

OHS PROGRAM: Take 6 Steps to Protect Workers from Welding Hazards



Welding, including any type of electric or fuel gas welding or cutting process such as arc welding, brazing, solid-state welding, soldering and resistance welding, is used to join materials and is a common practice in many industries. Because of the nature of this activity, however, welding exposes workers to various hazards, such as radiation, toxic fumes and excessive heat. To ensure that your workers are adequately protected from such hazards while welding or working near welders and that you comply with the requirements in the OHS laws as to welding, take these six basic steps.

Defining Our Terms

This article addresses the general welding requirements under the OHS regulations and doesn't cover underwater welding requirements or requirements specific to welding services from vehicles. In addition, we don't discuss welding requirements that apply only to specific workplaces, such as mines, or operations, such as diving operations.

TAKE 6 STEPS

In many jurisdictions, the welding requirements are included in the OHS regulations under the requirements for '[hot work](#)' in general or those for 'welding, cutting and allied processes.' In addition to setting their own specific

requirements for welding, jurisdictions generally require employers to comply with CSA Standard W117.2'06, *Safety in Welding, Cutting and Allied Processes*. This standard provides minimum requirements and recommendations to protect workers in an environment affected by welding, cutting, and allied processes and to prevent damage to property arising from the installation, operation and maintenance of equipment used in such processes.

Of course, you should always consult and comply with the welding requirements in your jurisdiction's OHS laws and any incorporated CSA standards, if applicable. But taking these basic six steps will help you comply with those requirements and protect workers:

[learn_more caption="Step #1: Inspect Welding Equipment"]

Before workers use any welding equipment, require them to inspect it to ensure it all works properly and that there are no leaks or defects. If a worker finds any defects, they must be repaired or the defective parts replaced before the equipment is used for welding. In addition, workers should confirm that the welding equipment has all required safety devices, such as those designed to prevent flashbacks or reverse gas flow, and that such devices are functioning as designed. Failure to have required safety devices can have tragic consequences.

Example: A mechanic was welding under a car when it caught fire and became engulfed in flames. He died the next day. The government claims that the auto body shop didn't provide flashback arrestors between the torch and the fuel supply to prevent reverse flow and stop a flame from burning back into the supply lines. The former owner of the shop was charged with criminal negligence causing death as well as 12 charges under the provincial OHS law [Elie Hoyerck, Sept. 11, 2015].[/learn_more]

[learn_more caption="Step #2: Inspect Area for Flammable & Explosive Materials"]

Before welding starts, ensure that the area around the welding work is inspected to identify any combustible, flammable and explosive material, dust, gases, or vapours that are present or likely to be present in that area. Then take steps to ensure that such materials aren't exposed to ignition from welding work by doing one or more of the following:

- Having the combustible, flammable and explosive material, dust, gas or vapour, or the sources of these, moved a safe distance from the work area;
- Having such material, dust, gas or vapour properly shielded from ignition;
- Moving the welding work to a location free from combustible, flammable and explosive material, dust, gas or vapour; or
- Scheduling the welding work so that such combustible, flammable and explosive material, dust, gas or vapour isn't exposed during welding and cutting operations.

Failing to rid the welding area of flammable or explosive materials can result in a fire or explosion, worker injuries and property damage.

Example: In Alberta, a company manager told workers to release flammable wastewater onto the ground at the back of the company's property. The next day, a welder inadvertently ignited the wastewater with a welding torch, causing a fire. The company was fined \$160,000 [*Western Biodiesel Inc.*, Govt. News Release, Aug. 16, 2011].

Insider Says: To respond to situations in which welding *does* cause a fire despite taking the above steps, most OHS regulations require employers to ensure that fire extinguishers are located near where welding work is being done and available to workers.[/learn_more]

[learn_more caption="Step #3: Ventilate Work Area, If Necessary"]

Welders are at the highest risk for exposure to welding gases and fumes. In fact, a [study](#) of welders in Manitoba found that exposure to the fumes created by welding may be the greatest hazard faced by welders. But anyone who works near a welder can also inhale welding fumes, especially when welding is done indoors or in a confined space.

According to [WorkSafeBC](#), welding fumes are made of many different metallic components. Each fume will be different depending on the material being welded, the electrode and the type of welding. The airborne gases and fumes produced or present during welding can include:

- Nitrous oxide;
- Carbon dioxide;
- Carbon monoxide;
- Shielding gases such as argon or helium;
- Ozone; and
- Metal fumes such as manganese and chromium.

And there are health effects for both short-term and long-term exposure to these gases and fumes.

Exposure to welding fumes can be controlled through the use of proper ventilation or PPE (discussed below). That's why the OHS laws may require you to ventilate the work area to remove hazardous fumes, generally using local exhaust ventilation in the areas or at the work stations where welding is being performed (as opposed to [general ventilation](#) for the entire workplace). For example, Sec. 12.114 of BC's OHS regulations says that effective local exhaust ventilation must be used at any fixed work station to minimize worker exposure to harmful air contaminants produced by welding, burning or soldering [Sec. 12.114].

Local exhaust ventilation systems are often comprised of a

hood, fan, duct and air cleaner. The system must be designed and installed so that welding fumes and gases are prevented from entering or drawn away from the welder's breathing zone and the rest of the workplace. You may also be required to monitor the work areas near the welding area to ensure that the level of concentration of air contaminants doesn't exceed those levels or values specified by law.[/learn_more]

[learn_more caption="Step #4: Require Use of Appropriate PPE"]

[This chart](#) contains the PPE requirements specific to welding in each jurisdiction. Such requirements may apply to both the welder and any co-workers working nearby, who could also be at risk. The key types of PPE for this work are:

- [Respirators](#) that are an approved type and suitable for use when welding;
- Appropriate face and [eye protection](#), such as welding helmets;
- Protective [gloves](#), ideally leather gauntlet type gloves with arm protection;
- Adequate body covering that includes an apron of leather or of other material offering equivalent protection; and
- Appropriate [safety footwear](#).

In addition to requiring workers to wear certain kinds of PPE, you should also address the kinds of clothing workers should and should not wear when welding. For instance, workers who are welding should wear flame retardant or fire resistant clothing, preferable made of cotton or wool. And you should bar them from wearing loose, ragged or oil-soaked clothing. Inappropriate clothing can put workers at risk.

Example: A student working for an Ontario company was welding when his sweatshirt ignited and caught fire, causing second degree burns. A supervisor pleaded guilty to failing to ensure that a worker was wearing apparel sufficient to protect him from injury while welding and was fined \$4,000 [Chad

Corriveau, Govt. News Release, April 9, 2013].

Insider Says: PPE isn't the only way to protect non-welding workers from welding hazards. For example, you may need to use non-reflective screens, partitions or curtains to shield welding activities and minimize the risk of exposing other workers to arc light.[/learn_more]

[learn_more caption="Step #5: Require Workers to Follow Safe Work Procedures"]

Develop and require workers to follow safe work procedures when welding. Consult the manufacturer's instructions for its welding equipment and incorporate those instructions into your safe work procedures. Such procedures will depend in part on the type of welding work done in your workplace. But those procedures should, at a minimum, include safe work rules such as the following:

- Don't leave welding equipment unattended unless proper safety measures are taken, such as removal of the electrodes from an electric welding machine;
- Workers should remove any coating on metal that could emit harmful contaminants before welding on such metal;
- Provide and require the use of tables, jigs or work benches made of non-flammable material when needed for support during welding;
- Keep passageways, ladders and stairs clear of hoses, cables and other welding equipment;
- Where it's necessary to catch falling sparks and slag, use glass-fibre blankets or fire-retardant welding tarpaulins;
- If welding is performed above an area where other workers may be present, ensure that adequate means are taken to protect any workers below the operation from sparks, debris and other falling hazards; and
- When possible, mark recently welded or flame cut work 'HOT' to prevent other workers from being burned by it.

You may also need specific safe work procedures for welding in confined spaces and welding on containers, especially as to proper cleaning and testing of containers. If the container previously contained a flammable or explosive substance and wasn't adequately cleaned and allowed to dry, the substance could ignite when welding is performed on the container.

Example: While a worker was welding a fitting on the top of a biodiesel settling tank, the tank exploded, killing him. The company and a company official pleaded guilty to an OHS violation. The Alberta court fined the company \$375,000 and the official \$15,000 [*GLP Instrumentation Inc. and Sebastien Berube*, Govt. News Release, Nov. 22, 2011].

SAFETY CHECKLIST: Download a [welding safety checklist](#) and use it to audit your welding safety procedures to ensure they comply with these requirements and adequately protect all workers.[/learn_more]

[learn_more caption="Step #6: Ensure Only Properly Trained Worker Do Welding Work"]

You should always ensure workers are properly trained to do their jobs (and to do them safely). But because of the hazards posed by welding, the OHS laws may go a step further and require employers to ensure that only [‘competent’ workers](#) or workers who've earned welding certificates engage in welding work. For example, Sec. 110(2) of Nova Scotia's OHS regulations says that an employer must ensure that a welding or allied process is performed by a competent person. Welding training should cover, at a minimum:

- Your welding safe work rules;
- The requirements in your jurisdiction on welding work;
- The selection, use and maintenance of welding equipment;
- How to inspect such equipment and what to do when leaks or defects are identified;
- Selection and use of appropriate PPE when welding; and

- Protections for other workers who may be near welding work.

TRAINING CHECKLIST: Download [a welding training checklist](#) that you can use to ensure workers assigned to perform welding are properly trained. The checklist includes several levels of training, ranging from basic to advanced training.[/learn_more]

BOTTOM LINE

As you can see from the various cases cited above, failing to take adequate steps to protect workers when welding can have serious and often tragic consequences. So ensure that your OHS program complies with the welding requirements in your jurisdiction's OHS laws and adequately protects workers' both welders and their co-workers' from the various hazards posed by such work.

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Welders at Risk of Losing Sense of Smell

According to researchers at the University of Pennsylvania School of Medicine in Philadelphia, professional welders who work in enclosed spaces with poor ventilation are at risk for losing at least some of their sense of smell.

Researchers tested 43 professional welders who worked in confined spaces on the San Francisco/Oakland Bay Bridge, asking them to identify 40 'scratch and sniff' odours. They found that the welders scored an average of seven points lower than a control group of people who weren't exposed to welding fumes.

Thirty-eight of the welders performed more poorly than the control group. Three of the workers had a total loss of sense of smell. In addition:

- 30.2% had a mild loss of sense of smell;

- 18% experienced a moderate loss; and
- 16.3% had a severe loss of sense of smell.

Senior study author Dr. Richard Doty said this study was the first to clearly demonstrate that welders who work in confined spaces without adequate respiratory protection are at risk for damaging their sense of smell. For more information on the importance of protecting welders from overexposure to fumes, including safety tips, read about [a study from Manitoba](#).