

Australian Standard®

Assurance of product quality

**Part 1: Pressure equipment
manufacture**

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 26 August 1993 and published on 27 September 1993.

The following interests are represented on Committee ME/1:

A.C.T. Occupational Health and Safety Office
Aluminium Development Council
Australian Chamber of Commerce and Industry
Australian Compressed Air and Mining Equipment Institute
Australian Institute for Non-destructive Testing
Australian Institute of Energy
Australian Institute of Petroleum
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National Occupational Health and Safety Commission

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PREFACE

This Standard was prepared by Standards Australia in conjunction with the National Occupational Health and Safety Commission (NOH&SC), also known as Worksafe Australia. The Standard was initiated by the Standards Australia Committee on Boilers and Pressure Vessels and has relevance to—

- (a) increasing national and international acceptance of the use of Quality Assurance (QA) as a means by which manufacturers and suppliers can provide assurances to purchasers, users and regulatory authorities that products and services are meeting the required standards; and
- (b) the Special Premiers' Conference held in October 1990 which highlighted the pressure equipment industry as one industry where regulatory review was required.

Occupational health and safety regulating agencies have indicated their collective view that QA could provide a framework by which manufacturers and suppliers could demonstrate compliance with the performance-based requirements of occupational health and safety legislation. However, it was recognized that QA alone would not provide full assurance in high hazard situations and that certain levels of external design verification and inspection of the product would be required, depending upon the hazard level. The hazard levels adopted in this Standard are comparable with those proposed by the European Community, Pressure Equipment Directive.

Existing Standards for pressure equipment come under the general banner of AS/NZS 1200—*Pressure equipment*. The Standards referenced in AS/NZS 1200 specify inspection requirements but do not deal with QA aspects. These Standards are largely based upon traditional legislative requirements which involve inspection by the regulating authorities. Newer style occupational health and safety legislation requires manufacturers, suppliers and owners to take full responsibility for their activities with pressure equipment. To assist in this process and to align with leading world practice, this Standard requires traditional external third-party inspection for more hazardous equipment but reduces this requirement where certified quality systems are in use.

This Standard is a new edition to the Standards referenced in AS/NZS 1200 and applies to boilers, pressure vessels and piping. Such equipment is a component of general hazardous plant and thus the concepts of QA and hazard levels contained in this Standard may apply to other hazardous plants. Also, in forming this Standard its important relationship with occupational health and safety legislation and the proposed NOH&SC *National Regulatory Model for Plant*, has been taken into account.

Because major changes to current practice will result from the use of this Standard, a transition period for adjustment of practices will be necessary. It is proposed that this Standard may be implemented from the date of publication with the acceptance of the relevant regulatory authority, but should not become mandatory until January 1994 or other time determined by the regulatory authorities. It is also expected that some improvements may be necessary as a result of experience in the use of the Standard.

This Standard is not intended to be retroactive; and the design and equipment already verified or approved do not require reverification in accordance with this Standard. Subsequent alterations, however, are the subject of this Standard.

Statements expressed in mandatory terms in Notes to Tables are deemed to be requirements of the Standard.

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STANDARDS AUSTRALIA

Australian Standard

Assurance of product quality

Part 1: Pressure equipment manufacture

S E C T I O N 1 S C O P E A N D G E N E R A L

1.1 SCOPE This Standard specifies requirements for the assurance of product quality in the manufacture of boilers, pressure vessels and pressure piping including associated safety equipment (hereinafter termed pressure equipment). It covers both purchaser specifications and regulatory requirements and recognizes the manufacturer's certified quality systems and the utilization of external design verification and inspection of fabrication.

The Standard applies to design, fabrication, inspection, testing, and despatch of the above equipment; and also applies to design and fabrication inspection requirements in relation to alterations and repairs where required by other Standards, e.g. AS 3788 and AS 3873. It does not apply to—

- (a) pressure equipment outside the scope of AS/NZS 1200;
- (b) installation of boilers and pressure vessels covered by AS 3892;
- (c) operation (including commissioning) and maintenance of boilers, pressure vessels and piping covered by AS 3873;
- (d) in-service inspection of boilers, pressure vessels and piping covered by AS 3788;
- (e) servicing of pressure equipment;
- (f) gas cylinders as defined in AS 2030;
- (g) transmission pipelines as defined by AS 1697, AS 1958 and AS 2885; or
- (h) tanks covered by AS 1692, AS 1940, API 650, and equivalent Standards.

NOTE: The Standard makes provision for additional requirements specified by the purchaser which are to be negotiated by the relevant parties, e.g. purchaser, designer, manufacturer, design verifying body and fabrication inspection body.

This Standard is referenced in AS 3788, AS 3873 and AS 3892 for the purpose of identifying hazard levels.

From the date of publication of AS 4343—1999, the Regulatory Authorities of New South Wales (WorkCover New South Wales), Victoria (Victorian WorkCover Authority), and Tasmania (Workplace Standards Authority) no longer endorse the provisions of AS 3920.1—1993, *Assurance of product quality*, Part 1: *Pressure equipment manufacture*.

1.2 APPLICATION This Standard is intended for use by those involved with the manufacture and associated aspects of safety and reliability of pressure equipment, i.e. purchasers, manufacturers, designers, material and component suppliers, test laboratories, verification bodies, inspection bodies and regulatory authorities.

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

1.4 DEFINITIONS For the purposes of this Standard, the definitions given in AS/NZS ISO 8402 and those below apply:

1.4.1 Alter—to change the design of, add to or take away from the plant where the change may affect health and safety, but does not include routine maintenance, repairs or replacements.

1.4.2 Audit, full—an audit performed by a JAS-ANZ accredited or approved auditing organization in which compliance or non-compliance to all the system elements prescribed in the quality management Standard is ascertained.

NOTE: In the interim period, until 31 December 1995, audits may be conducted by an auditing organization acceptable to the regulatory authority, instead of being accredited or approved by JAS-ANZ.

1.4.3 Audit, partial—an audit performed by a JAS-ANZ accredited or approved auditing organization between the full audits that it performs. Compliance or non-compliance to only some of the system elements is ascertained.

NOTE: In the interim period, until 31 December 1995, audits may be conducted by an auditing organization acceptable to the regulatory authority, instead of being accredited by JAS-ANZ.

1.4.4 Boiler—a vessel or 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, the products of combustion, electrical power, or similar high temperature means. It also includes superheaters, reheaters, economizers, boiler piping, supports, mountings, valves, gauges, fittings, controls, the boiler setting and directly associated equipment. It does not include a fully flooded or pressurized system where the water or other liquid is heated to a temperature lower than the normal atmospheric boiling temperature of the liquid.

1.4.5 Certified—certified by a certifying body.

1.4.6 Certifying (certification) body—a body accredited or approved by JAS-ANZ for the purpose of certifying manufacturer's quality systems, design verifying bodies, fabrication inspection bodies, or in-service inspection bodies. A certifying body shall not certify itself as a design verification body or a fabrication inspection body.

NOTE: In the interim until 31 December 1995, the regulatory authority may accept competent organizations as a certifying body.

1.4.7 Designer—a body corporate, firm or person responsible for the design of the pressure equipment.

1.4.8 Design verifying (verification) body—a body corporate or firm external to that of the designer and responsible for the verification of the design. The design verifying body may be a regulatory authority. (See Clause 4.5.)

1.4.9 External design verifier—a person employed by the design verifying body for the purpose of verifying pressure equipment designs. (See Clause 4.5.)

1.4.10 Fabrication inspection body—a body corporate or firm external to that of the manufacturer, and responsible for the inspection of materials and construction of pressure equipment. The fabrication inspection body may be a regulatory authority. (See Clause 5.4.)

1.4.11 Fabrication inspector—a person employed by the fabrication inspection body for the purpose of inspecting the fabrication of pressure equipment. (See Clause 5.4.)

1.4.12 Fired heater—a pressure vessel wherein a liquid is heated below its atmospheric boiling temperature or a process fluid is heated in tubes above or below its atmospheric boiling temperature by the application of fire, the products of combustion, electric power or similar high temperature means.

1.4.13 JAS-ANZ*—the joint accreditation system of Australia and New Zealand, which accredits or approves bodies providing conformity certification based on internationally recognized Standards.

1.4.14 Manufacturer—a body corporate, firm or person who manufactures pressure equipment.

1.4.15 Pressure equipment—boilers, pressure vessels and pressure piping.

1.4.16 Pressure piping—an assembly of pipes, pipe fittings, valves and pipe accessories subject to internal or external pressure and used to contain or convey fluid or to transmit fluid pressure. It includes distribution headers, bolting, gaskets, pipe supports and pressure-retaining accessories. It does not include any vessel that falls within the definition of a boiler or pressure vessel in this Standard nor any pipeline covered by any other legislation.

1.4.17 Pressure vessel—a vessel subject to internal or external pressure. It includes interconnected parts and components, valves, gauges and other fittings up to the first point of connection to connecting piping. It also includes fired heaters and gas cylinders, but excludes any vessel that falls within the definition of a boiler or pressure piping in this Standard.

1.4.18 Purchaser (or owner)—the person or organization for which the pressure equipment is manufactured.

1.4.19 Regulatory authority—the authority which is legally charged with the enforcement of the requirements of the legislation relating to pressure equipment in the State or Territory of Australia, or other country, in which the equipment is to be operated.

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SECTION 2 BASIC REQUIREMENTS

2.1 GENERAL Each unit of pressure equipment shall be subjected to the appropriate quality assurance, design verification and fabrication inspection requirements of this Standard to ensure that the design, material, fabrication, testing, documentation and dispatch comply with the relevant pressure equipment Standard.

2.2 MANUFACTURER'S QUALITY SYSTEM Each manufacturer of pressure equipment covered by this Standard shall have in place a quality system which enables the manufacturer to—

- (a) plan and control the manufacture of the pressure equipment so as to comply with the requirements of the applicable pressure equipment Standard (e.g. AS 1210, AS 1228, AS 1797, AS 2971, AS 3509, AS 4041); and
- (b) comply with either—
 - (i) the requirements in Clause 3.1 for a certified quality system; or
 - (ii) the procedures in Clause 3.2 for a non-certified quality system.

NOTE: The extent of any external design verification and fabrication inspection required in the manufacture of particular types of pressure equipment is related to the manufacturer's quality system and the hazard level of the equipment. (See Table 2.1).

2.3 EXTERNAL VERIFICATION OF PRODUCT QUALITY Where required by Table 2.1 and Clause 2.4, verification of the design of the product shall be performed by a design verifying body and inspection of the fabrication of the product shall be performed by a fabrication inspection body.

The verification of the design of pressure equipment by a design verifying body and the inspection of the fabrication of pressure equipment by a fabrication inspection body only apply to the pressure retaining components of the pressure equipment and shall exclude any valves, gauges, fittings, controls and ancillary equipment.

2.4 ALTERATIONS

2.4.1 Major alterations Where a major alteration is made to Hazard Level A, B or C pressure equipment during manufacture, the alteration shall be treated as a new design and, where required by Table 2.1 for the relevant hazard level, the altered design shall be submitted for external design verification in accordance with Section 4. Where required by Table 2.1 for the relevant hazard level, external inspection of fabrication in accordance with Section 5 shall be carried out.

Examples of major alterations include, but are not limited to the following:

- (a) An increase in the maximum allowable working pressure (internal or external) or temperature of pressure equipment regardless of whether or not a physical change was made to the pressure equipment.
- (b) A decrease in the minimum temperature such that additional mechanical tests are required.
- (c) The addition of new nozzles or openings in a boiler or pressure vessel, which require design calculations, e.g. where the nozzles or openings are larger in diameter than openings already in the equipment or which are located in positions which require redesign.
- (d) A change in the dimensions or contour of pressure equipment which affects stress calculations.

TABLE 2.1
RELATIONSHIP BETWEEN HAZARD LEVEL OF EQUIPMENT
AND REQUIRED DEGREE OF EXTERNAL DESIGN
VERIFICATION AND FABRICATION INSPECTION WITH AND
WITHOUT A MANUFACTURER’S CERTIFIED QUALITY SYSTEM

Hazard level of equipment (see Appendix B)	Design		Fabrication	
	Certified quality system status	Design verifying body (see Note 1)	Quality system status	Fabrication inspection body required (see Notes 2 & 3)
A	AS/NZS ISO 9001	Yes	AS/NZS ISO 9002	Yes
B	AS/NZS ISO 9001	Yes	AS/NZS ISO 9002	No
	No CQS	Yes	No CQS	Yes
C	AS/NZS ISO 9001	No (Note 4)	AS/NZS ISO 9002	No
	No CQS	Yes	No CQS	Yes
D	AS/NZS ISO 9001	No	No CQS	No
	No CQS	Yes (Note 5)		
E	No CQS	No	No CQS	No

LEGEND

CQS = Certified quality system to the nominated Standard or equivalent and includes audits by the certifying body, normally twice per year, to ensure that the quality system is applied and maintained

NOTES:

- 1 ‘Yes’ indicates that external design verification is required by a design verification body.
- 2 Piping and pressure safety devices do not require checking by a design verifying body or fabrication inspection body for Hazard Levels C, D and E.
- 3 Yes indicates external fabrication inspection is required by a fabrication inspection body. Where this Table requires the fabricator to have a certified quality system or inspection by a fabrication inspection body, or both, subcontractors shall also meet the same requirements.
- 4 ‘Yes’ for transportable pressure vessels.
- 5 Not required for miniature boilers complying with the AMBSC Code.

- (e) In a boiler or heat exchanger, an increase in any heating surface.
- (f) The addition of a pressurized jacket to pressure equipment which affects stress calculations.
- (g) Replacement of a pressure retaining part in a pressure vessel or boiler with a material of different nominal tensile strength or nominal composition from that used in the original design.

2.4.2 Minor alterations Where a minor alteration is made to Hazard Level A, B or C pressure equipment, external design verification or inspection of fabrication shall not be required for such alteration provided the alteration complies with the relevant pressure equipment Standard. However, the alteration to the design and the results of any fabrication inspection shall be documented by the designer and the manufacturer.