, provided a job-specific hazard assessment has been undertaken taking into account the working environment and the hazards presented in that workplace (e.g. structures, changing water levels, currents and wind).	Working near or over water	4.6
	The rescue method should reflect the complexity of the task and how accessible the fallen worker is. While a fall arrest system may hold the worker suspended, this can still lead to serious harm or death, so rescue should start immediately, so far as is reasonably practicable. If a worker is unconscious when rescued, lie them down in the recovery position until emergency services arrive. • There should be sufficient number of workers on site that have been suitably trained in rescue procedures and the use of specialist rescue equipment; • Workers must be familiar with and regularly practice specific techniques for rescuing personnel working with fall arrest equipment;	Rescuing a person from a fall	4.7

	• Rescue equipment must be available at all times, and maintained and inspected regularly to ensure that it is in good order and ready to be used whenever it may be required. • A pre-rigged retrieval system is a good way of ensuring prompt rescue.		
Scaffolding design	All scaffolding systems and equipment should be designed and proven (via analysis or testing) to meet or exceed industry standards. This also applies if a scaffolding system or component is subsequently varied or different systems are combined.	Information for importers and suppliers	5.1
	Anyone involved in the design of scaffolding systems (whether they are scaffolders, engineers, or designers of components) should consider; • the intended use of the scaffolding system; • the expected environment it will be erected and used in; • supporting surfaces/structures, including ground conditions; • how it will be used and by whom; • the planned service life; • testing, maintenance and repair requirements; • other products and components that will interact with or are related to the scaffolding; • technical specifications recommended in industry standards (eg AS/NZS 1576.1 Scaffolding – General requirements).	Considerations for scaffolding designers	5.2
	The following types of scaffolding should be designed by, or have the design verified by, a CPEng; • where the design is not covered by the manufacturer's specifications or instructions; • when substituting components from different scaffold systems that have not been tested, theoretically and/or physically, as safe to combine;	Engineer design	5.3

	• where additional components are included in a proprietary system and cannot be installed in accordance with these guidelines; • if the load-bearing capacity of the ground or other supporting structures has not been verified (e.g. propping and falsework); • if environmental loadings have not been verified; • strengthening design of scaffolding with mechanical lifting appliances with imposed load exceeding 250 kg; • tube and coupler scaffolding higher than 33 m; • scaffolds using a safety net; • event stage platforms being designed and erected to support people and materials (these may require building consent); • design loads of special duty scaffolds if there is not enough information in the manufacturer's specifications or instructions to determine or calculate loads; • mast-climbers; • support structures for a swinging stage; • horizontal lifeline and life rail systems; • scaffolding erected directly from a supporting structure, roof, veranda or balcony (design of point loads, tie spacing's etc.		
	Information to provide to the engineer: • Plan view showing dimensions and scaffold bay layout; • Cross sections of the scaffold in relation to the work face showing transverse bracing and plank levels; • Elevation showing longitudinal bracing and position of ties; • Section of the proposed ties and what the ties are connected to; • Detailed list of scaffold components and weights; • Screening information such as weight and porosity, to determine wind loads on the scaffold;	Engineer design	

	• Intended use of the scaffold; • Duty loading of the scaffold; • Soil samples (on request) to determine the load-bearing capacity of the ground the scaffold is to be erected on.		
	Dead Load (Self Weight): The dead load includes all components and equipment which are part of the scaffold. This includes structural components, platforms, edge protection, scaffold sheeting, hoists and suspension cables. **Live Load (Temporary Load):** The live load is the combination of: • duty live loads (classified as light, medium, heavy, special) including people and stacked materials; • environmental loads including; – wind loads on guardrails, toeboards, stacked materials, screens, sheeting, platform ropes, guy wires and other attachments; • snow loads; rain and ice loads in regions where they may affect the scaffold and claddings; • earthquake loads; • impact loads (short, sudden loadings such as materials being put on or taken off a platform, or mechanical hoist operations). **Duty Live Load Classifications:** • Light Duty; • Medium Duty; • Heavy Duty; • Special Duty.	Scaffold loads	5.4

	Scaffolds for public access can include; • pedestrian walkways; • footbridges; • stairs.	Scaffolds for public access	5.5
	Load combinations for strength limit states can be calculated as follows; (1.5 x dead load) + (1.5 x live loads, including environmental and impact loads). • Live loads on standards: Live loads on standards vary for different bays and platforms. • Environmental load design may require engineer input. • Environmental loadings are complex to calculate. There are also times when design loads may be unverified. Scaffolders should understand the basic principles and seek professional advice from a CPEng.	Calculating load combinations	5.6
	Permissible Loads on: • Scaffold Tube; • Aluminium Scaffold Tube.	Permissible loads on scaffold tube	5.7
	Loads on inclined load-bearing members: • Scaffolding tubes used as a strut (i.e. as a spur or a raker) under compression must be supported by a brace. The maximum distance between node points is 3m. • Permitted Loads on special duty scaffold; • Live loads for special duty structures must be designed by a CPEng, unless there is enough information and structural values to calculate loads. • Calculating the scaffold area: • Multiply the horizontal length of a scaffold by the average height of the scaffold to give the scaffold area in square metres length (m) x average height* (m) = Area (m2)	Loads on inclined load-bearing members	5.8

	The scaffold structure must be designed and constructed to remain stable against overturning, and it must be able to provide support for all loads imposed on it for the full period that the scaffold is in place. If stability is in doubt, the scaffold must be assessed by a competent person. > Minimum Tip Factor Ratio (table).	Stability	5.9
	Methods of erecting the scaffold; • Erect the scaffold directly through the supporting structure (e.g. standards pass through the supporting structure); • Backprop the supporting structure, directly below each standard. This transfers the scaffold weight through the supporting structure, to the backpropping directly below each standard. A visual inspection of the inside of the supporting structure will be required and a CPEng may need to verify the design; • Backprop the supporting structure, when the standards and backpropping are not directly in line. This may require using a beam system on top of the backpropping under the supporting structure, and a similar beam system on top of the supporting structure, below the standards. This method is used to transfer the load of the standard along the beam system when the backpropping has to be o set. A CPEng may need to verify the design; • Erect the scaffold directly on the supporting structure. A CPEng must verify that the supporting structure can support the imposed loads of the scaffold; • Erect a heavy-duty gantry over the structure, and scaffold from the gantry. A CPEng may need to verify the design; • Cantilever out a window or opening above the structure, to support the scaffold. A CPEng may need to verify the design; • Hang a scaffold from the parapet to form a hanging scaffold. A CPEng may need to verify the design;	Scaffolding over verandas, gantries or roofs	5.10

	• Suspend a scaffold (swinging stage or boatswain's chair).		
	Examples of special duty scaffolds; • Bay widths and lengths that do not meet the minimum or maximum width requirements; • Lift heights that do not meet the minimum or maximum height requirements; • Where one or both guardrails are excluded; • Where toeboards are excluded; • Vertical ladder on non-proprietary scaffolds; • Scaffolds with a gap greater than 300 mm to the workface without inside guardrails; • Limited access scaffolds; • Tube and coupler scaffolding over 33 m; • Scaffolds erected from proprietary equipment that fall outside the manufacturer's specifications; • Special duty bridging scaffolds; • Special duty roof saddle scaffolds. Consider notifying other kinds of special duty scaffolding to WorkSafe where a risk assessment has identified a greater risk of serious harm. Some examples of this kind of scaffolding are: • concentrated weight scaffolds; • special duty loading platforms; • special duty cantilever scaffolds; • special duty hanging scaffolds; • special duty falsework (propping); • stage platforms being designed and erected to support people and materials;	Special duty scaffold	5.11

	• scaffolds erected directly from a supporting structure, roof, veranda or balcony.		
Erecting the scaffold	Common risks when erecting (and dismantling) include; • People falling from the scaffold (e.g. due to inadequate edge protection, incomplete working platform, or component failure); • Components or pieces of equipment falling and injuring someone below; • Incorrect use of, or defective or badly maintained, tools or components cause personal injury; • Scaffold collapsing (e.g. due to incorrect construction or design); Personal injury from manual handling of equipment (i.e. unloading and loading, carrying or transporting components). Some special duty scaffolds and scaffolds involving high risks should also be notified to WorkSafe http://forms. worksafe.govt.nz/hazardous-work-notification • Isolate the work area using, for example, diversion barriers; • Install signage/tags on the access points of incomplete scaffold stating 'INCOMPLETE SCAFFOLD' or 'UNSAFE SCAFFOLD' as soon as possible and where they are easy to see; • If the scaffold is erected adjacent to or over public spaces or adjoining property specific controls like hoardings, catch fans or barricades with clear signs should be provided. Catch platforms should be designed to support a uniformly distributed load of not less than 5kPa; • The bottom lift should have a maximum height of 3m, and all other lifts should be between 1.8 and 2.1m high; • The scaffold structure should be assembled with edge protection installed progressively (tunnelling method) so no one is exposed to a fall;	Before you start	6.1

	• The scaffold must be as close as practicable to and no more than 300 mm away from the working face. If this is not practicable, inside guard rails must be installed; Harness, safety helmet and appropriate safety footwear must be worn at all times while erecting, altering or dismantling scaffolding. The harness must be hooked on to a suitable anchor point when there is a risk of a fall that could cause harm. Tighten scaffold components and connections securely using the correct tools; • Install all bracing, ties, guy ropes and buttresses as the scaffolding is being erected; • Ensure scaffold bays are not overloaded with scaffolding to be installed; • Install ladders and stairs at the same time as scaffold platforms and edge protection. Do not climb the outside of the scaffolding; • Non-proprietary platforms must have a minimum bay width of 675mm wide. All platforms must allow 450mm of clear access past stacked material and obstructions such as roof eaves; • Inspect every part of the scaffold when it is complete to ensure it is safe and fit for purpose; • When the scaffold is safe and ready for use, attach 'SAFE SCAFFOLD' signs at access and egress points.		
	Foundations must be able to carry all of the loads on the scaffold (dead and live loads). The foundations must be able to carry and distribute these loads at each standard, and over the whole area of the loaded scaffold. Determining this is the first step in basing out the scaffold. Weather conditions, particularly wind and rain, and the load-bearing capacity of the ground/ supporting structure are important considerations. In particular, think about areas that are;	Foundations and supporting structures	6.2

	• adjacent to trenches and on slopes, as the pressure exerted by the scaffold may cause the ground to subside; • prone to runoff or flooding, as flowing water or saturated ground may cause the ground to subside or be undermined; • sand or light material that has poor load bearing and may blow or wash away; Some types of supporting surfaces and structures: • Concrete floor slabs; • Tar seal or bitumen surfaces; • Compacted fill; • Uneven ground or rough terrain; • Sloping ground; • Soft soils or sand; • Verandas. **Soleboards:** Soleboards are used under baseplates or adjustable basejacks to distribute the load of the scaffold and to protect surfaces which may be adversely affected by point loadings (such as timber floors). **Baseplates:** A baseplate distributes the load from a standard to the soleboard or supporting structure. **Basejacks:** Adjustable basejacks (also known as screwjacks or adjustable baseplates) allow the scaffold to be levelled.		
	Basejacks are commonly used with proprietary scaffold systems. They can be used:	Foundations and supporting structures	6.3

	• in conjunction with a U-head plate to act as a U-head jack, or; horizontally to place a scaffold tube in compression (eg when they are used with a tube in a window frame to form a reveal		
	For proprietary scaffold systems, refer to the manufacturer's specifications. Most proprietary scaffold systems require ledgers and transoms to be fitted at the base of the scaffold. • Make sure the stability of the ground is known; • Decide how the scaffold will be kept stable, upright and free from undue movement. This may influence the design of the scaffold base so must be done early in the process. Use suitable soleboards and baseplates. • Level the ground and clear the area on which the scaffold is to be erected of any debris. • Determine how the scaffold will follow the perimeter of the building or structure and plan and measure carefully; • Ensure the placement of the first standard is the high point of any slope; • Stagger standards (i.e. erect standards, so that only one standard in a pair finishes in any one vertical lift. Stagger all ledgers and guardrails); • Ensure all standards and ledgers are plumb and level. If in doubt check with a spirit level. Maximum tolerance is + or - 5 degrees; • Ensure all joins in standards and ledgers are in the correct position and made with the appropriate components; • Do not use internal joint pins in ledgers as they are not rated for tension loads; • Ensure all standards bear firmly against baseplates; • Ensure all standards and ledgers are constructed with the appropriate span for the duty loadings of the scaffolding;	Basing out	6.4

	• Engage a CPEng to perform or check calculations and design of falsework and propping systems where necessary, and adhere to all dimensions and specifications;		
	Scaffold structures must be adequately braced in every plane. This will generally require bracing in at least two directions depending on the design and configuration of the scaffold system. Bracing may include; • longitudinal (or face) bracing; • traverse bracing; • plan bracing; • rakers.	Bracing	6.5
	Full edge protection must be installed where the gap between the working platform and the working face exceeds 300mm. Guardrails must be between 900 and 1100mm high with a midrail located halfway between the work platform and the top rail. The advance guardrail or tunnelling methods are the recommended methods to safely install edge protection.	Edge protection	6.6
	The Tunnelling Method (Preferred method for tube and coupler). The tunnelling method allows a guardrail to be progressively installed on a fully planked platform so that when the scaffolder enters the platform, edge protection is already in place. **Advanced Guardrail Installation Method;** Telescopic rails allow stanchions that are attached to the standards to be moved up to the next platform level while the scaffolder remains on the platform below. Platforms must be fully planked from below before scaffolders move up to that level to install the platform guardrails.	Guardrail installation methods	6.7

	Progressive Guardrail Installation Method; A guardrail is installed from the level below before the work platform is installed. The scaffolder can then enter the platform with the edge protection already in place.		
	Platforms must be; • as close as practicable to the working face with a maximum gap of 300mm; • strong enough to support all loads placed on them including dead and live loads; • fitted with edge protection (i.e. with guardrails and toeboards); • wide enough to allow 450mm of clear access past any stacked material or obstruction; • free of trip hazards (i.e. planks must be secured and butted rather than lapped in most circumstances).	Platforms	6.8
	Plan for the number of people using a scaffold and whether they need to carry materials or tools to the working platform; • Where possible, install a stair access rather than a ladder access. Ramps and personnel hoists are alternative options; • Access openings and stairways must not have sharp edges or points that could cause injury; • Openings in edge protection at access points to stairways and ladders must be protected by gates, tortured path, or be sufficiently distant from the working platform so that a person cannot fall through the opening; • Gates must open inwards onto the platform and be self-closing. Where gates are being used in place of guardrails, they must be designed and located so they perform the same function; • Where a personnel hoist is used, an alternative, non-mechanical means of egress such as stairs or a ladder should also be provided;	Ensuring adequate and safe access and egress	6.9

	Platforms must allow 450mm of clear access past ladder openings.		
	Stairs: • Handrails must be present and set 900mm − 1100mm above the stair tread and the landing. Flexible materials must not be used; • There must be a gate in place or tortured path to prevent people walking from a working platform into the stair opening; • If stairs are made up using components, they must be checked to ensure all steps are level, secure from movement and rotation, and can take the live loads imposed. Stair treads must be slip resistant and measure at least 500 mm wide x 175mm deep x 150-225mm high; • If using a 1.5m high stair, there must be a stepping platform from the working platform to the stair. A minimum landing of 400mm (in the direction of travel) must be provided at the top and bottom of each flight of stairs. **Ladders:** • Where practicable, ladders should be erected in an independent scaffold bay, so they do not interfere with the working platform; • Ladders must be in good structural condition and not affect the stability of the scaffold; • Where practicable, ladders must be pitched at a slope of not less than 1 in 4 and not more than 1 in 6; • Ladders must be securely tied to prevent movement top and bottom; • Ladders must extend at least 1 m above the exit point. A ladder can stop at the exit point if sufficient guardrails (stop ends) are in place that can be used to hold onto; • The height of the lowest rung must be no more than 400mm from the supporting surface; • The maximum ladder height between working platforms or landings must not exceed 4.2m;	Ensuring adequate and safe access and egress	6.10

	• Ladders must be offset to prevent a single continuous ladder; External ladders may only be used to a height of 5.1m or two lifts above the supporting structure.		
	General Maintenance of planks: Visually inspect planks before each use. Look for; • laminations separating (laminated planks); • warping, twisting, breaks and splits; • end fixings missing or damaged; • deep burns; • oil stains; • projecting nails; • rot; • saw cuts and notches.	Planks	6.11
	Methods of stabilising the scaffold structure; • Use bolster bays (also known as buttress or raker bays), rakers or outriggers to increase the base dimension; • Tie the scaffold to a supporting structure; • Use cables to guy the structure to supports or anchors; • Increase the dead load by securely attaching counterweights near the base; Rakers or outriggers are raking tubes attached to a scaffold to increase its base width, helping to stabilise it. Key points to remember: • Raking tubes must be braced to prevent bending and spreading; • Do not attach the raking tube more than 300mm from the standard; • The distance between braces (node points) on a raker must not exceed 3m;	Stabilising the scaffold	6.12

	• Where possible the horizontal brace should be above head height.		
	To prevent the raker from being forced further into the ground; • Connect a horizontal tube perpendicular to the raker at ground level using a load bearing fitting, or; • Drive a tube into the ground and attach the raker to it as close to the ground as possible. Spacing distances may differ due to: • use of screen mesh or other material, which adds a wind loading; • other environmental loads; • lifting appliances attached to a scaffold; • through load transfer to the scaffold base, lower standards supporting high dead and/ or live loads; • use of plan bracing; • use of raker bracing to the ground or other substantive support surface; • tie systems designed to support proprietary scaffolds. Additional requirements for ties: • They must not block access along the working platform and access way; • They should be connected to both inner and outer scaffold standards to increase the rigidity of the scaffold unless otherwise specified; • Ties between the scaffold and the structure should be non-pivoting and secured. They should not be able to be inadvertently loosened; • Add more ties as the load on a scaffold increases (e.g. if the scaffold is sheeted or netted, or the platform is used to store materials);	Stabilising the scaffold	
	• Inspect ties regularly to ensure that they have not been loosened or otherwise modified;	Stabilising the scaffold	

	• Do not overload the scaffold; • Additional ties may be required to stabilise scaffold in certain circumstances, such as in very high scaffolds, or in high wind; • Drilled-in anchors (whether expanding or chemical types) that are subject to tensile loads should only be used where it is not practicable to secure or tie the scaffold in any other way. Where they are used, drilled-in anchors must have a safety factor of 3 and they must be assessed for suitability by a competent person; • Where possible, use cast-in anchors or anchors that go through a wall rather than friction or chemical anchors; • Ties using chemical or mechanical anchors should have 'pull tests' conducted on a selection of either three anchors or 5% of anchors, whichever is the greater number.		
	Mechanical lifting appliances on a scaffold: • Hoists, winches and other lifting appliances may be mounted on scaffolding only if the scaffold structure is adequate in strength, or is specially strengthened and tied back, to take the imposed loads to a maximum of 250kg. • Strength of the scaffold must be calculated as at least twice the lifting capacity of the appliance. If the imposed load exceeds 250kg, the scaffold must be designed by a CPEng.	Mechanical lifting appliances on a scaffold	6.13
	Gin wheels must; • be of solid construction and have a suitable wheel diameter; • have rope guides to prevent the rope slipping off; • be free turning; • be able to be secured according to manufacturer's specifications or accepted industry practice;	Gin wheels	6.14

	• be attached to an appropriately designed and constructed support.		
	• Where a small amount of material is to be hoisted, a rope or hand line can be used. The minimum rope diameter is 12mm.	Hand lines	6.15
	C**ommon Bends and Hitches;** • Rolling Hitch; • Half Hitch; • Figure-8; • Timber or Plank Hitch; • Single Bowline; • Rolling Hitch; • Square Lashing.	Bends and hitches	6.16
	Wire Rope (Bulldog) Grips; WorkSafe Approved Code of Practice for Load-Lifting Rigging. **Shackles:** Both D and Bow shackles used in scaffolding and suspended scaffolding should have their SWL clearly marked and when in use the pin should be securely screwed in and moused to the body of the shackle with steel tie wire or similar.	Grips and shackles	6.17
	Pre-Handover Inspection; All scaffolds must be checked by a competent person before handover; Notifiable scaffolds must be inspected before they are handed over by someone with the appropriate certificate of competence. **Handover Certificate:**	Handover and tagging	6.18

	• has been built according to the agreed specification, duty rating, and any limitations on the use of the scaffold; • has been left in a suitable condition for its intended use; • complies with the relevant statutory requirements. **Tagging the Scaffold: Include on the tag:** • the status of the scaffold (ie SCAFFOLD UNSAFE or SCAFFOLD SAFE); • the name and contact phone number of the certified scaffolder (or erector if under 5m); • the purpose (Intended use) of the scaffold; • the duty loadings of the scaffold; • the maximum number of platforms or bays that may be loaded; • any limitations on the use of the scaffold; • a record of each inspection (these should be done weekly or after a significant storm or earthquake) or alteration, including who inspected or altered the scaffold and when it was done.		
Scaffold use and management	Pre-start checks before a scaffold is first used for the day should identify any risks. Pre-start checks on suspended scaffold must be done by a competent person and include a visual check and load test. **Minimum frequency of scaffold inspections**: • All scaffolds, regardless of height, that are in use for a week or more; • Notifiable scaffolds; • Suspended scaffolds. • Supporting structure/ foundation; • General structure; • Standards; • Ledgers, transoms and putlogs;	Pre-start checks and regular inspections	7.1

	• Ties and braces; • Couplers; • Working platforms; • Planks; • Guardrails and toeboards; • Stairs and ladders.		
	If the scaffold cannot be repaired, it should have the stair or ladder access removed if possible, and/or tags attached to all access points (where the means of access cannot be removed) or on visible locations on the scaffold, stating the status of the scaffold. The scaffold should be dismantled and disposed of.	Damaged or non-compliant scaffold	7.2
	When carrying out alterations or repairs ensure; • the scaffold is stable; • the status of the scaffold is displayed clearly; • repairs comply with the manufacturer and/or supplier's information; • the scaffold is not used until repairs have been completed and the scaffold has been inspected by a competent person.	Repairs and alterations to the scaffold	7.3
	• Set up exclusion zones with warning notices for other workers and public protection as required; • If scaffold has been used for removal of asbestos or work with hazardous material, obtain a clearance certificate from the user before dismantling. Ensure the scaffold is free of loose material and debris; • Inspect the scaffold for stability and plan for dismantling; • Ensure all debris and rubbish has been removed from the scaffold before beginning to dismantle it; • Dismantle by reversing the procedures required to erect the scaffold;	Dismantling the scaffold	7.4

	• Remove ties, braces, ledgers, transoms, planks and guardrails, followed by standards as joint positions are reached; • If a building or structure is being demolished, dismantle the scaffold so that no more than 4m of scaffold is left above the last vertical tie point at any time; • If a scaffold is being partially dismantled, make sure that the remaining section is stable; • Lower materials down. Do not drop or throw them; • Do not overload lower lifts with dismantled components. (Some components may be temporarily placed on lower lifts but must not be allowed to build up); • Install temporary raking tubes or ties to stabilise the scaffold if necessary; • Remove all scaffolding materials. Do not leave components on roofs or projecting cornices, etc.		
Tube and Coupler Scaffolding	**TUBES;** Tubes are the most basic scaffolding components. Steel and aluminium tube must not be used together (unless for non-structural components). Scaffold tube should comply with the requirements of AS/NZS1576.1 **COUPLERS/FITTINGS;** Couplers are used for joining tubes when constructing tube and coupler scaffolds. Couplers are usually made of cast, forged or pressed steel and may also be made of aluminium. Couplers may also be used as an accessory to prefabricated scaffolding systems. Couplers should comply with the requirements of AS/NZS 1576.2 • Right angle coupler/ 90 degree coupler; • Swivel coupler (Double coupler); • Putlog coupler (Single); • Putlog coupler (Twin blades);	Components	8.1

	• Sleeve coupler Joint pin.		
	Guide to spacing for tube and coupler scaffolding: • Duty Live Load (People and materials); • Max. standard spacing; • Max. Number of Working Platforms in one bay; • For TImber Planks Max. Putlog Spacing; • Scaffold Lift Spacing (m); • Min. bay width; • Min. Unobstructed Access.	Guide to spacing for tube and coupler scaffolding	8.2
	Returns (corners) for tube and coupler scaffolding should be planned and measured carefully. Two Standard (Pole) return; There should be two standards located at each corner or return. A general rule is: • if the scaffold turns to the right, two standards go on the left; • if the scaffold turns to the left, two standards go on the right. • Single Standard (Pole) return; • Note: For light duty scaffolds only. Single standard returns may be used if the standards in one direction are less than 2.4m from the corner in one direction, and less than 1.575m in the other direction.	Returns	8.3
	STANDARDS; For tube and coupler scaffolds, standards must be staggered if the top working platform is higher than the longest length of tube.	Staggering	8.4

	LEDGERS AND GUARDRAILS; Ledgers and guardrails should also be staggered. **PUTLOGS AND TRANSOMS;** Putlogs and transoms must not be joined. They should be cut to the correct length so that they do not protrude from the scaffold and create a hazard. Putlogs must be within 300mm of standards. There must be a putlog within 300mm of standards.		
	Longitudinal bracing is fixed to the outside of the scaffold and should be as close as practicable to 45 degrees. A maximum of four unbraced bays is permitted; • Brace end bays of every run; • Fix as close as possible to node points; • Longitudinal braces are most effective at 45 degrees; • Connect to the standard with a swivel coupler or to transoms with a right-angle coupler; • Use external (sleeve) joiners, or splice joints in braces;	Bracing and stabilising	8.5
	Transverse bracing: Options for attaching transverse bracing: • ledger at platform height to the underside of ledger above the lift using right-angle couplers; • standard to ledger above the lift using swivel couplers (this may be necessary to clear the toeboards); • standard to standard using swivel couplers. Remember to: • brace at each end of the scaffold; • fix as close as possible to node points.	Bracing and stabilising	

	Parallel Bracing: Dogleg Bracing: Plan Bracing: Raking Tubes: • Rakers; • Spurs; • Ties.		
	The base lift of a typical butt plank scaffold has transoms connected to the standard underneath the ledger using right-angle couplers. This arrangement provides additional transverse and longitudinal strength. All additional lifts are erected with the ledger connected to the standard using right-angle couplers and the putlogs for butt planking connected to the ledger with single couplers. There must be a putlog within 300mm of each pair of standards.	Butt plank tube and coupler scaffold	8.6
	Tube and coupler scaffolding higher than 33m (measured from the ground to the highest component) generally requires additional transverse bracing (dogleg or parallel), ties and double or secondary standards (installed within 300mm of each primary standard) up at least one third of the scaffold height. The structure is still erected by scaffolders but must be designed by a CPEng.	Tube and coupler scaffolds higher than 33 m	8.7
Proprietary or prefabricated scaffolds	Generally, components from different prefabricated scaffolding systems should not be mixed unless the load capacity of the combination has been proven. Components might be dimensionally compatible, but variations in physical and material properties can result in unpredictable load paths within a structure, and may result in some components being overstressed.	Additional components not covered by the manufacturer's specifications	9.1

	Aluminium scaffolds generally consist of prefabricated components including; • castors or basejacks; • aluminium end frames (generally with horizontal rungs); • aluminium braces – diagonal, horizontal and plan; • prefabricated captive decks and hatch decks; • aluminium prefabricated ladders or stairs; • aluminium outriggers. Access: An aluminium scaffold more than one bay long must have clear access between adjacent bays. Plan Bracing: For mobile aluminium scaffold, if the lowest working platform using prefabricated decks is above 3m from the supporting structure, plan bracing must be provided at the base of the scaffold. Safe Working Load (SWL): The designed SWL per bay must be checked and confirmed as adequate for the intended use of the scaffold.	Aluminium frame and brace tower systems	9.2
	Event structures (e.g. stage platforms, temporary grandstands and other structures that support people and materials) that are erected out of scaffolding components can be classified as special duty scaffolding, but they also fall under the Building Act 2004. They must comply with: • the Building Act 2004 and the Resource Management Act 1991; • local government requirements (a building consent may be required); They should also comply with relevant Standards, and the recommendations within these guidelines. A CPEng must design or verify the design, as these structures generally need to withstand considerable loads in concentrated areas.	Event structures	9.3

Scaffolding configurations	Basic rules for birdcage scaffolding: • A mobile elevating work platform can be used to help erect and dismantle birdcage scaffolds; • Control the risk of a fall with advance guard railing, the tunnelling method, or some other suitable method during erection and dismantling. Temporary platforms with edge protection should be provided; • Rescuing someone who has fallen is a key consideration for multiple-lift birdcage scaffolds – there must be a rescue plan in place;	Birdcage scaffold	10.1
	• Consideration must be given to providing appropriate access to the working platform, depending on the number of people working on it and the type of work being undertaken. If a ladder access is used through the top working platform of the birdcage, the ladder opening must be protected by a trap door, gate or tortured path; • Plank spans for birdcage should meet standard expectations around duty loading. • Loading; • Stability; • Working Platforms;	Birdcage scaffold	
	A hanging scaffold is hung from a supporting structure and is different from a suspended scaffold as it cannot be raised or lowered when in use. Hanging scaffolds are classified as special duty scaffolds. Loads must be calculated by a CPEng if there is not enough information in the manufacturer's instructions or specifications to calculate loads.	Hanging scaffold	10.2

	Components and systems that can be used to construct mobile scaffolds include: • aluminium prefabricated systems ; • breglass prefabricated systems (nonconductive); • steel frame scaffolds ('H' frame); • system or modular steel scaffolds; • tube and coupler scaffolds; • Mobile scaffolds are particularly prone to tipping over while in use.	Tower and mobile scaffolds	10.3
	There is a higher risk of tipping where: • The scaffold suddenly stops while being moved. They must not be ridden while being moved; • The height to the top most platform is greater than three times the minimum base dimension • There are people standing at or near the edge of the platform in conjunction with a sudden movement or action. This creates a temporary high point loading; • The capacity of the scaffold is based on a distributed load, not a point load at the edge. This means overturning can occur even when the design load capacity of the platform is not exceeded; • The scaffold is narrow and light; • The scaffold is exposed to adverse weather conditions; When moving a scaffold, ensure: • there are no people or materials on the scaffold; • there are no overhead power lines or other obstructions within 4m of the line of travel; • the ground is firm, clear and level.	Tower and mobile scaffolds	

	Methods for improving stability: • Position the scaffold as close as possible to the area being worked on; • Apply the castor brakes while the scaffold is in use; • Use outrigger bracing or larger base frames to increase the minimum base dimension; • Add weight to the scaffold base to improve stability; • Establish with the manufacturer exactly what the established SWL relates to; • Don't move mobile scaffolds in windy conditions;		
	Maintain the height to width ratio (these apply under normal weather conditions only); – for scaffolds over 2m high, ensure that the height of the top working platform is no more than three times the minimum base dimension; – for scaffolds under 2m high, ensure that the height of the top working platform is no more than two times the minimum base dimension.	Tower and mobile scaffolds	
	These are independent, tied standing scaffolds constructed on beams such as RSJs, UBs, soldiers, trusses, etc. that are cantilevered out from the building or structure. A CPEng must design (or verify the design of) the scaffold to ensure the supporting structure is able to support all loads imposed by the scaffold. The inboard length of the cantilevered beam (known as a needle) is generally attached to the structure by: • fixing the beam to the floor below by using a positive fixing such as a U-bolt fitted over the beam and through the concrete floor slab; • using counterweights on the beam; • installing props between the top of the beam and the underside of the floor above and securing the props so they cannot be dislodged.	Cantilevered scaffolds	10.4

	These encompass the entire face of a vessel (eg a tank or chimney). Vessel scaffolding includes circular, bay/lap, rectangular vessel, and splay scaffolding. Vessel scaffolding around a tank is commonly called tank scaffolding.	Vessel scaffolds	10.5
	Scaffold through veranda; • Back propping directly below standards; • Design by CPEng required unless veranda supports are exposed and a direct load path is visible; • One leg of the scaffold going through the veranda. The inside leg of the scaffold is supported by the veranda or load is transferred to the tie; • Design by a CPEng required unless you can ensure the outside standard and the tie arrangement could support the load. • Scaffold erected on a veranda with only one standard directly below backpropped. • Design by a CPEng required if you cannot guarantee that the outside standard and the tie could support the inside standard weight. • Scaffold erected above the veranda with the inside leg of the scaffold directly backpropped below but with the outside of the veranda only supported from below. • Design by a CPEng required unless you have exposed the veranda supports and ensured that the weight of the scaffold can be transferred through the veranda to the outside prop; • Scaffold erected above a veranda with only the outside of the veranda backpropped. Design by a CPEng required; • Heavy steel gantry erected on the footpath with the scaffold erected above; • Design by a CPEng required for the steel gantry; • Scaffold erected directly on a veranda. Design by a CPEng required.	Scaffold over a veranda or roof	10.6

	Sloping platforms may be used to access scaffolds and other structures. They should have platforms and edge protection that comply with these guidelines; Barrow ramps contain cleats alongside an uncleated board or channel. This allows wheelbarrows or wheeled loads to be moved easily while guarding against slipping. • For heavy loads (such as a concrete-laden wheelbarrow), gradients of about 1:12 are appropriate The maximum recommended slope for a cleated barrow ramp is 20 degrees or around 1:3	Sloping platforms and barrow ramps	10.7
	Roof edge protection is a means of protecting workers from a fall where working at height on a roof cannot be eliminated. Scaffolding is usually used for roof edge protection for long duration work, such as roof repair, cleaning and recoating. This section covers roof edge protection using scaffolding components (tube and coupler is often used). Considerations when designing roof edge protection; • How long the work will take; • How workers will access the scaffold safely; • How complex the work is; • How many workers will be on the roof; • The roof pitch. This will determine what configuration to install; • The roof height. WorkSafe must be notified if someone could fall 5m or more; • What condition the roof is in and what it is made of. Brittle roofs should not be accessed unless the risk of workers falling through is controlled; • The risks to workers installing the edge protection. Also consider risks to the public or homeowners; • Work platforms incorporated as edge protection should be designed to Medium duty at least to accept the impact forces of a falling worker;	Roof edge protection using scaffolding components	10.8

	• How the scaffold will be secured to prevent overturning should someone fall from the roof and strike the guardrails. Methods include: – tying to the building; – using raker bays or raking tubes; – by widening the base of the scaffold.		
Other Structures and supports	Prefabricated scaffold brackets should: • be designed (or design verified) by a CPEng; • have adequate and suitable means of attachment to provide vertical support and to resist accidental sideways movement; • be stable in the longitudinal direction of the platform under the applied horizontal force and have a factor of safety of not less than 5:1; • be fitted with guardrails, midrails, and toeboards on all platforms; • have suitable means of access and egress; • have measures to prevent shock loading by workers jumping down from the supporting structure; • have measures to prevent objects falling during erection, use and dismantling.	Brackets	11.1
	Heavy duty gantries will usually have: • primary beams housed in U-head jacks to transfer the load directly down the standard; • secondary beams at maximum 600mm centres and connected to primary beams; • top surface of plywood sheets or planks or a combination of both to withstand expected distributed and point loads; • adequate longitudinal and transverse bracing or rigidly tied to the supporting structure;	Heavy duty gantries	11.2

	• adequate edge protection installed including toeboards, guardrails and screening; • adequately protected from traffic (eg with barriers) and a sufficient distance from any roadway.		
	Mast climbers must have: • the manufacturer's specifications and instructions for erection and use; • anchor points or other means of tying the mast-climber to the structure; • the SWL clearly marked; • the foundation able to carry the intended loads; • the base of the mast-climber adequately protected; • the mast erected vertically and all ties approved and in place; • testing, pre-operational checks and servicing requirements carried out.	Mast-climbing work platforms	11.3
	The falsework should be regularly checked for any instability as well as: • immediately before and after loads are applied; • periodically after adverse weather conditions; • before dismantling;	Falsework or propping	11.4
	Falsework must have: • foundations able to support the loads carried by the falsework; • erection method in accordance with the manufacturer's specification and instructions, and the engineer's design (if required); • tolerances within allowable design limits; • all connections and junctions properly constructed; • adequate access and egress from the propped areas; • all falsework positioned centrally under the intended loads; • falsework designed to safely support all imposed loadings; • a safety factor of 3 in all aspects of the design;	Falsework or propping	

	• proprietary system design according to the manufacturer's specifications and instructions. U-Head Jack and Basejacks: Recommended minimum SWL: • 53 kN (5405 kg) at 200 mm extension • 41 kN (4180 kg) at 450 mm extension; or in accordance with the manufacturer's specifications.		
	Pairs of beams or trusses must be braced with tubes and couplers to prevent lateral buckling and twisting. Lacing and bracing must comply with the manufacturer's instructions or the bracing should be designed or verified by a CPEng. Bracing can be done by: • lacing tubes – connecting the inner and outer beams or trusses with tubes at the top and bottom chords; • plan bracing; • section bracing – connecting the top chord of one beam or truss to the bottom chord of the other.	Beams and trusses	11.5
	General requirements for trestles: • The working platform may not be more than 2m above the supporting surface; • The trestle scaffold must not be erected where a person or object can fall more than 2m (ie at the edge of an open floor); • Trestles must not be 'piggy-backed' to construct additional lifts; • Work must only be done from between trestles;	Trestle scaffolds	11.6

	• If the trestle scaffold is more than one bay long, heavy loads such as bricks or blocks must be placed directly over the putlogs; • Edge protection must be provided where there is a risk of a fall.		
	Requirements for Catch Fans: • Follow manufacturer's instructions and specifications or obtain design or verification from a CPEng; • Erect spurs from the existing scaffold; • Brace catch fan; – where possible using spurs from below; – where necessary using spurs or wire rope from above. • Brace supporting scaffold; • Construct additional ties at the level of the catch fan between the scaffold and the supporting structure; • Attach covering material (may include but is not limited to – planks and ply, ply, screening, chicken mesh); • Check the stability and compliance of the structure.	Catch fans	11.7
	Factors to consider when selecting screening material: • What is the wind loading? • What degree of protection is required? • Is the containment of dust a requirement? • What chemicals are to be used from the scaffold? • What are the ventilation requirements? • How flammable is the screening? • How much light is needed? • What size are the sheets of screen sections? • What are the requirements for fixing the screening?	Scaffolding with screening or containment sheeting	11.8

	Installation recommendations and methods for installing screening: • Fix it to fully decked and guardrailed platforms; • Fit to the outside of the scaffold unless specified; • Flush the outside of the scaffold to prevent tubes or other items from protruding; • Make it continuous, either by using sufficient overlap (preferable) or by carefully butt-joining the screening; • Secure the top edge of the screening before fixing the bottom edge; • Use a tag line in windy conditions to control the screening during fixing; • Keep the screening taut; • Lap under from the top for containment and lap over from the top for protection; • Keep the ends of the scaffold as close as practicable to the building or structure to prevent the wind getting behind the screening; • behind the screening; • Ensure the screening blows into a scaffold so it has the support of the framework. Screening blown away from the scaffolding framework only has the ties to support it; • Toeboards must be fitted; Screening material: Common materials used for screening or containment include: • netting (shadecloth); • shrink wrap; • sealed panel systems; • Mono ex; • plastic; • keder sheeting.		

	Temporary roofs are commonly constructed using tube and fitting components and/or proprietary systems. They may be supported by an independent scaffold or directly from a supporting structure. They can be mono- pitched or multi-pitched (e.g. gable roofs). The design of the temporary roof should take into account: • the span between supports; • erection options; • the clearance required between the temporary roof and supporting scaffold and the structure it is protecting (vertical and horizontal); • the area available for supporting scaffold or structure; • the type and area of cladding for roof and supporting scaffold; • how pressure can be relieved in the event of environmental loadings in excess of design loadings; • whether the supporting structure can withstand any imposed loads; • whether the slope is adequate for water run-off; • anchorage methods to resist vertical and horizontal forces with the use of ties, buttresses, counterweights and additional bracing.	Temporary roofs	11.9
	Independent scaffolds can be erected with timber standards, ledgers, putlogs, guardrails and toeboards. Platforms should be constructed with scaffold planks. Timber should be: • graded and preservative-treated to appropriate industry standards; • treated to commodity specification C3 if standards and sole plates are in direct contact with the ground (C7 is acceptable if they are not in contact with the ground); • The design and construction of timber scaffolding should be in accordance with appropriate industry standards. Timber should be of known grade	Timber scaffolds	11.10

	(machine stress graded). Bolts or equivalent connections are recommended on all joints.		
Suspended Scaffolding	• Where the structural stability is not verified, a CPEng must verify the supporting structure to ensure it can support all loads imposed by the scaffold. • Each suspension rig, cradle, hoist, protective device and load-limiting device must be inspected by a competent person before use each day. • Persons operating suspended scaffolding must be competent and authorised to operate it; • At least two people should be in the swinging stage at one time; • All hoists must be fitted with a secondary rope and protective device; • All hoists must have a load-limiting device; • A minimum factor of safety of 3 is required to support the suspended load; • Needles should be laced together where practicable; • There should be a system to prevent items falling from the cradle; • There must be a reliable and efficient communication system between the cradle users and other people; • Emergency procedures, including how to rescue someone or undertake an emergency descent, must be detailed in the emergency plan and communicated to all workers; • Control boxes should be lockable and secure and have an emergency stop button • Every worker on a suspended working platform must wear a safety harness that is secured to a suitable anchor or to an independent lifeline; • Lateral restraints may be required to stabilise the cradle when in use.	Basic rules when erecting, using, altering, and dismantling suspended scaffolding	12.1

	Persons operating suspended scaffold must be competent to use it. They must be given an induction by the scaffolder whenever a stage has been installed, altered, or shifted, including completing the required daily pre-start checks. • Boatswain's chair; • Manual swinging stage; • Mechanical swinging stage; • Work cage; • Multi-point suspended stage.	Types of suspended scaffolding	12.2
	Suspended scaffolding must be supplied with clear instructions about safe configurations for installation and the intended uses, load combinations, pre-start checks and emergency procedures. Before delivery, all suspended scaffolding equipment must be checked to ensure it is fit for use. A hoist test should be carried out along with a check on the load limiting device and safety device by a competent person before the hoist is sent out to a job. Suspended scaffolding must only be erected, altered or dismantled by or under direct supervision of a holder of a Suspended Scaffolding Certificate of Competence: • This person should check that the scaffold is safe to use by inspecting it and all of its components; • Once the scaffolding has been inspected, the scaffolder must attach the necessary tags and issue a handover certificate; • Scaffold structures (other than proprietary needles or parapet brackets) used to support a suspended scaffold must be erected, altered and dismantled by a holder of an Advanced Scaffold Certificate of Competence.	Erection, alteration and dismantling	12.3

	Pre-Delivery hoist testing; • Lift a test load of 1.25 times the rated load of the hoist (even if the hoist has a load limiting device) up a distance of not less than 3m; • Lower the load; • Arrest and sustain the load in any position without the hoist showing over-straining of any part; Suspended scaffolds should be inspected and tested daily by the user prior to use. In order to perform this test adequately, they must have instructions from the scaffolder, who should include this as part of the handover process. What to check for in daily inspections; • The suspension rig and cradle has not been tampered with and does not show any signs of damage; • The directional switches function correctly; • All emergency stop button switches function correctly; • The top limit switches operate; • The emergency crank handle is fitted, if required, and is left tightened (where the emergency crank handle has an electrical interlock, loosening the handle will cut off power and re-tightening the handle will return power to the controls); • The overspeed governor operates correctly; • After a manual tripping, the overspeed device functions correctly after resetting; • Any slack rope device functions correctly; • The load limiting device does not show any visible signs of damage to the equipment and connections to the scaffolding hoist or stirrup; • Damage to scaffold and its supporting structure by traffic, cranes or other plant – load test to insure the stage will support the intended loads.	Inspection of suspended scaffolding	12.4

	Suspended scaffolds must: • be controlled from the stage platform or chair; • have a push button or deadman lever control that will stop and automatically lock the motor and hoist when pressure on the control switch or lever is removed; • have independently operated controls; • have a manually operated emergency release mechanism in case of failure; • have safe access and egress points for users required to work from the cradle. Where access is not from the ground or a safe protected landing, safety harnesses and lanyards must be used by all those entering or leaving the cradle and the cradle secured against movement. Every worker on a suspended working platform must wear a safety harness that is secured to an appropriate anchor point within the cradle or cage, or to the chair or an independent lifeline.	Access and operation	12.5
	The maximum live load on a swinging stage should be according to the manufacturer's specifications. The rated load plus the self-weight of the cradle must not be more than the lifting capacity of the hoists supporting it. The lifting capacity must be clearly marked on the hoists.	Loadings	12.6
	Load-Limiting and Protective Devices; All powered scaffolding hoists must have: • a load-limiting (overload) device to act if the platform is overloaded, and; • a secondary rope and protective device to act in the event of overspeed or loss of suspension; The device must be designed so it:	Suspended scaffolding equipment	12.7

	• triggers if the load is over 1.25 times the rated capacity of the hoist; • is able to withstand a static load three times the working load limit (WLL) of the hoist; Hoisting wires or tackle must be anchored to: • a secure part of the structure; • needles; • designed brackets; • parapet hooks, or; • directly to the counterweights. Needles: • Needles and supporting beams consist of scaffold tubes and couplers, or structural beams designed for the intended loads; • Needle Stability; • Needles must be counterweighted or directly fixed to the supporting structure; Suspended load: The activation setting on the load-limiting device + the suspension and secondary ropes (cables) + weight of the hoist + power leads + any counterweights on the bottom of the ropes. **Outboard:** Distance from the fulcrum to the suspension point in metres. **Inboard:** Distance from the fulcrum to the fixing point (prop or tie down), or to the centre of the counterweights.		
	Unless specifically designed by a CPEng, each needle for a mechanically operated swinging stage must: • Swinging Stage Setup	Suspended scaffolding equipment -Swinging stages	12.8

	• Each needle must be Designed to carry; • Two points of suspension; • The entire load of the working platform including hoists, as well as the full live load of persons and materials on the working platform, plus the factor of safety; • more than two points of suspension; • The full dead and live load for each section between suspension points, plus the factor of safety; • be at least equivalent in strength to a 152 mm x 89 mm x 17.09 kg/m rolled steel joist when suspending a maximum load of 400 kg • be at least 3.6 m in length when counterweighted • be located so they do not project more than 1.5 m beyond the outer point of the support on the building or structure (maximum 1.5 m outboard from the fulcrum); • not have the outboard end of the needle lower than the inboard end.		
	Any central control box should: • be fully enclosed, lockable, shatterproof and weatherproof; • include socket outlets for hoists, an emergency stop button and a power-on light; • be removable for safety and security reasons; • be attached securely to guardrails of the cradle when in use and situated on the side away from the working face; • have spring loaded/deadman buttons and levers; • Type II devices must be designed so they are unaffected by direct currents; • Residual current devices complying with VDE 0664-20 or JIS C 8221, JIS C 8222 and JIS C 8201-2-2 may also be used.	Electrical equipment and controls	12.9