A GUIDE TO MANUAL HANDLING
Preventing injury during delivery of large gas cylinders
On 1 December 2012, the Dangerous Goods (Storage and Handling) Regulations 2012 (DG (S&H) Regulations 2012) replaced the Dangerous Goods (Storage and Handling) Interim Regulations 2011 (Interim Regulations) which expired on this date. The DG (S&H) Regulations 2012 have retained most of the legal requirements contained in the Interim Regulations. There are only a small number of changes. This document has not yet been updated to reflect the changes introduced by the DG (S&H) Regulations 2012. More information on the key changes introduced by these new regulations can be found in the guidance titled Information about: Key changes to dangerous goods storage and handling requirements available at worksafe.vic.gov.au/dgkeychanges and More information about: Incident reporting available at worksafe.vic.gov.au/incidentreporting.

On 18 June 2017, the Occupational Health and Safety Regulations 2017 (OHS Regulations 2017) replaced the Occupational Health and Safety Regulations 2007 (OHS Regulations 2007), which expired on this date. This publication has not yet been updated to reflect the changes introduced by the OHS Regulations 2017 and should not be relied upon as a substitute for legal advice.

Information on the key changes introduced by the OHS 2017 Regulations can be found in the guidance titled Occupational Health and Safety Regulations 2017: Summary of changes - available at https://www.worksafe.vic.gov.au/__data/assets/pdf_file/0011/207659/ISBN-OHS-regulations-summary-of-changes-2017-04.pdf. However, this guidance document contains material of a general nature only and is not to be used as a substitute for obtaining legal advice.
A Guide to Manual Handling

An Introduction

Gas cylinder delivery in Australia’s transport and storage (T & S) sector is an activity that can lead to severe sprain or strain injuries. Many effective work practices and innovative methods are already in place to overcome the risk of injury, yet the fact remains: full LP Gas and compressed gas cylinders are heavy and awkward to handle. Delivery of gas cylinders using manual handling techniques, therefore, is a high-risk activity. Since 1999, some 56 Victorians in the T & S sector, most commonly truck drivers and storepersons, have suffered injuries resulting in ten days or more off work from physically handling gas cylinders during delivery.

For workers, this type of injury can mean pain and discomfort which sometimes lasts for years, affecting not only their work but their everyday lives, families and relationships. For employers, these injuries may lead to WorkCover claims and increased premiums, as well as the inconvenience of having staff unable to work.

Yet much can be done to prevent these injuries from happening.

This document has been prepared by WorkSafe Victoria to provide practical help to people involved in the supply chain of delivering gas cylinders – employers, contractors, employees and customers. With an emphasis on identifying and fixing manual handling problems, the information we have presented provides simple and workable solutions based on risk identification and assessment.

Q. WHAT IS HAZARD MANAGEMENT?

A. Hazard management is a simple three step process:

1. Identify hazardous manual handling;
2. Assess risk (including postures, movements, forces, duration and frequency, and environmental factors);
3. Control the risk – i.e. eliminate or reduce the risk.

In short, FIND the problem, then FIX it.

A range of risk controls already exists within the transport and storage sector – many gas manufacturers have made significant capital investment in mechanical handling aids. Yet all workplaces in the delivery chain should focus their resources into putting physical risk controls into the workplace as standard operating procedure. If you have any queries about what this means for you or your workplace, please telephone the WorkSafe Advisory Service on (03) 9641 1555.

This publication refers to various Laws and Regulations which explain the legal requirements in more detail. For information on where to obtain copies, please see page 26 of this publication.

Delivering Large Gas Cylinders has been designed to provide practical and workable solutions in the form of a Comparative Chart which grades different activities in terms of their risk, and through a series of real-life Case Studies. Both offer a guide to risk assessment at various stages of the delivery process and provide effective risk controls.
WHY THIS GUIDE IS IMPORTANT

Background Issues
Gas cylinders are not designed for manual handling. They are cumbersome and heavy, awkwardly shaped and smooth, and some do not have handles. In almost all situations they must be transported and stored vertically.

The result is an activity which can be a cause of pain, insurance claims and commercial loss.

57% of all WorkCover claims made during July 2001 to April 2002 were due to sprains and strains.

This publication addresses the risk of injury from delivering:
1. Large high pressure industrial gas cylinders (e.g. G or F size) weighing between 50kg and 140kg when full; and
2. LP Gas cylinders weighing around 80kg when full.

These are sometimes called 45kg cylinders.

Smaller gas cylinders (such as high pressure D size or smaller), forklift LP Gas cylinders and BBQ gas cylinders are not covered in this document.

Delivering Large Gas Cylinders has been designed to provide practicable and workable solutions in the form of a chart that grades different activities in terms of their risk, and through a series of real life Case Studies. Both offer a guide to risk assessment at various stages of the delivery process and provide effective risk control options.

Who Should use this Guide?
This publication has been produced for all those responsible for gas cylinder distribution including employers, contractors, customers and employees.

What Duties do Employers and Employees Have?
All parties involved in the delivery chain have a responsibility to prevent work-related injury.

Employers should be aware that they have legal responsibilities not only for their regular staff, but for contractors or agency personnel as well.

Employers have a legal responsibility for managing risks associated with manual handling.

Employers have a legal requirement under the Occupational Health and Safety Act 1985 and the OHS Manual Handling Regulations 1999 to fulfil their obligations. If they implement effective risk management practices, they could also realise improved staff morale and business gains.

Employers are also required under the law to consult with elected workplace health and safety representatives when identifying hazards, assessing risk and controlling risk.

Employees, under Section 25 of the OH&S Act, while at work must take reasonable care for their own health and safety and for the health and safety of others. They must cooperate with the employers in respect to any action taken by the employer to comply with any requirements imposed under this Act.

Employees, under Section 25 of the OHS Act, while at work must take reasonable care for their own health and safety and for the health and safety of others. They must cooperate with the employers in respect to any action taken by the employer to comply with any requirements imposed under this Act.

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THE MANUAL HANDLING REGULATIONS 1999 REQUIRE EMPLOYERS TO:

- Identify tasks in your workplace that involve hazardous manual handling.
- Assess the risk of a musculoskeletal disorder (MSD) associated with these tasks.
- Eliminate the risk of MSD or if this is not practicable, reduce the risk.

To obtain copies of these documents call Information Victoria on 1300 366 356 or visit www.bookshop.vic.gov.au

It is important to remember that if someone other than the actual employee is carrying out the tasks on the employer’s behalf, the employer has a legal responsibility to ensure that the person has access to the proper equipment, support and appropriate training. This responsibility extends to providing a safe physical work environment, appropriate job design and work systems.

Employees, under the Manual Handling Regulations, are required to cooperate with their employers’ actions in regard to hazard identification, risk assessment and risk control.

Employees, under Section 25 of the OHS Act, while at work must take reasonable care for their own health and safety and for the health and safety of others. They must cooperate with the employers in respect to any action taken by the employer to comply with any requirements imposed under this Act.

How Should this Guide be Used?
This document uses two methods to demonstrate the ways of reducing risks when handling gas cylinders:

Method 1 – Comparative Chart of Tasks and Issues
A Comparative Chart (see page 5) provides a colour coded comparison between low risk practices and those where there is a high likelihood of injury occurring.

Specialist WorkSafe Victoria staff have conducted risk assessments of gas cylinder delivery practices using the Risk Assessment Worksheet and further methods detailed in the Manual Handling Code of Practice 2000.

The Comparative Chart encourages you to identify high risk tasks and then make an assessment of your workplace to implement safer work practices.

Method 2 – Case Studies
We have developed a series of Case Studies which outline a series of common practices involving delivery of full gas cylinders using different types of vehicles. The Case Studies work through the process of risk assessment using the Manual Handling Code of Practice and present our experienced judgement of the factors involved and some suggestions regarding eliminating or reducing risk.

By assessing how safely your workplace rates in our Comparative Chart on page 6 and then reading the appropriate Case Study (pages 8-23) for your activity, you will have a sound basis for risk assessment and development of risk controls.

It is the duty of individual employers to develop their own approach to preventing injuries associated with delivery of gas cylinders. The Occupational Health & Safety Act (1985) provides that employers (including contractors) are required to:

- Provide and maintain so far as is practicable for employees a working environment that is safe and without risk to health.

To fail to do so is likely to place employers in breach of the law.
WHAT IS INVOLVED IN GAS CYLINDER DELIVERY?

Gas cylinder delivery is a series of steps which involves:
1. Unloading empty cylinders at the supplier’s loading dock and loading full cylinders onto the vehicle;
2. Unloading full cylinders at the customer’s location and loading empty cylinders onto the vehicle;
3. After unloading the vehicle, moving full cylinders to the customer’s storage location and returning empty cylinders to the loading dock for loading onto the vehicle; and
4. Arranging cylinders on the vehicle and securing them for transport.

The objects used in these activities are typically:
1. Vehicles - ranging from small utilities to large trucks; and
2. Packages, ranging from crates - often called pallets or sometimes known as stillages - of industrial gas cylinders to single cylinders eg. LP Gas.

DELIVERING LARGE GAS CYLINDERS

The weight, size and shape of the cylinders and the layout of the workplace and the vehicle mean that the risk of injury in these activities can be very high. Every activity involved in large gas cylinder delivery should be examined for potential risk.

RISK ASSESSMENT

The Comparative Chart is a summary of identified hazards and an assessment of risks in the delivery of gas cylinders. The main components of gas cylinder delivery tasks have been colour coded according to the level of risk.

<table>
<thead>
<tr>
<th>GREEN - LOW RISK</th>
<th>AMBER - MEDIUM RISK</th>
<th>RED - HIGH RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>The practices in the green column should be regarded as the target for all workplaces.</td>
<td>The practices in the amber column are less effective in reducing risk, as compared to the green column, and should be treated as interim solutions only.</td>
<td>The practices in the red column should not be used in workplaces; an employer who allows those practices to be used is likely to be in breach of OHS legislation.</td>
</tr>
</tbody>
</table>

The values in the Comparative Chart are based upon the situations in the Case Studies and provide guidance as to the level of risk in those situations. If applying the values to other situations, variations of up to 10% may be considered as attaining a similar level of risk.

Employers, health and safety representatives and employees should cooperate to determine what actual risks are present in the workplace. A decision then has to be made, from the results of the risk assessment, as to what is practicable for the workplace. If the practices in the red column are being used an attempt should be made to see if the practices in the green column can be implemented straight away. If that is not practicable, corresponding practices in the amber column should be put in place as an interim solution until such time as a control from the green column can be implemented.

If the risk controls implemented involve the use of any manual handling technique or the use of a mechanical aid, ensure that information, training or instruction is provided together with appropriate supervision, in accordance with Section 21(2)(e) of the Occupational Health and Safety Act 1985 and Part 13.5 of the Manual Handling Code of Practice.

In other words, try following these steps:
1. Look at the practices in the workplace.
2. Find where these practices fit in the Comparative Chart.
3. Consider the options of how to move towards the green.
4. Compare your situation with the CASE STUDIES (pages 8-23).
5. Implement the changes necessary to achieve a safe workplace.
DELIVERING LARGE GAS CYLINDERS

How Does Your Workplace Rate?

### DELIVERY COMPONENT

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>GREEN - LOW RISK</th>
<th>AMBER - MEDIUM RISK</th>
<th>RED - HIGH RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading and unloading large cylinders onto vehicle</td>
<td>Less likely to result in injury - recommended controls</td>
<td>Same risk of injury - short term controls/additional controls required</td>
<td>Very likely to cause injury</td>
</tr>
<tr>
<td>Loading dock and vehicle tray</td>
<td>Using package sizes that discourage manual handling, e.g. On-site bulk tank / vessel and reutilization, or manifolded packages.</td>
<td>Lifting, by two trained competent persons, of large full cylinders with handholds (nominal weight 80kg), in accordance with a specific procedure that includes manual handling techniques that do not require the entire weight to be borne by the two persons. Techniques must be specific for the type of cylinder handled and designed for the task, the workplace and the range of vehicles to be loaded.</td>
<td>Lifting full cylinders any height by hand.</td>
</tr>
<tr>
<td>Using tailgate or side loader to raise cylinders to tray height or lower to the ground.</td>
<td>Sliding full cylinders over an edge and lowering them where the person’s hands are not above shoulder height or below mid-thigh height.</td>
<td>Lowering full cylinders by hand where the person’s hands are above shoulder height or below mid-thigh height.</td>
<td></td>
</tr>
<tr>
<td>Using forklift or crane to load/unload appropriately designed crates of industrial gas cylinders and manifolded cylinders.</td>
<td>Lifting empty cylinders by hand providing the person’s hands are not above shoulder height or below mid-thigh height.</td>
<td>Lifting empty cylinders any height while the person’s hands are above shoulder height or below mid-thigh height.</td>
<td></td>
</tr>
<tr>
<td>Using cylinders made of lighter materials (e.g. aluminium) or cylinders of smaller size.</td>
<td>Lifting empty cylinders more than 50cm by hand using two or more people and no person in team lifting more than 15kg.</td>
<td>Any lowering activity that involves the cylinder dropping any distance.</td>
<td></td>
</tr>
<tr>
<td>Loading dock and vehicle tray at same height to allow end-rolling and trolley loading.</td>
<td>Height difference between loading dock and vehicle tray requires lowering of full cylinders or raising of empty cylinders where the person’s hands are not above shoulder height or below mid-thigh height.</td>
<td>Height difference between loading dock or ground and vehicle tray requires lifting of full cylinders during loading or unloading.</td>
<td></td>
</tr>
<tr>
<td>Using portable ramp or plate to even out the height difference</td>
<td>Moving a partially loaded crate of cylinders by hand using a maintained pallet truck/flipjack on slight slope (e.g. a gradient less than 1 in 50).</td>
<td>Moving a fully loaded crate of cylinders using pallet truck/flipjack by hand on a slope (e.g. an adjustable loading dock with a gradient less than 1 in 50).</td>
<td></td>
</tr>
<tr>
<td>Access to loading bay by stairs and handrail.</td>
<td>Access to loading bay by ladder and handholds.</td>
<td>Climbing onto loading dock without steps, ladders or handholds.</td>
<td></td>
</tr>
</tbody>
</table>

### DELIVERY COMPONENT

<table>
<thead>
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<th>RED - HIGH RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rearranging large cylinders on the vehicle</td>
<td>End-rolling no more than 30m on flat, hard continuous surfaces such as concrete.</td>
<td>End-rolling over soft surfaces such as grass or over obstacles such as gravel, bunding, gutters or splay drains.</td>
<td>End-rolling full cylinders over steps or obstacles.</td>
</tr>
<tr>
<td>Rearranging crates of cylinders using forkift or crane.</td>
<td>End-rolling empty cylinders up or down steps or obstacles of 15cm or less.</td>
<td>End-rolling empty cylinders up or down steps of 25cm or greater.</td>
<td></td>
</tr>
<tr>
<td>Securing large cylinders into crates by webbing and ratchet at ground level.</td>
<td>Securing cylinders to gates by webbing and ratchet.</td>
<td>Securing cylinders by rope while in a position that could result in the person falling from height should the rope break.</td>
<td></td>
</tr>
<tr>
<td>Installing and removing gates</td>
<td>Using hinged gates with adequate space to swing them down or across.</td>
<td>Two-person lifting and installing of gates.</td>
<td>Securing by rope and knots.</td>
</tr>
<tr>
<td>Installing/removing pressurised vehicles to be loaded.</td>
<td>Using a two-wheel trolley with pneumatic wheels for moving on continuous surfaces.</td>
<td>Using a two-wheel trolley with pneumatic wheels for moving on continuous surfaces.</td>
<td>Two-wheel trolley moving for long distances on discontinuous surfaces such as flights of steps.</td>
</tr>
<tr>
<td>Using powered forklift or truck mounted crane to move crates and manifolded cylinders.</td>
<td>Moving a partially loaded crate of cylinders by hand using a maintained pallet truck/flipjack on slight slope (e.g. a gradient less than 1 in 50).</td>
<td>Moving a fully loaded crate of cylinders using pallet truck/flipjack by hand on a slope (e.g. an adjustable loading dock with a gradient of 1 in 60 or greater).</td>
<td></td>
</tr>
</tbody>
</table>
CASE STUDIES

How to use this Section

This chapter looks at the full range of activities involved in the delivery of gas cylinders. Case Studies describe seven common delivery practices, their identified risk factors and recommended control solutions.

Each Case Study includes information under the following headings:

1. Type of Vehicle;
2. Activity Description;
3. Risk Assessment;
4. Sources of Risk; and
5. Solutions/Options for Risk Control.

Other Hazards to Consider

A risk is defined as: the likelihood of injury or illness arising from exposure to any hazard. A hazard is defined as: the potential to cause injury, illness or disease.

When assessing risks and selecting risk controls, consideration should be given to other significant risks associated with gas cylinder delivery. These include, but are not limited to factors outlined in the following table:

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dangerous goods</td>
<td>All gas cylinders contain dangerous goods and are subject to regulatory control. The hazards of dangerous goods are covered in other WorkSafe Victoria guidance documents.</td>
</tr>
<tr>
<td>Forklifts</td>
<td>Handling of cylinders often involves the use of forklifts. There are specific hazards with the use of forklifts that are covered in other WorkSafe Victoria guidance documents.</td>
</tr>
<tr>
<td>Confined spaces</td>
<td>Cylinders may be stored in confined or enclosed spaces where there could be a dangerous build up of vapour from a leakage.</td>
</tr>
<tr>
<td>Crush injuries</td>
<td>Trapped and crushed fingers and feet are common injuries.</td>
</tr>
<tr>
<td>Slip, trips and falls</td>
<td>There is always a risk of injury resulting from a slip, trip or fall when manually handling a heavy and awkward object or gaining access to those objects.</td>
</tr>
</tbody>
</table>

See also WorkSafe Victoria’s publication A Guide to Risk Control Plans.
CASE STUDY 1: DELIVERY USING FLAT BED TRAY TRUCK WITH GATES – MANUAL LOADING METHOD

Vehicles

The vehicles used are of 4 to 12 tonne load capacity with several removable gates on the side and rear of the tray. Figures 1 & 2. Cylinders are end-rolled from loading dock onto tray.

Activity Description

In this example, gas cylinders are delivered by a tray truck with gates. The vehicle offers no alternative to manual handling of the cylinders. The driver parks the vehicle beside the loading bay, climbs onto the loading dock then lifts and removes the side gates. Cylinders are end-rolled onto the loading dock from the truck tray. To load, the driver end-rolls cylinders onto the vehicle from the loading dock. To transfer cylinders at delivery, the driver end-rolls both full and empty cylinders to and from the storage area which can be far from the delivery point.

Risk Assessment

The manual handling risks associated with this situation include repetitive awkward postures, sustained movement, high forces, environmental conditions and repetitive application of force.

SOURCE OF RISK DETAILS

| Workplace layout | Storing cylinders far from the loading area means that hand transfer to the loading area involves awkward movements for a long period (see solutions c, g & l). Large height difference between the loading dock and truck tray will require high forces to lift full and empty cylinders during loading (see solutions d, a & l). A loading dock which has no steps or safe access means that the driver must climb onto it and may not be able to use trolleys and other mechanical aids (see solutions a & l). If there is no loading dock, the driver must climb onto the truck and use high forces to lift and lower cylinders to and from the tray (see solutions a, b, c & e). Poor workplace layout or housekeeping may mean that the driver may have to adopt awkward postures and high forces to use techniques other than end rolling or using a trolley to move cylinders (see solutions a, l & b). |
| Object being handled | Cylinder design means it cannot be lifted and handled without awkward postures and high forces. These postures and forces also arise from the need to store & handle cylinders in the upright position (see solutions c, d, a, g & l). |

Solutions

| Tools and equipment | If there are no mechanical aids to move the cylinders then awkward postures and high forces need to be adopted (see solutions c, d, a & i). Lack of maintenance of mechanical aids or truck gates can mean that higher forces are needed to operate them or they cannot be used at all and safe methods of handling are used (see solution g). |
| Vehicle design | Lack of steps to the tray means that the driver must climb onto tray using awkward postures and high force. (see solution b). Height, size and design of cabin access may mean the driver adopts awkward postures to enter and leave the cabin (see solution b). If no mechanical aids are built into the vehicle, cylinders must be manually lifted on and off (see solutions c & e). Truck gates lifted from ground level require awkward postures and high force (see solutions f & a). |
| Work organisation | No other competent persons available to assist with handling means that the duration of cylinder handling over the day may be excessive (see solution n). |
| Task design | If the task requires unnecessary multiple handling in difficult situations then repetitive awkward postures are used (see solutions c, j, l, m & n). If sorting and end rolling of cylinders is done in a restricted space on the truck, especially with a full load, then uneven, fast or jerky forces and repetitive awkward postures are required (see solutions c & l). |
| Physical environment | Handling cylinders over floor surfaces that are uneven, damaged, sloped, sometimes wet or slippery will expose the driver to sudden and unexpected forces (see solutions a, c & f). |
| Environmental conditions | If there are no mechanical aids to move the cylinders then awkward postures and high forces need to be adopted (see solutions c, d, a & i). |
| Other risks | Dangerous Goods Legislation requires certain cylinders to be stored and transported upright and separated from other classes (see solutions c & l). It also requires that cylinders are not dropped or otherwise damaged (see solution m). Load Restraint Guide requires that cylinders are secured (see solution h). Forklifts should only be used to remove gates if a suitable attachment is used (see g attachment). There is an exclusion zone, the driver and other persons are not in the vicinity during forklift operations and there is space on the truck for the tynes to pick up the gates (see solution c). |

The manual handling risks associated with this situation include repetitive awkward postures, sustained movement, high forces, environmental conditions and repetitive application of force. Options for risk control include providing a loading dock with stairs and hand grips, using a tailgate or side lifter to unload full cylinders and load empty ones, and storing cylinders close to the delivery point.
CASE STUDY 2:

DELIVERY USING FLAT BED TRAY TRUCK WITH GATES –MECHANICAL LOADING METHOD

Vehicles

The vehicles used are of 4 to 12 tonne load capacity with several removable or fold-down gates on the side and rear of the tray.

Activity Description

In this situation, full cylinders of industrial gas are stored in crates. From a working position on the ground, the driver lifts and removes side gates and unlocks any securing mechanism. The forklift then lifts and removes crates of cylinders and places them on or off the vehicle. After loading, the driver secures the crates and lifts the side gates into place and secures any locks. The forklift rearranges the crates as appropriate and then transports the crates to the storage area.

Risk Assessment

A risk assessment conducted under the Manual Handling Regulations on these activities established that there was a risk due to repetitive awkward postures and high force.

<table>
<thead>
<tr>
<th>SOURCE OF RISK</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workplace layout</td>
<td>Obstructed or insufficient access to forklifts may mean that loads need to be manually handled (see solution e).</td>
</tr>
<tr>
<td>Object being handled</td>
<td>Gates may be obstructed by crates and require high force to lift and remove them. This could be due to the forklift placing crates in the wrong position or if crates shift in transit or during loading and press on the gates (see solutions a &amp; b).</td>
</tr>
<tr>
<td>Tools and equipment</td>
<td>If there are no mechanical aids to remove or install gates then high force may be required to lift and remove them (see solutions a &amp; f). Lack of maintenance of truck gates and crate securing mechanism may mean that higher forces are required to use them (see solution c).</td>
</tr>
<tr>
<td>Vehicle design</td>
<td>Lack of crate securing mechanism may mean the use of high force to move crates if gates obstructed (see solution b). Height, size and design of cabin access may mean the driver adopts awkward postures to enter and leave cabin (see solution b). Gates lifted from ground level require the use of awkward postures and high force (see solutions a, f &amp; g).</td>
</tr>
<tr>
<td>Skills and knowledge of operators</td>
<td>Lack of instruction in how to minimise risk by using the appropriate equipment, procedures and techniques during this task, e.g. inappropriate placement of crates close to gates (see solution d).</td>
</tr>
<tr>
<td>Other Risks</td>
<td>Load Restraint Guide requires that cylinders are secured (see solutions b &amp; h). Forklifts should only be used to remove gates or unload vehicle if there is an exclusion zone and the driver and other persons are not in the vicinity during forklift operations (see solution e). If unloading gates, the forklift should have a suitable attachment (e.g. jib attachment).</td>
</tr>
</tbody>
</table>

Solutions

If it may be necessary to implement a number of these risk control options together to reduce the risk as far as practicable:

a) Fit hinged gates to minimise lifting and replacing of side gates.

b) Fit a crate locking system to prevent movement of crates during transport.

c) Ensure a preventative maintenance program is in place to minimise the force required to remove gates.

d) Provide instruction, training and supervision on techniques for safe handling of cylinders to ensure competency of persons required to deliver gas cylinders, e.g. how to use equipment and how to select appropriate techniques with lowest risk for the conditions encountered and where to accurately place crates.

e) Provide safe and clear access of vehicle to the forklift unloading area.

f) Provide winch or other mechanical aid to install or remove gates.

g) Provide persons remove side gates while standing on loading dock which is at tray height.

h) Secure industrial gas cylinders in crates using webbing and ratchet.

The manual handling risks associated with this situation include repetitive awkward postures and high forces. Options for risk control include providing safe and clear access between the forklift and vehicle delivery area, and using hinged gates.
### CASE STUDY 3:

**FLAT BED TRAY TRUCK MODIFIED FOR CRATES AND FITTED WITH TAILGATE LIFTER**

#### Vehicles

Vehicles are 4 to 10 tonne load capacity and have been modified to handle crates of industrial gas or LP Gas. Crates can be unloaded by forkift. The vehicle has a hinged gate on each side for access and loading, and a tailgate or other specific lifter attached to the tray of the vehicle for unloading single cylinders. Single cylinders can be unloaded by end-rolling the cylinder out of the crate and onto a walkway with clear access to the lifting device. A locking system is used to secure crates of cylinders.

Figures 5 & 6: Gas cylinder trucks designed for delivery of both crates of cylinders and single cylinders.

#### Activity Description

The driver climbs onto the loading dock, opens the side gates and unloads single cylinders by end-rolling. Crates of cylinders are moved by forklift. If the vehicle is not parked at a dock, the driver opens the side gates then climbs onto the tray. Single cylinders are end-rolled to the mechanical lifter then lowered to the ground. Loading cylinders is the reverse. To rearrange cylinders on the vehicle, the driver end-rolls them into place and then cylinders are secured. The driver end-rolls cylinders to and from the storage area which can be far from the delivery point itself.

#### Risk Assessment

A risk assessment conducted under the Manual Handling Regulations on these activities established that there was a risk due to sustained movements, repetitive awkward postures, high force and environmental conditions.

### SOURCE OF RISK DETAILS

<table>
<thead>
<tr>
<th>Source of Risk</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workplace layout</td>
<td>Storing cylinders far from the loading area means that hand transfer to the loading area involves awkward movements for a long period (see solution a). Large height difference between the loading dock and truck tray could require high forces to lift full cylinders during loading (see solutions g &amp; m).</td>
</tr>
<tr>
<td>Object being handled</td>
<td>Cylinder design means it cannot be lifted and handled without awkward postures and high forces. These postures and forces also arise from the need to store &amp; handle cylinders in the upright position (see solutions a &amp; b).</td>
</tr>
<tr>
<td>Tools and equipment</td>
<td>Lack of maintenance of tailgate or truck gates may mean they cannot be used at all and less safe methods are used. (see solution h).</td>
</tr>
</tbody>
</table>

#### Solutions

- It may be necessary to implement a number of these risk control options together to reduce the risk as far as is practicable.
  - a) Use a cylinder trolley to move cylinders to customers’ storage area.
  - b) Change the loading method to allow mechanised handling of cylinders.
  - c) Ensure surface of loading dock is even, secure, non-slip surface and in continuous with the truck tray when there are height differences or gaps between the tray and the dock.
  - d) Provide safe and clear access of vehicle to the delivery/drop off point so that during loading and unloading, the driver is protected from other vehicle traffic.
  - e) Provide safe, clear and adequate access for drivers to handle cylinders at the delivery and storage areas.
  - f) Provide instruction, training and supervision on techniques for safe handling of cylinders to ensure competency of persons required to deliver gas cylinders, e.g. how to use equipment and how to select appropriate techniques with lowest risk for the conditions encountered.
  - g) Ensure that the loading dock and the truck tray are of a similar height that allows lifting cylinders by end-rolling.
  - h) Implement a regular maintenance program on mechanical aids and vehicles.
  - i) Provide steps and hand grips to the cabin and tray to provide three points of contact for hands and feet at all times.
  - j) Fit hinged gates to minimise lifting and replacing of side gates.
  - k) Secure industrial gas cylinders in crates using webbing and ratchet. 
  - l) Provide safe, clear and adequate access for drivers to handle cylinders at the delivery and storage areas.
  - m) Use an adjustable ramp to allow end-rolling to and from the tray and dock when there are height differences or gaps between the tray and the dock.

### The manual handling risks associated with this situation include risk due to sustained movements, repetitive awkward postures, high force and environmental conditions. Options for risk control include loading vehicle from a loading dock that is matched to the height of the vehicle and using a cylinder trolley to move cylinders to the customer storage area.
CASE STUDY 4:  
TRAY TRUCK MODIFIED FOR CRATES

Vehicles

This vehicle, a 12 tonne truck, has an 8 tonne load capacity and is modified to handle crated or manifolded cylinders via its own crane or forklift.

Figure 7: Palletised tray truck with forklift  
Figure 8: Palletised tray truck with crane

Activity Description

To load and unload, the driver unlocks the crate locking mechanism. Crates of cylinders are removed or placed on the vehicle by forklift or by use of vehicle crane. The crates are secured into place by the locking mechanism. To rearrange cylinders on the vehicle, crates are moved by forklift or crane. At the delivery point, a forklift moves crates.

Risk Assessment

A risk assessment conducted under the Manual Handling Regulations on these activities established that there was a risk due to high force if the locking mechanism is faulty or poorly designed.

Risk Source

A risk assessment conducted under the Manual Handling Regulations on these activities established that there was a risk due to high force if the locking mechanism is faulty or poorly designed.

Risk Details

- **Workplace layout**: Delivery point is not able to accept tray trucks and does not have space to use a crane or forklift (see solution d).
- **Object being handled**: Cylinders are transported in crates which require the use of forklift, pallet truck or crane to move. Using anything but a mechanical aid requires high forces (see solution d).
- **Tools and equipment**: Lack of maintenance of crane truck or forklift may mean that they cannot be used and less safe methods of handling are used (see solutions a & b).
- **Vehicle design**: Height, size and design of cabin access may mean the driver adopts awkward postures to enter and leave the cabin (see solution g).
- **Crate securing method**: May require high force (see solution c).
- **Crate securing method**: May need to be accessed from truck tray (see solution k).
- **Physical environment**: Handling crates using hand pallet truck over floor surfaces that are uneven, damaged, sloped, sometimes wet or slippery will expose the driver to sudden and unexpected forces (see solution i).
- **Skills and knowledge of operators**: Lack of instruction in how to minimise risk by using the appropriate equipment, procedures and techniques during this task (see solution e).
- **Other Risks**: Dangerous Goods Legislation requires certain cylinders to be stored and transported upright and separated from other classes (see solution j). Load Restraint Guide requirements that cylinders are secured (see solution f). Forklifts should only be used to remove gates or unload vehicle if there is an exclusion zone and the driver and other persons are not in the vicinity during forklift operations (see solution d). If unloading gates, the forklift should have a suitable attachment (e.g., jib attachment). Crates to be lifted by crane need to be specifically designed for that purpose (see solution h).

Solutions

- It may be necessary to implement more than one of these risk control options to reduce the risk as far as is practicable:
  - **a)** Ensure regular maintenance of the crate securing mechanism and crane, forklift or pallet truck.
  - **b)** Conduct regular inspection of the truck, crates and crane or forklift.
  - **c)** Ensure the design of the locking mechanism minimises force required to operate it.
  - **d)** Provide safe and clear vehicle access to the forklift unloading area.
  - **e)** Provide instruction, training and supervision on techniques for safe operation of the mechanical equipment.
  - **f)** Secure industrial gas cylinders in crates using webbing and ratchet.
  - **g)** Provide steps and hand grips to the cabin and tray to provide three points of contact for hands and feet at all times.
  - **h)** Ensure that crates designed for lifting by crane are designed to the appropriate Australian Standard.
  - **i)** Use powered forklift or crane truck to move crates around the workplace.
  - **j)** Provide safe, clear and adequate access for drivers to handle cylinders at the delivery and storage areas.
  - **k)** Ensure that the locking mechanism can be reached from ground level.

The manual handling risks associated with this situation include risk due to high force if the locking mechanism is faulty or poorly designed. Options for risk control include implementing a regular maintenance program of the crate securing mechanism and crane, forklift or pallet truck plus regular inspection of the truck, crates and crane or forklift.
CASE STUDY 5: DROP TRAY TYPE UTILITY

Vehicles
The vehicle has a 1 tonne load capacity and is modified to handle one crate of industrial gas cylinders or small numbers of individual cylinders. The rear tailgate folds down and the floor of the vehicle lowers to ground level to allow the use of forklifts and pallet jacks to load and unload crates. A locking system is used to secure the crates. Crates can be unloaded by forklift or hand pallet truck. Single cylinders can be unloaded by end-rolling the cylinder off the tailgate.

Figures 9 - 11: This vehicle is suitable for delivery of crates of industrial gases and single cylinders, and is able to be loaded manually or by mechanical means.

Activity Description
In this situation, crated cylinders are removed by forklift or hand pallet truck and individual cylinders are end-rolled onto or off the vehicle’s tailgate. The driver rearranges cylinders on the vehicle by end-rolling. The driver end-rolls both full and empty cylinders to and from the storage area which can be far from the delivery point.

Risk Assessment
A risk assessment conducted under the Manual Handling Regulations on these activities established that there was a risk due to high force and environmental conditions, and in some cases, sustained movements.

Solutions
It may be necessary to implement more than one of these risk control options to reduce the risk as far as practicable:

a) Use cylinder trolley to move cylinders to and from storage areas.
b) Use electric pallet truck or forklift to load and unload cylinder crates.
c) Ensure regular maintenance of floors and level work surfaces.
d) Provide safe and clear access of vehicle to the delivery/depot point so that during loading and unloading, the driver is protected from other vehicle traffic.
e) Provide safe, clean and adequate access for drivers to handle cylinders at the delivery and storage areas.
f) Provide instruction, training and supervision on techniques for safe handling of cylinders to ensure competency of persons required to deliver gas cylinders, e.g. how to use equipment and how to select appropriate techniques with lowest risk for the conditions encountered.
g) Secure cylinders using webbing and ratchet.

The manual handling risks associated with this situation include risk due to sustained movements, high force and environmental conditions. Options for risk control include using a cylinder trolley to move cylinders to and from storage areas, and using an electric pallet truck or forklift to load and unload cylinder crates.
CASE STUDY 6:

ONE TONNE UTILITY WITH TAILGATE LOADER

Vehicles

The utility vehicle has a 1 tonne load capacity and is modified with a tailgate lifter for loading and unloading.

Figures 12 & 13: Utilities with tailgate loader

Activity Description:

To load the cylinders, the driver lowers the tailgate, cylinders are end-rolled onto the tailgate and then it is raised to vehicle floor height. The driver steps onto the tailgate and then end-rolls the cylinders into place. Cylinders are then secured with webbing and tailgate is locked. To unload, the procedure is reversed. Cylinders are rearranged on the truck by end-rolling. To transport at the delivery point, the driver end-rolls both full and empty cylinders to and from the storage area which can be far from the delivery point.

Risk Assessment

A risk assessment conducted under the Manual Handling Regulations on these activities established that there was a risk due to repetitive awkward postures, sustained movements, high force and environmental conditions.

SOURCE OF RISK DETAILS

- **Workplace layout**: Storing cylinders far from the loading area means that hand transfer to the loading area involves awkward movements for a long period (see solutions b & c).
- **Object being handled**: Cylinder design means it cannot be lifted and handled without awkward postures and high forces. These postures and forces also arise from the need to store & handle cylinders in the upright position (see solutions a, b & c).
- **Tools and equipment**: If there are no mechanical aids to move the cylinders then awkward postures and high force loads need to be adopted (see solutions a, b & c). Lack of maintenance of mechanical aids or tailgate can mean that higher forces are needed to operate them or they cannot be used at all and less safe methods of handling are used (see solution d).
- **Task design**: If task requires unnecessary multiple handling in difficult situations then repetitive awkward postures are used (see solution h).
- **Physical environment**: Handling cylinders over floor surfaces that are uneven, damaged, sloped, sometimes wet or slippery will expose the driver to sudden and unexpected forces (see solutions b, h & k).
- **Skills and knowledge**: No defined instruction or training in how to minimise risk by using the appropriate equipment, procedures and techniques during this task (see solution j).
- **Other Risks**: Dangerous Goods Legislation requires certain cylinders to be stored and transported upright and separated from other classes (see solution h). It also requires that cylinders are not dropped or otherwise damaged (see solution i). Load Restraint Guide requires that cylinders are secured (see solution l). Forklifts should only be used to remove gates or unload vehicle if there is an exclusion zone and the driver and other persons are not in the vicinity during forklift operations (see solution h). If unloading gates, the forklift should have a suitable attachment (e.g. jib attachment).

Solutions

It may be necessary to implement a number of these risk control options together to reduce the risk as far as practicable:

- a) When delivering any quantity of large cylinders, ensure a tailgate lifter is large enough for the cylinders and a trolley.
- b) Use a cylinder trolley to move cylinders on and off the vehicle and to and from the storage area.
- c) Reduce manual handling through use of crates or methods using forklift or hoist/crane unloading.
- d) Implement a regular maintenance program on mechanical aids and tailgate lifter.
- e) Provide safe and clear access of vehicle to the delivery/drop off point so that during loading and unloading, the driver is protected from other vehicle traffic.
- f) Provide safe, clear and adequate access for drivers to handle cylinders at the delivery and storage areas.
- g) Provide instruction, training and supervision on techniques for safe handling of cylinders to ensure competency of persons required to deliver gas cylinders, e.g. how to use equipment and how to select appropriate techniques with lowest risk for the conditions encountered.
- h) Fix slippery and uneven surfaces.
- i) Secure cylinders using webbing and ratchet.
- j) Provide safe and adequate access for drivers to handle cylinders at the delivery and storage areas.
- k) Provide instruction, training and supervision on techniques for safe handling of cylinders to ensure competency of persons required to deliver gas cylinders.

The manual handling risks associated with this situation include risk due to repetitive awkward postures, sustained movements, high force and environmental conditions. Options for risk control include using a cylinder trolley to move cylinders and providing instruction, training and supervision on techniques for safe handling of cylinders to ensure competency of persons required to deliver gas cylinders.
DELIVERING LARGE GAS CYLINDERS

DELIVERING LARGE GAS CYLINDERS

Activity Description

To load, the driver lowers the tailgate and end-rolls the cylinders close to the tailgate. The cylinder is then manually loaded by one of the following methods: a two-person top and tail lift; a lift with one person on the tray who grasps the top of the cylinder and then pulls it onto the tray; or a lift where one person tilts the cylinder and then pulls it onto the tailgate and the other person tilts the cylinder onto the floor of the tray, then climbs onto the tray and stands the cylinder upright. The cylinder is then end-rolled to the headboard and secured. To unload, the driver end-rolls each cylinder to the vehicle’s rear, grasps it at the top, tilting it back and supporting its weight while it slides down the edge of the vehicle. Alternatively, two people unload the cylinder using a top and tail lift.

To rearrange cylinders on the vehicle, cylinders are end-rolled and then secured. To transfer cylinders at the delivery point, the driver end-rolls both full and empty cylinders to and from the storage area which can be far from the delivery point.

Risk Assessment

A risk assessment conducted under the Manual Handling Regulations on these activities established that there was a risk due to repetitive awkward postures, sustained movements, high force and environmental conditions.

Solutions

It may be necessary to implement a number of these risk control options together to reduce the risk as far as practicable:

a) Use a vehicle fitted with a tailgate lifter or with a tailgate that can be used as a ramp when delivering large cylinders to a delivery point without an adjustable height loading deck.

b) Use a trolley to move cylinders on and off the vehicle and to and from the storage area.

c) Reduce manual handling through use of cranes or methods using a fork lift or headroom.

d) Provide safe and clear access of vehicle to the delivery/drop off point so that during loading and unloading, the driver is protected from other vehicle traffic.

e) Provide safe and adequate access for drivers to handle cylinders at the delivery and storage areas.

f) Provide instructions, training and supervision on techniques for safe handling of cylinders to ensure compliance of persons required to deliver gas cylinders, e.g. how to use equipment and how to select appropriate techniques with lowest risk for the conditions encountered.

g) Deliver to a loading dock which is at vehicle floor height and allows loading cylinders by end-rolling.

h) Use an adjustable ramp to allow end-rolling to and from the tray and dock when there are height differences or gaps between the tray and the dock.

i) Provide a loading dock with steps or stairs and hand grips to provide three points of contact for hands and feet at all times.

j) Fix slippery and uneven floor surfaces.

Vehicle layout

Storing cylinders far from the loading area means that hand transfer to the loading area involves awkward movements for a long period (see solutions b & c).

Height difference between loading dock and truck tray could require high forces to lift full cylinders during loading (see solutions a, c, g & h).

Loading dock which has no steps or safe access means that the driver must climb onto it requiring awkward postures and may not be able to use trolleys and other mechanical aids (see solution l).

If there is no loading dock, the driver must use high forces to lift and lower cylinders to and from the tray (see solution a).

Poor workplace layout or housekeeping may mean that the driver may have to adopt awkward postures and high forces to use techniques other than end rolling or when using a trolley to move cylinders (see solutions d, e & f).

Activity Description

Using a trolley to move cylinders (see solutions d, e & l).

Awkward postures and high forces to use techniques other than end rolling or when to and from the tray (see solution a).

If there is no loading dock, the driver must use high forces to lift and lower cylinders onto it requiring awkward postures and may not be able to use trolleys and other mechanical aids (see solution i). If there is no loading dock, the driver must use high forces to lift and lower cylinders onto it requiring awkward postures and may not be able to use trolleys and other mechanical aids (see solution i).

Mechanical aids (see solution i). If there is no loading dock, the driver must use high forces to lift and lower cylinders onto it requiring awkward postures and may not be able to use trolleys and other mechanical aids (see solution i).

If there is no loading dock, the driver must use high forces to lift and lower cylinders onto it requiring awkward postures and may not be able to use trolleys and other mechanical aids (see solution i). If there is no loading dock, the driver must use high forces to lift and lower cylinders onto it requiring awkward postures and may not be able to use trolleys and other mechanical aids (see solution i).

Height difference between loading dock and truck tray could require high forces to lift cylinders during loading (see solutions a, c, g & h).

To rearrange cylinders on the vehicle, cylinders are end-rolled and then secured. To transfer cylinders at the delivery point, the driver end-rolls both full and empty cylinders to and from the storage area which can be far from the delivery point.

Risk Assessment

A risk assessment conducted under the Manual Handling Regulations on these activities established that there was a risk due to repetitive awkward postures, sustained movements, high force and environmental conditions.

Solutions

It may be necessary to implement a number of these risk control options together to reduce the risk as far as practicable:

a) Use a vehicle fitted with a tailgate lifter or with a tailgate that can be used as a ramp when delivering large cylinders to a delivery point without an adjustable height loading deck.

b) Use a trolley to move cylinders on and off the vehicle and to and from the storage area.

c) Reduce manual handling through use of cranes or methods using a fork lift or headroom.

d) Provide safe and clear access of vehicle to the delivery/drop off point so that during loading and unloading, the driver is protected from other vehicle traffic.

e) Provide safe and adequate access for drivers to handle cylinders at the delivery and storage areas.

f) Provide instructions, training and supervision on techniques for safe handling of cylinders to ensure compliance of persons required to deliver gas cylinders, e.g. how to use equipment and how to select appropriate techniques with lowest risk for the conditions encountered.

g) Deliver to a loading dock which is at vehicle floor height and allows loading cylinders by end-rolling.

h) Use an adjustable ramp to allow end-rolling to and from the tray and dock when there are height differences or gaps between the tray and the dock.

i) Provide a loading dock with steps or stairs and hand grips to provide three points of contact for hands and feet at all times.

j) Fix slippery and uneven floor surfaces.

Vehicle layout

Storing cylinders far from the loading area means that hand transfer to the loading area involves awkward movements for a long period (see solutions b & c).

Height difference between loading dock and truck tray could require high forces to lift full cylinders during loading (see solutions a, c, g & h).

Loading dock which has no steps or safe access means that the driver must climb onto it requiring awkward postures and may not be able to use trolleys and other mechanical aids (see solution l).

If there is no loading dock, the driver must use high forces to lift and lower cylinders to and from the tray (see solution a).

Poor workplace layout or housekeeping may mean that the driver may have to adopt awkward postures and high forces to use techniques other than end rolling or when using a trolley to move cylinders (see solutions d, e & f).
Appendix 1: Glossary of Terms

- **Risk**: the likelihood of injury or illness arising from exposure to any hazard.

- **Hazard**: the potential to cause injury, illness or disease.

- **Manual Handling**: means any activity requiring the use of force exerted by a person to lift, push, pull, carry or otherwise move, hold or restrain any object.

- **Crate**: a purpose-built high-sided pallet that allows numbers of cylinders of gas to be stacked and secured vertically for lifting by a forklift or other lifting plant.

- **Cylinder**: a metal cylindrical container of gas under pressure. The term “bottle” is not a preferred term in the industry.

- **End-rolling**: also known as “trundling” “wheeling” “whirling” or “churning”; manually moving a cylinder by loosely holding it at the top to guide and restrain it and rolling it by spinning it on its base with the other hand, or foot.

- **Nominal capacity**: the approximate weight of gas in the cylinder; e.g. LP Gas cylinders are commonly referred to as “45 kg cylinders” because they hold approximately 45 kg of gas.

- **Practicable**: means having regard to all the following:
  
  a. the severity of the hazard or risk in question;
  
  b. the state of knowledge about that hazard or risk and any ways of removing or mitigating that hazard or risk;
  
  c. the availability and suitability of ways to remove or mitigate that hazard or risk; and
  
  d. the cost of removing or mitigating that hazard or risk.

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Appendix 2:
Examples of mechanical aids for handling cylinders

A large range of trolleys and lifters are available to help reduce manual handling risks.

- Gas cylinder pallet
- Handles for gas cylinder
- Three wheel gas cylinder trolley
- Gas cylinder loader
- Battery pallet truck
- Magnetic cylinder trolley
- Two cylinder trolley
- Plastic cylinder pallet
Appendix 3: Further Information

A range of sources can provide you with further information. These include:

**ACTS AND REGULATIONS**

- Occupational Health and Safety Act 1985
- Occupational Health and Safety (Manual Handling) Regulations 1999
- Occupational Health and Safety (Plant) Regulations 1995
- Occupational Health and Safety (Certification of Plant Users and Operators) Regulations 1994
- Occupational Health and Safety (Issue Resolution) Regulations 1999
- Occupational Health and Safety (Incident Notification) Regulations 1997
- Occupational Health and Safety (Confined Spaces) Regulations 1996

Acts and regulations are available from Information Victoria on 1300 366 356 or order online at www.bookshop.vic.gov.au/

If you only want to view the legislation you can use the Parliament of Victoria web site; go to www.dms.dpc.vic.gov.au/, click on “Victorian Law Today” and scroll down to the “Search” window.

**CODES OF PRACTICE**

Relevant WorkSafe Victoria Codes of Practice:
- Manual Handling (No. 25, 2000)
- Plant (No. 19, 1995)
- Storage and Handling of Dangerous Goods
- Hazardous Substances (No. 24, 2000)
- First Aid in the Workplace (No. 18, 1995)
- Workplaces (No. 3, 1988)
- Confined Spaces (No. 20, 1996)

Copies of codes of practices can be obtained by contacting WorkSafe Victoria on 03 9641 1333, or your local WorkSafe Victoria office.

Other useful health and safety information is available on WorkSafe Victoria’s web site; go to www.workcover.vic.gov.au

**AUSTRALIAN STANDARDS**

- AS 1418.1 – 1994 Cranes (including hoists and winches) - General requirements
- AS 1596 Supplement 1 – 1994 LPG Gas – Storage and handling – Siting of LPG Gas automotive retail outlets
- AS/NZ 1596 – 1997 Storage and handling of LPG Gas
- AS 2030.1 – 1999 The verification, filling, inspection, testing and maintenance of cylinders for storage and transport of compressed gases. Part 1 Cylinders for compressed gases other than acetylene
- AS 2030.2 – 1999 The verification, filling, inspection, testing and maintenance of cylinders for storage and transport of compressed gases. Part 2 Cylinders for dissolved acetylene
- AS 4332 – 1995 The storage and handling of gases in cylinders
- AS/NZS 2865 – 2001 Safe working in a confined space

Australian Standards are available from Standards Australia on 1300 654 644, or on-line at www.standards.com.au
Other sources of Information and Publications

INDUSTRY ORGANISATIONS
Australian Gas Association, Technical Office, 2 Park Way, PO Box 122, Braeside, VIC 3195, Tel 03 9580 4500, Fax 95801 5100 email melbourne@gas.asn.au
Australian Industrial Gas Manufacturers Association, Tel. 02 8874 4400, Fax 02 9886 9289
Australian Liquidified Petroleum Gas Association Tel. 02 9319 4733, email mail@alpga.asn.au

INDUSTRY PUBLICATIONS
Available from Australian LP Gas Association:
- LP Gas Automotive Retail Outlets Code of Practice for Safe Operation (booklet)
- Exchange Cylinder Filling (video)
- Distribution of LP Gas (video)
Available from Australian Industrial Gas Manufacturers Association:
- Transport of Cylinders on Vehicles to comply with the Load Restraint Guide (guidance note)

OTHER
Available from Australian Government Info Shop (190 Queen St. Melbourne Tel. 9670 4224.):
- The Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code)
- Load Restraint Guide
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