

Australian Standard[®]

Cranes, hoists and winches

Part 8: Special purpose appliances



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- Association of Consulting Engineers Australia
 - Australian Industry Group
 - Australian Institute for Non-destructive Testing
 - Bureau of Steel Manufacturers of Australia
 - Construction and Mining Equipment Association of Australia
 - Crane Industry Council of Australia
 - Department for Administrative and Information Services (South Australia)
 - Department of Consumer and Employment Protection, WorkSafe Division (WA)
 - Department of Industrial Relations (Qld)
 - Department of Infrastructure, Energy and Resources (Tasmania)
 - Department of Labour New Zealand
 - Institution of Engineers Australia
 - State Chamber of Commerce
 - Victorian WorkCover Authority
 - WorkCover New South Wales
-

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STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 1418.8–2008

Cranes, hoists and winches

Part 8: Special purpose appliances

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Technical Committee ME-005 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

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NOTES

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Part 8: Special purpose appliances

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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 supersede AS 1418.8—2002.

The objective of this Standard is to provide requirements for special purpose appliances for reference by manufacturers, suppliers, users and regulators.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

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STANDARDS AUSTRALIA

Australian Standard Cranes, hoists and winches

Part 8: Special purpose appliances

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for appliances used for the hoisting of materials or materials and personnel involved in lifting the materials that are not covered by other parts of AS 1418. It is complementary to AS 1418.1 but requirements given herein take precedence over corresponding requirements in AS 1418.1.

NOTES:

- 1 General guidance on the safe use of the appliances covered by this Standard is given in AS 2550.1.
- 2 Requirements for appliances intended to support work platforms are given in AS 1418.10.

1.2 NORMATIVE REFERENCES

The following documents are indispensable to the application of this Standard:

NOTE: Documents referenced for informative purposes are listed in the Bibliography.

AS

- | | |
|--------|--|
| 1000 | The international system of units (SI) and its application |
| 1101 | Graphic symbols for general engineering |
| 1101.1 | Part 1: Hydraulic and pneumatic systems |
| 1210 | Pressure vessels |
| 1418 | Cranes, hoists and winches (all parts) |
| 1657 | Fixed platforms, walkways, stairways and ladders—Design, construction and installation |
| 1735 | Lift, escalators and moving walks (all parts) |
| 2549 | Cranes (including hoists and winches)—Glossary of terms |
| 2550 | Cranes, hoist and winches—Safe use |
| 2550.1 | Part 1: General requirements |
| 2752 | Preferred numbers and their use |
| 4024 | Safety of machinery (series) |
| 4772 | Earth-moving machinery—Quickhitches for excavators and backhoe loaders |

AS ISO

- | | |
|------|--|
| 1000 | The international system of units (SI) and its application |
|------|--|

ISO

- | | |
|------|---|
| 7000 | Graphical symbols for use on equipment—Index and synopsis |
| 8643 | Earth-moving machinery—Hydraulic excavator and backhoe loader boom-lowering control device—Requirements and tests |

ISO

10567 Earth-moving machinery—Hydraulic excavators—Lift capacity

EN

60204 Safety of machinery—Electrical equipment of machines

60204-1 Part 1: General requirements

VSB6 National Code of Practice for Heavy Vehicle Modifications

1.3 DEFINITIONS

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

1.3.1 Platform hoist

A fixed hoist, fitted with a platform, intended to serve two levels that raise and lower in the vertical plane, but does not include hoists covered by other parts of AS 1418, and wheelchair lifts and other lifts covered by the AS 1735 series.

NOTE: Platforms hoists are intended to primarily lift loads and may accommodate personnel for the purposes of attending the loads.

1.3.2 Side-boom pipelayer (SBP)

A crane, intended for use in on-site pipelaying operations, comprised of a wheeled or crawler type vehicle or similar unit to the side of which is attached a boom, which may pivot about its connection to the host frame. A hoisting mechanism is attached to raise and lower both boom and lifted loads.

1.3.3 Tool carrier

A wheeled loader with a fixed-length loader arm, usually incorporating a quick coupler, to which can be fitted a variety of attachments.

NOTE: A telescopic handler is not a tool carrier, although they are sometimes called this.

1.4 EXPRESSION OF PERFORMANCE

1.4.1 Load rating of appliance

The rated capacity (hoisting) shall be expressed either in tonnes, or for values less than 1 t, in kilograms.

1.4.2 Range of hoisting

The nominal range of hoisting expressed in metres.

1.4.3 Working velocities

For power-operated appliances, the nominal working velocities shall be expressed in metres per second.

1.5 NEW DESIGNS OR INNOVATIONS

This Standard does not preclude the use of designs, material, methods of assembly, procedures and the like, which do not comply with a specific requirement of this Standard, or are not mentioned in it, but which can be shown to give equivalent or superior results to those specified. Where there is a variation from the specifications in this Standard, the variation shall be identified and the means used to ensure an equivalent or superior level of safety and performance shall be proven by calculation or testing, or a combination of calculation and testing.

SECTION 2 GENERAL REQUIREMENTS FOR DESIGN

2.1 DESIGN

2.1.1 Basis of design

2.1.1.1 *General*

The structural and mechanical design, including assessment of loading, material selection and limitations of stress, deflection and fatigue loading, shall be carried out in accordance with AS 1418.1 and shall take into consideration the loads and load combinations specified in the appropriate section of this Standard.

2.1.1.2 *Risk assessment*

A risk assessment shall be undertaken before completing the design and manufacture of the appliance and the attachments that can be fitted to it. The risk assessment shall take into account the structural and operational requirements the appliance is being designed for. The assessment shall be in writing.

2.1.1.3 *Mechanisms*

The design of the appliance mechanisms shall comply with the requirements of AS 1418.1 for appliance mechanisms, on the following basis:

- (a) Manually operated—strength basis only.
- (b) Power-operated—
 - (i) strength basis; and
 - (ii) life (fatigue or wear, or both).

2.1.1.4 *Design for strength*

The design for strength of the appliance shall comply with the requirements of—

- (a) AS 1418.1 for appliance loads; and
NOTE: For manually operated mechanisms, the design may be based on static loading, that is, the dynamic factors specified in AS 1418.1 need not be applied.
- (b) AS 1418.1 for appliance mechanisms, provided they are capable of withstanding tests in accordance with Clause 2.6.3 (for manually operated appliances) and Clause 2.6.4 (for power-operated appliances).

2.1.1.5 *Design for life*

The mechanism of a power-operated appliance shall be designed for a minimum life of 10 years, which shall be determined by the operating time and the load condition applied during that operating time.

2.1.1.6 *Lubrication*

Unless materials with inherent lubricating properties are used, the design of the appliance shall ensure that all moving parts can be effectively lubricated.

2.1.2 Manual operating effort

The operating effort necessary to handle the rated capacity of a manually operated appliance shall be not greater than the appropriate value given in Table 2.1.2. In applying Table 2.1.2, cognizance shall be taken of the frequency of use and associated ergonomic issues. For drum type appliances, the design working load shall include the maximum mass of rope that is capable of being wound on the drum.

Crank handles shall have an operating radius not greater than 400 mm.

TABLE 2.1.2
MANUAL OPERATING EFFORT

Type of operating mechanism	Maximum manual operating effort N
Crank handle	250
Endless chain	500
Lever, horizontally operated	300
Lever, vertically operated	400

2.1.3 Classification of appliance

The classification of the appliance shall be in accordance with the requirements of AS 1418.1, and the guidance on selection provided in the relevant appendix therein, except that the number of operating cycles shall be determined by consideration of typical applications for a nominal life of 10 years.

NOTES:

- 1 Model type appliances generally have a group classification based on load condition 0. For more arduous applications, a higher group classification and load condition requiring fatigue analysis may be necessary.
- 2 Guidance on selection is given in AS 1418.1 for typical crane application classification.
- 3 The structural design life specified in AS 2550.1 is quoted as 25 years. This Standard nominates a 10 year design life.

2.1.4 Deflection

Deflections shall be limited so as to maintain the structural and service integrity of the appliance. Consideration shall be given to deflections under all conditions of loading that result in—

- (a) lateral movement of the platform or guides;
- (b) stress fluctuations in appliance structure connections;
- (c) misalignment of or interference between parts of the appliance; and
- (d) cyclic vibration and related movements.

NOTE: For guidance, refer to AS 3990 or AS 4100.

2.1.5 Braking mechanism

The braking mechanism shall incorporate a brake to safely control the vertical movement of the load and to bring it to rest. Where the mechanism is of the positive-drive type, the brake shall apply automatically when the power source to the driving mechanism is de-energized.

Where failure of a coupling would render the braking systems (including safety brake) ineffective, the brake shall be located on the load side of the coupling.

2.1.6 Drive isolation

Means shall be provided to isolate each drive, whether electrical, hydraulic, pneumatic or mechanical, to prevent operation by unauthorized personnel.

2.1.7 Guardrailings

Where required, guardrailings shall comply with relevant requirements of AS 1657.

2.2 COMPONENTS

2.2.1 General

Critical fastenings and elements used to connect and assemble components and parts shall be designed and fitted so as to prevent, by positive means, the development of slackness, which may cause displacement.

NOTE: For the purpose of this Clause 'critical' is intended to mean a condition of reduced safety created by the consequent loss in controllability of motion or load, or abnormal wear in load-sustaining parts.

2.2.2 Steel wire rope and chains

The design factor on steel wire ropes shall be not less than 5 and on chains shall be not less than 6. For platforms intended to support personnel, the design factor shall be not less than 10.

2.3 ELECTRICAL EQUIPMENT AND CONTROLS

Electrical equipment and controls that are incorporated in appliances shall comply with the relevant requirements of AS 1418.1 and, where applicable, specific requirements appropriate to particular types of appliances specified in this Standard.

2.4 PNEUMATIC EQUIPMENT AND CONTROLS

Pneumatic equipment and controls that are incorporated in appliances shall comply with the relevant requirements of AS 1418.1 and, where applicable, specific requirements appropriate to particular types of appliances specified in this Standard.

2.5 HYDRAULIC EQUIPMENT AND CONTROLS

Hydraulic equipment and controls that are incorporated in appliances shall comply with the relevant requirements of AS 1418.1 and, where applicable, specific requirements appropriate to particular types of appliances specified in this Standard.

2.6 TESTING

2.6.1 General

The quality of design of each type model shall be verified by a type test (see Clause 2.6.2). The type test shall be conducted on one or more production units.

2.6.2 Type test

Each type model of appliance shall be subjected to the tests prescribed in Clause 2.6.3 for manually operated appliances or Clause 2.6.4 for power-operated appliances.

Manually operated appliances that have been subjected to type tests shall not be used or offered for use.

2.6.3 Type tests for manually operated appliances

Manually operated appliances shall be subjected to the following tests:

- (a) A test load equal to the rated capacity shall be applied to the appliance and shall be hoisted, in a manner similar to that used in normal practice, through the full range of hoisting including the functioning of all operational and safety devices.

An appliance shall be considered to have passed this test, if it hoists, arrests, and sustains the various test loads in any working position within the range of hoisting without visible or measurable permanent distortion.

- (b) A test load equal to twice the maximum rated capacity shall be applied to the appliance and shall be hoisted through a distance sufficient to rotate the slowest moving part through not less than one complete revolution, without any part or component of the appliance showing signs of permanent distortion or the appliance becoming inoperative.

2.6.4 Type test for power-operated appliance

Power-operated appliances shall be subjected to a test load equal to 1.25 times the rated capacity. The test load shall be operated through the range of hoisting.

An appliance shall be considered to have passed this test if it hoists, arrests, and sustains the various test loads in any working position within the range of hoisting without visible or measurable permanent distortion.

2.6.5 Operational test

Every appliance shall have applied to it a test load equal to the rated capacity. The test load shall be operated through the range of hoisting. This test shall include the functioning of all operational and safety devices of the appliance.

NOTES:

- 1 For large appliances, this test may take the form of a commissioning test.
- 2 Guidance for commissioning inspections for platform hoists and tip trucks is given in Appendix A.

2.7 MARKING

The marking of each type of appliance shall be as specified in the appropriate section of this Standard.

Marking shall be in the English language, and values shall be in SI units, in accordance with AS ISO 1000.

2.8 TEST RECORDS

Test records shall be maintained and shall include the following information about each appliance:

- (a) Type model identification.
- (b) Serial number.
- (c) Description.
 - (i) Classification of appliance.
 - (ii) Classification of mechanism of appliance, where powered.
- (d) Rated capacity hoisting.
- (e) Test load applied.
- (f) The name and address of the manufacturer, the name and status of the signatory, and the date of issue of the records.

2.9 OPERATION AND MAINTENANCE INSTRUCTIONS MANUALS

Operation and maintenance instruction manuals shall be provided and shall be in accordance with AS 1418.1.

SECTION 3 GENERAL PLATFORM HOISTS

3.1 SCOPE OF SECTION

Together with Sections 1 and 2, this Section specifies requirements for platform hoists. It is complementary to Sections 1 and 2 of this Standard but requirements given herein take precedence over any corresponding requirements in those Sections.

NOTE: Examples of typical hazards associated with hoists are listed in Appendix B.

3.2 TYPES

Platform hoists shall include—

- (a) tailgate hoists;
- (b) guided platform hoists laterally restrained by guides;
- (c) unguided platform hoists with the lateral restraint provided by the hoist structure; and
- (d) platform hoists, guided or unguided, fully enclosed within a shaft, serving two fixed levels.

Platform hoists shall not include wheelchair lifts or lifts intended to be used by the public.

3.3 LOAD RATING

Each platform hoist shall be rated in terms of—

- (a) classification (see Clause 2.1.3);
- (b) rated capacity, in kilograms or tonnes and, where personnel are permitted to ride on the platform, the number of personnel; and
- (c) for power-operated hoists, hoisting velocity (raising and lowering), in metres per second.

3.4 LOADS

3.4.1 Rated capacity

The rated capacity shall be the maximum mass that may be raised and lowered by the platform hoist, as appropriate, and for which the platform hoist is designed.

Where personnel are permitted to ride on or access the platform, the rated capacity shall include an allowance of 110 kg per person and a minimum of 40 kg for equipment above the stated rated capacity for the goods.

3.4.2 Gravitational loads

Gravitational loads shall be the gravitational forces due to each part of the platform hoist, supporting structure and other similar forces applied to the platform hoist or part of platform hoist under consideration.

3.4.3 Inertial loads

Inertial loads shall be the inertial forces due to the acceleration or deceleration of moving parts of the platform hoist and its load. Inertia forces shall be determined in accordance with the relevant requirements of AS 1418.1.

3.4.4 Additional loads

Forces arising from wind pressure acting on the hoist, thermal effects and other incidental loadings shall be determined in accordance with the relevant requirements in AS 1418.1.

3.5 LOAD COMBINATIONS

The platform hoist and platform hoist-supporting structure shall be designed to withstand the application of the vector combination of the loadings specified in Table 3.5 which produce the highest stress condition in the part of the platform hoist or platform hoist-supporting structure under consideration.

TABLE 3.5
COMBINATIONS AND VALUES OF LOADINGS

Load type	Description of load	Load symbol	Loading values			
			In-service		Out-of-service	
			Without wind	With wind		
			1	2	3	4
Principal load	Dead load	P_{GS}	P_{GS}	P_{GS}	P_{GS}	P_{GS}
	Hoisted load	P_D	ψP_D	$0.9 \psi P_D$	—	—
Additional loads	Wind forces—In-service wind load	P_{IW}	—	$0.9 P_{IW}$	—	—
	Wind forces—Out-of-service wind load	P_{OW}	—	—	$0.9 P_{OW}$	—
Special loads	Erection and commissioning forces	P_x	—	—	—	$0.75 P_x$
	Testing forces	P_{TG}	—	—	—	$\frac{1 + \psi}{2} \times P_{TG}$

NOTES:

- 1 ψ is the hoisting factor (see AS 1418.1).
- 2 General load combinations are tabulated in AS 1418.1.

3.6 DESIGN AND CONSTRUCTION

3.6.1 Platform

3.6.1.1 Floor loading

The platform hoist shall be designed to withstand each of the following loadings separately (including inertial effects):

- (a) The gravitational effect of the rated load of the platform hoist uniformly distributed over each half of the floor area (i.e., front half, rear half, side halves).

Where a tailgate platform is enlarged to enable the tailgate to close off the opening in the body of a vehicle, the 'No load zone area' on the tailgate shall be determined and clearly marked and maintained.

The floor area as defined in this Clause shall equal the 'Total platform floor area' less the 'No load zone area' but not be less than or 65% of the 'Total platform floor area'. The 'No load zone area' shall be capable of supporting personnel in accordance with Clause 3.4.1.

- (b) The gravitational effect of the largest concentrated load which the platform hoist is intended to handle but not less than 1500 N.

3.6.1.2 Platform-sill loading

The platform sill shall be designed to withstand each of the following loadings separately (ignoring inertial effects):

- (a) The gravitational effect of 25% of the rated load of the platform hoist concentrated at the centre of the sill.
- (b) The gravitational effect of the largest concentrated load which the platform hoist is intended to handle but not less than 1500 N.

3.6.1.3 Clearance around platform

The maximum clearances at landing sills shall be 30 mm.

NOTE: A flap may be required at landing sills (e.g. where trolleys or pallet lifters are used).

Where the sides of the platform in a shaft are not enclosed (e.g. by a wire mesh or solid panel), the clearances between the platform and the enclosure shall be a maximum of 20 mm and the walls of the shaft shall be relatively smooth and free of sharp edges which could snag the load during movement of the platform.

3.6.1.4 Limitation of tilt and sway

The platform shall not tilt more than 2° from the horizontal under the most severe loading condition. Stops shall be provided, where necessary, to keep wheeled loads stable on the platform.

The hoist base shall be anchored in a permanent manner and any horizontal swaying of the platform shall be limited to an amplitude of 1% of the extended height.

3.6.2 Drive mechanism

3.6.2.1 General

The velocity of a platform hoist in both directions shall not exceed 0.1 m/s and shall be fitted with an audible and visual alarm for warning persons during the lowering operation, except where one of the following conditions apply:

- (a) The platform is fitted with a non-flexible skirt or apron, in which case the velocity shall not exceed 0.17 m/s where personnel may ride the platform hoist, or 0.4 m/s for platform hoists not designed to accommodate persons during the hoisting operation.
- (b) The platform is enclosed in a well or enclosure, in which case the velocity shall not exceed 0.17 m/s where personnel may ride the platform hoist, or 0.4 m/s for platform hoists not designed to accommodate persons during the hoisting operation.

3.6.2.2 Rope-reeving system

Platform hoists supported by a rope-reeving system shall comply with the following minimum requirements:

- (a) The rope-reeving system of each platform hoist-driving mechanism shall comply with AS 1418.1.
- (b) The rope diameter shall be not less than 8 mm.
- (c) Except where the rope is attached to a drum, rope terminations shall be effected by hand splicing, a swaged ferrule or wedge-type socket.
- (d) Bulldog grips or metallised sockets shall not be used to terminate hoist ropes.
- (e) Means shall be provided to automatically sustain the platform and load at the upper level independent of the hoisting medium. The lower operating level shall be limited by fixed stops.