PRO-LIFT
Training & Assessment Services

CPCCLRG3002

Licence to perform rigging intermediate level

Student Guide

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Welcome

Welcome to **CPCCLRG3002 Licence to perform rigging intermediate level.**

Information provided may help to ensure your safety.

This unit

This unit specifies the skills and knowledge required to safely perform intermediate rigging work.

Riggers use mechanical load shifting equipment and associated gear to move, place or secure loads, including plant, equipment or members of a building or structure. Riggers ensure the stability of those members and set up and dismantle cranes and hoists.

This unit includes rigging work involving:

- hoists with jibs and self-climbing hoists
- cranes, conveyors, dredges and excavators
- tilt slabs
- demolition of structures or plant
- multiple lifts

Rigging work is undertaken in construction and other industries where load shifting equipment is used to move, place or secure loads.

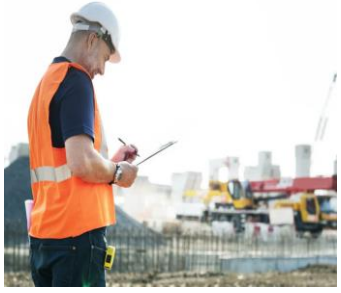
Completion of the general construction induction training program, specified in the Safe Work Australia model Code of Practice: Construction Work, is required by anyone carrying out construction work. Achievement of CPCCWHS1001 Prepare to work safely in the construction industry meets this requirement.

This unit has a pre-requisite requirement. This requirement may be met by either the successful completion of the unit CPCCLRG3001 Licence to perform rigging basic level or holding a valid licence for basic rigging.

Competence in this unit does not in itself result in a licence. A licence is obtained after competence is assessed under applicable Commonwealth, state or territory work health and safety (WHS) regulations.

Elements covered in this unit are:

1. Plan task
2. Select and inspect equipment
3. Set up task
4. Undertake intermediate rigging activities
5. Complete task



WHS Law

Legislation is law passed by Parliament.

It governs many areas, including health and safety at work.

It can be national, or relevant to individual states and territories.

You need to know the WHS legislation that covers your job and workplace.

You are required by law to comply with them.

You need to understand how WHS Acts, regulations, codes and standards affect your work, job and workplace.

Acts & Regulations

Acts - Are law. They describe how to provide health and safety in the workplace

The *Work Health and Safety Act*

2011 QLD / NT / WA / NSW

2004 –Victoria

The Act is the cornerstone of legislative and administrative measures to improve occupational health and safety

Regulations - are made under the Act. They set out the practical steps to follow to comply with the Act

Codes of practice & Australian Standards

Codes of practice - Give practical guidance on how to legally comply with regulations and Acts

Australian Standards - Developed to provide minimum levels of performance or quality. Cover hazards, work processes and products.

The safest way to carry out the work activity is to read, understand and follow your

- Safe work method statements
- Codes of practice

Workplace information or procedures

You can obtain workplace information and or procedures including emergency plans through

- Site safety plan
- Site induction
- Site office
- Contact site supervisor or foreman

Consult other personnel

Always consult doggers, crane operators or other riggers when reviewing task instructions

- When clarification if required
- To ensure everyone understands the lift plan or task instructions
- To ensure all persons understand their role
- To confirm required communication signals

Plan and prepare

Other than hazards you should plan for

- Location of task
- Access and egress
- Plant required for a task
- Equipment required for a task
- Suitability and availability of equipment
- Permits required for the task

New or unknown rigging activities

An employer must provide ***training, supervision, instruction and or information*** before you can perform new or unknown rigging activities.

Work health and safety regulator

If a person is not conducting high-risk work safely the regulator can

- Suspend the licence
- Cancel the licence
- Not renew their licence
- Order to undergo re-assessment

Health and safety

Employers have an obligation to ensure the health and safety of all workers by

- Providing and maintaining safe plant and structures
- Providing and maintaining safe systems of work
- Providing and maintaining a work environment without risks to health and safety
- Providing information, training, instruction or supervision for work to be undertaken safely

Duty of Care requirements

Duty of care examples

- Take reasonable care for own health and safety
- Take reasonable care for the health and safety of others who may be affected by your actions
- Comply with anything your employer does to meet WHS/OHS requirements
- Do not interfere or misuse anything provided in a workplace for WHS/OHS

Intermediate rigger tasks

Rigging tasks that an intermediate rigger licenced to conduct on a worksite

- All work that a basic rigger can perform
- Erection of cranes, conveyors, dredges and excavators
- Erection of tilt slabs
- Erection of hoists with jibs and self-climbing hoists
- Dual lifts

Obtain workplace safety information

Use documents to obtain workplace safety information

- Legislation and regulations
- Relevant Australian standards
- OHS/WHS policy
- Codes of practice
- Safe Work Method Statements (SWMS) or Job Safety Analysis (JSA)

Purpose of a SWMS

Completing a Safe Work Method Statement (SWMS)

- Used to identify hazards
- Used to assess risk and document controls
- Used to manage hazards involved in tasks you intend to undertake
- Used to comply with safe work requirements

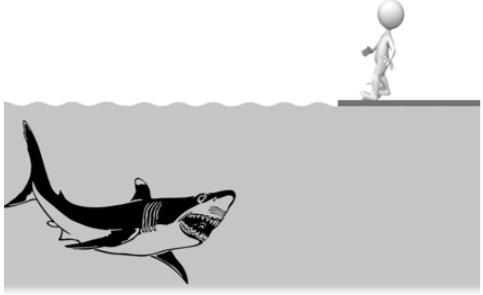
Equipment information

Information that will supply details on the inspection, care and use of equipment

- Australian standards
- Manufacturer specifications

Hazard vs Risk

A **Hazard** is *something that has the potential to harm you*



A **Risk** is *the possibility of harm (death, injury or illness) from exposure to a hazard*

Consider and plan for hazards

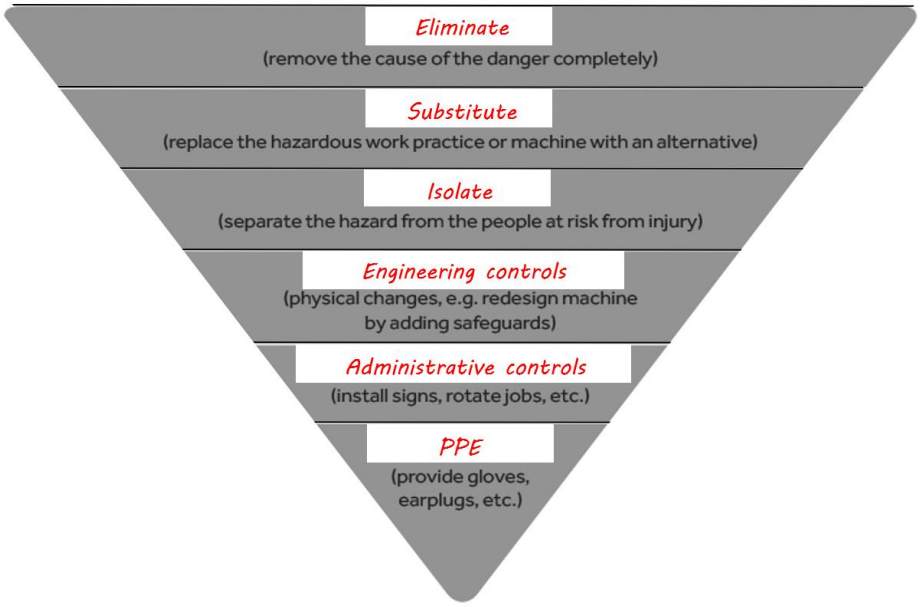
Structure or environment	*Control*
• Instability of work areas	• Seek advice form an engineer
• Falls from heights	• Fall arrest equipment
• Falling objects	• Hoardings, safety screens or nets, exclusion zones, tool lanyards, signage
• Poor lighting	• Adequate lighting to be established across the workplace before working
• Wind, poor weather	• Observe forecast, monitor current conditions, use a lift plan that includes a safe work method; check crane wind rating

Movement	*Control*
• Plant and equipment • Vehicle traffic • Personnel or pedestrian	• Traffic control / management, exclusion zones including traffic and or pedestrian barriers
• Hazardous manual tasks	• Prepare a SWMS, use equipment to eliminate or minimise manual handling e.g., gin wheel, load skates, snatch block, beam trolley, chain blocks

Underground and overhead	*Control*
• Electric lines • Underground services	• Safety distance for the relevant state, spotter • Safe separation distance, exclusion zone

Equipment	*Control*
• Faulty equipment • Electrical items	• Pre-start checks on equipment, tag out procedures • Electrical testing and tagging, isolation devices

Hierarchy of hazard controls



Fall prevention & fall arrest equipment

Fall prevention and fall arrest equipment is required at ***2m or higher.***

Personal protective equipment

Determine requirements or procedures for the use of personal protective equipment

- Site induction
- Site signage
- Safety data sheets
- SWMS

Tagline

Conditions that would likely require the use of a tagline

- The load suspended by the crane is likely to swing back and forth (due to wind or other external factors) creating a control hazard.
- The movement or rotation of the load causes a hazardous condition.
- To help orient a load for proper placement or connection upon landing

Identify the location of power lines

Visual signs can help you to identify the location of power lines on your worksite

- Power line marker balls
- Safety warning/danger signs
- Tiger tails

Minimum safe operating distances

Minimum safe distances you must maintain when working near electric lines.

QLD / NSW

Up to 132,000v = 3m

132,000v to 220,000v = 4.5

220,000v to 275,000v = 5m

Above 275,000v = 6m

NT

50v to 1000v = ...3m

1000v to 33000v = …...3m

33000v to 66000v = ….4m

66000v to 132000v =...5m

WA

Less than 33KV = 3m

Over 33kv = 6m

Over 133kv = 8m

VIC / SA/ ACT / TAS

<u>Distribution lines(poles)</u>

- *No closer than* **3m** with a qualified/registered spotter
- Without spotter 6.4m

<u>Transmission Lines (Towers)</u>

- *No closer than* 8m with a qualified/registered spotter
- Without spotter 10m

Power lines

If you need to work closer than the prescribed safe operating distances for power lines

- Contact the relevant authority for an access permit
- Ask to have the power disconnected or appropriately insulated by contacting the relevant supply authority
- Use a qualified safety observer (spotter) and observe legislation within your state or territory

Respond to unsafe incident or event

- Stop work
- Assess the situation
- Resolve issue (if possible)
- Get advice and assistance where required
- Report the incident to relevant authority and according to workplace procedures

Safely carry tools

Safely carry tools when working on a ladder

- In a tool belt with load rated D-ring tether anchors
- In a tool bag with load rated D-ring tether anchors

Reduce manual handling

Reduce manual handling, when moving tools or materials into a work area

- Use a materials hoist
- Use mobile plant equipment e.g., crane
- Use a gin wheel or an electric hoist

Pipe clamps

Before selecting pipe clamps, consider

- Orientation of use
- Working Load Limit (WLL)
- Diameter of pipe
- Thickness of pipe

Identify rigging equipment

Identify rigging equipment or any associated lifting gear required for a lift ***from the lift plan.***

Lifting beam or spreader bar

Considerations before selecting a lifting beam or spreader bar

- Amount of available head room
- Whether the load will need to be evenly distributed across two lifting points above the bar
- Whether the load must be supported by multiple lifting points under the bar
- Whether a weak or flexible load that needs support will need to be lifted

Chain roller or load skates

Before using chain roller or load skates, consider

- Type of roller for the floor type to avoid floor damage
- Type of roller for rolling resistance
- Footprint and manoeuvrability (size of the object, path of required movement or need for steerable load skates)
- Tonnage (capacity of the load skate and duty of roller material)
- Tug assist or manual, towable handle or manual T bar

Jack checks

Checks should be performed on jacks prior to use

- WLL exceeds that of the load to be lifted
- Condition of pawl, the teeth of the rachet and the handle
- Release valve is operating satisfactorily
- Worn rams, pistons or plungers
- Complies with Australian standards and functions as per manufacturer's original specifications

Fasten a hoist rope

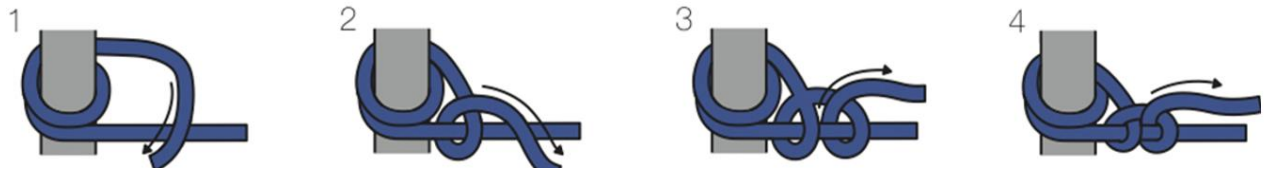
Methods to fasten the tail of the hoist rope to the winch drum include

- Clamp and bolts
- Socket and wedge
- Wire rope grips
- Poured sockets

Round turn and two half hitches

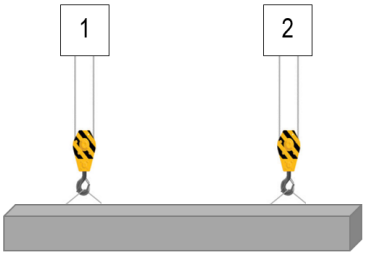
Advantages of using a round turn and two half hitches

- Can be tied quickly
- Can be tied under load
- Self-tightening
- Does not bind to the tying point making it simple to untie and can be undone under load



You are coordinating a multi-crane lift using the two cranes of same type at a fixed radius

- The share of the load being carried by Crane 1 is 6 tonnes
- The share of the load being carried by Crane 2 is 9 tonnes



What is the minimum rated capacity required for each crane at the fixed radius throughout the lift?

Minimum crane 1 capacity

= Load share + 20% of load share

= 6 + (6 X 20%) = 7·2 tonnes

Or

Load share x 1·2 = 6 X 1·2 = 7·2 tonnes

Minimum rated capacity of crane 1

7·2 tonnes at fixed radius

Minimum crane 2 capacity

= Load share + 20% of load share

= 9 + (9 X 20%) = 10·8 tonnes

Or

Load share x 1·2 = 9 X 1·2 = 10·8 tonnes

Minimum rated capacity of crane 2

10·8 tonnes at fixed radius

You must conduct a multi-crane lift using four (4) cranes of same type at a fixed radius

- The share of the load being carried by Crane 1 is 12 tonnes
- The share of the load being carried by Crane 2 is 17 tonnes
- The share of the load being carried by Crane 3 is 22 tonnes
- The share of the load being carried by Crane 4 is 27 tonnes

Minimum crane 1 capacity = Load share + 50% of load share = 12 + (12 X 50%) = 18 tonnes Or Load share x 1·5 = 12 X 1·5 = **18 tonnes**	**Minimum crane 2 capacity** = Load share + 50% of load share = 17 + (17 X 50%) = 25·5 tonnes Or Load share x 1·5 = 17 X 1·5 = **25·5 tonnes**
Minimum crane 3 capacity = Load share + 50% of load share = 22 + (22 X 50%) = 33 tonnes Or Load share x 1·5 = 22 X 1·5 = **33 tonnes**	**Minimum crane 4 capacity** = Load share + 50% of load share = 27 + (27 X 50%) = 40·5 tonnes Or Load share x 1·5 = 27 X 1·5 = **40·5 tonnes**

Calculate the percentage of the load that each crane should be carrying given the following information

- Crane 1 has a maximum rated capacity of 36 tonnes
- Crane 2 has a maximum rated capacity of 25 tonnes

The cranes will be used to lift an evenly distributed and balanced load that is symmetrical

Load is 15 metres in length and weighs 37 tonnes

Percentage crane 1 = 36t ÷ (36t + 25t) = 36t ÷ 61t = ·590 X 100 = 59% of the load	**Percentage crane 2** = 25t ÷ (36t + 25t) = 25t ÷ 61t = ·409 X 100 = 40·9% Rup = 41% of the load
The proportion (percentage) of the load to be carried by crane 1 = 59% of the load	
The proportion (percentage) of the load to be carried by crane 2 = 41% of the load	

Calculate the load share (in tonnes), that crane 1 and crane 2 from the previous question should be carrying

- The cranes will be used to lift an evenly distributed and balanced load that is symmetrical
- Load is 15 metres in length and weighs 37 tonnes

Load share crane 1	**Load share crane 2**
= 37t X 59% = 37t X ·590 = 21·83 t	= 37t X 41% = 37 X 0·410 = 15·17 t

Load share to be carried by crane 1 = 21·83 t

Load share to be carried by crane 2 = 15·17 t

Calculate the minimum rated capacity that crane 1 and crane 2 from the previous question should be carrying

Minimum crane 1 capacity	**Minimum crane 2 capacity**
= Load share + 20% of load share = 21·83 + (21·83 X 20%) = 26·196 = 26·2 t Or Load share X 1·2 = 21·83 X 1·2 = 26·196 = 26·2 t	= Load share + 20% of load share = 15·17 + (15·17 X 20%) = 18·204 = 18·21t Or Load share x 1·2 = 15·17 X 1·2 = 18·204 = 18·21 t

Minimum capacity of **crane 1** = 26·2 t

Minimum capacity of **crane 1** = 18·21 t

Calculate the length of the load that crane 1 and crane 2 should carry

- The cranes will be used to lift an evenly distributed and balanced load that is symmetrical
- Load is 15 metres in length and weighs 37 tonnes

Length of load to be carried by crane 1	**Length of load to be carried by crane 2**
= Length of load X load percentage = 15m X 59% = 8·85 metres = 15m X·590 = 8·85 metres	= Length of load X load percentage = 15m X 41% = 6·15 metres = 15m X 0·410= 6·15 metres

Length carried by **crane 1** = 8·85 metres

Length carried by **crane 2** = 6·15 metres

Identify the positions for the sling attachment points for crane 1 and crane 2 using the information from the previous question

As the load is symmetrical and evenly distributed, the slinging points for each crane will be a distance equal to half of the respective lengths calculated in the previous question (measured in from each end of the load)

Slinging point for crane 1

= Length of load to be carried by crane 1 ÷ 2

= 8·85 metres ÷ 2

= 4·425 metres in from the end of crane 1 load

Slinging point for crane 2

= Length of load to be carried by crane 2 ÷ 2

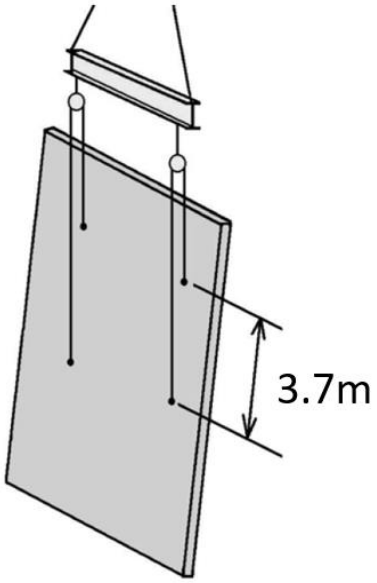
= 6·15 metres ÷ 2

= 3·075 metres in from the end of crane 2 load

Slinging point for crane 1 = 4·425 metres in from crane 1 end of load

Slinging point for crane 2 = 3·075 metres in from crane 2 end of load

Calculate the lengths of the slings required to lift the tilt panel below.



Calculation method

2 X (the distance between the two vertical attaching points using the same sling)

2 X 3·7 = 7·4m

You are required to make calculations relative to the felling of a concrete column, the column will be lowered

- Column dimensions 500mm square by 5.5 m high
- FSWR and winch to be used

Calculation method

Weight of column = width (m) X length (m) X height (m) X 2·4 (mass of cubic metre of concrete)

0·5 X 0·5 X 5·5 X 2·4 = 3·3 tonnes

Answer = 3·3 tonnes

What weight should the winch in the previous question be able to support?

Calculation method

Winch working load = 1·5 (safety factor) X weight of column

1·5 X 3·3 = 4·95 tonnes

Answer = 4·95 tonnes

Determine horizontal distance between the pulling mechanism and the structure to be felled (concrete column)

- Column dimensions 500mm square by 5.5 m high
- FSWR and winch to be used

Calculation method to determine horizontal distance

1·5 X 5·5 = 8·25

Answer = 8·25 metres

Determine the distance to the wire rope that a person may stand during felling

Calculation method to determine distance to the sides of the wire rope

Distance to sides of rope no closer than ¾ (safety factor) of horizontal distance from winch to structure

0·75 X 8·25m = 6·1875 Rup

Answer = No closer than 6·2 metres

Establish communication method

You should discuss communication methods and signals with other relevant personnel before starting work

- Ensure appropriate methods are selected
- Ensure all personnel understand the signals to be used
- Avoid confusion

Communication methods

Acceptable methods of communication on a worksite include

- Two-way radio
- Verbal
- Written
- Whistle signals
- Hand signals

Fall arrest system

A fall arrest system such as an energy absorber or inertia reel should be selected as a suitable control method only ***when other risk controls are not feasible.***

Inspect a safety harness or lanyard

A safety harness or lanyard must be inspected

- Before and after each use
- Every six months by height safety equipment inspector

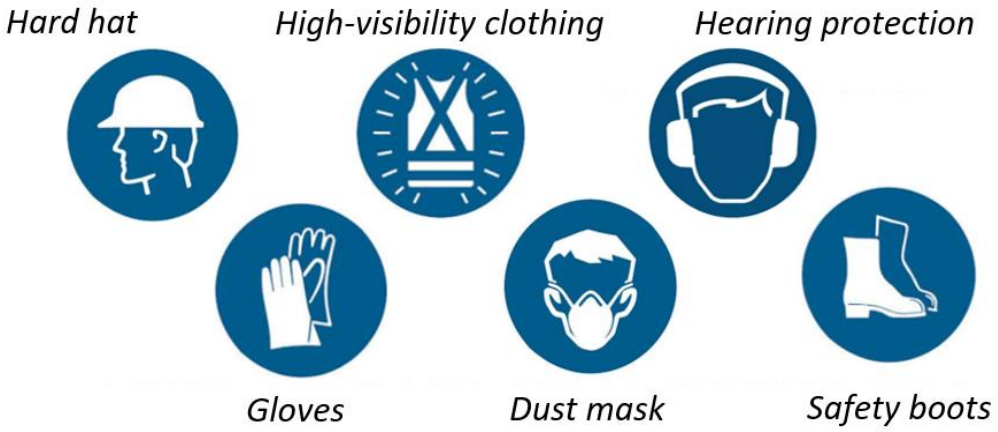
Lanyard / Safety harness

Factors that cause a lanyard or safety harness to become unsafe for use

- Frayed
- Split
- Chemical damage
- UV damage
- Heat damage
- Out of date

PPE required

Always ensure you are familiar with the signs and symbols for personal protective equipment.



Inspect safety equipment

Always inspect safety equipment including personal protective equipment ***before and after any work.***

Check plate clamps prior to use

- Inspect internal and external surfaces for fractures, wear and distortion
- Check all pin holes for wear
- Inspect the throat (clamp opening) width. At zero grip, the cam should be in full contact with the pad
- Measure the width of the throat. If the measurement at the base, where the pad is located is greater than at the top, the body has been overloaded. Replace the clamp and tag the defective clamp and remove it from service

Lever block and come-along checks

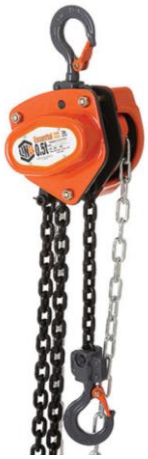
Checks should be made to a lever block or come-along prior to use

- Inspect for damaged or deformed parts
- No twists, kinks or stretched chain links
- Check the retaining pawl engages correctly
- Check the idling operation mode for excessive retaining plate and pawl rattle
- Check brake functioning correctly

Snatch block pre-use checks

- Wear, corrosion, cracks, nicks, gouges or deformation of hook or swivel tee
- Wear, corrosion and damaged thrust washers of yoke assembly
- Wear, at bolt and center pin bearing areas of load and center plate
- Hook latch operation

Chain block pre-use checks



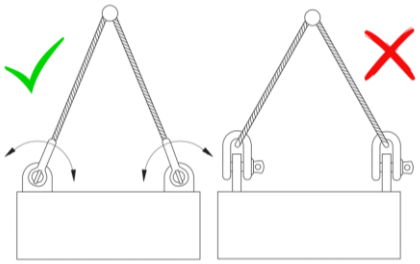
Checks should be performed before using a chain block for lifting activities

- Condition of the hand chain and load chain
- Sheave wheels, hooks and outer casing
- The mechanism and any safety devices for wear, nicks/cuts in chains, bent components, rust etc.
- Hook safety latch in place and functional

Shackle damage

Types of use that can damage a shackle during lifting include but are not limited to

- Undersized shackle
- Incorrect selection of shackle
- Side loading
- Exposing a shackle to heat

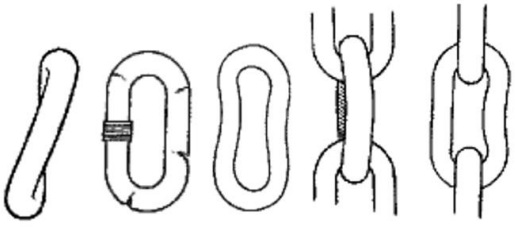


Flexible steel-wire rope defects

- Kinks
- Stretching
- Abrasion
- Crushed
- Knotting
- Corrosion
- Damage to eye

Chains unsafe for lifting

- Twisted
- Cracked
- Stretch
- Kinked
- Knotted
- No rated capacity tags
- Gouged or cut more than 10% of original diameter



Synthetic slings defects

Inspecting synthetic slings for defects

- Damage to stitching
- Damage to sleeve
- Chemical damage
- Cuts or tears
- No label
- Wear and tear
- Burns

Inspecting a beam trolley before use

- Structural check for deformation, cracks or excessive wear on any trolley parts including trolley wheels and bearings
- Loose or missing guards, fasteners, covers, stops or nameplates
- Check operating mechanisms to ensure normal operation occurs
- Supporting beam condition including clear of dirt or grit
- Labels and marking including WLL of the trolley for legibility

Beam clamps

Before connecting lifting gear to beam clamps, check

- Rated capacity of the beam clamp is appropriate to the load
- Screw handle has been used to tighten the clamp securely to the beam
- That the beam flange is seated properly within the jaws

Sheave defects

Defects that identify a sheave is not safe for use

- No WLL markings
- Flange crack or chipped
- Groove or bearing worn
- Bending/warping

Cantilever crane loading platform

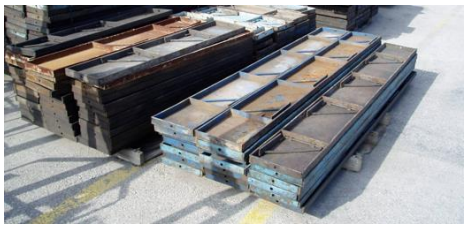
Checks before a cantilevered crane loading platform can be used

- Working Load Limit displayed
- Tare weight identified
- All bolts or connectors must be secured and tightened in position
- All props must be plumb and have the secure rear ties in position
- There must be no gap between the platform floor and floor slab
- All props must be set to ensure minimal jack extension
- Rear handrails must be in position
- Engineer approval if required



Perimeter safety screen or shutter

Determine the inspection, handling and storage requirements for safety screens or shutters according to manufacturer's specifications.



Inspections or records

Inspections or records required for an elevated work platform or mast climbing platform, may include

- Regular inspections as recommended by the manufacturer or competent person
- Pre-start inspection according to the manufacturer and workplace procedures
- Service and maintenance must be kept in a logbook or similar form

Missing tags or visible defect

If you come across lifting gear with missing tags or visible defect

- Tag out
- Isolate
- Report
- Record

Communication equipment

Checks should be made on a two-way radio before use

- Visual defects
- Battery charged
- Channel setting
- Volume setting

Communicate

You can ensure the task plan, risk controls and impact on other workplace activities are communicated to relevant personnel by

- Involving them in the task planning
- Involving them in the risk assessment process
- Establishing and maintaining communication throughout the entire work task

Risk controls

Risk controls are required when plant or structure is erected over a footpath e.g.,

- Warning sign and barriers
- Overhead protection
- Pedestrian exclusion zones

Operating in low light

Before performing rigging activities in a low light environment, you must have ***adequate lighting*** over the whole work area to ensure safety

Open design rigging screw

Using an open design rigging screw when attaching a static line to an eye bolt allows for visual inspection of threads.

Tension a static line

Methods to tension a static line

- Turnbuckle
- Come-a-long winch
- Tirfor winch

Terminated ends

Methods suitable to fasten the terminated ends of a wire rope static line

- Double saddle clamps
- Suitable wedge sockets
- Machine splice with thimble eye
- Purpose designed fittings, such as swaged or pressed fittings

Ground conditions

Most suitable ground conditions to bear pressure

- Hard rock
- Shale rock
- Sandstone
- Compacted gravel with up to 20% sand

Determine ground conditions

You can determine ground conditions including soil bearing capacity by reviewing a ***soil report*** *from a* ***geotechnical engineer.***

Suspended floor, roof or landing

Consult with an engineer or see an engineering report to determine the suitability of a suspended concrete floor, a building roof or landing.

Ensure stability during steel erection

- FSWR guys
- Plumbed using steel wedges if necessary
- Wind bracing bays erected
- Fibre rope guys shrink when wet and stretch when dry, and are therefore dangerous to use as guys

Demolishing a structure

You must follow the required documentation when demolishing a structure

- Demolition plan
- SWMS

Approved demolition plan

You must refer to the ***demolition plan approved by an engineer*** before a structure above a post-tensioned transfer beam can be demolished.

Consequence of shock loading

The consequence of shock loading during demolition activities

Examples

- Excessive dynamic force
- May exceed load rating of the crane
- Damage the crane
- Damage the lifting gear
- Cause instability

Crucial actions

Crucial actions must be taken, where unexpected movement or overstressing of structural members becomes apparent

- Stop work
- Remove everyone from the area
- Immediately report the situation to the demolition supervisor

Temporary guys

Temporary guys should be used control the sudden shifting of a beam being freed during demolition work.

Safety factor

50% is the recommended safety factor for demolishing in-situ members by use of winches and rigging gear.

Minimum allowable diameter

The minimum allowable diameter of FSWR felling rope

- 12mm

Grade 80 felling chain

- 8mm

Crane workbox

A ***personnel box,*** (***workbox)*** that complies with the Australian standards could be used to suspend a person from a crane to perform a work task where no other means is suitable.

Additional capacities

Determine the additional capacities required for the following multiple crane lifts.

2 cranes are used for a lift	1.2 times or 20%
3 cranes are used for a lift	1.33 times or 33%
4 or more cranes are used for a lift	1.5 times or 50%

Indicate portion of the load share

A rated capacity indicator or load moment indicator is used when performing multi-crane lifts, this is to indicate portion of the load share on each crane.

Equalising equipment

A lifting beam, or other equalising equipment should be used when two cranes will be used to support a load

Example

- Because neither crane is capable of independently lifting the load
- When cranes are close together e.g., lifting large columns
- It acts as a lever

Coordinating a multiple crane lift

When coordinating a multiple crane lift, the rigger should monitor or ensure

Example

- Weather conditions
- Hoist ropes remain vertical at all stages
- Crane operators only undertake one motion at a time
- Luffing up in preference to luffing down
- All movements are carried out at slow speeds
- Communication is maintained during lift procedures

Pick and carry multi-crane lift

When coordinating a pick and carry multi-crane lift, the rigger should ensure

Example

- Keep load close to ground
- Ensure the crane has rated capacity for the load in articulation and travel
- Aim to position the cranes either side by side or in line with one another
- Designate a lead crane to control the pace of travel, ensure the following crane adjusts speed to keep hoist rope vertical

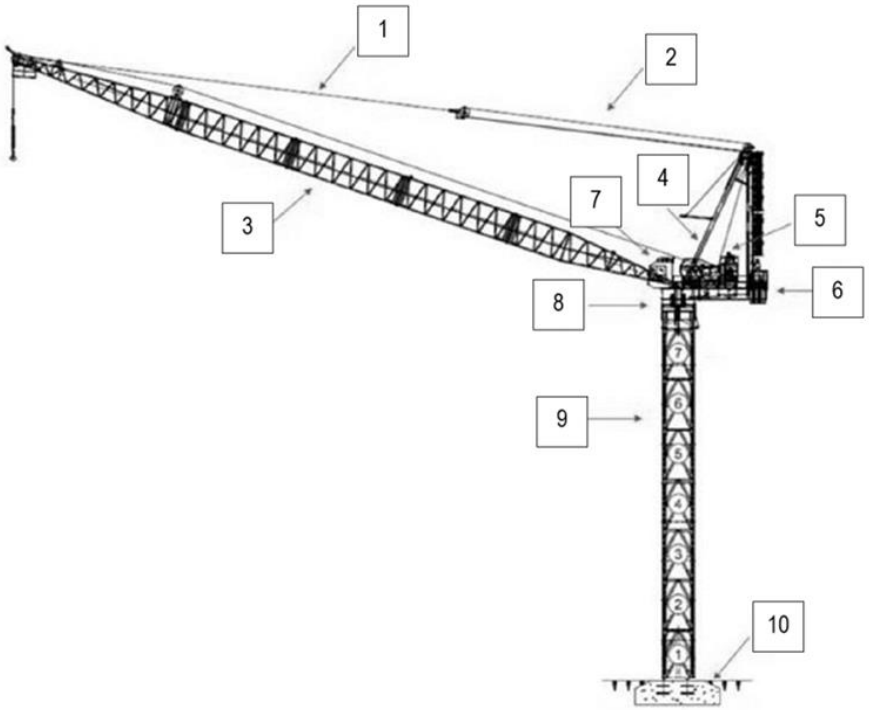
Multiple crane lift

It would be hazardous to luff down during a multiple crane lift

- Crane instability
- It increases load radius and contributes to the overturning moment of the crane
- Cranes could contact each other

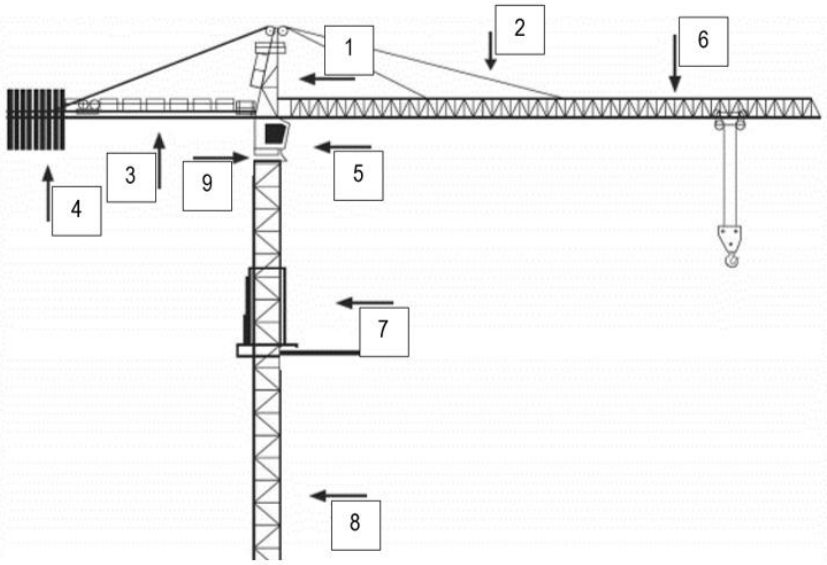
Luffing jib tower crane

1	Pendant
2	Luffing rope
3	Boom (Jib)
4	A Frame
5	Power pack
6	Counterweights
7	Cab
8	Slew Mount
9	Tower sections
10	Pontoon



Hammerhead tower crane

1	A Frame
2	Pendants
3	Counter Jib
4	Counterweights
5	Cab
6	Front Jib
7	Climbing Frame
8	Tower Sections
9	Slew Mount



Free-standing tower sections

Contact an ***authorised engineer or manufacturer*** in order to establish the amount of free-standing tower sections before you must tie to a building or structure.

Establish the component weights

Always establish the component weights before erecting a tower crane.

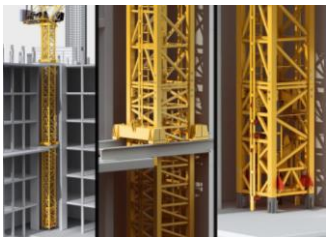
This can be done by ***checking the erection manual, or by checking the manufacturer's labels or markings on each section.***

Attach lifting gear

Attach the lifting gear when preparing to lift boom or jib sections

- To the top chords
- To the lifting lugs incorporated on the boom chords
- According to the erection manual provided by the manufacturer

Support an internal type tower crane



Methods used to support an internal type tower crane to the inside of a building

Example

- Extendable beams according to the design requirements
- Collar and yoke
- Ladder rack and climbing system

Crane counter weights

To maintain stability, you need to install or remove tower crane counter weights according to manufacturer's specifications.

Stop turnbuckles loosening

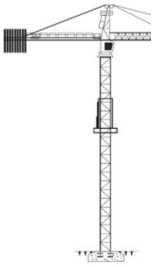
Stop turnbuckles loosening from vibration when tensioning tower crane counterweight ropes.

Turnbuckle frame must be locked out using a locking plate.

Maximum wind rating

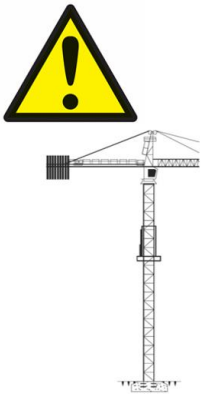
Establish the maximum wind rating for the external crane climbing activity.

This can be found ***in manufacturer's specifications, erection manual, or load chart supplied with the crane***



Vertical spacing of ties or collars

To establish information relating to the vertical spacing of ties or collars, refer to ***the crane standing or climbing documentation provided by the engineer or manufacturer.***



Climbing activity

If the bolts that connect the crane and the climbing frame are disconnected at the same time during the climbing activity, ***the machine deck could fall off the towers.***

Communicating with crane operator

The person responsible for communicating with the crane operator from inside the tower is the ***licenced rigger in charge (intermediate or advanced rigger).***

Monorail attached to tower crane

A ***monorail*** is attached to the tower in order to support the incoming tower section being lifted by the crane.

Tower guides

The tower guides should be released to the minimum measurement ***before starting any climbing operations.***

Clear of obstructions

Ensure the tower sections are clear of obstructions prior to climbing ***to avoid jamming sections.***

Ensure the frame slides freely

To ensure the frame slides freely over the tower sections, riggers will need to adjust the climbing frame guides numerous times throughout the climb.

Reach equilibrium

Luff the boom out at minimal speed to equalise the balance on the tower of a luffing type tower crane.

Travelling type counterweight

You must luff the boom to the minimum radius ***to be able to lock or disconnect the travelling type counterweight.***

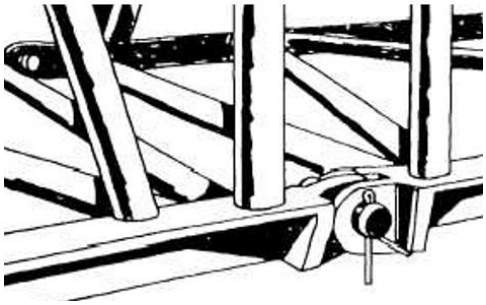
Identify cantilevered boom length

Information must be obtained to identify the maximum cantilevered boom length supported from the butt section of a mobile lattice boom crane

Example

- The boom sequence diagram in the operator's manual
- Manufacturer's specification

Flanged pins

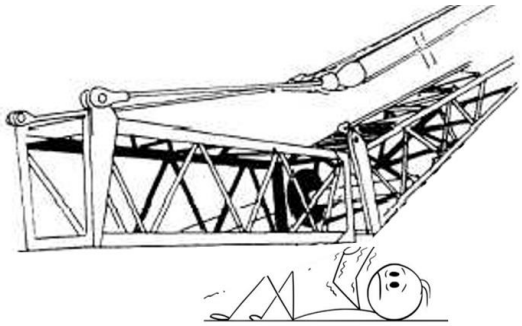


A high number of accidents have occurred while riggers were removing booms.

The flanged pins should be connected from ***inside to the outside*** when connecting sections of boom.

Installing the pins from the inside to outside prevents the need for a rigger to work from inside the boom to drive pins out.

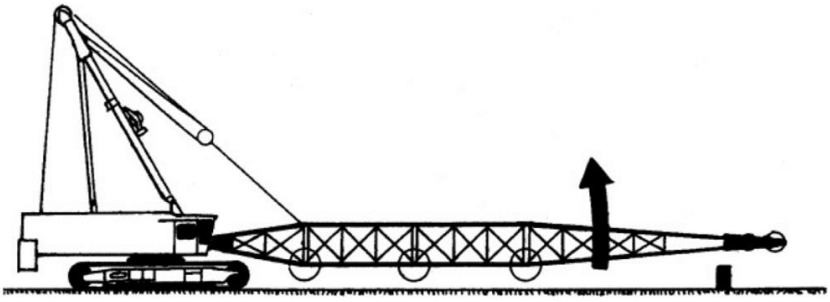
Lattice boom pin hazard



It is hazardous to remove the lattice boom pins from under and inside the boom, ***the boom will collapse and may cause death or serious injury.***

Dismantling lattice boom crane

The bottom pins should be removed first, when the boom is cantilevered and the butt section is supported by the bridle during dismantling of a lattice boom crane.



Cantilevered portion of boom is not supported, and top pins therefore are not to be removed. Bottom pins (circled) may be removed.

Replacing a wire rope

Use ***the manufacturer's manual*** to find information on size, length, lay and construction before replacing a wire rope on a crane.

Wire rope is not pre-tensioned

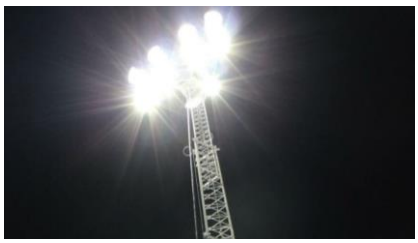
If a wire rope is not pre-tensioned when being run on a multi-layered hoist drum the following could occur

Example

- Crushing or deforming between lower layer ropes
- Diving to a lower layer
- Abrasion of rope when dislodging from lower layer
- Shock loading from the load on the crane

Non-guyed light or crane tower

Refer to the ***manufacturer specifications*** to establish the inspection or handling requirements for a non-guyed light or crane tower.



Lift a tilt-up concrete panel

Types of rigging and or associated equipment required to safely lift a tilt-up concrete panel

Examples

- Cranes
- Bracing
- Work platforms
- Supports to hold slab in position
- Equalising lifting gear
- Lifting equipment
- Communication devices
- Lifting attachments for the slab

Chemical anchors

100% of chemical anchors must be proof tested to working load limit, when used to fix braces.

Tilt panel braces

To establish the alignment tolerance and minimum number of braces required for each tilt panel, ***refer to the erection documentation provided by the manufacturer or engineer.***

Safety factor for inserts

2.25 or (2 ¼) is the minimum safety factor when using lifting inserts or bracing inserts.

Proof test lifting clutches

Lifting clutches need to be proof tested ***every twelve months.***

Panel suction or binding

Panel suction or binding is hazardous when lifting a panel from the casting bed. It ***increases the dynamic load of the rigging system, overloading the crane due to stored energy.***

Limiters or indicators

Rated capacity limiters or load moment indicators must be used when lifting a tilt panel from a casting bed, this is ***to indicate suction between panels or excessive loading.***

Rigging configuration

To establish the rigging configuration required to lift a certain panel, ***refer to the erection documentation provided by the manufacturer or engineer.***

Remove the load from the hook

You can remove the load from the hook when installing a panel, ***when all braces are installed and tensioned according to erection documentation.***

Width of packers or shims

The minimum allowable width of packers or shims under a panel edge is ***100mm or the panel thickness, whichever is lesser.***

Height of packers or shims

40mm is the maximum allowable height of packers or shims under a panel edge, unless specifically designed.

Persons directly involved

Only persons directly involved in the erection of panels are allowed into an area where tilt panels are being lifted.

Adjustable brace working load limit

Information regarding adjustable brace working load limit must be accessible, ***working load limit when brace is at zero extension and at maximum extension.***

Retaining devices

Retaining devices e.g., padlocks must be fitted to adjustable brace lock pins.

Dangerous lifting

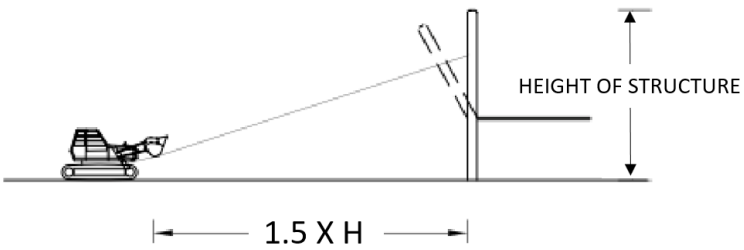
It is dangerous to lift a panel that is leaning towards a crane, ***if the lifting system fails, the panel could fall against the crane or overturn the crane.***

Exclusion zone

Persons must stand ***outside the exclusion zone***, when felling structures by wire rope or chain.

Minimum allowable horizontal distance

1.5 times the height of the structure is the minimum allowable horizontal distance between a pulling mechanism and the structure to be felled when using wire rope or chain.



Incorrectly slung

A pre-cast or pre-stressed beam is hazardous when incorrectly slung and turned on its side, ***it could collapse causing death or serious injury to workers or damage plant and/or other structures.***

Additional or unwanted materials

Additional or unwanted materials should be removed from the work area as soon as possible for

- Hazard prevention
- Safety

Unserviceable

If components of structure, plant or equipment are found to be unserviceable

- Tag out
- Isolate
- Record in service or maintenance book
- Report

Store plant, gear and equipment

Correctly store plant, gear and equipment

- According to manufacturer instructions
- According to workplace procedures

Remove hazard control measures

When hazard control measures such as barriers, signs or safety nets are no longer needed.

Remove them from the work area, inspect for defects and store them correctly.

THE END.