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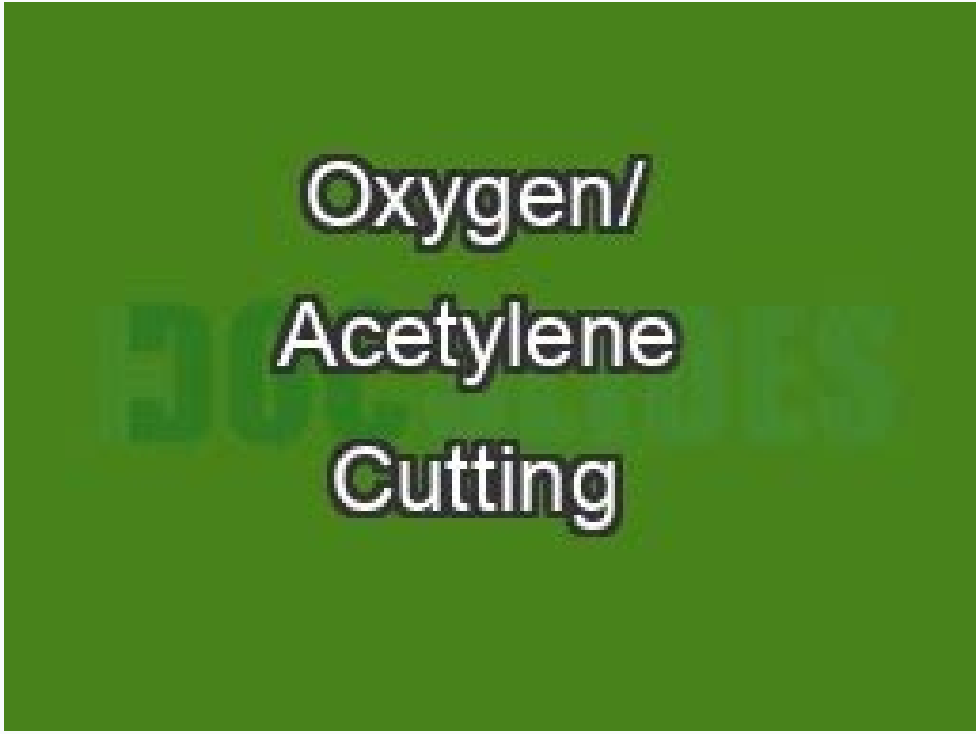

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Acetylene safety tips

Acetylene safety precautions. How dangerous is acetylene. Acetylene safety regulations. Acetylene torch safety tips.

Acetylene is a highly flammable and explosive gas, so it is important to take proper safety precautions when working with it. Here are some acetylene safety tips:Wear appropriate personal protective equipment (PPE) when handling acetylene, including safety glasses, gloves, and flame-resistant clothing.Store acetylene cylinders in an upright position and secure them to prevent them from falling over. Keep them in a well-ventilated area away from heat sources and combustible materials.Keep a fire extinguisher nearby when working with acetylene, and know how to use it in case of an emergency.Do not smoke or use open flames in the vicinity of acetylene cylinders or when working with acetylene.Never attempt to fill or refill acetylene cylinders yourself. Leave that job to trained acetylene professionals.Ensure all system controls and safety equipment are working correctly before and during filling operations.Follow your daily and hourly checklists to ensure key steps are followed. Be sure to test compressor and generator trips (for abnormal pressure & temperature) on a regular basis.Before transferring carbide, confirm that an adequate nitrogen purge was completed.Perform periodic maintenance to verify all scales, safety reliefs and grounding/bonding systems are working to designed parameters.Immediately before devalving a cylinder for maintenance, always confirm that the cylinder's contents have been vented to ambient pressure.Never use acetylene in an enclosed space or in areas where there is insufficient ventilation.Before using acetylene, make sure that all connections and hoses are secure and in good condition. Inspect them regularly for cracks, leaks, or other damage.Always use a flashback arrestor on the regulator and torch to prevent flames from traveling back into the gas supply.Never use acetylene at pressures higher than those recommended by the manufacturer.If you detect any unusual odors or suspect a leak, turn off the acetylene supply and ventilate the area immediately. Contact an acetylene technical expert to address the issue.CGA Members and GAWDA Subscriber Members are encouraged to register for the 2023 CGA & GAWDA Acetylene/Liquefied Petroleum Gas Safety Seminar taking place June 12-15, 2023 (June 12 & 15 are committee meeting days) in Greensboro, NC. © Copyright Compressed Gas Association. All rights reserved. Acetylene gas is a highly useful substance, widely found in industrial applications and a mainstay in many hobbyists' private workshops and garages. Its characteristics make it useful in "oxy-fuel" welding and cutting, but also uniquely dangerous to work with if you don't understand the hazards. Safely working with any substance starts with a cursory knowledge of the substance itself.



A copy of the safety data sheet (SDS) is a great place to start, and it can be easily found using the common name or the Chemical Abstracts Service (CAS) number 74-86-2. The SDS will give you a great overview of the general precautions and safety measures involved in working with acetylene but is not a stand-in for proper training and supervision. Takeaways: While acetylene in the air can cause oxygen deprivation, it becomes a fire risk long before it reaches those levels. A basic overview of the chemical characteristics helps understand how the substance will behave and the hazards that can come from handling it: Acetylene is a simple alkyne hydrocarbon with a vapor density of 0.9, meaning it is marginally lighter than air and will rise slightly. More likely, it'll mix with the surrounding air and remain more or less in place unless it is moved mechanically.Due to its triple-bond chemical structure, acetylene produces a uniquely energetic flame, reaching the highest flame temperature of all common hydrocarbons. Combustion with oxygen can produce flames up to 3,500°C (6,332°F)Under pressure, acetylene can undergo a decomposition process, yielding hydrogen and carbon soot or "lampblack." This reaction also generates heat and pressure, which can spell disaster for compressed gas cylinders. For this reason, acetylene is usually dissolved in acetone and stored in a porous medium that hinders decomposition. The American College of Governmental Industrial Hygienists (ACGIH) and OSHA list no established toxicity for acetylene other than a mild anesthetic effect. The gas is, however, a "simple asphyxiant," meaning that it can displace air and create an atmosphere deficient in oxygen. Combine that with the fact that it either has no odor at all or a faint garlic-y smell, and leaks may be both hazardous and inconspicuous. If the oxygen level in an environment is lower than 19.5% for any reason, nobody should be working in the area without supplied air. This is a peripheral consideration, really – the percentage that would have to be present in the air to create an asphyxiation risk is way, way above that needed to produce a fire. It makes sense, then, to apportion your hazard controls to the fire risk. Fire is the most obvious and significant hazard in acetylene use. The range of acetylene fuel/air mixtures that will ignite is so broad that for simplicity, most literature simply states that any amount in the air is flammable. If a leak develops and the concentration reaches the right mixture with the surrounding air, a simple spark can be enough for ignition. In Acetylene's case, the concentration (LEL) only has to be 2.5%, meaning that locally, a small leak can reach the right atmospheric concentration in no time. All that is needed is a wandering spark from nearby grinding, a static discharge, or a simple "not intrinsically safe" device operating in the vicinity. (Learn about The Dangers of Gas in a Confined Space.) The point is, ignition can come from so many sources, it's far more important to ensure that explosive atmospheres don't have a chance to develop in the first place. Proper compressed gas practices and procedures are critical! Where acetylene is in use, compressed oxygen will also be found. Both are needed to get the full potential of oxy-fuel welding and cutting because adding oxygen causes fuel to burn with much greater energy. Special care is needed in storing, handling, and using both acetylene and oxygen cylinders, and each has its own set of rules. Acetylene cylinders should never be dragged, rolled, or dropped and should not be handled at all by the valve.Safety caps should be used on cylinders (especially oxygen) when transporting and they should be chained in place at all times. Oxygen is compressed into the cylinders at over 2,000 psi, meaning that a sheared valve readily turns a bottle into a missile. Extra care should be taken in ensuring the valve is not damaged.Acetylene cylinders should not be transported in enclosed spaces such as a trunk and shouldn't be stored on their side, because doing so allows the liquid acetone to enter the valves and may cause damage.Any significant mechanical shock to an acetylene cylinder means it should be re-tested because internal damage (particularly to the porous medium) may not be apparent but creates voids where decomposition can occur, thus creating an explosion risk.When in use, oxygen cylinders must be fully open at the valve, but acetylene valves should be opened only one half-turn to allow it to be quickly turned off. Acetylene equipment is manufactured with a number of engineering controls in place that makes it safer to work with. All equipment should be used as instructed by the manufacturer, with all safety controls in place and inspected by a qualified person. Check-valves, flashback arrestors, and the porous storage medium help prevent ignited fuel-oxygen mixture from going back down the hose and igniting the material in the cylinder.Steel fittings and piping are used instead of metals such as copper, which can allow for the formation of acetylides, a shock- and friction-sensitive byproduct that can increase fire risk.Inlet connectors to the regulator are right-hand threaded for oxygen and left-hand threaded for acetylene to prevent mixing up the connections during setup.Pressure-relieving mechanisms are built into the cylinders by the manufacturer that allows them to vent when exposed to high temperatures. This can fuel a surrounding fire in some cases, but it helps prevent the explosion of the cylinders with the release of all their contents and the associated pressure and shrapnel. (Learn what-is-the-meaning-of-back-fire-sustained-backfire-and-flashback-and-what-is-its-preventive-measures-in-welding-applications/) In addition to engineering safety controls, but there are also some basic practical rules that apply to acetylene use per ANSI Z49.1-2012 (Safety in Welding, Cutting, and Allied Processes): Before connecting, oxygen cylinder valves should be "cracked" (opened slightly while standing aside and re-closed) before connecting the regulator to displace any potentially combustible particles from the valve.Never use acetylene at pressures above 15 psig, as it becomes unstable above that pressure.Purge the system before use each day by bleeding off the hoses one at a time.No oil should be used in cleaning, assembling, or connecting the regulators, as this can provide the fuel that ignites under oxygen re-compression.Gas hoses are color-coded – red for acetylene and green for oxygen.Cylinders should be stored upright and chained in place.Oxygen and fuel gas cylinders should be stored separately by at least 20 feet, or separated by a barrier of at least five feet that can resist fire for a half-hour. Finally, workers using acetylene have to don the proper PPE for the task: A suitable, ANSI Z87.1 compliant welding helmet or goggles with an appropriate shade or safety glasses with an appropriate shade and full-face protection, depending on the hazards of the task.NFPA 2112 approved flame-resistant clothing with no cuffs or uncovered, upward-facing pockets that can catch sparks.Welding gloves are made of leather or another suitable material.Respiratory protection (usually a fitted half-mask with a P100 particulate filter).Suitable leather footwear. This is by no means an exhaustive list of everything a worker needs to know to safely work with acetylene, it's merely a primer. Anyone working with this material should be well trained and supervised until competent. Oxy-fuel welding and cutting can be incredibly useful in the right hands, but careful, deliberate training and consistent procedures are necessary to make sure it is used safely. About Post Author Between 2003 and the end of 2012, the UK Fire and Rescue Service operated a very disruptive protocol for dealing with fires involving (or suspected to involve) acetylene cylinders. This original protocol caused much misinformation to circulate about the behaviour of acetylene in response to fire – and in turn influenced the Health and Safety Executive and many ancillary bodies, such as insurers, to recommend that oxy-acetylene should be replaced by oxy-propane where possible. Following detailed research, this has since been re-assessed through the 'BAM Research' project. You can find out more on the BCGA website. The Fire and Rescue Service protocol for acetylene fires was officially changed with effect from 30th November 2012. The reality now is that an acetylene fire need be no more disruptive than any other fire involving gas cylinders and that in many scenarios, oxy-acetylene is the safer option to choose. Secure It. Ventilate It. Respect It. There are a number of practical tips and guidelines that users can follow to control the risks when transporting or handling acetylene. These are outlined in the following: Make sure the cylinder shut-off valve is closed before transport and during storage. Never rely on gas equipment such as torches or regulators to shut off the gas. Transport cylinders in a suitably ventilated vehicle: an open or flatbed truck or trailer or a ventilated gas compartment in an enclosed vehicle, pneumatically sealed from the driver and passenger cabin. Make sure the cylinders are properly restrained and valves are protected during transport. Drive directly to your destination and unload the cylinders immediately when you get there. If the cylinders have not remained vertical throughout, allow them to stand vertically for a minimum of 60 minutes before use. Never store flammable gas cylinders in an unventilated vehicle. Always comply with all local regulations governing the transport of cylinders in vehicles and the safe unloading and storage of acetylene cylinders. This can include specific measures such as signage on the vehicle, a fire extinguisher, safety information in the vehicle and safety training for the driver. Secure It. Ventilate It. Respect It. Transported and used correctly, acetylene is a very safe gas.



However, our research shows that a minority of users fail to follow good practice guidelines, resulting in the following potential risks: Some customer vehicles are not fitted with appropriate restraints to prevent cylinders from toppling over or moving around in the vehicle. This can result in fires and injuries. There are two sources of hazard here. During transport, the cylinder handwheel valve can knock against something which opens the valve. This allows gas to escape, and can result in a fire or explosion. Also, cylinders are very heavy and will be travelling at the same speed as the vehicle. If the driver brakes and the cylinders are not adequately secured, they will be propelled forward and can cause severe damage or injury. Some acetylene cylinders are collected and transported in unventilated vehicles. In the event of a leak – no matter how minor – gas can build up in the vehicle and result in a fire or explosion. This risk is magnified over prolonged storage periods. For instance, some users – once they have finished their day's work – leave their cylinders in an unventilated vehicle overnight. This gives gas leaks a chance to build up over time. This risk is compounded by inappropriate use of the regulator to shut off the gas supply. The regulator can easily leak so it is essential that the shut-off valve is used for this purpose. Acetylene cylinders contain a porous mass and liquid acetone that dissolves the gas. If a cylinder has been transported, it must be left to settle in an upright position on arrival. This gives the liquid acetone time to return to its correct place in the porous mass. Failure to do so can cause quality problems with acetone liquid getting into the gas. In extreme situations, this might make the cylinder less safe to use. Secure It. Ventilate It. Respect It. At BOC, safety is our number one priority – both within and beyond company walls. So we have decided to take the lead in promoting acetylene safety and encouraging best practices in the transport, handling and use of all gas cylinders.



This starts with educating our customers on the potential risks of acetylene. Our awareness and education efforts focus on mitigating injuries and fatalities through communication campaigns such as our joint initiative with the European Industrial Gases Association (EIGA). We deliver this information directly to our customers through our worldwide distribution and retail network, backing up these efforts with direct communication and training opportunities. Complementing our education activities, we offer further gas safety training to all customer-facing gas retailers and continue to work closely with trade associations and industry bodies to encourage maximum observance of the new safety guidelines. We also offer a range of practical services to help customers with their concrete transport needs.

USES OF ACETYLENE

- ✓ Raw material for Organic Compounds
- ✓ Welding and Metal Cutting

If, for instance, you do not have a suitable vehicle, your local BOC retailer can deliver for you. We can also help if your valve is not protected. Your BOC retail outlet or gas agent will fit a disposable plastic cap to the handwheel to prevent it being knocked open during transport. You can dispose of these after your journey or keep them for re-use. After several years of extensive research in the UK and Germany, the Government's Chief Fire and Rescue Adviser (CFRA) has published new operational guidance on dealing with acetylene cylinders involved in fires. In the event of a fire, new best practice requires just one hour of water cooling on the cylinder with a hazard zone of up to 200m if appropriate, followed by a further hour of precautionary monitoring. This is a considerable improvement on the previous guidance, published in 2003, which required any acetylene cylinder that has been involved in a fire to be cooled for 24 hours. The CFRA's new best practice is a result of work by the German Federal Institute for Material Testing and Research and a five-year study of acetylene cylinder incidents attended by London Fire Brigade. It brings the UK Fire and Rescue Service into line with other fire and rescue services around the world. The revised guidance is available to download as a PDF on the government services and information website and the relevant chapter on acetylene cylinders starts at page 295.