



Industrial and Medical Gas Safety Alert

11 Sept. 2018

Hurricane Aftermath - Floods

This GAWDA Safety Alert is issued to inform GAWDA members of potential contamination of gas cylinders resulting from the aftermath of the recent Hurricanes. This alert applies to medical oxygen cylinders caught in flood situations. *This alert was originally issued in November 2012 in response to Hurricane Sandy and again in 2017 (Hurricanes Harvey and Irma).*

Hurricanes bring flooding and wind damage to wide areas. In the aftermath of storms, GAWDA members do their best to keep critical medical gases supplied to hospitals, fire companies and ambulances.

One GAWDA member, who experienced Hurricane Sandy, reminds us to include in our emergency plans how we will care for the needs of our employees who are filling and delivering cylinders during and after natural disasters. In addition to power and fuel, be certain to have food and other necessities available for your personnel who help to supply critical medical gases. Some of your personnel may not be able to get home... or their homes may have been damaged.

This alert is being issued to reinforce the need to be extra vigilant in the receipt, inspection, cleaning and repair of medical oxygen cylinders that have been exposed to flood situations.



Contaminated valves & connections

When medical oxygen cylinders are involved in a flood, they are very likely contaminated and require special attention before reprocessing. Potential contamination includes, but not limited to, hydrocarbons from overflowing fuel tanks, mud and sewage. The following recommendations are listed below to assist in mitigating the risk of incidents associated with contaminated medical oxygen cylinders exposed to flood situations.

- Review hazards associated with contaminated medical oxygen cylinders with all affected employees
- Wear proper personal protective equipment when handling potentially contaminated medical oxygen cylinders
- Segregate contaminated cylinders from non-contaminated cylinders during transport and storage to avoid contaminating clean cylinders
- Document the customer and location where contaminated cylinders were retrieved

This information was developed to assist GAWDA members in complying with government regulations; it does not constitute legal advice, and users are advised to obtain legal counsel to develop their individual compliance programs. Additionally, GAWDA does not guarantee that use of this material will ensure compliance with any regulatory or legal standard.

- Inspect for oil, diesel, waste, sewage, mud, biological hazards, etc. on the cylinder wall, on the cylinder valve, and in the cylinder valve outlet and attachments
- Perform hammer test (dead-ring) on all potentially contaminated steel cylinders to detect presence of corrosion
- Verify cylinder pressure prior to opening cylinder valve. Properly vent cylinders.
- Invert small cylinders containing “zero” pressure and open valve to inspect for possible internal liquid contamination.
- Properly clean external and internal medical oxygen cylinder and cylinder components with oxygen compatible cleaning solutions
- Properly dispose of spent cleaning solutions and contaminates.



Contact Mike Dodd if you have further questions.

Be sure to use oxygen safe cleaning materials. For further guidelines, please read:

- CGA SA-30-2017, *Handling Cylinders After Natural Disaster Exposure*
- CGA SA-31-2017, *Receiving Cylinders After Natural Disaster Exposure*
- CGA G-4.1-2018 *Cleaning of Equipment for Oxygen Service*
- CGA C-10-2013, *Guidelines to Prepare Cylinders and Tubes for Gas Service and Changes in Gas Service*

An excellent cleaning agent that is oxygen safe, biodegradable, non-toxic, and inexpensive is Crystal Simple Green.

This GAWDA Industrial Gas and Medical Gas Safety Alert is issued jointly by Mike Dodd and Tom Badstubner, your GAWDA DOT and FDA consultants. Please contact Mike Dodd (mldsafety@hotmail.com) or Tom Badstubner (tom@asteriskllc.com) for further information.

Hydrocarbon contamination



Contaminated flood water line

SAFETY ALERT

HANDLING CYLINDERS AFTER NATURAL DISASTER EXPOSURE

This safety alert is issued to provide recommended practices for handling cylinders that have been exposed to a natural disaster event such as flooding, hurricane, tornado, fire, earthquake, etc. The devastation caused by these events can result in damaged gas cylinders and related equipment, which can affect their integrity and safe operation.

Compressed gas cylinders contain a variety of products that can present a range of hazards such as flammability, oxidizers, toxicity, asphyxiation, and more. The cylinder contents are also stored under pressure, which can cause the contents to leak if the container or related equipment is damaged. Cylinders that are damaged or leaking can pose serious hazards and must be addressed only by trained emergency responders or the cylinder supplier.

WARNING: UNTRAINED PERSONS SHALL NOT ATTEMPT TO VENT OR HANDLE DAMAGED CYLINDERS.

Natural disasters can result in exposing a cylinder to a variety of hazardous conditions that include floodwater submersion; impact from debris; exposure to foreign contaminants like mud, sewage, and oil or grease; damage from falling, etc. If cylinders have been exposed to adverse conditions such as those listed previously, contact emergency responders or the cylinder supplier for further instruction. Cylinders with obvious significant damage or that are leaking should only be addressed by emergency responders with HAZMAT training or the cylinder supplier.

Contact information for the cylinder supplier is listed on the label as shown in Figure 1a. If a label is not present, the cylinder neckring shown in Figure 2 can be used to identify the cylinder supplier.

Cylinders collected from natural disaster areas must be separated according to their hazard class. Oxidizing and flammable gases should be kept at least 25 ft apart. The cylinder label provides information on its contents and hazards. The transportation labels shown in Figures 1a - 1d provide a quick visual identification for the gas hazard class. Propane (barbeque) cylinders should be treated as flammable and segregated with other flammable gases. Cylinders without a label should be segregated and identified by the supplier when possible.

For more detailed information on the safe handling and storage of cylinders, see CGA P-1, *Standard for Safe Handling of Compressed Gases in Containers* and NFPA 55, *Compressed Gases and Cryogenic Fluids Code* [1, 2].

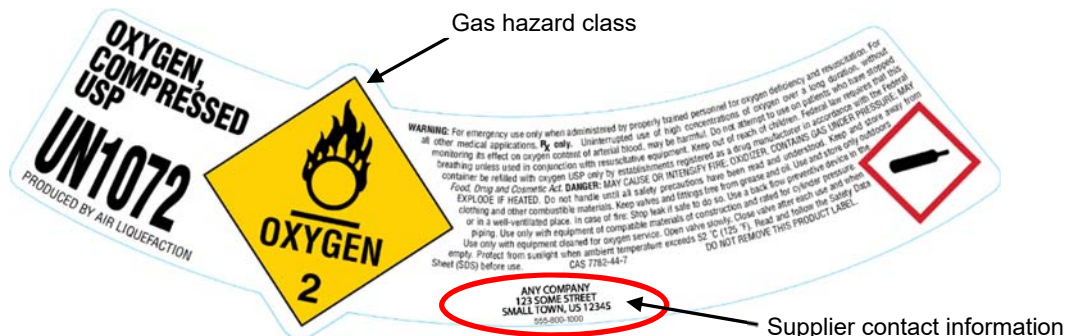


Figure 1a—Example label for oxidizer hazard class

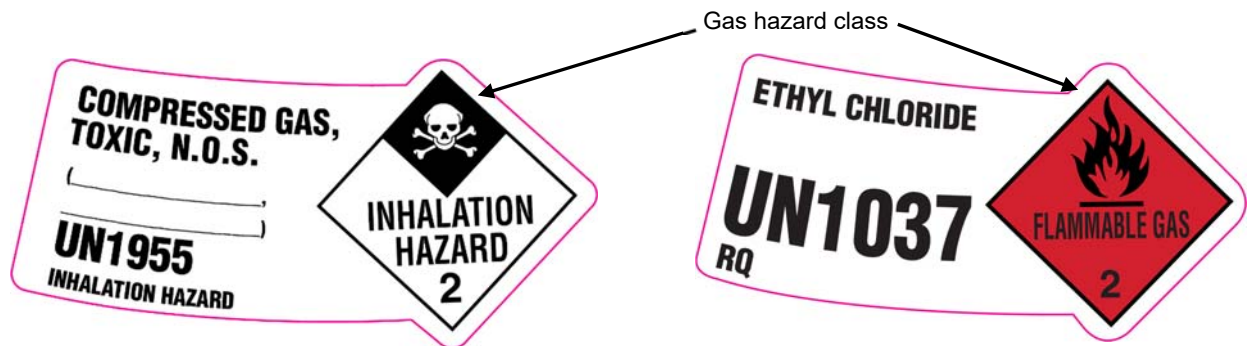


Figure 1b—Example label for toxic hazard class

Figure 1c—Example label for flammable hazard class

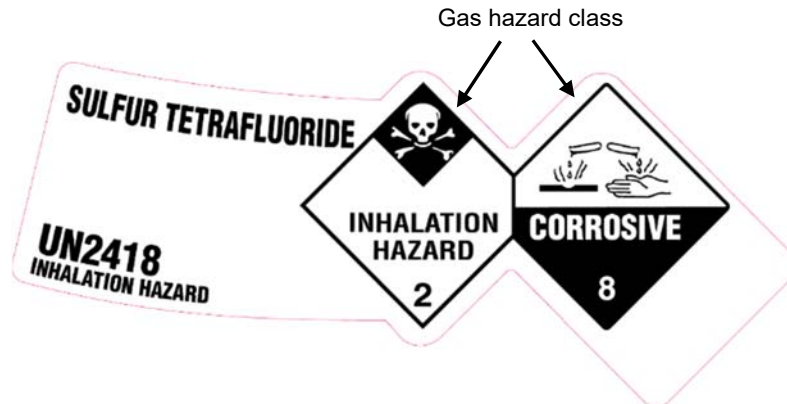


Figure 1d—Example labels for toxic and corrosive hazard classes

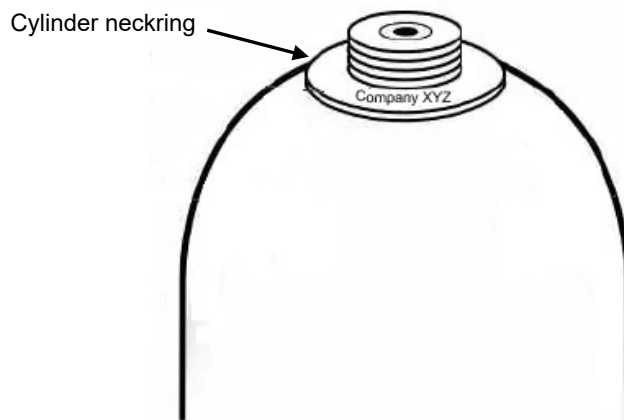


Figure 2—Example of cylinder neckring with supplier name

References

Unless otherwise specified, the latest edition shall apply.

[1] CGA P-1, *Standard for Safe Handling of Compressed Gases in Containers*, Compressed Gas Association, Inc. www.cganet.com

[2] NFPA 55, *Compressed Gases and Cryogenic Fluids Code*, National Fire Protection Association, Inc. www.nfpa.org

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Safety and Health Committee

FIRST EDITION: 2017

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SAFETY ALERT

RECEIVING CYLINDERS AFTER NATURAL DISASTER EXPOSURE

This safety alert is issued to provide recommended practices for gas suppliers receiving cylinders that have been exposed to a natural disaster event such as flooding, hurricane, tornado, fire, earthquake, etc. The devastation caused by these events can result in damaged gas cylinders and related equipment, which can affect their integrity and safe operation.

Natural disasters can result in exposing a cylinder to a variety of hazardous conditions including fresh and salt water submersion; impact from debris; exposure to foreign contaminants such as mud, sewage, and oil or grease; damage from falling, etc. Cylinders exposed to adverse conditions require extra attention in the receipt, inspection, cleaning, and repair processes prior to reuse.

When handling cylinders from disaster areas, you should wear personal protective equipment (PPE) such as safety glasses, leather protective gloves, and safety shoes with metatarsal and toe protection. Additional PPE such as chemical-resistant gloves worn under leather gloves and contaminant-resistant clothing may also be required. Due to the potential for biological and other contaminants, contaminated PPE or clothing should be removed and cleaned or discarded. Frequent hand washing is encouraged.

It is important to remember that some cylinder contents can be dangerous if not properly handled and decontaminated. Cylinders could be contaminated but have no visible signs of contamination. Cylinders that have been submerged should be initially treated as contaminated.

Cylinders containing oxidizers with signs of grease, oil, or other hydrocarbon contamination should be treated with extreme caution. Clean these cylinders if possible before handling. Ensure that your gloves are not contaminated with oil, grease, fuel, or other hydrocarbons. Do not allow these cylinders to impact the ground, truck, or any hard surfaces as a sudden impact could cause a flash or cylinder failure.

If you are unsure of the cylinder's condition or the cylinder is determined to be unsafe to move, you should not move the cylinder. You should contact your company for further instruction and alert others not to touch the cylinder until additional help arrives.

You should document the location where the cylinder was picked up.

As cylinders are received at the supplier facility from disaster areas:

- Visually inspect the cylinders and valves for contamination and damage, including:
 - residues of foreign material on the cylinders, caps, and valves
 - mud, grass, or debris lodged in the caps or in or around the valve, valve outlet, and pressure relief device
 - water lines on the cylinders (see Figure 1)
 - large dents or gouges on the cylinders; and
- Segregate cylinders that are damaged or contaminated from other cylinders.

Cylinders that appear to have been submerged, damaged, or contaminated should undergo an external visual inspection to determine whether they are fit for continued service. Cylinders that are suspected to have been submerged or have low or no pressure should also undergo an internal visual inspection.



Figure 1—Example of cylinders with a water line

For detailed information on inspection procedures, see the following CGA publications:

- CGA C-6, *Standard for Visual Inspection of Steel Compressed Gas Cylinders*;
- CGA C-6.1, *Standard for Visual Inspection of High Pressure Aluminum Alloy Compressed Gas Cylinders*;
- CGA C-6.2, *Standard for Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders*;
- CGA C-6.3, *Standard for Visual Inspection of Low Pressure Aluminum Alloy Compressed Gas Cylinders*;
- CGA C-6.4, *Methods for External Visual Inspection of Natural Gas Vehicle (NGV) and Hydrogen Gas Vehicle (HGV) Fuel Containers and their Installations*;
- CGA C-13, *Guidelines for Periodic Visual Inspection and Requalification of Acetylene Cylinders*; and
- CGA C-17, *Methods to Avoid and Detect Internal Gas Cylinder Corrosion* [1-7].

For related information on safe handling practices, see the following CGA publications:

- CGA P-1, *Standard for Safe Handling of Compressed Gases in Containers*;
- CGA P-38, *Guideline for Devalving Cylinders*;
- CGA P-63, *Disposal of Gases*; and
- CGA P-70, *Standard for the Safe Handling of Oxygen Cylinders in the Offshore Marine Industry* [8-11].

References

Unless otherwise specified, the latest edition shall apply.

[1] CGA C-6, *Standard for Visual Inspection of Steel Compressed Gas Cylinders*, Compressed Gas Association, Inc. www.cganet.com

[2] CGA C-6.1, *Standard for Visual Inspection of High Pressure Aluminum Alloy Compressed Gas Cylinders*, Compressed Gas Association, Inc. www.cganet.com

[3] CGA C-6.2, *Standard for Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders*, Compressed Gas Association, Inc. www.cganet.com

[4] CGA C-6.3, *Standard for Visual Inspection of Low Pressure Aluminum Alloy Compressed Gas Cylinders*, Compressed Gas Association, Inc. www.cganet.com

[5] CGA C-6.4, *Methods for External Visual Inspection of Natural Gas Vehicle (NGV) and Hydrogen Gas Vehicle (HGV) Fuel Containers and their Installations*, Compressed Gas Association, Inc. www.cganet.com

[6] CGA C-13, *Guidelines for Periodic Visual Inspection and Requalification of Acetylene Cylinders*, Compressed Gas Association, Inc. www.cganet.com

[7] CGA C-17, *Methods to Avoid and Detect Internal Gas Cylinder Corrosion*, Compressed Gas Association, Inc. www.cganet.com

[8] CGA P-1, *Standard for Safe Handling of Compressed Gases in Containers*, Compressed Gas Association, Inc. www.cganet.com

[9] CGA P-38, *Guideline for Devalving Cylinders*, Compressed Gas Association, Inc. www.cganet.com

[10] CGA P-63, *Disposal of Gases*, Compressed Gas Association, Inc. www.cganet.com

[11] CGA P-70, *Standard for the Safe Handling of Oxygen Cylinders in the Offshore Marine Industry*, Compressed Gas Association, Inc. www.cganet.com

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Cylinder Specifications Committee

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