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AS 2550.15—1994

Australian Standard®

Cranes—Safe use

**Part 15: Concrete Placing
equipment**

This Australian Standard was prepared by Committee ME/5, Cranes. It was approved on behalf of the Council of Standards Australia on 4 May 1994 and published on 20 June 1994.

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Association of Consulting Engineers, Australia
Australian Chamber of Manufactures
Australian Institute of Building
Bureau of Steel Manufacturers of Australia
Construction and Mining Equipment Association of Australia
Crane Industry Council of Australia
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Cranes—Safe use

Part 15: Concrete Placing equipment

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PREFACE

This Standard was prepared by the Standards Australia Committee on Cranes. It covers specific requirements for the safe use of concrete placing equipment and is intended for use in conjunction with AS 2550.1, *Cranes—Safe use*, Part 1: *General requirements*.

This Part 15 of *Cranes—Safe use*, specifies the requirements which apply to concrete pumping equipment. Additional requirements are to be covered by subsequent parts.

Published Standards in the series are:

AS

- 2550 Cranes—Safe use
- 2550.1 Part 1: General requirements
- 2550.4 Part 4: Tower cranes
- 2550.5 Part 5: Mobile and vehicle—Loading cranes
- 2550.10 Part 10: Elevating work platforms
- 2550.15 Part 15: Concrete placing equipment (*this Standard*)

It is intended to publish the following parts:

- (a) Guided storing and retrieving appliances.
- (b) Builders' hoists and equipment.
- (c) Special purpose appliances.
- (d) Vehicle hoists.
- (e) Building maintenance units.
- (f) Mast work platforms.

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.

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CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE	4
1.2 REFERENCED DOCUMENTS	4
1.3 DEFINITIONS	4
SECTION 2 PLANNING	
2.1 GENERAL	5
2.2 MATTERS TO BE CONSIDERED	5
SECTION 3 SELECTION OF CONCRETE PLACING EQUIPMENT	6
SECTION 4 SITING	
4.1 GENERAL	7
4.2 CONFIGURATION (SET UP) OF CONCRETE PLACING EQUIPMENT	7
4.3 DELIVERY PIPELINES	8
4.4 ENVIRONMENTAL IMPACT FACTORS	8
4.5 ELECTRICAL SUPPLY	8
SECTION 5 PERSONNEL	
5.1 MANAGEMENT	9
5.2 EQUIPMENT OPERATORS	9
SECTION 6 ERECTION AND DISMANTLING	10
SECTION 7 OPERATION	
7.1 OPERATING INSTRUCTIONS	11
7.2 PRE-OPERATION CHECKS	11
7.3 HOUSEKEEPING	11
7.4 UNAUTHORIZED PERSONNEL	11
7.5 OPERATION	11
7.6 HIGHWAY TRAVEL	12
7.7 OPERATION NEAR AERIAL CONDUCTORS (OVERHEAD POWERLINES)	12
7.8 HAND SIGNALS	13
7.9 PIPELINE CLEANING PROCEDURE	13
7.10 CONCRETE HOPPER CLEANING	14
7.11 NOISE EXPOSURE CRITERIA	14
SECTION 8 MAINTENANCE, INSPECTION AND ASSESSMENT	
8.1 GENERAL	19
8.2 LOGBOOK	19
8.3 MAINTENANCE, INSPECTION AND RECORDS	19
8.4 PIPELINES	21
APPENDICES	
A MANDATORY WARNING AND SAFETY SIGNS	22
B ADVISORY WARNING AND SAFETY SIGNS	25
C NOISE LEVELS	27
D ACCIDENT TYPES	27
E CONCRETE PLACING EQUIPMENT LOGBOOK	27



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STANDARDS AUSTRALIA

Australian Standard
Cranes—Safe use

Part 15: Concrete placing equipment

S E C T I O N 1 S C O P E A N D G E N E R A L

1.1 SCOPE This Standard specifies requirements for the safe use of concrete placing equipment. The design, construction, testing and associated specific requirements of concrete placing equipment are given in AS 1418.15 and the general requirements are specified in AS 1418.1. This Standard is complementary to AS 2550.1, but the requirements herein shall take precedence over the corresponding requirements of AS 2550.1.

1.2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

1055	Acoustics—Description and measurement of environment noise
1055.2	Part 2: Application to specific situations
1171	Methods for magnetic particle testing of ferromagnetic products and components
1269	Acoustics—Hearing conservation
1418	Cranes (including hoists and winches)
1418.1	Part 1: General requirements
1418.15	Part 15: Concrete placing equipment
1554	Structural steel welding (known as the SAA Structural Steel Welding Code)
2207	Methods for the ultrasonic testing of fusion welded joints in steels
2452	Non-destructive testing—Determination of thickness
2452.3	Part 3: Use of ultrasonic testing
2549	Cranes—Glossary of terms
2550	Cranes—Safe use
2550.1	Part 1: General requirements
3000	Electrical installations—Building, structures and premises (known as the SAA Wiring Rules)
3012	Electrical installations—Construction and demolition sites
NOHSC (National Occupational Health and Safety Commission)	
1007	National Standard for occupational noise

1.3 DEFINITIONS For the purpose of this Standard, the definitions given in AS 2549 (substituting ‘concrete placing equipment’ for ‘mobile crane’) and those below apply.

1.3.1 Equipment operator—those persons responsible for the actual operation of the concrete placing equipment. This includes linesmen, boom and pump operators.

1.3.2 Supervision—is that part of management undertaken by a supervisor directing and overseeing the work of the person who is being supervised and who is able, insofar as is practicable, to respond promptly to emergency situations.

S E C T I O N 2 P L A N N I N G

2.1 GENERAL The planning and application of concrete placing equipment requirements should commence as early as possible in the development of any project.

Where concrete placing equipment will be required to operate in or near buildings or structures, then floor loadings, access and clearances should be considered at the project design stage.

Wherever practicable, the planning should include consultation with the supplier of the concrete and of the concrete placing equipment.

2.2 MATTERS TO BE CONSIDERED At appropriate stages during planning, the following matters shall be considered, where applicable.

- (a) Establishment of a management plan and risk assessment.
- (b) Selection of concrete placing equipment.
- (c) Site access and equipment siting.
- (d) Proximity of powerlines and other services.
- (e) Obtaining authorizations.
- (f) Requirements of regulatory authorities.
- (g) Protection and safety of public (see Appendices A and B).
- (h) Procedures for the setting up of the equipment, the pipelines and the pumping procedure.
- (i) Make up, selection and qualifications of the equipment crew, which could include—
 - (i) boom or pump operators;
 - (ii) linesmen;
 - (iii) observers; and
 - (iv) traffic controllers.
- (j) Communication system.
- (k) Weather conditions.
- (l) Ground conditions.
- (m) Proximity of excavations.
- (n) Personal protective equipment (see Clause 7.9(d) and Appendix C).
- (o) Emergency procedures.
- (p) Inspection, maintenance and repair.
- (q) Lightning protection.
- (r) Cleaning of equipment and containment, and disposal of waste.
- (s) Manual operations.
- (t) Accident types (see Appendix D).

SECTION 3 SELECTION OF CONCRETE PLACING EQUIPMENT

Before selecting concrete placing equipment for a particular operation, the following information shall be considered:

- (a) The amount of concrete to be placed.
- (b) Concrete mix design and quality assurance.
- (c) The concrete delivery height and distance.
- (d) Required location of concrete and access.
- (e) Clean out and disposal of waste requirements.
- (f) Site access and conditions.
- (g) Construction methods and sequence timing.

SECTION 4 SITING

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

- (a) Equipment standing (set up on site).
- (b) Access and proximity hazards.
- (c) Environmental factors.

4.2 CONFIGURATION (SET UP) OF CONCRETE PLACING EQUIPMENT When consideration is being given to the configuration (generally designated as the 'set-up') of the concrete placing equipment, attention shall be paid to the manufacturer's instructions and the following requirements:

- (a) A sufficiently large, clear, solid, level area to allow for the outriggers or stabilizers to be fully extended.
- (b) The equipment shall be set up level or at no greater angle than is permitted by the manufacturer as described in the boom pump operating manual.
- (c) Where fitted, outrigger/stabilizer pads shall be sufficiently clear of banks, soft or filled ground, or other obstacles liable to interfere with the safe operation of the machine.

If the ground is not firm or is near excavations, the operator shall ensure that the allowable bearing pressure of the ground is not exceeded by the loading on any outrigger/stabilizer and shall place, if necessary, suitable packing under the outrigger/stabilizer pads.

- (d) A careful investigation shall always be made to ensure that concrete placing equipment is not positioned over or adjacent to cellars, basements or inadequately compacted ground as might exist following demolition of buildings, backfilling of trenches or where other earth filling has taken place unless adequate precautions are taken to ensure the stability and safety of the concrete placing equipment.
- (e) Where the concrete placing equipment is to be set up on a structure or suspended floor, then a competent person shall ensure that the structure or suspended floor is adequate for the loads. This shall be certified.
- (f) The exclusion of unauthorized persons from the area by barricades or other suitable means. Exclusion areas include areas under or close to the boom and near the hopper.
- (g) The working area shall be safe from other traffic.
- (h) The concrete receiving hopper to be at such a height as to allow an adequate gravity flow of concrete into the hopper.
- (i) If more than one truck is required to approach the hopper at any one time, a spotter or traffic controller should be on hand to safely direct the movement of the trucks. No person shall stand between the reversing truck and the hopper.
- (j) All outriggers/stabilizers shall be fully extended unless the manufacturer specifies that operation is allowable with the outriggers/stabilizers at other than full extension. Any condition or limitations subject to such usage shall be observed. Instructions as to such usage shall be displayed.
- (k) Overhead power lines, underground services and other obstructions.

4.3 DELIVERY PIPELINES Concrete delivery pipelines shall be adequately secured to the building or structure with particular attention being given to the reaction forces, which may be considerable where high pump pressures are involved. The reaction blocks or mountings at changes of direction of pipelines shall be adequately designed to ensure that the delivery pipeline remains in place.

As a guide the following are the minimum sizes of pipeline steel support clamps:

- (a) On pipelines with a maximum of 5 floors of vertical run—
 - (i) clamps at a maximum of 3 m spacing; and
 - (ii) clamps to be formed with material 100 mm × 12 mm for base plate and clamp ring, with 2 (one each side) 16 mm clamping bolts and 2 × 20 mm fixing bolts to the floor or wall.
- (b) On pipelines with runs in excess of (a)—
 - (i) clamps at a maximum of 3 m spacing; and
 - (ii) clamps to be formed with material 150 mm × 12 mm for base plate and clamp ring, with 4 (two each side) 16 mm clamping bolts and 4 × 20 mm fixing bolts to the floor or wall.

All fixing bolts shall be either through bolts, cast in, chemical anchors or other fittings suitable for the application.

Pipelines should not be fixed to scaffolding, hoist towers, crane towers or formwork unless a proper engineering assessment has been carried out to determine the suitability of the structure to withstand the imposed load.

All quick-acting couplings shall be secured by a suitable safety locking device where—

- (i) air purging is used;
- (ii) pumping pressures exceeding 4 000 kPa are used;
- (iii) quick-acting couplings are used on boom pipeline; or
- (iv) quick-acting couplings are used on vertical pipelines.

4.4 ENVIRONMENTAL IMPACT FACTORS The environmental factors imposed by the concrete pumping process should be considered. These may include the following:

- (a) Noise.
- (b) Noxious fumes.
- (c) The satisfactory disposal of waste concrete and cleaning water.

4.5 ELECTRICAL SUPPLY Installation of the electrical supply shall be in accordance with AS 3000, AS 3012 and the relevant parts of AS 1418, as applicable.

S E C T I O N 5 P E R S O N N E L

5.1 MANAGEMENT Management's responsibilities shall be clearly understood. These should be written down as a policy statement and be readily available. A clearly defined policy enhances the effectiveness of the management's efforts to prevent accidents.

Management's responsibilities shall cover the following matters:

- (a) The control, planning and selection of concrete placing equipment.
- (b) Ensuring that sufficient qualified and trained personnel and suitable equipment are available for the operation.
- (c) The transportation and setting up of the equipment.
- (d) The operation of the equipment by competent and trained personnel under adequate instructions.
- (e) The inspection and maintenance of the equipment.
- (f) The preparation and maintenance of instructions for the assembly, operation, cleaning, inspection and maintenance of the equipment.
- (g) The provision and use of personnel protective equipment.
- (h) Risk assessment.

5.2 EQUIPMENT OPERATORS

5.2.1 Qualifications The qualifications of the equipment operators shall comply with all requirements of the relevant regulatory authority.

5.2.2 Authorization Each equipment operator shall be in possession of a certificate of competency, where applicable, and be authorized by a responsible representative of the equipment owner, or hirer, to operate the particular equipment.

5.2.3 Physical and mental fitness of operators The equipment operators shall not operate the equipment unless they are physically and mentally capable. In the event of an equipment operator becoming unwell when in control of a machine, they shall render the equipment out-of-service and report the situation to their supervisor.

5.2.4 Alcohol and drug usage Persons working with concrete placing equipment shall avoid the use of alcohol and drugs, which may have a detrimental effect on their performance.

5.2.5 Training Only trained and competent personnel shall be entrusted with the operation of concrete placing equipment. Operating personnel shall be given adequate specific training and supervised experience on the type of equipment to be used so as to become thoroughly competent in its use before being allowed or authorized to operate the equipment. Organizations operating concrete pumps shall formulate a training program to include all aspects that affect the safe working of the type or types of pump and ancillary equipment concerned. Most of the skills can only be fully developed on site, and a trainee operator shall work under supervision of a qualified person until qualified. An essential part of the training is the study of the operation and instruction manuals provided by the manufacturers and the owner's company training and instruction manuals.

SECTION 6 ERECTION AND DISMANTLING

Management shall provide in English a set of erection and dismantling instructions which shall incorporate the manufacturer's latest recommendations where available and shall clearly identify each item of equipment. These instructions shall be followed. Where the manufacturer's instructions are not available, suitable instructions shall be drawn up by a competent person. Any departure from the specified procedures may impose excessive loading on structural and mechanical parts. Adherence to the following is required:

- (a) Management's instruction book shall be available to the erection staff.
- (b) The erection or dismantling operation shall be supervised by a competent person.
- (c) The erection staff shall be familiar with the prescribed procedure.
- (d) The prescribed procedures for the assembly of components shall be followed in the correct order, using proper equipment and tools.
- (e) Only parts and components meeting the correct performance and strength requirements shall be used.

SECTION 7 OPERATION

7.1 OPERATING INSTRUCTIONS Management shall provide in English a set of operating instructions. These shall incorporate the manufacturer's latest recommendations where available and shall clearly identify each item of equipment.

These instructions shall be kept with the concrete placing equipment at all times. When manufacturer's instructions are not available, they shall be drawn up by a competent person.

The operating instructions shall be strictly followed by all operators.

7.2 PRE-OPERATION CHECKS Before commencing operations, the equipment operator or other authorized person, shall carry out routine checks in accordance with the operating instructions, which shall be sufficient to ensure the safe operation of the equipment. A typical check list is shown in Section 8.

Before operating the concrete placing equipment, the designated operator shall be satisfied that—

- (a) there are no unauthorized personnel on or about the equipment; and
- (b) the equipment is in a safe operating condition.

Where any adjustments or alterations are necessary to ensure the safe operation and function of the equipment, these shall be carried out by authorized personnel.

7.3 HOUSEKEEPING Each item of concrete placing equipment shall be kept as clean as is practicable. All working and access areas shall be kept clear.

7.4 UNAUTHORIZED PERSONNEL Unauthorized personnel shall not be allowed to approach concrete placing equipment when it is operating. Barricades or guarding shall be provided where necessary.

7.5 OPERATION The following items shall be observed:

- (a) A concrete placing boom shall not be used as a hoisting crane.
- (b) Where a concrete placing boom is to be connected to a fixed line, a flexible line shall be connected between the boom and the line to allow the boom to move under the reaction forces.
- (c) Concrete placing equipment in operation should not contact any fixed object.
- (d) Concrete placing equipment, either truck mounted or independently mounted, should never be operated in wind speeds exceeding those as allowed by the manufacturer.
- (e) Concrete placing equipment should not be operated during an electrical storm.
- (f) Where applicable, outriggers/stabilizers shall be fully extended and locked before unfolding the boom.
- (g) Outriggers/stabilizers shall be periodically checked for settlement or undue movement.
- (h) The operator should carry out periodic visual checks of the equipment.
- (i) The operator should pay attention to unusual noises and take appropriate action.

When a line hand is controlling the drop hose, the boom operator shall not move the boom unless instructed to do so by the line hand controlling the drop hose.