

# GAZETTE

Australasian Institute of Engineer Surveyors Inc.

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November 2004

## Boiler Operation and Maintenance

*How You Can Help Save Fuel, Prevent Damage and Avoid Accidents*

*AIES Editor's Note:* This article has been reprinted with permission from HSB Australia and has been sourced from the USA. It may not reflect Australian legislation or Australian Standards requirements. The material should be used at the reader's discretion.

*Editor's Note:* Hartford Steam Boiler has published a number of articles on general boiler maintenance over the years. The following is updated information on critical safety and control devices and recommendations to keep a boiler in proper working condition.

Most boiler problems don't occur suddenly. They develop slowly over a long period of time. So slowly, in fact, that you grow accustomed to the change without realising it has taken place. Corrosion slowly builds up in the safety valve. Sediment collects in the float chamber on the connection lines of the low water fuel cutoff device. Scale accumulates on the waterside of your boiler tubes.

Each year, hundreds of accidents are reported nationally involving steam and hot water heating boilers in businesses, public buildings and other facilities. The majority of these incidents are attributed to malfunctioning low water cut-offs, operator error, poor maintenance and/or corrosion. Properly functioning control or safety devices are absolutely essential for any boiler. The only way you can be confident they will work when called upon to do so is to regularly perform required maintenance and testing.

### **What are these control and safety devices?**

Some of the more obvious ones are discussed below, with basic recommendations for testing



and maintenance. These are not the only items on a boiler that contribute to its proper operation, but they are some of the primary ones. This discussion of testing and maintenance procedures is not exhaustive - consult with your boiler manufacturer, contractor, insurer, or state boiler authorities for any questions about detailed procedures and requirements.

### **Safety Valves**

Often considered the primary safety feature on a boiler, the safety valve should really be thought of as the last line of defence. If something goes wrong, the safety valve is designed to relieve all

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Meetings are held at  
The Ryde Eastwood Leagues Club  
117 Ryedale Road, West Ryde, Sydney

5.30pm Refreshments  
6.00pm General Meeting

### Tuesday 14th December 2004

Christmas Meeting

Guest Speaker: Alan Kerruish  
WorkCover NSW  
Topical News Items

### Tuesday 22nd March 2005

General Meeting

Guest Speaker: Craig Hancock  
Tomlinson boilers

### Tuesday 21st June 2005

Annual General Meeting

Closing Date for the next issue of the  
AIES Gazette is 10th January 2005

The AIES Gazette is published on a quarterly basis by the Editorial Subcommittee.

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Austin Goodfellow

All contributions should be sent to the Editor **Robert Crnkovic** at the contact points below, or forwarded to any member of the Editorial Committee. We strongly encourage electronic copy to save duplication of labour. If you are forwarding an article from another journal we also need a photocopy of the original text, name of journal, date of publication and contact details so that we can seek permission to republish.

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## GAZETTE CONTRIBUTIONS

### Disclaimer

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The committee has reviewed our current status, whilst also progressing with projects at hand. With the markedly changing regulatory, industrial and commercial climate, we need to adapt and consolidate. To that end your committee is identifying areas which will assist in delivering the information and services to the membership.

#### Member Survey

Enclosed in this issue is a Member Survey/Update which I urge everyone to complete and return. An audit of our records has found some discrepancies, especially in currency of phone and/or fax numbers and email addresses. This information will allow for the publishing of an accurate Members Directory in early 2005. It will also allow for the canvassing of views from the membership and provide information on the desired direction, needs and levels of participation.

#### Website Development

Happy to advise we now have a Domain name [www.aies.org.au](http://www.aies.org.au). Whilst the site is being developed a basic sign post will be displayed including Executive Committee as an interim measure.

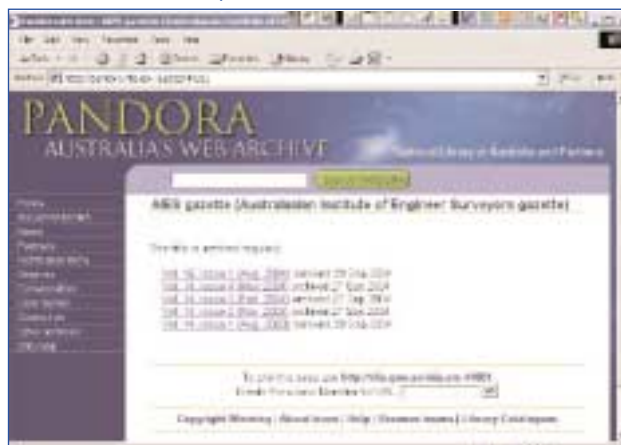
#### National Library Archive - Pandora's Archive

A recent innovation has been the posting of previous issues of the Gazette to the National Library Archives website. This website is a repository for many science and technology publications, being a wealth of knowledge for both students and practitioners of various disciplines of alike. From this platform it is intended to assist in the dissemination of information about our organisation to colleges, industry, regulatory bodies using both corporate and public libraries as a conduit.

For access to this site please use this quick link.  
<http://pandora.nla.gov.au/tep/44081>

#### Graeme Vickery

Below: National Library Archive - Pandora's Archive



## Letter to the Editor ...

### Subject: Air Compressors Pressure Vessels

I have recently been advised that Pulford Air Compressors are sourcing contracts to service air compressors and to survey the associated pressure vessels.

This will severely impede on the clientele of many of our members.

I am also advised that other air compressor service companies offer this service.

I do not believe that Pulfords have accredited Pressure Vessel Surveyors on their staff. However, if they do employ such qualified engineers, then they are required to be directly accountable for both surveying and signing the Certificate of Inspection for each pressure equipment item that they personally survey. Therefore, this survey work cannot be delegated to non qualified engineers unless under direct supervision.

Then, it is important that this practice is urgently stopped through direct support and action from WorkCover NSW. Maybe this warrants a letter and visit to the Chief Executive Officer of WorkCover NSW. Any lesser action may end up in some person's inbox. Such a visit would enhance our image with WorkCover Senior Management. We have previously met with the Minister where we had a significant concern.

#### I recommend urgent action on this matter.

In the May Edition of our Gazette, Jon Blackwell, Chief Executive Officer of WorkCover NSW, advised that an amnesty was in place until 30 April for operators to meet their accreditation obligations.

As you well appreciate, the examination process for Accredited Boiler and Pressure Equipment Surveyors through A.C.I.P. and the previous WorkCover NSW Boiler and Pressure Vessel Inspector's Licence, includes non destructive testing techniques, metallurgy, materials and structures and boiler and pressure vessel design. Each accredited Pressure Vessel Surveyor carries ultrasonic thickness testing equipment as part of their inspection kit. Therefore, our member pressure equipment surveyors are suitably qualified and well recognised. They also receive ongoing in-service training and attain subsequent examinations for continued validation of their qualifications.

Furthermore, I do not believe that insurance companies would accept pressure vessel certificates signed by non qualified operators. Hence, insurance cover would become null and void.

From my experience in the field, Pulford and other air compressor company service technicians are trained as electricians and do not have the pressure equipment surveyors training, qualifications or equipment required for this work.

**Graham Goodfellow, Principal Consultant**  
**G R Goodfellow Pty Ltd**



# AICIP EXAMS

We understand that the following dates have been scheduled by AICIP for public exams:

**In-Service Inspector of Pressure Equipment  
Written Papers A & B**

Monday 18th April 2005

Monday 5th September 2005

**Senior In-Service Inspector of Pressure Equipment  
Written Papers C & D**

Tuesday 19th April 2005

Tuesday 6th September 2005

**Practical Papers 2005**

Dates of practical papers to be confirmed

Requests for information on AICIP certification and renewal requirements may be addressed to Krystyna Whittaker – **telephone:** (02) 9748 4443, or **email:** kwhittaker@wtia.com.au

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the pressure that can be generated within the boiler. Although it is essential, a safety valve can also give you a false sense of security that encourages letting the testing and maintenance schedules slide. Keep in mind that the same conditions that make other safety devices malfunction can also affect the safety valve.

Every steam and hot water heating boiler must have at least one safety or safety relief valve of sufficient relieving capacity to meet or exceed the maximum burner output. The ability of a safety valve to perform its intended function can be affected by several things, such as internal corrosion or restricted flow, which can prevent the valve from functioning as designed. Internal corrosion is probably the most common cause of "freezing" or binding of safety/relief valves. This condition is generally caused by slight leaking or "simmering" due to improper seating of the valve disk and is a condition that should be corrected without delay.

To assure that a valve's mechanism will operate properly, the try-lever should be lifted once a month and the valve set pressure tested annually. If a valve will not operate or does not reseat properly when tested, the boiler must be shut down immediately and the valve repaired or replaced. The safety or safety relief valve must be set to open at or below the maximum allowable working pressure established by the manufacturer. This is the maximum pressure at which the designers have determined the boiler

can be safely operated. The maximum allowable working pressure is listed on the required boiler nameplate or tamping.

It is not good practice to operate a boiler too close to the valve setting. Operating too close to the set pressure will cause these valves to leak slightly, resulting in an internal corrosion build up that will eventually prevent the valve from operating.

***Water Level Control and Low Water Fuel Cut-offs***

These devices perform two separate functions, but are often combined into a single unit. This method is economical, providing both a water level control function and the safety feature of a low water fuel cut-off device. We recommend, however, that both steam and hot water boilers always have two separate devices - a primary and a secondary low water fuel cut-off. They should be attached to the boiler through separate openings to prevent a restriction in the connecting piping from disabling both devices. Many jurisdictions require two such devices on steam boilers.

Piping should be kept open and free of scale or sludge build up at all times. Properly installed piping will use "cross tees" so the piping can be easily cleaned and inspected. A simple indicator that trouble may be developing in piping connections may show up when the float chamber of the low water fuel cut-off is flushed

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out or drained. The water level should quickly return to normal in the gauge glass when the drain valve is closed. A slow return is a good indication that the connecting piping to the boiler is being restricted.

The most common water level control and low water fuel cut-off devices consist of two main components, a float chamber and an electrical switch operated by a float in the float chamber. A malfunction in either will prevent the cut-off device from operating. Malfunctions in the float chamber are generally the result of neglect; tampering and age most often cause those in the switch and associated wiring.

As the water level in the boiler drops, there is a corresponding drop in the float. When the float reaches a preset position, it activates an electrical switch that shuts off the burner. Sludge and sediment accumulate in the bottom of the float chamber, and, if not regularly flushed out, will build up preventing the float from dropping down to the shut off level. Note that flushing the float chamber should not be considered as a test of the low water cut-out.

### ***Be Careful When Testing***

Low water fuel cut-offs should be checked periodically for proper operation during the period when the boiler is operating. Since this test requires lowering the boiler water to the minimum safe operating level, qualified personnel should use extreme caution. Never allow the water level to drop out of sight in the water gauge glass. This test should be done daily for steam boilers operating at more than 15 psig and weekly for those operating at less than 15 psig. In addition, a slow drain test should be done semi-annually on steam boilers operating at more than 15 psig.

In addition to these periodic tests of the low water device, the float chamber on the water level control and/or the low water fuel cut-off should be thoroughly flushed to remove any accumulated sediment. At least once a year, water level controls and low water fuel cut-off devices should be disassembled, cleaned and checked. These devices are an important part of boiler safety. Unless you are thoroughly familiar with them, have an experienced technician perform this type of maintenance.

The electrical switches and wiring are generally quite reliable and require little ongoing maintenance. At least once a year, the switches should be cleaned and any dust or dirt removed. The covers should be kept tightly in place except

when opened for cleaning. If used and maintained properly these switches are virtually trouble free. However, if abused they can be a prime cause of boiler accidents. During the annual cleaning the wiring should be examined for signs that insulation is cracking. All connections should be tight.

### ***Don't Bypass the Switches***

It is not unusual for a maintenance worker to remove the cover and install a "jumper" wire to prevent the switch from operating. This starts out as a temporary convenience, often to "fix" a boiler that keeps shutting off on low water while being operated at high demand or as a temporary means to test other circuits in the control system.

This bypass can easily become a permanent and dangerous condition. A boiler that regularly shuts down indicates a very serious problem that could lead to a catastrophic accident. A jumper wire should never be permanently installed in a low water device. Only a qualified technician should use a jumper to test another circuit.

### ***The Fuel System***

The fuel system, particularly the burner, requires periodic cleaning and routine maintenance. Failure to maintain the equipment in good working order could result in higher fuel costs, the loss of heat transfer or even a furnace explosion.

Modern fuel systems are very complex assemblies, consisting of both electronic and mechanical components. Over a period of time many things may go wrong - ignition transformers deteriorate or fail, ignition electrodes burn and become coated, fuel strainers and burner equipment become clogged, fuel valves become dirty and leak, air/fuel ratios drift out of adjustment, flame scanners become dirty. Many users wisely contract with their gas company or oil service company to periodically check and maintain their burner equipment.

Properly maintained equipment should be safe and reliable, but devices installed to assure safe operation are sometimes viewed as an inconvenience. The personnel who operate the boiler may tamper with or adjust these devices, thereby compromising operation of the boiler.

The safety feature most often adjusted is the burner purge cycle, designed to prevent furnace explosions caused by a build up of unburned fuel in the furnace chamber. The cycle length is determined by the equipment manufacturer to

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purge fuel from a leaking fuel valve or an unsuccessful ignition sequence. It is annoying to have a boiler fail to ignite and then wait for the burner to go through another complete purge cycle. You may be tempted to shorten or even bypass the cycle. Don't! Doing so greatly increases the chances of a serious furnace explosion.

### ***The Water Gauge Glass***

The importance of proper cleaning and maintenance of the water gage glass, or sight glass, cannot be stressed enough.

The water gauge glass on a steam boiler enables the operator to visually observe and verify the actual water level in the boiler. If not properly cleaned and maintained, however, a gauge glass can seem to show there is sufficient water, when the boiler is actually operating in a low water condition. A stain or coating can develop on the inside of the glass where it is in contact with boiling water. After a time, this stain gives the appearance of water in the boiler, especially when the glass is completely full or empty of water.

Another problem that can be the indirect cause of accidents is for the connection lines to the gauge glass to become clogged and show normal water levels when water may be low. The piping connecting the gauge glass to the boiler should be cleaned and inspected regularly to assure it remains clear.

One final problem should be mentioned. Often, a boiler is operated with the isolation valves to the gauge glass closed because the glass has been broken, or is leaking. Take the time to replace the glass, even if the boiler must be shut down. That inconvenience is nothing compared to the damage that may result from operating a boiler without a gauge glass. Some operators routinely replace the glass and seals during annual maintenance, because it is so important to verify the actual water level.

### ***The Stack Temperature Gauge***

A stack temperature gauge is normally installed on a boiler to indicate the temperature of the flue gas leaving the boiler. A high stack temperature indicates that the tubes may be getting a build up of soot or scale. Also, the baffling inside the boiler may have deteriorated or burned through, allowing gases to bypass heat transfer surfaces in the boiler. These conditions generally develop slowly over a long period of time, slow enough so the person who operates

the boiler can become accustomed to the gradually rising temperature. Approximately 1 percent in boiler thermal efficiency is lost for a 40-degree F increase in stack temperature.

### ***Boiler Logs Are Important***

The majority of boiler accidents can be prevented. One of the most effective tools is the proper use of operating and maintenance logs. Boiler logs are the best method to assure a boiler is receiving the required attention and provide a continuous record of the boiler's operation, maintenance and testing. Because a boiler's operating conditions change slowly over time, a log is the best way to detect significant changes that may otherwise go unnoticed.

If a boiler is to be kept in good operating condition, someone who tends to the boiler must be responsible for its operation and maintenance. This person should have a good understanding of boiler operation and safety devices. Maintenance and testing should be performed and recorded in the log on a regularly scheduled basis. The responsible individual should initial the log to verify each operation performed, who performed it, and when it was done.

Source: [www.hsb.com](http://www.hsb.com) "The Locomotive"



★ Safety Alert ★ Safety Alert ★ Safety Alert ★ Safety Alert ★

No. 1 – 2002

## CHROME PLATED VALVE



### Details

A service technician was injured while applying hand pressure to close a fire hydrant valve to prevent it leaking. The injury occurred when the centre of the 64 mm chrome plated brass fire hydrant valve, weighing 2.8 kg, was forced from the valve body by the water pressure in the system.

### Contributing Factors

An investigation into this accident revealed that:

- ★ Washers in this and other fire hydrant valves were replaced two days earlier and were correctly re-assembled.
- ★ The failed valve body appeared to be soft and distorted easily.
- ★ The valve was approx 40 to 50 years old.
- ★ The technician was standing in front of the valve to close it.

### Recommendations

- ★ Where chrome plated fire hydrant valves are installed it is strongly recommended that building owners have them inspected by a 'competent person'. They should be replaced where faulty.
- ★ Persons should not stand in front of hydrant valves during servicing, adjustment or operation.

If you would like further information contact Workplace Standards Tasmania on:  
Telephone: 1300 366 322 (inside Tasmania) or (03) 6233 7657 (outside Tasmania)

Fax: (03) 6233 8338

Email: [wstinfo@dier.tas.gov.au](mailto:wstinfo@dier.tas.gov.au)

Internet: [www.wsa.tas.gov.au](http://www.wsa.tas.gov.au)

## My Safety Relief Valves are OK...!

*Many plant owners and operators disregard their moral obligations to ensure the safety and reliability of their processes by not keeping their safety relief valves adequately serviced. The following briefly summarises what is required when it comes to keeping relief valves properly maintained which is a part of Australian Standard 3788.*



Australian standard AS3788: 2001 Pressure Equipment - In-Service Inspection provides a guide to when and how PRV's should be inspected and overhauled. In-service visual inspections should be carried out at least annually (a 3 month extension can be applied if the owner has reviewed and recorded the justification for such an extension) to check for external damage to the PRV and, where possible, blockage in the outlet or discharge piping and leak tightness of the PRV. Valves with easing gear should be operated if plant integrity will not be compromised and weather protection should also be inspected for integrity.

At appropriate periods PRV's should be removed, tested for operation on a full-flow test bench, and, if necessary, overhauled. Where history and documentary evidence demonstrates that dismantling is not warranted, then the testing period may be extended. PRV's should be tested at periods not exceeding the internal inspection period of the vessel or five years, whichever is less. Where the internal inspection period is greater than five years, and the internal service is clean, non-sticking and non-corrosive, the testing period may be extended up to the internal inspection period, providing weatherproof external protection is used that prevents dust, rain, or other contamination that can affect valve performance.

The owner of the plant is responsible to adhere by these requirements as set out by Australian Standards and should show beyond all reasonable doubt that they have followed these guidelines if they are required to do so by the relevant Workcover authorities. It should be noted that AS 3788: 2001 is a guideline only to users, inspectors and regulatory authorities on the inspection of in-service pressure equipment. It is not law and has no legal authority but can be used by government authorities having jurisdiction ie: Workcover if required. And remember, it's the end user's responsibility to keep their pressure equipment suitably maintained and in good working condition. When was the last time your relief valves were inspected?

For further assistance in regards to pressure relief valve inspection and servicing requirements feel free to contact **Barry Herrett at Austral Engineering Supplies Sydney Head Office**  
Telephone: **02 9877 8133** or any of our national sales branches.

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## *Brass Ball Valves on Blowdown Systems*

Thorough in-service inspection of valves and fittings can mean the difference between life and death. This was demonstrated when the failure of a boiler component recently resulted in a fatality. The tragedy occurred when the valve body broke apart, resulting in the high temperature water flashing into steam. A worker in the vicinity of the boiler sustained serious burns and later died at the hospital.

The two-inch threaded forged brass ball valve had markings of steam pressure of 150 psi. The boiler was designed with a WPM of 125 psi.

The jurisdictional investigation revealed that a forged brass material of the valve, not designed for this application, was used for the boiler external piping. The material in question was identified as ASTM B283 C37700 forging brass.

The ASME Power Piping Code, B31.1 specifically prohibits the use of this material for applications other than boiler external piping.

Inspectors should take note during initial and in-service inspections the valves and fittings that make up boiler external piping. Not all boilers are installed by qualified individuals, and often replacement of the original equipment, which was code approved at the time of installation, is not of the same material.

It is their responsibility to confirm that the piping and fittings are suited for their intended application. Markings on valves and other fittings may not be an adequate source for this information. Questionable valves and fittings and piping should require additional investigation as to the proper material and code compliance.

### **"R" Review**

Recently, some common findings have been noticed on Qualification Review Reports. This information could be helpful to inspectors, certificate holders, and team leaders concerning Certificate Quality programs.

For those "R" certificate applicants who register "R" forms:

- The certificate holder's program must address NBIC paragraph RC-1150B, which requires "R" forms registered with the National Board or be retained by the certificate holder for a minimum of five years.
- The certificate holder's program must address NBIC paragraph RC-1151, which requires sequential "R" form log for "R" forms to be registered with the National Board.
- For alterations in the scope of the certificate, the certificate holder's program must address NBIC paragraph RC-3053, which requires certificate holders who make alterations to "registered" pressure-retaining items also register the R-2 form with the National Board.

When the certificate holder chooses to use material from the organisation's inventory, the program must address how material is controlled and issued. Identification and control must be addressed starting with the design documents, purchase order(s), receipt inspection, placement into inventory or withdrawal from inventory, and acceptance by the inspector through incorporation into the pressure-testing item.

When a new fabrication is used to demonstrate the ASME and "R" quality program, the appropriate repair/alteration documentation, including "R" forms, should also be provided to demonstrate the repair/alteration portion of the program.

# MEMBERSHIP SURVEY

## Membership Records/Directory Update

Following a review of previous Annual Returns by the committee, publication of the 2004 Membership Directory has been held over awaiting a broader receipt of acknowledgements. Incomplete and outdated details didn't warrant us going to press.

The committee has identified a reluctance to return "Annual Returns" in their present form. Until this issue has been formally resolved an interim measure has been implemented by way of "Member Survey". This measure has a twofold aim in that it seeks to prompt member perusal/update of their current details and also a survey of Assoc Activities. With a changing climate in respect to new members, industry scene and commercial requirements the expectations of the Assoc are changing. To meet these requirements feedback is needed from the membership so as to assist in identifying and focusing our attentions.

Whilst we may obtain many varied viewpoints, at least these might be prioritised in respect to time, effort, commitment and funds to support them. Please take a moment to review the Form, update and include respective information, passing comment at the prompts.

**Don't forget to send back promptly in the return addressed envelope.**

### Member Directory Information (for 2005 print run)

Surname \_\_\_\_\_ First Name \_\_\_\_\_ Preferred Name \_\_\_\_\_

Address \_\_\_\_\_

Phone: Business ( ) \_\_\_\_\_ Home ( ) \_\_\_\_\_ Mobile \_\_\_\_\_

Postal Address \_\_\_\_\_

Email: Business \_\_\_\_\_ Home \_\_\_\_\_

### Gazette

Is the Publication meeting your levels of interest? *(please circle)* Yes / No

Comment: \_\_\_\_\_

### AICIP

Are you happy with the current commitment, support and feedback from AICIP? *(please circle)* Yes / No

Comment: \_\_\_\_\_

### Training

Would you support training events in your own State on topics such as OH&S, Insurance, Small Business Management, Corporate Sponsorship evening? *(please circle)* Yes / No

Comment: \_\_\_\_\_

### Participation

Would you like to participate in any of the following areas: *(please circle)*

Gazette Publication Yes / No

AICIP Representation Yes / No

Australian Standards Representation Yes / No

Website Support Yes / No

Other \_\_\_\_\_

Comment: \_\_\_\_\_

**Other Suggestions:** \_\_\_\_\_

**Thank you!**



## Out in the Field...

by Ray Chilton & others

### Some Anecdotes and Industry Comments with Challenges Ahead for Inspectors...

- A Boiler Company canvassing work in North West NSW advised a Plant Manager they could de-rate a 70 HP Boiler so they didn't need a Boiler Attendant. Education Required on Code.
- Boiler Companies have been known to sell 6000 Kw and 600 Kw Fire Tube Boilers as 5000 Kw and 500 Kw units, respectively, so as to bring them into a lower category with less impositions.
- Air Receivers are being brought into Australia through Queensland with no stamping on the vessel to AS1210 or AS 2791. Under Queensland jurisdiction they Do Not have to register Plant under 500 litres capacity. This varies in other Australian States. Talking to importers they say they have never heard of any specific Code requirements.
- A Boiler was sighted without Re-Hydro test dates following repairs. On asking for supporting documentation of tests their was no history available.
- Boiler Service technicians have been setting Safety Valves 10% above Design Pressure. They were either ignorant or misinterpreted the Code and were reluctant to lower it onsite.
- At a Periodic inspection, Boiler Technicians were also in attendance and reluctant to test the Safety Valves by bringing the Boiler up to pressure, as they commented the valves could possibly leak after they re-seated. This would then incur more work and prolong the job.
- It's amazing to see how many Boiler Controls fail to operate after an Annual Inspection, especially on Limited or unattended Boilers. Do Plant Owners really know if these units are being serviced if an accredited inspector doesn't ask for them to be checked?
- A liquid Nitrogen tank sourced from South Australia displayed a Certificate with No Certified Pressure and No Stamping.
- Refrigeration Piping System being installed with no weld maps & Procedures, NDT or Hydrotest information available.
- A new air receiver made in Victoria failed internal inspection due to lack of visible weld penetration of the longitudinal seam. A replacement vessel was provided by the manufacture.
- A hydraulics' company in Victoria provided a power pack with an attached hydraulic accumulator operating at 10 000 psi which had no stampings or documentation. On enquiry the supplier/manufacturer admitted that the accumulator was a copy made by their fitter. A new vessel was provided which met standards requirements.
- A discount tool supplier which imports air compressors manufactured by a factory in China. Previously the air compressors came out of the factory in Italy with the appropriate stampings and certification, however the Chinese models have no identification plates attached. We are talking 270 litre tanks and after contacting the tool supplier some 2 months ago they explained it was an oversight and plates would be sent out and riveted on to all vessels, which has in fact been done. The plate however has no design approval and after checking with the supplier they confirmed as of 15.11.04 the approval has not been granted pending clarification of welding procedures. It goes without saying these vessels can not be registered with WorkCover NSW. Let the buyer beware.

**We would be interested in feedback in relation to  
what other Inspectors are finding in the field  
*plus*  
Information on current registration requirements  
across other jurisdictions sought.**

## COLLAPSED TANK



If a Tank is not designed for vacuum, odds are it will be damaged if placed under vacuum.

Low pressure storage Tanks and Railcars are particularly susceptible to damage.

This is why those low pressure switches on the suctions of blowers are so important – you can't manually shut the blower down fast enough to avoid damage if the blower pulls vacuum on a tank.



Not only is the equipment damaged but the hydrocarbon contents may also be released

This tank collapsed while being pumped out! Painters had covered the vent with plastic sheeting. The steel tank collapsed before the plastic sucked through.

Never underestimate the potential of a low pressure or vacuum condition to cause damage.

Are vacuum vents/reliefs/breakers fitted?

Are protective devices visible & labelled?

Do vacuum devices appear on checklists?

# Freak Pressure Vessel Explosion...!

**A** dead sperm whale has exploded while being delivered to a research centre near the southwestern city of Tainan.

Passers-by and cars were soaked in blood and body parts were sprayed over a road after the bursting of the whale, which was being carried on a trailer.

The whale had died earlier on a beach and had been collected so its remains could be used for educational purposes.



A marine biologist blamed the explosion on pressure from gases building up in the mammal as it began to decompose.

The whale attracted a lot of onlookers both before and after it exploded.

***“What a stinking mess. This blood and other stuff that blew out on the road is disgusting, and the smell is really awful,”***

Several parked cars and pedestrians got covered in blood when it exploded.

Residents and shop owners wore masks while trying to clean up the spilt blood and entrails.

“What a stinking mess. This blood and other stuff that blew out on the road is disgusting, and the smell is really awful,” said one resident.

Professor Wang Chien-ping, of the National Cheng Kung University in Tainan, had ordered the whale to be moved to the Shi-Tsao Natural Preserve after his own institution refused to allow a post-mortem examination on its own premises.

## Record find

He said that the animal had been close to death when it was found on a beach and had died by the time help arrived.

“Because of the natural decomposing process, a lot of gases accumulated, and when the pressure build-up was too great, the whale’s belly exploded.”

However, he said despite the explosion, enough of the whale remained to allow for an examination by marine biologists.

Professor Wang said initial observation showed the whale to be an older bull and that its weight of 50 tonnes and 17 metre-length made it the largest whale ever recorded in Taiwan.

Reports say because of the whale’s size, it took 13 hours, three large lifting cranes and 50 workers to get the mammal loaded on the trailer truck for its final trip.



## Twin tail fall arrest failure (interim advice)

### Purpose

To highlight the risk of failure when using twin tail fall arrest lanyards. The guidance in this Alert is an interim measure and additional guidance will be provided as further information becomes available.

### Background

A worker recently received fatal injuries as a result of falling from a transmission tower near Toowoomba. The worker was using a twin tail fall arrest lanyard at the time of the incident when he fell. He suffered fatal injuries when his lanyard failed.

Workplace Health and Safety Queensland (WHSQ) is currently investigating the incident and the exact causes of failure have not yet been determined.

### Twin tail fall arrest lanyard

The twin tail arrest lanyard is the term used to describe a fall arrest system where a worker uses the twin tails of the lanyard to hook on and off as he or she climbs a structure. In this method the climber is always connected to the structure via one of the tails as he or she climbs the structure. An example of a twin tail type lanyard can be seen in Figure 1.



Figure 1: Twin tail fall arrest lanyard

### Results of preliminary investigations

In summary, tests conducted on similar types of lanyard revealed that:

1. The energy absorber part of the lanyard operated as intended, when the twin tails were both connected to anchor points (on a structure) and the energy absorber part was connected to the body harness.
2. The lanyard has the potential to fail if a drop test is conducted with one tail of the lanyard anchored and the other connected to the drop weight. The lanyard failed at connector loop "A" (Refer to Figure 2)



Figure 2: Failure of lanyard at loop "A"

From the lanyard used in the incident, it has been observed that the energy absorber on the lanyard did not operate but the webbing on the absorber's connector loop "A" failed (Refer to Figure 2). At this stage it is not possible to determine the cause of the incident. However, a number of findings are apparent from the preliminary investigations and the tests conducted on similar lanyards. An important finding that should be highlighted immediately is that failure of the lanyard may occur when one tail of the lanyard is attached to an anchorage point and the other tail is back-hooked in particular configurations to a side attachment D on the harness (Refer to Figure 3).

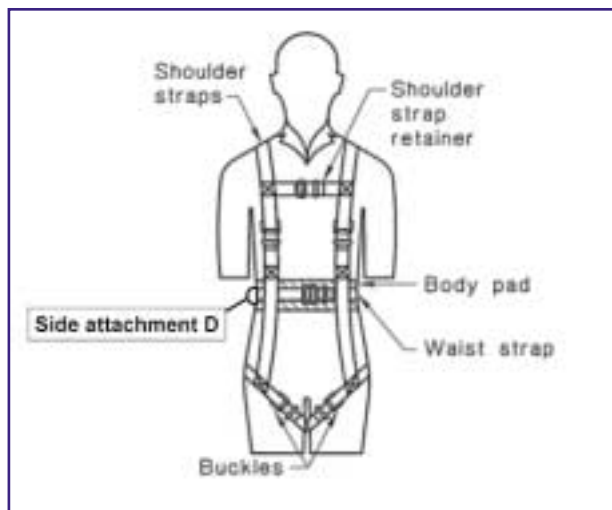


Figure 3: Example of harness showing side attachment D

The side attachment D on the harness is generally intended for the user of the harness to operate in travel restraint/work positioning mode and should not be used for attaching a fall arrest lanyard. Connection of any part of the lanyard to a side attachment D may lead to the energy absorber being by-passed in the event of a fall. The shock loading will effectively be transferred to the twin tails of the lanyard.

### Recommendations

In view of the seriousness of the incident and the fact that further investigation needs to take place, WHSQ recommends the following interim measures:

1. The use of fall arrest systems are not the preferred method of managing the risks associated with climbing or moving along a structure. Engineering controls, such as the use of elevating work platforms, provide a higher degree of safety. Fall arrest systems should only be used when it is impracticable to use other safer work methods.
2. As an interim measure, the use of twin tail fall arrest lanyards should be discouraged from use, pending the outcome of the investigation. However, twin tail fall arrest lanyards may be considered fit for use if users gain an assurance from the manufacturer (based on appropriate test results) that their product will not fail in the event of a fall when one lanyard tail is attached to an anchorage point and the other

tail is back-hooked, in any possible configuration, to a side attachment D on the harness. Twin tail fall arrest lanyards that meet this criterion need also to be used in strict accordance with guidelines provided by the manufacturer.

### Legislative requirements

Section 28 of the Workplace Health and Safety Act 1995 requires employers to ensure the health and safety of their workers and others at a workplace. Section 31 lists obligations of principal contractors. Section 36 lists obligations of workers and other persons and Section 32 lists obligations of designers, manufacturers, importers and suppliers of plant.

### Further information

*For more information contact*

**Workplace Health and Safety Queensland**  
**Phone: 1300 369 915**  
**Internet: [www.whs.qld.gov.au](http://www.whs.qld.gov.au)**

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