GUIDELINES FOR THE DISPOSAL OF ACETYLENE CYLINDERS

Document 144-003
February 2023

AUSTRALIA NEW ZEALAND INDUSTRIAL GAS ASSOCIATION

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GUIDELINES FOR THE MANAGEMANT OF WASTE ACETYLE CYLINDERS Doc 05/21

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Guide to Use

The Australia New Zealand Industrial Gas Association (ANZIGA) is the industry association representing companies that produce and distribute industrial gases, including bulk and compressed gas for the industrial, medical, food, scientific and hospitality markets (referred as Industrial Gases) in Australia and New Zealand.

ANZIGA membership encompasses all the major producers and suppliers in both Australia and New Zealand.

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Purpose

The Australia New Zealand Industrial Gas Association (ANZIGA) members are committed to ensuring that condemned acetylene cylinders in Australia and New Zealand are disposed in a manner that follows environmental best practice and minimises waste to landfill.

Where possible, all components of the cylinders should be reclaimed and/or recycled. The Guidelines outlined here have been drafted in consultation with ANZIGA members, who are committed to working towards their full implementation. The ability to implement these guidelines is largely governed the available technology.

When appropriate facilities become available, and new technologies emerge, the guidelines will be reviewed and amended as required.

Table of Contents

1 Introduction

This publication provides guidance on the safe disposal of acetylene gas cylinders. The safety and environmental risks associated with acetylene, solvents and asbestos have been considered. The main principle is a commitment to the identification of best industry practice and guidance to ANZIGA members on its implementation.

2 Scope and purpose

2.1 Scope

This publication sets out the standards for the safe treatment and disposal of acetylene cylinders and reflects the priority that ANZIGA gives to the protection of people and the environment.

The publication determines the standards to be achieved and provides guidance on methods by which these can be achieved. Methods should only be adopted where an equivalence of safety can be demonstrated.

2.2 Purpose

This publication is intended to serve as a general guide for organisations undertaking the disposal of acetylene cylinders. It aims to provide a guide for operating managers for identifying and managing the safety risks associated with undertaking the disposal of acetylene cylinders and minimising the detrimental environmental impacts of these operations.

3 Definitions

3.1 Acetylene Cylinder

Cylinder and valve, with or without fusible plugs, containing a porous material and a solvent for the storage of dissolved acetylene.[1]

3.2 Porous Material

Single or multiple component material introduced to or formed in the cylinder shell that, due to its porosity, allows the absorption of a solvent/acetylene solution.[2]

4 Guidelines for the Disposal of Acetylene Cylinders

4.1 Background

Acetylene has been produced in commercial quantities for over one hundred years. As such, it was one of the original industrial gases and is still widely used throughout industry.

Acetylene is a high energy gas which is unstable when compressed in its free state. To ensure safe storage, it is dissolved under pressure in a suitable solvent. In Australia and New Zealand, the solvent used is acetone. Prior to 1990 dimethylformamide (DMF) was used in some cylinders as an alternative solvent for cylinders assembled in cylinder bundles. All acetylene cylinders are filled with a porous material into which the solvent is absorbed. The acetylene dissolves in the solvent which holds the acetylene in a stable condition.

The porous material is a complex matrix which must satisfy certain basic requirements:

- an ability to stop decomposition of the acetylene caused by 'flashbacks' in the system,
- a stable structure over a long period of time to prevent the creation of voids or cracks in the matrix for example by rough handling of the cylinder,
- a uniform structure which completely fills the cylinder volume, and
- a high porosity to ensure optimum fill ratios of the cylinders.

The first three points are crucial for the safe operation of acetylene cylinders. Defects would lead to instability, and in extreme cases, failure of the cylinder.

Until the development of an asbestos free porous material in the early 1990s, most porous materials used in acetylene cylinders contained small (less than 1% of the cylinder volume) quantities of asbestos. As the asbestos fibres are bound within the porous material no asbestos fibres are emitted during the discharge of acetylene from the cylinder.

In Australia and New Zealand, the replacement of acetylene cylinders containing asbestos has been ongoing since the mid-1990s. Coupled with the 2003 prohibition on the importation of products containing asbestos, the proportion of acetylene cylinders still in service containing asbestos is extremely small.

These porous materials have the same benefits and degree of safety as the asbestos based porous materials.

Acetylene cylinders are high integrity high strength containers, made in accordance with relevant national and international standards or regulations.

4.2 Objectives

This publication reflects the principles of duty of care for dealing with waste. Duty of care requires that all reasonable steps be taken to look after any waste generated and that illegal disposal by others is prevented. Additionally, disposal of potentially hazardous waste should be consistent with Best Available Techniques Not Entailing Excessive Costs, otherwise known at BATNEEC.

This publication's guidelines have been developed to reflect the experience from ANZIGA companies.

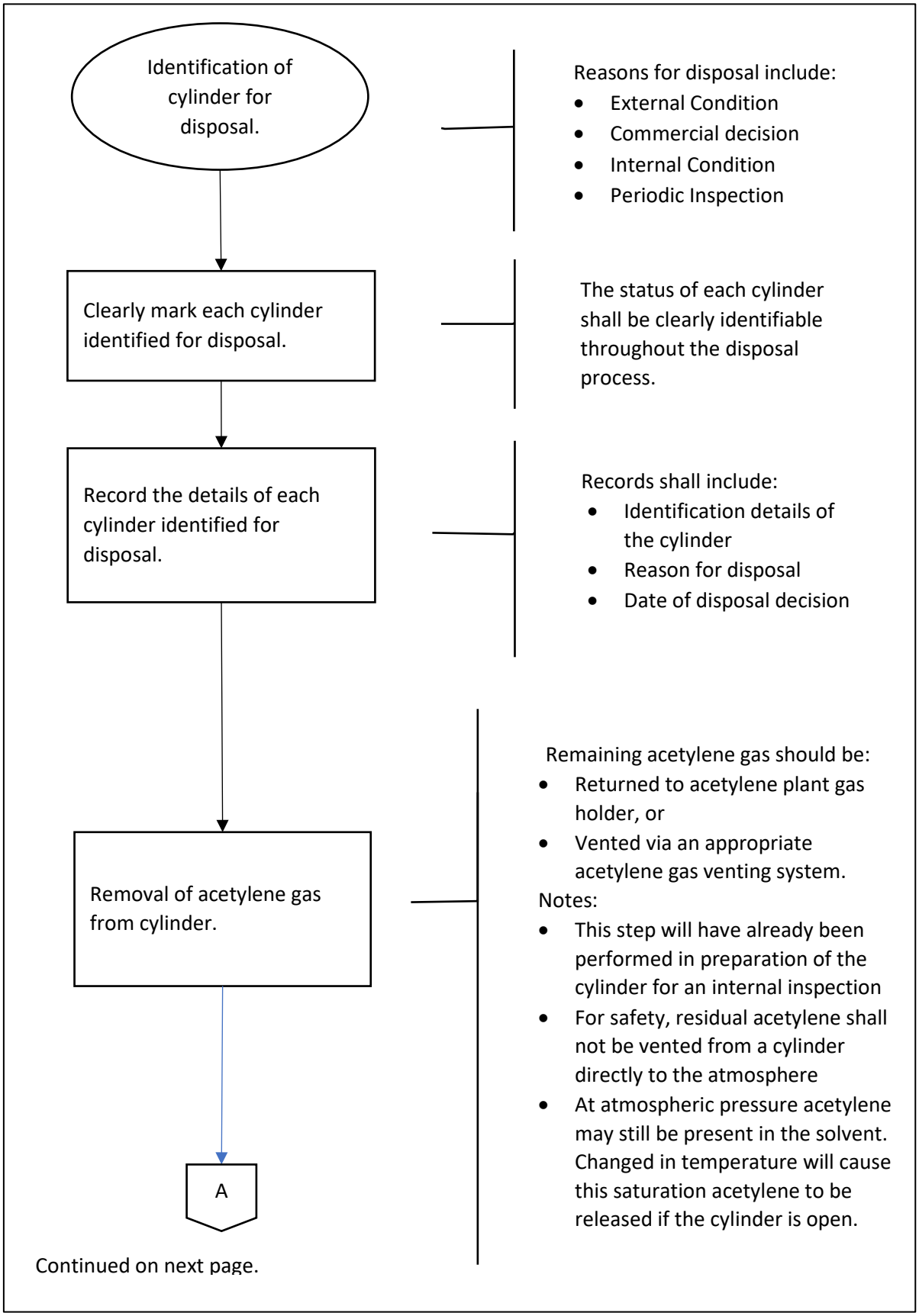
The publication applies to the treatment and disposal of all designs of acetylene cylinders, including those containing asbestos and all solvent types.

4.3 Principles

Cylinders shall not be disposed of while they contain acetylene, solvent, or moisture. Subsequent corrosion of the cylinder can cause the solvent or moisture to leak out which can cause long term environmental problems. Provided that the porous material, even if it contains asbestos, is contained until after it has been stored in a suitably designed and licensed landfill site, it presents no pollution potential to any environmental medium.

Safety and environmental hazards shall be controlled. The risks of different treatment and disposal methods shall as be assessed and controlled with an equivalence of safety to landfill containment.

4.4 Flowchart – Procedure for the Disposal of Acetylene Cylinders



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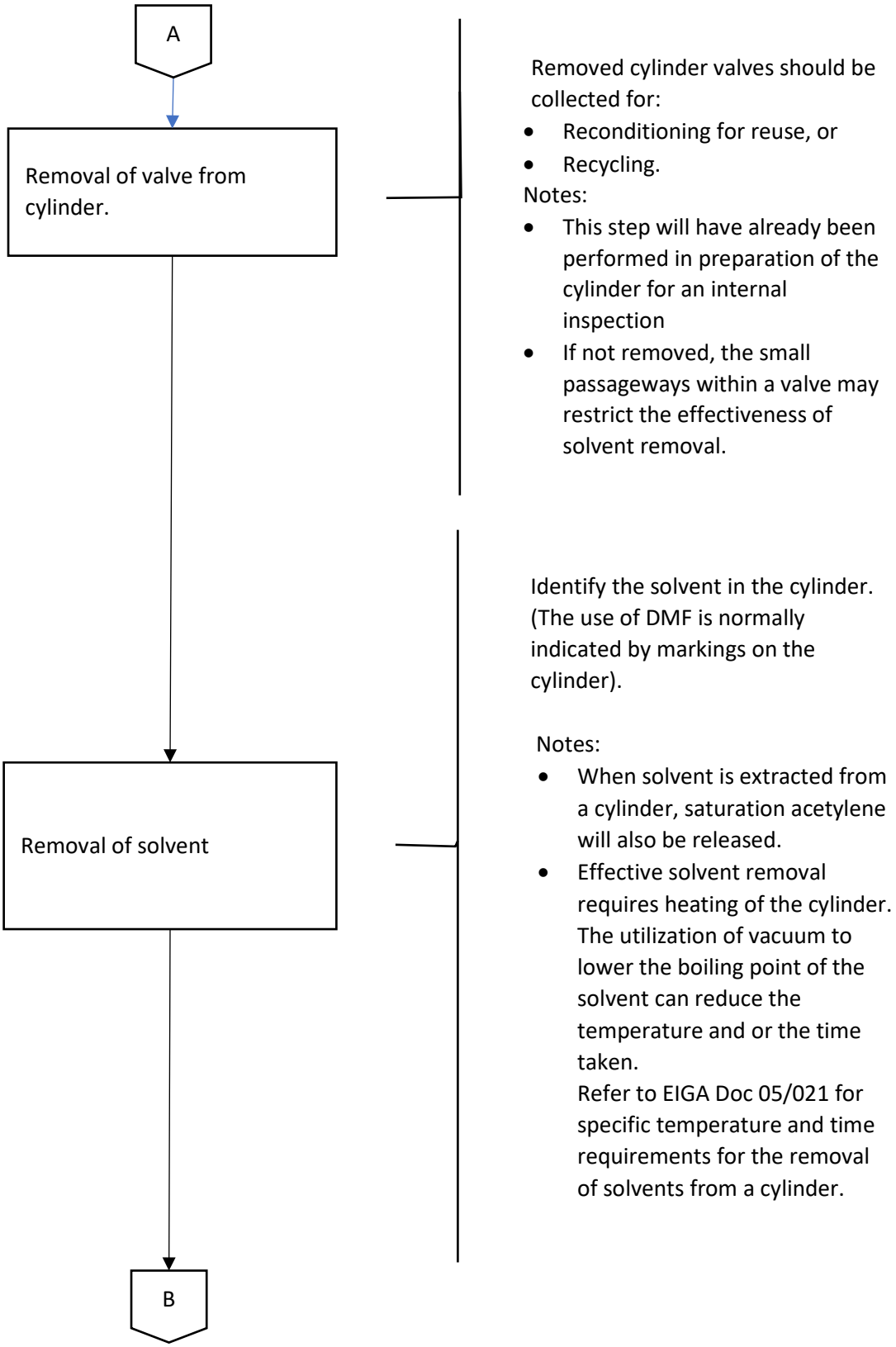

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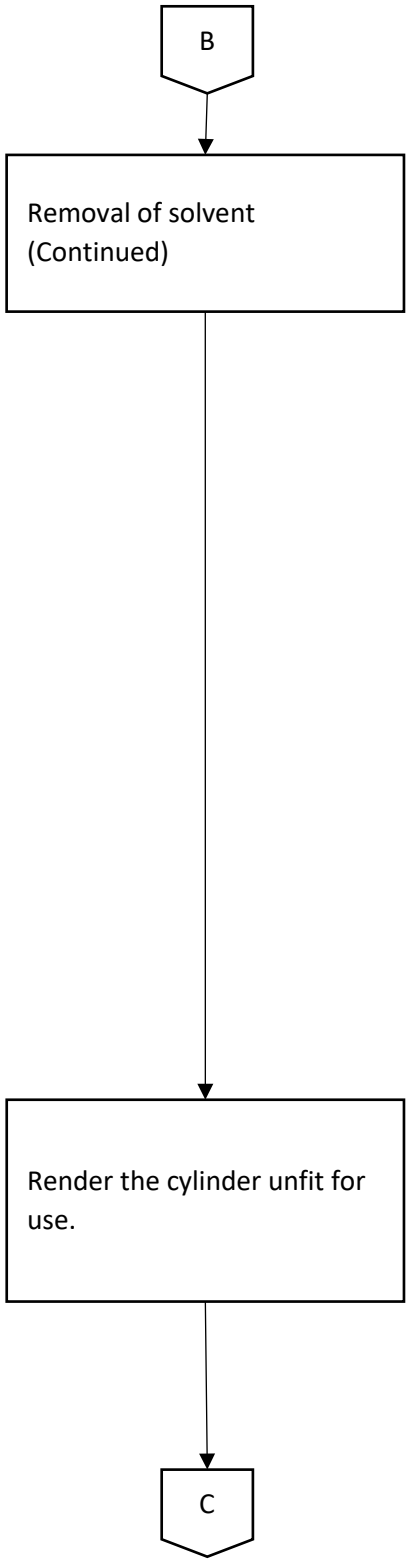

Warning: Solvents will only be partially removed by cylinders being left open to the "open air" for any period due to poor heat transfer, as the cylinder contents are not held above the boiling point of the solvent.
The "open air" venting of cylinders in warmer/drier climates will improve the effectiveness of the solvent removal. During this process, the cylinders should be protected from the ingress of moisture into the cylinder. The ingress of moisture is detrimental to the effective removal of the solvent, promotes internal corrosion of the cylinder and increases the potential for future leaching from the cylinder.
Consideration should be given to capturing the recovered solvent in a controlled manner for reuse. The solvent could be processed and refined to meet the standards required for reuse.

To prevent the cylinder from being returned to service it shall be made unfit for use. Methods may include:

- The permanent damage of the cylinder neck threads.
- Fitting of a permanent neck thread plug.

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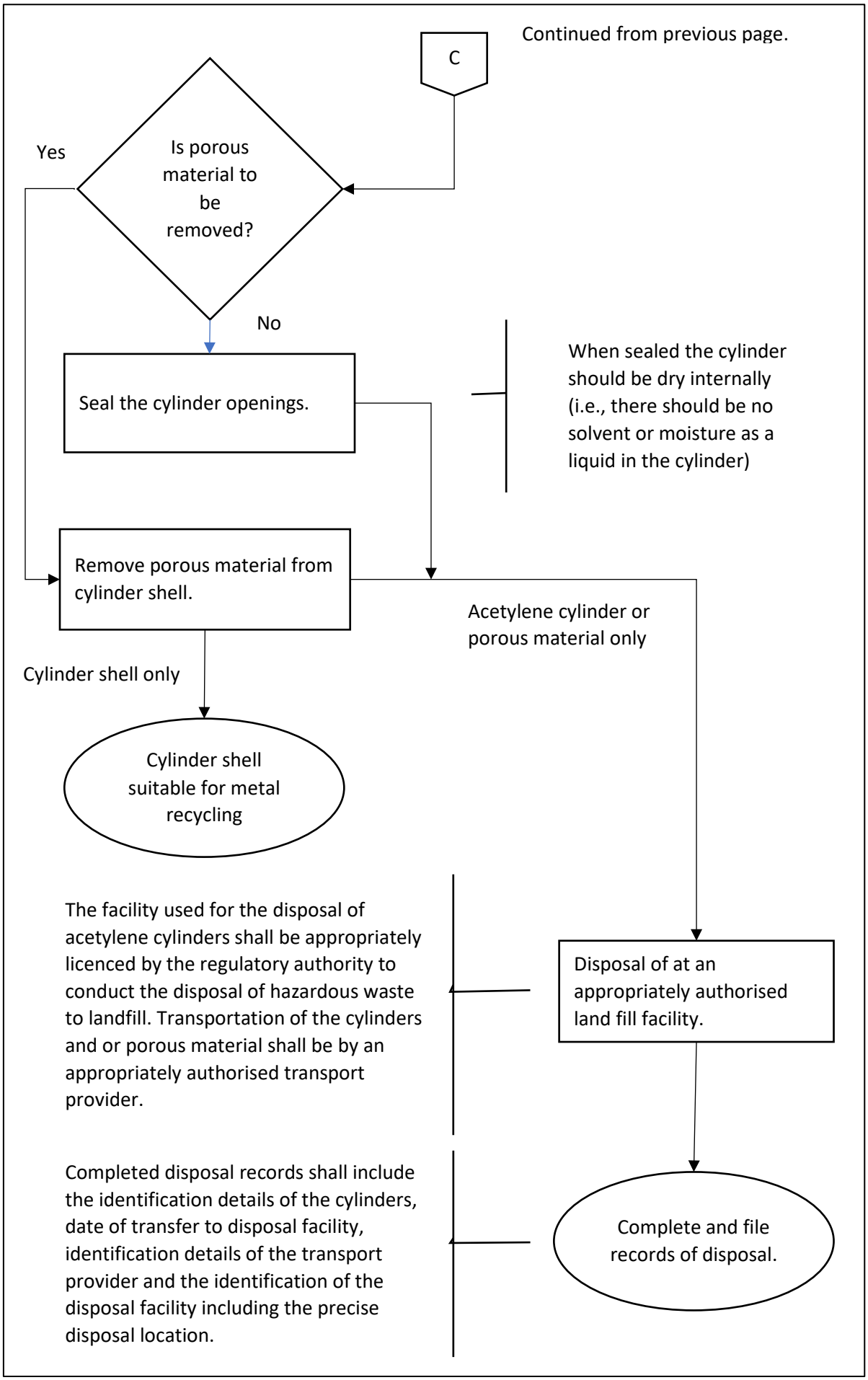
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Is porous material to be removed?
Yes
No
Seal the cylinder openings.
When sealed the cylinder should be dry internally (i.e., there should be no solvent or moisture as a liquid in the cylinder)
Remove porous material from cylinder shell.
Acetylene cylinder or porous material only
Cylinder shell only
Cylinder shell suitable for metal recycling
The facility used for the disposal of acetylene cylinders shall be appropriately licenced by the regulatory authority to conduct the disposal of hazardous waste to landfill. Transportation of the cylinders and or porous material shall be by an appropriately authorised transport provider.
Disposal of at an appropriately authorised land fill facility.
Completed disposal records shall include the identification details of the cylinders, date of transfer to disposal facility, identification details of the transport provider and the identification of the disposal facility including the precise disposal location.
Complete and file records of disposal.

5 Additional Information

Additional information on the removal of acetylene gas from a cylinder, solvent removal, acetylene cylinder waste management methods reference should be made to EIGA Doc 05/21 Guidelines for the Management of Waste Acetylene Cylinders.[3]

6 References

[1] AS 2030.2:2021 *The verification, filling, inspection, testing and maintenance of cylinders for the storage and transportation of compressed gases, Part 2: Cylinders for dissolved acetylene.*
www.store.standards.org.au

[2] ISO 10462:2013 *Gas cylinders – Acetylene cylinders – Periodic inspection and maintenance* www.iso.org

[3] EIGA Doc 05/21 *Guidelines for the Management of Waste Acetylene Cylinders.*
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