AS 1210—1997
(Incorporating Amendment Nos. 1, 2 and 3)



Australian Standard™

# Pressure vessels

Standards Australia

This Australian Standard was prepared by Committee ME-001, Pressure Equipment. It was approved on behalf of the Council of Standards Australia on 31 January 1997 and published on 5 July 1997.

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# Pressure vessels

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# PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee ME/1 on Pressure Equipment to supersede AS 1210—1989, *Unfired Pressure Vessels (known as the SAA Unfired Pressure Vessels Code)*. This Standard is a 'Primary Applicable Standard' referenced in AS/NZS 1200 which is the main Standard for pressure equipment and outlines general requirements for water tube, fire tube, shell and miscellaneous boilers, pressure vessels, pressure piping and related matters. AS/NZS 1200 is referred to in the Worksafe Australia, *National Standard for Plant*.

*This Standard incorporates Amendment No. 1 (February 1998), Amendment No. 2 (September 1998) and Amendment No. 3 (April 2002). The changes arising from the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure, or part thereof affected.*

This Standard is the result of a consensus among representatives on the Joint Committee to produce it as an Australian Standard. Consensus means general agreement by all interested parties. Consensus includes an attempt to remove all objection and implies much more than the concept of a simple majority, but not necessarily unanimity. It is consistent with this meaning that a member may be included in the Committee list and yet not be in full agreement with all clauses of this Standard.

Revisions and additions contained in the published Amendments 1 to 4 to the 1989 edition of this Standard, together with subsequent revisions and additions approved by the Committee, have been included in this edition.

The main changes introduced subsequent to Amendment 4 include an extension to cover fired and unfired pressure vessels, non-metallic pressure vessels, extensive editorial modifications to align with current Standards Australia practice and a number of important technical changes, including the addition, revision and clarification of the scope, stress tables, minimum thickness, flat plates, inspection openings, transportable vessels, relief valve capacity and risk management.

As part of the restructuring of various Standards covered by AS/NZS 1200 into 'core' type Standards, most requirements for manufacture and heat treatment, welding and brazing qualification, examination and testing and installation have been deleted, and reference is made to specific Standards covering these matters.

The removal of this data has left a number of appendices and clauses blank. The complete clause renumbering of the whole of the Standard has been avoided as clauses are referred to in many documents, such as quality assurance manuals, manufacturing specifications and computer calculations.

Minor changes have been made in the welding procedure requirements, including relevant postweld heat treatment requirements, principally to align with world practice. It is not intended that qualified welding procedures will be invalidated by these changes nor that the changes will be applied retrospectively.

References to riveted construction have been withdrawn as this type of construction is rarely used at the present time. For guidance, reference may be made to the now superseded AS CB1, Part 1: *Boilers other than water tube boilers and locomotive boilers for railway purposes*, reference copies of which are available at the Standards Australia Information Centres.

A2 A significant change by Amendment No. 2 to this 1997 edition is the reduction of the factor of safety used to determine the material design stress from 4 to 3.5. There are a number of justifications for such a change, including the improvement in the quality of materials, an improvement in the quality of welding and fabrication, improved inspection technology and better information on design, operation, maintenance and vessel failures.

This Standard follows in principle other codes forming part of AS/NZS 1200 in giving guidance to designers, manufacturers, inspection bodies, purchasers and users in the form of minimum engineering requirements which are necessary for the safe design, manufacture and testing of pressure vessels. In special instances additional requirements may be necessary for adequate performance or safety.

The requirements in this Standard have been formulated to afford reasonably certain protection of life and property and to indicate where a margin for deterioration in service may be needed so as to give a reasonably long, safe period of usefulness. The Standard takes into consideration advancements in design and materials, and the evidence of experience.

The Standard contains basic data necessary for design, including material specification, design parameters, requirements for fabrication, testing and inspection. These requirements are specified in terms of principles to the fullest practicable extent, supplemented where necessary by further detail to obtain uniform interpretation of principle and guidance on best methods. In other areas the Standard indicates where caution is necessary but a direct prohibition would be unwise at the present level of knowledge.

The Standard incorporates the class system of vessels based on different classes of construction, and gives basic principles to indicate where such classes should or are to be used. Three main classes are adopted using the present level of stress (safety factor of 4 approximately). Additional classes of vessel, i.e. Class 1 H and 2 H, may be produced in accordance with AS 1210 Supplement 1, which permits the use of design stresses higher than those contained herein.

The specific design requirements of the Standard are based on a simplified engineering approach and are intended to be the standard methods of design. However, in special instances, particularly where guidance is not provided in this Standard, other methods may be used provided that the validity of the design is satisfactorily established and agreed.

No rules for manufacture can be written in sufficient detail to ensure good workmanship in manufacture. Each vessel manufacturer is responsible for taking every necessary step to make sure that the quality of manufacture is such as will ensure compliance with good engineering practice and design.

The user will also need to consider many factors beyond those covered by this Standard in the final specification of a vessel and is cautioned that the Standard is not a complete design handbook and that there is a need for competent engineering judgement.

The Standard continues to be written largely for Australian conditions and to cater for recent moves in various States and Territories to objective or performance regulations rather than the earlier prescriptive ones. These moves also have lead to privatization of inspection functions such as design verification, manufacture and in-service inspection, and agreement by designers, manufacturers, purchasers and others involved.

Thus the Standard uses competent inspection bodies as in European Union practice in place of the previous regulatory authority; and is written as far as practical for clear interpretation and use in contracts to assist all parties and facilitate safety and trade.

It provides flexibility to use alternative methods, materials, Standards and the like where equivalent safety and performance is achieved and any departures from the Standard are clearly identified in all documentation and are agreed.

Acknowledgment is gratefully made to the American Society of Mechanical Engineers for permission to reproduce certain extracts from the *ASME Boiler and Pressure Vessel Code*. In addition, acknowledgment is made of the considerable assistance provided by British and other national Standards.

This Standard makes use of the draft ISO Standard for pressure vessels and the current American and British Standards for pressure vessels as well as other selected leading Standards including the developing European Standards and the experience and