

1. SCOPE

This Note provides guidance for assuring product conformance when purchasing imported and locally manufactured materials and components that are used to construct pressure equipment.

2. BACKGROUND

In recent years, there have been numerous instances where materials and components for pressure equipment have been rejected due to non-compliance with the purchase order standard. Flanges, pipe, forgings, castings, fittings and valve bodies are examples of recent non-compliant items. This has happened despite the fact that certification attesting to authenticity and conformance to a stated standard has been supplied.

Larger Australian manufacturers and operators of pressure equipment have purchasing systems incorporating approved vendors and quality assurance systems that usually identifies deficiencies before major problems arise in service. However, smaller or less knowledgeable organisations may not apply the necessary precautions when purchasing pressure equipment or associated components.

3. PRODUCT CONFORMANCE SYSTEMS

3.1 Australian System

to maintain pressure equipment safety standards, AS 3920.1 "Assurance of Product Quality – Part 1, Pressure Equipment Manufacture" was introduced in 1993. The intention behind this standard is the greater the consequence of failure (measured by hazard levels), the greater the effort that needs to be expended during design, procurement and fabrication to reduce the probability of failure and subsequent harm. This concept was clarified in a new standard AS 4343-2005: "Pressure equipment – Hazard" levels which provides a measure for potential consequence.

In pressure equipment terms, the greater the volume and operating pressure, the more dangerous the contents and the more likely is the location to cause secondary damage, the higher is the hazard level. By convention, the highest hazard level is A, and the lowest is E. Thus the higher the hazard level of the pressure equipment the higher the effort required to assure conformity in the design, purchasing, manufacturing and operating phases.

Reference is made to AS 3920.1 in AS/NZS 1200:2000: "Pressure equipment" which is the 'parent' document for use by the pressure equipment industry in Australia and New Zealand. AS/NZS 1200:2000 contains a note indicating that revision to AS 3920.1 - 1993 is needed. AS/NZS 1200:2000 itself is currently under revision, and if it is referenced in the new National Standard for Plant, it will be necessary that AS 3920.1 is also revised. Until this revision occurs, this Note provides advice on the extent of inspection documentation required to assure product conformity.

Traditionally, State Regulatory Authorities carried out conformity assessment in Australia. These organisations contained the necessary infrastructure and personnel to perform design verification and inspection during the fabrication, operation and maintenance of pressure equipment. Changes to the regulations in Australia over the last ten years have placed the onus for conformity assessment on the Owner. Notwithstanding AS 3920.1, this has resulted in an 'ad-hoc' approach to conformity assessment with the result that Australia is now increasingly vulnerable to an influx of non-conforming pressure equipment materials and components.

This 'ad hoc' approach is not the case in more regulated countries. In the European Union, USA, New Zealand, Japan etc conformity assessment systems are rigorously applied.

3.2 American System

Probably the best known example to Australian industry is the American conformity assessment system. Here ASME assesses and approves fabricators through the use and application of stamps. As a completely separate entity, the National Board assesses and approves the independent third party Inspectors. Design verification and product fabrication in the USA system remains the legal responsibility of the stamp holder.

3.3 European System

It was recognised in Germany many years ago that when materials were ordered and delivered, the documentation accompanying the material did not always reflect the actual properties of the material. German Standards therefore introduced DIN 50049, which described different certificates for different end-user requirements. With the advent of Euro-Norms, this standard was issued as EN 10204:1991 “Metallic Products – Types of inspection documents”.

In October 2004 the new edition of EN 10204:2004 was published. Like the preceding edition it determines the different types of inspection documents that can be placed at the purchaser’s disposal for the delivery of metallic products such as those required for making pressure equipment. Table 1 lists types of inspection documents available to the purchaser.

Table 1. EN 10204:2004 Inspection documentation for purchase of metallic products

Designation of the document type		Document content	Document validated by
2.1	Declaration of compliance with the order	Statement of compliance with the order	The manufacturer
2.2	Test report	Statement of compliance with the order, with indication of results of non- specific inspection	The manufacturer
3.1	Inspection certificate 3.1	Statement of compliance with the order, with indication of results of specific inspection	The manufacturer’s authorised inspection representative independent of the manufacturing department
3.2	Inspection certificate 3.2		The manufacturer’s authorised inspection representative independent of the manufacturing department and either the purchaser’s authorised inspection representative or the inspector designated by the official regulations

There are four types of documents ranging from a ‘declaration’ to an ‘inspection certificate 3.2’ that increase the validation requirements required to demonstrate conformity. Purchasers choose the appropriate document that satisfies conformance of the product for the intended service.

3.4 International System

The International Standards Organisation adopted EN10204:1991 and re-issued it as ISO 10474:1991 “Steel and steel products - Inspection documents”. It has the same content as EN10204:1991 and defines the different types of inspection documents supplied to the purchaser. This ISO standard is used in conjunction with: ISO 404 for steel and steel products; ISO 4990 for steel castings. It is likely that the new edition of ISO 10474 will be the same as EN 10204:2004.

The Standard describes seven types of documents that can be issued for conformity assessment of materials and components, Table 2

Table 2. ISO 10474-1991 Inspection documentation for steel and steel products

Standard Designation	Document	Type of control	Contents of document	Delivery conditions	Documentation validated by:
2.1	Certificate of compliance with the order	Non-specific	Without mention of test results	In accordance with the requirements of the order, and if required, also in accordance with official regulations and corresponding technical rules	The manufacturer
2.2	Test report		With mention of test results carried out on the basis of non specific inspection and testing		
2.3	Specific test report	Specific	With mention of test results carried out on the basis of specific inspection and testing	In accordance with regulations and the corresponding technical rules	The inspector designated in the official regulations
3.1A	Inspection certificate 3.1A				
3.1B	Inspection certificate 3.1B				
3.1C	Inspection certificate 3.1C			In accordance with the specifications of the order	The purchaser's authorised representative
3.2	Inspection report 3.2				The manufacturer's authorised representative independent of the manufacturing department and the purchaser's authorised representative

4. PURCHASING GUIDELINES FOR PRESSURE EQUIPMENT

Until AS 3920.1 is revised, it is recommended that the appropriate European or International inspection documentation or equivalent be required as part of the purchase order (PO) for pressure equipment, material or associated components. The following three step purchasing guidelines are recommended. These purchasing guidelines require the use of AS 4343-2005 and AS 4458-1997.

Step 1. Determine the AS 4343 hazard level of the pressure equipment or the pressure equipment component when it will be in operation. The hazard level will be given as a letter 'A' through to 'E' with Hazard level A representing the highest hazard and level E the lowest.

Step 2. Determine the 'Identification Requirements' of the pressure equipment components to be purchased according to AS 4458. There are 'Type A', 'Type B' and 'Type C' identification. The types of material identification required for various pressure equipment components are given in table 4.1 of AS 4458-1997.

Step 3. Conformity assessment for purchasing activities is accomplished by incorporating either the ISO or European inspection requirements into the POs as given in Table 3. The location where the purchase is taking place will dictate the appropriate standard.

Table 3. Purchasing Conformity Assessment Guidelines

AS 4343 Hazard Level	AS 4458 Material Identification Requirements	Australian Conformity Assessment Guidelines incorporated into PO	
		ISO 10474:1991 Inspection Requirements	EN 10204:2004 Inspection Requirements
A	Type A Type B Type C	3.1.C 3.1.C 3.1.B	3.2 3.2 3.1
B	Type A Type B Type C	3.1.C 3.1.B 3.1.B	3.2 3.1 3.1
C, D & E	Type A Type B Type C	3.1.B 3.1.B 2.2	3.1 3.1 2.2

It should be noted that the purchase of Hazard level A and B pressure equipment and components requiring ISO 10474 inspection requirement 3.1.C, or EN 10204 inspection requirement 3.2, will require conformance validation by the purchaser's authorised inspection representative. The purchaser will have to make arrangements for such validation.

5. VENDORS

5.1 Vendor Assessments

Most purchasers have developed internal approved vendor lists, and many multinational companies have lists developed and controlled for overseas head offices. All companies involved in purchase of pressure equipment and associated components should have a system where vendors go through pre-qualification in order to become an approved vendor.

It is not necessary for the purchaser to conduct assessments, and indeed, unless the purchaser has qualified and experience Assessors available, it is often better to subcontract this to one of the established Third Party Agencies. Typical Agencies include Lloyds, Bureau Veritas, Det Norske Veritas and a number of Australian NATA accredited bodies etc. Such Agencies operate locally and overseas, and are often well placed to issue ISO 10474 Type 3.1.C or EN 10204 3.2 certification when required by Table 3.

5.2. Quality Management Systems

For a new vendor, it is recommended that the purchaser conduct an on-site assessment of the vendor's manufacturing facilities as well as a review of the quality management system prior to any purchase.

5.3 Historical Performance

Many purchasers approve vendors based on satisfactory past performance. Whilst this maybe satisfactory for immediate past performance it does not substitute the inspection requirements of Table 3.

5.4 Control of Vendor Lists

The responsibility for monitoring and maintaining an approved vendor list that lies with the Purchasing Department cannot be met without input from the Engineering and Quality Assurance Departments. These two groups will be instrumental in determining that a vendor's manufacturing facilities and quality management systems are adequate for the supply of the product.

6. COSTS

Well-established Quality Management principles suggests that the cost of managing quality will be up to 4% of the purchase price of the item. For the purchase of Hazard Level A and B components a figure of 4% is not unreasonable.

7. SUMMARY

To improve assurance that supplied materials and components are as ordered and required, it is recommended that appropriate certification and inspection and quality insurance be included in purchase orders.

8. REFERENCES

AS/NZS 1200-2000 Pressure Equipment

This Standard is a 'parent' document for use by the pressure equipment industry in Australia and New Zealand. It covers the design, materials, manufacture, examination, testing, installation, conformity assessment, commissioning, operation, inspection, maintenance, repair, alteration and disposal of pressure equipment

AS 4343-2005: Pressure equipment - Hazard levels

Used in the design, manufacture, inspection, conformity assessment, use and ultimate disposal of pressure equipment. The hazard levels determined by this Standard are minimum values and may need in certain cases to be increased. **NOTE:** The National Standard for Plant, NOHSC:1010 (1994), and subsequent State and Territory regulations usually reference this Standard (or AS 3920.1) and require design registration or notification for boilers and pressure vessels of hazard levels A, B, C and D and registration of such equipment with hazard levels A, B or C.

AS 4458-1997: Pressure equipment - Manufacture

Sets out requirements for the manufacture of pressure equipment as specified in the pressure equipment Standards AS 1210, AS 1228 and AS 4041. Fabrication, heat treatment, forged construction, cast construction and testing are covered.

AS 3920.1-1993: Assurance of product quality - Pressure equipment manufacture

Specifies requirements for the assurance of product quality in the manufacture of boilers, pressure vessels and pressure piping including associated safety equipment (hereinafter termed pressure equipment). It covers both purchaser specifications and regulatory requirements and recognises the manufacturer's certified quality systems and the utilization of external design verification and inspection of fabrication. *Note – this standard is currently under revision*

ISO 10474:1991 : Steel and steel products - Inspection documents

Defines the different types of inspection documents supplied to the purchaser. Shall be used in conjunction with: ISO 404 for steel and steel products; ISO 4990 for steel castings.

BS EN ISO 10204 – 2004 Metallic products — Types of inspection documents

This document supersedes EN 10204:1991. The main changes are reduction of the number of inspection documents:

- type 2.3 of the previous edition has been deleted;
- type 3.1 replaces type 3.1.B of the previous edition;
- type 3.2 replaces types 3.1.A, 3.1. C and the inspection report 3.2 of the previous edition.

Type 2.1 : Declaration of compliance with the order

Document in which the manufacturer declares that the products supplied are in compliance with the requirements of the order, without inclusion of test results.

Type 2.2 : Test report

Document in which the manufacturer declares that the products supplied are in compliance with the requirements of the order and in which he supplies test results based on non-specific inspection.

Type 3.1: Inspection certificate

Document issued by the manufacturer in which he declares that the products supplied are in compliance with the requirements of the order and in which he supplies test results. The test unit and the tests to be carried out are defined by the product specification, the official regulation and corresponding rules and/or the order. The document is validated by the manufacturer's authorised inspection representative, independent of the manufacturing department.

Type 3.2: Inspection certificate

Document prepared by both the manufacturer's authorised inspection representative, independent of the manufacturing department and either the purchaser's authorised inspection representative or the inspector designated by the official regulations and in which they declare that the products supplied are in compliance with the requirements of the order and in which test results are supplied.

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NDNP TECHNOLOGY DIFFUSION ACTIVITY # 27	 Welding Technology Institute of Australia ABN 69 003 696 526	Document No: 9.4.4-QR-005
	NATIONAL DIFFUSION NETWORKS PROJECT TECHNOLOGY QUESTIONNAIRE Pressure Equipment Industry Group “Purchasing of Pressure Equipment Materials and Components”	Revision No: Rev 0
		Page 1 of 2 Date: 18 Nov 2005

As part of the WTIA National Diffusion Networks Project the Pressure Equipment Industry Sector has identified the need for quality verification guidelines when purchasing pressure equipment and components such as pipe, flanges, castings, forgings and steel. Until Australian Standard AS 3920.1 – 1993 “Assurance of Product Quality – Part 1, Pressure Equipment Manufacture” is revised, the WTIA has prepared a Technical Guidance Note “Purchasing of Pressure Equipment” to fulfill this need. As a valued technology expert in this area we would like you to be part of the Technology Expert Group to review this note. Please complete this questionnaire so that we can gauge the success of meeting this need.

Objective 1: Identify the need for product conformance verification for pressure equipment

Anecdotal evidence suggests that there is an increasing frequency of non-conforming pressure equipment and components for pressure equipment entering Australia. This guidance note is intended to provide the Pressure Equipment Industry guidance on applying the appropriate quality verification steps for the purchase of pressure equipment. How well does the document achieve these aims?

poor average good very good

Comments: _____

Objective 2: Identify appropriate technology receptors in the Pressure Equipment Industry

This document was written for Purchasers, Engineers and Quality Personnel involved in the design, purchase, fabrication and maintenance of pressure equipment and components. Are these people the appropriate individuals we should be targeting?

yes no

What other types of companies and/or personnel do you suggest we target? _____

Objective 3: Identify current best practice for verifying quality of pressure equipment

The document was written to reflect current world’s best practice for the verification of pressure equipment conformance. Do you envisage opportunities for the use of this practice in the industry?

yes no

If yes, what and where, if no why not? _____

Objective 4: Is the information provided clear, concise and accurate?

yes no

If not, why? _____

Objective 5: Broad dissemination of technology to the Pressure Equipment Industry

Please indicate how best to disseminate this information to the appropriate Pressure Equipment Industry Recipients

Free Website Download Poster Pocket Guide Pamphlet

If poster, what size? A1 A2 A3 Laminated What selling price? \$

If a pocket guide, what selling price? \$

Other format? _____

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Objective 6: Continuous Improvement

Please Identify areas where the document can be improved or return the document with your recommended additions/amendments. Alternatively, please use the area below to provide any additional comments.

Respondents Name: _____ *Company:* _____ *Phone:* _____

Fax: _____ *Email:* _____ *Date:* _____

Please Fax (02 9748 2858) or E-mail (j.baker@wtia.com.au) your response .

Your prompt response is appreciated.

The WTIA has joined forces with industry and government to create a 3.5 million dollar Technology Support Centres Network. This network will assist industry to identify and exploit world's best technology and manufacturing methods to establish a vibrant Australian industry beyond 2006. Together we will be implementing a step by step process which will lead to ongoing viability and greater profitability for all concerned:



- (1) Determine your technological and manufacturing needs;
- (2) Identify world's best practice;
- (3) Draw upon the network to implement world's best practice at your site

