

Part XXI WELDING, BURNING AND CUTTING OPERATIONS

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Section	Title	Revision Date
E453	<u>Burning and welding</u>	September 2009
E457	<u>Respiratory protection</u>	September 2009

Explanations

The Standards listed below are referenced in this Part of the Regulations.

Standard Agency	Standard Number	Standard Title
CSA	W117.2	<i>Safety in Welding, Cutting and Allied Processes</i>

Section E453 Burning and welding

Subsection E453(4) There are two hazardous conditions addressed by Subsection 453(4): reverse gas flow and arrest a flashback.

Devices to prevent reverse gas flow, usually referred to as "reverse flow check valves," function only to stop the reverse flow of gases. They are not designed to stop a flame in a flashback.

Reverse gas flow may happen if one of the following conditions occurs:

- One of the gas cylinders empties before the corresponding valve on the torch is closed, and gas from the other hose/cylinder flows back up the hose, possibly as far as the regulator.
- Both cylinder valves are closed at the end of the task and both torch valves are opened to bleed off the oxygen and fuel gas, in which case the oxygen will likely reverse flow into the lower-pressure fuel gas hose and possibly into the regulator.

- The torch tip gets plugged and gas from the higher-pressure line (usually the oxygen supply) reverse flows into the line with lower pressure.

A flashback may happen if:

- (a) a combustible mixture of oxygen and fuel gas exists in the torch body, a hose and/or the regulator, and
- (b) an ignition source starts the mixture burning.

The burning action in a flashback is usually explosive as the flame front travels very rapidly back through the combustible mixture. A device to arrest such a flashback is usually referred to as a "flashback arrestor," and it works by extinguishing the flame front when it reaches the device.

Many new torch models have reverse flow check valves and flashback arrestors built into them. The devices are also available as separate components that can be installed between the torch and the regulators. The best protection for the oxyfuel system is achieved if the reverse flow check valves and flashback arrestors are installed in or at the torch. Most devices will have an arrow indicating the direction of gas flow to assist with ensuring the devices are installed in the proper orientation. The manufacturer's name or recognized trademark should be visible on the devices. Devices without such marking should not be used. Usually the devices are Underwriters Laboratory (UL) approved, and so marked.

Reverse flow check valves should be tested to ensure operational efficiency:

- At least once each month (unless the manufacturer recommends a more frequent test interval),
- If a flashback occurs, and
- If there is a decrease in gas flow on demand with ample supply of gas in the cylinder or other source

A simple test procedure for reverse flow check valves is to remove the valves from the equipment and do the following two checks:

- Submerge only the inlet end of the valve in water and blow into the opposite end. Any evidence of bubbles indicates the valve is leaking and defective.
- Blow in the inlet end of the valve to test for free flow operation. A restriction to free flow indicates the valve may be plugged with debris or stuck to the valve seat and not operating properly.

Section E457 Respiratory protection

The intent of this section is to ensure that if an effective means of natural, mechanical, or local exhaust ventilation is not feasible or practicable during a

welding, burning, or similar operation, that respiratory protective equipment be provided and worn. It implies that respiratory protective equipment is not required if effective natural, mechanical, or local exhaust ventilation is in place. This may be appropriate for some welding processes such as shielded metal arc welding (SMAW) on mild steel; respirators may not be necessary once adequate ventilation controls are in place. For other processes, such as welding on chromium or cadmium alloy metals, a respirator may also be required to provide supplementary protection to ventilation controls. Of particular concern is worker protection during welding, burning, or similar process in a confined space. In consideration of these factors, this guide has been developed to provide direction in determining when ventilation should be used, the type of ventilation effective in different situations, and when respiratory protection should be used.

Exposure control can include natural ventilation for processes where exposure levels to airborne contaminants are inherently low, such as tack welding on mild steel using a mild steel rod or wire. Natural ventilation is air movement within an indoor work area provided by open doors or windows, or in an outdoor location by being exposed to natural air movement (wind). Natural ventilation cannot be depended on in a work location containing structural barriers that can restrict natural air movement.

The requirements for wearing respiratory protection during welding and related processes are based on the potential risk of overexposure to airborne contaminants that may be generated by the specific welding, burning, or related process. Some processes pose significantly greater risk to the worker than others. For example, a worker welding on mild steel in an unenclosed, outdoor location with good natural ventilation is highly unlikely to be overexposed to airborne contaminants from the process.

The potential for overexposure is also determined by the location of the welding process and the conditions in which the welder is working. Questions to consider:

- Is the area well ventilated, either by natural or mechanical means?
- Is the welder working in an open, limited, or confined area?
- What is the welder's position relative to the welding plume?

These questions can be answered by identifying the hazards and assessing the risks for overexposure.