AS/NZS 4671:2019

Australian/New Zealand Standard™

Steel for the reinforcement of concrete

AS/NZS 4671:2019

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The following are represented on Committee BD-084:

Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Steel Association
Austroads
Building Industry Federation
Bureau of Steel Manufacturers of Australia
Business New Zealand
Concrete NZ
Concrete Pipe Association of Australasia
Galvanizers Association of Australia
Master Builders Australia
National Precast Concrete Association Australia
Steel Reinforcement Institute of Australia

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Originated in Australia as part of AS A81—1958, AS A82—1958, AS A83—1958, AS A84—1958, AS A92—1958 and AS A97—1965.
Originated in New Zealand as part of NZS 197:1949, NZS 1255:1956, NZS 1693:1962, NZS 1879:1964 and NZS 3423P:1972.
Previous edition AS/NZS 4671:2001.
Second edition 2019.

Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee BD-084, Steel Reinforcing and Prestressing Materials, to supersede AS/NZS 4671:2001, *Steel reinforcing materials*.

The objective of the Standard is to provide materials specifications for steel bars and welded mesh used to reinforce concrete structures that have been designed in accordance with standards such as AS 3600, *Concrete structures*, or NZS 3101.1, *Concrete structures standard*, *Part 1*. This Standard has also been referenced by other design standards.

Differences between this Standard and the 2001 edition are briefly outlined below.

(a) *General* — The title of the Standard has been changed to harmonize with ISO 6935, *Steel for the reinforcement and prestressing of concrete*. Although closely aligned technically with both ISO 6935, *Steel for the reinforcement and prestressing of concrete — Test methods* (series) and ENV 10080, *Steel for the reinforcement of concrete — Weldable ribbed reinforcing steel B500 — Technical delivery conditions for bars, coils and welded fabric*, this Standard continues to be classed as not equivalent to these documents primarily because —

(i) ISO 15630 does not contain specific requirements appropriate for reinforcement for earthquake-resistant structures; and

(ii) consequential differences in both the text and numerical values, although minor in nature, are too numerous.

Minor technical and editorial errors and omissions have been addressed.

Changes proposed by the New Zealand Ministry of Business, Innovation and Employment (MBIE) in 2016, in relation to Class E mesh, have been incorporated where possible.

(b) *Strength grades* — Additional higher strength grades of reinforcing steel with a lower characteristic yield stress up to 750 MPa have been introduced in consultation with design standard committees.

The chemical, mechanical and identification requirements for each standard strength grade have been specified.

(c) *Product conformity* — Product conformity requirements have been extensively redrafted to introduce requirements for type testing, batch conformance and long-term quality. In particular, batch conformance criteria allows for minor deviations outside specified limits provided the long-term quality levels are achieved. The importance of long-term quality is emphasized.

The Standard requires that testing is conducted by laboratories in accordance with AS ISO 17025, *General requirements for the competence of testing and calibration laboratories*.

An optional manufacturer's certificate has been introduced to replace the test report in the previous Appendix B. Minimum requirements for the certificate include long-term quality statements.

Two new appendices have been added. Appendix E provides an explanation of the concept of long-term quality versus batch testing. Appendix F gives a rationale for product conformity and sampling, and discusses appropriate points for sampling decoiled products.

The terms "normative" and "informative" are used in Standards 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.

Contents

Introduction

The publication of AS/NZS 4671:2001 enabled a number of significant benefits to the concrete construction industry:

(a) More efficient use of materials, and for designers, to detail less congested reinforcing layouts (particularly in columns and walls) with the use of 500 MPa steels.

(b) More reliable member performance as a result of the clarification of minimum ductility levels.

(c) More uniform product as a result of tighter conformance requirements.

(d) Compatibility between "design" and "production" parameters with the introduction of characteristic values based on normative long-term production statistics.

Since 2001 there have been significant changes in areas that needed to be addressed by this new edition of the Standard.

The limit of 500 MPa for reinforcing steel did not allow manufacturers and designers to explore the options of producing higher strength grades, which can carry higher loads and in turn, may reduce costs further or enhance sustainability.

The existing strength grades remain unchanged except for plain grade 300E (R300E), where the A_{gt} has been reduced to 12 %. R300E, produced off coil, is used solely for fitments and stirrups and does not have as high ductility demand. Higher grades of reinforcing steel up to 750 MPa have been included in separate tables. This change will allow designs to standards such as AS 3600, *Concrete structures*, and NZS 3101, *Concrete structures standard*, to utilize the potential benefits offered by higher strength reinforcing steels. High strength reinforcing steels are typically used for fitments in confinement regions to reduce congestion. Research has shown that high strength ligatures offer improved performance at the joints of concrete beams and columns under seismic loading.

Higher strength grades of reinforcing steel have the potential to improve the sustainability outcomes for the Australian and New Zealand community.

The provision of an optional product conformity report and the requirement for testing to be conducted by laboratories conforming with AS ISO 17025 for the specific test required is designed to address the concerns raised in the New Zealand Ministry of Business, Industry and Employment (MBIE) 2016 amendment to the building code.

NOTES

Australian/New Zealand Standard

Steel for the reinforcement of concrete

1 Scope

This Standard specifies requirements for the chemical composition, mechanical properties and geometric properties of steel used for reinforcing concrete, in the form of —

(a) deformed or plain bars and coils;

(b) machine-welded mesh; and

(c) continuously threaded bars.

This Standard does not apply to prestressing steels, stainless steel, epoxy coated and galvanized reinforcing steels.

NOTE 1 Prestressing steels are covered by AS/NZS 4672.1 and AS/NZS 4672.2.

NOTE 2 Information on galvanized reinforcing steels is available in *Galvanized Reinforcement In Concrete—An Introduction For Engineers and Designers* and S.R. Yeomans, *Galvanized Reinforcement In Concrete Structures—Questions and Answers*. Both are available from the Galvanizers Association of Australia.

2 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 for informative purposes are listed in the Bibliography.

AS 1391, *Metallic materials — Tensile testing at ambient temperature*

AS ISO/IEC 17025, *General requirements for the competence of test and calibration laboratories*

AS/NZS 1554.3, *Structural steel welding, Part 3: Welding of reinforcing steel*

AS/NZS 1050.1, *Methods for the analysis of iron and steel, Part 1: Sampling iron and steel for chemical analysis*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 15630-1, *Steel for the reinforcement and prestressing of concrete — Test methods — Part 1: Reinforcing bars, rods and wire*

ISO 15630-2, *Steel for the reinforcement and prestressing of concrete — Test methods — Part 2: Welded fabric and lattice girders*

ASTM E415, *Test method for analysis of carbon and low-alloy steel by spark atomic emission spectrometry*

3 Terms and definitions

For the purposes of this Standard, the following terms and definitions apply.

3.1
ageing
heating of the test specimen to 100 ± 10 °C, maintaining this temperature for a period of 60 +15, 0 min and then cooling the specimen in still air to room temperature

Note 1 to entry: The method used to determine the temperature can be a calibrated oven (calibrated for both temperature and temperature spatial distribution) or boiling water.