



Number 3 January 2009

## SAFETY ALERT – GAS CYLINDER RUPTURES



### Purpose

This safety alert informs motor sport stakeholders including officials, competitors, pit/service crews and contractors of the risks associated with gas cylinders rupturing during refilling. These gas cylinders are often present in automotive panel repair shops and they are also used by competitors and contractors in both paddock areas and service parks while at motor sport events. Compressed gases under high pressure can present a number of hazards. Depending on the particular gas, there is potential for simultaneous exposure to both mechanical and chemical hazards.

This alert also provides basic safety guidelines to help assist in the safe handling and storage of compressed gas cylinders.

### Circumstances

*Recently an incident occurred at a gas suppliers facility where an E size (24 litre water capacity) cylinder ruptured during refilling. Damage to the cylinder had been disguised by the user, resulting in the rupture, which could have caused injury or death.*

*The cylinder was subjected to the standard pre-fill inspection procedure. During refilling the cylinder ruptured. Cylinders were dislodged from the filling rig and damage was caused to the area. Fortunately no one was injured.*

*The cylinder was being filled with an argon based mixture which is an inert gas used for welding and other purposes. An explosion and fire could have resulted if it had been filled with flammable gas.*

*The supplier engaged an independent metallurgist to evaluate the ruptured cylinder. It was found that:*

- *the heat tag around the neck ring of the cylinder had been replaced (a heat tag is a plastic that melts when a cylinder is exposed to excess heat, such as being near a furnace or from being in a fire);*
- *the cylinder had been abraded and repainted;*
- *the mechanical strength of the cylinder was less than half of that required by **Australian Standard AS1777-2005 Aluminium Cylinders for compressed gases – seamless – 0.1 kg to 130 kg**; and*
- *there was a uniform reduction in hardness throughout the cylinder.*

*It was concluded that the cylinder had been damaged by exposure to high temperature during use or while stored. A user had disguised the damage by replacing the heat tag and repainting the cylinder.*

*Following the incident the gas supplier is reviewing its pre-fill inspection process and the type of heat indicator it uses to avoid further incidents.*

### Recommendations for Users

Any tampering with high pressure aluminum alloy gas cylinders is dangerous and can damage property and cause injury or death.

Users should follow the gas supplier's instructions for safe use. These include :

- storing cylinders in a cool well ventilated area - away from heat and ignition sources and combustible material, especially if cylinders contain flammable gases;
- cylinders to be secured in an upright position at approximately 2/3 height, using appropriate material – chain, wire cable, or commercially available cylinder straps;
- cylinders should be segregated by hazard class while in storage, at the minimum the oxidizers (such as oxygen) must be separated from flammable gases by 20 feet and empty cylinders should be isolated from full cylinders;
- never using aluminum alloy cylinders without a heat tag or any cylinders with damage to the shell (burn marks, bulging, surface gouging or dents);

### **Disclaimer**

This Safety Alert has been compiled by the Confederation of Australian Motor Sport (CAMS) from information contained within *Work Safe Alerts* and should be used in conjunction with any Australian Standards and/or any statutory requirements or responsibilities. CAMS assumes no legal responsibility for any risks either included or not included in the SAFE ALERT or in relation to any other risk management material prepared by CAMS.



- users should inform gas suppliers of any damage to cylinders that occurred while in their possession;
- locate cylinders away from pedestrian or vehicle thoroughfares. Make sure that the cylinders are chained or secured. This can be done in a group but remember segregation may need to occur depending on *hazard class* of gas;
- when moving cylinders to or from paddock or service park areas - move with an appropriate trolley - ensure the valve is closed before moving;
- never drag, slide or roll a cylinder and never carry the cylinder by the valve;
- wearing of personal protective equipment ( safety shoes, glasses and gloves ) when handling and connecting cylinders
- keeping ammonia –based leak detection solutions, oil and grease away from cylinders or valves. These may cause an adverse, dangerous reaction;
- if a leak is detected, consider removing the cylinder to an isolated and well-ventilated area, away from incompatible materials, but only if this is possible while maintaining personnel safety. Allow the cylinder to remain isolated until the gas has discharged, making certain the appropriate warnings are given to all persons in the area;
- wear appropriate foot protection when moving or transporting cylinders;
- make sure the cylinder is equipped with the correct regulator;
- keep the cylinder clear of all sparks, flames and electrical circuits;
- cylinder valve should be opened slowly, never using force when opening or closing;
- cylinder valve should not be left open when equipment is not in use - even when empty, air may diffuse through the opening causing contamination and corrosion with the cylinder; and
- reading the labels and Material Safety Data Sheets before use.

#### Advice for Gas Suppliers

Gas suppliers need to be aware that damage to high pressure, aluminum alloy cylinders could be disguised. They need to take all reasonable practicable steps to ensure that damage is detected during pre-fill inspection.

In the event of a rupture of high pressure, aluminum alloy cylinder during refilling, gas supplier employers must ensure that the health and safety of employees involved in the task is protected. A risk assessment should be in place which supports training, instruction and safe work method statements .

When inspecting and maintaining these types of cylinders, gas suppliers/contractors should ensure that:

- inspection and maintenance is in accordance with AS 2030.1-1999; and
- the extent of the inspection and how often inspections could occur is sufficient to assure proper functioning of the equipment.

In summary, when you are using gas cylinders in the garage you should take care that they are secure at all times within the garage, paddock area or service park and that they are not exposed to any unnecessary high temperature.

When moving cylinders, you should always use a trolley - making sure that they are correctly secured and consider the appropriate personal protection equipment required. Do not use a gas cylinder if you cannot be certain of its contents.

#### **Disclaimer**

This Safety Alert has been compiled by the Confederation of Australian Motor Sport ( CAMS ) from information contained within *Work Safe Alerts* and should be used in conjunction with any Australian Standards and/or statutory requirements or responsibilities. CAMS assumes no legal responsibility for any risks either included or not included in the SAFE ALERT or in relation to any other risk management material prepared by CAMS.

