

AS 4324.1:2025



Mobile equipment for continuous handling of bulk materials

Part 1: General requirements for the design of steel structures



AS 4324.1:2025

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The following are represented on Committee ME-043:

- Australian Industry Group
- Australian Steel Institute
- Engineers Australia
- Minerals Council of Australia
- SafeWork NSW Agency
- The Australasian Institute of Mining & Metallurgy
- The University of Sydney
- University of Newcastle
- University of Wollongong
- Weld Australia
- Western Sydney University

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Australian Standard®

Mobile equipment for continuous handling of bulk materials

**Part 1: General requirements for the design of
steel structures**

Originated as AS 4324.1:1995.
Previous edition AS 4324.1:2017.
Third edition AS 4324.1:2025.

How to read this Standard

This page explains the meaning of the language and structure of this Standard.

Refer to Standards Australia's [Standardisation Guide 006](#) for more details about drafting rules.

Australian and Australian/New Zealand Standards are voluntary unless they are referenced in legislation or called up in contracts.

Requirements

To conform to a Standard, all requirements in the Standard need to be met.

A requirement is any statement in the Standard which uses the word "shall".

Recommendations, permissions and possibilities

The following words are commonly used in Standards, but statements using them do not have to be followed to conform to the Standard:

- (a) "should" means that something is recommended.
- (b) "may" means that something is permitted.
- (c) "can" means that something is possible.

Structure of Standards

A Standard always has the following parts:

- (i) The Preface states who developed the Standard, what the Standard is aiming to do, and how it relates to other documents.
- (ii) The Scope states what the Standard is about, what it covers and what it does not cover.
- (iii) The Normative references clause lists other documents that are referenced in the Standard as part of requirements.
- (iv) The Terms and definitions clause defines important terms to help with understanding the Standard.

A Standard may also include other parts, such as the following:

- (1) A normative appendix sets additional requirements that need to be conformed to.
- (2) An informative appendix provides additional information or guidance. They usually do not contain requirements. If an informative appendix does contain requirements, the Standard will explain when those requirements apply.
- (3) A Bibliography lists documents referenced in the Standard but not as part of requirements.

Many Standards include notes. Notes provide recommendations and/or guidance only. They never contain requirements.

Preface

This Standard was prepared by the Standards Australia Committee ME-043, Bulk Handling Equipment, to supersede AS 4324.1:2017.

The objective of this document is to provide requirements for the design of steel structure for bulk handling equipment.

The major changes in this edition are as follows:

- (a) [Section 2](#) Materials has been simplified to allow greater automatic acceptance of steel procured in conformance to AS 4100 or AS/NZS 5100.6. Testing requirements for when this is not the case have been provided.
- (b) Introduction of a new load case at [Clause 3.4.2](#), W_s , termed “stranded from tiedown”. This load case addresses several instances experienced by industry where uncontrolled motion and damage of machines has been caused by rapidly approaching local storm events.
- (c) Introduction of a new load case at [Clause 3.5.14](#), BL, termed “loss of chutes/telescopic chutes”. This load case addresses several instances experienced by industry where chutes on shiploaders have been lost from their booms.
- (d) Additional clarification and minor improvements to loading requirements in [Section 3](#).
- (e) Further clarification and modifications of resistance to drifting requirements in [Clause 4.2](#).
- (f) Variation of the modified yield value to be used for structural design in [Clause 5.3](#).
- (g) Additional clarification and minor improvements to the use of the structural design rules in [Section 5](#).
- (h) Modification and simplification of the tensile safety factors required for ropes, straps, stays and hydraulic cylinders in tension in [Clause 5.7.5](#).
- (i) Introduction of minimum buckling factors for hydraulic cylinders in compression in [Clause 5.7.7](#).

Explanatory notes on the drafting of this document are given in [Appendix A](#).

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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Introduction

This document is the third revision of AS 4324.1.

The development of the first edition of this Standard in 1995 was based largely on the German Code for structural design, BG—1986 Regulations, *Calculations and dimensioning of large machines in open cuts*, and the International Standard ISO 5049-1:1994, *Mobile equipment for continuous handling of bulk materials, Part 1: Rules for the design of steel structures*, but included a number of variations to provide coverage of a more comprehensive range of machinery and loading conditions.

The 2017 edition provided greater clarity in loading requirements and greater simplicity in the prescription of structural design requirements. More emphasis was placed on specifying design requirements that are specific to the machine, and the recognition that effective controls, protective devices systems and load limiting devices play an integral part in the operation and limitation of applied loading to structures of this type. Duplication of requirements for structural materials and design rules was avoided where possible by direct reference to established Australian or International Standards. Following structural reliability analyses, the strength limit state approach was also modified to accommodate the load factor (per primary load case) and resistance design/partial safety factor approach. The preferred method of structural design is a subject for agreement between the purchaser and the supplier or prescription via the technical specification.

This edition continues the development of the Standard to recognize and refine the requirements to contemporary circumstances.

Committee ME-043 recognizes that some load cases are based on general industry knowledge and other international precedents. For future revisions of specific values in certain clauses, coordinated field-testing or a significant level of research across a wide variety of machines and materials is likely to be required.

Australian Standard®

Mobile equipment for continuous handling of bulk materials

Part 1: General requirements for the design of steel structures

Section 1 Scope and general

1.1 Scope

This document specifies general requirements, design loads and specific requirements for the design of structures of mobile equipment for continuous handling of bulk materials, including appliances and machines that are intended to carry out similar functions (e.g. excavators, stackers, reclaimers, ship loaders, ship unloaders, belt wagons, sizing rigs and spreaders).

This document may be applied to the design of stationary equipment that is similar to mobile equipment in this document.

It is not intended that this document be applied to the following equipment, but it may be applied to parts of such equipment:

- (a) Feeders, fixed conveyors, bucket elevators and storage structures with through flow of materials.
- (b) Intermittent operation bulk handling equipment (i.e. equipment that handles or excavates material on a cyclic basis, such as draglines and power shovels).

NOTE Explanatory notes on the drafting of this Standard are given in [Appendix A](#).

1.2 Application

This document shall be used for the design of new structures of mobile equipment for continuous handling of bulk materials. This document should be used as part of a risk assessment process for evaluation of existing machine structures for continued use, upgrade or modification, including machines designed to this document.

The application, omission, or variation of the requirements of specific clauses of this document shall be documented in a technical specification (see [Clauses 1.4.38](#) and [1.8](#)), subject to the requirements of this document.

Specified omission or reduction of the requirements of this document shall only occur following assessment of the risk of that load case occurring. The risk assessment shall include the assessment and documentation of the effectiveness of the controls and protections that will be implemented to prevent the situation occurring and the consequences if the event occurs. This risk assessment shall be documented with justifications provided as technically and practicably valid. Refer to AS/NZS ISO 31000.

[Appendix B](#) provides the information that shall be established within a technical specification for supply of a machine.

1.3 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

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

AS 1170.4, *Structural design actions, Part 4: Earthquake actions in Australia*

AS 1418.1:2002, *Cranes, hoists and winches, Part 1: General requirements*