# AIR COMPRESSORS
## *in the workplace and home*

*Guidelines and requirements for the safe supply, use and asset management of air compressor pressure vessels*

Issued by:

AICIP
Australian Institute for the Certification of Inspection Personnel

COMPRESSED AIR AUSTRALASIA

*Supplied by:*

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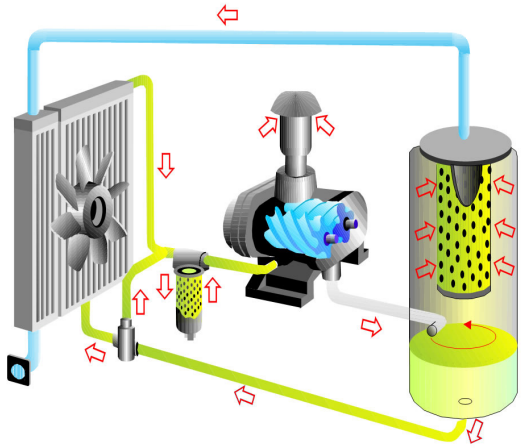
## AIMS *of this guide*

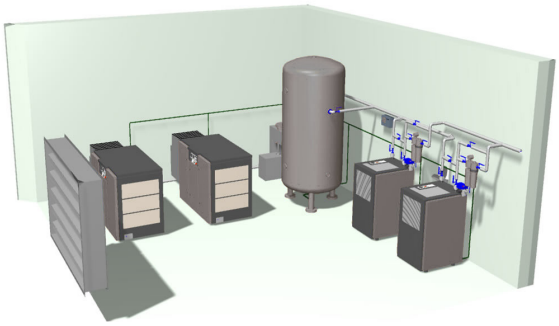
- Briefly provide best guidance and good practice for air compressor pressure vessels (pressure vessels) manufacturers, suppliers, hirers, users, maintenance personnel, trainers and trainees
- Help improve economy, save energy, resolve a number of confusing issues and promote safety
- Improve awareness of obligations and regulatory requirements (some users operating illegally)
- Help regulators in national revision of OHS regulations with respect to Plant
- Support relevant Australian Standards (AS 1210 and AS/NZ 3788)
- Accompany the supply of new pressure vessels
- Provide a guide to the desirable type of inspection report

## *AIR COMPRESSOR PRESSURE VESSELS OVERVIEW*

- Defined as pressure vessels which receive and store compressed air
- Classed as hazardous plant because of the stored pressure energy which increases as pressure and volume increase
- Require reasonable care and inspection for safe, useful, economic, and long life, and to maintain their good safety record
- Typically part of an air compressor system (see the figures) with air supply from a remote source via piping, or from a compressor mounted on top, adjacent or inside the pressure vessel
- Made usually of carbon steel or aluminium, but may be stainless steel, plastics, or other material
- Used in a wide range of industries, eg mining, transport (air brake reservoirs), dentistry, and many others
- Usually of cylindrical in shape and small (1L) to large (10000 L); static or transportable



Internal air receiver (eg. screw compressor)



External air receiver (example configuration)

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|---|---|---|
| Pressure vessels are hazardous plant, and if misused, can kill. | Compressors used in the workplace must comply with the relevant state or territory OHS legislation. | It is essential to properly install, use and maintain, and have inspected regularly. |
| Air compressor pressure vessels over 30 MPa.L require regulatory registration. | Owner and users have full responsibility for care, safety, compliance with law. | Feedback is welcome and will be considered for improvement of this guide. |

## *PURCHASING AN AIR COMPRESSOR*

- Users should determine basic needs: size ie volume (allow for future), pressure, type of service (static, transportable, rough use), material to suit air quality and service environment, fittings required, and importantly the standard to which the pressure vessels is designed and manufactured *(see Standards page 3)*
- Select reputable maker and supplier of the pressure vessel/compressor. See *www.compressedair.net.au/members.html*
- For advice on purchasing an air compressor, please see *www.compressedair.net.au*
- Ensure documentation is adequate *(see Documentation page 4)*
- If practical, check pressure vessels in operation
- For hire, the pressure vessel should be currently registered, with an inspection certificate which shows the date for next inspection is after your use

### COMMON CONVERSIONS

*VOLUME:*
1000 Litre = 1 cubic metre = 35.3 cubic feet

*PRESSURE:*
1 MPa (megaPascal) = 1000 kPa (kiloPascal) = 10 bar = 145 psi (pounds per square inch)

*FREE AIR DELIVERY:*
28.3 L/minute = 1 cfm (cubic feet per minute)

## LOCATION CONSIDERATIONS

- Installation should be in safe place, preferably out of weather, near main use of air, handy to controls and mounted so that waste fluids are directed to its drain
- If site is dusty, protect safety valves from blockage, eg with light bag
- Locate air intake for clean air to avoid damage to compressor, pressure vessel and downstream equipment
- Properly maintain safety devices and important controls
- Ensure connectors are soundly locked, as they can be dangerous when burst or disconnected

## STANDARDS OF AIR RECEIVER DESIGN AND MANUFACTURE

- Air receivers must be designed and manufactured to nationally recognised standards when their size requires design registration
- All Australian State and Territory regulatory authorities allow any recognised reputable standard to be used, but some require that the construction must also satisfy Australian Standards AS 1210 or AS 2971. The approval number must be shown on the vessel
- Suppliers must also ensure air receivers supplied can be readily registered and used without delay or extra cost in the State or Territory where they are used

## REGISTRATION OF PRESSURE VESSELS

*In Australia, to help ensure safety, large pressure vessels are required by law to be registered with a regulatory authority. Owners, users and suppliers should be familiar with the regulatory requirements in their state. Thresholds detailed here were correct for all states at the time of publishing.*

### *DESIGN REGISTRATION BY SUPPLIER*

> Many pressure vessels must be registered by the supplier. Take care when buying a pressure vessel to ensure this is done, if required

> Design registration threshold is: Volume x Design Pressure ≥ 30MPa. L

> When threshold is met (eg 30 L X 1000 kPa, or 30 L x 10 bar), the maker or supplier must have the design registered with one State/Territory regulatory authority

> In some occasions, overseas standards may be used, provided that the vessel's design is registered by an appropriate state body

### *PRESSURE VESSEL REGISTRATION BY OWNER/OPERATOR*

> Pressure vessel registration threshold is: Volume x Design Pressure ≥ 100MPa. L in in some states

> Check with your state health and safety body (eg WorkCover in NSW) for more information and up to date thresholds

> The owner or operator must register and regularly reregister the pressure vessel. This excludes virtually all air vessels associated with on road vehicles but not those for air-start on most heavy machinery

> This registration aims to ensure the pressure vessel was made to the design and standard

> Renewal is required every 1 to 3 years depending on the State or Territory

## IN-SERVICE INSPECTION OF AIR COMPRESSOR PRESSURE VESSELS

### WHY

> Suitable inspection is needed with hazardous plant to assess its safety after installation and to detect any dangerous deterioration in service, and to comply with OHS laws

> Uses appropriate visual examination, testing, operation and certification in accordance with AS/NZS 3788, and may require calculations and use of construction standards

### WHEN

> Threshold: Volume x Design Pressure ≥ 100MPa. L

> Inspections conducted at periods in accordance with AS/NZS 3788. External inspection required at maximum 2 yearly intervals & internal inspection required at maximum 4 yearly intervals

> Actual inspection interval is subject to agreement between the inspector and the owner of the vessel, and should suit plant shut-down and maintenance schedules

### WHO

> By a "competent person" who is capable, responsible, qualified and willing to indicate in writing the pressure vessel is suitable to use until the next required inspection date

> For guidance on such persons, see AS/NZS 3788 Appendix V, and AICIP web (www.aicip.org.au) for certified inspectors and NATA website (www.nata.com.au) for accredited inspection bodies

## OUTCOME

> Inspection is to be in accordance with AS/NZS 3788 Pressure equipment – in-service inspection

> A report is to be issued in line with AS/NZS 3788. This may use the proforma available online at CAAA and AICIP websites, or equivalent, as many inspectors use other compliant forms

> Any corrective actions to make the pressure vessels safe for service should be undertaken as soon as possible according to the inspection report/certificate

## PREPARATION

> The owner or user should:

- Make available to the inspector any necessary information (see *Documentation* section below)
- Ensure the pressure vessel is ready and safe for the agreed inspection (scope, time, etc)

## OPERATION OF AIR COMPRESSORS

- Pressure vessels and compressors should be operated by suitably trained personnel in accordance with the maker's and owner's instructions
- They should be treated with care and drained of any water or oil at regular intervals

## MAINTENANCE AND REPAIR

- Follow manufacturer's maintenance recommendations
- Have this done by competent persons
- Take care in locating leaks; don't increase pressure above designed working pressure
- Take care with any weld repair on the pressure vessels and ensure welding personnel are qualified – some weld repairs may require retesting of the vessel
- Touch up painting to prevent local corrosion and thinning which may reduce vessel's working life
- Replace leaking fittings with care
- Ensure safety valve set pressure, size and capacity is not tampered with between in-service inspections

## RECOMMENDED CHECKS OF AIR COMPRESSOR PRESSURE VESSELS

- At suitable periods during operation, including maintenance and between required inspections, checks should be made by visual examination and other means (eg smell, feel, hear)
- This is to detect any evidence of damage or deterioration: dents, corrosion, leaks (loss of pressure and possible cracking), cracks, excessive noise or vibration (which may lead to fatigue cracking of pressure vessels, attachments or piping), or excessive heat (which, with oil can lead to internal explosion)
- If necessary to disassemble the pressure vessel outside an in-service inspection, the internal surfaces and attachments to the pressure vessels should be closely examined. Findings should be reported to allow consideration by the in-service inspector
- Report or record any serious shortcomings or doubtful condition. If in doubt, check.

## DOCUMENTATION

- The owner should keep at least the following in a safe and readily accessible place:
  - > the purchase receipt and OEM instructions
  - > reports of significant incidents and maintenance
  - > inspection reports and certificates and evidence of current registration
  - > Manufacturer's Data Report (MDR)
- Inspection body should keep notes made of the inspection, and the final report and certificate
- AICIP and CAAA have developed a downloadable form for pressure vessel reports and inspection certificates which complies with Australian Standards. Please see www.compressedair.net.au or www.aicip.org.au. Other forms may also be suitable for in-service inspections.

## FOR FURTHER INFORMATION:

Contact your equipment supplier or maker – for manufacturer details, please see air receiver record

Compressed Air Association of Australasia (CAAA):

www.compressedair.net.au