AS 5221.1:2021

Australian STANDARD®

STANDARDS Australia

Cranes — Design principles for loads and load combinations

Part 1: General (ISO 8686-1:2012, MOD)

AS 5221.1:2021

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The following are represented on Committee ME-005:

Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Institute for Non-Destructive Testing
Better Regulation Division (Fair Trading, Safework NSW, Testsafe)
Bureau of Steel Manufacturers of Australia
Crane Industry Council of Australia
Department of Regional NSW
Elevating Work Platform Association of Australia
Engineers Australia
National Heavy Vehicle Regulator
Office of Industrial Relations, Qld
Transport for NSW
Victorian WorkCover Authority (WorkSafe Victoria)
WorkSafe Division — Department of Mines, Industry Regulation and Safety (DMIRS) WA

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First published as AS 5221.1:2021.

Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee ME-005, 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 establish general methods for the calculating loads and principles to be used in the selection of load combinations for proofs of competence in accordance with AS 5224 for the structural and mechanical components of cranes as defined in ISO 4306.1.

This Standard provides for two distinct kinds of application —

(a) the general form, content and ranges of parameter values to facilitate development of load and load combinations in standards for specific types of cranes; and

(b) a framework for agreement on loads and load combinations between a designer or manufacturer and a crane purchaser for those types of cranes where specific standards do not exist.

This Standard is an adoption with national modifications and has been reproduced from ISO 8686-1:2012, *Cranes — Design principles for loads and load combinations — Part 1: General*. The modifications are additional requirements and are set out in Appendix ZZ, which has been added at the end of the source text.

Appendix ZZ lists the variations to ISO 8686-1:2012 for the application of this Standard in Australia.

As this Standard is reproduced from an International Standard, the following applies:

(i) In the source text “this part of ISO 8686” should read “this Australian Standard”.

(ii) A full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendix or annex to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 8686-1 was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 10, *Design — Principles and requirements*.

This second edition cancels and replaces the first edition (ISO 8686-1:1989), which has been technically revised.

ISO 8686 consists of the following parts, under the general title *Cranes — Design principles for loads and load combinations*:

— *Part 1: General*

— *Part 2: Mobile cranes*

— *Part 3: Tower cranes*

— *Part 4: Jib cranes*

— *Part 5: Overhead travelling and portal bridge cranes*

NOTES

Australian Standard®

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Part 1: General (ISO 8686-1:2012, MOD)

1 Scope

This part of ISO 8686 establishes general methods for the calculating loads and principles to be used in the selection of load combinations for proofs of competence in accordance with ISO 20332 for the structural and mechanical components of cranes as defined in ISO 4306-1.

It is based on rigid body kinetic analysis and elastostatic analysis but expressly permits the use of more advanced methods (calculations or tests) to evaluate the effects of loads and load combinations, and the values of dynamic load factors, where it can be demonstrated that these provide at least equivalent levels of competence.

This part of ISO 8686 provides for two distinct kinds of application:

a) the general form, content and ranges of parameter values for more specific standards to be developed for specific types of cranes;

b) a framework for agreement on loads and load combinations between a designer or manufacturer and a crane purchaser for those types of cranes where specific standards do not exist.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4302, *Cranes — Wind load assessment*

ISO 4306 (all parts), *Lifting appliances — Vocabulary*

ISO 4310, *Cranes — Test code and procedures*

ISO 20332, *Cranes — Proof of competence of steel structures*

3 Terms and definitions

For the purposes of this document, the definitions given in ISO 4306 and the following apply.

3.1
load or loads
external or internal actions in the form of forces, displacements or temperature, which cause stresses in the structural or mechanical components of the crane

3.2
analysis
⟨rigid bodies⟩ study of the movement and the inner forces of systems modelled by elements that are assumed to be non-elastic

3.3
analysis
⟨elastic bodies⟩ study of the relative elastic displacements (distortion), movement and the inner forces of systems modelled by elements that are assumed to be elastic