

Approved Code of Practice for

Pressure Equipment (Excluding Boilers)

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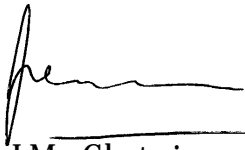
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NOTICE OF ISSUE

I have issued the *Approved Code of Practice for Pressure Equipment (Excluding Boilers)*, being a statement of preferred work practices or arrangements for the purpose of ensuring the health and safety of persons to which this code applies and persons who may be affected by the activities covered by this code.



J.M. Chetwin
Secretary of Labour
August 2001

FOREWORD

I have approved this statement of preferred work practices, which is an *Approved Code of Practice for Pressure Equipment (Excluding Boilers)*, under section 20 of the Health and Safety in Employment Act 1992. When a code is approved, a Court may have regard to it in relation to compliance with the relevant sections of the Health and Safety in Employment Act. This means that if an employer in an industry or using a process to which an approved code applies can show compliance with that code in all matters it covers, a Court may consider this to be compliance with the provisions of the Act to which the code relates.



Hon. Margaret Wilson
Minister of Labour
August 2001

SUMMARY OF THE HEALTH AND SAFETY IN EMPLOYMENT ACT 1992

The principal object of the Health and Safety in Employment Act 1992 (HSE Act) is to prevent harm to employees at work. To do this, it imposes duties on employers, employees, principals and others, and promotes excellent health and safety management by employers. It also provides for the making of regulations and codes of practice.

It is recommended that this summary be read in conjunction with the HSE Act.

REGULATIONS

Regulations are promulgated from time to time under the HSE Act. Regulations may impose duties on employers, employees, designers, manufacturers, and others relating to health and safety. These regulations may apply with respect to places of work, plant, processes or substances and may have been made to deal with particular problems that have arisen.

APPROVED CODES OF PRACTICE

“Approved Codes of Practice” are provided for in section 20 of the HSE Act. They are statements of preferred work practice or arrangements, and may include procedures which could be taken into account when deciding on the practicable steps to be taken. Compliance with codes of practice is not mandatory. However, they may be used as evidence of good practice in court.

EMPLOYERS' DUTIES

Employers have the most duties to perform to ensure the health and safety of employees at work.

Employers have a general duty to take all practicable steps to ensure the safety of employees. In particular, they are required to take all practicable steps to:

- Provide and maintain a safe working environment;

- Provide and maintain facilities for the safety and health of employees at work;
- Ensure that machinery and equipment is safe for employees;
- Ensure that working arrangements are not hazardous to employees; and
- Provide procedures to deal with emergencies that may arise while employees are at work.

Taking “all practicable steps” means doing what is reasonably able to be done in the circumstances, taking into account:

- The severity of any injury or harm to health that may occur;
- The degree of risk or probability of that injury or harm occurring;
- How much is known about the hazard and the ways of eliminating, reducing or controlling it; and
- The availability, effectiveness and cost of the possible safeguards.

HAZARD MANAGEMENT

Employers must have an effective method to identify and regularly review hazards in the place of work (existing, new and potential). They must determine whether the identified hazards are significant hazards and require further action.

If an accident or harm occurs that requires particulars to be recorded, employers are required to investigate to determine if it was caused by or arose from a significant hazard.

“Significant hazard” means a hazard that is an actual or potential cause or source of:

- Serious harm;
- Harm (being more than trivial) where the severity of effects on a person depends (entirely or among other things) on the extent or frequency of the person’s exposure to the hazard; or
- Harm that does not usually occur, or usually is not easily detectable, until a significant time after exposure to the hazard.

Where the hazard is significant, the HSE Act sets out the steps employers must take:

- Where practicable, the hazard must be eliminated;
- If elimination is not practicable, the hazard must, where practicable, be isolated;
- If it is impracticable to eliminate or isolate the hazard, the employer must minimise the likelihood that employees will be harmed by the hazard.

Where the hazard has not been eliminated or isolated, employers must:

- Ensure that protective equipment is provided, accessible and used;
- Monitor employees' exposure to the hazard;
- Seek the consent of employees to monitor their health; and
- With their informed consent, monitor employees' health; and
- Ensure the hazard is effectively controlled.

INFORMATION FOR EMPLOYEES

Before employees begin work, they must be informed by their employer of:

- Hazards employees may be exposed to while at work;
- Hazards employees may create which could harm people;
- How to minimise the likelihood of these hazards becoming a source of harm to themselves and others;
- The location of safety equipment; and
- Emergency procedures.

Employees should be provided with the results of any health and safety monitoring. In doing so, the privacy of individual employees must be protected.

EMPLOYERS TO INVOLVE EMPLOYEES IN THE DEVELOPMENT OF HEALTH AND SAFETY PROCEDURES

Employers need to ensure that all employees have the opportunity to be fully involved in the development of procedures for the identification and control of significant hazards and for dealing with or reacting to emergencies and imminent danger.

TRAINING OF EMPLOYEES

Employers must ensure employees are either sufficiently experienced to do their work safely or are supervised by an experienced person. In addition, employees must be adequately trained in the safe use of all plant, objects, substances and protective clothing and equipment that the employee may be required to use or handle.

SAFETY OF PEOPLE WHO ARE NOT EMPLOYEES

Employers also have a general duty towards persons who are not employees.

Employers must take all practicable steps to ensure that employees do not harm any other person while at work, including members of the public or visitors to the place of work.

EMPLOYEES' AND SELF-EMPLOYED PERSONS' DUTIES

Employees and self-employed persons have a responsibility for their own health and safety while at work. They must also ensure that their own actions do not harm anyone else.

However, these responsibilities do not detract from the employer's responsibilities.

ACCIDENTS AND SERIOUS HARM (RECORDING AND NOTIFICATION)

The HSE Act requires employers to keep a register of work-related accidents and serious harm. This includes every accident that harmed (or might have harmed):

- Any employee at work; or
- Any person in a place of work under the employer's control.

Employers are also required to investigate all accidents and near-misses to determine whether they were caused by, or arose from, a significant hazard.

Employers are required to notify serious harm that occurs to employees while at work to the Secretary of Labour (in practice, the nearest OSH office), as soon as possible. In addition, the accident must also be notified in the form prescribed within 7 days. (Suitable forms for notification are available from OSH offices and selected stationers.)

If a person suffers serious harm, the scene of the accident must not be disturbed unless to:

- Save life or prevent suffering;
- Maintain public access for essential services, e.g. electricity, gas; or
- Prevent serious damage or loss of property.

The OSH office will advise whether it wishes to investigate the accident and what action may be taken in the meantime.

PART 1: GENERAL

1.1 APPLICATION AND PURPOSE

This code of practice has been prepared by the Engineering Safety Section of the Occupational Safety and Health Service of the Department of Labour in conjunction with the industries concerned. Its purpose is to support the requirements of the Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways) Regulations 1999 (PECPR) and the Health and Safety in Employment Regulations 1995.

Adoption of this code of practice should provide the assurance that safety for all types of pressure equipment is maintained.

With suitable technical backup, proposals for changes to this code of practice may be submitted to the Manager, Engineering Safety, for consideration by the industry group concerned.

1.2 SCOPE

This code of practice applies to all pressure equipment covered by the PECPR Regulations except boilers and hot water boilers. Where reference is made to boilers it has been done to ensure consistency with those parts of the regulations covering pressure equipment.

It specifies requirements for materials, design, manufacture, installation, repairs, alteration, maintenance, servicing, inspection, commissioning, testing and operation.

Information on personnel safety has been included in appendix N.

Note:

1. For boilers and hot water boilers refer to the *Approved Code of Practice for the Design, Safe Operation, Maintenance and Servicing of Boilers*.
2. Gas appliances and installations coming within the scope of the Gas Act 1992, except where specifically included by this code, are excluded.
3. Pipelines coming within the scope of the Petroleum Act 1937, Gas Act 1992 and the Health and Safety in Employment (Pipelines) Regulations 1999 are excluded.

1.3 DEFINITIONS

All practicable steps in relation to achieving any result in any circumstances, means all steps to achieve the result that it is reasonably practicable to take in the circumstances, having regard to–

- (1) The nature and severity of the harm that may be suffered if the result is not achieved; and
- (2) The current state of knowledge about the likelihood that harm of that nature and severity will be suffered if the result is not achieved; and
- (3) The current state of knowledge about harm of that nature; and
- (4) The current state of knowledge about the means available to achieve the result, and about the likely efficacy of each; and
- (5) The availability and the cost of each of those means.

Alteration means to change the design of, adding to or taking elements away from equipment and includes the relocation of non-mobile equipment. “Alter” has a corresponding meaning. It does not include repairs, replacements or routine maintenance.

ASME means American Society of Mechanical Engineers.

Authorised Inspection Agency means an inspection agency as defined by ASME or the National Board of Boiler and Pressure Vessel Inspectors.

BS means British Standard.

CBIP means Certification Board for Inspection Personnel.

Certificate of Competence has the meaning given by 2.6.6.

Certificate of Design Verification means a certificate issued by an inspection body in accordance with regulations 30 and 31 of the PECPR Regulations.

Certificate of Inspection means a certificate issued or renewed by an inspection body in accordance with regulations 32 and 33 of the PECPR Regulations.

Certification Body means an organisation carrying out certification assessments of other organisations to the AS/NZS ISO 9000 series Quality Management Standards and which is accredited by the Joint Accreditation System of Australia and New Zealand.

Competent Person means a person who has acquired, through training, qualification or experience, or a combination of these, the knowledge and skills enabling that person to perform the task required.

Condition Monitoring is the process of measuring or testing a parameter, state or condition of an item of equipment, or specific parts of it. The results of the examination are used to indicate the current condition of that equipment. Analysis of changes and trends over time are used to predict the safe operational life of the equipment.

Conformity Assessment means the methods used to demonstrate that equipment complies with specified requirements.

Controller means a person who is the owner, lessee, sub lessee, or bailee of any equipment in a place of work. This does not include a home occupied by that person.

Cylinder means a pressure vessel with an internal volume exceeding 250 litres that is designed in accordance with a standard noted in appendix I and is used to transport permanent and liquefied gases.

Note: It is expected that this 250 litre limit will be increased by regulations pending under the Hazardous Substances and New Organisms Act 1996.

Design Standard means any standard of generally accepted industry practice, recognised by the Secretary, for the design, alteration or repair of equipment.

Design Verification means verification that the following comply, in every respect relating to safety, with the requirements of this code of practice and the appropriate design standards and contain every safety feature that is relevant, whether or not referred to in the code or standards:

- (1) Designs of pressure equipment;
- (2) Alterations to designs, affecting the structural strength or safety of equipment, made in the course of manufacture;
- (3) Designs of a repair or alteration affecting the operational safety of equipment repaired or altered or any other equipment; and
- (4) The fabrication and inspection requirements specified by the designer.

Design Verifier means a person who:

- (1) Is employed or engaged by an inspection body to carry out the functions referred to in regulation 26; and
- (2) Is the holder of a relevant certificate of competence.

Equipment means pressure equipment and includes the attachments, fittings, foundations, mountings, supports and any plant used in connection with pressure equipment but excludes equipment listed in schedule 2 to the PECPR Regulations.

Equipment Inspector means a person who:

- (1) Is employed or engaged by an inspection body to carry out the functions referred to in regulation 27; and
- (2) Is the holder of a relevant certificate of competence.

External Inspection, in relation to equipment, means the inspection and testing while in service, of the fittings, safety devices, mountings, attachments and supports, and the readily accessible surfaces of the

item and its structure, or, while out of service, as many of these items as are possible.

Fabrication Inspection means inspection of equipment during the process by which it, or its component parts, is manufactured.

Fired Heater

- (1) Means a device, not including a boiler or hot water boiler:
 - (a) Most of which is an arrangement of pressure containment parts; and
 - (b) Which heats gases or liquids at pressures exceeding 50 kPa by the use of directly applied combustion processes; or the application of heated gases; and
- (2) Includes any of the following that are necessary to ensure the pressure integrity of the device or its safe operation:
 - (a) Piping;
 - (b) Combustion equipment;
 - (c) Combustion management systems;
 - (d) Controls;
 - (e) Controls for fluid temperature and flow;
 - (f) Fans;
 - (g) Pressure fittings;
 - (h) Pumps;
 - (i) Supports.

Gas does not include steam, but includes air, a mixture of gases (whether or not also including steam) or hydrocarbon vapour. It includes any substance that, while being a gas at standard temperature and pressure, is for the time being in solid or liquid form while being processed, stored, transported, or used at low temperature, at high pressure, or both. It also includes any substance that, while being a gas at standard ambient conditions is, for the time being, dissolved in a liquid solvent.

Hazard Level in relation to any pressure equipment, means the hazard level determined by the designer in accordance with AS 4343.

In-service in relation to equipment means that the equipment has been commissioned and is being used, or is capable of being used, for the purpose for which it was designed.

Inspection Body means:

- (1) An organisation currently recognised under regulation 25; and
- (2) In relation to a design verifier or equipment inspector, the inspection body by which the design verifier or equipment inspector is employed or engaged.

An inspection body may be a Type A, B or C as defined by ISO 17020.

Internal Inspection in relation to equipment means the inspection of the internal surfaces, fittings, devices, mountings and attachments. It may, where appropriate, be executed by other than internal examination by using non-destructive methods of examination.

IPENZ means Institution of Professional Engineers New Zealand.

ISO, when immediately followed by a number, means a standard of that number issued by the International Organisation for Standardisation.

ITP means inspection and test plan and is:

- (1) For equipment under manufacture, a schedule of surveillance and hold points at which any inspection and testing required by the manufacturing standard is performed.
- (2) For in-service equipment, a schedule of equipment, inspection periods and inspection and test methods.

kPa means gauge pressure in kilopascals.

Liquid means a substance that is normally a liquid at standard atmospheric pressure and 20°C.

Maintenance includes servicing.

Manufacture means to manufacture equipment that could reasonably be expected to be operated in a place of work. "Manufacture" as a noun has a corresponding meaning.

NDE means non-destructive examination.

Operate, in relation to equipment:

- (1) Means to use the equipment; and
 - (2) Includes making the equipment available for use, whether by hiring or otherwise;-
- and "Operation" has a corresponding meaning.

Operating and Maintenance System means a documented management system for the operation, maintenance and control of equipment. This system shall incorporate those parts of a quality management system that are appropriate for the equipment concerned and shall be audited by an inspection body.

OSH means the Occupational Safety and Health Service of the Department of Labour.

Piping Components means pipes, tubing, fittings, flanges, gaskets, bolting, valves, and supports and all mechanical elements used or intended to be used for joining or assembling into pressure tight piping systems. It includes all devices such as expansion joints, flexible joints, pressure hoses, traps, dryers, and strainers associated with pressure equipment containing or intended to contain steam, or gases at pressures exceeding 50 kPa or liquids at pressures exceeding 50 kPa, that are necessary to maintain the safety of the pressure equipment, either alone or as part of an operating system.

Pressure means the pressure above the atmospheric pressure.

Pressure Containment Parts includes coils, drums, interconnecting parts, tubes, and vessels.

Pressure Equipment includes a boiler, boiler piping, compressor, fired heater, gas turbine, hot water boiler, piping component, pressure fitting, pressure piping, pressure vessel, pump, steam engine, or steam turbine.

Pressure Fittings

- (1) Means fittings that are associated with pressure equipment the purpose of which is to contain any or all of the following:
 - (a) Gases at pressures exceeding 50 kPa; or
 - (b) Liquids at pressures exceeding 50 kPa; or
 - (c) Steam; and
- (2) Includes all mountings, pressure gauges, safety devices, valves and other articles necessary to maintain the safety of the pressure equipment, whether the pressure equipment stands alone or is part of an operating system.

Pressure Piping

- (1) Means an assembly of piping components the purpose of which is to convey fluid, or transmit a fluid pressure, for any of the following or any combination of them:
 - (a) Gases at pressures exceeding 50 kPa;
 - (b) Liquids at pressures exceeding 50 kPa; or
 - (c) Steam; and
- (2) Includes all pressure relief valve piping up to the point of release; and
- (3) Includes all supports for pressure piping necessary to maintain safety of the pressure equipment, whether the pressure equipment stands alone or is part of an operating system.

Pressure Relief means the controlled and automatic relief of pressure to a safe disposal location or system by the operation of a safety device.

Pressure Test means a hydraulic or pneumatic test carried out on an item of pressure equipment, by applying to it a pressure greater than its safe working pressure to test the pressure integrity of construction, or the adequacy of alterations or repairs made to it.

Pressure Vessel

- (1) Means an unfired vessel, the purpose of which is to hold, process, store, transport, or use all or any of the following:
 - (a) Gases at pressures exceeding 50 kPa;
 - (b) Liquids at pressures exceeding 50 kPa; or

- (c) Steam; and
- (2) Includes all fittings, mountings, piping and supports necessary to maintain the safety of the pressure vessel, whether the pressure vessel stands alone or is part of an operating system; and
- (3) Includes vessels heated by electricity or by a hot gas or liquid; but
- (4) Does not include fixed roofed or floating roofed storage tanks.

Note: For electric and electrode boilers refer to the *Approved Code of Practice for the Design, Safe Operation, Maintenance and Servicing of Boilers*.

Qualification Issuing Agency means an agency currently recognised under regulation 29.

Quality Management System means a system currently certified under regulation 28.

Recognition means recognition by the Secretary as provided for in regulations 22 and 25.

Repair means restoring equipment to a safe operating condition, but does not include alterations, replacements or routine maintenance.

Safe Working Pressure in relation to any equipment, means the pressure for which the equipment has been designed to safely operate in accordance with the specific requirements of the design code, or lower pressure assigned to the equipment for safety reasons.

Safety Device means any kind of device, item, or system that is used in or on equipment and that controls or monitors an aspect of the safety of the equipment. It includes a bursting disc, pressure relief device, safety valve or other similar safety device.

Secretary means the Chief Executive of the Department of Labour.

Specified Activity in relation to equipment, means any of the following:

- (1) Design verification;
- (2) Equipment inspection;
- (3) Operation of an unattended or limited attendance boiler.

Standards of Generally Accepted Industry Practice means the documents or standards, not limited to those listed in schedule C, that provide the basis for safe design of equipment and safe working practice.

Steam means water vapour at a pressure equal to or greater than atmospheric pressure and a temperature equal to or greater than 100°C.

Supplier

- (1) Means a person who imports or supplies equipment that could reasonably be expected to be operated in a place of work; and
- (2) Includes a person who sells, or hires, or offers for sale or hire,

equipment that could reasonably be expected to be operated in a place of work.

Transportable Vessels are pressure vessels designed for the transport of fluids under pressure. They include road tanker vessels, rail tanker vessels, portable vessels, portable tanks and tank shipping containers.

Type Fault means a fault inherent in a particular kind of equipment, resulting from deficiencies in the design or manufacturing process, that may cause equipment to cause serious harm to a person.

PART 2: APPLICATION OF THE REGULATIONS

2.1 REGULATIONS

2.1.1 Introduction

- (1) Part 2 is provided to assist readers interpret and apply the PECPR Regulations to pressure equipment.
- (2) The headings used in this part of the code follow the headings in the corresponding parts of the regulations.
- (3) The summary provided is necessarily brief. If there is any conflict between this commentary and the regulations the regulations take precedence.

2.1.2 Interpretation

Key words and terms are defined in part 1 of this code. (See also schedule 1 of the PECPR Regulations.)

2.1.3 Meaning of “controller”

A “controller” of equipment is the person who is the owner, lessee, sublessee or bailee of equipment in a workplace.

2.1.4 Meaning of “equipment”

- (1) Equipment, as defined in the PECPR Regulations, means pressure equipment, cranes or passenger ropeways. It does not include equipment which is excluded by the PECPR Regulations.

Note: For the purpose of this code of practice equipment is defined in part 1 as “pressure equipment”.

- (2) Reference to equipment in this code means:
 - (a) In relation to a controller refers to equipment for which the controller is the owner, lessee, sub lessee or bailee.
 - (b) In relation to a designer refers to equipment being designed or designed.
 - (c) In relation to a manufacturer refers to equipment being manufactured or manufactured.
 - (d) In relation to a supplier refers to equipment being supplied or supplied.

2.1.5 Exemptions for controllers, designers, manufacturers or suppliers

- (1) The Secretary may grant an exemption from any duty imposed by the regulations to controllers, designers, manufacturers or suppliers.
- (2) The Secretary may impose any condition thought fit on an exemption and must publish details of an exemption in the Gazette.
- (3) The Secretary may, at any time, cancel an exemption and must publish a notice in the Gazette indicating that an exemption is to be cancelled and the date on which the cancellation takes effect.

2.1.6 Exemptions for equipment

- (1) The Secretary may exempt equipment from any or all of the regulations and impose any condition thought fit on the exemption. Details of the exemption will be published in the Gazette.
- (2) The Secretary may, at any time, cancel an exemption given to equipment and publish a notice in the Gazette indicating that an exemption is to be cancelled and the date on which the cancellation takes effect.

2.1.7 Relationship between the Act and regulations

Except where an exemption is granted, a person on whom a duty is imposed by these regulations must comply with that duty even though the Health and Safety in Employment Act may impose the same, similar or additional duty.

2.2 DUTIES OF CONTROLLERS

2.2.1 Information to be held by the controller

- (1) Controllers of pressure equipment shall obtain from the manufacturer or supplier:
 - (a) Any catalogues, drawings, manuals, specifications and other information required to ensure that all relevant activities can be carried out safely.
 - (b) Drawings, manuals and other data including design verification, inspection and test certificates that are necessary to establish that the equipment has been designed, manufactured, erected and commissioned in accordance with the PECPR Regulations.
- (2) Where the information noted in 2.2.1(1) (a) or (b) is not available from the manufacturer or supplier it shall be obtained from some other source. This data shall comply with the requirements of any quality management system under which the equipment is operated or, confirmed as suitable for the equipment by an inspection body.

- (3) The controller must keep all information which is necessary to demonstrate compliance with the PECPR Regulations at the place of work. This includes:
 - (a) Certificates of Design Verification and the documents and drawings to which they refer;
 - (b) All Certificates of Inspection and test reports arising from manufacturing, erection and commissioning;
 - (c) Erection and commissioning information required for the safe operation, maintenance and servicing of the equipment;
 - (d) Manufacturer's data reports including details of nominal wall thickness and corrosion allowances; and
 - (e) The date, time, full description and the inspection and test reports for any repair or alteration.
- (4) This data must be kept secure and be available to all persons requiring access to it, including equipment inspectors. It shall be kept available for reference until disposal of the equipment.

2.2.2 Accident notification

Controllers shall ensure that where any event occurs in a place of work that:

- (a) Causes damage that affects the safety of equipment; or
- (b) Has the potential to affect the safety of equipment; and

which could have resulted in serious injury, they must, as soon as possible, notify the Secretary. This initial notice must, within seven days of the event occurring, be followed by a detailed report to the Secretary. The report must be in writing and be prepared by an inspection body or a registered engineer.

2.2.3 Duties in relation to operation

Controllers shall take all practicable steps to ensure, with respect to operating of equipment, that:

- (a) It is safe and operated safely within the limits for which it was designed and it is maintained in a safe condition;
- (b) It is not operated if it does not have a current Certificate of Inspection; and
- (c) Equipment which has been adjusted, altered or repaired is, where appropriate, inspected and issued with a new Certificate of Inspection before it is put back into operation.

Note: Equipment listed in schedule B of this code or, which is otherwise exempt under the PECPR Regulations, does not require a Certificate of Inspection.

2.2.4 Duties in relation to repairs or alterations

- (1) Controllers of pressure equipment shall ensure that repairs or alterations affecting operational safety of equipment are:
 - (a) Carried out by competent persons;
 - (b) Design verified in accordance with appendix A of this code; and
 - (c) Inspected as appropriate by an equipment inspector or competent person.
- (2) Where appropriate, controllers shall ensure that equipment which is altered or repaired (other than minor alterations or repairs) is issued with a new Certificate of Inspection before it is put back into service.

2.3 DUTIES IN RELATION TO UNSAFE EQUIPMENT

2.3.1 Employee's duty

Employees of controllers shall take all practicable steps to advise the controller, as early as practicable, of any equipment or activity which they believe to be unsafe.

2.3.2 Investigation of potentially unsafe equipment

- (1) Controllers shall ensure that where they become aware of equipment that may be unsafe, the matter is investigated by a competent person in a manner which is both timely and appropriate for the circumstances.
- (2) Where equipment is determined to be unsafe, the controller shall:
 - (a) Withdraw the equipment from service and render it inoperable;
 - (b) Clearly mark the equipment as withdrawn from service;
 - (c) Record details of the equipment withdrawn from service and its location;
 - (d) Not return the equipment to service until it has been restored to a safe condition;
 - (e) Where appropriate, have the equipment inspected by an equipment inspector and issued with a new Certificate of Inspection; and
 - (f) Record details of any inspection and testing carried out to confirm that remedial work is satisfactory.

2.3.3 Notification of type fault

If a controller believes that equipment may have a type fault, the controller shall, as soon as practicable, give the manufacturer and

supplier written notice to this effect. "Type fault" is defined under 1.3 Definitions.

2.3.4 Correction of type fault

- (1) Where a manufacturer or supplier is advised in writing of a type fault under regulation 14, or otherwise becomes aware of a possible type fault, they shall determine whether a type fault exists. If a type fault exists, then the manufacturer or supplier shall:
 - (a) Stop manufacture and supply of that equipment until the fault is corrected;
 - (b) Advise controllers of that equipment of any precautionary measures that should be taken;
 - (c) If the type fault is an immediate risk to safety, then the manufacturer or supplier shall advise the controller to withdraw the equipment from service; and
 - (d) At their expense, arrange for any type fault to be corrected.
- (2) A manufacturer or supplier who determines that equipment has a type fault must advise the Secretary of details of the fault and what measures are being taken to correct it.

2.4 DUTIES OF DESIGNERS, MANUFACTURERS AND SUPPLIERS

2.4.1 Relationship to duties in Health and Safety in Employment Regulations 1995

The duties imposed on designers, manufacturers and suppliers under part 3 of the regulations complements the duties imposed by part VII of the Health and Safety in Employment Regulations 1995.

This means, for example, that:

- (a) Designers must comply with regulation 18 (see 2.4.3 below). This is in addition to the requirements of regulation 66(2) of the Health and Safety in Employment Regulations 1995.
- (b) Manufacturers must comply with regulation 19 (see 2.4.4 below). This is in addition to the requirements of regulation 67(1) of the Health and Safety in Employment Regulations 1995.
- (c) Manufacturers and suppliers must comply with regulation 21 (see 2.4.6 below). This is in addition to the requirements of regulations 67(3) and 67(4) of the Health and Safety in Employment Regulations 1995.

2.4.2 Sufficient compliance with duties in regulations 18 to 20

- (1) The Secretary may recognise standards and codes relating to the operational safety of equipment and may impose any limit or condition thought appropriate on any recognition.

Such standards and codes may relate to, for example:

- (a) Load;
 - (b) Pressure;
 - (c) Temperature;
 - (d) Operating life;
 - (e) Design verification and inspection; and
 - (f) Hazard levels.
- (2) The Secretary may also withdraw recognition of standards.
 - (3) A notice must be published in the Gazette of any recognition that has been granted or withdrawn. A recognition notice must include details of any limits or conditions that have been imposed on the recognition.
 - (4) Designers, manufacturers and suppliers will have complied with a duty relating to design, design verification, fabrication inspection, manufacture and supply which is placed on them by the PECPR Regulations, provided they have complied with a recognised standard that relates to that specific duty.

Note:

1. Standards recognised by the Secretary are listed in schedule C of this code.
2. Details of any changes to the list of recognised standards, since issue of this code, are available from the Secretary.

2.4.3 Duties relating to design and design verification

- (1) Designers shall ensure that all equipment, or any alterations to equipment, are designed in accordance with the appropriate standards specified in schedule C of this code, or otherwise recognised by the Secretary. This includes taking into account any seismic design requirements for the equipment.
- (2) Where there are no recognised standards applicable to an item of equipment, then it shall be designed in accordance with the standards of generally accepted industry practice.
- (3) Designers shall ensure that equipment, or any alteration to equipment they design:
 - (a) Is safe when used in accordance with its intended purpose;
 - (b) Has its hazard level and design life determined and specified in the design documents;

- (c) Has its design verification requirements determined in accordance with 3.5 of this code, and specified in the design documents;
- (d) Has its manufacturing requirements specified in the design documents; and
- (e) Has its fabrication inspection requirements determined in accordance with 3.7 of this code, and specified in the design documents.

2.4.4 Duties relating to manufacture and fabrication inspection

- (1) Manufacturers shall ensure that the designers of equipment they are to manufacture have complied with regulation 18.
- (2) Manufacturers of equipment shall ensure that any manufacturing is carried out in accordance with a verified design and the manufacturing requirements specified in the design.
- (3) Manufacturers shall ensure that any design changes to equipment during manufacture are approved by the designer and, where appropriate, design verified.
- (4) Manufacturers shall ensure that equipment is inspected and tested by an inspection body in accordance with the requirements of the manufacturing standard, and any inspection and test plan (ITP) specified by the designer.
- (5) Manufacturers shall ensure that inspection reports are prepared by the equipment inspectors for the equipment they inspect. The manufacturer shall obtain copies of these inspection reports.
- (6) Manufacturers of equipment that has been designed overseas shall ensure that it has been designed and design verified to a standard that is equivalent to that required by regulation 18.

Note: Manufacturers who intend using a design from overseas are advised to seek the assistance of their inspection body before committing to manufacture.

2.4.5 Duties relating to supply

- (1) Suppliers of pressure equipment manufactured in New Zealand, shall ensure that before such equipment is supplied that the manufacturer has complied with regulation 19.
- (2) Suppliers of imported equipment shall ensure that it has been designed, design verified, manufactured, inspected and tested in accordance with regulations 18 and 19.
- (3) Suppliers of imported second-hand equipment shall ensure that equipment supplied has not exceeded its design life.

2.4.6 Duty relating to the provision of information

- (1) Designers, manufacturers and suppliers must ensure they provide the following information for the use of purchasers or hirers of equipment:

- (a) All data that is necessary to ensure that every activity involving the equipment can be carried out safely. This includes drawings, manuals and any other data relevant to the safe operation of the equipment. Where appropriate, this shall include records of previous use.
 - (b) All documentation necessary to establish that the equipment has been designed, design verified, manufactured and inspected in accordance with this code of practice. This includes Certificates of Design Verification, inspection and test reports and Certificates of Inspection issued by an inspection body.
 - (c) Records of previous use.
- (2) Manufacturers shall ensure that equipment is labelled with key data relevant to its safe operation. This should include:
- (a) The name of the manufacturer, the year of manufacture, the unique identifier assigned by the inspection body; and
 - (b) Relevant operating parameters such as safe working pressure, maximum and minimum design temperatures, etc.

2.5 ADMINISTRATIVE PROVISIONS

2.5.1 Sufficient compliance with functions in regulations 23 to 35

- (1) The Secretary may, subject to any conditions thought necessary, grant recognition to standards, codes or other documents containing requirements relating to:
- (a) Recognition procedures;
 - (b) Functions and recognition of inspection bodies;
 - (c) Design verifiers and equipment inspectors;
 - (d) Quality management systems;
 - (e) Qualification issuing agencies;
 - (f) Design verification and inspection certificates; or
 - (g) certificate of competence.

The clauses containing requirements relating to these matters are 2.5.2 to 2.5.8 and 2.6.1 to 2.6.6 inclusive.

- (2) The Secretary must publish a notice in the Gazette specifying details including any limits or conditions of the recognition that has been granted. The Secretary may also withdraw recognition of a document, and must publish details of withdrawal of recognition in the Gazette.
- (3) Provided there is no other evidence to the contrary, a standard or code recognised by the Secretary remains recognised until notice of its withdrawal of recognition has been published in the Gazette.

- (4) Compliance with a recognised document meets the requirements of regulations 23 to 35 provided the document covers the subject matter of the regulations.
- (5) Standards and codes listed in schedule C of this code are recognised by the Secretary.

2.5.2 Recognition procedures

- (1) The Secretary, on receipt of a written application, may grant recognition as described in:
 - (a) Regulation 25(1) to a New Zealand inspection body;
 - (b) Regulation 25(2) to an overseas inspection body; or
 - (c) Regulation 29(2) to a qualifications issuing agency.
- (2) The Secretary must:
 - (a) Notify the applicant in writing of a grant of recognition;
 - (b) Specify the period for which the recognition is current; and
 - (c) Specify any limits and conditions on the recognition.
- (3) The Secretary may also withdraw a condition of recognition:
 - (a) If satisfied that a condition has not been observed or;
 - (b) It would otherwise be in the interests of safety to do so; and
 - (c) After giving an individual or organisation concerned an opportunity to be heard.

The Secretary must notify the individual or organisation concerned of the withdrawal of recognition.

2.5.3 Inspection bodies: functions

- (1) The functions of inspection bodies are to:
 - (a) Perform design verification and the issuing and cancelling of Certificates of Design Verification on the recommendation of design verifiers;
 - (b) Perform equipment inspection and the issue, renewal, suspension and cancellation of Certificates of Inspection on the recommendation of equipment inspectors;
 - (c) Suspend and cancel Certificates of Inspection, issued by other inspection bodies, on the recommendation of equipment inspectors;
 - (d) Advise the Secretary of any equipment that is so unsafe that the inspection body, on the advice of equipment inspectors, has refused to issue or renew a Certificate of Inspection or, has suspended or cancelled its Certificate of Inspection; and
 - (e) Provide a unique identifier for equipment when issuing its first Certificate of Inspection. This unique identifier must be permanently applied to the equipment by the equipment

inspector, usually by hard stamping, at the time of the first inspection.

- (2) Inspection bodies, depending on the scope of their accreditation, employ design verifiers and/or equipment inspectors to perform the design verification and equipment inspection work in 2.5.3(1).

2.5.4 Inspection bodies: recognition

- (1) Inspection bodies operating in Australia and New Zealand may be recognised by the Secretary provided:
 - (a) They are accredited to ISO 17020 (EN 45004) by International Accreditation New Zealand (IANZ) or, by the National Association of Testing Authorities, Australia (NATA);
 - (b) OSH has been given the opportunity to participate during the accreditation audit and subsequent surveillance audits of the inspection bodies;
 - (c) They have procedures in place which ensure that persons employed as equipment inspectors or design verifiers have appropriate certificate of competence issued by CBIP, IPENZ or the Secretary;
 - (d) They have procedures in place which ensure that trainee design verifiers and trainee equipment inspectors hold appropriate qualifications, have the necessary experience and skills and are effectively supervised;
 - (e) They have procedures in place which ensure that design verification or equipment inspection is carried out by persons holding a relevant certificate of competence;
 - (f) They carry out their work in an objective fashion that promotes safety and the public interest; and
 - (g) There is no reasonably foreseeable conflict of interest between their design verification and equipment inspection activities and any other work they may undertake.
- (2) Inspection bodies operating outside Australia and New Zealand may also be recognised by the Secretary provided:
 - (a) They are accredited to a recognised industry standard, by an organisation which has a mutual recognition agreement with International Accreditation New Zealand; or
 - (b) They have the status of an inspection body under the law of the country in which they have their headquarters. The law must require accreditation or equivalent and impose requirements which are comparable to those imposed on New Zealand and Australian inspection bodies.

2.5.5 Design verifiers

Design verifiers perform design verification on behalf of an

inspection body and make recommendations to the inspection body on the issuing and cancellation of Certificates of Design Verification.

2.5.6 Equipment inspectors

- (1) Equipment inspectors perform equipment inspection on behalf of an inspection body and make recommendations to the inspection body on the issue, renewal, suspension or cancellation of Certificates of Inspection. These recommendations shall be made to the inspection body regardless of whether that inspection body was responsible for the issue of any current Certificate of Inspection.
- (2) They must inform manufacturers and controllers on matters relating to the safety of the equipment which they inspect and on any action to be taken to make the equipment safe.

2.5.7 Quality management systems

- (1) Quality management systems shall be certified to a recognised industry standard by an agency accredited by the Joint Accreditation System of Australia and New Zealand. (JAS-ANZ).
- (2) Controllers shall give OSH the opportunity to participate in the certification audit and subsequent surveillance audits.
- (3) Controllers with quality management systems for equipment must conform with the requirements of that quality management system.

2.5.8 Qualification issuing agencies

- (1) Qualification issuing agencies issue certificate of competence and advise applicants on the equivalence of qualifications obtained outside New Zealand.
- (2) The Secretary may recognise an organisation as a qualifications issuing agency if satisfied that it is competent to perform this function.
- (3) A qualification may be issued by a qualifications issuing agency only after it has determined by examination and/or assessment that the person seeking the qualification has the requisite training, skills, knowledge and experience.
- (4) The qualification issuing agencies recognised by the Secretary and the occupational groups for which they issue qualifications are:
 - (a) Certification Board for Inspection Personnel for equipment inspectors;
 - (b) Institution of Professional Engineers New Zealand for design verifiers; and
 - (c) New Zealand Industry Training Organisation for boiler operators, engine drivers and process plant operators.

- (5) The Secretary may request a qualification issuing agency to supply names of persons holding a particular certificate of competence.

2.6 CERTIFICATES

2.6.1 Certificates of Design Verification

- (1) A design verifier may recommend to an inspection body that a Certificate of Design Verification be issued for equipment, provided it has been design verified and found to be safe for its intended purpose.
- (2) An inspection body must consider all documents submitted by the design verifier in support of a recommendation to issue a Certificate of Design Verification. If the inspection body agrees with the recommendation, it must stamp the documents and issue a Certificate of Design Verification.

2.6.2 Contents of a Certificate of Design Verification

- (1) A Certificate of Design Verification must include the following information about the equipment that has been design verified:
 - (a) A brief description of the equipment;
 - (b) The name of the person or organisation seeking the certificate;
 - (c) The name of the inspection body;
 - (d) The name of the design verifier;
 - (e) The date of issue;
 - (f) The standards, codes, guidelines, etc. to which the equipment conforms;
 - (g) The drawings, identified by drawing number, and details of any other data including ITPs, included in the design verification process;
 - (h) The principal design parameters, e.g. design pressures, design temperatures, design life, hazard level, nozzle loadings, etc.;
 - (i) The seismic coefficient;
 - (j) The maximum wind loading;
 - (k) The contained fluid(s);
 - (l) Any design alterations and other requirements that the design verifier specifies for the equipment; and
 - (m) Details of any other documents giving further information in relation to a) to l) for the verified design that it is not practicable to include on the Certificate of Design Verification.
- (2) Certificates of Design Verification must be signed by the design verifier, and:

- (a) Carry the logo of the accreditation body which accredited the inspection body issuing the certificate; or
- (b) Contain a statement noting that the inspection body is accredited by an accreditation body named on the certificate.

2.6.3 Issue and renewal of a Certificate of Inspection

- (1) An equipment inspector may recommend to an inspection body that a Certificate of Inspection be issued or renewed for equipment for a specified period provided it has been inspected and the equipment inspector has reasonable grounds for believing it is safe and would remain safe during the recommended inspection period.
- (2) An inspection body may issue or renew a Certificate of Inspection, on the recommendation of an equipment inspector, for the recommended inspection period. It may impose conditions on the Certificate of Inspection.

2.6.4 Term and contents of a Certificate of Inspection

- (1) A Certificate of Inspection remains in force until such time as:
 - (a) The period specified in the certificate expires;
 - (b) A new Certificate of Inspection is issued following an adjustment, repair or alteration of the equipment; or
 - (c) The certificate is withdrawn or suspended by an inspection body.
- (2) An equipment inspector may recommend to an inspection body that it extend, subject to any terms or conditions that the inspector thinks fit, the inspection period of a Certificate of Inspection that is about to expire. The equipment inspector shall only recommend an extension where:
 - (a) The equipment has been visually examined; and
 - (b) The inspector has reasonable grounds for believing the equipment would be safe for the period of the extension.
- (3) An inspection body may extend a Certificate of Inspection on one occasion only for a maximum period of three months. The extension shall be subject to any terms and conditions recommended by the equipment inspector.
- (4) A Certificate of Inspection must include the following information about the equipment concerned:
 - (a) A brief description of the equipment;
 - (b) The unique identifying number issued to the equipment by the inspection body responsible for the first inspection;
 - (c) The purpose of the equipment as specified by the designer;
 - (d) The location of the equipment;

- (e) The name of the manufacturer;
 - (f) The safe working pressure;
 - (g) The design minimum and/or maximum working temperature where the minimum is less than 0°C and/or the maximum is greater than 100°C;
 - (h) The name of the equipment inspector;
 - (i) A statement of the inspector's opinion that the equipment was safe at the date of inspection and will remain safe for the period of the certificate if operated and maintained properly;
 - (j) The date of the inspection;
 - (k) The date of expiry of the certificate;
 - (l) The name of the inspection body that issued the certificate;
 - (m) The name and business address of the controller; and
 - (n) The title of any other document giving further details in relation to a) to m) where it is impractical for these to be included on the Certificate of Inspection.
- (5) Certificates of Inspection must:
- (a) Carry the logo of the accreditation body which accredited the inspection body issuing the certificate; or
 - (b) Contain a statement noting that the inspection body is accredited by an accreditation body named on the certificate.

2.6.5 Suspension or cancellation of a Certificate of Inspection

- (1) An equipment inspector who is satisfied on reasonable grounds that equipment is unsafe or unfit for use may recommend to an inspection body that a current Certificate of Inspection should be suspended or cancelled. The inspection body, after giving the controller of the equipment concerned a suitable opportunity for comment:
 - (a) May cancel or suspend the Certificate of Inspection; and
 - (b) Must advise the controller of the action taken.
- (2) The Secretary, where satisfied on reasonable grounds that equipment is unsafe or unfit for use may, after giving the controller of the equipment concerned a suitable opportunity for comment, cancel or suspend a Certificate of Inspection. The Secretary must notify the controller of the action taken.

2.6.6 Certificates of Competence

- (1) A certificate of competence may be issued by a qualification issuing agency or by the Secretary. This indicates that the certificate holder is qualified to carry out a specified activity relevant to the certification. Specified activities include equipment

inspection and design verification.

- (2) A certificate of competence is valid for the period shown on the certificate, but may be suspended or cancelled by the Secretary if the Secretary is satisfied on reasonable grounds that the holder should no longer hold such a certificate. The Secretary must give the holder a reasonable time to comment before cancelling or suspending a certificate of competence.

2.6.7 Duties of inspection bodies in relation to certificate of competence

- (1) Inspection bodies must ensure that any design verification or equipment inspection they carry out is performed by a holder of a relevant certificate of competence.
- (2) Inspection bodies may have trainees carry out design verification or equipment inspection, provided they are competent to carry out the tasks assigned to them and they work under the effective supervision of a holder of a relevant certificate of competence. Effective supervision requires the supervisor to be based at the same office or works as the trainee.

2.6.8 Certificates of Inspection

A Certificate of Inspection that was issued before the commencement of the PECPR Regulations and is current is deemed to be still current. The provisions of the regulations, with any necessary modifications, apply to it.

2.6.9 Certificates of Competence

A certificate of competence that was issued before the commencement of the PECPR Regulations and is current is deemed to be still current. The provisions of the regulations, with any necessary modifications, apply to it.

PART 3: GENERAL TECHNICAL REQUIREMENTS

3.1 SCOPE

This part of the code applies to pressure equipment, except boilers and hot water boilers, coming within the scope of the PECPR Regulations 1999.

3.2 GENERAL

3.2.1 The design, manufacture, operation, maintenance and inspection of pressure equipment shall comply with the relevant standards or reference documents listed in schedule C and the other requirements of this code.

3.2.2 Imported second-hand equipment shall comply with the current requirements of this code of practice. Second-hand equipment that already had a Certificate of Inspection shall comply with the requirements that applied at the time it was certified, except that a redesign verification shall be performed where the equipment is to be subject to greater seismic and/or more adverse process loads than those for which it was originally designed.

3.2.3 Alternative standards to those listed in schedule C may be recognised for use provided it can be demonstrated that the alternative standards are equivalent to those in schedule C and are equally safe in use.

3.2.4 The following documentation shall be supplied in the English language, in accordance with the duties relating to the provision of information in the PECPR Regulations:

- (1) Standards, including alternative standards in 3.2.3 and any supporting documents referenced by the standards; and
- (2) All information necessary for design, design verification, inspection, operation, maintenance and repair of equipment.

Where an alternative standard is an English language translation of an original it shall be approved as an authentic version of the standard by the organisation issuing the original standard.

3.2.5 All pressure equipment shall be installed so that the isolation requirements of clause C.5 of AS/NZS 3788, and/or clause 3.4.3 of AS 3873 can be met.

3.3 MATERIALS

3.3.1 Materials for pressure equipment shall comply with the requirements of the relevant design standard listed in schedule C and other requirements of this code.

3.3.2 Alternative materials may be used, provided they are selected in accordance with the requirements of the relevant design standard or appendix B of this code.

3.4 DESIGN

3.4.1 General

- (1) Pressure equipment, or alterations to pressure equipment, shall be designed in accordance with this code and the requirements of the relevant design standard listed in schedule C.
- (2) Foundations and support structures for equipment including pipework shall be certified by an engineer who is appropriately qualified, has relevant experience and is currently registered under the Engineers Registration Act 1924. This requirement for certification also applies to building structures used to support pressure equipment.
- (3) Designers shall specify on documents submitted for design verification, details of material impact test temperatures, test specimen dimensions, and impact energy requirements for any materials requiring impact testing. This data shall be in accordance with the applicable design standard for the equipment concerned and be acknowledged on the Certificate of Design Verification.

3.4.2 Design for seismic, wind and snow loading

Pressure equipment, associated foundations and support structures shall be designed for seismic, wind and snow loading in accordance with this code and the relevant standard in schedule C.

Note: New Zealand requirements for seismic design are contained in AS/NZS 1200.

3.4.3 Computer-aided design

Software used for the design of pressure equipment must be validated for use. Refer to 3.5.2.

3.4.4 Design life

- (1) The design life of pressure equipment shall be determined in accordance with the relevant design standard.
- (2) Any parts of pressure equipment subject to design lifetime limits shall be clearly identified by the designer at the time of making application for design verification.
- (3) The design life shall be specified in quantitative terms and details

shall be included in the operating and maintenance instructions provided for equipment.

3.4.5 Hazard level

The hazard level of pressure equipment shall be determined in accordance with AS 4343.

3.4.6 Risk management

Where appropriate, a risk assessment in accordance with AS/NZS 4360 shall be performed for equipment.

3.5 DESIGN VERIFICATION

3.5.1 General

- (1) New pressure equipment and alterations to pressure equipment shall be design verified.
- (2) The design verification requirements of pressure equipment shall be determined in accordance with appendix A of this code.
- (3) Pressure equipment which has been designed with strain considerations uppermost and which has membrane stresses that are well within limits permitted by a relevant internationally recognised standard for the material concerned (or which refers to the material concerned) may be issued with a Certificate of Design Verification on the basis of a design statement issued by the manufacturer. The form of the design statement shall be as shown in the relevant part of appendix C. Any ancillary system associated with this equipment, which is designed to accommodate specified membrane stress levels, shall be subject to the normal design verification process.

3.5.2 Computer-aided design verification

- (1) Software used for design verification of pressure equipment must be validated for use, with any residual errors known (for example via published errata) and appropriate corrections made. Additional checks by other design methods should be made to confirm appropriate modelling techniques, correct input data and correct functioning of software. This is especially important for finite element analysis.
- (2) Application software packages shall have been verified and approved by recognised organisations such as the Nuclear Regulatory Authority or Code of Federal Regulations in the United States or NAFEMS (National Association for Finite Element Methods and Standards) in the United Kingdom or other standards of generally acceptable industry practice.
- (3) Software must be kept up to date with all current amendments and errata which affect design. The software application manual must be available for reference.

- (4) Code-specific software should provide an audit trail through the print out of all relevant equations.
- (5) Entry to program shall be controlled by password or by other means which prevent unauthorised access.
- (6) Program coding shall be validated and protected against unauthorised and inadvertent changes. Data files shall be regularly backed up and copies securely archived so that simultaneous loss of the working data file and backup will not occur.

3.6 MANUFACTURE AND WORKMANSHIP

3.6.1 General

Manufacture of and alterations to pressure equipment shall comply with a standard listed in schedule C.

3.6.2 Nameplates on lagged vessels

Where a vessel is to be totally lagged, the manufacturer shall ensure a nameplate is mounted, for identification purposes, in a position where it is visible to the operator.

3.6.3 Manufacturer's data report

The manufacturer shall complete a manufacturer's data report. This shall be in accordance with the requirements of the manufacturing standard. Where the standard does not provide for this documentation, a manufacturer's data report shall be completed in accordance with appendix D.

3.7 INSPECTION AND TESTING

3.7.1 General

- (1) Pressure equipment shall, as appropriate, be inspected and tested in accordance with 3.7.2 or 3.7.3.
- (2) Where controllers receive a written report from an inspection body, specifying that equipment is to be restored to a safe condition and/or, that it requires (re)certification, the controller shall:
 - (a) Carry out any necessary corrective action; and
 - (b) Record details of any corrective action taken.

Where, subsequent to corrective action, the inspection body is not satisfied that the controller has made the equipment safe and, if required, obtained (re)certification, it shall issue the notice in appendix L. Where appropriate, the inspection body shall also suspend or cancel any Certificate of Inspection issued for the equipment.

3.7.2 New or altered equipment

New pressure equipment and alterations and repairs (except for minor alterations and repairs) to pressure equipment shall be inspected during manufacture in accordance with appendix A of this code.

3.7.3 In-service equipment

- (1) In-service pressure equipment shall be inspected and tested at commissioning and thereafter periodically in accordance with 3.7.3, 3.7.4, 3.7.5 and appendix F of this code.
- (2) Inspection periods are shown in schedule A, 'Table of inspection periods'. These supplement those given in table 4.1 of AS/NZS 3788 and shall override those in table 4.1 where there is any conflict between these inspection periods.
- (3) Controllers of pressure equipment which:
 - (a) Contains catalysts; or
 - (b) Is not specifically covered in table 4.1 of AS/NZS 3788 or schedule A:

shall consult with an inspection body on the inspection periods for the equipment.

Where certifying any such inspection period, the inspection body shall have regard for the standards of generally accepted industry practice, AS/NZS 3788 and this code. Where equipment cannot be categorised in the terms of AS/NZS 3788, then the setting of its inspection period should be referred to the Secretary.

- (4) Equipment noted in 3.7.3(3) and other pressure equipment for which internal inspection is not practicable but is required, shall be subject to appropriate condition monitoring.
- (5) Insulated, non-vacuum, non-jacketed static storage vessels shall have insulation removed at all points of high cyclic stress to enable an external inspection when an internal inspection is carried out.
- (6) Insulated, non-vacuum, non-jacketed transportable vessels that were in service when this code came into effect and which lack the facility to readily remove and replace insulation at the points of cyclic stress, shall have such insulation removed and redesigned within 6 years from the date of manufacture.
- (7) If there is evidence that moisture has penetrated the insulation of any static or transportable vessel, then sufficient insulation shall be removed to check for corrosion.

3.7.4 Pressure relief and safety valves

Pressure relief and safety valves shall be inspected and tested in accordance with appendix E of this code.

3.7.5 Extension of inspection period

- (1) Inspection periods may be extended beyond those specified in columns 4 and 5, table 4.1 of AS/NZS 3788 or schedule A of this code, only where a controller's ITP for the equipment concerned has been recognised by the Secretary. Maximum extended inspection periods are described in appendix F.
- (2) The procedure for obtaining recognition of an ITP is given in appendix F.

3.8 OPERATION, MAINTENANCE AND SERVICING

3.8.1 General

- (1) Pressure equipment shall be operated, maintained and serviced in accordance with:
 - (a) The relevant standards and reference documents specified in schedule C and other relevant requirements of this code;
 - (b) Manuals provided by the designers, manufacturers or suppliers;
 - (c) The standards of generally accepted industry practice;
 - (d) The experience of the controller in operating, maintaining and servicing such equipment; and
 - (e) The relevant requirements of AS 3873.
- (2) Where appropriate for equipment, quality management systems shall be developed and maintained. Equipment covered by a quality management system shall be operated in accordance with that system.
- (3) Where appropriate, written procedures shall be prepared for operating and testing of equipment and inspection and maintenance programmes shall be generated. These shall cover all reasonably foreseeable conditions including changes to equipment and processes and shall incorporate all relevant safety requirements.
- (4) Operating procedures and inspection and maintenance programmes for equipment shall be kept under review and continually improved and updated by competent persons.
- (5) Safety devices shall be operable whenever equipment is used. All tests of emergency procedures, alarms, safety trips, and other safety devices, relating to equipment, shall be performed as recommended in the operating manuals for the equipment or in accordance with the standards of generally accepted industry practice. Where appropriate, testing shall be witnessed and approved by an inspection body.

- (6) Operating procedures and other relevant data shall be available to any person who operates equipment.

3.8.2 Records

- (1) Records shall be kept of the operation, maintenance, repair, alteration and servicing of pressure equipment in accordance with AS/NZS 3788 and this code. These shall include:
 - (a) Records of the date, time and details of repairs, maintenance; servicing, adjustment, alterations and testing procedure;
 - (b) Records of the date, time, details and results of inspections and names of the inspectors and inspection bodies; and
 - (c) Records of run hours and equipment condition, including logs of relevant operating parameters, for equipment having a finite design life or subject to condition monitoring.
- (2) Records shall be available for review by equipment inspectors.

3.8.3 Repairs, alterations and re-rating

Repairs, alterations and re-rating of in-service pressure equipment shall comply with AS/NZS 3788 and this code or be acceptable to an inspection body.

3.8.4 Safe remaining life

The safe remaining life of pressure equipment shall be determined in accordance with this code and AS/NZS 3788 or by equivalent methods acceptable to an inspection body.

3.9 SCHEDULE B EQUIPMENT

3.9.1 Equipment specified in schedule B of this code does not require design verification by an inspection body or a Certificate of Inspection, however, this does not relieve controllers of their other responsibilities under the PECPR Regulations or the Health and Safety in Employment Act 1992 or other regulations made under the Act.

3.9.2 Although equipment specified in schedule B is exempt from design verification and inspection by an inspection body, controllers may elect to engage an inspection body to provide these services and certify such equipment in lieu of design verification and inspection by other competent persons.

3.9.3 Equipment specified in the schedule B, shall be:

- (1) Installed, inspected, tested, operated and maintained having regard for the manufacturer's recommendations and in accordance with relevant standards. Where such manufacturer's recommendations or relevant standards do not exist, then in accordance with the standards of generally accepted industry practice;
- (2) Designed, manufactured, installed, inspected, tested, operated and maintained by competent persons;

- (3) Inspected and tested in accordance with plans providing details of the frequency, standards, and procedures to be followed; and
- (4) Permanently labelled to display key operational data in accordance with the standards of generally accepted industry practice. The label shall be visible to the operator.

PART 4: SPARE

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PART 5: PRESSURE VESSELS

5.1 SCOPE

- 5.1.1 This part of the code applies to pressure vessels coming within the scope of the PECPR Regulations. It details requirements for design, design verification, manufacture, operation, maintenance, repair and inspection.
- 5.1.2 For electric and electrode boilers refer to the *Approved Code of Practice for the Design, Safe Operation, Maintenance and Servicing of Boilers*.

5.2 GENERAL

Pressure vessels shall comply with 3.2 and other relevant requirements of this code.

5.3 MATERIALS

Materials used in the manufacture, repair or alteration of pressure vessels shall comply with 3.3 of this code.

5.4 DESIGN

5.4.1 General

- (1) Pressure vessels shall be designed in accordance with AS/NZS 1200 except where amended by this code.

Note: Shell/tube heat exchanger tube sheets may be designed in accordance with the Tubular Exchanger Manufacturers Association (TEMA) Code, provided the use of this code complies with the provisions of ASME VIII, division 1.

- (2) Pressure vessels shall have inspection openings in accordance with the relevant design standard. Where the design standard does not specify requirements for inspection openings, or they are not specified in this code of practice, then they shall comply with BS 470.

Note: Refer to 5.4.3(2) for inspection opening requirements for small pressure vessels.

- (3) Designers shall provide to design verifiers details of all loads for which a pressure vessel is to be design verified. This shall include loads which are supported by or react on the vessel.

5.4.2 Temperatures and pressures

- (1) Pressure vessels shall be designed and constructed to operate safely between specified temperature and pressure limits. These limits shall include due allowance for any design uncertainties or operational fluctuations.
- (2) The minimum design temperature of a pressure vessel shall be as follows:
 - (a) For pressure vessels installed as part of a continuous process or system, the minimum design temperature shall be not greater than the minimum design limit for that part of the system or 0°C, whichever is the lesser;
 - (b) For pressure vessels used for storage the minimum design temperature shall be not greater than the lowest applicable value of:
 - (i) The minimum temperature of the product under delivery or containment conditions;
 - (ii) The lowest temperature created in the vessel when fluid is added or withdrawn;
 - (iii) 0°C if located inside or with substantial protection against exposure to low temperatures; or
 - (iv) -10°C if located out of doors unless more severe conditions apply at a particular locality. (A site-specific minimum temperature may be substituted where the inspection body is satisfied that it is appropriate for the application.)
- (3) The maximum design temperature of a pressure vessel shall not be less than the maximum temperature to which it may reasonably be exposed.
- (4) The maximum design pressure of a pressure vessel shall be not less than the pressure at which its overpressure protection system is set to commence operation.
- (5) Pressure vessels for refrigeration systems shall be designed in accordance with AS/NZS 1677.

5.4.3 Small pressure vessels

- (1) The following standards may be used for pressure vessels which come within their scope:
 - (a) AS 2971 *Serially-Produced Pressure Vessels*, or
 - (b) UL 1450 *Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment*. (For pressure vessels used as part of an air compressing system.)

- (2) Pressure vessels in 5.4.3(1) shall have inspection openings in accordance with the applicable standard. If this does not specify inspection openings, then they shall comply with the BS 470 except that inspection openings are not required for:
 - (a) Air receivers with a water capacity not exceeding 50 litres; or
 - (b) Refrigeration and cryogenic vessels.

5.4.4 Seismic design

- (1) Pressure vessels which have a service weight exceeding 1 tonne and a centre of gravity under service conditions higher than 1 metre above the lowest part of the pressure vessel or its permanently attached supports shall comply with 5.4.4.
- (2) Pressure vessels shall conform with the applicable design standard and the following seismic design requirements. These seismic provisions shall be regarded as a minimum for pressure vessels installed at approximately ground level. Special consideration shall be given to any vessels which, because of their design, have components placed at a significant height above ground level.
- (3) Pressure vessel supports and shells shall be designed to conform with the seismic provisions of NZS 4203. The limiting stresses permitted by the applicable pressure vessel design standard shall not be exceeded, for seismic forces acting in any horizontal direction, when the vessel is at design pressure and temperature and the vessel contents at normal working level.
- (4) Pressure vessels intended to be suitable for any location in New Zealand shall have a Zone Factor of 1.2 applied during the design process. (Refer to NZS 4203 Fig. 4.6.2.)
- (5) Pressure vessels for installation in a specific location in New Zealand shall have, as a minimum, the zone factor for that location applied during the design process.
- (6) Pressure vessels shall not be relocated to a seismic zone which has a higher seismic coefficient than the one for which they were design verified unless the design is re-verified for that zone.
- (7) The value of the seismic design coefficient shall not be less than that given in AS/NZS 1200 for the relevant geographical area of New Zealand.
- (8) The greater of the loadings derived from the applicable seismic design coefficient and analysis to NZS 4203 shall be used. These coefficients refer to the “serviceability limit state” for pressure containment and the “ultimate limit state” for foundation design.
- (9) The design and construction of equipment foundations shall be certified by an engineer who is appropriately qualified, has relevant experience and is registered under the provisions of the Engineers’ Registration Act 1924. This certification is also

required for building structures and foundations where equipment is supported by the building structure.

- (10) Notwithstanding the requirements of 5.4.4, where a site-specific study has been carried out which includes appropriate geological and structural investigation, then pressure vessels may be designed in accordance with the seismic coefficients derived from this study.

5.5 DESIGN VERIFICATION

- 5.5.1 Pressure vessels shall be design verified in accordance with 3.5.
- 5.5.2 Design verification shall allow for all loads supported by or reacting on the vessel. Where necessary, these loads shall be obtained from the designer by the design verifier.
- 5.5.3 The validity of a verified design shall be in accordance with appendix A.
- 5.5.4 Where seismic design coefficients are determined in accordance with 5.4.4(10) the designer shall include, with any design submitted to a design verifier, sufficient information to enable the design verifier to:
 - (1) Verify that any site-specific analysis has been performed by competent persons; and
 - (2) That the data derived from the analysis has been correctly applied to the design.

5.6 MANUFACTURE AND WORKMANSHIP

Pressure vessels shall be manufactured in accordance with the applicable standard and with 3.6 of this code.

5.7 INSPECTION AND TESTING

5.7.1 New pressure vessels

- (1) New pressure vessels shall be inspected and tested in accordance with 3.7.2.

This shall include inspection and testing:

- (a) During manufacture and erection; and
 - (b) At completion of installation and commissioning.
- (2) Pressure vessels manufactured in New Zealand to ASME, section VIII, division 1 or division 2 may, provided the purchaser agrees, be subject to inspection and testing at hold points corresponding to those specified for the equivalent category of vessel in NZS PD 5500, in lieu of ASME code stamping. This inspection shall be in accordance with appendix A.

Note: NZ BS 5500 (BS 5500) has been replaced by NZS PD 5500.

- (3) Pressure vessels manufactured to ASME Boiler and Pressure Vessel Code, section X, Fibreglass Reinforced Plastic Pressure Vessels shall be ASME code stamped.
- (4) ASME code stamping shall be performed by an inspector who holds an appropriate National Board commission and is employed by an authorised inspection agency, which is recognised by the Secretary.

5.7.2 In-service pressure vessels

- (1) In-service inspection of pressure vessels shall be carried out in accordance with 3.7.3.
- (2) Pressure vessels shall be prepared for inspection in accordance with the requirements of the equipment inspector. This preparation may include withdrawing the vessel from service, opening up, cleaning, removal of insulation, stripping down and laying out of fittings and ancillary equipment.

5.8 OPERATION, MAINTENANCE AND SERVICING

Pressure vessels shall be operated, maintained and serviced in accordance with 3.8 of this code.

PART 6: PRESSURE PIPING

6.1 SCOPE

This part of the code applies to pressure piping coming within the scope of the PECPR Regulations.

6.2 GENERAL

Pressure piping shall comply with 3.2 and other relevant requirements of this code.

6.3 MATERIALS

Materials used in the manufacture, repair or alteration of pressure piping shall comply with 3.3 of this code.

6.4 DESIGN

6.4.1 General

- (1) Pressure piping shall be designed in accordance with 3.4 and 6.4 of this code.
- (2) Pressure piping including supports, guides, anchors, etc., shall be designed to withstand the loadings imposed by hydraulic testing, as a separate load case, when this method of pressure test is to be used.
- (3) Where pressure piping systems connect to other equipment, then the forces, moments, torques and associated displacements applied at the connection shall be determined for all relevant load cases including the cold case where cold pull or creep relaxation is relevant. The designer shall then ensure that the loadings and associated displacements:
 - (a) Are such that the permissible stress levels in the connected equipment are not exceeded; or
 - (b) Are made available to the designer of the connected equipment.
- (4) Where there is a risk of persons being injured through contact with hot/cold surfaces of piping systems; such surfaces shall be insulated or otherwise made safe.

- (5) Alterations to pressure piping shall be performed in accordance with the latest issue of the standard to which it was originally designed. Where this is not practicable the piping system may be redesigned to an appropriate standard from Schedule C.

6.4.2 Refrigeration piping systems

Refrigeration piping systems shall be designed in accordance with ASME B31.3 (with optional EEMUA Supplement), ASME B31.5, or AS 4041 (Class 1) and AS/NZS 1677 and this code.

6.4.3 Seismic, wind and snow loadings

- (1) Pressure piping shall be designed in accordance with 3.4 for seismic, wind and snow loadings.
- (2) Notwithstanding the requirements of 6.4.3(1) where a site-specific study has been carried out which includes appropriate geological and structural investigation, then pressure piping may be designed in accordance with the seismic coefficients derived from this study.

6.5 DESIGN VERIFICATION

6.5.1 Pressure piping systems shall be design verified in accordance with 3.5.

6.5.2 Where seismic design coefficients are determined in accordance with 6.4.3(2) the designer shall include, with any design submitted to a design verifier, sufficient data to enable the design verifier to:

- (1) Verify that any site specific analysis has been performed by competent persons; and
- (2) That the data derived from the analysis has been correctly applied to the design.

6.6 MANUFACTURE AND WORKMANSHIP

6.6.1 Pressure piping shall be manufactured in accordance with 3.6.

6.6.2 Where appropriate pressure piping shall be colour-coded in accordance with NZS 5807 or equivalent standard.

6.7 INSPECTION AND TESTING

6.7.1 New pressure piping

- (1) New pressure piping shall be inspected and tested in accordance with 3.7.2.
- (2) Ammonia pipework, and other Group 2B pipework constructed to ASME B31.5, shall be inspected and tested in accordance with Chapter VI of ASME B31.3.

6.7.2 In-service pressure piping

In-service pressure piping shall be inspected and tested in accordance with 3.7.3.

6.8 OPERATION, MAINTENANCE AND SERVICING

Operation, maintenance and servicing shall comply with 3.8 of this code.

PART 7: STEAM TURBINES

7.1 SCOPE

This part applies to steam turbines coming within the scope of the PECPR Regulations.

7.2 GENERAL

Steam turbines shall comply with the relevant standards in schedule C of this code.

7.3 MATERIALS

7.3.1 All materials used in the construction of pressure-retaining parts shall comply with appropriate British Standards or the ASME Boiler and Pressure Vessel Code, section II (or the equivalent ASTM specification). They shall be suitable for continuous use for the design life of the turbine at the maximum operating temperature and pressure specified.

7.3.2 Materials for pressure-containing components shall be identified in the terms of British Standards, the ASME Boiler and Pressure Vessel Code, section II or the equivalent ASTM specification.

7.4 DESIGN

7.4.1 General

Steam turbines shall be designed in accordance with 3.4 and 7.4 of this code.

7.4.2 Instrumentation

Steam turbines shall, where applicable, be fitted with the instrumentation specified in BS EN 60045-1, clause 11.

7.5 DESIGN VERIFICATION

7.5.1 General

- (1) Steam turbines which are proven standard production models of an internationally recognised manufacturer may, for the purpose of design verification, be accepted by an inspection body on the basis of a manufacturer's design statement as set out in appendix C and the other documentation in 7.5.2 of this code.

- (2) Steam turbines which are proven standard production models of an internationally recognised manufacturer with rated output not exceeding 250 kW do not require design verification by an inspection body.
- (3) All other steam turbines must be design verified by appropriate analytical and test procedures.

7.5.2 Documentation required with a design statement

The following documents shall be supplied to an inspection body when seeking a Certificate of Design Verification on the basis of a turbine manufacturer's design statement:

- (a) A design statement in accordance with appendix C;
- (b) Sufficient drawings and documents to enable the steam turbine pressure retaining parts and their material to be readily identified; and
- (c) General details of the protective devices included with the steam turbine.

7.6 MANUFACTURE AND WORKMANSHIP

7.6.1 General

Manufacture and workmanship of steam turbines shall comply with 3.6 and 7.6 of this code.

7.6.2 Manufacturer's nameplate

A manufacturer's nameplate should be permanently attached to each steam turbine stating the manufacturer's name and address, and:

- (a) Maximum steam pressure and temperature (at the stop valve);
- (b) Maximum exhaust pressure;
- (c) Operating rpm;
- (d) Overspeed trip rpm;
- (e) Maximum rated shaft output;
- (f) Type and model number of the steam turbine;
- (g) Serial number; and
- (h) Date of manufacture.

7.7 INSPECTION AND TESTING

7.7.1 General

- (1) Inspection and testing during manufacture shall comply with 3.7 and 7.7 of this code.

- (2) Sufficient data, drawings, documents and other information shall be supplied to the inspection body to enable an equipment inspector to readily identify the steam turbine and its major pressure-retaining components.

7.7.2 Inspection

- (1) The following inspection shall be carried out on all pressure-retaining components. The party responsible for each part of the inspection shall be as follows:
 - (a) For steam turbines with a maximum rated shaft output up to and including 250 kW:
 - (i) Materials by the manufacturer;
 - (ii) Workmanship by the manufacturer; and
 - (iii) Pressure test by the manufacturer.
 - (b) For steam turbines with a maximum rated shaft output greater than 250 kW and up to and including 500 kW:
 - (i) Materials by the manufacturer;
 - (ii) Workmanship by the manufacturer; and
 - (iii) Pressure test witnessed by an inspection body.
 - (c) For steam turbines with a maximum rated shaft output exceeding 500 kW:
 - (i) Materials by the manufacturer with verification by an inspection body;
 - (ii) Workmanship by an inspection body; and
 - (iii) Pressure test witnessed by an inspection body.
- (2) The degree of verification of materials and the inspection of workmanship by the inspection body should take into account the quality assurance applied by the manufacturer.

7.7.3 Pressure tests

- (1) All parts containing steam, except as noted in 7.7.3(2), shall be pressure tested in accordance with the relevant standard from Schedule C.
- (2) Exhaust steam zones in which pressure may rise above atmospheric pressure during normal operation or overpressure conditions shall be pressure tested to 1.5 times the maximum internal steam pressure occurring under overpressure conditions or, 100 kPa, whichever is the greater.
- (3) Notwithstanding the requirements of 7.7.3(1) and 7.7.3(2), other methods of testing/examination may be substituted for pressure testing provided it can be demonstrated that they are generally accepted industry practice and they are acceptable to the inspection body.

- (4) Exhaust steam zones which are clearly defined and protected by overpressure trips, which can be demonstrated to limit pressure during overpressure conditions to pressures below atmospheric pressure, shall be designed and tested in accordance with the standards of generally accepted industry practice.

7.7.4 Inspection and test reports

Inspection and test reports for all steam turbines shall be provided to the controller and shall be available for viewing by the equipment inspector.

7.7.5 Overspeed and overpressure trip devices

For all steam turbines with a maximum rated shaft output exceeding 250 kW the adequacy of all overspeed and overpressure trip devices shall be demonstrated to the equipment inspector following erection and commissioning.

7.7.6 Documentation required for Certificate of Inspection

The following documents shall be available for perusal by the inspection body at the time application is made for a Certificate of Inspection:

- (a) A copy of the design acceptance/verification certificate and documents described in 7.5 of this code;
- (b) The inspection and test reports required by 7.7 of this code; and
- (c) The general arrangement drawings for the steam turbine.

7.7.7 In-service inspection

In-service inspection shall be carried out in accordance with the principles of 3.7. It shall include:

- (a) Inspection and certification of overspeed, overpressure and other turbine safety protection systems at periods determined in accordance with the recommendations of the manufacturer and the standards of generally accepted industry practice.
- (b) Internal inspection of turbines, emergency stop valves and governor valves at periods determined in accordance with the recommendations of the manufacturer and the standards of generally accepted industry practice.
- (c) Turbine ancillary systems, coming within the scope of the PECPR Regulations, shall be inspected and tested in accordance with AS/NZS 3788 and this code of practice.

7.8 OPERATION, MAINTENANCE AND SERVICING

Steam turbines shall be operated, maintained and serviced in accordance with the principles of 3.8 of this code.

PART 8: MISCELLANEOUS PRESSURE EQUIPMENT

8.1 SCOPE

This part applies to pressure equipment such as gas turbines, pumps, steam engines, compressors, etc., coming within the scope of the PECPR Regulations.

8.2 GENERAL

Miscellaneous pressure equipment shall comply with 3.2 and other relevant requirements of this code.

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SCHEDULE A: INSPECTION PERIODS FOR PRESSURE EQUIPMENT NOT INCLUDED IN TABLE 4.1 OF AS/NZS 3788

Inspection periods for pressure equipment shall be determined in accordance with 3.7.3 of this code of practice.

TABLE OF INSPECTION PERIODS

1	2	3	4	5	6
Pressure Equipment	Commissioning Inspection Required?	First Yearly Inspection Required?	Inspection Period (Years)		
			External Inspection Period	Internal Inspection	
				Nominal Period	Extended Period
Reactor vessels containing catalysts	Y	Y	1	4	12

SCHEDULE B: PRESSURE EQUIPMENT NOT REQUIRING A CERTIFICATE OF INSPECTION

CLASS A: PRESSURE EQUIPMENT REQUIRING THE APPOINTMENT OF A COMPETENT PERSON

The following equipment does not require a Certificate of Inspection but requires the appointment of a competent person:

- Pressure equipment with hazard level D to AS 4343 that is operated and maintained within a management system conforming with F2 of appendix F.
- Compressors and pumps with input power exceeding 25 kW.
- Gas turbines and their cooling systems.
- Steam turbines with a maximum rated output not exceeding 250 kW.
- Enclosures for high-voltage electrical equipment such as switchgear, busbars, control gear, bushings and instrument transformers, all of which contain an electrically-insulating gas.

CLASS B: PRESSURE EQUIPMENT NOT REQUIRING THE APPOINTMENT OF A COMPETENT PERSON

The following equipment does not require a Certificate of Design Verification, a Certificate of Inspection or the appointment of a competent person:

- Pressure equipment with hazard level E to AS 4343.
- Air-conditioning equipment, intended for commercial use, using refrigerant gases that are both non-flammable and non-toxic.
- Commercial heat pump equipment using refrigerant gases that are both non-flammable and non-toxic.

- Commercial refrigeration equipment containing non-flammable and non-toxic gases which has a capacity to remove energy from the cold body not exceeding 30 kW.
- Compressors and pumps with input power not exceeding 25 kW.
- Pressure vessels that conform with appendix M.
- Pressure vessels that are:
 - (i) Designed in accordance with the standards of generally accepted industry practice for gas cylinders or gas containers and are used for the transport of their contents;
 - (ii) Used for the transport of permanent or liquified gases; and
 - (iii) Filled only at filling stations that meet the standards of generally accepted industry practice.
- Steam-heated clothes presses and tyre moulds.

Note: Transportable vessels, which contain dangerous goods and are transported by sea, must comply with appendix M.

SCHEDULE C: STANDARDS LIST AND REFERENCED DOCUMENTS

Unless otherwise noted, the following list refers to the latest issue and amendment of the standard or document.

GENERAL

ANSI/NB - 23	<i>National Board Inspection Code</i>
AS 1548	<i>Steel plates for pressure equipment</i>
AS 3873	<i>Pressure equipment – Operation and maintenance</i>
AS 3892	<i>Pressure equipment – Installation</i>
AS 4343	<i>Pressure equipment – Hazard levels</i>
AS 4458	<i>Pressure equipment – Manufacture</i>
AS/NZS 1200	<i>Pressure equipment</i>
AS/NZS 3788	<i>Pressure equipment – In-service inspection</i>
AS/NZS 4360	<i>Risk management</i>
BS 1501	<i>Steels for pressure purposes</i>
BS EN 10028	<i>Specification for flat products made of steels for pressure purposes</i>
NZS 4203	<i>Code of practice for general structural design and design loading for buildings</i>
NZS 5807	<i>Code of practice for industrial identification by colour, wording or other coding</i>

HYPERBARIC CHAMBERS

ASME PVHO-1 1990	<i>Pressure vessels for human occupancy</i>
CSA Z275-1-93	<i>Hyperbaric facilities</i>

MANAGEMENT SYSTEMS

AS/NZS ISO 9001	<i>Quality Systems – Model for quality assurance in design/development, production, installation and servicing</i>
AS/NZS ISO 9002	<i>Quality Systems – Model for quality assurance in production and installation</i>
AS/NZS ISO 8402	<i>Quality management and quality assurance – Vocabulary</i>
ISO-IEC Guide 25	<i>General requirements for the competence of calibration and testing laboratories</i>
ISO Guide 39	<i>General requirements for the acceptance of inspection bodies</i>
ISO 17020 (EN 45004)	<i>General criteria for the operation of various types of bodies performing inspection</i>

PRESSURE VESSELS

ANSI/UL 1450	<i>Motor-operated air compressors, vacuum pumps, and painting equipment</i>
AS 1210	<i>Pressure vessels</i>
AS 1210, Supplement No.1	<i>Unfired pressure vessels – Advanced design and construction</i>
AS 1210, Supplement No.2	<i>Pressure vessels – Cold-stretched austenitic stainless steel vessels</i>
AS 2971	<i>Serially produced pressure vessels</i>
AS 3577	<i>Steel cylinders for compressed gases - Welded - 150 kg to 500 kg</i>
ASME Boiler and Pressure Vessel Code, Section VIII	<i>Rules for Construction of Pressure Vessels</i> <i>Division 1</i> <i>Division 2 Alternative Rules</i>
ASME Boiler and Pressure Vessel Code, Section X	<i>Fiber-Reinforced Plastic Pressure Vessels</i>
AS/NZS 1596	<i>Storage and handling of Liquefied Petroleum Gas</i>
AS/NZS 1677, Parts 1-2	<i>Refrigerating systems</i>
AS/NZS 3711.6	<i>Tank containers</i>
BS 470	<i>Specification for inspection, access and entry openings for pressure vessels</i>

BS 1101	<i>Specification for pressure containers for paint and other similar substances</i>
BS 2646, Parts 1-5	<i>Autoclaves for sterilisation in laboratories</i>
BS 3274	<i>Tubular heat exchangers for general purposes</i>
BS 3970, Parts 1-5	<i>Sterilising and disinfecting equipment for medical products</i>
BS 4814	<i>Specification for expansion vessels using an internal diaphragm for sealed hot water heating systems</i>
BS 4994	<i>Vessels and tanks in reinforced plastics</i>
BS 5169	<i>Specification for fusion welded steel air receivers</i>
BS 7201	<i>Hydro-pneumatic accumulators for fluid power purposes</i>
BS EN 286, Part 1	<i>Simple unfired pressure vessels designed to contain air or nitrogen</i>
NZS/BS 853	<i>Specification for calorifiers and storage vessels for central heating and hot water supply</i>
NZS/BS 5045, Parts 1-3	<i>Transportable gas containers</i>
NZS PD 5500	<i>Specification for unfired fusion welded pressure vessels</i>
TEMA	<i>Standards of Tubular Exchanger Manufacturers Association</i>
UL 1450	<i>Motor-operated air compressors, vacuum pumps and painting equipment</i>

Note: NZ BS 5500 (BS 5500) has been replaced by NZS PD 5500.

PIPEWORK

ASME B31.1	<i>Power Piping</i>
ASME B31.3	<i>Process Piping</i>
ASME B31.4	<i>Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids</i>
ASME B31.5	<i>Refrigeration Piping</i>
AS 4041	<i>Pressure Piping</i>
NZS/BS 806	<i>Specification for design and construction of ferrous piping installations for and in connection with land boilers</i>

REFRIGERATION SYSTEMS

AS/NZS 1677

Refrigerating systems

ROTATING EQUIPMENT

BS EN 60045-1

Steam turbine procurement

BS EN 60953-2

Rules for steam turbines thermal acceptance tests

BS 5968

Methods of acceptance testing of industrial steam turbines

API Standard 611

General purpose steam turbines for refinery services

ANSI/ASME PTC6

Steam turbines performance test code

ANSI/ASME PTC 6-1

Interim test code for an alternative procedure for testing steam turbines

TRANSPORTABLE EQUIPMENT

AS/NZS 3711.6

Tank containers

IMDG Code

International Maritime Dangerous Goods Code

ISO 1496.3

Series 1 freight containers - Specification and testing - Part 3: Tank containers for liquids, gases and pressurised dry bulk

NZS 5418

Transportation containers for hazardous substances

WELDING

BS EN 287

Approval testing of welders for fusion welding

BS EN 288

Specification and approval of welding procedures for metallic materials

ASME Boiler and Pressure Vessel Code, Section IX

Welding and Brazing Qualifications

AS/NZS 3992

Pressure equipment – Welding and brazing qualification

OSH APPROVED CODES OF PRACTICE AND GUIDELINES

Approved Code of Practice for the Management of Noise

Approved Code of Practice for the Safe Use of Visual Display Units

Approved Code of Practice for the Management of Substances Hazardous to Health

Guidelines for the Prevention of Falls

Guidelines for the Management and Removal of Asbestos

Guidance Notes on Providing First Aid Facilities and Training To Meet the Requirements of The Health and Safety in Employment Act 1992 and Regulations 1995

Safe Working in Confined Spaces

APPENDIX A: CONFORMITY ASSESSMENT

A1. INTRODUCTION

- A1.1 This appendix specifies the conformity assessment requirements for pressure equipment coming within the scope of the PECPR Regulations.
- A1.2 Conformity assessment shall include design verification and fabrication inspection.
- A1.3 Conformity assessment shall be performed, as indicated in table A, by an accredited inspection body, within a manufacturer's quality management system, or by a competent person. (See Note 4 to Table A.)

TABLE A

Hazard Level of Equipment	Design		Fabrication	
	Management System (Notes 1 and 2)	Inspection Body (Notes 3 and 4)	Management System (Notes 1 and 2)	Inspection Body (Notes 3 and 4)
A		Yes		Yes
B	AS/NZS 9001 No QMS	Yes Yes	AS/NZS 9002 No QMS	No Yes
C	AS/NZS 9001 No QMS	No (Note 5) Yes	AS/NZS 9002 No QMS	No Yes
D	AS/NZS 9001 No QMS	No Yes	AS/NZS 9002 No QMS	No No
E	No QMS	No	No QMS	No

Note:

1. 'No QMS' means a quality management system is not required.
2. 'AS/NZS 9001' or 'AS/NZS 9002' means the relevant quality management system is required.
3. 'Yes' indicates that design verification/fabrication inspection by an inspection body is required.
4. 'No' indicates that design verification/fabrication inspection may be performed by a competent person. Where a quality management system is required then this person must hold a relevant IPENZ or CBIP certificate of competence.
5. 'Yes' for transportable pressure vessels.

A2. INSPECTION BODIES

- A2.1 Inspection bodies providing conformity assessment services must be recognised by the Secretary and accredited to ISO 17020 (EN 45004).
- A2.2 Inspection bodies shall provide only conformity assessment services permitted by their accreditation type and scope.

A3. QUALITY MANAGEMENT SYSTEM

- A3.1 Designers and manufacturers carrying out conformity assessment shall, where required by table A, be certified to AS/NZS 9001 or AS/NZS 9002 respectively.

Note: These standards have been superseded by AS/NZS ISO 9001:2000 but may remain in use until 1 January 2004. After this date, certification must be to this latest revision.

- A3.2 OSH must have been given the opportunity to participate in any audits of a designer's/manufacture's quality management system carried out by the certification body.
- A3.3 Designer's and manufacturer's quality management systems must include procedures acceptable to OSH for ensuring that:
- (1) Persons employed are competent and appropriately qualified;
 - (2) Quality assurance work is carried out in an objective fashion; and
 - (3) Quality assurance management have an independent reporting path to the chief executive.
- A3.4 Following ISO certification, designers and manufacturers must obtain an exemption under regulation 5 of the PECPR Regulations before carrying out any in-house conformity assessment permitted by this appendix. This conformity assessment shall only be performed for equipment which they design/manufacture.
- A3.5 OSH may make unexpected visits between audits, in order to verify ongoing compliance with a quality management system.

A4. DESIGN VERIFICATION

A4.1 General

- (1) Pressure equipment design shall be verified for compliance with the applicable standards and this code. Design verification shall also include any requirements specified by the purchaser which are relevant to the safety of the equipment.
- (2) Design verification may also include other verification work by agreement with the purchaser provided this does not compromise the validity of the design verification process.

- (3) Design verification shall have regard for any circumstances including seismic disturbance which may reasonably be expected to arise in relation to the equipment so that when the equipment is properly maintained it remains safe for persons who operate or maintain it or who may otherwise be in its vicinity.
- (4) Unless otherwise specified by the inspection body, or affected by A4.5 of this code, more than one item of equipment may be manufactured from a verified design.

A4.2 Design Documentation

A design submitted for verification shall include the following:

- (a) Three copies of drawings of the equipment. These shall include design data relevant to the design verification such as:
 - Design standard;
 - Class of construction;
 - Hazard level;
 - Seismic, wind and snow loadings;
 - Contents;
 - Dimensions;
 - Material specifications;
 - Weld details;
 - Connections and openings;
 - Supports;
 - Lifting attachments; and
 - Transport requirements.
- (b) A copy of design calculations including all specified design conditions;
- (c) Any other data necessary to assist with verification of the design (e.g. service conditions and valve and fitting specifications); and
- (d) Where relevant to verification, the applicable parts of the purchaser's specification.

A4.3 Extent of design verification

The following aspects of design shall be included in design verification:

- (a) Suitability of materials for service;
- (b) Adequacy of all pressure parts for design operating conditions including the effect of pressure, temperature, externally applied loads and local environmental conditions such as seismic disturbances, wind, snow and ice;

- (c) Manufacturing and testing requirements including an ITP;
- (d) Specifications for flanges, valves and fittings;
- (e) Transportation and erection plans and procedures;
- (f) Equipment life including the procedure to be followed when the end of any finite life is reached;
- (g) Equipment supports not covered by A4.6 of this code; and
- (h) Where appropriate, any other aspects of design affecting safety.

A4.4 Programming of design verification

Design shall be verified before the commencement of manufacture except where the manufacturer:

- (a) Accepts the risk of future rejection of the design including any rework of design, equipment manufacture and inspection and testing that may be necessary subsequent to completion of design verification;
- (b) Ensures that all tests and inspection are carried out in accordance with the relevant standard and specification; and
- (c) Makes all necessary documentation available to the inspection body prior to commencing fabrication. This shall include the ITP and fabrication drawings.

A4.5 Alterations requiring design verification

Alterations to existing equipment or equipment under manufacture shall be treated as a new design and design verified. Depending on the extent of the alteration it may be necessary to re-verify the affected components only or, the whole design. Alterations include:

- (a) A change to design operating parameters which would adversely affect equipment. e.g. Changes to design pressure or temperature;
- (b) Alterations of pressure or structural parts of equipment, e.g. the addition of nozzles or openings which require design calculations; a change in the dimensions or contours of equipment; an increase in heating surface; the addition of a pressurised jacket;
- (c) A change to materials or manufacturing methods;
- (d) A revision or withdrawal of a standard used for design verification, prior to commencing manufacture of equipment. (The effective date of any such change shall be in accordance with the standard's requirements for implementation. Equipment contracted for prior to a standard being revised may be manufactured to a design verified in accordance with the issue of the standard at

acceptance of tender. However, the parties to a contract may agree that the equipment should incorporate any revisions subsequent to the issue of a standard on which the contract was based);

- (e) A change which would impair internal access;
- (f) An environmental change which would adversely affect equipment. (Re-verification may be required if equipment is to be located in a different seismic zone); and
- (g) Other alterations which may affect the health or safety of personnel.

A4.6 Foundations and supports

The design and construction of equipment foundations and building structures supporting equipment must be certified by an engineer who is appropriately qualified, has relevant experience and is currently registered under the provisions of the Engineers Registration Act, 1924.

A5. CERTIFICATE OF DESIGN VERIFICATION

A5.1 The contents of a Certificate of Design Verification shall be as described in 2.6.2 of this code.

A5.2 Where a design is verified within a manufacturer's quality management system, then this shall be recorded on the manufacturer's data report along with the data in 2.6.2 of this code.

A6. FABRICATION INSPECTION

A6.1 General

- (1) Fabrication inspection shall be performed on pressure equipment under manufacture and erection to establish compliance with the design standard and this code. It shall include any inspection requirements specified by the purchaser which are relevant to the safety of the equipment. Fabrication inspection shall be performed in accordance with a verified ITP using verified drawings for the equipment concerned.
- (2) Where a verified ITP is not available, inspection and testing shall be performed to an ITP prepared in accordance with appendix K.
- (3) Fabrication inspection may also include other inspection work agreed between the purchaser and the inspection body, provided this does not affect the integrity of the inspection process.

A6.2 Facilities

- (1) Equipment inspectors shall be given access to inspect equipment in the manufacturer's works and to equipment under erection at any stage during its manufacture and erection.

- (2) Manufacturers shall ensure that materials and equipment are in suitable condition and accessible at any time agreed for an inspection.
- (3) Manufacturers shall agree to a reasonable notice period for an inspection with the equipment inspector, prior to that inspection.

A6.3 Extent of fabrication inspection

Fabrication inspection shall include as applicable the following work:

- (a) Verification that a manufacturer has appropriate procedures covering the manufacturing process and is capable of satisfying the requirements of the approved ITP;
- (b) Review of design verification documentation, including certified drawings, prior to manufacture commencing. (Where manufacture has commenced prior to design verification being completed, the inspector shall be provided with a copy of the available manufacturing drawings. Any equipment manufactured prior to verified drawings being available must be re-inspected later to check for conformity with the verified drawings. If there is any deviation the equipment must be reworked to conform to the verified drawings or, the as-built reverified. The manufacturer's data report shall not be completed prior to equipment being inspected for conformity against verified drawings);
- (c) Inspection of materials to establish compliance with specifications, design requirements and applicable standards;
- (d) Inspection of pressings, forgings and castings to establish compliance with specifications, design requirements and applicable standards;
- (e) Inspection of weld preparation, shape, fit-up and cleanliness of parts to establish compliance with design requirements and applicable standards;
- (f) Checks of welding and brazing procedures to establish that they are qualified in accordance with design requirements and applicable standards;
- (g) Checks to confirm that welders and brazers are qualified to the applicable procedures;
- (h) Inspection to establish that specified welding procedures are used;
- (i) Inspection to establish that required production test welds are carried out and the results acceptable;
- (j) Inspection to establish that heat treatment complies with design requirements and applicable standards;

- (k) Inspection to establish that non-destructive examination and other tests have been performed in accordance with design requirements and applicable standards;
- (l) Inspection to establish that material, weld and other imperfections have been satisfactorily repaired;
- (m) Inspection of equipment to establish that thickness, surfaces and shapes are in compliance with design requirements and applicable standards;
- (n) Witnessing of pressure tests to establish compliance with design requirements and applicable standards;
- (o) Performing internal and external dimensional checks to establish compliance with tolerances in design documents and applicable standards;
- (p) Inspection to establish that equipment stamping and nameplate markings comply with applicable standards and this code of practice;
- (q) Inspection and testing of protective fittings to establish compliance with design requirements and applicable standards;
- (r) Any other inspection which is necessary to establish compliance with the applicable standards, this code of practice and to ensure safety; and
- (s) Review and signing of the completed manufacturer's data report and ITP;

A7. MANUFACTURER'S DATA REPORT

- (1) The manufacturer shall complete a manufacturer's data report. This shall comply with the requirements of the manufacturing standard. Where the standard does not provide for this documentation a manufacturer's data report shall be completed in accordance with appendix D.
- (2) The manufacturer's data report shall be signed by the inspector and by the manager responsible for manufacture of the equipment.

APPENDIX B: ALTERNATIVE MATERIALS

B1. GENERAL

B1.1 This appendix applies to:

- (1) The use of ASME materials in pressure equipment designed to NZS PD 5500 and BS 5169;
- (2) The use of alternative materials in pressure equipment designed to ASME Boiler and Pressure Vessel Code, Section VIII, Division 1;
- (3) The use of AS 1548 material in pressure equipment designed to NZS PD 5500 or BS 5169; and
- (4) The use of AS 1548 material in pressure equipment designed to BS EN 286 part 1.

B1.2 Unless otherwise permitted by a trade agreement, AS/NZS 1200 or, an 'Enquiry Case' or other mechanism of the standard concerned, the use of alternative materials as described in this appendix is to have the agreement of the purchaser.

B1.3 All materials used under the provisions of this appendix shall be identified by ASME code or AS or BS standard number. Details of material grades shall be included on documents provided for design verification.

B2. ASME MATERIALS USED WITH BRITISH STANDARDS

B2.1 Introduction

- (1) Subject to compliance with B2 the following materials may be used for pressure equipment manufactured to NZS PD 5500 or BS 5169, within the applicable temperature limits for the materials, without additional elevated temperature testing of the materials:
 - (a) ASME material specifications identified by the letters 'SA' prefixing the specification number, for example SA 515; and
 - (b) ASTM specifications identified in the ASME Boiler and Pressure Vessel Code, section II, Material Specifications - Part A - Ferrous Materials, as being identical to the ASME specifications of the same specification number.

- (2) Part B2 of this appendix is subject to any change to NZS PD 5500 or BS 5169 which:
 - (a) Amends or includes tables for any of the ASME materials;
 - (b) Revises or covers the use of the ASME materials by an Enquiry Case; or
- (3) Provides for the use of the ASME materials in some other manner.

In the event of any such change the amendments to the relevant standard shall override this appendix.

B2.2 NZS PD 5500 and BS 5169 applications

- (1) Materials listed in the ASME Boiler and Pressure Vessel Code Section VIII in tables UCS-23 and UHA-23 may be used for NZS PD 5500 and BS 5169 applications provided they satisfy the requirements of these standards for 'materials not covered by British Standards'. Maximum stress values shall be derived in accordance with the provisions of the construction standard. Impact testing requirements shall be as required by annex D of NZS PD 5500.
- (2) The following additional conditions also apply to the use of ASME Steels:
 - (a) There shall be compliance with the notes to ASME Boiler and Pressure Vessel Code section I, part D, table 1A;
 - (b) The material manufacturer's documentation shall show that the material complies with the notes to ASME Boiler and Pressure Vessel Code section II, part D, table 1A relating to the supply condition of the material;
 - (c) The materials listed in the ASME Boiler and Pressure Vessel Code, section II, part D, table 1A, shall only be used where their application is covered by documented welding procedures to BS EN 288, part 3 approved by a certified welding inspector or inspection body; and
 - (d) All applicable criteria of BS EN 288, part 3 including the steel grouping system and annex A (record of approval tests of welding procedures) apply.

B3. ALTERNATIVE MATERIALS FOR USE WITH ASME SECTION VIII DIVISION I PRESSURE VESSELS

B3.1 Introduction

This part covers the use of alternative materials in designs which would comply, except for variations permitted by this code of practice, with the ASME Boiler and Pressure Vessel Code, section VIII, division I. Subject to compliance with B3, these materials do

not require additional elevated temperature testing or other physical or chemical testing.

B3.2 Alternative materials

The permitted materials are those complying with BS 1501: Part 1 - Steels for Fired or Unfired Pressure Vessels: Plates (or equivalent BS EN 10028 material) or AS 1548 Steel Plates for Boilers and Pressure Vessels.

B3.3 General

The application of part B3 is subject to any change to BS 1501 (or equivalent BS EN 10028 material) or AS 1548 which substantially alters the current technical requirements of these standards.

B3.4 Maximum allowable stress values

- (1) Maximum allowable stress values for materials in B3.2 shall be calculated as prescribed in ASME VIII, division 1, appendix P.
- (2) The values used for maximum tensile strength and minimum yield strength shall be the minimum specified values in the respective materials standard specification.

B4. AS 1548 PLATE FOR NZS PD 5500 VESSELS

B4.1 Introduction

- (1) The use of AS 1548 plate shall conform with section 2 of NZS PD 5500 and B4.1 and, as appropriate, B4.2, B4.3 or B4.4.
- (2) Where AS 1548-7-460R is to be used for hot forming or, for applications requiring post fabrication heat treatment then it must be certified by the manufacturer as 'interchangeable' with AS 1548-7-460A or, recertified as AS 1548-7-460A.
- (3) Hot forming, cold forming and normalising processes shall conform with the requirements of NZS PD 5500.
- (4) Design stresses shall be established in accordance with NZS PD 5500, annex K using yield and tensile strength values from AS 1548. For elevated temperatures consideration shall be given to the application of time dependent design strengths.

Note:

1. The grades of AS 1548 plate that are generally available are AS 1548-7-460R and AS 1548-7-460N. Where AS 1548-7-460R is specified in this code of practice, it means plate produced by 'normalising rolling' and which is in a delivery condition the same as 'N' of BS EN 10028-2 P295GH. The plate manufacturer shall be consulted if there is any doubt about delivery condition.

2. Provided there is compliance with appendix C of AS 1548, AS 1548-7-460R and AS 1548-7-460RH, plates of thickness greater than 12 mm may be interchanged with A and AH grade plates respectively.

B4.2 Vessels with design temperature 50°C to 400°C.

Use AS 1548-7-460NH or AS 1548-7-460RH as shown in table B1.

B4.3 Vessels with design temperatures 0°C to 50°C.

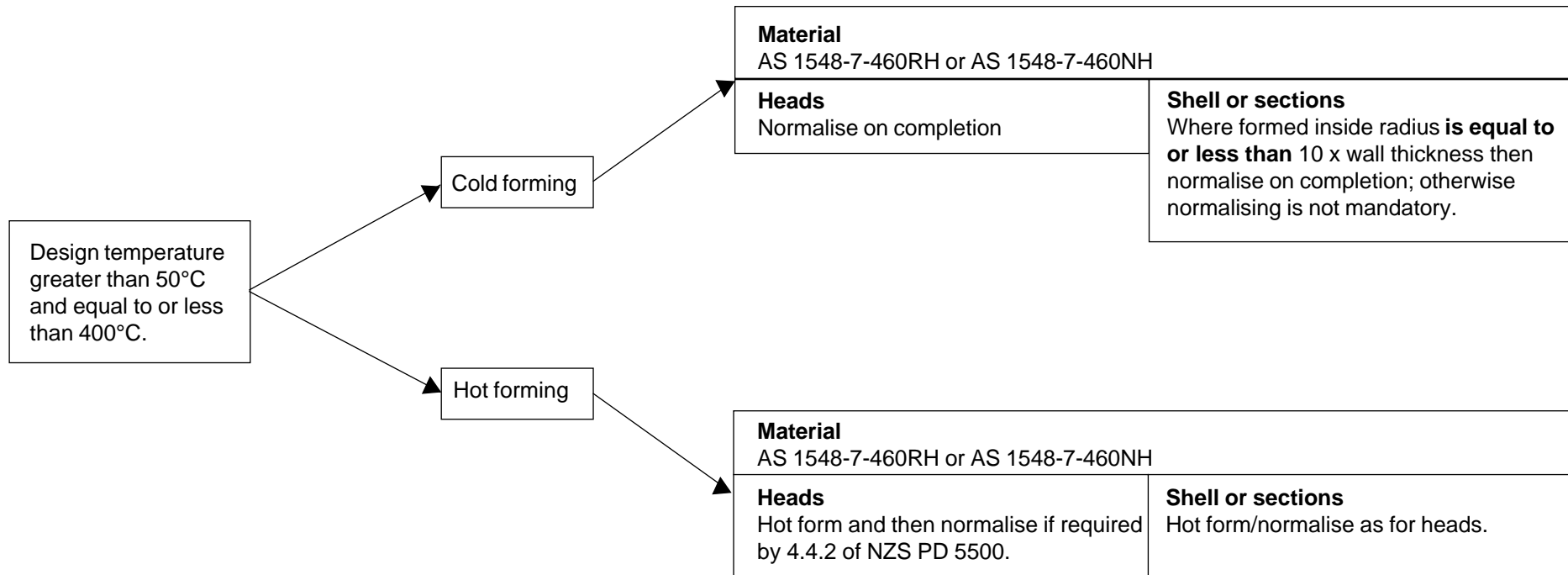
Use AS 1548-7-460N or AS 1548-7-460R as shown in table B2.

B4.4 Vessels with design temperature below 0°C.

- (1) In the case of vessels with material impact test temperature +20°C to -20°C use AS 1548-7-460NL or AS 1548-7-460RL as shown in table B3. Where AS 1548-7-460R is to be used it must be recertified AS 1548-7-460AL or it must be certified as interchangeable with AS 1548-7-460A and tested in accordance with NZS PD 5500, annex D.
- (2) In the case of vessels with a material impact test temperature below -20°C use AS 1548-7-460NL as shown in table B4.

TABLE B1: ALTERNATIVE MATERIALS, HIGH TEMPERATURE APPLICATIONS

Selection and forming of AS 1548-7-460 materials (8 mm to 80 mm thick) for pressure vessels manufactured to NZS PD 5500



Note 1. Refer to 4.2.2.3.1 of NZS PD 5500 for post cold forming heat treatment requirements.

Note 2. 'H' shall be equal to or greater than the design temperature.

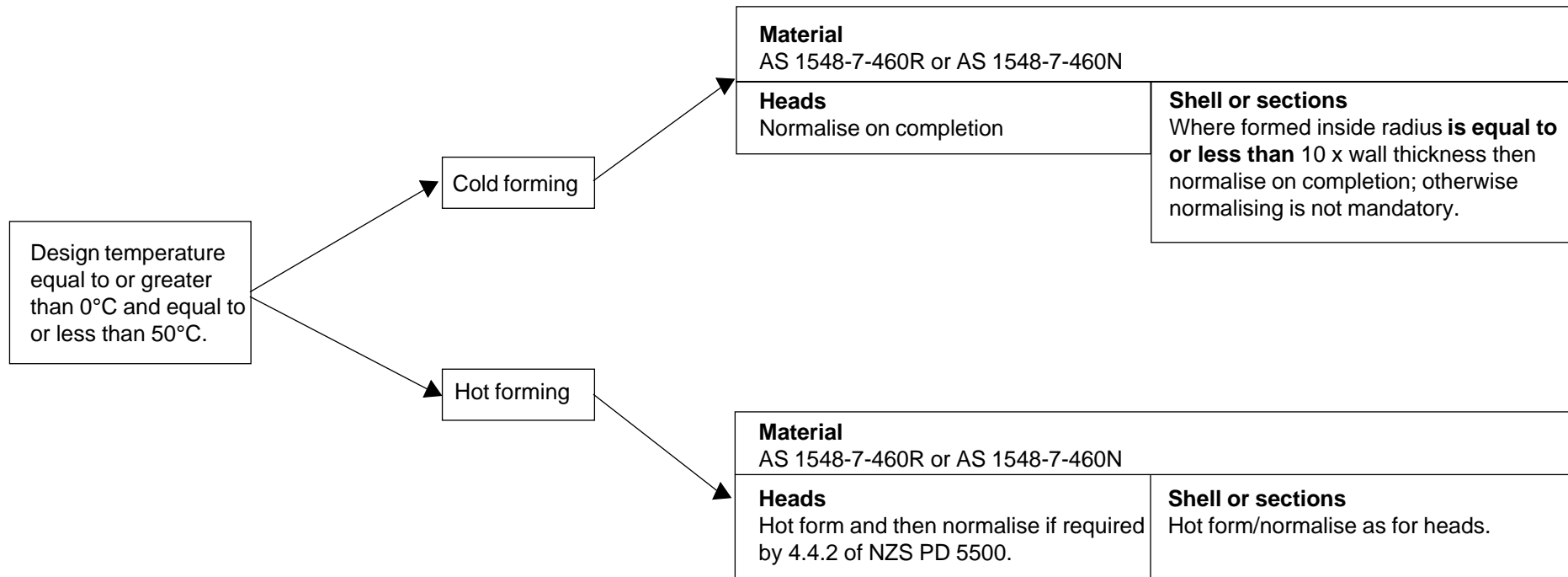
'H' may be derived for AS 1548-7-460R by testing in accordance with NZS PD 5500.

The results of these tests shall conform with Table 5, AS 1548.

These tests shall be carried out on each plate and a test report attached to the material manufacturer's test certificate.

TABLE B2: ALTERNATIVE MATERIALS, AMBIENT TEMPERATURE APPLICATIONS

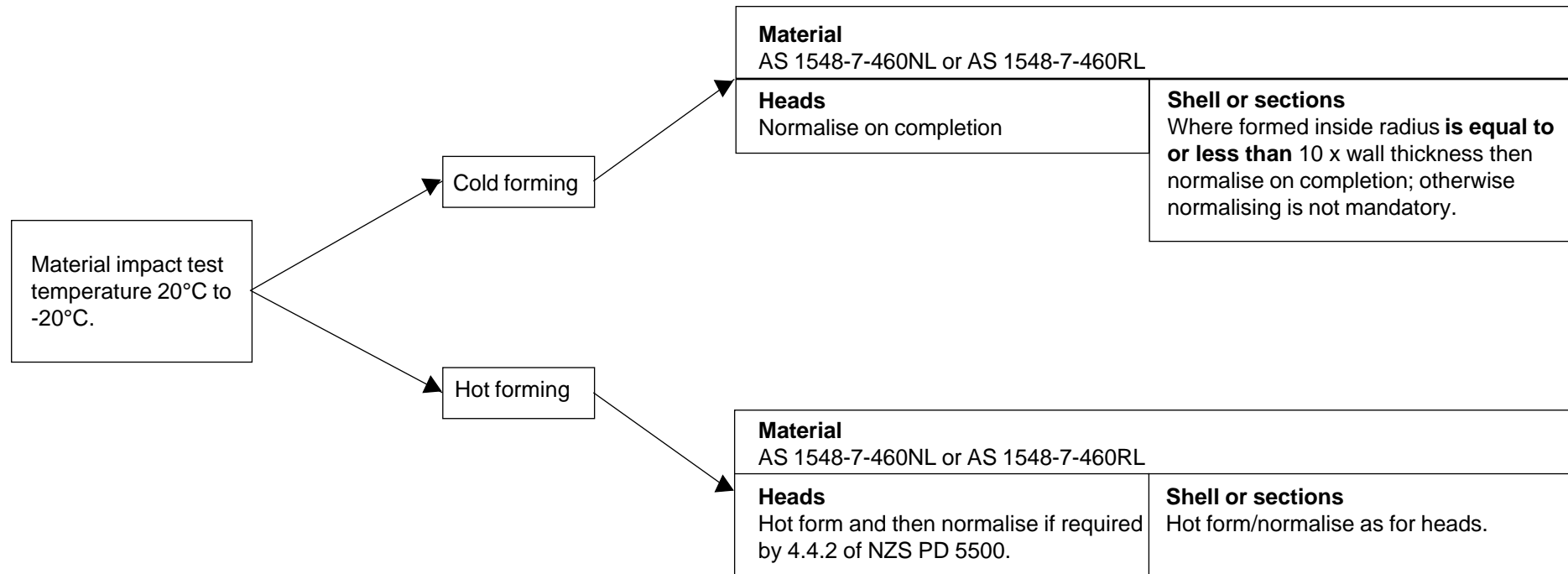
Selection and forming of AS 1548-7-460 materials (8 mm - 80 mm thick) for pressure vessels manufactured to NZS PD 5500



Note 1. Refer to 4.2.2.3.1 of NZS PD 5500 for post cold forming heat treatment requirements.

TABLE B3: ALTERNATIVE MATERIALS, LOW TEMPERATURE APPLICATIONS

Selection and forming of AS 1548-7-460 materials (8 mm to 80 mm thick) for pressure vessels manufactured to NZS PD 5500



Note 1. Refer to 4.2.2.3.1 and annex D of NZS PD 5500 for post cold forming heat treatment requirements.

Note 2. a) The material impact test temperature 'L' shall conform with NZS PD 5500 annex D.

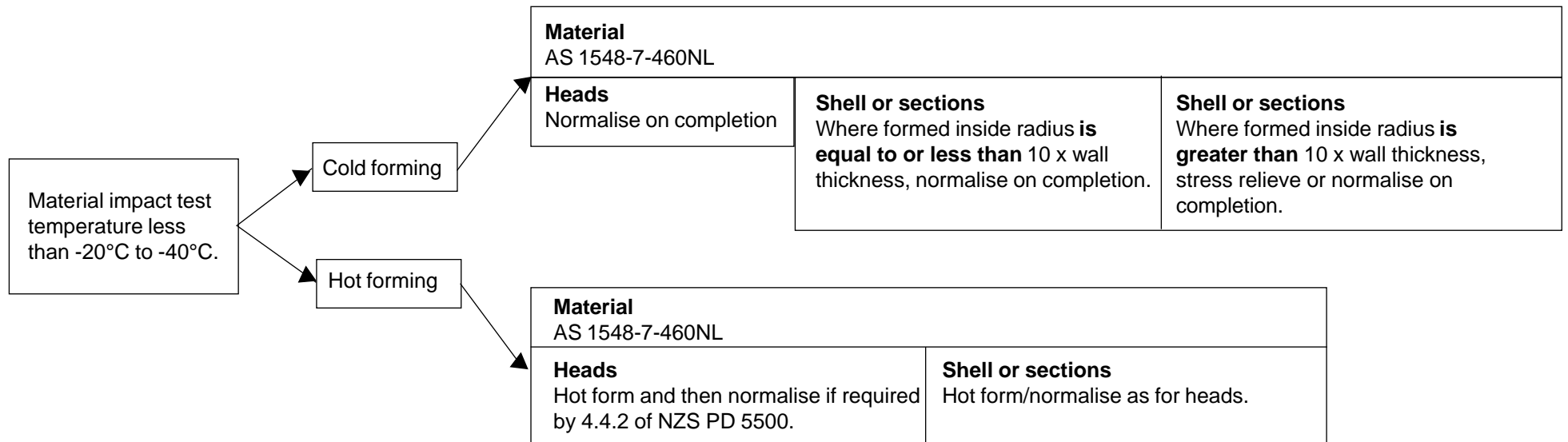
b) 'L' may be derived for AS 1548-7-460R by testing in accordance with annex D of NZS PD 5500. The test results shall conform with the requirements of NZS PD 5500

Each plate shall be tested and the test report attached to the material manufacturer's test certificate.

c) The lowest MITT permitted for BHP AS 1548-7-460R material shall be -20°C for 8 mm to 40 mm thickness range and 0°C for greater than 40 mm to 80 mm thickness range. Outside these thickness ranges N grade must be used.

TABLE B4: ALTERNATIVE MATERIALS, VERY LOW TEMPERATURE APPLICATIONS

Selection and forming of AS 1548-7-460 materials (8 mm to 80 mm thick) for pressure vessels manufactured to NZS PD 5500



Note 1. Refer to 4.2.2.3.1 and annex D of NZS PD 5500 for post cold forming heat treatment requirements.

Note 2. Use 'N' grade (normalised material) only.

'L' is the material impact test temperature. Material supplied as 'L' grade shall conform with NZS PD 5500, annex D.

Note 3. AS 1548-7-460 materials shall not be used for applications requiring a material impact test temperature lower than -40°C.

Note 4. The material shall also be certified 'H' where the maximum design temperature is greater than 50°C.

B5. AS 1548-7-460 PLATE FOR BS 5169

The use of AS 1548 7 460 plate is acceptable subject to the following conditions:

- (1) The design stress is to comply with the values given in BS 1501 151 430, table 2.
- (2) Weld procedures are to be to BS EN 288: part 3.
- (3) Welders must be qualified to BS EN 287: part 1.

B6. AS 1548 TYPE PLATE FOR BS EN 286 PART 1

The allowable stresses and the selection of grade of material shall be determined in accordance with the procedures in the standard.

APPENDIX C: DESIGN STATEMENTS

C1. TURBINE MANUFACTURER'S DESIGN STATEMENT

I (*full name of person*) being the senior manager responsible for design at (*full name of company and its registered address*) being the manufacturer of (*describe the steam turbine by name, type, model and serial number*) hereby testify that:

1. The turbine has been designed for the following maximum operating conditions:
Stop valve inlet steam pressure
 - Stop valve steam temperature
 - Exhaust pressure
 - Operating speed
2. The emergency overspeed trip mechanism shall operate at rpm.
 3. The maximum continuous rating of the turbine is kW.
 4. The maximum overload output of the turbine is kW.
 5. The turbine complies with the seismic design requirements of AS/NZS 1200.

Signed

.....
(*Type full name*)

Date ___ / ___ / ___

Note: This statement must be supplied on company letterhead.

C2. MANUFACTURER'S DESIGN STATEMENT

I (*full name of person*) being the senior manager responsible for design at (*full name of company and its registered address*) being the manufacturer of (*describe the pressure equipment by name, type, model and serial number*) hereby testify that:

1. The (*description of the equipment*) has been designed to the following standard(s):

.....
.....

2. The (*description of the equipment*) has been predominantly designed to accommodate strain to limits which ensure that membrane stresses in all pressure containment parts, are well within the maximum levels permitted by standards recognised by OSH, for equipment manufactured in the same materials and operating in a similar environment and that pressure is not a significant design factor.
3. The (*description of the equipment*) is a production model which has proven to be safe in operation.
4. The equipment complies with the seismic design requirements of AS/NZS 1200.

Signed

.....
(*Type full name*)

Date ___ / ___ / ___

Note: This statement must be supplied on company letterhead.

APPENDIX D: MANUFACTURER'S DATA REPORTS

- D1. The manufacturer's data reports shall be completed for all equipment in accordance with the requirements of the relevant manufacturing standard.
- D2. Where the manufacturing standard does not specify the preparation of a data report then the report included in this appendix shall be completed for equipment which is rated hazard level D or higher by AS 4343.
- D3. The manufacturer's data reports shall be archived by the controller so that they are available to the place of work at which the related equipment is located. They shall be available for perusal when required by an equipment inspector.
- D4. Supplementary data sheets shall be used where there are insufficient fields in any part of the manufacturer's data report or additional fields are required.

MANUFACTURER'S DATA REPORT

Unique Identification No. (issued by inspection body)

1. Description of the vessel:
2. Manufactured by:
3. Manufactured for:
4. Location of installation:
5. Certificate of Design Verification, reference and date:
-
6. Manufacturer's serial number:
7. Construction code and issue:
8. Type and class:
9. Zone factor and seismic design coefficient:
10. Hazard level (AS 4343):
11. Drawings:

Drawing Number:	Revision:	Title:

12. Design Parameters:

Principal Components	Design Pressure (kPa)	Design Temp (Min, Max °C)	Design Life (h/cycles)	Corrosion Allowance

13. Post-Weld Heat Treatment

Component	Temperature	Holding Time	Chart No.	Calibration Data

14. Non-Destructive Examination

Component	NDE Method	Extent of NDE	Report Number

15. Safety Devices

Type of Safety Device	Make and Type	Size	Set Pressure

16. Welding Record

Names of Welding Operators	Type of Qualification	Welding Procedure Applicable	Qualification Expiry

17. Welding Production Control Tests (if applicable):

18. Pressure Test

Test Position	Test Pressure Time Held	Test Medium and Temperature	Date

19. Manufacturer's Comments

(Include details of any non-compliances with the specification and any significant repairs made during manufacture.)

20. Manufacturer's Declaration

I hereby declare that:

- (a) The details given in this report are correct;
- (b) The pressure vessel bearing the manufacturer's serial number in clause 6 has been constructed in accordance with the drawings in clause 11 and the Certificate of Design Verification noted in clause 5; and
- (c) The vessel complies with the standard/code noted in clause 7 and the Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways) Regulations 1999 and is suitable for the nominated pressures and temperatures.

For Manufacturer: Date:/...../.....

Position: Name of Company:

21. Inspection Body's Declaration

I hereby declare that the construction and testing of the above vessel has been carried out under our surveillance. To the best of our knowledge and belief all aspects of this work comply with the standard/code noted in clause 7 and the Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways) Regulations 1999.

For Inspection Body: Date:/...../.....

Name of

Position: Inspection Body:

APPENDIX E:

PRESSURE RELIEF DEVICES

- E1. Pressure relief devices shall be serviced, maintained, tested and inspected in accordance with AS/NZS 3788 except as modified by this appendix.
- E2. Controllers shall ensure that records for pressure relief devices are maintained in accordance with the requirements of AS/NZS 3788.
- E3. Servicing and maintenance of pressure relief devices shall be carried out within an appropriate management system. It may be either a quality management system specifically assessed and certified for such work, or an operating and maintenance system acceptable to an inspection body.
- E4. Testing and inspection of pressure relief devices shall performed by an inspection body or, an accredited testing laboratory.

APPENDIX F: IN-SERVICE INSPECTION

F1. GENERAL

- F1.1 In-service pressure equipment which is not excluded by the PECPR Regulations or, covered by an exemption notice issued under the regulations, shall be inspected following commissioning and thereafter inspected periodically in accordance with AS/NZS 3788 except as modified by this code of practice.
- F1.2 The inspections performed shall include:
- (1) Commissioning inspections;
 - (2) First yearly inspections;
 - (3) External inspections; and
 - (4) Internal inspections.
- F1.3 The controller shall make all relevant records for equipment available for perusal by the equipment inspector. These will include declarations of conformity, Certificates of Design Verification, manufacturing inspection and test reports, Certificates of Inspection, inspection reports and relevant operating and maintenance records.
- F1.4 Equipment specified in schedule B does not require inspection and certification by an inspection body. However, this equipment must be operated and maintained within an appropriate management system. The controller must ensure that this equipment is kept in safe working condition and where required by schedule B appoint a competent person to take responsibility for it.

F2. MANAGEMENT SYSTEM

- F2.1 The inspector shall ensure that equipment being inspected is operated, maintained and serviced by the controller within an appropriate management system.
- F2.2 Where inspection periods are derived from Table 4.1, AS/NZS 3788, controllers shall have a management system for equipment that satisfies the requirements of Section 3, AS/NZS 3788 and this appendix. This shall be either a documented operating and maintenance system or an ISO certified quality management system. The management system shall be in accordance with the following table.

TABLE F1: MANAGEMENT SYSTEMS

External Inspection	Internal Inspection		
	Nominal Period	Extended Period	Further Extended
1	1	2	2

1. Documented operating and maintenance system or a quality management system.
2. Quality management system.

F3. INSPECTION PERIODS

- F3.1 Following an inspection of equipment the equipment inspector shall recommend an inspection period for the equipment to the inspection body.
- F3.2 Where a management system complies with F2.2 the maximum inspection period for equipment shall be in accordance with F6, F7 and F8 of this code.
- F3.3 Where a management system does not comply with F2.2 but the inspector is satisfied that the equipment is being safely managed, the maximum inspection period for equipment shall be 12 months.
- F3.4 The inspection period approved by an inspection body shall not exceed that recommended by an equipment inspector.
- F3.5 An inspection body shall include as a condition of issue of a Certificate of Inspection its requirements for any review and auditing, during the inspection period, of a controller's ITP and associated inspection, operating and maintenance data. This review and auditing shall be carried out to ensure that equipment is maintained in a safe condition during the currency of the certificate.

F4. COMMISSIONING INSPECTION

- F4.1 New equipment or equipment returning to service after alterations or repairs (other than minor) or change of duty outside design parameters, shall be inspected.
- F4.2 The documentation to be made available by the controller, for review by the inspector, during commissioning inspection shall include declarations of conformity, manufacturer's data reports, Certificates of Design Verification, manufacturing inspection and test reports and any operating or commissioning data required by the inspector.
- F4.3 The equipment shall be issued with a Certificate of Inspection prior to (re)entering service.

F5. FIRST YEARLY INSPECTION

- F5.1 First yearly inspections shall be carried out where indicated by table 4.1, AS/NZS 3788 and these shall include both internal and external inspections.
- F5.2 The inspection period(s) approved by the inspection body, following the first yearly inspection, shall be set in accordance with F3 of this code.

F6. EXTERNAL INSPECTION AND INTERNAL INSPECTION, NOMINAL PERIOD

- F6.1 External and internal inspections, nominal period, shall be carried out in accordance with AS/NZS 3788 and this code.
- F6.2 The inspection periods in columns 4 and 5 of table 4.1, AS/NZS 3788 and schedule A are maximum nominal periods. The equipment inspector may recommend to the inspection body that an inspection period up to the relevant nominal period be included on a Certificate of Inspection where:
- (1) The controller is satisfied that the period would be safe;
 - (2) There is relevant operating experience with the equipment;
 - (3) An appropriate management system, in accordance with section 3 of AS/NZS 3788, has been put in place for the equipment;
 - (4) Appropriate consideration has been given to the criteria set out in 4.4.3.6 of AS/NZS 3788;
 - (5) There is compliance with the other relevant requirements of AS/NZS 3788 and this code; and
 - (6) The equipment inspector is satisfied, following inspection and consideration of criteria 1) to 5) above, that the equipment is safe and would remain safe for the recommended inspection period.

F7. EXTERNAL INSPECTION AND INTERNAL INSPECTION, EXTENDED PERIOD

F7.1 Introduction

- (1) 'Extended periods' of inspection as noted in 4.4.3.2 and 4.4.3.3(b), AS/NZS 3788 shall only be approved by an inspection body where the controller's ITP has been recognised by the Secretary. The maximum 'extended periods' permitted are shown in column 6 of Schedule A and table 4.1, AS/NZS 3788.
- (2) The documentation noted in F7.2 to F7.3 is required by the Secretary with any application for the recognition of an ITP for extended inspection periods.

F7.2 From the controller

- (1) A letter of application seeking recognition (or an extension of existing recognition) in the terms of the 'recognition' provisions of the regulations.
- (2) This letter shall include:
 - (a) A schedule of the pressure equipment for which extended inspection periods are being sought. This schedule shall include the unique identification numbers issued for the equipment by the inspection body responsible for its initial certification; and
 - (b) Statements certifying that:
 - (i) The equipment will be operated within a quality management system of appropriate scope, which complies with regulation 28. This will include coverage of inspection and testing and monitoring of process and operating parameters affecting the life of the pressure equipment;
 - (ii) The equipment will be inspected and tested in accordance with an ITP approved by their inspection body;
 - (iii) The equipment will be operated within any process and operating parameters nominated in the ITP;
 - (iv) All persons responsible for management and implementation of the ITP are competent and trained in accordance with the requirements of the PECPR Regulations; and
 - (v) Their inspection body may have access at any time, to any equipment and records they require, for the purpose of monitoring and review of the ITP.

F7.3 From the inspection body

A letter supporting the controller's application for recognition (or an extension to an existing recognition). The letter is to include statements certifying that:

- (a) The relevant process and historical data, required to assess the ITP for the equipment concerned, have been reviewed; and
- (b) The ITP has been examined and that:
 - (i) It is in accordance with 'risk-based inspection' principles;
 - (ii) All damage mechanisms have been identified;
 - (iii) The inspection procedures are appropriate in respect to determining the accumulated damage;

- (iv) There has been an adequate review and appropriate incorporation of the historical inspection data for the equipment;
- (v) It is in conformance with the requirements of AS/NZS 3788 for extended inspection periods; and
- (vi) They (the inspection body) will periodically review the ITP and will notify the controller of any changes that are necessary in order to maintain the integrity of the Certificates of Inspection issued for equipment covered by the plan.

F8. INTERNAL INSPECTION, FURTHER EXTENDED PERIOD

Further extended periods of inspection as described in 4.4.3.3(c), AS/NZS 3788 shall only be approved by an inspection body where:

- (1) The controller's ITP covering the equipment has been recognised by the Secretary; and
- (2) The requirements of 4.4.3.3(c), AS/NZS 3788 would be satisfied.

APPENDIX G:

WELDING APPROVALS

G1. PRESSURE EQUIPMENT MANUFACTURED TO BS OR BS EN STANDARDS

G1.1 Except where modified by the applicable manufacturing standard, or this code of practice, the following standards shall be used for pressure equipment manufactured to BS or BS EN Standards for:

- (1) The approval testing of welding procedures; and
- (2) The approval testing of welders working to approved welding procedures.

BS EN 287: Part 1: 1992 *Approval Testing of Welders for Fusion Welding, Part 1: Steels*

BS EN 287: Part 2: 1992 *Approval Testing of Welders for Fusion Welding, Part 2: Aluminium and Aluminium Alloys*

BS EN 288: Part 1: 1992 *Specification and Approval of Welding Procedures for Metallic Materials, Part 1: General Rules for Fusion Welding*

BS EN 288: Part 2: 1992 *Specification and Approval of Welding Procedures for Metallic Materials, Part 2: Welding Procedure Specification for Arc Welding.*

BS EN 288: Part 3: 1992 *Specification and Approval of Welding Procedures for Metallic Materials, Part 3: Welding Procedure Tests for the Arc Welding of Steels.*

BS EN 288: Part 4: 1992 *Specification and Approval of Welding Procedures for Metallic Materials, Part 4: Welding Procedure Tests for the Arc Welding of Aluminium and its Alloys.*

Note:

1. The EN Standards do not invalidate previous welding procedure approvals to BS 4870, parts 1 and 2 or, previous welder's qualification approvals to BS 4871, parts 1 and 2, provided the intent of the applicable EN standard has been satisfied and any additional testing required by it has been completed.
2. Subject to the requirements of note 1, existing approvals to BS 4870 and BS 4871 will be accepted as being in compliance with the requirements of the EN design and fabrication standards for welder testing and weld procedure qualification.

3. Documentation issued under BS 4870 and BS 4871 shall be updated to conform with the requirements of the relevant EN standard.

G2. PRESSURE EQUIPMENT MANUFACTURED TO ASME STANDARDS

G2.1 ASME IX shall be used for:

- (1) The approval testing of welding procedures; and
- (2) The approval testing of welders working to approved welding procedures,

for pressure equipment manufactured to ASME Standards except where modified by the relevant manufacturing standard or this code of practice.

G3. PRESSURE EQUIPMENT MANUFACTURED TO AUSTRALIAN STANDARDS

G3.1 AS 4458 and AS 3992 shall be used for:

- (1) The approval testing of welding procedures; and
- (2) The approval testing of welders working to approved welding procedures,

for pressure equipment manufactured to Australian Standards except where modified by the relevant manufacturing standard or this code of practice.

APPENDIX H: NDE SUPPLIERS AND OPERATORS

- H1. NDE suppliers providing services which influence the issue of a Certificate of Inspection for equipment shall be accredited as a testing laboratory or an inspection body. (See also regulation 25(a) of the PECPR Regulations).
- H2. NDE operators carrying out the NDE noted in H1 shall hold appropriate CBIP qualifications and be a signatory of the NDE supplier or, they shall be supervised by a signatory of the supplier.

Note: It is a general requirement of an inspection body's accreditation that suppliers providing services, which influence the decision to issue a Certificate of Inspection, comply with the criteria stipulated in ISO 17020 or in the relevant standard of the EN 45000 series.

APPENDIX I: CYLINDERS

I1. SCOPE

This appendix specifies the conformity assessment and in-service inspection requirements for cylinders coming within the scope of the PECPR Regulations.

Note: Pressure vessels of any capacity that are manufactured to a standard in I2 but are fixed in position and filled or pressurised via attached piping shall comply with part 5 of this code.

I2. DESIGN

Cylinders shall comply with one of the following standards:

- (1) American: USA Department of Transportation Specification 3AAX Seamless steel cylinders;
- (2) Canadian: TC-3AAXM Seamless steel tubes; and
- (3) United Kingdom: BS 5045 Transportable gas containers.

I3. DESIGN VERIFICATION

Cylinders shall be design verified by an inspection body.

I4. INSPECTION

I4.1 Cylinders and their fittings and documentation shall be inspected, certified and registered by an inspection body before going into service.

I4.2 Inspection bodies shall maintain a register of certified cylinders which records the:

- (1) Manufacturer's name;
- (2) Owner's name;
- (3) Manufacturing standard;
- (4) Inspection body's name;
- (5) Cylinder serial number;
- (6) Date stamped with inspection body's mark; and
- (7) Equipment inspector's name.

15. CONTROLLERS' RESPONSIBILITIES

I5.1 Controllers of cylinders shall ensure that:

- (1) They comply with the requirements of this appendix; and
- (2) Cylinders and their fittings, are maintained in a safe condition.

I5.2 Controllers shall maintain a register of the cylinders for which they are responsible. This shall record the:

- (1) Manufacturer's name;
- (2) Manufacturing standard;
- (3) Serial number;
- (4) Test pressure in kPa;
- (5) Date of the manufacturer's test;
- (6) Dates of all periodic re-tests and names of the testing stations;
- (7) Tare weight where appropriate; and
- (8) Third party markings.

I5.3 Cylinders shall be re-tested at intervals not exceeding five years by a volumetric expansion test at a testing station approved by the Occupational Safety and Health Service of the Department of Labour..

I5.4 Controllers shall ensure that cylinders which:

- (1) Become damaged, or corroded;
- (2) Fail the volumetric expansion test;
- (3) Are deemed unsafe by a filling station; or
- (4) Are otherwise defective,

are cut up or flattened so they cannot be reused. Controllers shall ensure that the method of destruction is safe and appropriate for the cylinder and any residual contents.

I5.5 Controllers shall record the destruction of a cylinder in their cylinder register.

16. FILLING STATIONS

Filling stations shall not fill a cylinder unless the cylinder:

- (1) Is in good order and condition;
- (2) Has been tested within the previous five years, either at the time of manufacture or by a subsequent volumetric expansion test at an approved testing station; and
- (3) Is correctly marked.

17. TESTING STATIONS

- I7.1 Authorised testing stations shall hold current approval from the Occupational Safety and Health Service of the Department of Labour..
- I7.2 Test pressures and limits of permanent expansion permitted by the manufacturing specification for the cylinder shall not be exceeded.

APPENDIX J: TRANSPORTABLE PRESSURE VESSELS

J1. SCOPE

This appendix applies to transportable pressure vessels and their supports and piping systems.

It also applies to pressure vessels which are not under pressure during transit but are pressurised during discharge.

J2. GENERAL

J2.1 Transportable pressure vessels shall comply with 3.2 of this code and this appendix.

J2.2 Vehicles transporting goods coming within the scope of the Dangerous Goods Regulations must be approved by the Occupational Safety and Health Service of the Department of Labour.

J2.3 Pressure vessels exceeding 450 litres capacity that are transported by sea come under the jurisdiction of the Maritime Safety Authority of New Zealand (MSA). See appendix M for further information.

J3. MATERIALS

J3.1 Materials of construction for transportable vessels shall be appropriate for the equipment and comply with the applicable design standard. Where there are no specific requirements in the standard for elongation or Charpy V-notch impact values then, where appropriate, the material shall have:

- (1) Elongation properties complying with the elongation requirements in the relevant section of the International Maritime Dangerous Goods Code; and
- (2) A Charpy V-notch impact value of 40 Joules at the lower of the minimum design temperature or -20°C .

J3.2 The mechanical properties of the weld filler metal shall conform with the parent material specification. This shall be proven by weld procedure and weld production tests which include Charpy V-notch impact testing. See J3.1.

J4. DESIGN

J4.1 General

- (1) Transportable vessels and their piping systems shall be designed, manufactured, inspected and tested in accordance with this code and either:
 - (a) NZS PD 5500 Construction category one and ASME B31.3 respectively. All branch connections shall have full penetration welds which meet the acceptance levels specified in NZS PD 5500; or
 - (b) ASME section VIII division 1 and ASME B31.3 respectively providing there is compliance with the following additional requirements:
 - (i) Welded joints categories A and B shall be type No. 1 of table UW-12 and welded joints categories C and D shall be full penetration welds;
 - (ii) All NZS PD 5500 appendices that are applicable and not covered by the ASME Code shall be applied;
 - (iii) For ferritic steels intended for welding, the upper limit of the carbon range (in the ladle analysis) shall not exceed 0.25% and the maximum phosphorus and sulphur content shall not exceed 0.05% each; and
 - (iv) All welded joints are subject to 100% NDE in accordance with code requirements; or
 - (c) AS 1210 and ASME B31.3; or
 - (d) For seagoing transportable vessels, the International Maritime Dangerous Goods Code (for International Maritime Organisation tanks).
- (2) The thickness of the main shell and ends for single shell pressure vessels and the inner shell of cryogenic pressure vessels shall be not less than that specified in the appropriate section of the International Maritime Dangerous Goods Code.
- (3) The thickness of the outer shell of cryogenic pressure vessels shall be not less than 3 mm.
- (4) The minimum design pressure shall not be less than the developed pressure within the vessel at the reference temperature. This shall be taken as the sum of the following:
 - (a) Vapour pressure at the relevant reference temperature;
 - (b) The effect on total pressure contributed by the presence of other gases in the ullage space;
 - (c) The effect of the solubility of air or other gases in the liquid (where no reliable data for solubility exists, it can be neglected); and

- (d) The dynamic or surge pressure which shall be calculated (using a consistent system of units) as follows:

$$D_p = NP/A$$

where

- D_p = Dynamic or surge pressure
 P = Maximum possible weight of the vessel contents
 A = Cross sectional area of tank
 N = 2 except for rail tankers. For rail tankers the longitudinal force derived from the note in the table in J4.3 is to be substituted for 'NP'.

(see table in section J4.3 of this code).

- (5) The membrane stress in the shell of a transportable vessel during pressure testing shall not exceed the limit specified in the International Maritime Dangerous Goods Code.
- (6) Vessels that are pressurised only during discharge shall be designed as static vessels except that the design of supports and attachments to the pressure parts shall comply with the requirements for transportable vessels. The vessel shall be designed to accommodate all loads supported or reacting on it.

J4.2 Design temperature range

- (1) The maximum design temperature shall be not less than:
- (a) For low-pressure liquefiable gases:

Water Capacity of Container in Litres	Temperature (°C)
Not exceeding 250	57.5
Exceeding 250 but not exceeding 1,000	52.5
Exceeding 1,000 but not exceeding 5,000	50.0
Exceeding 5,000 but not exceeding 26,000	45.0
Exceeding 26,000	40.0

- (b) For high-pressure liquefiable gases:

Water Capacity of Container in Litres	Temperature (°C)
Not exceeding 1,000	55.0
Exceeding 1,000 but not exceeding 5,000	52.5
Exceeding 5,000	47.5

(c) For permanent gases:

Water Capacity of Container in Litres	Temperature (°C)
For all sizes of container	65.0

- (2) The minimum design temperature shall be the lesser of -10°C or the minimum shell temperature under all conditions of service.
- (3) The definition of low-pressure liquefiable gases, high-pressure liquefiable gases and permanent gases shall be as given in the Dangerous Goods (Class 2 - Gases) Regulations.

J4.3 Impact forces

The vessel and its supports shall be designed to withstand the forces imposed by the weight of the vessel plus contents (when fully loaded) multiplied by a factor N of magnitude and direction given in the following table:

Magnitude and Direction of 'N'

Loading Direction:	Longitudinal	Transverse	Vertically Upward	Vertically Downward
Dedicated rail tankers	See note	1	1	2
Dedicated road tankers	2	1	1	2
Multi-modal and other tanks	2	1	2	2

Note: The vessel and its supports shall be designed to withstand a force of $2.80 \times T/G$ megaNewtons

where: T = weight of tank plus contents.

G = gross weight of tank car.

These loadings do not include additional forces, which may be imposed on the vessel due to impact from collisions or other accidental circumstances. Where appropriate, the designer and purchaser shall by agreement, increase factor N for particular operational conditions or fluids.

J4.4 Filling ratios

The filling ratios for tanks carrying Dangerous Goods (Class 2 - Gases) shall comply with the requirements of the Occupational Safety and Health Service of the Department of Labour.

J4.5 Supports, frameworks and lifting attachments for multi-modal tanks

These shall be designed in accordance with:

- (a) NZS 5418, part 1; or

- (b) AS/NZS 3711.6.

J4.6 Attachment of vessel to non-pressure parts

Non-pressure parts and supports shall be attached to the vessel by means of suitable pads. These shall comply with the following requirements:

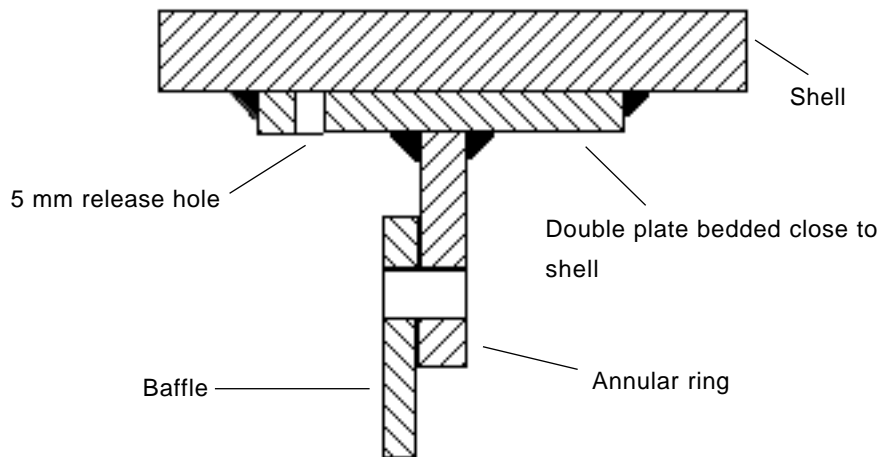
- (a) Their material shall be identical to the vessel shell material;
- (b) Their thickness shall be not less than the minimum calculated thickness of the shell plus corrosion allowance and not greater than the maximum permitted by the design standard;
- (c) They shall have a corner radius equal to one-quarter to one-half of the width of the pad;
- (d) They shall be provided with telltale holes; and
- (e) They shall extend not less than 50 mm in each direction beyond the attached fitting.

J4.7 Lifting

Lifting and handling arrangements shall be provided for transportable vessels. These shall not adversely affect the vessel's structural integrity. They shall be designed to withstand forces from any direction from the vessel, contents and live loads.

J4.8 Fittings

- (1) Internal baffles in transportable vessels shall not impede the heat



equalisation movement of the contents. They shall be designed and constructed in accordance with the following sketch.

- (2) Vessels shall be fitted with a gauge which indicates the liquid level of the contents. Ullage gauges shall be adjusted for each product, to a level which will not allow the vessel to become liquid full at the design temperature. Gauge glasses shall not be used.
- (3) Transportable vessels shall be fitted with two pressure gauges. A

shut-off valve shall be installed between the pressure gauges and the tank. These gauges shall be used only for checking the pressure of the contents.

- (4) Vessels shall be provided with a suitable temperature measuring device. These shall be fitted in sealed pockets welded into the shell of the vessel or alternatively incorporated in the pipework.
- (5) Vessels shall be equipped with one or more safety relief devices each having direct access to the vapour space of the vessel:
 - (a) They shall have a capacity which is sufficient to protect the vessel when it is overturned, discharging liquid and exposed to fire with a heat input rate of:

$$Q = 71 \times A^{0.82}$$

where

Q = heat input rate in kilowatts.

A = tank surface area in square metres.

- (b) They shall be of the spring-loaded type. They shall not allow water ingress and shall be designed and installed to avoid flame impingement on the tank should discharged fluid ignite;
 - (c) They shall be internally mounted with no vital part protruding beyond the tank shell where it might be damaged by a tank roll-over.
- (6) Transportable vessels and their pipework and fittings shall be designed to minimise the possibility of damage or failure, affecting their integrity.

J4.9 Inspection Openings

All vessels, except for cryogenic vessels, shall have inspection openings in accordance with 5.4.1(2) of this code.

J4.10 Design Information

The following information shall be specified on general arrangement drawings:

- (a) Design code;
- (b) Hazard level;
- (c) Contained fluid;
- (d) Vapour pressure of the fluid at design temperature;
- (e) Maximum and minimum design temperatures;
- (f) Design pressure;
- (g) Working pressure;
- (h) Surge pressure;
- (i) Set pressure for pressure relieving device;

- (j) Test pressure;
- (k) Working temperature;
- (l) Corrosion allowance (internal/external);
- (m) Weight of contents and filling ratio;
- (n) Weight of the empty vessel with and without insulation;
- (o) Details of all fittings including safety relief valves; and
- (p) Magnitude and direction of any torques, forces or moments applied to the vessel.

J5. DESIGN VERIFICATION

- J5.1 Transportable pressure vessels shall be design verified in accordance with 5.5 of this code.
- J5.2 The validity of a verified design shall comply with 5.5 of this code.

J6. MANUFACTURE AND WORKMANSHIP

J6.1 General

- (1) Manufacture and workmanship of transportable pressure vessels shall comply with 3.6 of this code and this appendix.
- (2) After completion of fabrication, all transportable pressure vessels shall be heat treated in accordance with the applicable design code.

J6.2 Marking and Identification

- (1) The contents of a vessel shall be clearly displayed on the sides and rear of the vessel as prescribed by the Occupational Safety and Health Service of the Department of Labour.
- (2) The following information shall be marked on the vessel nameplate:
 - (a) Vessel manufacturer;
 - (b) Identification mark;
 - (c) Design code;
 - (d) Maximum static working pressure;
 - (e) Maximum allowable working pressure;
 - (f) Design pressure;
 - (g) Design temperature range;
 - (h) Test pressure;
 - (i) Date of pressure test. (A sufficient space shall be allowed on the visible name plate for future test dates (minimum of 10 spaces);

- (j) Corrosion allowance (internal);
 - (k) Corrosion allowance (external);
 - (l) Type of contents; and
 - (m) Water capacity of vessel in litres.
- (3) The data in J6.2(2) above shall be stamped on a corrosion-resisting plate fixed to conspicuous non-pressure part of the vessel. The data on this plate shall not be obscured by painting.
- (4) The vessel identification mark shall be clearly displayed on both sides of the vessel in characters not less than 100 mm high.
- (5) A sign shall be displayed near the lifting attachments which states that the use of chains or ropes passing over or around the vessel is strictly prohibited.

J7. INSPECTION AND TESTING

- J7.1 Transportable pressure vessels shall be inspected and tested in accordance with 5.7 and this appendix.
- J7.2 IMO vessels should be inspected in accordance with the requirements of the IMDG Code.
- J7.3 In addition to inspection and certification by inspection bodies, controllers shall ensure that there is an inspection of transportable vessels by competent persons every three months or at intervals specified in a management plan for the vessels concerned. This shall include the vessel, fittings, piping and structural supports and any requirements of AS/NZS 3788. The competent person shall, on completion of an inspection, advise the controller in writing that the tank is satisfactory, or list all corrective work to be undertaken before the tank is returned to service. A further inspection shall be carried out following completion of any corrective work.

J8. OPERATION, MAINTENANCE AND SERVICING

- J8.1 Transportable pressure vessels shall be operated, maintained and serviced in accordance with 3.8 of this code and this appendix.
- J8.2 Controllers shall notify their inspection body of any repairs, maintenance or other corrective work carried out on a vessel which affects its pressure containing parts or safety.

APPENDIX K: INSPECTION AND TEST PLANS – FABRICATION

K1. GENERAL

- K1.1 Fabrication work coming within the scope of the PECPR Regulations shall be inspected and tested in accordance with an ITP covering the manufacturing process.
- K1.2 Hold points at which the equipment shall be inspected and tested during manufacture shall be included in the ITP.
- K1.3 Where a verified ITP is not provided it shall be derived from the applicable standard and table K1 by agreement between the equipment inspector and the manufacturer. This ITP shall include any inspection and testing shown in table K1 which is relevant to the equipment under manufacture.
- K1.4 The manufacturer shall agree with the equipment inspector, prior to commencing manufacture, the hold points required for inspection and testing.

K2. INSPECTION AND TESTING

- K2.1 Table K1 notes the inspection and testing required during manufacture, which will typically be carried out by an equipment inspector.
- K2.2 Manufacturing hold points shall be established which will accommodate this inspection and testing.

TABLE K1: INSPECTION AND TESTING

Inspection and Testing	Remarks
Correlation of material certificates with materials and check for conformity with material specification.	The manufacturer shall make the certificates available to the equipment inspector for independent checking.
Identification of material and witnessing of transfer of identification marks in manufacturer's works.	Origin of material to be demonstrated from available records to the satisfaction of the equipment inspector. Any transfer of identification marks may be witnessed by the manufacturer's QA department.
Examination of material cut edges and heat affected zones.	The equipment inspector shall carry out this examination.
Approval of weld procedures.	The equipment inspector shall witness tests unless the procedures are already approved.
Approval of welders and operators.	The equipment inspector shall witness tests unless the welders and operators are already approved.
Examination of set-up of seams for welding including dimensional check, examination of weld preparations, tack welds, etc.	The equipment inspector shall carry out an independent examination in the case of equipment subject to visual examination only.
Inspection of second side of weld preparations after first side is completed and root cleaned.	The equipment inspector shall carry out an independent examination in the case of equipment subject to visual examination only.
Examine non-destructive test reports and check compliance with agreed procedure and acceptability of any defects.	The manufacturer shall make the reports available to the equipment inspector for independent checking.
Examine heat treatment records and check compliance with agreed procedure.	The manufacturer shall make the reports available to the equipment inspector for independent checking.
Witness the pressure test and, where necessary, record the amount of permanent set.	
Examine the completed vessel before despatch. Where appropriate this shall include: <ul style="list-style-type: none">• Dimensional checks;• Preparation for surface treatment; and• Surface treatment checks. Check marking.	

APPENDIX L: FORM OF NOTICE

Where a controller has received a written report from an inspection body requiring corrective action as noted in 3.7.1(2) and, has not taken appropriate action to remedy the matter within the period specified in the report, the inspection body should issue the following notice.

Client address

Date

Dear Sirs

Outstanding Corrective Action

Brief description and unique identifier of equipment

Inspection bodies have a general duty under the Health and Safety in Employment Act 1992 and a specific duty under regulation 24 of the Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways) Regulations 1999 to advise the Secretary of Labour of unsafe equipment.

We note from our files that the following matters in our report **reference and date** are still outstanding.

Brief details of corrective actions and/or outstanding Certificates of Inspection reported by the inspection body.

In accordance with the duties noted above, a copy of this notice has been forwarded to the Secretary of Labour.

Please contact us to make arrangements to complete this work.

Yours faithfully

**Signed by Technical Manager
Inspection Body**

cc Secretary of Labour
Department of Labour
Occupational Safety & Health Service
PO Box 3705
Wellington
Attention: Engineering Safety

APPENDIX M: PRESSURE VESSELS TRANSPORTED BY SEA

- M1. Transportable vessels exceeding 450 litres capacity, which contain dangerous goods and are transported by sea, shall comply with the requirements of the Maritime Safety Authority of New Zealand (MSA).
- M2. The vessels in M1 shall be designed and manufactured in accordance with the IMDG code, the International Convention for Safe Containers (if a tank container), and in accordance with MSA rule requirements.
- M3. The vessels in M1 shall be design verified, inspected and certified by an organisation recognised by MSA.
- M4. For MSA rules on dangerous goods pressure vessels transported by sea, contact:

The Manager, Safety & Environmental Standards
Maritime Safety Authority
PO Box 27006
Wellington
Tel: (04) 494 1242 Fax: (04) 494 1263

APPENDIX N: SAFETY OF PERSONNEL

N1. INDUCTION TRAINING

- N1.1 Induction training, which includes the training required by N1.2, shall be provided for all new employees and contractors entering a workplace.
- N1.2 Induction training should cover: security; first aid; incident reporting; emergency alarm; emergency response; hazards; protective clothing and equipment; fire safety; permit system, plus any other safety requirements for the workplace concerned.

N2. PERMIT SYSTEMS

- N2.1 Where appropriate, access to confined spaces and hazardous areas and equipment shall be controlled by a permit system.
- N2.2 Permits shall include any instructions, conditions and controls relevant to their issue, e.g. isolation requirements, hot work precautions, hazards that may be encountered, atmospheric testing, use of chemical agents, stand-by personnel and rescue requirements, precautions, personnel protective equipment, etc.

N3. ENVIRONMENTAL AND HEALTH MONITORING

- N3.1 Where a hazard cannot be eliminated or isolated employers must, under Section 10 of the Health and Safety in Employment Act 1992, ensure that:
- (1) Protective equipment is provided and that it is accessible to and used by their employees;
 - (2) Their employees' exposure to the hazard is monitored;
 - (3) They seek the consent of their employees to monitor their health; and
 - (4) Once their employees' consent has been obtained, they monitor their employees' health.
- N3.2 The following examples describe methods of compliance with Section 10 of the Health and Safety in Employment Act:
- (1) Where persons work in the vicinity of equipment generating a noise level in excess of 85 dBA, their exposure to this noise must

be managed. This may be done by enclosing the equipment and/or by providing hearing protection, such as earmuffs. Protective devices such as earmuffs must be clean, properly fitted and maintained.

- (2) Where persons work with asbestos there must be compliance the Asbestos Regulations 1998. The OSH publication *Guidelines for the Management and Removal of Asbestos*, sets out requirements for compliance with these regulations.
- (3) Where persons work in spaces which may be contaminated by other substances or affected by low oxygen levels, then these spaces shall be monitored to ensure that safety is not compromised by contamination or low oxygen level.
- (4) Where persons must have good eyesight in order to carry out their work safely their employer must, after getting their informed consent, arrange for their eyesight to be periodically assessed.

The frequency and type of monitoring required often depends on the exposure encountered. Publications from OSH and other sources provide guidance on monitoring. However, further advice may be required from health professionals with specialist knowledge of specific exposure hazards.

N3 FIRST AID

The Health and Safety in Employment Regulations 1995 impose duties on employers in relation to first-aid facilities. The OSH publication *Guidance Notes on Providing First Aid Training* provides information on compliance with these duties and other information on first aid.

N4. REFERENCE DATA

For further information relevant to personnel safety refer to:

- (1) The OSH website: www.osh.dol.govt.nz
- (2) The *OSH List of Publications*. These publications include:
 - *Approved Code of Practice for the Management of Noise*
 - *Approved Code of Practice for the Use of Visual Display Units in the Place of Work*
 - *Approved Code of Practice for the Management of Substances Hazardous to Health in the Place of Work*
 - *Guidelines for the Prevention of Falls*
 - *Guidelines for the Management and Removal of Asbestos*
 - *Guidance Notes on Providing First Aid Training*
 - *Safe Working in Confined Spaces*