

The business case for recycling acetylene tanks

Overview

Most compressed gas cylinders in use today can be safely recycled to some degree, salvaging the metal shell for scrap and in some cases the residual gas contained inside. An exception has long been tanks containing acetylene, which make disposal problematic because they contain a solid, solvent-bearing core used to stabilize the gas. As a result, most tank owners are forced to landfill these tanks when they can no longer be recertified for use, presenting numerous liability risks and environmental disadvantages. For other tank owners, stockpiling on-site has been the preferred approach, presenting a different set of HSE concerns as well as logistical issues. However, facilities are now available to enable safe recycling of acetylene tanks, including the residual acetylene gas and solvent. This paper discusses the relative benefits of this method of disposal from a business and environmental perspective.

Why acetylene cylinders are different

Tanks of compressed acetylene gas are ubiquitous in the welding industry, with millions in use as cutting or welding torches every day. Compressed Gas Association (CGA) publication C-13 sets forth standard procedures for periodic inspection of compressed gas cylinders such as those containing acetylene, and those which fail inspection and recertification must be disposed of responsibly.

The acetone factor

Acetylene's flammability is its essential value to the welding industry. But it also creates safe handling concerns. To stabilize the acetylene and reduce the potential for "flashback" ignition of the tank, acetylene cylinders are fitted with a solid binding medium containing as much as six gallons of acetone (C^3H^6O), which controls decomposition by reducing dissolved oxygen levels. This solvent is considered crucial to the safe operation of acetylene cylinders.

Over time and multiple re-fillings, a given acetylene tank cylinder will eventually fail to pass requalification and must be properly disposed of. In the past, this has meant that the metal shell, the residual acetylene gas and acetone are all either sent to a landfill or stockpiled on the owners' site. This latter option raises risks of leakage and soil leaching, human injury and other HSE issues for the site owner. And the drawbacks to landfilling include the material waste of burying large amounts of recyclable aluminum or steel and the risks of leakage, environmental damage and subsequent liability.

Acetone is a common solvent used in a wide range of household and industrial products from fingernail polish remover to detergents. Acetone is considered a VOC and



according to the National Institutes of Health,¹ breathing moderate-to-high levels of acetone for short periods of time can cause nose, throat, lung, and eye irritation. It can also cause intoxication, headaches, fatigue, stupor, light-headedness, dizziness, confusion, increased pulse rate, nausea, vomiting, and shortening of the menstrual cycle in women. Human exposure to acetone can occur via contaminated drinking water or food and by living near a landfill site or other facility that releases acetone emissions.²

The presence of asbestos

Acetylene tanks produced before 1984 may pose an even more serious disposal challenge for tank owners. In these older tanks, the solvent-bearing mass housed in the tank often incorporates small amounts of asbestos, employed to add stability without flammability. While these asbestos fibers pose no harm during the discharge of the acetylene in the tank, they do represent a disposal concern. And while asbestos-free tanks became the norm in the 1990s, many of these older tanks are still in use or are stockpiled awaiting disposition.

The EU Position

While there are currently no specific EPA guidelines on the disposal of acetylene tanks in landfills, the European Union has established waste handling procedures under the document recommends solvent removal prior to disposal and specifies that wet removal of the core mass requires that acetylene and solvent in the cylinder be removed first. EU guidelines encompass safe disposal of asbestos-contaminated tanks; "for acetylene cylinders with asbestos mass... [safe disposal] involves at a minimum removal of the solvent..."

EIGA 2006 – "GUIDELINES FOR THE MANAGEMENT OF WASTE ACETYLENE CYLINDERS IGC Doc 05/06/E"

A new alternative

For acetylene tank owners, the disadvantages of landfilling are clear, especially for those committed to sustainability programs and quality initiatives related to environmental practices. And in 2008, a safe and practical process for recycling acetylene cylinders, including those contaminated with asbestos, was developed by Massachusetts-based Cylinder Recyclers.

The process not only allows for recycling of the scrap metal from these canisters, it also salvages any residual acetone for reuse. Following an initial tank inspection, the tank is de-valved and fitted with couplings. Organics are removed from the cylinders under a vacuum, and acetone is condensed out and collected downstream for recycling. The cylinders are sent to a self-contained area where the core is cut from the metal shell and sent to a licensed Sub-Title D Landfill for proper disposal. The metal shell is then cut and recycled.

Tank owners are provided with full disposal documentation including start and final weights, the amount of acetone and metals collected for reuse, and a manifest for the core material shipped out. This provides the detailed paper trail required by many

¹ toxtown.nlm.nih.gov/text_version/chemicals.php?id=1

² toxtown.nlm.nih.gov/text_version/chemicals.php?id=1



organizations for compliance with internal and external environmental policies and initiatives. For example, requirements for 14001:2004 certification demand “objective evidence which can be audited to demonstrate that the environmental management system is operating effectively in conformity to the standard.”

The business case for recycling

The environmental advantages of recycling acetylene tanks are clear. Salvaging recyclable metals and solvent reduces raw material consumption, reduces landfill volumes, and eliminates the potential for soil and groundwater contamination and subsequent human exposure to solvent emanating from landfills.

For most companies, these environmental advantages are enough to make recycling the preferred option for disposal, especially those organizations who currently stockpile spent cylinders out of reluctance to landfill them. However, there is considerable additional business value in recycling.

Risk reduction

The potential for landfill leaching and environmental damage creates potential liability risks and costs for tank owners, as does stockpiling spent acetylene tanks on-site, which creates potential for human injury resulting from handling the tanks or exposure to solvents via leakage.

Compliance and certification

Recycling programs, sustainability efforts and environmental risk reduction are for many businesses important components of their corporate environmental policies and programs.

For companies pursuing six-sigma quality standards, ISO 14001:2004 certifications or other quality credentials, recycling programs, sustainability efforts and environmental risk reduction must be high priorities.

Being a partner and employer of choice

Sustainability measures such as recycling and pursuit of ISO 14001:2004 certification are valuable tools that can be used to the benefit of the business. To internal stakeholders, they demonstrate control over organizational processes and activities that impact the environment and assure employees or potential employees that they are working for an environmentally responsible organization.³

These measures can also be used to satisfy external constituents such as customers and community stakeholders that a business supports its environmental claims (walks the walk) and is committed to environmental responsibility.

³ ISO 2008 –

www.iso.org/iso/iso_catalogue/management_standards/iso_9000_iso_14000/iso_14000_essentials.htm



And perhaps most important, many organizations today use environmental responsibility as a criteria for vendor selection. More and more businesses are evaluating their supply chains with an eye toward sustainability and overall environmental costs. This has significant implications for distributors of industrial equipment such as acetylene cylinders.

According to sustainability consulting firm Cameron-Cole, “corporations worldwide are utilizing environmental supply chain management strategies to help drive procurement decisions to not only manage potential risk from their suppliers, but also to improve the overall footprint of their products and services... an increasing number of U.S.-based firms are beginning to evaluate the environmental position of their vendors, and they are not stopping at their immediate vendors. Some firms have implemented aggressive programs aimed at incorporating second and third-tier vendors, i.e., the suppliers of the suppliers. As a condition of doing business with you, your customers might start to require that their vendors step up to the environmental challenge.”⁴

Recycling – a viable and proven option

For distributors and owners of acetylene cylinders, the opportunity to recycle spent or damaged tanks presents major business and environmental benefits. Some of the nation’s largest gas distribution companies have adopted acetylene tank recycling programs using this new process. In 2008 alone, more than 75 tons of acetone were salvaged for reuse using the process and thereby kept out of public landfills.

For these companies, the hard and “soft” costs of landfilling – including potential liability, HSE hazards and handling and transport issues; environmental compliance drivers; the market value of being a “green” vendor and employer combine to make recycling acetylene tanks their preferred operational practice.

⁴ Cameron-Cole - 2007