



Cranes, hoists and winches—Safe use

Part 5: Mobile cranes



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- Australian Industry Group
- Australian Institute for Non-Destructive Testing
- Bureau of Steel Manufacturers of Australia
- Concrete Pumping Association of Australia
- Crane Association of New Zealand
- Department of Commerce, WorkSafe Division, WA
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Australian Standard®

Cranes, hoists and winches—Safe use

Part 5: Mobile cranes

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PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee ME-005, Cranes, to revise AS 2550.5—2002, *Cranes, hoists and winches—Safe use, Part 5: Mobile cranes*. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to ensure AS 1418.5 design requirements align with the *Work Health and Safety Act 2011* and the practices and safe use of mobile cranes.

Significant changes in this edition include the expansion of the requirements and guidance for maintenance, inspection and repair, and inclusion of guidance on dual hoist lifting.

This Standard is part of a series that provides uniform requirements and guidance for the safe use of cranes, including building maintenance units, hoists and winches.

Standards Australia uses the term ‘shall’ to indicate requirements that have to be met to be in compliance with the Standard in question. Compliance with this Australian Standard is not required by legislation in any Australian jurisdiction, unless the Standard has been specifically incorporated by an Act of regulation in the jurisdiction.

The Commonwealth, state and territory governments may choose to incorporate this Australian Standard into their work health and safety regulations. The exact manner of incorporation will determine whether the whole document is incorporated or whether specific sections or provisions of this Standard are incorporated. The manner of incorporation will determine which of the Standard’s requirements (‘shall’ statements) have been made a legal requirement in a jurisdiction. As a general principle, where an Australian Standard is incorporated by a regulation, the legal status of the Standard’s requirements and recommendations is made clear by the incorporation provisions of the regulation.

Jurisdictions may also choose to incorporate this Australian Standard (either in whole or in part) in an approved code of practice made under WHS law. The purpose of the approved code of practice is to provide practical guidance to persons on how to comply with their obligations under the enabling WHS Act, or regulations made under the Act.

Readers will need to refer to their jurisdiction’s approved codes of practice to determine which parts of this Australian Standard (if any) have been incorporated into codes of practice and the manner of incorporation.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

Published Standards in the series are as follows:

AS	
2550	Cranes, hoists and winches—Safe use
2550.1	Part 1: General requirements
2550.3	Part 3: Bridge, gantry, portal (including container cranes) and jib cranes
2550.4	Part 4: Tower cranes
2550.5	Part 5: Mobile cranes (this Standard)
2550.6	Part 6: Guided storing and retrieving appliances
2550.7	Part 7: Builders’ hoists and associated equipment
2550.10	Part 10: Mobile elevating work platforms
2550.11	Part 11: Vehicle-loading cranes
2550.13	Part 13: Building maintenance units
2550.15	Part 15: Concrete placing equipment

AS

2550.16 Part 16: Mast climbing work platforms

2550.19 Part 19: Telescopic handlers

2550.20 Part 20: Self-erecting tower cranes

AS/NZS

2550.9 Part 9: Vehicle hoists

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE.....	6
1.2 APPLICATION	6
1.3 REFERENCED DOCUMENTS.....	6
1.4 DEFINITIONS.....	6
1.5 INSTRUCTIONS.....	7
1.6 DESIGN REQUIREMENTS.....	7
SECTION 2 PLANNING	
2.1 GENERAL.....	8
2.2 PLANNING.....	8
2.3 MATTERS TO BE CONSIDERED	8
SECTION 3 SELECTION.....	10
SECTION 4 SITING	
4.1 GENERAL.....	11
4.2 CRANE STANDING.....	11
4.3 PROXIMITY HAZARDS AND VISIBILITY	12
4.4 ENVIRONMENTAL RESTRICTIONS.....	13
4.5 CLEARANCES	13
SECTION 5 ERECTION AND DISMANTLING	
5.1 CRANE STABILITY DURING ERECTION AND DISMANTLING PROCEDURES	14
5.2 COMMISSIONING	15
5.3 ADJUSTMENT OF OUTRIGGERS.....	15
SECTION 6 OPERATION	
6.1 GENERAL.....	16
6.2 TRAVELLING AND TRANSPORTATION	16
6.3 OPERATION NEAR AERIAL CONDUCTORS (OVERHEAD POWERLINES)	17
6.4 PILING SERVICE.....	24
6.5 LOAD RATING	24
6.6 PRECAUTIONS IN THE USE OF A TELESCOPIC BOOM CRANE.....	26
6.7 TRAVELLING WITH SUSPENDED LOADS (PICK AND CARRY).....	27
6.8 TORQUE CONVERTERS.....	33
6.9 GRAVITY LOWERING (FREE FALL).....	33
6.10 MULTIPLE HOIST OR CRANE OPERATION.....	33
6.11 ERECTION OF WIND TURBINE	34
6.12 VESSEL-MOUNTED MOBILE CRANES.....	34
6.13 HOOKS FITTED WITH SAFETY CATCH	36
SECTION 7 MAINTENANCE, INSPECTION AND REPAIR	
7.1 GENERAL.....	37
7.2 ROUTINE INSPECTIONS	37
7.3 MAJOR INSPECTION	37
7.4 INSPECTION PERSONNEL.....	40

SECTION 8 LIMITING, INDICATING AND DATA RECORDING DEVICES

8.1	INSPECTION, TESTING AND CALIBRATION	41
8.2	RECORDS.....	41
8.3	MAINTENANCE	41
8.4	OPERATING AND MAINTENANCE INSTRUCTIONS	41

APPENDICES

A	BASIC TERMINOLOGY AND FUNCTIONS OF TYPICAL MOBILE CRANES ..	42
B	EXAMPLE OF INSPECTION AND TESTING CERTIFICATE.....	43
C	EXAMPLE OF COMPETENT PERSONS FOR THE TYPE OF INSPECTION	46

STANDARDS AUSTRALIA

Australian Standard

Cranes, hoists and winches—Safe use

Part 5: Mobile cranes

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the safe use of mobile cranes as defined in AS 2549. It is complementary to AS 2550.1, but requirements given herein take precedence over the corresponding requirements in AS 2550.1.

The requirements in Clause 6.3 are not applicable to electrical supply organizations or their contractors where the electrical supply organization has issued alternative requirements.

The basic terminology and functions of typical mobile cranes are given in Appendix A.

1.2 APPLICATION

This Standard shall apply to the safe use of mobile cranes of the type specified in AS 1418.5. The requirements of AS 1418.5 shall apply and no requirements given herein shall circumvent the requirements of AS 1418.5.

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS	
1418	Cranes, hoists and winches
1418.5	Part 5: Mobile cranes
2549	Cranes (including hoists and winches)—Glossary of terms
2550	Cranes, hoists and winches—Safe use
2550.1	Part 1: General requirements
2759	Steel wire rope—Use, operation and maintenance
3600	Concrete structures
AS/NZS	
3000	Electrical installations (known and the Australian/New Zealand Wiring Rules)
ISO	
12480	Cranes—Safe use
12480-1	Part 1: General

1.4 DEFINITIONS

For the purpose of this Standard, the definitions given in AS 1418.5, AS 2549, AS 2550.1 and those below apply.

1.4.1 Competent person

A person who has acquired through training, qualification, experience or a combination of these, the knowledge and skill enabling that person to correctly perform the required task.

1.4.2 Crane operator

The person who operates the crane.

1.4.3 Crane inspector

A person with the necessary knowledge and experience to perform the specific crane inspection.

1.4.4 Pile extraction

An operation in which a device called an 'extractor', which is usually a reciprocating or vibratory type (and may be used either for driving or extraction of piles), strikes the pile upwards and breaks its adhesion, the force used to withdraw the pile being provided by the crane hoist rope from which the extractor is suspended.

1.4.5 Lift procedure

A document with the requirements of the crane and equipment used with the lift, the method of lifting and personnel involved in the lift.

1.4.6 Professional engineer

Any one or a combination of the following:

- (a) A person registered in a relevant area of practice on the National Professional Engineers Register.
- (b) Where applicable, a member of a scheme established under professional standards legislation in the relevant jurisdiction.
- (c) A Chartered Professional Engineer (CPEng).
- (d) Other person providing satisfactory evidence to a responsible authority that they have the qualifications and experience to be competent to independently perform the required tasks.

1.4.7 Shall

Indicates that a statement is mandatory for compliance with this Standard.

1.4.8 Should

Indicates a recommendation.

NOTE: Neither following nor ignoring a recommendation results in non-compliance with the Standard.

1.5 INSTRUCTIONS

Instructions shall be prepared, maintained and made readily available to the appropriate personnel, to ensure the safe use of the crane. Such instructions shall include the manufacturer's instructions, recommendations and specifications. Where any of these instructions, recommendations and specifications are not available from the manufacturer or are deemed inappropriate arising from safety or legislative or similar concerns, they shall be drawn up by a competent person. Instructions shall use procedures and provide outcomes that are in accordance with the requirements of this Standard.

1.6 DESIGN REQUIREMENTS

All mobile cranes shall be designed in accordance with AS 1418.5.

SECTION 2 PLANNING

2.1 GENERAL

The planning and application of crane requirements should commence as early as possible in the development of each project. Planning should include consultation with the crane manufacturer, proprietor, supplier, operator, designer, importer and agent.

Where ownership or the use of a crane has changed, the suitability of the crane for the operation it is to be involved in shall be assessed by a competent person.

2.2 PLANNING

The following planning activities, as a minimum, shall be carried out by a competent person(s):

- (a) The selection and safe use of the crane.
- (b) Travel and access requirements.
- (c) The assembly and erection of the crane.
- (d) That the supporting surface or structure is capable of supporting the crane for the anticipated duration of the job.
- (e) Appraising an existing crane for suitability for use (including freefall), and ensuring that the appraisal is carried out by a competent person.
- (f) Adequate competent personnel are available for all tasks.
- (g) Suitable equipment is available for the assembly and erection, maintenance, operation and dismantling of the crane.
- (h) Condition monitoring of the crane.
- (i) The maintenance, inspection and safe operation of the crane and rigging equipment.
- (j) The preparation, availability and maintenance of instructions for the assembly, operation, maintenance and inspection of the crane.
- (k) Emergency procedures for the evacuation of personnel from the crane.
- (l) Procedures to deal with all reasonably foreseeable emergency situations.
- (m) Assessing the site for proximity hazards, (see Clause 4.3.1).

Where cranes are required to operate in or near buildings or structures, crane loadings and access should be considered at the project design stage.

2.3 MATTERS TO BE CONSIDERED

At appropriate stages during planning, the following matters, as a minimum, shall be addressed, where applicable:

- (a) Lightning protection.
- (b) Appropriate earthing for the conditions (e.g. static electricity build up due to EMR or wind).
- (c) Site access and crane siting.
- (d) Safety of personnel.
- (e) Protection and safety of public.
- (f) Proximity of above- and below-ground services (e.g. power, gas and water).

- (g) Procedures for the setting up of the crane.
- (h) Procedures for lifting operations.
- (i) Selection of a mobile crane without freefall capability where freefall is not required, or otherwise provision of positive lockout of such features where they are also not required.
- (j) Procedures for the dismantling of the crane.
- (k) Selection of the personnel.
- (l) Communication system(s).
- (m) Weather conditions, (e.g. anticipated wind speeds, rainfall and temperature range).
- (n) Ground conditions.
- (o) Proximity of excavations.
- (p) Selection of lifting gear to the appropriate Australian Standard.
- (q) Personal protective equipment.
- (r) Emergency procedures.
- (s) The documentation of work procedures where the lifting operation is not of a routine type, (e.g. multiple crane lifting).
- (t) Consultation and coordination with other groups working in the area.
- (u) Lighting (e.g. for night operations).
- (v) Parking/storage facilities.
- (w) Access for servicing.
- (x) Interaction with people, plant and structures.
- (y) Provision of anti-collision systems.
- (z) Hazardous environments in which the crane may operate (e.g. explosive atmospheres).
- (aa) Water flow, including tides and floods.

Consideration should be given to obtaining the appropriate authorization that may be required (e.g. from local councils or electricity distributors).

SECTION 3 SELECTION

Before selecting a crane for a particular application, all relevant information shall be obtained and all relevant operational criteria shall be determined, which shall include, as a minimum, the following:

- (a) Mass, centre of gravity and physical characteristics of the load.
- (b) The mass of the lifting gear and other deductions from the rated capacity chart.
- (c) The location from which the load is to be lifted.
- (d) The location to which the load is to be placed.
- (e) The result of an appraisal of an existing crane, if applicable.
- (f) The maximum permitted forces on the supporting surface or structure.
- (g) Ground and site conditions.
- (h) Rated capacity of the crane.
- (i) The nature of the rigging or slinging to be used.
- (j) The movement limitations of the crane and the load.
- (k) The mechanism for controlling the luffing of the boom.
- (l) Other limitations of the crane.
- (m) Multiple crane lifting.
- (n) Working environment including explosive atmospheres, hazardous gases, corrosive atmospheres and ambient temperatures, including full speed operation against in-service wind load.
- (o) Preparation of a lift procedure where the lifting operation is not a routine type (e.g. multiple crane lifting).

SECTION 4 SITING

4.1 GENERAL

Where applicable, attention shall be given to the following factors:

- (a) Crane standing (see Clause 4.2).
- (b) Proximity hazards and visibility (see Clause 4.3).
- (c) Environmental factors, for example noise and noxious fumes (see Clause 4.4).
- (d) Clearances (see Clause 4.5).

4.2 CRANE STANDING

4.2.1 General

The loads imposed by the crane shall be assessed by a competent person to establish the ability of the crane standing or support structure for the duration of the job.

The loads imposed by the crane while in service, out of service, and during erection and dismantling, shall be obtained from the crane manufacturer or a competent person. The loadings shall include the combined effects of the following:

- (a) Dead loads arising from the mass of the crane (including any counterweight, ballasting or foundation, where appropriate).
- (b) Dead loads arising from the mass of the loads and any lifting attachment(s).
- (c) Dynamic forces caused by movements of the crane.
- (d) Wind loadings, resulting from wind speeds up to the maximum permitted, taking into account the degree of the exposure of the site.

A competent person shall assess the ground (including underground cavities and soft ground) or means of support to determine whether the crane can operate within the levels and other parameters specified by the manufacturer.

Loads shall not be imposed on any new concrete supporting structure until the structure has reached sufficient strength, as specified in AS 3600.

4.2.2 Wind load

All aspects of in-service and out-of-service wind loading, including the wind funnelling effects caused by adjacent building and structures, shall be assessed to determine the effect on the crane standing or support structure.

Limited operation, in conformance with manufacturer's recommendations, may be permitted at wind speeds exceeding 10 m/s. Loadings arising from such use shall not be considered additional to the requirements of AS 1418.5.

4.2.3 Working over cellars, ground cavities or underground services

The site shall be checked by competent person(s) for the presence of cellars, ground cavities, underground services, ducts and the like. Where the check reveals the presence of these, precautions shall be taken to ensure the stability of the crane and crane standing.

4.2.4 Excavations and embankments

Where a crane is required to work in the vicinity of an excavation or an embankment, the possibility of slip or collapse of the supporting surface shall be evaluated by a competent person. Where necessary, the excavation or embankment shall be reinforced.

4.2.5 Soft surfaces

A crane shall not be erected for operating on soft or waterlogged surfaces unless measures are taken to ensure crane standing is stable. Mats, steel plates, timber sleepers, a concrete raft or similar aids shall be used to distribute the operational loads under the support points of the crane, so that the bearing capacity of the supporting surface is not exceeded.

4.2.6 Riverbed, tidal or flood water areas

Precautions shall be taken to protect cranes that are required to stand in flowing water against specific hazards, such as scouring the surface around the crane. The effectiveness of the measures shall be monitored.

NOTE: The possibility of a crane being trapped by floodwater or by an incoming tide should be considered.

4.2.7 Working on structures

The structure of a bridge, a wharf, a jetty, a building or a suspended concrete slab shall be checked by a competent person to ensure that it is capable of withstanding the operational forces applied by a crane operating on it.

4.2.8 Outriggers

When outriggers are to be used, the site conditions shall allow for setting up of the outriggers to the manufacturer's specifications.

Where necessary, steel plates of the required strength or packing shall be placed under the outrigger footplates to ensure that the allowable bearing pressure under the footplate is not exceeded.

Frequent verification of the level of the crane from the level indicator and examination of the crane standing shall be made during the working day to ensure that there has been no movement that might affect the stability of the crane. Such verification shall be made immediately before and after lifting a load equal to or greater than 50% of the crane's rated capacity.

4.3 PROXIMITY HAZARDS AND VISIBILITY

4.3.1 Proximity hazards

Proximity hazards shall be assessed by a competent person. Proximity hazards include, but are not limited to, the following:

- (a) Overhead powerlines.
- (b) Nearby structures or other cranes.
- (c) Excavations.
- (d) Fixed hazards.
- (e) Personnel movement within the crane working area.
- (f) Mobile equipment movement within the crane working area.
- (g) Public access areas, including roadways, railways and rivers.
- (h) The effects of electromagnetic radiation (EMR) (e.g. busbars, strobe lights, induction furnaces or welding) on radio, infrared or electronic controls.
- (i) The vicinity of airfields and aircraft flight paths. Where necessary, aircraft warning lights shall be fitted to the highest part of the crane. The jib and boom sections shall be marked and operated in accordance with airport authority requirements.

4.3.2 Visibility

The crane should be sited in such a way that the crane operator always has optimum visibility of the working area.

4.4 ENVIRONMENTAL RESTRICTIONS

Precautions shall be taken against the effects of noise, exhaust gases, hydraulic fluids, lubricants, fuel, dust and other environmental pollutants emitted by the crane.

4.5 CLEARANCES

Where two or more cranes (including boom equipped plant) work within a site or share the same air space, procedures or anti-collision systems shall be established to maintain clearances that prevent contact between parts of the cranes and crane loads, except where multiple crane lifting is carried out in accordance with AS 2550.1. When cranes operate on adjacent sites and potentially share the same air space, procedures shall be formulated to ensure such clearances are maintained between the cranes.

SECTION 5 ERECTION AND DISMANTLING

5.1 CRANE STABILITY DURING ERECTION AND DISMANTLING PROCEDURES

Precautions shall be taken when erecting and dismantling a crane to ensure that the stability of the crane is maintained. Instructions for erection and dismantling as specified in Clause 1.5 shall be followed. The following items shall be addressed, as a minimum, where applicable:

- (a) Only parts and components meeting the manufacturer's specification shall be used.
- (b) Jointing pins shall be assembled so that they can be removed by a person standing on the outside of the assembly.
- (c) All outrigger jacks shall be fitted with foot plates according to manufacturer's instructions.
- (d) All outrigger jacks shall be fitted and adjusted in accordance with the operating instructions.
- (e) The correct amount of counterweight shall be fitted on the crane and at the appropriate location before the boom or jib is raised.
- (f) When the operating length of boom or jib is reduced, the specified counterweight shall ensure that the backward stability of the crane is not adversely affected.
- (g) Appropriate precautions shall be taken before a long boom is lowered to the ground level.

NOTE: Unless otherwise stated in the operating instructions, a long boom or jib should be erected or lowered with boom axis or jib axis in the longitudinal axis of the mounting (i.e. in the crane's most stable position). For a crawler mounted crane operating on a hard surface, packers may be placed under the ends of the crawler tracks, to reduce the tendency of the crane to rock when a long boom or jib is lowered to the ground level.

- (h) To maintain the best margin of stability when a long boom is raised or lowered to the ground level, the hook blocks shall be lowered and rested on the ground before the boom or jib is lowered.
- (i) Where timbers are used under outrigger footplates, they shall be sound graded timber and arranged so that successive layers are laid at 90° to each other (pig sty fashion) so that the top layer is in line with the outrigger arm (see Figure 5.1).
- (j) Timbers used under outrigger footplates shall be—
 - (i) square edged;
 - (ii) split less than ¼ of the length of the timber member;
 - (iii) rot free; and
 - (iv) have minimum dimensions of 200 mm width and 75 mm depth, unless specified by the crane manufacturer.
- (k) Engineered mats manufactured of steel, synthetic or composite materials shall be capable of supporting loads without excessive* bending and shear failure, or other deleterious effects.

* There are various limits set for different materials.