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Superseded by AS 2593-1995

Under review See DR 94257

Amendment 1 - February 1993

AS 2593—1990

Australian Standard®

Boilers—Unattended and limited attendance

STANDARDS AUSTRALIA

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This Australian Standard was prepared by Committee ME/1. It was approved on behalf of the Council of Standards Australia on 11 January 1990 and published on 2 April 1990.

The following interests are represented on Committee ME/1:

Aluminium Development Council

Australian Compressed Air and Mining Equipment Institute

Australian Institute for Non-destructive Testing

Australian Institute of Energy

Australian Institute of Petroleum

Australian Liquefied Petroleum Gas Association

Australian Valve Manufacturers Association

Boiler and Pressure Vessel Manufacturers Association of Australia

Bureau of Steel Manufacturers of Australia

Confederation of Australian Industry

Department of Defence

Department of Industrial Affairs, Qld

Department of Labour and Industry, Tas.

Department of Labour, S.A.

Department of Labour, Vic.

Department of Occupational Health, Safety and Welfare, W.A.

Department of Territories

Electricity Supply Association of Australia

Institute of Metals and Materials Australasia

Institution of Engineers Australia

Insurance Council of Australia

Metal Trades Industry Association of Australia

National Association of Testing Authorities Australia

Railways of Australia Committee

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Sugar Research Institute

Welding Technology Institute of Australia

Workcover Authority, N.S.W.

Work Health Authority, N.T.

This Standard was issued in draft form for comment as DR 88236.

STANDARDS AUSTRALIA

Amendment No. 1
to
AS 2593—1990
Boilers—Unattended and limited attendance

REVISED TEXT

The 1990 edition of AS 2593 is amended as follows; the amendments should be inserted in the appropriate places.

SUMMARY: This Amendment applies to the Contents, Clauses 1.1, 1.3.1, 1.3.3.7, 1.3.3.9, 1.3.27, 1.3.34, 2.1.1, 2.1.2, 2.2.3, 2.6, 3.1, 3.4.2.2, 3.4.3, 3.5.1.2, 3.5.3.2, 3.5.5.1, 3.5.5.2, 3.6, 3.7, 3.8, 3.12, 3.14.1, 4.3.3, 4.3.5, 4.4.3.2, 4.4.3.3, 5.3.1, 5.3.4, 5.3.6, 5.3.7.1, 5.3.7.2, 5.3.7.3, 5.3.8, 6.2, 6.4, 6.5, 7.1 to 7.6, 8.2, 8.5, 9.1, 9.2, 9.3.1, 9.3.2, 9.3.3, 9.3.4, 9.4.1, 9.4.2, 9.4.3, 9.4.4, 9.5.2, 9.7.1, 9.7.2, 9.7.3, Table 1.1, Appendix A, Paragraph B2, and Appendix F.

Published on 15 February 1993.

Implementation: This Amendment to this Standard is intended to apply to the design and manufacture of boilers carried out after the date of publication but it should not be applied on a mandatory basis before 15 August 1993 (see Note 1) or applied retrospectively (see Note 2).

NOTES:

1 The implementation dates required by some Inspecting Authorities may vary from the above dates.

2 Implementation in respect to work in progress should be negotiated between the parties concerned.

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Pages 3 and 4 Contents

1 Clause 6.2, *delete* 'HOUSING AND ACCESS' and *substitute* 'HOUSING, ACCESS AND SECURITY'.

2 After Clause 6.4, *insert* '6.5 BLOWDOWN'.

3 *Delete* Clauses 7.1, to 7.6 in full and *substitute* '7.1 FLUES AND CHIMNEYS'.

4 Clause 8.2, *delete* 'ELECTRICAL DIAGRAMS' and *substitute* 'ELECTRICAL DATA'.

5 After Clause 8.4, *insert* '8.5 CERTIFICATES'.

6 After Appendix E, *insert* 'F TYPE TEST FOR A BOILER SUBJECT TO POWER FAILURE'.

AMDT No. 1 FEB. 1993

Page 5 Clause 1.1

1 Note 1, line 4, *delete* the words 'approved by' and *substitute* 'acceptable to'.

2 Note 2, lines 3 and 4, *delete* the words 'the approval of' and *substitute* 'acceptance by'.

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Page 5 Clause 1.3.1

Delete the existing definition and *substitute* the following:

1.3.1 Acceptable, acceptance, accepted—the equipment or procedure conforms to the Australian Standard applicable to the equipment or procedure, or it can be shown to fulfil the performance requirements of this Standard if no such Standard exists.

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Page 6 Table 1.1

Delete the existing Table, including the Notes and *substitute* the Table on the following page:

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TABLE 1.1
CRITERIA FOR TYPE, CAPACITY AND ASSOCIATED SUPERVISION AND MAINTENANCE FOR UNATTENDED AND LIMITED ATTENDANCE BOILERS (see also Note 1 to Clause 1.1)

Attendance category	Boiler types	Maximum capacity*	Equipment and management codes	Supervision			Maintenance	
				By	When	How	By	When
1. Attended operation	All types	No limit	AS 1228 or AS 1797 (not AS 2593)	Certificated boiler attendant	Continually‡	Normal boiler checks	A responsible and experienced person	Manufacturer's recommendations but at least annually
2. Limited attended operation	(a) Water-tube steam boilers and all types of hot water boilers	20 MW	AS 1228 or AS 1797 plus AS 2593	Certificated boiler attendant	4-hour intervals maximum	Daily checking and logging of results	Maintenance contractor as per AS 2593	3 months maximum
	(b) All types †	5 MW	AS 1228 or AS 1797 plus AS 2593	Certificated boiler attendant	8-hour intervals maximum	Daily checking and logging of results	Maintenance contractor as per AS 2593	3 months maximum
3. Unattended operation	(a) Water-tube steam boilers and all types of hot water boilers (excluding electric element)	10 MW	AS 1228 or AS 1797 plus AS 2593	Trained but not necessarily certificated person	24-hour intervals maximum	As per AS 2593	Maintenance contractor as per AS 2593	5 weeks maximum
	(b)(i) Electrode or electric element (element fails on low water)	No limit	AS 1797 plus AS 2593	Trained but not necessarily certificated person	7-day intervals maximum	As per AS 2593	Maintenance contractor as per AS 2593	12 months maximum
	(ii) Electric element (element may not fail on low water)	250 kW			7-day intervals maximum			
		6 MW			24-hour intervals maximum			5 weeks maximum
4. Low-hazard §	Small low-hazard boilers	125 kW (fire tube welded tubes) 250 kW (all other types)	AS 1228 or AS 1797 (not AS 2593)	Trained but not necessarily certificated person	24-hour intervals maximum	Normal boiler checks	A responsible and experienced person	Manufacturer's recommendations but at least annually

NOTES:

* Capacity denotes maximum rated power output that can be derived from the boiler.

† Plain tubes in the top two (2) rows of fire-tube boilers shall be unwelded at each end.

‡ Not necessarily continuous, but sufficiently frequent to ensure that the attendant will observe and take action in as short a time as possible, on any malfunction or change in conditions that may occur.

§ It is not intended that the requirements of this Standard apply to boilers deemed to be attended boilers and low-hazard boilers by the Inspecting Authority in the State or Territory in which the boiler is to be installed.

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Page 7 Clause 1.3.3.7

Line 3, *delete* the words 'approved by the Inspecting Authority as'.

AMDT No. 1 FEB. 1993

Page 7 Clause 1.3.3.9

1 Line 3, *delete* the words 'approved by the Inspecting Authority as'.

2 Line 6, *delete* the word 'approved' and *substitute* 'specified'.

AMDT No. 1 FEB. 1993

Page 8 Clause 1.3.27

1 Line 2, *delete* the words 'approved by' and *substitute* 'acceptable to'.

2 In the Note, *delete* the word 'approval' and *substitute* 'acceptance'.

AMDT No. 1 FEB. 1993

Page 8 Clause 1.3.34

Delete the existing Clause and *substitute* the following:

1.3.34 Self-checking system—a sub-circuit within the boiler management system, designed and arranged to automatically and regularly test the integrity of low water and flame failure devices by dynamic testing of each and every component on which safe and correct operation is dependent, usually by creating a change of state.

AMDT No. 1 FEB. 1993

Page 9 Clause 2.1.1

1 Item (b), line 4, after the word 'personnel', *insert* '(see Note)'.

2 After Item (c), *add* the following new Note:

NOTE: In order to minimize the operating water content and potential overheating effects in the event of a loss of water, unattended steam boilers are limited in Table 1.1 to water-tube construction type or electric boilers.

AMDT No. 1 FEB. 1993

Page 9 Clause 2.1.2

Delete the existing Clause and *substitute* the following:

2.1.2 Water gauges. Water gauges shall comply with AS 1271 and, if of the tubular type, shall be fitted with safety balls, to prevent the escape of both steam and water from a ruptured glass, and with approved protective guards.

AMDT No. 1 FEB. 1993

Page 9 Clause 2.2.3

After the existing paragraph, *add* the following new paragraphs:

The shell and tube ends of each limited attendance fire-tube boiler shall be protected from direct flame radiation.

Where a fire-tube boiler is converted to limited attendance operation, a reappraisal of the metal temperature and permissible heat input shall be made to ascertain that the converted boiler complies with the design temperature requirements of AS 1797.

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Page 9 Clause 2.6

After the existing paragraph, *add* the following new paragraphs:

Two devices shall be provided to protect against overheating of any tube circuit due to loss of flow or scale build-up. The action of any overheating protection device shall cause complete shutdown and require independent manual reset of that device.

The superheater design shall be such as to allow for the safe automatic start and operation of the boiler and superheater.

AMDT No. 1 FEB. 1993

Page 10 Clause 3.1

Third paragraph, line 4, *delete* the word 'approved' and *substitute* 'acceptable'.

AMDT No. 1 FEB. 1993

Page 10 Clause 3.4.2.2

Delete the existing first sentence and *substitute* the following:

One main fuel safety shut-off valve at least in a gas-fired system or an oil-fired system, and the main diverter valve in a solid-fuel-in-suspension-fired system shall close in not more than 1 s after it has been de-energized.

AMDT No. 1 FEB. 1993

Page 10 Clause 3.4.3

First paragraph, line 3, *delete* the word 'approved' and *substitute* 'acceptable'.

AMDT No. 1 FEB. 1993

Pages 10 and 11 Clause 3.5.1.2

1 Item (a), *delete* the existing first and second paragraphs in full and the first 3 lines of the third paragraph, and *substitute* the following:

(a) Not less than two low water safety devices of acceptable reliability, independent of each other. On unattended steam boilers, one such device shall be fitted directly into the steam drum. On limited attendance boilers, both devices may be fitted externally. For boilers exceeding 500 kW power output, one low water safety device shall be incorporated into an acceptable self-checking system.

The operation of low water safety devices shall be in accordance with the fault shutdown requirements of Clauses 4.2.3 or 5.2.4, as appropriate.

Where used as part of a self-checking system, the low water device shall comply with the following requirements:

2 *Delete* existing Item (a)(iv)(B) and *substitute* the following:

(B) Malfunctioning of the level device.

3 Item (b), first paragraph, line 5, delete the words 'unless otherwise approved'.

4 Item (b), after the second paragraph *insert* the following new Note:

NOTE: An existing boiler with externally fitted low water and level control devices using pneumatic or electronic transmitters fitted with 3-valve manifolds and sensing lines for low water and water level control, may be excluded from the requirements above for isolating and sequencing blowdown valves, subject to acceptance by the Inspecting Authority, when the boiler is converted from attended to limited attendance operation.

AMDT No. 1 FEB. 1993

Page 11 Clause 3.5.3.2

Line 1, *delete* the words 'Approved low' and *substitute* 'Low'.

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Page 12 Clause 3.5.5.1

Lines 3 and 4, *delete* 'Except where otherwise approved, an approved high' and *substitute* 'A high'.

AMDT No. 1 FEB. 1993

Page 12 Clause 3.5.5.2

1 Item (d), line 3, *delete* the word 'approved'.

2 Item (e), lines 2 and 3, *delete* the words 'an approved' and *substitute* 'a'.

3 Item (f)(i)(B), line 3, *delete* the word 'approved' and *substitute* 'acceptable'.

4 Item (f)(ii)(A), line 7, *delete* the word 'approved' and *substitute* 'acceptable'.

5 Item (f)(ii)(B), line 4, *delete* the word 'approved' and *substitute* 'acceptable'.

6 Note 1, line 1, *delete* the word 'approved'.

AMDT No. 1 FEB. 1993

Pages 12 and 13 Clause 3.6

Delete the existing Clause and *substitute* the following:

3.6 ELECTRICAL POWER ISOLATION. Each boiler management system shall incorporate a main isolator or circuit breaker which shall be capable of being locked in the open position, and shall be capable of being closed only by manual means.

The means of isolation shall be located in a safe and readily accessible location and shall be clearly and prominently labelled.

The reset facility shall be located in the vicinity of the boiler to enable a visual inspection of the boiler system to be made, prior to reset, to establish that the operating condition that required the operation of the isolator has been corrected and the boiler is in a safe starting condition.

AMDT No. 1 FEB. 1993

Page 13 Clause 3.7

Delete the existing Clause and *substitute* the following:

3.7 POWER FAILURE PROTECTION.

3.7.1 Design and construction. The boiler and combustion equipment shall be designed and constructed so that loss of electric power at any time shall cause complete shutdown.

The combustion chamber, bed, or grate system shall be designed and operated to minimize the stored energy in the system upon power failure.

3.7.2 Hazard of overheating. Where there is a hazard of overheating of pressure-retaining parts, e.g. where the combustion chamber is refractory-lined or there is a bed or grate solid-fuel-firing system capable of retaining a large quantity of heat energy, one of the following means shall be taken to minimize the hazard:

(a)(i) The main steam or energy outlet valve shall be closed, the feedwater control valve opened or bypassed; and

(ii) An auxiliary water supply pump either steam or engine-driven shall be started to maintain the feedwater level in the boiler.

(b) Alternatively, a type test may be performed by the manufacturer in accordance with Appendix F and the results made available to the Inspecting Authority.

AMDT No. 1 FEB. 1993

Page 13 Clause 3.8

1 Line 4, *delete* the designation 'AS 1288' and *substitute* 'AS 1228'.

2 After the existing paragraph, *add* the following new paragraph:

Where programmable logic controls are used, the program software shall be verified as complying with AS 2593, independently of the software designer. Where the program software has been certificated by the manufacturer, including independent verification, the program software shall be in the form of a non-volatile memory module which cannot be modified at site.

AMDT No. 1 FEB. 1993

Page 14 Clause 3.12

Delete the existing Clause and *substitute* the following:

3.12 MULTIPLE-BURNER INSTALLATIONS. Each multiple-burner installation shall comply with the requirements for multiple main burners in AS 1375.

AMDT No. 1 FEB. 1993

Page 14 Clause 3.14.1

Lines 1 and 2, *delete* the words 'Unless otherwise approved, a', and *substitute* 'A'.

AMDT No. 1 FEB. 1993

Page 18 Clause 4.3.3

1 Item (f), line 2, *delete* the word 'shall' and *substitute* 'should'.

2 Item (f), line 3, *delete* the words 'unless otherwise approved'.

AMDT No. 1 FEB. 1993

Page 18 Clause 4.3.5

Delete the existing Clause and *substitute* the following:

4.3.5 Steam-atomized burners. Where a steam-atomized burner is used, a suitable atomizing steam pressure interlock shall be fitted in the system.

AMDT No. 1 FEB. 1993

Page 18 Clause 4.4.3.2

Delete the existing Clause and *substitute* the following:

4.4.3.2 *Safety shut-off valve system requirements for main and start gas supplies.* The main burner gas supply and the start gas supply shall be fitted with separate safety shut-off valve systems which comply with the following minimum requirements, selected on the basis of the gas input rate through the individual system. Systems shall comply with AGA 501.

(a) Valves shall be automatic shut-off valves having the tightest shut-off requirements with respect to closure against reverse flow condition (refer AGA 214 Class 1).

(b) For a gas input rate not exceeding 5 GJ/h (1.4 MW), the valve arrangement shall be two valves in series.

(c) For a lighter-than-air gas where the gas input rate exceeds 5 GJ/h (1.4 MW) but does not exceed 20 GJ/h (5.5 MW), the valve arrangement shall be double block and vent.

(d) For a lighter-than-air gas where the gas input rate exceeds 20 GJ/hh (5.5 MW), the valve arrangements shall be—

  (i) double block and vent with a position proving system; or

  (ii) double block with a leakage detection system.

(e) For a heavier-than-air gas where the gas rate exceeds 5 GJ/h (1.4. MW), the valve arrangement is to be double block with a leakage detection system.

(f) Gas-fired equipment shall be installed in accordance with AGA 601.

In systems complying with Clause 4.4.3.2(d), no valve shall be energized unless closed position indicator switches, position proving valves, or leakage detection systems indicate or prove closed valves immediately prior to start-up.

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Page 18 Clause 4.4.3.3

Delete all the existing Clause and *substitute* the following:

4.4.3.3 *Leakage detection.* Where a leakage-detection system is used, such system shall check for gastightness—

(a) for boilers with forced draught only: immediately prior to or during a portion of the pre-purge period and may also check during the post-purge period; or

(b) for boilers with any other form of powered draught equipment: immediately prior to the start-up of any fan and may also check during the post-purge period.

The leakage-detection system shall activate an alarm and initiate a lockout in the event of a 'valve insufficiently gastight' signal when the leakage rate detected exceeds 300 L/h or 0.05% of the maximum gas flow rate, whichever is the lesser.

AMDT No. 1 FEB. 1993

Page 20 Clause 5.3.1

Delete the existing Clause and *substitute* the following:

5.3.1 General. Each component used in a solid-fuel-fired (bed or grate) boiler shall be designed and constructed so as to prevent a hazardous condition from arising.

AMDT No. 1 FEB. 1993

Page 20 Clause 5.3.4

Delete the existing Clause and *substitute* the following:

5.3.4 Ignition of bed fuel. Where ignition of the bed of a solid-fuel-fired combustion system is by automatic means, the automatic pilot ignition system shall comply with the relevant requirements in Sections 3 and 4 for a gas pilot or a low-fire gas start flame system.

Where ignition of the bed is by manual means, the operator shall ensure that combustion of the main fuel is stable before starting the supply of the main fuel to the bed or grate.

The support gas of a fluidized bed system shall comply with the relevant requirements for a low-fire gas start flame system.

AMDT No. 1 FEB. 1993

Page 20 Clause 5.3.6

Delete all the existing Clause and *substitute* the following:

5.3.6 Burn-back protection. The fuel feeding system of each solid-fuel-fired boiler shall be designed to prevent burn-back in the bunker in accordance with AS 3892.

AMDT No. 1 FEB. 1993

Page 21 Clause 5.3.7.1

Delete the existing Clause and *substitute* the following:

5.3.7.1 *General.* The boiler shall comply with the relevant requirements of Clauses 3.5, 3.7 and 5.3.7.2.

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Page 21 Clause 5.3.7.2

Delete all the existing Clause.

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Page 21 Clause 5.3.7.3

Redesignate the existing Clause 5.3.7.3 as 5.3.7.2.

AMDT No. 1 FEB. 1993

Page 21 Clause 5.3.8

Delete all the existing Clause, including the subclauses, and *substitute* the following:

5.3.8 Solid fuel and residue handling plant. The solid fuel and ash handling, storage and dust collection equipment for each boiler shall be in accordance with AS 3892.

AMDT No. 1 FEB. 1993

Page 22 Clause 6.2

Delete all the existing Clause, including the subclauses, and *substitute* the following:

6.2 HOUSING, ACCESS AND SECURITY. The housing, access and security requirements for each boiler shall be in accordance with AS 3892.

AMDT No. 1 FEB. 1993

Page 22 Clause 6.4

Delete all the existing Clause, including the subclauses, and *substitute* the following:

6.4 WATER TREATMENT. Each boiler shall be supplied with water treated in accordance with AS 3873.

AMDT No. 1 FEB. 1993

Page 22 Clause 6.5

After Clause 6.4, *add* the following new Clause:

6.5 BLOWDOWN. Each boiler shall be provided with blowdown facilities in accordance with AS 3892. In addition, each steam boiler which consumes water containing over 5 mg/L total solids and intended for operation for a period in excess of 8 h without human supervision shall be provided with at least one automatic device to control the level of the total dissolved solids during that period.

AMDT No. 1 FEB. 1993

Pages 23 and 24 Clauses 7.1 to 7.6

Delete all the existing Clauses, including all subclauses, and *substitute* the following:

7.1 FLUES AND CHIMNEYS. Each boiler shall be fitted with flues and a chimney in accordance with AS 3892.

AMDT No. 1 FEB. 1993

Page 25 Clause 8.2

Delete all the existing Clause and *substitute* the following:

8.2 ELECTRICAL DATA. The manufacturer shall provide sufficient information on the electrical control system to permit safe operation and maintenance of the boiler. The information shall include the following:

(a) Schematic wiring diagrams which shall identify each major item of equipment and its rating. The means of identification used shall correspond to that used for labelling the control panel and for the identification of switches, contactors, relays, circuit breakers, resets, indicators, terminals and cables.

(b) Flow sheets or circuit description detailing the operating sequence of the control system and its safety interlocking procedures, where electronic devices are fitted.

All symbols used shall comply with the relevant Australian Standards for graphic symbols for electrotechnology unless otherwise agreed by the owner.

AMDT No. 1 FEB. 1993

Page 25 Clause 8.5

After Clause 8.4, *add* the following new Clause:

8.5 CERTIFICATES. The owner shall ensure that an appropriate certificate of compliance with AS 2593 is issued prior to operation.

AMDT No. 1 FEB. 1993

Page 26 Clause 9.1

Line 10, *delete* the words 'the Inspecting Authority' and *substitute* 'AS 3873'.

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Page 26 Clause 9.2

Third paragraph, line 1, *delete* the words 'seeking approval to' and *substitute* 'who'.

AMDT No. 1 FEB. 1993

Page 26 Clause 9.3.1

1 First paragraph, line 6, *delete* the words 'approved by' and *substitute* 'acceptable to'.

2 *Delete* Items (a), (b) and (c), but not the Notes, and *substitute* the following, *adding* a new Item (d):

(a) Daily checking of each boiler other than excluded boilers (see Clause 9.3.4) in accordance with Clause 9.4.1.

(b) Weekly checking of each boiler other than excluded boilers (see Clause 9.3.4) in accordance with Clause 9.4.2.

(c) Periodic testing and maintenance of each boiler other than excluded boilers (see Clause 9.3.4) in accordance with Clauses 9.4.3 and 9.5.1.

(d) Yearly inspection, maintenance and testing at each boiler in accordance with Clause 9.5.2.

AMDT No. 1 FEB. 1993

Page 26 Clause 9.3.2

Delete the existing Clause and *substitute* the following:

9.3.2 Daily and weekly checking. The owner shall be responsible for the daily and weekly checking of the boiler to ensure its safe and reliable operation.

AMDT No. 1 FEB. 1993

Page 26 Clause 9.3.3

1 Line 4, *delete* the words 'approved by' and *substitute* 'acceptable to'.

2 *Delete* the existing Note.

AMDT No. 1 FEB. 1993

Page 26 Clause 9.3.4

After Clause 9.3.3, *add* the following new Clause:

9.3.4 Excluded boilers. The boilers referred to as excluded boilers in Clauses 9.3.1 and 9.4 shall be electrode boilers, electric element boilers with elements which fail before the pressure-retaining parts exceed their design temperature and electric element boilers not exceeding 250 kW power output with elements which cannot be assured of failing before the pressure-retaining parts exceed their design temperature.

The excluded boilers shall be examined daily for any obvious deterioration or malfunction.

AMDT No. 1 FEB. 1993

Page 26 Clause 9.4.1

Delete all the existing Clause and *substitute* the following:

9.4.1 Daily checking. Except for excluded boilers (see Clause 9.3.4) and water-heating boilers where the feedwater make-up is minimum, the operating and safety systems of each boiler shall be checked at least once per day.

The daily checking shall include the following:

(a) Blow down and check water gauge glasses for correct water level.

(b) Visually check operation of the water level controls on steam boilers.

(c) Check operation of each automatic blowdown system.

(d) Examine all glands, flanges and connections to ensure that there are no substantial leaks.

(e) Examine all locks and seals to ensure that there has been no unauthorized tampering.

Where the daily checking reveals the need for maintenance or adjustment, such maintenance shall be carried out as soon as practicable, in general in accordance with Clause 9.5.1.

AMDT No. 1 FEB. 1993

Pages 26 and 27 Clause 9.4.2

1 *Redesignate* existing Clause 9.4.2 as 9.4.3 and *insert* the following new Clause 9.4.2:

9.4.2 Weekly checking. In conjunction with the daily checking procedure (see Clause 9.4.1), additional checks shall be made at regular intervals not exceeding seven days and shall include the following:

(a) Test boiler water for the levels of total dissolved solids and pH.

(b) Check operation of flame failure detection system to shutdown energy input and boiler in correct order.

(c) Instigate a boiler shutdown and check shutdown procedure and the correct operation of the visual display panel during the shutdown sequence.

(d) For each boiler other than water-heating boilers, operate intermittent (manual) blowdown while the boiler is off-line.

NOTE: Waterwall headers should only be blown down while the boiler is off-line.

(e) For boilers other than water-heating boilers, blow down any external water level safety device and check operation of interlock.

(f) Reset any manual reset interlocks, check water level in gauge glasses and restart boiler.

(g) Check start-up sequence and visual sequence indicator operation.

(h) Check that all management systems are operating, all valves are correctly set and water level is correct before leaving boiler.

Where the weekly checking reveals the need for maintenance or adjustment, such maintenance shall be carried out as soon as practicable, in general in accordance with Clause 9.5.1.

The following information shall be recorded in a suitable log:

(i) Date and time of checking.

(ii) Each check and examination and the results thereof.

(iii) The name of the person who performed the checking.

(iv) Date and time of any lock-out or equipment malfunction.

2 Existing Clause 9.4.2, (now redesignated as Clause 9.4.3), *delete* the existing first three paragraphs and Item (a) and *substitute* the following:

9.4.3 Periodic testing. Except for excluded boilers (see Clause 9.3.4), periodic testing of the boiler operating and safety systems, in addition to daily and weekly checking, shall be carried out at intervals not exceeding the applicable period specified in Column 9, 'Maintenance—When', of Table 1.1.

The procedure shall be in accordance with that specified in Clause 9.4.1 and shall include the following additional checks:

(a) Lower the boiler water level to check the operation of the low water and extra low water devices.

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Page 27 Clause 9.4.3

Redesignate existing Clause 9.4.3 as 9.4.4.

AMDT No. 1 FEB. 1993

Page 27 Clause 9.5.2

1 First paragraph, lines 6 and 7, *delete* the words 'as required by the Inspecting Authority'.

2 Item (a), *delete* the words 'the Inspecting Authority' and *substitute* 'AS 3788'.

AMDT No. 1 FEB. 1993

Page 28 Clause 9.7.1

Delete the existing Clause and *substitute* the following:

9.7.1 General. Where the boiler owner requires the maintenance specified in Clauses 9.4 and 9.5 to be carried out by a contractor, the boiler owner shall:

(a) Enter into a written maintenance contract with the contractor.

(b) Verify that the contractor has the experience and facilities to carry out the maintenance in a manner acceptable to the Inspecting Authority.

(c) Ensure that the maintenance contract is in force at all times during the boiler operation.

(d) Make the boiler available to the contractor at agreed times to allow the maintenance period requirements of Table 1.1 to be met.

(e) Obtain maintenance reports from the contractor in accordance with Clause 9.5.4.

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Page 28 Clause 9.7.2

Line 2, *delete* the words 'approved by' and *substitute* 'acceptable to'.

AMDT No. 1 FEB. 1993

Page 28 Clause 9.7.3

Lines 3 to 5, *delete* the words 'notify the Inspecting Authority and the contractor accordingly, and shall'.

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Page 29 Appendix A

1 *Insert* the following Australian Standards in the appropriate sequence:

1375 SAA Industrial Fuel-fired Appliances Code

3788 Boilers and pressure vessels—In-service inspection

3873 Boilers and pressure vessels—Operation and maintenance

3892 Boilers and pressure vessels—Installation

2 *Delete* the following British Standards (BS):

2486 Recommendations for treatment of water for land boilers

4076 Specification for steel chimneys

3 After the existing list of Standards, *insert* the following:

AGA (The Australian Gas Association)

214 Approval requirements for automatic shut-off valves and vent valves

501 Code for industrial and commercial gas-fired appliances

601 Gas installation code

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Page 30 Paragraph B2

Item (b), line 1, *delete* the words 'approved by' and *substitute* 'acceptable to'.

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Page 36 (new) Appendix F

After existing Appendix E, *add* the following new Appendix:

APPENDIX F

TYPE TEST FOR A BOILER SUBJECT TO POWER FAILURE

(This Appendix forms an integral part of this Standard.)

F1 GENERAL. This Appendix gives a procedure and acceptance criteria for a type test for checking the ultimate safety of the design of a boiler that may be subject to a power failure. It is intended for use for a boiler where a potential hazard may exist due to stored heat energy in the system, e.g. where the combustion chamber is substantially refractory-lined or the boiler is a solid-fuel-fired, bed or grate type, and the boiler is not fitted with an independent auxiliary water supply pump that would automatically operate when a power failure occurs.

F2 TYPE TEST. Provided that the boiler tested is representative of a manufacturer's standard product range for the boiler type, including combustion equipment arrangement, fuel type, refractory content and installation, the test shall be deemed to be representative of other boilers in the standard product range.

F3 TEST PROCEDURE. The procedure for the test shall be as follows:

(a) Identify each critical part of the boiler.

NOTE: A critical part is a part which would first become heated above its design temperature in the event of loss of water by boiling off due to stored heat energy in the boiler system.

(b) Attach a temperature sensing device to each critical part such that the temperature/time relationship is indicated.

NOTE: Recording may be necessary if required as evidence by the Inspecting Authority.

(c) Fire the boiler at maximum capacity for a minimum period of 30 min.

(d) Leave the main steam or energy outlet in the normally open position.

(e) Simulate a power failure by opening the main power switch. The shutdown of the water supply, combustion system, fan and draught system shall be complete.

(f) Monitor and log the temperature of the boiler metal at each critical part for at least 30 min after the shutdown of power. Record the maximum metal temperature.

If the metal temperature of any part exceeds its design temperature during the course of the test, the test shall be aborted and the following steps taken:

(i) Close the main steam or output valve.

(ii) Re-establish the power supply to the boiler.

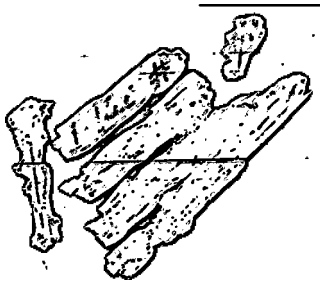
(iii) Shutdown any fuel supply system and, for a solid-fuel-fire bed or grate boiler, rake over the fuel bed to minimize radiation to the boiler heating system.

F4 ACCEPTANCE CRITERIA. Provided that the metal temperature of any part monitored in the test does not exceed its design temperature, the boiler shall be deemed to have passed the test, notwithstanding the fact that it is likely that, for a steam boiler, the water level will drop below the level visible in the water level gauge glass, due mainly to evaporation of steam as the pressure decays.

AS 2593—1990

Australian Standard®

Boilers—Unattended and limited attendance



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PREFACE

This Standard was prepared by Standards Australia's Committee on Boilers and Pressure Vessels, to supersede AS 2593—1983, *Boilers—Unattended.*

The first edition (1983) of this Standard was primarily directed to boilers up to 3 MW rating, and in general required that unattended steam boilers be restricted to water-tube types but allowed any type of boiler to be used as a hot water boiler. It was based on information and experience then available in Australia on the operation of such boilers, particularly in Victoria where they had been covered by regulations since 1973.

Subsequently, the inspecting authorities developed a table of boiler attendance categories as their criteria for the uniform regulation of supervision, attendance, and maintenance requirements for various types of automatically controlled industrial boilers. Recognizing that some States and Territories may have to amend legislation or regulations to accommodate these criteria, the inspecting authorities have agreed that these criteria may be used to specify types of boilers, and associated limits, covered in this edition of the Standard.

The major change in this edition is the extension of the scope to cover limited attendance boilers as well as unattended boilers within the criteria for type, capacity, and attendance category developed by the inspecting authorities as their basis for the uniform regulation of these boilers. It also introduces requirements for solid-fuel-in-suspension firing as well as criteria for the approval of testing and maintenance organizations and personnel.

The overall safety and efficiency of a boiler is dependent on appropriate supervision, inspection, and maintenance of the boiler. Inspecting authorities have issued or are currently preparing regulations to cover such aspects, and this Standard is to be read in conjunction with the appropriate statutes or regulations.

The design parameters, types of boilers, associated equipment, controls, and installation requirements in this Standard have been selected to maximize the two most important features essential to safe and reliable operation of boilers without continuous human supervision—

(a) the overall system of control of operations which must be highly reliable, maximize fail-safe features of all equipment, and utilize self-checking fail-safe features for all critical control equipment; and

(b) the type of boiler and energy input which must be such that in the rare event of the overall system of control failing unsafe, the mode of failure of the boiler system will result in minimal risk to any person.

Users of this Standard are reminded that it has no legal authority in its own right, but may acquire legal standing in one or more of the following circumstances:

(i) Adoption by a government or other authority having jurisdiction.

(ii) Adoption by a purchaser as the required standard of construction when placing a contract.

(iii) Adoption where a manufacturer states that a vessel is in accordance with this Standard.

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STANDARDS AUSTRALIA

Australian Standard

Boilers—Unattended and limited attendance

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard specifies requirements for unattended and limited attendance boilers which are intended to be operated for periods with no human supervision. It includes special features within the control, management and supervision systems, associated valves and fittings, housing, and installation, as well as requirements and responsibilities for checking, testing and maintenance of these boilers.

The limits on the type, design criteria, and usage of unattended and limited attendance boilers to which this Standard is intended to apply are as follows:

(a) Boilers for fixed land installations.

(b) Boilers having a design pressure not exceeding 2.5 MPa.

(c) Boilers having a power output within the capacity specified in Table 1.1 for the boiler type and category. (See also Note 1.)

(d) Boilers complying with the supervision and maintenance requirements specified in Table 1.1 for the boiler type and category.

(e) Boilers for the generation of steam, or other vapour, for which duty the types of boiler permitted are—

(i) water-tube type, electric type, or low hazard type (see Table 1.1) for unattended operation; and

(ii) any type of boiler for limited attendance operation (see Table 1.1).

(f) Boilers for the heating of water, or other liquid at a pressure above that of the atmosphere and to a temperature not less than the normal atmospheric boiling temperature of the liquid, for which duty any type of boiler complying with AS 1228 or AS 1797 is permitted for unattended operation, provided that for other than water-tube and electric type boilers, steam or vapour is not generated in the boiler and the boiler drum or shell is fully flooded.

(g) Boilers having any of the following sources of energy input:

(i) Gas fuel (mains or other gases).

(ii) Oil fuel with a closed flashpoint greater than 23 °C.

(iii) Solid fuels, including solid-fuel-in-suspension.

(iv) Waste heat fluids.

(v) Electric power.

NOTES:

1. This Standard may also be applied to boilers outside the limits specified in (a) to (g) above where equivalent safety and reliability are ensured and the boiler and its installation are ~~approved by~~ the Inspecting Authority. Current requirements of some Inspecting Authorities may vary from the criteria given in Table 1.1.

2. Except for definitions in Clause 1.3.3, other Clauses in the Standard refer to steam and water only; it is intended that the Standard may be applied to other fluids subject to ~~the approval of~~ and compliance with any additional safety features required by the Inspecting Authority.

SEE AMENDMENT 1

1.2 REFERENCED DOCUMENTS. A list with titles of the documents referred to in this Standard is given in Appendix A.

1.3 DEFINITIONS.

SEE AMENDMENT 1

1.3.1 ~~Approved, approval—approved by, or approval of, the Inspecting Authority~~.

1.3.2 Authority having jurisdiction—the authority having statutory powers to control the design, manufacture and installation of services, pollution control equipment, fire protection systems and others, as appropriate.

NOTE: The definition is not intended to mean the purchaser or manufacturer where no authority appears to have jurisdiction. In such cases, the matter should be referred to the Inspecting Authority.

1.3.3 Boilers.

1.3.3.1 *Boiler*—an arrangement of vessels and interconnecting parts, wherein steam, or other vapour is generated, or water or other liquid is heated at a pressure above that of the atmosphere by the application of fire or the products of combustion or by electrical means or by solar means.

It also includes valves, gauges, fittings and controls directly associated with the boiler and, where consistent with the requirements of this Standard, includes the boiler setting and associated equipment.

It does not include a fully flooded system or pressurized system where the water or other liquid is heated to a temperature lower than the normal atmospheric boiling temperature of the liquid.

1.3.3.2 *Electrode boiler*—a boiler in which the water or other liquid is heated by the passage of an alternating current through the liquid.

1.3.3.3 *Element boiler*—a boiler in which the water or other liquid is heated by an electrical element.

1.3.3.4 *Fire-tube boiler*—a boiler in which the water or other liquid to be heated is contained in a vessel which may be directly heated or contain tubes in which combustion takes place or through which products of combustion flow.

1.3.3.5 *Forced circulation boiler*—a water-tube boiler composed of a small number of long tubes in which evaporation is substantially suppressed and into which tubes a regulated flow of water is forced, a mixture of steam and water flowing from the outlet end of each tube and entering an unheated separator where the water and steam are separated, the water returning to the system.