

# Safe use of crane-lifted work boxes

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Work boxes are personnel-carrying devices designed to be lifted by a crane for the purpose of providing an elevated working area. This document provides guidance to enable duty holders to develop a safe system of work for tasks where it is necessary to lift personnel by using a crane lifted-work box.

## Background

This guidance note replaces a previously issued safety alert titled 'Using workboxes to lift personnel - Braking and operational requirements for cranes'.

The replaced safety alert was issued following the revocation of historical prescriptive regulations that required cranes to be fitted with an additional brake acting directly on the hoist drum when lifting persons.

This guidance note has been created following changes to Australian Standards, the advancement in crane technology and load monitoring devices, and the ongoing risks associated with using crane-lifted work boxes.

## Consideration of crane-lifted work boxes as a height access method

Before choosing to use a work box, it is first necessary to identify whether a work box offers the highest level of protection against risks to employees' health and safety that is reasonably practicable in the circumstances.

Work boxes supported and suspended by a crane are a form of a temporary work platform and are defined in the Occupational Health and Safety Regulations 2017 (OHS Regulations) as a passive fall prevention device.

Although work boxes supported and suspended by a crane are a passive fall prevention device, the cranes that they are connected to are not specifically designed to lift people and, due to the many single point dependencies in both the design of the crane and the work box, other types of temporary work platform need to have been considered and determined to be not reasonably practicable before a work box is used. Other temporary work platforms that are also passive fall prevention devices include fixed, mobile or suspended scaffolds, mobile elevating work platforms and mast climbing work platforms.

## Design

### The work box

Work boxes are devices designed to be lifted by a crane to provide a working area for the persons elevated and working from it. Workboxes need to be designed and built in accordance with 'AS 1418.17 Cranes – Design and construction of workboxes' or an equivalent standard, which include the following features:

- an edge protection system with the sides of the work box at least 1 metre high;
- the working load limit, tare mass and the design registration number of the work box marked on the work box;
- a handrail that runs around the inside of the box perimeter to help prevent injury to persons' hands in the event of the work box contacting an obstruction;
- an inward opening door (if provided), that is self-closing and provided with an automatic or self-latching system to prevent unintentional opening. Note that for a first aid rescue box / cage the door is to be outward opening, to facilitate stretcher access.

# Safe use of crane-lifted work boxes

- the lifting equipment is attached to the lifting points by means of hammerlocks or moused shackles with a factor of safety for each suspension sling being at least eight for chains and ten for wire rope.

## The crane

Cranes used to lift work boxes need to have at least two independent braking systems fitted to the winch so that the failure of one braking system will not result in the loss of control of the load. The two independent systems can comprise of a static / holding brake system (such as the drive motor hydraulics) and a dynamic / park brake system (such as an internal wet clutch system). The requirement for the two independent braking systems also applies for the winch fitted to the luffing function of luffing-type cranes.

The independent braking systems need to be fail-safe and automatically apply in the case of a power failure.

The crane should be equipped with controls that return to neutral and stop the crane when released.

If an additional brake is fitted in addition to the original cranes manufacturer's design then the additional brake should be installed to act directly on the hoist drum via a rigid connection; this can assist in controlling the risk of a failure of the primary brakes or any single component in the brake and drive train.

The crane needs to also be fitted with a latching safety hook and an anemometer (wind speed indicator).

Tower cranes should be equipped with an emergency load lowering device that enables the brakes to be released manually in the case of crane power failure. The design needs to ensure that the load is under control at all times and that the brakes do not overheat outside their design parameters. After the emergency load lowering device has been released the brakes should automatically reset.

Cranes used to lift work boxes should be fitted with power lowering and if the crane is fitted with a free fall function it should be positively locked out while lifting a work box to avoid inadvertent disengagement.

The crane needs to be fitted with an upper hoist limit (anti-two block device) that stops operation of the hoist and luff (if applicable) functions of the crane. Other limiters fitted to the crane need to be operational.

Cranes to be used to lift persons via a work box need to be fitted with a rated capacity indicator and limiter.

## Inspection and maintenance

A preventative maintenance scheme should be in place for the crane, work box and associated lifting equipment that should be based on the manufacturer's recommendations and relevant Australian Standards. For each item inspected supporting information should be provided and understood by those undertaking the inspections that include what is looked at, what is looked for, the rejection/acceptance criteria for each item and how it is measured, identified and confirmed. Records need to be maintained of the findings, together with any action taken.

Due to the risks associated with lifting persons in a work box connected to a crane it is recommended that a documented assessment of the condition of the crane, work box and associated equipment be undertaken by a competent person prior to setting up the crane for work box activities.

## Design life

The design life of the critical crane components that are essential for maintaining control of the suspended work box need to be identified. It then needs to be confirmed that these components have not exceeded their design life. Those components that have reached or have passed the theoretical design life need to be inspected and assessed, such as undertaking a major inspection, to quantify or reassess the remaining design life or have the components replaced prior to suspending persons from the work box using the crane.

Accurate crane usage records need to be maintained to assist in a competent person's assessment of the crane to ensure that the components have not exceeded their design life. Data logging devices or winch hour meters, together with manufacturer's information can assist with this.

# Safe use of crane-lifted work boxes

A major inspection should be documented and be in accordance with the original crane manufacturer's recommendations (if provided), Australian Standard series AS2550 and per the details in the inspection and maintenance section of this guidance note. Thorough recommissioning, including an independent 3<sup>rd</sup> party verification should be undertaken prior to returning the crane back into service following a major inspection.

## System of work

### Planning

A lift plan/study needs to be developed along with documented lifting procedures to assist in the development of risk controls to assist in protecting the work box persons and other personnel including the public. If performing construction work, a Safe Work Method Statement (SWMS) must be developed for this task, due to a risk of a person falling more than 2 metres.

The lift plan/study can be incorporated into the SWMS.

The crane selected must:

- have a minimum capacity of 1 tonne at the maximum radius for the task to be performed, and
- have capacity 2 times the maximum hoisted load (including personnel) in all areas of the work box travel path, and
- have a hoist rope load that is less than 50% of the crane hoist winch capacity

When using a crane that is fitted with an event recording device, the information stored on the device should be reviewed to identify any overloading or overriding events that may compromise the safe operation of the crane. Any events identified must be fully investigated prior to using the crane to suspend a work box.

For mobile cranes, a documented geotechnical assessment of the proposed crane standing area needs to be undertaken prior to selecting the crane to determine the ground bearing capacity. The ground bearing pressure exerted by the crane in its configuration should not exceed the ground bearing capacity in the crane standing area. During the lift, the crane standing area should be monitored for any changes or movement, including during load tests.

### Crane operation

The crane operator needs to remain at the crane controls whilst the crane is being used to lift the work box. No other loads are to be lifted by the crane whilst the work box is lifted and the crane must not travel while anyone is in the work box.

Loads must be lifted in a way that ensures that the load remains under control during the activity. Therefore persons should not be lifted in a work box in winds exceeding 7m/s. The lift procedure should identify the maximum wind speed for lifting persons in a work box.

Prior to lifting persons by a crane in a work box, a load test and test lift should be undertaken and evidence of the tests retained e.g. date and time stamped photographic evidence.

During the load test the crane and hoist needs to hold a load, equivalent to 2 times the work box rated capacity at the radius at which the work box is to be suspended. The load shall then be visually monitored for movement or creep. The test will be successful if no movement or creep is detected over a 5 minute testing period.

### Work box use

Persons in the work box must substantially remain within the confines of the work box while they are being lifted or suspended.

A full body safety harness needs to be provided and worn by the person(s) in order to prevent, so far as is reasonably practicable, injury to the person as a result of the fall. The full body fall arrest harness should comply with AS/NZ 1891.1 and be provided with energy absorbers with the lanyard length as short as possible, while still permitting the persons in the work box freedom of movement and able to maintain both feet on the floor of the work box. Harnesses need to be attached to the designated fall-arrest anchorage points in the work box or to the main sling ring above the workers' heads.

Note: When a work box is being lifted over water, there may be an exception to the use of safety harnesses. For example, if a person is wearing a safety harness and the crane/work box was to tip over or enter the water, the use of the safety harness may mean that the person in the work box could be dragged underwater with the

# Safe use of crane-lifted work boxes

equipment. In this instance, a site-specific risk assessment should be conducted, and recorded, to determine whether a safety harness or other risk control measures are required e.g. a personal flotation device.

At least one person in the work box must hold a dogging or rigging High risk work licence class to ensure correct directions are communicated to the crane operator. There also needs to be an effective means of communication (with back-up system) between the dogger or rigger in the work box and the crane operator such as a radio or whistle.

## Emergency plan

When using work boxes at height where there is a risk of a fall of more than two metres, an employer must ensure that emergency procedures are established in accordance with the OHS Regulations before the task is undertaken. The emergency procedures must, so far as is reasonably practicable, enable the rescue of an employee in the event of a fall, and the provision of first aid to an employee who has fallen, and can be carried out immediately after a fall.

There must also be means provided by which the persons being lifted or suspended can safely exit from the plant (work box) in the event of a failure in the normal operation of the plant (crane).

Instructions should also be available and understood by those with responsibilities for the operation of the crane manual-release mechanism that is to be used in the event of a power failure or malfunction.

## Information, instruction training or supervision

Information, instruction, training or supervision must be in place for the systems of work associated with the use of the work box. This should include that persons:

- hold the relevant High risk work licence class(es), and
- know how to undertake load tests, inspections of equipment, and the correct use of equipment such as fall arrest height safety equipment, emergency procedures, etc.

## Plant design registration

Certain plant designs must be design registered with WorkSafe or a corresponding Authority before it can be used in the workplace. This includes:

- work boxes suspended from cranes
- mobile cranes with a rated capacity greater than 10 tonnes
- tower cranes
- gantry cranes with a rated capacity of 5 tonnes
- bridge cranes with a rated capacity of 10 tonnes

A list of plant that must be design registered is contained in Schedule 2 of the OHS Regulations and in the Compliance code: Plant.

## Further information

### WorkSafe publications

Compliance code: Plant

Compliance code: Prevention of falls in general construction

Safe Work Method Statements

Working safely in the general construction industry: A handbook for the construction regulations

Major inspection of cranes, hoists and winches

### Australian Standards

AS 1418.1 – Cranes, hoists and winches – Part 1: General requirements

AS 1418.17 – Cranes (including hoists and winches) – Part 17: Design and construction of workboxes

AS/NZS 1891 – Industrial fall-harness systems and devices (series)

AS 2550.1 – Cranes, hoists and winches – Safe use – Part 1: General requirements

AS 4991 – Lifting Devices

AS/NZS 5532 – Manufacturing requirements for single point anchor devices used for harness-based working at heights devices

# Safe use of crane-lifted work boxes

## **European Standards**

EN13000 – Cranes. Mobile cranes

## **International crane stakeholder assembly**

Guidance – Lifting of Persons with Mobile Cranes,  
N003, (04,2016)

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