Shop Safety Mini Series

Southwest Center
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Torch Safety

Perhaps some of the most versatile and useful tools in a shop environment are torches. They can be used for brazing, soldering, cutting, bending, and other tasks.

Types of Torches

Oxy-acetylene torches (figure 1) use a combination of highly flammable acetylene gas and oxygen to make a flame burning 6,330 degrees Fahrenheit. This is the only torch able to cut steel. Oxy-acetylene torches are widely used to heat steel for bending and cutting, welding when electricity is not readily available, and other specialty tasks such as underwater welding and cutting, heat treating stone, and fire polishing glass. Acetylene tanks and hoses are typically red, and oxygen tanks and hoses are usually green or black.

Figure 1: Oxyacetylene Torch Cutting and Welding Outfit
Photo Source: https://www.northerntool.com/shop/tools/product_200342921_200342921?cm_mmc=Bing-pla&utm_source=Bing_PLA&utm_medium=Welding%20%3E%20Gas%20Welding%20%2B%20Cutting%20Apparatus&utm_campaign=Gentec&utm_content=164477&msclkid=b372f17c6842151314d8ace182fcb0ef

Plumber's torches (figure 2) can be found in many shops as well, since they are more compact. Most of these are propane fueled, burning at about 3,500 degrees Fahrenheit. They are mainly used for soldering copper pipes or loosening stuck fasteners and are not powerful enough to cut, braze, or melt most metal. They can also be found fueled by butane, propylene, or a blend of gases.

Safety

The cylinders or "bottles" used to hold oxygen and acetylene gas are pressurized, and safe handling practices should be following during transportation and storage. When moving the cylinders, always remove the regulator and install the valve cap. Cylinders should be kept in a vertical position and chained to a permanent structure during use and storage. An oxygen cylinder at 2,000 psi can become a lethal projectile if it falls over and the cylinder valve is damaged.

Figure 2: Plumber's Torch
Photo Source: https://www.finehomebuilding.com/2004/05/01/soldering-copper-pipe-2

Acetylene gas is unstable at pressures above 30 psi. It is stabilized for use by dissolving it in acetone and using a special porous material inside the gas cylinder. If an acetylene cylinder is transported horizontally then it should be allowed to equalize in the vertical position for as long as it was horizontal. This will prevent acetone from being withdrawn from the tank.

Gas cylinders, regulators, hoses, and torches should be inspected for damage prior to use. Regulators should be designed and labeled for the gas being used. Use a soapy water solution to check connections

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for leaks. Ensure that a hose check valve is in place to prevent gas mixing in the hoses. Keep hoses and tanks away from heat sources and open flames. Never oil regulators, valves, or torches, as oil is flammable.

Gas valves on oxygen tanks are designed to be opened fully during operation to prevent leaks. However, acetylene valves should not be opened more than 1-1/2 turns. When using the torch, always light fuel first, then introduce oxygen. Use the correct tip size and pressure for the task being performed. A backfire can occur if the pressure is too low or the torch tip touches the work surface. During a backfire, the torch flame moves back into the tip and is extinguished with a loud pop. This is generally harmless, but a backfire can cause a flashback. This is often indicated by a loud hissing or whistling sound after a backfire. The flame can travel back through the hoses and explode the gas cylinder. Flashback arrestors should be employed to help prevent this. When finished, turn off the oxygen first and then the acetylene at the torch. Then close the valves on the gas cylinders. Finally, reopen the torch valves to bleed off any excess gas in the hoses.

Although torches are not as dangerous as arc welding, they still produce eye damaging light. Safety glasses with a filter shade of 2-5 should be worn based on the operation being performed. Wear flame resistant clothing and gloves to protect the skin from sparks and slag, and do not roll up sleeves or pant legs. Many metals, alloys, and anti-rust coatings give off harmful fumes when heated. Galvanized metal is notorious for this. Always make sure to be in a well-ventilated area when using a torch.

Figure 3: Safety Glasses, 5.0 IR Filter Lens
Photo Source: https://www.amazon.com/Pyramex-Emerge-Safety-Glasses-Filter/dp/B00P7DKKCI?tag=weldinghelmetpros-20&th=1

Finally, do not use oxygen as a substitute for compressed air to blow off clothes or surfaces. The oxygen is absorbed by clothing and makes them extra flammable in the event of ignition.

References:

https://www.harrisproductsgroup.com/en/Expert-Advice/tech-tips/oxy-fuel-equipment-safety-guidelines.aspx

https://www.dmme.virginia.gov/dmm/PDF/TRAINING/REFRESHER/MaintenanceRepairTopics/AR-oxygen-acetyleneuseandsafety.pdf

https://www.finehomebuilding.com/2004/05/01/soldering-copper-pipe-2

https://www.osha.gov/Publications/OSHAfactsheet-eyeprotection-during-welding.pdf

Torch Safety Quiz

1. When cutting steel, a _____ torch is used.
   a. Propane
   b. Butane
   c. Oxyacetylene
   d. Methane
2. Cylinders in transport should be kept ____.
   a. Vertical, with the cap on
   b. Vertical
   c. Horizontal
   d. At a 45 degree angle
3. True or False: Fuel cylinder regulators should be kept well oiled.
   a. True
   b. False
4. When using oxyacetylene, light which gas first?
   a. Oxygen
   b. Propane
   c. MAPP
   d. Acetylene
5. Using incorrect pressure or tip size can result in _____.
   a. knickknack
   b. paddywhack
   c. flashback
   d. trashsack

Torch Safety Quiz Key

1. C, Oxyacetylene
2. A, Vertical, with a cap on
3. B, False
4. D, Acetylene
5. C, Flashback