



CICA Position Paper

Deration of Cranes Used for Demolition Work

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1. Introduction

This CICA Position Paper outlines the definition of demolition work and requirements for operation of cranes used for demolition work. Refer to Demolition Code of Practice^[1] for risk management process, planning the demolition work, demolition methods and demolition of special structures.

2. Definition of Demolition Work

Demolition work means to **demolish** or **dismantle** a structure or part of a structure that is load-bearing or otherwise related to the physical integrity of the structure^[1] by pre-planned and controlled methods or procedures.

Alter, maintain, remodel or repair a structure (which requires demolition or dismantling part of a structure that is load bearing) is classed as demolition work.

Demolition work does not include^[1]:

- the dismantling of formwork, falsework, scaffolding or other structures designed or used to provide support, access or containment during construction work, or
- the removal of power, light or telecommunication poles.

A person conducting a business or undertaking who proposes to carry out any of the following demolition work must ensure that written notice is given to the regulator at least 5 days before the work commences^[2]:

- demolition of a structure, or a part of a structure that is load-bearing or otherwise related to the physical integrity of the structure, that is at least 6 metres in height
- demolition work involving load shifting machinery on a suspended floor, and
- demolition work involving explosives.

A demolition licence is required for a number of conditions that relate to the way demolition work is carried out, i.e., WorkCover Queensland requires a demolition licence to demolish or dismantle a structure that involves use of load shifting equipment (e.g. crane). Refer to individual State Authority requirements on notification of demolition work and demolition licence requirements.

If in doubt about whether work conducted is demolition work or not, contact State WorkSafe authorities to clarify before commencing work.

Cranes are used in demolition work for a number of purposes including:

- lifting and lowering plant and/or materials
- lifting and lowering personnel work boxes
- holding suspended loads, and
- swinging-ball demolition service

For different crane applications in demolition work, crane lifting capacity shall follow the operation rules specified in section 3.

3. Requirements for Deration of Cranes Used for Demolition Work

The use of cranes for demolition work requires the preparation of a Safe Work Method Statement (SWMS) before work commences. The crane manufacturer should be consulted for the use of the crane for special duties like demolition work. Appropriate type of high risk work licence is required according to the capacity and type of crane. Traffic management arrangements should be implemented to prevent collision with pedestrians or other mobile plant.

3.1 Lifting and Lowering Plant and/or Materials

Lifting products of demolition may be hazardous because the loads may be greater than assessed or may impose excessive dynamic loads on the crane. Additional crane rated capacity may be required based on the Design Factor applied.

3.1.1 Non Engineered Lifts

When the load to be lifted weight is not known the mass and dimension need to be calculated using rules of thumb, e.g. Concrete 2.5t/m³ Steel 7.8t/m³. This should be assessed by the rigger and operator and combined be comfortable that there assessment is as accurate as possible. Where there is no additional consulting engineering as a minimum a Design Factor of **2X Load** should be adopted. For Example, a 4t estimated load should have a crane capacity of at least 8t, plus hook block and rigging. Compromising this rule of thumb can mean the crane is insufficient.

3.1.2 Engineered Lifts

When a consulting engineer is engaged for lifts on a demolition / deconstruction site there are normally methods, section sizes, lift plans etc carried out, and consultation with crane crew/ company prior to lift being carried out. A minimum Design Factor of **1.5X Load** should be adopted. For Example, a 4t load means a crane capacity of 6t, plus hook block and rigging, is required. This margin is there as a consideration that a load could be caught or not quite cut through etc.

3.1.3 Returnable Lifts

Consideration should also be given to making loads returnable. Meaning additional support offered to put the load back to its original location, should weather conditions turn unfavourable, load exceeds estimated weights, outrigger pressures are exceeded, or crane SWL exceeded, etc. There are many ways to achieve this. Install seating cleats/ brackets / propping etc. Vee Cutting of steel structures to allow for load to sit and be re attached.

3.1.4 Precast Concrete

Never rely on existing installed lifting points. They have a limited lift life and are usually exhausted after installation. The condition of the lifting clutch retention bar in the concrete is impossible to determine. Core holes through panels at least 500mm below panel edge. This ensures cores are below the external ring reinforcing within the panel. Use short endless chain slings to sling loads. This minimises core hole size and allow protection of larger chain slings / Latchlok hooks from damage when laying panels down.

3.1.5 Trees

Trees are very difficult to assess as there are many variables to consider in determining mass and COG, e.g. density, tapering bows etc. Shock loading or static overloading of the crane can occur if the COG or mass are miscalculated. The rated capacity of the crane should be capable of **2X** the calculated load to allow for miscalculation.

3.2 Lifting and Lowering Personnel Work Box

Refer to AS2550.1, Section 6.19 for requirements for suspension of persons by crane [3].

3.3 Swinging-ball Demolition Service

The use of cranes with a swinging ball for demolition is not common. The use of a swinging ball for demolition shall be restricted to cranes designed for arduous duty, such as convertible dragline excavators [4].

A crane that has been used for swinging-ball demolition shall not be used for general lifting until it has been thoroughly inspected by a competent person and noted in the service records (logbook) to be in a satisfactory condition. When a crane is used for demolition duties, the cabin shall be fitted with a structure to protect against falling objects.

For guidance it is recommended that the mass of the demolition ball should be restricted to about 35% of the crane's safe working load based on the boom length and maximum radius of operation.

Recommended practice for swinging-ball demolition [5]:

- an anti-spin swivel should be used between the hoist rope and demolition ball attachment
- the supporting ropes should be of such a length or so restrained that it is not possible for the ball to swing against any structure other than the structure being demolished
- the crane should be selected and used in accordance with AS 2550 and the boom head should be not less than 3.0m above the height of the building to be demolished
- cranes with hydraulic telescopic booms should not be used with demolition balls
- demolition balls should not be used in proximity to power lines
- it should be noted that certain manufacturers do not recommend use of their cranes for demolition ball duties or may approve this only conditionally, such as with restriction in the technique to be followed, the maximum boom jib length to be used, and like requirements
- for a required ball mass and working height only a crane of excess capacity both in respect of working load and boom or jib length should be used
- the ball should be positively fixed in such a manner to prevent it becoming disconnected by slack in the load line or other causes. The hoist line and ball connections should be checked at least twice per day
- care should be taken that no part of the structure collapses on the ball possibly pulling the crane over
- only crane operators skilled in swinging-ball techniques should be used in this operation



4. Reference

- (1) Demolition Work Code of Practice, March 2015, Safe Work Australia
- (2) Work Health and Safety Regulation 2011
- (3) AS2550.1 (2011) Cranes, hoists and winches—Safe use, Part 1: General requirements.
- (4) AS2550.5 (2002) Cranes, hoists and winches—Safe use, Part 5: Mobile Cranes.
- (5) Demolition (Code of Practice No. 14, 1991) WorkSafe Victoria.

5. Further Information

This Position Paper contains summary information only and further information and a listing of CICA recognized Crane Engineers is available by contacting The Crane Industry Council of Australia:

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