

Australian Standard[®]

**Steel tubes—Pressure application—
Flash butt welding**

This Australian Standard was prepared by Committee ME/1, Pressure Equipment. It was approved on behalf of the Council of Standards Australia on 8 May 1996 and published on 5 July 1996.

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**Steel tubes—Pressure application—
Flash butt welding**

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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 CB15.5—1968, *The welding of steel pressure piping (known as the SAA Pipe Welding Code)*, Part 5: *Flash butt welding of steel pipes and tubes* (incorporating Amendment No. 1).

This Standard is the result of a consensus among representatives on the Joint Committee to produce this document as an Australian Standard. Consensus means general agreement by all interested parties. Consensus includes an attempt to remove all objections 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.

Changes since the last edition include the following:

- (a) A complete revision and renumbering of the Standard.
- (b) Updating to current Standards Australia style.
- (c) Updating all reference documents and materials.
- (d) Inclusion of a typical flash butt weld procedure data sheet as an Appendix.

This Standard specifies welding procedure, equipment, requirements for completed welds, procedure qualification tests, and production control tests and includes an Appendix illustrating flash butt weld imperfections.

For the purpose of this Standard, the term ‘tube’ has been adopted, but no difference is intended in the meaning between ‘tube’ and ‘pipe’ although idiomatic use prefers sometimes the one and sometimes the other.

Reference was made to BS 4204:1989, *Specification for flash welding of steel tubes for pressure applications* during the preparation of this Standard and acknowledgment is gratefully made to the British Standards Institution for the considerable assistance provided by BS 4204.

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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Originated as AS CB15.5—1968.
Revised and redesignated as AS 4413—1996.

STANDARDS AUSTRALIA

Australian Standard

Steel tubes—Pressure applications—Flash butt welding

SECTION 1 GENERAL

1.1 SCOPE This Standard sets out general requirements for the flash butt welding of steel pipes, tubes and fittings, for pressure equipment and other pressure or high duty applications, carried out on automatic flash butt welding machines.

1.2 OBJECTIVE The objective of this Standard is to establish reliable methods for the satisfactory automatic flash butt welding of steel tubes and fittings for pressure purposes.

1.3 APPLICATION This Standard is specifically intended to apply to the automatic flash butt welding of carbon steel, low alloy steel and high alloy steel tubes and fittings.

1.4 DEFINITIONS For the purpose of this Standard, the definitions given in AS 2812 and those below apply.

1.4.1 May—indicates that a statement is optional.

1.4.2 Parties concerned—the purchaser, designer, manufacturer, design verifying and inspection bodies, supplier, installer, owner and regulatory authority, as appropriate.

1.4.3 Regulatory authority—any Commonwealth, State or Territory regulatory authority in Australia with the jurisdiction for pressure equipment safety and includes an officer of that authority with delegated responsibility by that authority.

1.4.4 Shall—indicates that a statement is mandatory.

1.4.5 Should—indicates a recommendation.

1.5 PARENT METAL The parent metal shall be carbon steel, low alloy steel or high alloy steel complying with the requirements of Australian or other equivalent Standards and shall be suitable for the intended application.

The steel or combination of steels selected shall be shown by the procedure qualification tests (see Section 5) to be capable of being satisfactorily flash butt welded.

1.6 SIZE OF TUBE The diameter, thickness and length of tube which can be flash butt welded depends on the capacity of the machine to be used and it shall be determined by the procedure qualification tests that the tubes come within this machine capacity (see Section 5).

1.7 BACKING GASES Where backing gases are required to minimize flash and oxidation in the bore of the tube, dry air, argon, a mixture of 88% nitrogen–12% hydrogen, or other suitable gas mixture, as agreed between the parties concerned may be used.

The type of backing gas and the pressure at which it is to function depends on the type of material being welded and the dimensions of the tube. The gas to be used, the pressure at which it is to be supplied and the flow to provide an adequate positive pressure at the weld shall be determined when fixing the welding procedure. The same conditions shall then be used for production welds.

NOTE: It is normal good practice to use air for carbon steel and argon or suitable gas mixtures for low alloy and austenitic steels.

It is essential, when using backing gases other than air, for the gas to be present throughout the preheating and cooling cycle and, therefore, an adequate purge time shall be allowed for the gas to completely fill the tube which shall remain filled until the weld has cooled or the tube has been withdrawn from the machine. When long lengths of tube are being welded, internal diaphragms may be used.

1.8 REFERENCED DOCUMENTS The following documents are referred to in this Standard.

AS

2205 Methods of destructive testing of welds in metal

2205.3.1 Transverse guided bend test

2205.5.1 Macro test—Cross-section examination

2812 Welding, brazing and cutting of metals—Glossary of terms

3000 Electrical installations —Buildings, structures and premises (known as the SAA Wiring Rules)

3978 Non-destructive testing —Visual inspection of metal products and components

AS/NZS

1337 Eye protectors for industrial applications

1338 Filters for eye protectors

1338.1 Part 1: Filters for protection against radiation generated in welding and allied operations

SECTION 2 WELDING PROCEDURE

2.1 GENERAL The welding procedure is intended to cover all welding variables which influence the final quality of the weld.

2.2 END PREPARATION The ends of the tubes to be welded shall be machine cut so that the end edge or surface lies in a plane at right angles to the axis of the tube, the end being cut square as shown in Figure 2.2(a). The tube ends may also be chamfered as shown in Figure 2.2(b) to facilitate the onset of flashing when straight flash welding. It is desirable that the face areas which will be in contact when welding should be approximately equal.

Where the bores of tubes are machined, boring shall be concentric with the outside diameter and the tube thickness shall not be reduced below the specified design thickness. The machined parallel length shall be sufficient to provide for the total allowance (i.e. allowance for reduction in length due to burn-off and upset), and to provide in the finished weld at least 3 mm parallel portion from the edge of the weld to the start of the radius or taper. The machining shall run out smoothly into the bores at a taper not steeper than 1 in 4 (14°); except where the change in thickness does not exceed 1 mm, an ample radius may be used to provide a smooth transition. Typical details are shown in Figure 2.2(a).

Machining of the tube shall be restricted to controlled bore tubing and shall be such that —

- (a) the outside diameter is machined concentric over a length to suit the machine dies; and
- (b) the transition and thickness are as required above.

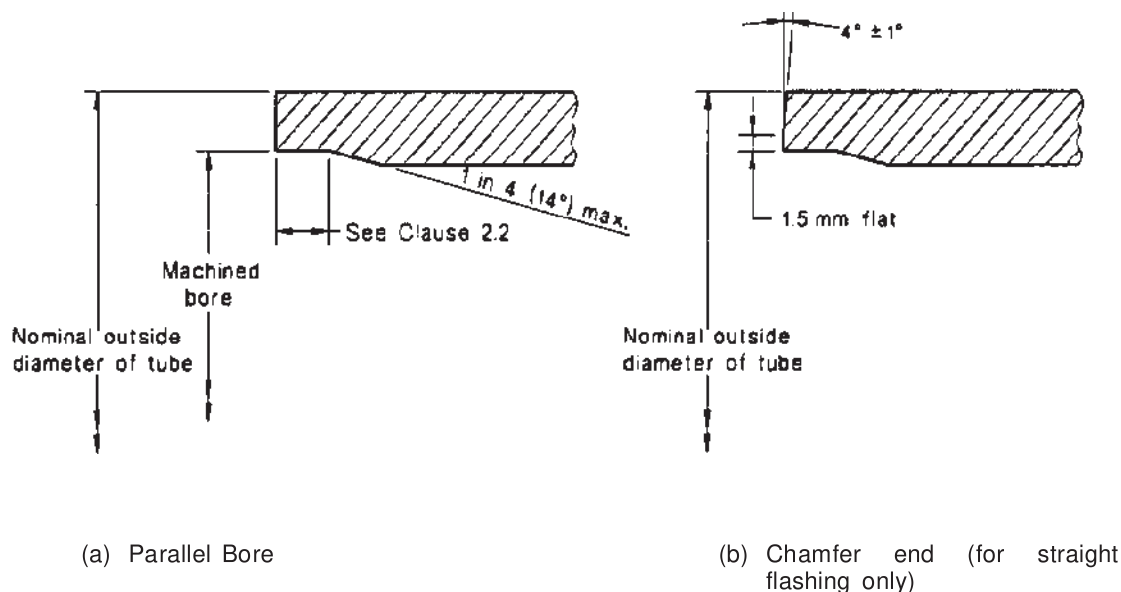


FIGURE 2.2 TYPICAL END PREPARATIONS