Occupations and Workplaces

Welder

On this page

What should I know before reading about this occupation?

This profile summarizes the common issues and duties of welders. Welders can work at a wide variety of types of workplaces. Because each workplace is unique, there is no way to predict all of the possible hazards you may encounter. This summary focuses on the major job duties that most welders would have in common.

What, briefly, does a welder do?

Welders use specialized equipment to "weld" or join together metals. They will also cut or trim metal objects. There are many different types of welding including:

- Gas tungsten arc welding (GTAW)
- Gas metal arc welding (GMAW)
- Flux-cored arc welding (FAW)
- Plasma arc welding (PAW)
- Shielded metal arc welding (SMAW)
- Resistance welding
- Laser beam welding

- Submerged arc welding (SAW)

Many will also solder and grind materials. Flame cutting equipment, and various metal shaping machines (shears, straighteners, bending machines) may also be used.

Welders need to know how to prepare the metal for welding or cutting. They need to know which type of welding to do, how to use their equipment safely, how to follow work procedures, and what procedures to use for quality control.

Welders can work in places that manufacture structural steel, boilers, heavy machinery, aircraft, and ships. They also work in many industrial sectors such as automotive, oil and gas, manufacturing, forestry, mining, construction, etc.

What are some health and safety hazards associated with being a welder?

Hazards typically fall into one of six general categories as listed below. For more information on that issue, prevention, or how to work safely with a chemical or material, click on the links where provided.

Biological

While it depends on the workplace itself, welders do not normally encounter biological hazards.

Chemical

Welding can create fumes which are a complex mixture of metallic oxides, silicates and fluorides. Fumes are formed when metal or other materials, such as flux or solvents, are heated above their boiling point, and their vapours condense into very fine particles (solid particulates). Welding fumes normally contain oxides of the materials being welded and of the electrodes being used. If the metal has a coating or paint, these too can decompose with the heat and become part of the fumes. Care should be taken when working near these fumes as health effects can be both immediate or occur at a later time.

Welders also often work with and around:

- Flammable hazardous products
- Compressed gases
- Asbestos

Ergonomic

Many injuries to welders are the result of strains, sprains and work-related musculoskeletal disorders (WMSDs). Welders often have to:

- Lift or move heavy objects
- Work in awkward positions for long periods of time
- Handle and hold heavy welding guns
- Perform repetitive motions

See OSH Answers document on Welding - Ergonomics for more information.

Physical

Welders can be exposed to:

- Excessive noise levels
- Excessive heat or cold
- Electromagnetic fields
- Laser light
- Radiation

Welding arcs and flames can emit intense visible (VIS), ultraviolet (UV) and infrared (IR) radiation. Gamma- or X-rays can be emitted by inspection equipment or welding machines. Skin and eye damage such as "welder's eye" or cataracts can result in certain types of radiation.

Safety

Welders often have to work:

- At heights
- In confined spaces
- Could experience electrical shock or electrocution

Other safety hazards include:

- Flying particles which can enter the eye or skin.
- Cuts and stabs from sharp metal edges.
- Injury from other equipment (e.g., using power tools such as grinders, chippers, drills, etc.).

- Slips, trips or falls due to location or environment near the job.
- Burns from hot surfaces, flames, sparks, etc.
- Fires from sparks, flames or hot metals (a special situation includes when the surrounding atmosphere becomes oxygen-enriched and thus easier to ignite.) Fires may also result from flashbacks or equipment failure. Please note that clothes soiled with oils or grease can burn more easily. In addition, sleeves or cuffs that are folded or rolled up can "catch" sparks and increase the risk of fire.

Psychological

Work demands and deadlines may contribute to the stress felt on the job. In addition, some welders may be required to work shifts or extended work days which can have health effects.

Are there any long-term health effects of being a welder?

The International Agency for Research on Cancer (IARC) states that there is sufficient evidence in humans that ultraviolet radiation can cause ocular melanoma (a type of eye cancer). The IARC has also classified welding fumes as carcinogenic to humans (Group 1). IARC describes welding fumes as consisting mainly of fine solid particles (with an aero-dynamic diameter of less than 1 μm), and as a complex mixture of particles from the wire or electrode, base metal, or any coatings on the base metal. They consist mainly of metal oxides, silicates, and fluorides.

According to the International Labour Office (ILO), welders are at increased risk of:

- Respiratory tract infections have been shown to be increased in severity and frequency among welders. Chemical irritation due to exposure to metal fumes seems to be the cause of respiratory infections.
- Pneumoconiosis (a chronic respiratory disease caused by inhaling metallic or mineral particles); in particular, siderosis, a type of pneumoconiosis related to inhaling iron oxide).
- Possible hearing loss.
- The exposure to UV light may result in chronic damage to the eyes and skin.
- Damage to the central nervous system, when exposed to lead, manganese and aluminum fumes.
- Respiratory disease from high concentrations of carbon dioxide and related oxygen deficient atmospheres (particularly in poorly ventilated places).

- Chronic poisoning occurs when certain materials are present in welding fumes, such as zinc or cadmium, polychlorinated biphenyls (from the decomposition of anti-corrosion oils), or decomposition products from paints.

(Sources: Welder. IARC Monographs Volume 118: Welding, Molybdenum Trioxide, and Indium Tin Oxide; International Hazard Datasheets on Occupations, International Labour Office; and Hansen, et al (2017). "Carcinogenicity of welding, molybdenum trioxide, and indium tin oxide" the Lancet, Vol.18)

What are some preventative measures that can be taken?

- Install effective ventilation wherever possible.
- Always wear the correct personal protective equipment (PPE). Protective clothing should be selected to provide protection from radiation, ignition, or electric shock. Clothing should not be able to trap sparks that may ignite the material. Welders should wear eyewear that has UV protection. They also should use ear protection. Fire-resistant earplugs will help protect the ears where sparks or spatter can enter the ear. If local exhaust ventilation is not adequate or practical, respiratory equipment should be used. Aprons and fire-resistant heavy leather gloves will help protect the hands and clothing. Capes, leather sleeves, or shoulder protection may be necessary during some welding operations.
- Be sure that flammable products are stored far away from the work areas.
- Inspect ladders or scaffolding before using. Know how to use fall protection equipment, and use where appropriate.
- Learn safe lifting techniques.
- If a job requires work in an awkward position (e.g., with hands above shoulder level) be sure to take frequent breaks.
- Make sure that an appropriate fire extinguisher or fire watch personnel is close by in case of a fire.
- Know how to use and store the welding equipment, including compressed gas cylinders.

What are some general safe work practices to know?

Welders will need to know:

- General information about welding.
- Proper selection, use, maintenance and storage of PPE.

- Confined space entry procedures.
- Fall protection procedures.
- Lock-out / tag-out procedures.
- How to work safely with flammable hazardous products.
- How to work safely with compressed gases.
- How to work safely with power tools.
- Working safely on ladders, and platforms or scaffolds.
- Manual material handling (lifting) techniques.
- Follow appropriate standards when welding boilers, pressure vessels and pressure piping systems.

All workers should:

- Follow company safety rules
- Know about WHMIS and SDSs
- Hazard reporting
- Good housekeeping procedures

Where can I get more information?

Because of the wide variety of workplaces where welding may occur, and the vast range of materials used by welders, all situations cannot be covered in this document.

NOTE: If you have health concerns, ask your doctor or medical professional for advice.

If you have any questions or concerns about your specific workplace, you can ask one or more of the following for help:

- Your health and safety committee or representative.
- Your union.
- Your safety department.
- Your supervisor or manager.
- Check with your local library.
- Your local government department responsible for health and safety.

General information is available in OSH Answers or through the CCOHS person-to-person Inquiries Service.

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