

Australian Standard®

**Boilers—Safety, management,
combustion and other ancillary
equipment**

This Australian Standard was prepared by Committee ME/1, Boilers and Pressure Vessels. It was approved on behalf of the Council of Standards Australia on 7 July 1993 and published on 13 September 1993.

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Boilers—Safety, management, combustion and other ancillary equipment

First published as AS 3653—1993.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2148



Documents

Document Sharing Hub
ISBN 0 7262 6402 5

PREFACE

This Standard was prepared by the Standards Australia Committee on boilers and pressure vessels.

The Standard consolidates, rationalizes and extends the present requirements and recommendations for boiler ancillaries in AS 1228—*Boilers—Water-tube*; AS 1797, *Boilers—Fire-tube, shell and miscellaneous*; AS 2593, *Boilers—Unattended and limited attendance* and associated Standards. It is part of a major program to restructure, unify and simplify the various Standards for particular types of equipment and components which form the *SAA Boiler Code* (AS 1200). AS 1200 is referred to in Statutory Regulations in Australia and covers requirements for land installations of boilers, pressure vessels, piping and associated matters.

On publication of this Standard, AS 1228 and AS 1797 will be amended to delete the common requirements now covered herein and replace them by appropriate cross-references to this Standard.

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STANDARDS AUSTRALIA

Australian Standard

Boilers—Safety, management, combustion and other ancillary equipment

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard specifies the requirements for components, ancillary equipment and management systems used as a part of the boiler pressure and energy generating systems, including management systems, combustion equipment, water level security, safety valves, general valves and fittings, blowdown connections and integral piping.

NOTE: Ancillary equipment and its installation, which form part of the support system, e.g. feed water supply, plant piping, and environmental equipment, are covered in AS 3892.

This Standard is intended to—

- (a) establish the requirements for boiler management systems for all levels of automated operation, and to include controls, interlocks, electrical systems and other safety systems;
- (b) establish the minimum requisite fittings and valves such as safety valves and blowdown valves;
- (c) establish selection criteria for energy input equipment such as combustion equipment and the requirements for interfacing with the boiler design; and
- (d) form a bridge between the design codes (AS 1228, AS 1271, AS 1797) and AS 3892.

1.2 APPLICATION This Standard is intended for use in association with the relevant boiler Standard, AS 1228 or AS 1797, which specifies the total minimum requirements for the design, construction and testing of water-tube boilers and of fire-tube, shell and miscellaneous boilers, respectively.

It consolidates uniform minimum requirements for the ancillary equipment for all types of boilers to ensure safe performance and protection of personnel, equipment and the environment.

1.3 REFERENCED DOCUMENTS The documents referred to in this Standard are listed in Appendix A.

1.4 DEFINITIONS For the purposes of this Standard, the definitions in AS 1228, AS 1271, AS 1797 and AS 2593 apply.

1.5 IMPLEMENTATION This Standard is intended to apply to the design and manufacture of boilers carried out after the date of publication. It should not be applied on a mandatory basis before (date six months after publication) (see Note 1) or applied retrospectively (see Note 2).

NOTES:

- 1 The implementation date required by some inspecting authorities may vary from the above date.
- 2 Implementation in respect to work in progress should be negotiated between the parties concerned.



SECTION 2 GENERAL VALVES, GAUGES AND OTHER FITTINGS

2.1 GENERAL REQUIREMENTS

2.1.1 Design and construction The design and construction of valves, gauges, and other fittings shall comply with the requirements of AS 1271.

2.1.2 Valve and fitting scantlings The calculations made to determine the dimensions of pressure parts of the valve or fitting shall be based on the relevant design pressure and temperature of the component to which the valve or fitting is to be fitted.

2.1.3 Minimum requisite fittings

NOTE: Unless otherwise specified by the purchaser or the manufacturer, the fittings required by Clauses 2.1.3.1, 2.1.3.2 and 2.1.3.3 are to be supplied by the manufacturer of the boiler.

2.1.3.1 Steam boiler fittings Each steam boiler shall be provided with all fittings necessary for safe operation. Subject to Clause 2.1.3.4, the fittings shall include the following:

- (a) Safety valve.
- (b) Water gauge.
- (c) Steam pressure gauge.
- (d) Attachment for test gauge.
- (e) Steam stop valve (see Note 2).
- (f) Feed check and isolating valve.
- (g) Blowdown valve.
- (h) Drain valve (where drainage not provided by other means).
- (i) Provision for boiler water sampling and chemical dosing.

NOTES:

- 1 A typical arrangement of the integral boiler piping covered by this Standard is shown in Appendix B.
- 2 For main boiler installations in power stations with only one boiler connected to one turbine (unitized plant), it will not be necessary to provide for steam stop valves at the boiler outlet. The turbine stop valves are considered to adequately fulfil any safety requirement.

2.1.3.2 Hot water boiler fittings Each water heating boiler shall be provided with all fittings necessary for safe operation. Subject to Clause 2.1.3.4, the fittings shall include the following:

- (a) An overpressure relief system consisting of at least one of the following:
 - (i) Water relief valve.
 - (ii) Safety valve.
 - (iii) Connection to an expansion vessel fitted with a safety or relief valve.
 - (iv) Connection to an open-vented head tank.
- (b) Water gauge (unless fitted to an expansion vessel).
- (c) Pressure gauge.
- (d) Attachment for test gauge.
- (e) Temperature indicator.

- (f) Inlet and outlet stop valves.
- (g) Drain valve.
- (h) Low-water device (unless fitted to the expansion vessel or head tank).

2.1.3.3 Organic fluid heater or vaporizer fittings Each organic fluid heater or vaporizer shall be provided with all fittings necessary for safe operation. Subject to Clause 2.1.3.4, the fittings shall include the following:

- (a) An overpressure relief system including at least one of the following:
 - (i) Fluid relief valve.
 - (ii) Connection to an expansion vessel fitted with safety or relief valve.
- (b) Liquid gauge (unless fitted to an expansion vessel).
- (c) Pressure gauge.
- (d) Temperature indicator.
- (e) Inlet and outlet stop valves.
- (g) Drain valve.

2.1.3.4 Special applications For special applications, e.g. a closed circuit boiler without a feed pump, all fittings necessary for the safe operation of the boiler shall be provided (see Note).

NOTE: Approval by the inspecting authority may be required.

2.1.4 Accessibility All valves and fittings shall be arranged in such positions as to be accessible for operation, examination and overhaul.

2.1.5 Screwed connections Screw-threaded joints may be used for the connection of mountings to boilers under the following conditions:

- (a) *Pipe threads* Threads shall be in accordance with AS 1722, or other equivalent Standard.

Threads shall be right-hand and may be taper-to-taper, parallel-to-parallel, or taper-to-parallel.

Threads shall be cut clean and true to their full length and depth. Where required by the specification, threads shall comply with the gauging requirements of that specification.

- (b) *Size limitation* Threaded joints other than for screwed flanges shall not exceed 65 mm outside diameter.
- (c) *Temperature limitation* Threaded joints other than for screwed flanges shall be limited to a maximum metal temperature of 260°C.
- (d) *Pressure limitation* Threaded joints using steel 'heavy' pipes with sockets both of which conform to the dimensions of AS 1074 or BS 1387, shall be limited to the design pressure given in Table 1.

NOTE: AS 1074 and BS 1387 materials are not acceptable for integral pressure parts of boilers.

- (e) *Special pressure limitations* Threaded joints may be used for pressures higher than those shown in Table 1, provided that materials, design, and construction are suitable for the intended pressure/temperature and service.

Threaded joints of taper-to-taper or parallel-to-parallel type, made with components which comply with BS 5154 or any other equivalent Standard may be used for pressures up to the maximum permitted by that Standard for the component having the lower pressure/temperature rating.

TABLE 1
DESIGN PRESSURE FOR THREADED JOINTS OTHER
THAN SCREWED FLANGES

Outside diameter mm	Design pressure, MPa		
	Taper-to-parallel joint	Parallel-to-parallel joint	Taper-to-taper joint
≤35	1.2	1.2	2.1
>35 ≤50	1.05	1.05	1.75
>50 ≤65	0.860	0.860	1.55

(f) *Sealing* Where parallel threads are used on both mating components, a seating shall be provided on both components. Where threaded joints are likely to seize or corrode, sealing should be arranged to prevent threads from coming in contact with the contained fluid. A sealing gasket where used shall be fitted so that inadvertent blockage of the passageway is not possible.

To facilitate tightening during assembly and to promote long-time pressure-tightness of threaded joints, the use of a material having lubricating, sealing and adequately stable properties for the intended service is recommended.

Where parallel threads are used in a curved surface and sealing is required, a jointing surface shall be provided in accordance with Figure 1.

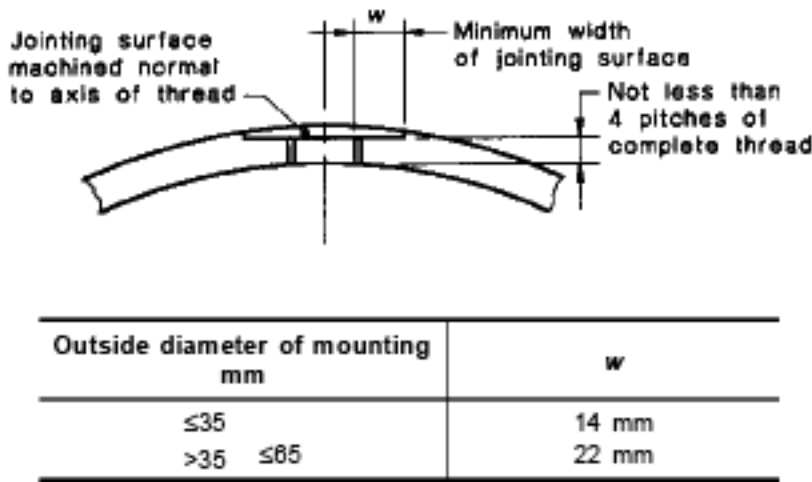


FIGURE 1 SEALING SURFACE FOR PARALLEL-THREADED JOINTS

(g) *Length of thread engagement* Length of thread engagement shall be in accordance with the appropriate Standard in this Clause; in no case shall it be less than four pitches of complete thread (see Figure 1).

(h) *Attachment to vessel* Screwed mountings may be attached to boiler shells or ends by screwing direct or by the use of screwed sockets, branches or pad connections.

Screwed sockets shall comply with, and shall be welded to the vessel in accordance with, the requirements of AS 1228 or AS 1797, as appropriate.

2.1.6 Studs for fittings Studs securing fittings shall have a thread engagement of at least one stud diameter, and shall otherwise be in accordance with AS 1228 or AS 1797, as appropriate.

2.2 STOP AND ISOLATING VALVES

2.2.1 Stop valves The stop valve connecting the boiler to the steam delivery pipe shall be attached directly to the drum or shell or as near as practicable to it. In the case of a boiler with a superheater, the stop valve shall be located as near to the outlet from the final superheater header as is practicable.

2.2.2 Isolating valves Where two or more boilers are connected together, every interconnecting pipe from each boiler to a common steam range shall, in addition to the boiler stop valve, be fitted with both a non-return valve and a stop valve between the non-return valve and the steam range. The non-return valve may be combined with the boiler stop valve, but, when fitted separately, shall be located immediately at or as closely as practicable to the boiler stop valve. Where the non-return valve is integral with the boiler stop valve and is of a single seat type, the valve head shall be positively guided throughout its travel.

Water and steam balance pipes between interconnected hot water boilers need not comply with these requirements, but provision shall be made in every balance pipe for the isolation of one boiler from the others. This may be carried out by the provision of a double shut-off valve arrangement with an atmospheric vent between the valves or by the provision of a readily insertable blanking-off arrangement. The arrangement of balance pipes shall be such that water cannot be discharged from below the safe water level of any of the interconnected boilers.

2.2.3 Valve type The stop and isolating valves shall not be of the cock or ball type.

2.3 BLOWDOWN AND DRAIN FACILITIES

2.3.1 General All boilers shall be provided with blowdown and drain facilities and where appropriate, a common service may be used for both facilities. Blowdown and drain piping shall comply with AS 3892.

2.3.2 Blowdown facilities Blowdown facilities, which are capable of removing precipitates formed by the water treatment and maintaining the concentration of suspended and dissolved solids below the maximum recommended by the boiler manufacturer, shall be provided as follows:

- (a) Each boiler shall be fitted with suitable blowdown valves placed at or as near as practicable to the points of highest concentration of solids.
- (b) Where required for the discharge of surplus water or for the removal of scum, valves should be attached to other appropriate points.
- (c) For mudlegs and blowdown pipes and connections, the pipe between the apparatus and the blowdown valve shall, where exposed to furnace heat, be protected by brickwall or other heat-resisting material arranged so that the pipe may be inspected and shall not be constrained against expansion.
- (d) Blowdown pipes which are subjected to the boiler operating pressure shall be at least 20% thicker than those required for steam service at the same pressure. The internal diameter of the pipe shall be not less than the required bore of the blowdown valves.
- (e) Blowdown discharge shall be arranged to discharge into a blowdown tank or pit in accordance with the AS 3892.