Safety Lines

OSH occupational safety & health service te ratonga oranga

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Design Verification

This article on design verification is an update on articles that have appeared in *Safety Lines* in recent years.

Note: This general article does not replace the appropriate approved codes of practice or the Health and Safety in Employment (Pressure Equipment, Cranes, and Passenger Ropeways) Regulations 1999 (PECPR Regulations) to which reference should always be made. Due care has been taken in the preparation of this article but in the event of any conflict the code or regulations are correct.

What is Design Verification?

It is necessary to clarify a few terms that are sometimes confused, and the following definitions are offered to indicate the view of Engineering Safety in this matter:

Checking: Assessment of the internal consistency and numerical accuracy of calculations and dimensional correctness of drawings associated with a design.

Design review: Peer assessment of general design concepts and assumptions at design outset, and possibly other critical design stages.

Design verification: Independent confirmation that a design fully complies with the designated standard.

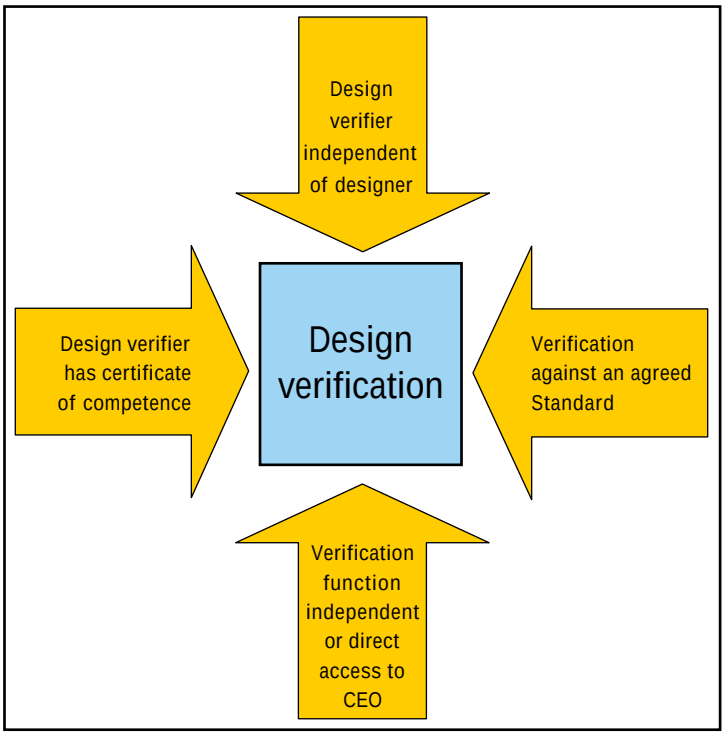
A more comprehensive definition of design verification, specifically in relation to the PECPR Regulations, is given in the regulations as:

> "Design verification" means verification that the following comply, in every respect related to safety, with the requirements of the appropriate design standards and contain every safety feature that is relevant, whether or not referred to in those standards:
>
> (a) Designs of equipment; and
>
> (b) Alterations to designs, affecting the structural strength or safety of equipment, made in the course of manufacture; and
>
> (c) Designs of repair or alteration affecting the operational safety of the equipment repaired or altered or any other equipment; and
>
> (d) The fabrication inspection requirements specified by the designer.

Fundamentals of Design Verification

There are many important aspects to design verification, but the following four points are fundamental:

1. The design verifier must be independent of the designer–under no circumstances may the designer of equipment and the design verifier be the same person. It is also highly undesirable for there to be any reporting relationship between the designer and design verifier.
2. The design verifier must have an appropriate certificate of competence from a recognised qualification issuing agency.
3. The design verifier must be independent of the equipment manufacturer/designer (as is normally the case where design verification is done by an independent inspection body) or have direct access to the CEO of that organisation.
4. Verification must be carried out against an agreed and nationally or internationally accepted standard.



Design Verification Fundamentals

Regulation

Engineering Safety (OSH) regulates design verification by:

1. Outlining design verification requirements within approved codes of practice; and
2. Participating in IANZ audits of organisations engaging in, or proposing to engage in, design verification, to ensure that their systems support the requirements of the codes.

In addition, organisations proposing to engage in design verification need to be recognised for the purpose by the Secretary of Labour who is advised by Engineering Safety.

Design Verifier

The design verifier, the person who carries out design verification, must hold a relevant certificate of competence, and is normally employed by an

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inspection body. IPENZ is currently the sole recognised qualification issuing agency and issues the certificate of competence, after determining the appropriateness of qualifications of an individual to act as a design verifier under defined circumstances. The certification process has provision for:

1. A review of the applicant's job history; and
2. A competency check; and
3. If appropriate, an oral interview by a selected panel.

In certain cases a design verifier may be employed by an organisation, other than an inspection body, which has an appropriate ISO 9000 quality management system in place and has been granted an exemption (under regulation 5) by the Secretary.

Design verifiers and their employers should note that certification is for 3 years. Re-certification involves:

1. Assessment of the verifier's continuing professional development; and
2. Examination of the verifier's relevant job record covering the previous certification period; and
3. Independent assessment by an externally appointed panel member, who may recommend either re-certification or full re-application as for a new applicant.

Hazard Levels

Design verification requirements are influenced by the hazard level of the equipment as defined in AS 4343-1999 *Pressure equipment–Hazard levels*. Approved codes of practice spell out the requirements for design verification in terms of these hazard levels.

Design verification requirements in relation to hazard levels can be found for pressure equipment in Appendix A of the *Approved Code of Practice for Pressure Equipment*, and these are reflected for boilers in the latest draft *Code of Practice for the Design, Safe Operation, Maintenance and Servicing of Boilers*. Both of these documents can be obtained free from the OSH website.

Reverification of Existing Designs

When a change is made to a design standard that affects the design, the design should, depending on the conditions of the standard, generally be reverified to the updated standard within 6 months. This means that design reviews of repeat and type approvals should be performed as the designs may be affected by a standards update.

When a design is reverified as a consequence of a standards change, either an entire reverification or in some cases a relevant partial reverification may be carried out.

It is the responsibility of the designer and manufacturer to ensure that necessary design changes and reverification are carried out to reflect the current appropriate standards.

When the design verifier ascertains that the new changes accurately reflect the up-to-date standards, the new design verification certificate, in accordance with the updated standards, is issued for the complete equipment.

Readers are also referred to AS/NZS 1200:2000 *Pressure equipment*, section 1.12.

Reverification of Modified Equipment

Where there has been a modification to equipment which affects safety, such as structural alteration, changed duty, or environment, it is necessary to submit the design for design verification. In some instances it may only be necessary to reverify affected components.

Reverification requirements for alterations to boilers are given in G4.5 of the draft *Code of Practice for the Design, Safe Operation, Maintenance and Servicing of Boilers.*

Design Verification of Boiler Management Systems

The entire boiler management system, including hardware and software, requires design verification. Appendix D of the draft *Code of Practice for the Design, Safe Operation, Maintenance and Servicing of Boilers* provides guidance covering:

- Type acceptance of boilers
- Documentation and design statements
- The use of control components not covered by an 'applicable Standard'
- Design verification of boiler controls
- Design verification of a complete boiler management system.

PECPR Regulations–Clarification: Hydraulic Systems

Background

Hydraulic systems in general are excluded under Schedule 2.

Hydraulic systems generally include items which are defined in Schedule 1 as pressure equipment (for example, pressure piping).

A question therefore arises as to whether items which are in themselves pressure equipment as defined in Schedule 1 are subject to the regulations, despite being part of a hydraulic system which is excluded through Schedule 2.

The intention of the exclusion in Schedule 2 of hydraulic systems was to remove from jurisdiction of the regulations such systems as are commonly found performing the control and actuation functions of industrial, construction and agricultural machinery.

It is recognised that there may be cases where the scale and hazard of some untypical hydraulic systems may require treatment as pressure equipment.

Clarification

Only hydraulic systems whose function is control and/or actuation are the subject of this clarification (i.e. it does not apply where the primary purpose of the system is the conveyance of the fluid).

In order to differentiate between the majority of Schedule 2 excluded hydraulic systems, which need not be covered by the regulations (though possibly technically qualifying as pressure equipment), and those parts of exceptional systems which may need full compliance, the following criteria will be applied:

1. If any part of the hydraulic system contains only oil or water, it is excluded.
2. If any part of the hydraulic system contains fluid(s) other than oil or water, and its hazard level is not greater than E when assessed in accordance with AS 4343-1999, it is excluded.
3. Otherwise the part of the hydraulic system is treated as pressure equipment subject to the regulations.

Defective Fittings

Adrian Mathewson of Genesis Power recently reported having received a defective fitting from a reputable New Zealand supplier. The fitting was a carbon steel butt welding pipe reducer (4 inch to 2.5 inch) to ASTM A234 WPB with certification identifiable to the fitting. The item was of overseas manufacture.

Whilst welding the fitting to the adjacent component, the welder heard a sharp noise. Examination revealed a jagged crack on the outside of the fitting, which on visual evidence did not seem to have propagated right through. The fitting will be metallurgically examined.

Another larger reducer from the same overseas manufacturer, which was also identifiable to a certificate, showed surface crack-like defects when examined under MPT.

Genesis advised their supplier that they would not accept any further product from this manufacturer and instigated a records check to identify any other fittings from the same source.

Genesis received another fitting containing unacceptable defects, this time from a different overseas manufacturer. This was a carbon steel butt welding reducer (3 inch to 2 inch) to ASTM A234 WPB.

During welding, a crack-like defect became evident and another was revealed by NDT. The fitting was removed from the pipe spool and Genesis will not accept product from this manufacturer either.

HERA Courses

The following courses are being offered by HERA Training Centre:

Course: Welding Inspection
Venue: Manukau City, November 11-15

Course: Ultrasonic Testing Theory and Inspection of Welds.
Venue: Manukau City, September 30-October 4

Course: Management Appreciation in Non-Destructive Testing and Weld Quality Control.
Venue: Manukau City, October 23

For further details contact:

HERA Training Centre
PO Box 76134 Manukau City
Phone: (09) 262 2885 Fax: (09) 262 2856
Email: admin@hera.org.nz

Elevated Work Platforms

The current *Approved Code of Practice for Power-Operated Elevating Fork Platforms*, dated 1995, is to be reviewed. Industry representatives met in July 2002 to consider the extent of work to be undertaken, and a representative working group was nominated to progress the situation.

One basic question to be resolved is whether to keep the document as an approved code of practice or change it to a guideline. Guideline documents tend to be more industry produced and can be modified more easily than an approved code of practice, which has a statutory public comment requirement and also needs Ministerial approval.

Submissions in relation to amending the approved code of practice or producing best practice guidelines, and detailed content/change recommendations are requested not later than the end of November 2002.

Please send submissions to Rod Gibbon at:

OSH Northland Regional Office
PO Box 141, Whangarei
E-mail: rod.gibbon@osh.dol.govt.nz

Announcements

An overseas inspection body, Commercial Union Insurance Company, has changed its name to OneBeacon America Insurance Company and its address is as below:

OneBeacon America Insurance Company
Contract Inspection Services
One Beacon Street
Boston MA 02108-3100
United States of America

The following company has been removed from the list of recognised overseas inspection bodies providing design verification services due to office closure:

Lloyds Register Industry Division
Lloyds Register House
29 Wellesley Road
Croydon, CR0 2AJ
United Kingdom

SGS New Zealand Ltd has acquired Marine and Industrial Safety Inspection Services Limited, and the resultant inspection body is to be known as SGS New Zealand Ltd, trading as SGS M&I. The company's contact address is:

SGS M&I
SGS New Zealand Ltd
PO Box 27 347
Wellington

New Engineering Safety Website

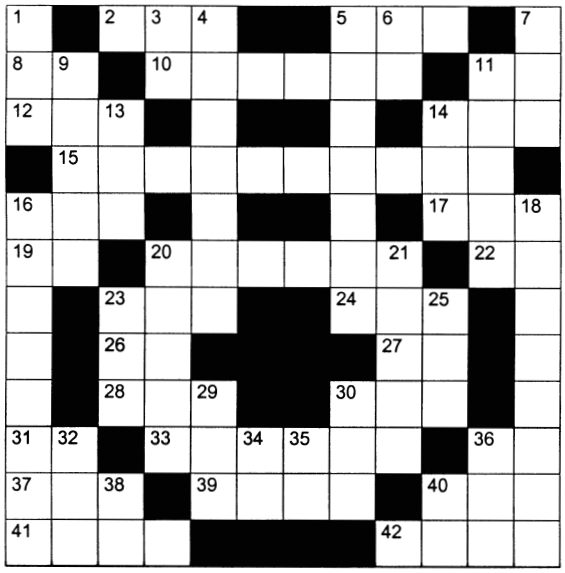
Engineering Safety has increased its presence on the Internet and now has its own web page, just a click away from the OSH homepage. Although it is new, there is already quite a lot there and it is well worth a visit. Launch day was 11th September and the page will be updated regularly.

The Engineering Safety web page will be used to make announcements, and provide useful information, policy statements, articles, links, etc. For example, you can now check approved organisations directly from this site. This will become our most prominent and regular means of communication–we recommend that you add the site to your favourites/ bookmarks.

What will this mean for *Safety Lines*? Inevitably it will give way to the web page, which will have a wider scope, encompassing that of the newsletter. We do, however, foresee a period of overlap whilst the web page develops to maturity (with the benefit of feedback we hope!). When *Safety Lines* is replaced, new articles will appear directly on the web, as will most of its other items. Issues of *Safety Lines* will remain linked to the web page, so nothing will be lost. To draw attention to significant new content we will provide appropriate notification to subscribers, in place of the *Safety Lines* early warning system.

We hope you will find our new communications vehicle meets your needs, and we encourage you to register. You can go now to our web page at: http://www.osh.dol.govt.nz/touch/eng-safety/index.shtml.

Puzzle Place



Answers include abbreviations and acronyms.

ACROSS

2 Industry association for the chemical industry
5 Set up; get ready - e.g. equipment
8 Not direct current
10 Layout (of information)
11 __ Law (TV)
12 One-way memory
14 e.g. cation
15 Confusing
16 Irritate
17 Document to aid compliance
19 Expressing position or point in time
20 Often abbreviated unit of current
22 With the result that
23 Inn
24 Wily
26 Anno Domini
27 Nearly the highest navy rank
28 Strengthening piece
30 Sewn border
31 Silver
33 Torpidity
36 A quality term
37 Fasten with string
39 On top of
40 Belonging to us
41 Bad feeling through others' fortune
42 Fitted with a shoe

DOWN

1 Spoil
3 Conditional on
4 Unit of electric charge
5 Surprise attackers
6 The information business
7 Opposite over adjacent (short form)
9 Its tail points away from the sun
11 Word of God
13 Combine
14 Incorporated
16 Confirm
18 Unenclosed message medium
20 Official examination of documents
21 Young eel
23 Normal amount
25 Climbing plant; its edible part
29 Constrictor
30 Another climbing plant; used for beer
32 A strong drink
34 Form of communication
35 Polonium
36 Quid pro __
38 Unit of energy
40 Expressing surprise

Answers can be obtained by email from robin.bain@osh.dol.govt.nz.

Answers to *Safety Lines* Issue 54 Crossword

	ACROSS	DOWN	
1	Oaf	2	Farad
5	Ash	3	Pray
6	Airfield	4	Head
7	Car	5	Adder
8	Die	7	Crotchet
10	Yard	9	Energies
13	Odds	11	AA
15	Al	12	RI
16	Tree	14	Sips
17	Hogs	16	Tend
19	AC	18	Gauss
21	Deli	19	Ah
23	Chop	20	CO
25	Tau	22	Elude
26	UPS	23	Crab
27	Standard	24	Peal
28	BMS		
29	Eat		

Correction to *Safety Lines* Issue 54

Telephone and fax numbers of inspection body:

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