

Devalving Gas Cylinders

Precautions to be taken when devalving gas cylinders

Introduction

Near misses, injuries and fatalities have occurred during the incorrect devalving of cylinders that were pressurised. These operations have been associated with the uncontrolled release of gases to the environment, worker health and safety concerns from gas exposure, fires, and the catastrophic sudden release of energy.

Among several incidents reported to EIGA, one of the most serious occurred during routine maintenance work of a 20-litre water capacity aluminium alloy medical oxygen cylinder.

The hand wheel of the valve of the cylinder was broken. The cylinder was placed inside a horizontal devalving machine. During the devalving process, a violent fire occurred destroying the top part of the cylinder. The cylinder and the valve were projected a considerable distance in opposite directions.

The operator died as a result of severe burns having been covered by the combustion products from the upper part of the cylinder. Most of the shoulder of the cylinder was consumed, with approximately 2 kg of the aluminium alloy having been lost.

It is believed that the cylinder was still filled with high-pressure oxygen when the devalving process took place with the resultant fire having started at the internal neck threads of the cylinder.

This Safety Information does not address the safe release of product and purging process of gas cylinders, see EIGA Doc.129, *Pressure Receptacles with Blocked or Inoperable Valves* and ISO 25760, *Gas cylinders - Operational procedures for the safe removal of valves from gas cylinders*.

If a cylinder is devalved under pressure the following can occur:

- Violent ejection of cylinder valve and, if the devalving is carried out using a horizontal machine possibly the cylinder as well
- Flash fire, for example, oxygen filled in an aluminium alloy cylinder resulting in projection of hot metal

Recommendations

The recommendations of EIGA when devalving a cylinder are:

- Devalving shall only be performed by trained and certified personal and it is recommended to be carried out at a retest / maintenance facility, following a risk assessment.
- Before devalving any cylinder (steel or aluminium alloy), it is essential to strictly apply the procedures for checking if the cylinder still contains gas under pressure. The pressure level can be low / residual pressure after use or high pressure depending on the last use of the cylinder. The valve shall be checked to see if it is broken, opening the hand wheel does not always result in lifting the lower spindle This is why a check shall be performed by either introducing an inert gas or using a rubber bulb (except for flammable gases) (this test is commonly referred as "whisper test"). A detailed

procedure is given in ISO 25760. For valves with a residual pressure function, (RPV valves) and valves incorporating an integrated pressure regulator, (VIPRs) specific procedures and tools are required.

- Any cylinder with a blocked or inoperable valve shall be put aside and a specialist shall take the appropriate actions. For all cylinders (steel or aluminium alloy), with blocked or inoperable valves, see EIGA Doc.129 and ISO 25760. These shall be put aside and depressurised only if the operator is protected from hazards including severe fire, especially for aluminium alloy cylinders in oxygen service.
- During the devalving operations, the operator performing the devalving and the other personnel in the immediate area shall be located in a safe place or adequately protected, for example, using a cage around the devalving machine. Applicable regulation such as the machinery directive can apply.
- Every devalving machine shall be subjected to a risk assessment to ensure safe operation. A risk assessment shall include:
 - cylinder;
 - size;
 - working pressure; and
 - material, for example aluminium alloy
 - gas service;
 - position of devalving machine (horizontal, vertical);
 - devalving torque; and
 - valve type.

Additional references

Unless otherwise specified the latest edition shall apply.

EN 1968 *Transportable gas cylinders – Periodic inspection and testing of seamless steel gas cylinders* www.cen.eu

EN 1802 *Transportable gas cylinders – Periodic inspection and testing of seamless aluminium alloy gas cylinders* www.cen.eu

CGA-P-38 *Guidelines for devalving cylinders* www.iso.org

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