**Checklist - planning the safe set-up and operation of tower cranes**

A tower crane is a boom crane or jib crane mounted on a tower structure. There are three general types:

* horizontal/hammerhead
* luffing jib type
* self-erecting.

Tower crane operation can present a risk of injury to people from the following:

* Structural failure. This includes the failure of any crane component, such as the boom, jib, hydraulic rams or wire rope. Crane overloading is a major cause of structural failure which can occur without warning.
* Crane collapse. This can occur if the crane becomes unstable as a result of overloading. A collapse may be influenced by a number of factors, including the incorrect use of counterweights, crane tower bolts being incorrectly torqued, the incorrect installation of crane ties or poor design of the tower crane base.
* Contact or collision with other plant and structures. This can occur where sufficient clearances are not maintained between the tower crane and other plant and structures, such as other cranes, concrete pumping booms, buildings and overhead powerlines.
* Falling objects. This can occur during erecting, jumping and dismantling activities and by the way loads are secured during lifting operations. Falling objects are a risk to workers and members of the public.
* Falls from height. Workers can fall when erecting, dismantling or maintaining tower cranes.

**Why is planning important?**

Planning is the first step in ensuring that work is done safely. Planning for tower crane operations should start as early as possible and involve consultation with everyone engaged in the work including the principal contractor, crane owner, crane supplier, electricity entity, designer and project manager. Good planning involves:

* selecting the right crane(s)
* siting, erecting and commissioning the crane
* planning, scheduling and coordinating the work
* operating the crane safely, including shut down.

Effective planning will help identify ways to protect people who are:

* erecting, climbing, commissioning and dismantling tower cranes
* directly involved in the lifting operation, such as the crane operator and dogger
* performing other work activities at the workplace
* in areas adjacent to a tower crane, including public areas.

**How to use this checklist**

This checklist can be used to assist with the set up and operation of tower cranes at a construction workplace. The assessment can be led by a principal contractor, Person Conducting a Business or Undertaking (PCBU), crane crew or health and safety representative (HSR) and should be done in consultation, coordination and cooperation with everyone involved. For example, a representative from the principal contractor might assemble a group of relevant people from the site to discuss each item and coordinate the actions required for any **‘no’** responses.

The *Work Health and Safety Act 2011* requires a PCBU to consult, so far as is reasonably practicable, with workers who are likely to be directly affected by a health and safety matter and with other duty-holders at the same workplace. The items in the checklist are based on the [*Tower crane Code of Practice 2006*](https://www.worksafe.qld.gov.au/__data/assets/pdf_file/0016/58201/tower-crane-cop-2006.pdf0IDhFyCWLwz6g9IX3zmg) which should be referred to for further guidance. Records of completed checklist can be kept to monitor and review items at a later date.

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| --- |
| **Part one – site details** |
| **Date of assessment:** |  |
| **Assessment completed by:** |  |
| **Name of PC or PCBU:** |  |
| **Site location:** |  |
| **Name of crane owner:** |  |
| **Crane item/rego number:** |  |
| **Make, model and year of manufacture:** |  |
| **Type of crane:** |  |

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| --- | --- | --- |
| **Section** | **Item** | **Response and comments** |
| **Part two – selecting the right plant** |
| Planning the crane requirements | 1. Have factors that affect the safe operation of a tower crane been considered in the project planning and design stage? This includes:
* liaising with electrical entities regarding the supply of electricity and control measures for working around existing power supply (e.g. de-energising powerlines)
* determining crane requirements, including loading bays and site access, at the project design stage
* ensuring tower cranes are installed a safe distance away from other cranes and plant (e.g. concrete placement booms) to reduce the likelihood of collision
* ensuring the crane machine deck remains a safe distance above the building.
 | □ Yes □ NoComments: |
| 1. Is the type of crane selected suitable for the lifting work that needs to be performed?

Consider:* the kind of loads to be lifted (e.g. weights, dimensions, lift heights/radii)
* the frequency and duration the plant will be used
* the type of lifting and placements required
* workplace conditions (e.g. site access, proximity of other plant and structures, public areas).
 | □ Yes □ NoComments: |
| Registration | 1. Is the crane registered with Workplace Health and Safety Queensland?

Tower cranes, including self-erecting tower cranes, are registerable plant. | □ Yes □ NoComments: |
| Inspections and maintenance | 1. Has the operator carried out a documented pre-operational inspection on the crane prior to starting work? This should cover, but not be limited to:
* all relevant items indicated in the operations manual
* operating and emergency controls
* brakes
* safety switches and interlocks, including limiting and indicating devices
* a visual inspection of the structure
* wire ropes
* counterweights.
 | □ Yes □ NoComments: |
| 1. Is an inspection report available as evidence that the annual inspection has been carried out in accordance with the manufacturer’s specifications?
 | □ Yes □ NoComments: |
| 1. If the crane is ten years or older, is the major inspection certificate available for inspection?
 | □ Yes □ No □ N/AComments: |
| Crane manuals and markings | 1. Are the *crane operator manual* and *crane load chart* written in English, use metric units and are they available to the crane operator at all times (i.e. kept in the cabin)?
 | □ Yes □ NoComments: |
| 1. Does the crane and its lifting components have all required markings? Do all operator controls indicate their function and operation?
 | □ Yes □ NoComments: |
| **Part three - planning, scheduling and coordinating the work** |
| Planning the work | 1. Has a Safe Work Method Statement (SWMS) been prepared for high-risk construction work associated with erecting, operating and dismantling the crane, that adequately:
* describes the high-risk construction work to be undertaken
* sets out the steps required to perform the work
* identifies hazards
* describes the control measures to be used?
 | □ Yes □ NoComments: |
| 1. Does the SWMS follow the hierarchy of controls to prioritise higher-level control measures and not rely solely on administrative controls?

For example, the assembly of boom/jib done at ground level to eliminate risks associated with working at height. | □ Yes □ NoComments: |
| 1. Have workers been consulted in the development of the SWMS by:
* providing input in to the content of the SWMS
* demonstrating that they understand the content of the SWMS.
 | □ Yes □ NoComments: |
| 1. Is there a system in place for monitoring compliance with the SWMS (e.g. task observation, periodic SWMS review)?
 | □ Yes □ NoComments: |
| 1. Where there is a likelihood of complex lifts (e.g. dual lifts, heavy lifts, tailing precast), have documented lifting procedures been developed that define responsibilities and approach the crane lift in a logical, systematic way?
 | □ Yes □ No □ N/AComments: |
| Determining the crane crew | 1. Has an assessment of the size and complexity of the work to be undertaken been done to determine the crane crew required? This will determine:
* the number of operators and doggers required
* the number of riggers required for activities associated with erecting, commissioning, maintaining and dismantling the crane
* whether a trained safety observer is required for maintaining electrical exclusion zones
* whether a crane coordinator should be appointed.
 | □ Yes □ NoComments: |
| 1. Do the workers involved hold the required high-risk work licence to perform the work?
	* Crane operator.
	* Dogger/rigger.
 | □ Yes □ NoComments: |
| 1. Has the crane operator received documented familiarisation training on the make and model of crane they are operating?

Refer to Appendix 3 of the *Tower Crane Code of Practice 2006* for a list of items that can be included in a familiarisation training checklist. | □ Yes □ NoComments: |
| 1. Did the induction training provided to workers (e.g. operator, riggers, doggers, workers in vicinity of crane) cover what to do in the event of an emergency involving the crane and identify people with specific emergency roles? This will include information about:
* how to use warning systems and what to do when they sound
* how to shut-down the crane safely
* how to evacuate the crane and the area nearby safely
* effective communication between all workers near the device to evacuate safely
* how to use firefighting and rescue equipment and where to find it
* training workers to respond to injured people and evacuate people (e.g. what to do if someone contacts an energised overhead electric line).
 | □ Yes □ NoComments: |
| **Part four - plant siting and setup** |
| Proximity to plant, structures and public areas | 1. Is the crane positioned so that the risk of injury from collision with other plant or structures is minimised? Consider:
* overhead electrical lines and other services
* nearby structures
* other cranes or high obstructions (e.g. concrete placement booms), including those in adjacent workplaces
* the vicinity of aerodromes and aircraft flight paths.
 | □ Yes □ NoComments: |
| 1. If the crane shares the same air space with another crane from an adjacent workplace, has the principal contractor from each workplace negotiated and implemented documented systems of work to minimise the risk of collision?
 | □ Yes □ No □ N/AComments: |
| 1. Is the crane positioned so that lifting loads over public areas (e.g. footpaths, roads, railways, waterways, buildings) is avoided where possible?
 | □ Yes □ NoComments: |
| Exclusion zones | 1. Have appropriate exclusion zones been established around the crane? They should:
* prevent cranes nearing the vicinity of overhead electrical lines
* prevent people working around the area of the crane that don’t need to be there
* prevent other plant and vehicle traffic from entering the area of the crane
* avoid lifting loads over areas where people are present
* keep workers and others a safe distance away from the crane when maintenance or climbing of the crane is being carried out.
 | □ Yes □ NoComments: |
| 1. Have all relevant workers been informed and understand where exclusion zones are established?
 | □ Yes □ NoComments: |
| Erecting and dismantling tower crane | 1. Is there a system in place to ensure that during erecting, climbing and dismantling the crane, the risk of the crane collapsing is minimised? This includes:
	* instructions for erecting and dismantling activities
	* activities supervised by a competent person
	* components are assembled in the correct sequence
* tower sections are the correct model and identified with their type and serial number
	+ the correct type and grade of bolts are used when connecting tower sections
	+ all bolts are correctly torqued
	+ work is scheduled to take place outside of normal work hours as far as practicable
	+ appropriate exclusion zones are maintained.
 | □ Yes □ NoComments: |
| 1. Have crane ties been secured to the supporting structure at set intervals in accordance with the crane manufacturer’s and designer’s instructions?
 | □ Yes □ No □ N/AComments: |
| 1. Are control measures in place to minimise the risk of workers falling from height during the erecting, climbing and dismantling of the crane? Control measures include:
* edge protection systems
* travel restraint systems
* fall-arrest harness systems.
 | □ Yes □ No □ N/AComments: |
| 1. Are control measures in place to minimise the risk of workers or other people being hit by falling objects during the erecting, climbing and dismantling of the crane?

These control measures include:* exclusion zones
* tool lanyards
* mesh screens
* scheduling of work
* restraining systems for crane components.
 | □ Yes □ NoComments: |
| Commissioning | 1. Is a commissioning report available that confirms that a component person has tested, inspected and ensured the crane is in full working order prior to it being put in to active service?
 | □ Yes □ NoComments: |
| Wind conditions | 1. Have wind conditions been considered as to how they may affect the crane's stability?

Consider:* wind speed as measured at the top of the tower
* maximum wind speed rating of tower crane installation (e.g. crane, crane base, crane ties) specified by the manufacturer or designer
* effect of wind gusts
* types of loads (e.g. surface area) and lifts to be performed
* experience and judgement of the operator.
 | □ Yes □ NoComments: |
| **Part five - operating the plant safely** |
| Communication | 1. Has a reliable method of communication between the crane operator and other relevant workers (e.g. doggers, riggers, crane coordinator) been implemented to prevent dropped loads and collision with other plant and structures? Communication can include the use of:
* radio communication, including dedicated radio frequency, equipment checks, clear and constant-talk communication and procedures for loss of signal
* hand signalling
* other methods such as bells, buzzers and whistles.
 | □ Yes □ NoComments: |
| 1. Where more than one dogger is involved in a lift, does each dogger understand where responsibility for their part of the lift lies to ensure that the crane operator is taking radio instructions or visual signals from only one person at any one time?
 | □ Yes □ No □ N/AComments: |
| Limiting or indicating devices | 1. Is the crane fitted with the following safety functions and indicators in working order:
* rated capacity limiter to prevent overloading
* motion limiting devices to prevent damage to the crane caused by movement outside the designed range of movement
* working radius indicator to display the location of the suspended load in relation to the crane
* load indicators to measure and display the mass of the load being lifted?
 | □ Yes □ NoComments: |
| Lifting loads | 1. Is all lifting gear of adequate capacity, in good condition and appropriately marked with relevant information (e.g. Safe Working Load)?
 | □ Yes □ NoComments: |
| Ergonomic issues | 1. Is there safe access to the crane cabin and other frequently accessed areas of the crane?

Consider:* changes in directions of ladders
* landings to allow rest breaks while climbing
* avoiding the use of continuous vertical ladders
* guardrails on tower landings and machine deck
* mechanisms to allow riggers to safely access the crane’s jibs (e.g. static lines).
 | □ Yes □ No □ N/AComments: |
| 1. Do procedures exist to prevent incidents associated with impaired work performance from fatigue? Consider:
* workload
* length of shift
* previous hours and days worked
* time of day or night worked
* driving time required to get to job.
 | □ Yes □ NoComments: |
| Leaving the crane unattended | 1. Before leaving the crane unattended, has it been secured to prevent unauthorised use?

This requires:* removing all loads from the hook
* raising the hook to a position safely clear of other operations
* disabling all powered motions
* removing keys from the crane
* leaving the crane boom to weathervane, where there is no risk of the boom contacting other structures
* locking the operator cabin
* restricting access to the machine deck.
 | □ Yes □ NoComments: |

**What to do next**

If you answered **‘no’** to any of the items during the assessment, further action should be taken. This should start with a discussion with the relevant people on site to gather more information and decide on a course of action. Keeping a record of the completed assessment will help to monitor and review items at a later date.

The items in the checklist are based on the [*Tower crane Code of Practice 2006*](https://www.worksafe.qld.gov.au/__data/assets/pdf_file/0016/58201/tower-crane-cop-2006.pdf0IDhFyCWLwz6g9IX3zmg) which should be referred to for further guidance.