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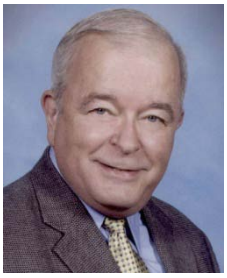

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# NATIONWIDE ACETYLENE SHORTAGE RAISES SAFETY CONCERNS

On March 21, a Carbide Industries plant near Louisville, KY, which produced about 75% of the calcium carbide that was used in the U.S. exploded and burned, resulting in a major shortage of acetylene and safety concerns associated with the use of alternative fuels.

With this major shortage of acetylene and significant price increases that are expected to continue for several years, MCAA contractors may want to convert to other fuel gases such as natural gas, propane and propylene.

Are there any benefits to switching other than price? In short, yes.

Other gases cut and heat faster than acetylene and they are safer. A propane flame, for example, releases 255 Btu/CF in its inner cone and 2243 Btu/CF in its outer cone versus 507 and 963 Btu/CF respectively for acetylene. Because propane has more total energy in the flame, it will cut and heat steel faster than acetylene. However, because the propane inner flame has less heat, it takes a few seconds longer to initiate a pierce with propane than with acetylene. Also, because propane releases so much heat, it is not optimal for cutting sheet metal since the extra energy will cause more distortion of the sheet and melting of the flame-side edges. Other fuel gases behave similarly to propane, but they release a little less energy.

A serious down side of acetylene is that it will explode if pressurized above 29 psig. Accordingly, acetylene regulators typically are limited to delivering 25 psi and are redlined at 15 psi. Drop something on an acetylene-filled gas line and, if the shock wave exceeds 29 psi, it will explode. Acetylene is delivered in cylinders that are filled with acetone which dissolves the acetylene and allows it to be shipped at pressures above 29 psi. Some insurance companies charge a premium for a shop that uses acetylene.

Because of this risk of explosion, if you decide to convert to other fuels, Compressed Gas Association SB-8 (2009) specifies that you must replace regulators that carried acetylene since any residual acetylene in the regulator will explode if it is pressurized in excess of 29 psi when the replacement gas is introduced. Exploding regulators-not pretty!

In addition, acetylene is carried in gas hoses that are Grade R which has a non-oil-resistant liner tube and cover, or Grade RM, which has a non-oil-resistant liner tube and a flame, and

oil-resistant cover. Hoses for all other fuel gases should be Grade T, which is suitable for all fuel gases, including acetylene, and has a flame and oil-resistant tube and cover. See Rubber Manufacturer's Association (RMA) IP-7, *Specifications for Rubber Welding Hose.*

Torch bodies are generally useable for all fuel gases, but the tips (both cutting and heating) need to be the ones specified by the torch manufacturer for the fuel gas being used.

Check valves and flashback arrestors can be reused but should be flushed using low pressure (2 psi) air or nitrogen prior to installing anything on the downstream end of the device. Piped-in acetylene gas distribution systems should also be flushed in a similar low-pressure, open-ended manner, flushing the header first, and then opening all legs and outlets. The header discharge should be outdoors and away from any sources of ignition.

Hoses and fittings used with any cutting or heating apparatus must be of sufficient size to provide the required flow of gases. Follow manufacturers' recommendations. The use of small I.D. hoses, improper splices, fittings, excessive hose length, check valves, or flashback arrestors will cause pressure drops and can result in insufficient gas flow. Low flow of gases can result in overheating of heating tips and possibly cause a flashback or backfire that can cause damage to the apparatus and injure to the operator. Backfiring is an indication of insufficient flow to a burner head and should be investigated by a supervisor any time it is heard.

There are several standards that all contractors should have and be familiar with when dealing with oxyfuel heating and cutting:

ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*. This standard is available at www.aws.org and it is free. Other health and safety fact sheets, many of which are suitable for training, are also available free.

AWS C4.2, Recommended *Practices for Safe Oxyfuel Gas Cutting Torch Operation*

AWS C4.3, *Recommended Practices for Safe Oxyfuel Gas Heating Torch Operation*

AWS F4.1, *Recommended Safe Practices for Preparation for Welding and Cutting of Containers and Piping*.

NFPA-51, *Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes*

*To learn more about the National Certified Pipe Welding Bureau, please contact Nick Nikpourfard at nnikpourfard@mcaa.org or (301) 869-5800*