

Australian Standard™

Pipelines—Gas and liquid petroleum

Part 2: Welding

This Australian Standard was prepared by Committee ME-038, Petroleum Pipelines. It was approved on behalf of the Council of Standards Australia on 14 June 2002 and published on 21 June 2002.

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Australian Gas Association
Australian Institute of Petroleum
Australian Petroleum Production and Exploration Association
Australian Pipeline Industry Association
Bureau of Steel Manufacturers of Australia
Cooperative Research Centre for Materials, Welding and Joining
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Department of Minerals and Energy W.A.
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee ME-038, Petroleum Pipelines, to supersede AS 2885.2—1995.

The objective of this Standard is to provide requirements for the welding of pipelines designed and constructed in accordance with AS 2885.1

The objective of this revision is to include editorial changes, and technical changes, which became necessary as a result of experience in the use of the Standard in the five years since it was issued. This revision also incorporates the outcomes of an extensive program of pipeline welding research, which has been undertaken by the Cooperative Research Centre for Welded Structures with the assistance of industry sponsorship.

The changes that have been made include the following:

- (a) The use of automatic welding equipment has been directly provided for and, because of this, reference to operators has been included as well as to welders.
- (b) A list of items requiring approval within the meaning of that term in the AS 2885 Standards has been incorporated in Appendix G.
- (c) A formal process for any delegation of the operating authority's powers and responsibilities has been included.
- (d) The application of the Standard to pipelines and pipeline assemblies but not to station pipework has been made clear.
- (e) In recognition of the widely held view in the pipeline industry that the ordinary Standards for the higher grades of gas metal arc welding wires and cellulosic electrodes are not adequate, new appendices have been included to give guidance on the proper selection of these consumables.
- (f) Substantive change has been made to the requirements dealing with qualification of a welding procedure. The statement of the purpose has been improved, and a requirement has been introduced for the procedure to be free from the risk of hydrogen assisted cold cracking (HACC), that is, for HACC to be 'designed-out' of the procedure. A new Appendix F has been incorporated to give procedures on how this can be achieved.
- (g) Two serious problems that the industry has faced for many years have been addressed in changes to the methods of qualifying a welding procedure. The need for repeated and unnecessary requalification by testing of simple proven procedures has been largely eliminated. In addition to the pre-existing provision that procedures could be qualified by the production of documentary evidence of previous approval, a new provision has been introduced in which procedures applying to the most common grades and thicknesses in applications with a low risk of HACC are deemed to be prequalified, and therefore do not require testing. As well as this, in special circumstances, in order to address the problem of qualifying procedures on large or expensive fittings and in other circumstances where it may be impracticable or impossible to obtain representative material upon which to qualify the procedure, a provision has been introduced making it possible for qualification by the use of appropriately qualified and experienced supervision.
- (h) The essential variables have been revised and clarified.
- (i) Specific reference has been included to the outcome of the CRC-WS research showing, for normal lifts, the small effect upon the risk of HACC of the release of the line-up clamp prior to completion of the root pass.

- (j) The related subjects of excessive weld reinforcement height and inadequate radiographic density in the weld region has been given attention as a result of the failure of the treatment in the 1995 revision to work adequately in practice. Greater attention is given to the problem of excessive reinforcement height at the welder qualification stage and at the stage of visual inspection of production welds. Following that, although the radiographic density requirements have been changed and are now primarily couched in terms of parent metal density, there is now a mandatory minimum lower density limit of 1.3, and if this is not met, the weld has to be ground to reduce the reinforcement height and then be re-radiographed. Previously it was seen as the radiographer's responsibility to achieve recommended density limits. The changes reflect the fact that alterations to the radiographic procedure in order to bring the density above the minimum limit in excessively thick regions, whilst being maintained below the maximum permitted values in the parent metal, would adversely affect radiographic quality.
- (k) The ultrasonic inspection requirements have been completely revised. Ultrasonic inspection is now a permitted method of inspection of equal status to radiography. Previously, the use of ultrasonic testing required approval. The use of automatic ultrasonic inspection is now expressly provided for.
- (l) The amount and the location of non-destructive examination are required to be considered part of the risk assessment conducted in accordance with AS 2885.1.
- (m) The Tier 1 and 2 defect acceptance criteria have been revised to reflect the findings of the research program. These acceptance criteria are based on an underlying philosophy that all of the girth welds in a pipeline, whether they are so identified by a risk assessment or not, should have the reserve capability to withstand limited plastic longitudinal strain in at least one of the adjacent pipes.

The above is not an exhaustive list of changes.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of the Standard.

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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STANDARDS AUSTRALIA

Australian Standard

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Part 2: Welding

1 SCOPE AND GENERAL

1.1 Scope

This Standard specifies materials, welding consumables, welding processes, weld preparations, qualifications of welding procedures and personnel, and fabrication and inspection requirements for the construction and maintenance welding of carbon and carbon-manganese steel pipelines down to 3.2 mm wall thickness designed and constructed in accordance with AS 2885.1. The welding of corrosion resistant alloy steel pipelines, or pipelines with wall thicknesses less than 3.2 mm is not precluded but is not expressly covered by this Standard. The welding of such pipelines has to be given special consideration.

The welding may be done by a manual metal arc, submerged arc, gas tungsten arc, gas metal arc, flux cored arc, oxyacetylene, or by a combination of these using a manual, semi-automatic, or automatic welding technique or a combination of these techniques. The welds may be produced by position or roll welding or by a combination of position and roll welding.

1.2 Qualification and approval

Welding shall be performed by qualified personnel, in accordance with qualified welding procedures.

Welding procedures shall be approved.

The welding procedure shall be documented.

Items requiring approval in accordance with this Standard shall be as given in Appendix G. Activities undertaken within the scope of this Standard shall be directed by an operating authority appointed for the purpose of giving approvals as defined in this Standard. The process for any delegation of the operating authority's powers shall be in accordance with Figure 1.2.