DUP
Under Revision See DR95737

Amendment 1 - January 1992.
Amendment 2 - December 1992.

AS 3788—1990

Australian Standard®

Boilers and pressure vessels—In-service inspection

STANDARDS AUSTRALIA

J

This Australian Standard was prepared by Committee ME/1, Boilers and Unfired Pressure Vessels. It was approved on behalf of the Council of Standards Australia on 21 May 1990 and published on 17 September 1990.

The following interests are represented on Committee ME/1:

ACT Administration—Office of City Management
Australian Compressed Air 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 Industrial Relations and Employment, N.S.W.
Department of Labour and Industry, Tas.
Department of Labour, S.A.
Department of Labour, Vic.
Department of Occupational Health, Safety and Welfare, W.A.
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
Society of Mechanical Engineers of Australasia
Sugar Research Institute
Welding Technology Institute of Australia
Work Health Authority, N.T.

This Standard was issued in draft form for comment as DR 88104.

STANDARDS AUSTRALIA

Amendment No 1
to
AS 3788—1990
Boilers and pressure vessels—In-service inspection

REVISED TEXT

The 1990 edition of AS 3788 is amended as follows; the amendments should be inserted in the appropriate place.

SUMMARY: This Amendment applies to Clauses 1.3.3, 1.3.13, 2.4, 3.1, 3.3.1, 3.4, 4.1, 4.3, 4.4.3.4, 4.4.3.6, 4.6.3, 4.6.4, 4.6.5.3, 5.2.5.1, 5.3.2, 5.3.3, 5.3.5, 5.3.6, 5.3.8, 6.1, 6.3, 8.3, Table 4.1 and Appendices A, B, E, F, G and N.

Published on 17 January 1992.

AMDT No 1 JAN 1992

Page 5 Clause 1.3.3

Last line, *delete* 'as assessed by the owner' and *add* the following new Notes:

NOTES:

1 A competent person shall be each person involved in the overall inspection process who contributes to the integrity assessment of the pressure equipment and includes the accredited inspector.

2 A competent person may seek specialist advice and assistance as required to make mature judgement.

AMDT No 1 JAN 1992

Page 7 Clause 1.3.13

Add the following new Clause 1.3.13:

1.3.13 Defect—imperfections, damage, deterioration, or deficiencies in pressure equipment.

NOTE: The presence of a defect in pressure equipment does not necessarily imply that the equipment is unfit for service.

AMDT No 1 JAN 1992

Page 8 Clause 2.4

Add the following new Clause 2.4:

2.4 INSPECTION PROCESS The inspection process shall achieve the objectives of the inspections (see Clause 2.1), shall be cognisant of the inspection elements (see Clause 2.2) and shall be performed at the stages required in Clause 2.3 and as follows:

(a) The inspection requirements are planned by consultation between the accredited inspector, the owner and competent persons as required. The planning stage will establish the items of plant to be inspected, the scope of inspections, methods of inspections, requirements for surface preparation, safety requirements, and other relevant matters.

(b) Where appropriate, an inspection shall be performed while the plant is operational for signs of deterioration, damage or evidence that suggests damage or deterioration may exist, e.g. leaks, vibration. The planned inspections may be reviewed based on this inspection.

(c) Based on the results of the inspection, the accredited inspector shall assess the findings and provide a report to the owner which includes the following:

  (i) Summary of the inspections performed, the inspection methods and findings.

  (ii) Detailed inspection reports for all inspections.

  (iii) The criteria for assessment of the inspection findings.

  (iv) The results of the assessment of the inspection findings.

  (v) Reports covering the assessment of the inspection findings, e.g. assessments by the inspector or competent persons.

  (vi) The recommended interval to the next inspection.

  (vii) Special comments, e.g. defect monitoring requirements, recommended future inspections, recommended repairs, or recommended changes to current operating practices and parameters.

Where appropriate, a certificate for continued operation shall be furnished by the accredited inspector.

ISBN 0 7262 7233 7

AMDT No 1 JAN 1992

Page 9 Clause 3.1

1st sentence, *add* the following:

'(as defined in Table 4.1)'.

2nd sentence, *delete* 'preferably' and the last 'should'.

Add the following as a last paragraph:

The owner shall ensure that all persons involved in assessing the integrity of the pressure equipment are competent.

AMDT No 1 JAN 1991

Page 9 Clause 3.3.1

3rd paragraph, *delete* 'AS 3900 and should' and *substitute* 'AS 3901 or AS 3902 and shall'.

AMDT No 1 JAN 1992

Page 10 Clause 3.4

After 'LP gas automatic fuel vessel', *add* 'and'.

Insert '(' before 'including'.

Insert ')' after 'capacity'.

AMDT No 1 JAN 1992

Page 11 Clause 4.1

Add the following as 2nd and 3rd paragraphs:

Inspections referred to in Table 4.1 shall be executed by an accredited inspector.

The owners' attention is especially drawn to their responsibilities as specified in Clause 4.4.3.4.

AMDT No 1 JAN 1992

Page 11 Clause 4.3

Add the following Note after the second paragraph:

NOTE: AS 3873 refers to requirements for the operation and maintenance of pressure equipment.

AMDT No 1 JAN 1992

Page 12 Clause 4.4.3.4, second line

Delete 'pressure'.

AMDT No 1 JAN 1992

Page 13 Table 4.1—NOTES

Note 6, 2nd sentence, after 'reheaters' *add* 'vacuum vessels'.

AMDT No 1 JAN 1992

Page 13 Clause 4.4.3.6(a)(xv)

After 'zinc' *add* 'or'.

AMDT No 1 JAN 1992

Page 16 Clause 4.6.3

Delete 'establish procedures' and *substitute* 'ensure procedures are established'.

AMDT No 1 JAN 1992

Page 16 Clause 4.6.4

First sentence after 'In-service', *add* 'visual'.

Add the following new last sentence:

Valves with easing gear should be operated.

AMDT No 1 JAN 1992

Page 16 Clause 4.6.5.3

Last paragraph, after 'a competent person' *add* 'or where required by the Inspecting Authority, by an accredited inspector.'

AMDT No 1 JAN 1992

Page 19 Clause 5.2.5.1(c)(v)

Delete 'and'

Page 19 Clause 5.2.5.1(c)(vi)

Add '; and'

Page 19 Clause 5.2.5.1(c)

Add the following:

(vii) the material thickness.

AMDT No 1 JAN 1992

Page 21 Clause 5.3.2(e)

Add the following at the end of the sentence:

'and known specific defects'.

AMDT No 1 JAN 1992

Page 21 Clause 5.3.3

First sentence, *delete* 'following:' and *insert* 'assessment of specific defects.'.

AMDT No 1 JAN 1992

Page 21 Clause 5.3.3(a)

Delete '(a) *Assessment of specific defects*'.

AMDT No 1 JAN 1992

Page 21 Clause 5.3.3(b)

Transfer 'Clause 5.3.3(b)' to new Clause numbered '**5.3.8**'.

AMDT No 1 JAN 1992

Page 22 Clause 5.3.5

Delete 'n =' and *substitute* 'n_i ='.

Delete 'N =' and *substitute* 'N_i ='.

AMDT No 1 JAN 1992

Page 22 Clause 5.3.6

For 'T_m =' *delete* '(see Appendix N)'.

AMDT No 1 JAN 1992

Page 22 Clause 5.3.8

Renumber as '**5.3.9**'.

First sentence, *delete* 'above' and *insert* '(Clauses 5.3.4, 5.3.5, 5.3.6 and 5.3.7)'.

AMDT No 1 JAN 1992

Page 24 Clause 6.1(b)

Delete 'competent personnel' and *substitute* 'a competent person(s)'.

AMDT No 1 JAN 1992

Page 24 Clause 6.3

First sentence, *delete* 'reduce' and *substitute* 'alter' and *delete* 'to exceed the original design parameters'.

AMDT No 1 JAN 1992

Page 24 Clause 6.3(b)

Delete 'should' and *substitute* 'shall'.

AMDT No 1 JAN 1992

Page 24 Clause 6.3(d)

Delete 'should' and *substitute* 'shall'.

AMDT No 1 JAN 1992

Page 29 Clause 8.3(e)

Delete 'correspondence' and *substitute* 'records'.

AMDT No 1 JAN 1992

Page 31 Appendix A

Delete entry for AS 3900 and *insert* the following:

3873	Boilers and pressure vessels—Operation and maintenance
3901	Quality systems for design/development, production, installation and servicing
3902	Quality systems for production and installation

AMDT No 1 JAN 1992

Page 32 Paragraph B2.2

First sentence, after 'study' *insert* '(HAZOP)'.

AMDT No 1 JAN 1992

Page 42 Table E2

Delete existing Table and *substitute*:

TABLE E2

SUMMARY OF TYPE AND FREQUENCY OF INSPECTION OF TRANSPORTABLE VESSELS

Inspection			Type of vessel					
Period	Location		Anhydrous ammonia cargo (and others subject to stress corrosion cracking)	AS 1210 Group G steels (Q and T construction)	Liquefied gas vessels >14 000 L (including LPG but excluding anhydrous ammonia and Group G steels [Q and T construction])	Insulated vessels and cryogenic vessels	Powder discharge vessels with non-corrosive, non-flammable or non-toxic cargoes	Others
First year of service	External	Welds with cyclic bending	V	V and NDE	V and NDE	See Note	Nil	V
		Other welds	V	V and NDE	V and NDE		Nil	V
	Internal	Welds with cyclic bending	V and NDE	V and NDE	V and NDE		Nil	V
		Other welds	V	V and NDE	V and NDE		Nil	V
		Knuckles	V and NDE	—	V		Nil	V
Subsequent years of service	External	Welds with cyclic bending	V 1y, NDE 3y	V 1y, NDE 3y	V 4y, NDE 4y		V 5y	V 4y, NDE 4y
		Other welds	V 1y, NDE 6y	V 1y, NDE 3y	V 4y, NDE 8y		V 5y	V 4y, NDE 8y
	Internal	Welds with cyclic bending	V 1y, NDE 1y	V 3y, NDE 3y	V 8y, NDE 8y		V 10y	V 8y, NDE 8y
		Other welds	V 1y, NDE 3y	V 3y, NDE 3y	V 8y, NDE 8y		V 10y	V 8y, NDE 8y
		Knuckles	V 1y, NDE 3y	—	V 8y		V 10y	V 8y

LEGEND:

L = litres
LPG = liquefied petroleum gas
NDE = non-destructive examination
Q and T = quenched and tempered
V = visual inspection
1y, 3y, 4y, etc. = inspections at one, three, four, etc. year intervals, respectively

NOTE: The type and frequency of inspection of insulated vessels and cryogenic vessels is to be by agreement.

AMDT No 1 JAN 1992

Page 44 Paragraph F4(j)

Delete 'the first 10 years of operation or after' and *insert* 'each 10 years of operation or after each'.

Add final sentence 'When a defect is found at the rear, the front end should be examined.'

AMDT No 1 JAN 1992

Page 45 Paragraph G3

Last paragraph, *add* 'by a competent person'.

AMDT No 1 JAN 1992

Page 65 Paragraph N3.6(a)

Last line, *delete* 'then substitute $(t - c)$ for t' and *substitute* 'then substitute $(t_m - c)$ for t_m'.

AS 3788—1990

Australian Standard®

Boilers and pressure vessels—In-service inspection

First published as AS 3788—1990.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 6363 X

PREFACE

This Standard was prepared by the Standards Australia Committee on Boilers and Unfired Pressure Vessels. It was recognized there was a need to give guidance to users, inspectors, and statutory authorities on the inspection of in-service pressure equipment. Existing Standards on pressure vessels, while specifying requirements for the safe design, construction, and installation of pressure equipment, do not provide information for its in-service inspection or maintenance.

This Standard forms part of AS 1200, SAA Boiler Code. The SAA Boiler Code is referred to in Statutory Regulations within Australia.

It provides inspection requirements to ensure the continued safe operation of the pressure equipment. In special circumstances additional requirements may be necessary for adequate performance or safety. The material contained in this Standard will be a valuable aid in the training of inspectors.

Users of this Standard are reminded that it has no legal authority in its own right, but acquires legal standing where adopted by government or other authority having jurisdiction, or if specified as part of a commercial contract.

During the preparation of this Standard, reference was made to the following publications:

AIP CP12—1985	Code of practice for inspection of boilers and unfired pressure vessels in process plants
API 510—1980	Pressure vessel inspection code. Maintenance, inspection, rating, repair, and alteration
API	Guide to inspection of refinery equipment
ANSI/NB-23—1984	National board inspection code
ROSPA—1975	Registration and periodic inspection of pressure vessels (Published by Imperial Chemical Industries Ltd).
IP	Model code of safe practice. Part 12—1976.

Acknowledgement is made of the assistance obtained from these publications.

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

CONTENTS

Page

APPENDICES

STANDARDS AUSTRALIA

Australian Standard

Boilers and pressure vessels—In-service inspection

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard specifies the requirements for the inspection, repair and alteration of in-service boilers, unfired pressure vessels, and associated control and safety equipment, and piping (hereinafter referred to as pressure equipment), and gives guidance in the execution of such inspection. It includes the initial inspection after installation and prior to commissioning. The inspection flow diagram (Figure 1.1) illustrates the various types of inspection covered by this Standard.

This Standard provides information for Inspecting Authorities, owners, and inspectors to facilitate agreement on, and the establishing of uniform minimum requirements for in-service inspections, including inspection frequencies and procedures to ensure safe and economic operation. Information is provided for the assessment of defects and deterioration of pressure equipment.

NOTE: No rules can be written in sufficient detail to cover all aspects of the inspection of in-service pressure equipment. Each owner is responsible for ensuring that the extent and frequency of inspection is adequate for the continued safe operation of the pressure equipment. This may require the seeking of expert outside advice.

This Standard provides a basis for establishing the competence of inspection personnel and may be used by Inspecting Authorities to set minimum standards of inspection.

This Standard applies to but is not limited to the following pressure equipment:

(a) Boilers and associated pressure parts, controls and pipework covered by AS 1228, AS 1797 and AS 2593.

(b) Unfired pressure vessels and associated pressure parts, controls and pipework covered by AS 1210 and AS 2971 (serially produced pressure vessels).

(c) Pressure piping covered by AS CB15.1, AS CB15.3, AS CB15.5, AS CB18.1 and AS 1135.

(d) Storage tanks built to API 620 or equivalent.

This Standard does not apply to—

(i) pumps, compressors or turbine casings;

(ii) gas cylinders covered by AS 2030.1, AS 2030.2 and AS 2030.4 (i.e. not exceeding 500 kg water capacity) which are inspected in accordance with AS 2337.1;

(iii) pipelines covered by AS 1697, AS 1958, AS 2018 and AS 2885;

(iv) aerosol containers covered by AS 2278;

(v) domestic hot water supply heaters and tanks covered by AS 1056.1, AS 1529 and AS 3142, and other domestic pressure equipment;

(vi) LP gas vessels for automotive purposes covered by AS 3509; or

(vii) fire-extinguishers covered by AS 1841, AS 1842, AS 1844, AS 1845, AS 1846, AS 1847 or AS 1848.

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

Where reference is made to a Standard by its number only, the reference applies to the current edition of the Standard including any amendments. Where reference is made to a Standard by number, year, and where relevant an amendment number, the reference applies to that specific document.

1.3 DEFINITIONS For the purposes of this Standard, the definitions below apply.

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

1.3.2 Boiler management system—a system that controls the entire boiler function including the energy input management system, the water level management system, the pressure controls, instruments and circuitry.

1.3.3 Competent person—a person suitably qualified, adequately trained, and appropriately experienced for the class or kind of work in which the person is engaged, ~~as assessed by the owner.~~ SEE AMENDMENT (1)

1.3.4 Dangerous occurrence—is defined as—

(a) an explosion or fire;

(b) any occurrence resulting in the death of or serious injury to any person or in substantial damage to property; or

(c) any other occurrence involving imminent risk of any explosion or fire, or any such death, injury or damage.