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METHOD FOR VERIFYING THE MINIMUM ELEVATED TEMPERATURE LOWER YIELD OR PROOF STRESS PROPERTIES OF CARBON AND LOW ALLOY STEEL PRODUCTS

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THE FOLLOWING GOVERNMENT DEPARTMENTS AND SCIENTIFIC AND INDUSTRIAL organizations were officially represented on the committee entrusted with the preparation of this standard:

Aluminium Development Council
Associated Chambers of Manufactures of Australia
Australian Chamber of Commerce
Australian Compressed Air Institute
Australian Institute of Metals
Australian Institute for Non-destructive Testing
Australian Liquefied Petroleum Gas Association
Australian Mines and Metals Association
Australian Valve Manufacturers Association
Australian Welding Institute
Australian Welding Research Association
Boiler and Pressure Vessel Manufacturers Association of Australia
Bureau of Steel Manufacturers of Australia
Department of Defence
Department of Labour Relations and Consumer Affairs, Queensland
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Departments of Labour and Industry
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Petroleum Refining Engineers Advisory Committee
Queensland Society of Sugar Cane Technologists
Railways of Australia Committee
Society of Mechanical Engineers of Australia
The Institution of Engineers, Australia
Universities and Technical Colleges

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In order to keep abreast of progress in industry, Australian standards are regularly reviewed. Suggestions for improvement to published standards, addressed to the head office of the Association, are welcomed.

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AUSTRALIAN STANDARD

METHOD FOR VERIFYING THE MINIMUM ELEVATED TEMPERATURE LOWER YIELD OR PROOF STRESS PROPERTIES OF CARBON AND LOW ALLOY STEEL PRODUCTS

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PREFACE

This standard was prepared by the Association's Committee on Boilers and Unfired Pressure Vessels as part of a program of revision and metrication of the various codes and specifications which make up the SAA Boiler Code (AS 1200).

It describes a method whereby the designated elevated temperature properties of steel products can be verified on the bases of their room temperature properties and statistical evidence, rather than by representative batch tests.

The need for such a procedure arose from the adoption of the minimum lower yield or proof stress at operating or design temperature as a criterion for design and the consequent introduction of such properties into the relevant material standards and application codes.

This standard is based in part on BS 3920, Procedure for Deriving and Verifying the Minimum Elevated Temperature Yield or Proof Stress Properties of Steel Products. The standard does not include a procedure for deriving the properties of the steels, but sets out the method to be followed in verifying minimum elevated temperature lower yield or proof stress values specified in an appropriate material specification. These minimum stress values are established in accordance with the derivation procedure specified in ISO 2605/I, Steel Products for Pressure Purposes — Derivation and Verification of Elevated Temperature Properties — Part I: Yield or Proof Stress of Carbon and Low Alloy Steel Products, which requires that test results from at least fifty casts shall be obtained.

Recognizing that the *derivation* procedure to be followed complies with the requirements of the ISO standard, the committee has adopted for the *verification* procedure a minimum of ten casts from which test data are to be obtained, which is a variation from the requirement of fifteen casts in the ISO standard. (The ISO standard anticipates a variation in the minimum quantity of data required in the light of future experience.)

Except as noted in the preceding paragraph, this standard is aligned with the relevant sections of ISO 2605/I. However, Australia had submitted a negative vote on the draft of the ISO standard, giving as the reasons, disagreement with the quantity of data required in the verification procedure and with the broad interpretation of the term 'manufacturer' which permits two or more suppliers with a loosely defined relationship to be considered as one manufacturer.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

METHOD FOR VERIFYING THE MINIMUM ELEVATED TEMPERATURE LOWER YIELD OR PROOF STRESS PROPERTIES OF CARBON AND LOW ALLOY STEEL PRODUCTS

1 SCOPE. This standard describes a method for verifying lower yield or proof stress properties as an alternative to elevated temperature acceptance testing, whereby a manufacturer may satisfy a purchaser that the product supplied consistently meets the requirements of the material specification.

The procedure given herein, while minimizing the amount of elevated temperature testing required to be done by the manufacturer, at the same time provides no less assurance to the purchaser than is provided by batch testing methods.

NOTE: All lower yield or proof stress data used to implement the standard are to be obtained from tests, either at room temperature or at elevated temperature, carried out in accordance with:

ISO/R 783, Mechanical testing of steel at elevated temperatures — Determination of lower yield stress and proof stress proving stress; or

BS 3688, Methods for mechanical testing of metals at elevated temperature; or other standards based on an equivalent strain rate.

2 VERIFICATION PROCEDURE.

2.1 Basis of Verification Procedure. The basis of the procedure is that data relating to a particular manufacturer's product are compared, at a number of temperatures, with the 95 percent lower confidence limits used to derive the specification minima and given in the following material standards:

AS 1548, Steel Plates for Boilers and Unfired Pressure Vessels
AS 1835, Seamless Steel Tubes for Pressure Purposes
AS 1836, Welded Steel Tubes for Pressure Purposes.

2.2 Basic Requirements.

2.2.1 *Application.* The procedure shall be applied separately for each product form, thickness or section size range and heat-treatment condition for which elevated temperature proof stress properties are specified in the relevant standard or other specification and for which verification is sought.

2.2.2 *Selection of samples.* The data utilized shall be obtained using test samples which —

(a) are representative of the thickness or section size range and heat treatment to which the specified properties apply; and

(b) provide room temperature tensile strength values reasonably uniformly distributed over not less than 60 percent of the specified tensile strength range.