

## EH Resident Competency 1.20

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**Competency 1.20** EH Residents shall demonstrate a familiarity level knowledge of the safety hazards associated with welding.

### 1. Supporting Knowledge and Skills

- a. Describe the operation and specific hazards associated with the following types of welding processes:
  - Shielded
  - Arc
  - Resistance
  - Gas
- b. Identify the confined space precautions and mechanical ventilation requirements for welding activities.
- c. Discuss the fire prevention precautions during welding activities.
- d. Discuss the precautions and requirements for storage and use of compressed gas cylinders used for welding.

### 2. Self-Study Activities (corresponding to the intent of the above competency)

Below are two web sites containing many of the references you may need.

Web Sites		
Organization	Site Location	Notes
Department of Energy	<a href="http://wastenot.inel.gov/cted/stdguido.html">http://wastenot.inel.gov/cted/stdguido.html</a>	DOE Standards, Guides, and Orders
OSHA	<a href="http://www.osha-slc.gov/">http://www.osha-slc.gov/</a>	OSHA documents and search engine
U.S. House of Representatives	<a href="http://law.house.gov/cfr.htm">http://law.house.gov/cfr.htm</a>	Searchable Code of Federal Regulations

You may refer to any available reference when completing the exercises.

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**Read** 29 CFR 1910.252, *Welding, Cutting, and Brazing*.

EXERCISE 1.20-A Describe the specific hazards associated with the following types of welding processes:

- Shielded
- Arc
- Resistance
- Gas

**Read** 29 CFR 1910.252, (c).

EXERCISE 1.20-B Identify the confined space precautions and mechanical ventilation requirements for welding activities.

**Read** 29 CFR 1910.252, *Welding, Cutting, and Brazing*.

EXERCISE 1.20-C Discuss the fire prevention precautions during welding activities.

**Read** 29 CFR 1917.152 (d)(1).

EXERCISE 1.20-D Discuss the precautions and requirements for storage and use of compressed gas cylinders used for welding.

EXERCISE 1.20-E When may frozen compressed gas cylinders be thawed with boiling water?

**Read** 29 CFR 1910.252.

EXERCISE 1.20-F In general welding and cutting, what is the minimum space per welder before mechanical ventilation is required?

### 3. Summary

Welding is a common activity at many sites and facilities, both during new construction and remodeling, and routine maintenance activities. It is also a common source of accident and injury perhaps due to the significantly different types of hazards it produces. Welding, by its nature, offers myriad opportunities for burns resulting from the torch, slag, splattering metal, the welded object, and welding rods. Particular risks to the eyes are present from the molten metal or from flash burns. Any welding activity

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may produce toxic fumes either from the welding equipment, rods, etc., or from the item being welded or its contents. Electrical welding adds the risk of electric shock to the other common hazards. Because of the danger involved, there are many standards regulating the welding site, protective clothing and equipment, and ventilation.

### **4. Exercise Solutions**

EXERCISE 1.20-A Describe the specific hazards associated with the following types of welding processes:

- Shielded
- Arc
- Resistance
- Gas

ANSWER 1.20-A Your answer may vary, but should be substantially similar to this. Fire, toxic fumes, eye damage, and burns are hazards common to all welding processes. Gas welding also has cylinder rupture and explosions as an additional hazard. Arc welding has electric shock as an additional hazard.

EXERCISE 1.20-B Identify the confined space precautions and mechanical ventilation requirements for welding activities.

ANSWER 1.20-B Three key factors govern ventilation during welding, the dimensions of the space in which the welding is to be done, the number of welders, and the possible evolution of hazardous fumes, gases, or dust. Confined spaces present particular hazards and require ventilation to keep the maximum allowable concentration of toxic fumes, gases, or dusts below the maximum allowable concentration (specified in 1910.1000). In confined spaces the gas cylinders and welding machines must be left outside, and heavy portable equipment mounted on wheels must be securely blocked. Lifelines, safety belts, airline respirators, fume collectors, exhaust ventilators, and watchers are also advised or required, depending upon the situation.

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EXERCISE 1.20-C Discuss the fire prevention precautions during welding activities.

ANSWER 1.20-C The two basic classes of fire prevention precautions are dealing with fire hazards and use of fire guards. If the object to be welded or cut cannot be readily moved, then all movable fire hazards in the vicinity should be taken to a safe place. If this is not possible, then fire guards should be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards. Use of fire extinguishers and a fire watch are appropriate in some situations.

EXERCISE 1.20-D What is the minimum separation in storage of oxygen cylinders from fuel gas cylinders and combustible materials?

ANSWER 1.20-D The minimum safe distance is 20 feet or a barrier having a fire-resistance rating of 30 minutes.

EXERCISE 1.20-E When may frozen compressed gas cylinders be thawed with boiling water?

ANSWER 1.20-E “Gas welding and cutting. (1) Compressed gas cylinders: . . . (ix) Shall not be thawed by boiling water;” 29 CFR 1917.152 (d)

EXERCISE 1.20-F In general welding and cutting, what is the minimum space per welder before mechanical ventilation is required?

ANSWER 1.20-F “General. Mechanical ventilation shall be provided when welding or cutting is done on metals not covered in paragraphs (5) through (12) of this section. . . (A) In a space of less than 10,000 cubic feet (284m<sup>3</sup>) per welder.” 29 CFR 1910.252(c)(2)(i)(A)