



Mines Safety Bulletin No. 135

Subject: Support conditions for pressure vessels

Date: 02 November 2016

Background

Under regulation 6.33 of Mines Safety and Inspection Regulations 1995 (MSIR), pressure vessels are required to be designed to Australian Standard AS 1210 *Pressure vessels*. This includes designing for all possible loading, as stated in section 3.2.3 of AS 1210, which includes horizontal forces such as wind, earthquake and external pipe loads.

To remain stable pressure vessel supports require resistance to uplift and sliding. It is unlikely that connecting pipework would have been designed to act as restraining members under these circumstances, unless it has been clearly stated on a design drawing.

The stability of pressure vessels also relies on a supporting structure which is designed by a competent person, applying the referenced standards in section 3.24.2 of AS 1210.

Inspectors have observed that the anchorage and vessel support information on some pressure vessel drawings is inadequate. There were also numerous instances where the support conditions for pressure vessels were not satisfactory.

Supports were observed:

- not anchored securely (no hold-down bolts)
- not anchored to a structural member
- with significant loss of material due to corrosion.

Some of these vessels had previously been inspected by a classified plant inspector. These inspections, recorded in the classified plant record book, noted no defects.

Potential defects of support condition cannot be remedied unless it is noted or recognised. Correct defect identification and subsequent remedial works will ensure conformity with the design intent and the ongoing integrity of the pressure vessels.





Pressure vessel supports. A. Unanchored vessel containing refrigerated argon gas. B. Air receiver leg anchored to grating only. C. Severe corrosion of a support bracket to an acid elution column (condition of shell unknown). D. Air receiver not bolted down and connection point corroding.

Summary of hazard

If pressure vessels are not anchored, or have inadequate support, horizontal forces can tip them over or cause uncontrolled movement. This can overstress the nozzle connections, pull flanges apart or result in other unexpected responses from the vessel, exposing personnel around the vessel to an increased risk of harm.

Contributory factors

- Support information is not documented in the pressure vessel design drawings.
- Poor condition of supports is not identified as a potential defect or hazard.
- Inspection personnel may not appreciate the scope of their responsibilities as required by the applicable Australian Standards.

Actions required

The following actions are recommended to duty holders to help prevent the uncontrolled movement of pressure vessels.

Design and build

- Designers are reminded of their duty to provide design and installation information [r. 6.5 MSIR].
- Information on support conditions and anchorage detail of pressure vessels, as intended by the designer, should be presented in the drawings or installation procedure of the pressure vessel.
- Implement the designer's intent, including anchoring details, on site.

Maintenance and operation

- Employers are reminded of their general duties to maintain all plant [r. 6.2 MSIR].
- All pressure vessels are to be inspected, operated and maintained, using applicable parts of AS/NZS 3788 *Pressure equipment – in-service inspection* and AS 3873 *Pressure equipment – operation and maintenance* [r. 6.26 MSIR].

Note: Refer to section 4.4 of AS/NZS 3788 and section 3 of AS 3873 for inspection of the condition of supports.

- Investigate and document defects, include probable causes and their effect on the fitness for service of the pressure equipment.

Note: Classified plant inspectors are to provide the findings of inspections in report form (section 2.3 of AS 3788) and supply to the report to the employer, so the employer's obligations under regulation 6.25 of the Mines Safety and Inspection Regulations 1995 can be met.

- A competent person must advise the employer which repairs are to be carried out to fix identified defects [r. 6.22 MSIR].

Further information

- Standards Australia, www.standards.org.au

AS 1210 Pressure vessels

AS/NZS 3788 Pressure equipment – in-service inspection

AS 3873 Pressure equipment – operation and maintenance

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