

Safety Lines

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GUIDELINES FOR THE DESIGN VERIFICATION OF BOILER MANAGEMENT SYSTEMS

Engineering Safety has been asked by design verifiers and boiler manufacturers to comment on various aspects of design verification of boiler controls and boiler management systems. In particular, guidance was sought on:

1. Type approval of boiler controls;
2. The use of controls components not covered by an 'applicable standard';
3. Design verification of boiler management systems;
4. Documentation and design statements; and
5. Verification of boiler safety controls.

The following was our response:

Type approval of boiler controls

Inspection bodies providing design verification services for boilers may, in addition to issuing design verification certificates for 'one-off' boilers, issue a 'type approval' for serially-produced equipment including boiler controls.

This type approval would be specific to the organisation which sought the approval. Type approved controls may then be applied to boilers conforming with the approval criteria.



For boiler controls, type approval would be for a discrete control or control assembly, not some minor component.

The use of controls components not covered by an 'applicable standard'

In order to be approved by a design verifier, control components should comply with a recognised 'applicable standard'.

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Advance Notice

Ninth International Conference on Pressure Vessel Technology - April 2000

The Ninth International Conference on Pressure Vessel Technology, ICPVT-9, will be held from 9 to 14 April 2000, in Sydney, Australia.

The ICPVT-9 is being organised by the Australian Steering Committee of the Asian and Oceanic Regional Committee of ICPVT, through its principal sponsoring organisations: WorkCover Authority of New South Wales and the Institution of Engineers Australia.

It will be the first time this conference is held in the Southern Hemisphere.

ICPVT provides an international forum to update knowledge of pressure vessel technology. The main purpose of ICPVT-9 is to bring together engineers, scientists and others, interested in design, manufacture, inspection, testing, operation, codes and standards, to

exchange experience and technical information regarding pressure vessel technology, including boilers, vessels, piping, pipelines and gas cylinders.

Main Topics

1. Design and Stress Analysis of Pressure Vessels, Piping, Fittings and Special Components.
2. Materials and Manufacturing of Components.
3. Experimental Studies – Operating Experiences and Failure Analysis.
4. Codes and Standards – Quality Assurance – Non-Destructive Testing and Inspection

To Get More Information on the Conference

If you want more information or:

- Would like to attend the conference;
- Would like to present a paper;
- Are interested in the exhibition and would like an information package,

Please contact: Mr Lucian Kent
Chairman
ICPVT-9 Steering Committee
400 Kent Street
Sydney NSW 2000 Australia

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However, in cases where there is no recognised 'applicable standard' the boiler manufacturer shall obtain sufficient technical data from the controls manufacturer to establish that the control would be appropriate for the particular application. This information may be obtained from technical data in the controls manufacturer's catalogue or in a detailed technical statement from the **controls manufacturer**.

In either case, it is the boiler manufacturer's responsibility to ensure that the quality of the data provided is satisfactory and, on the basis of the technical data provided by the manufacturer, that the control will be appropriate for the particular application.

Design verification of boiler management systems

The boiler manufacturer shall get the complete boiler management system (BMS), including hardware and any software coding design, verified by persons independent of the BMS designers.

The boiler manufacturer shall engage a design verifier who has the appropriate experience and skills to perform this work. This may be a consultant or an inspection body. The design verifier may also be an employee of the boiler manufacturer provided this person is independent of the BMS designers and has a separate reporting path to the chief executive.

This verification is independent of that which must be performed by a third party inspection body when obtaining a design verification certificate for a complete boiler. However, it may be the basis for the statement that the

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boiler manufacturer must supply, to the inspection body, advising that the boiler management system has been verified.

This provision for boiler management systems recognises their complexity and allows for situations where effective verification may require works testing and the services of hardware and software specialists who would not normally be on an inspection body's staff.

Documentation and design statements

When obtaining a design verification certificate from a third party inspection body for a complete boiler, the boiler manufacturer's submission to the third party inspection body shall include:

1. A schedule of the safety controls to be installed on the boiler and sufficient technical data for the inspection body to verify that these controls are in accordance with the *Approved Code of Practice for the Design, Safe Operation, Maintenance and Servicing of Boilers*.
2. A functional description of the boiler management systems logic applicable to the safety controls.
3. A statement that the boiler management system – including hardware, software and associated field equipment – have been designed in accordance with the *Approved Code of Practice for the Design, Safe Operation, Maintenance and Servicing of Boilers*, and that under all conditions in which:
 - a) Operational control or safety in the terms of this code may be compromised; or
 - b) A system fault has occurred in a critical component of the boiler management system or its associated field equipment,

Then the controls will 'fail safe' and, when appropriate, the boiler fuel and air supply will be cut off.

4. A statement that the boiler management system – including hardware, software and associated field equipment – has been design verified by persons, with appropriate skills and experience, who were independent of the design process for the boiler management system.

Verification of boiler safety controls

The third party inspection body shall, as part of the overall design verification process for the boiler:

1. Verify that all safety controls required by the code of practice have been provided.
2. Verify that all safety controls have been designed and manufactured to a recognised 'applicable standard' and are appropriate for the boiler or, are covered by data provided by the controls manufacturer, from which it would have been reasonable for the boiler manufacturer to conclude that the controls have been designed and manufactured to a standard appropriate for the boiler.
3. Verify that the functionality of the boiler safety controls, as described by the boiler manufacturer, are appropriate for the particular boiler. *Ed.*

Ammonia Refrigeration Pipework

Engineering Safety have been asked to advise on 'inspection and test' requirements for ammonia pipework designed and manufactured to ASME B3 1.5.

We advise that Group B2 pipework which includes ammonia pipework must be inspected and tested in accordance with the requirements of Chapter VI of ASME B3 1.3.

CBIP Courses

Engineering Safety has been notified by the Certification Board for Inspection Personnel (CBIP) that training courses will be held as follows:

Surface Methods of Inspection 4 to 7 August 1997

This course provides training in magnetic particle, liquid penetrant, and visual inspection techniques and methods. It is suited to a wide variety of NDT personnel including aircraft engineers, surveyors, technicians and welders, who require both theory and practical skills and, to persons preparing for CBIP examinations.

Welding Inspection 23 to 27 June 1997, 1 to 5 September 1997 and 17 to 21 November 1997

This course will provide training in welding processes, welding procedures, welder qualifications, materials, identification of materials, drawings, records and reports. It is suitable for persons preparing for the CBIP welding inspector examination or technical people engaged in fields such as manufacturing, construction, quality assurance or inspection.

For further information please contact:

Peter Hayward
Certification Board for Inspection Personnel
PO Box 76 134
Manukau City
email: met-ndt.hera@wave.co.nz
Tel. 09 262 2885 Fax. 09 262 2856

Safety Alert

Favco STD 1000 Series Cranes

Engineering Safety has been advised by Favelle Favco Equipment Ltd. of a mandatory modification which is required for the Favco STD 1000 series tower crane. This series was designed over twenty years ago and the recent application of modern analysis techniques has highlighted a part of the mast which can be over-stressed in normal operation.

All owners of Favco STD 1000 series cranes must ensure that their particular model of this crane is appropriately modified to overcome this problem.

Expiry of CBIP Certificates

Persons holding CBIP qualifications should check the expiry date on their certificate. Some certificates have already expired and many others are coming close to an expiry date.

Inspectors should take care to ensure that their certificates are currently valid. In particular, Equipment Inspectors performing inspection coming within the scope of the proposed Pressure Equipment, Cranes and Passenger Regulations, may find they no longer have the legal standing necessary to perform the full range of inspection tasks if their certificate is not renewed.

For renewal of certificates or more information contact:

Peter Hayward
Certification Board for Inspection Personnel
PO Box 76 134
Manukau City
email: met-ndt.hera@wave.co.nz
Tel. 09 262 2885 Fax. 09 262 2856

Further information on approved modifications is available from:

Favelle Favco Equipment Ltd.
PO Box 29-151
Greenwoods Corner
Auckland
Ph (09) 579 0724
Fax (09) 579 4123

Overhead Travelling Cranes

Engineering Safety has been informed of a situation where excessive wear of a crane rope had gone undetected for an extended period.

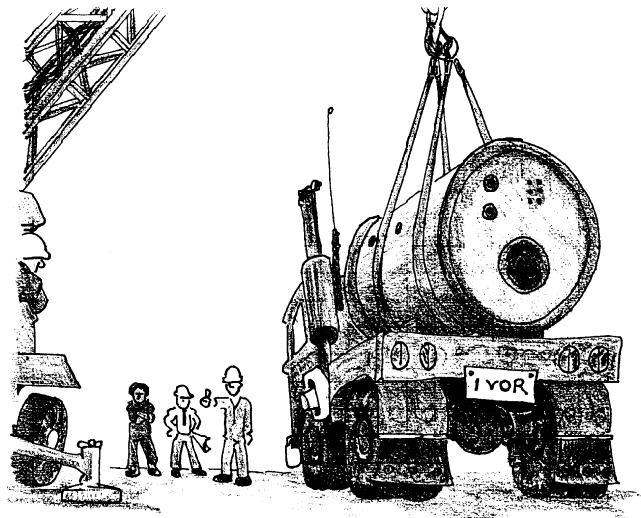
The crane had a rope tension measuring device fitted on a 'dead' section of rope between the hook block and the equalising sheave. It is thought that fretting action, from a slight rope movement on the heavily loaded measuring device, during crane operation, caused the wear.

Cranes with this type of tension measuring device should have the relevant section of rope checked regularly.

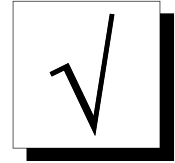
Mobile Cranes

Engineering Safety has received reports that the pinion bushes in the planetary gear box of the boom hoist of a mobile crane had worn to the extent that the pinions were in danger of dropping out of mesh. This would have resulted in a boom hoist failure.

The excessive wear was considered to be a result of a lack of lubrication. The gear box, which required daily greasing, had grease nipples for the pinion bushes which were not always clearly visible.



Swift Survey



Engineering Safety will soon be sending out survey forms to the majority of clients on our address database.

These will be used to assess the performance of Engineering Safety in meeting client needs through a series of questions addressing matters such as:

- Satisfaction of needs
- Quality of service
- Understanding of point of view
- Assistance with problems
- Provision of information
- Availability of Engineering Safety staff
- Progress reporting
- Assistance with improvements
- Prioritising of concerns
- Meeting of deadlines
- Flexibility in meeting needs

The questions will be straightforward and require only a numbered response to indicate your rating of Engineering Safety.

We wish to continuously improve our performance and a good return rate for the survey will help us achieve this goal.

Update of AS 3920.1 - 1993 Assurance of Product Quality, Part 1: Pressure Equipment Manufacture

Further to **Short Notes** in the February 1997 issue of *Safety Lines* advising that AS 3920.1 - 1993, Assurance of Product Quality is being revised, we now reprint an article "Under Pressure" from *The Australian Standard* (TAS), March 1997, 18(3) p.14.

"Under Pressure"

Significant changes in the regulatory area of pressure equipment have brought about the need to revise and update the Australian Standard covering the manufacture of this equipment.

AS 3920.1-1993, Assurance of Product Quality, Part 1: Pressure Equipment Manufacture, specifies the assurance of product quality for the manufacture of boilers, pressure vessels and pressure piping. It covers design verification and inspection of pressure equipment during manufacture.

It also provides a means of classifying pressure equipment into various degrees of hazard levels. The hazard level of a particular item of pressure equipment depends on the type of equipment, its volume, pressure and contents. Equipment with a low hazard level requires no third party design verification or fabrication inspection.

The hazard classification in AS 3920.1 is referenced in a number of other documents and sources. For example; AS/NZS 3788, the In-service Inspection Standard, uses the hazard classification to determine the frequency of in-service inspection and a number of the regulatory authorities use the hazard classification to determine registration requirements for pressure equipment. Experience gained in the use of AS 3920.1 will be used to fine tune the hazard classification.

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Pressure Equipment, Cranes and Passenger Ropeways Regulations

Engineering Safety and Department of Labour legal advisers have completed a review of the legal draft of the PECPR Regulations prepared by the Parliamentary Counsel Office. This draft has now been returned to the Parliamentary Counsel Office for action.

We will continue to update readers on progress with the introduction of the PECPR Regulations in future issues of *Safety Lines*.

Update of AS 3920.1 - 1993 Assurance of Product Quality, Part 1: Pressure Equipment Manufacture ... (Continued from Page 5)

To assist in the classification of fluids, Tubemakers Piping Systems have produced a document which classifies around 1000 types of fluids. This document is an important reference aid for users of AS 3920.1 and will be updated and included in the next edition of AS 3920.1.

A committee meeting was held last month (February 1997) where the scope of the revision was determined and drafting tasks allocated. Comments and suggestions on improving the standard are welcome.

Committee ME/1: Pressure Equipment
Chairman: Dr John Higgins - Amcor Paper
Projects manager: Rex Blatchford (Sydney)''

AS 3920.1 is widely used in New Zealand for assessing design verification and fabrication inspection requirements for pressure equipment coming within the scope of the draft PECPR Regulations. As noted in **Under Pressure**, AS 3920.1 was also used to determine the inspection frequency for equipment covered by the joint Australian/New Zealand Standard AS/NZS 3788 Pressure Equipment — In-service inspection.

If you wish to suggest any amendments to AS 3920.1 please let us know; Engineering Safety have representation on the ME/1 Committee.

A Hard Act to Follow

Our regular editor, Graham Woulfe, is in Canada on leave of absence for 3 months and his mantle has been passed to Peter Williamson.

Although he may be a long way from the office, his heart is still with *Safety Lines*. We recently received an e-mail from Graham, noting that we should be at work getting out this edition and offering help with its preparation.

We hope we can maintain the very high standard achieved by Graham. Ed.

Safety Lines is a publication of the Engineering Safety Unit of the Occupational Safety and Health Service, Department of Labour, PO Box 3705, Wellington.

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