

# WELDING SAFETY

## PURPOSE

The purpose of this policy is to ensure that employees can safely operate a variety of welding apparatus to connect various metals together.

## SCOPE

This policy applies to all employees operating welding equipment. In addition, this policy applies to any employee assisting individuals with welding equipment or working in an area where welding is being performed.

Secondarily, employees responsible for issuing confined space permits shall ensure they are familiar with welding operations to prevent accidents, injuries, or illnesses.

## RESPONSIBILITIES

The Risk Manager shall develop and implement a Welding Safety Program to ensure the safe operation of welding equipment and to reduce potential fire exposures. The Risk Manager shall also ensure that department heads have the appropriate knowledge and tools available to implement this program. The Risk Manager is responsible for ensuring appropriate training programs are available to department heads and employees.

Department heads are responsible to ensure that employees comply with this policy. Department heads are also responsible to ensure that all welding operations occurring within their department are appropriate and safe. Department heads shall also ensure that any hot work permits are issued appropriately and that no employees enter confined spaces to perform work without prior permits or training. Department heads will ensure that employees attend training related to this program.

Employees have the responsibility to ensure they attend training on this program. Employees also have the responsibility to ensure they have the proper personal protective equipment (PPE) and don the PPE prior to welding. Employees also have a responsibility to attend training and follow confined space procedures if working in confined spaces. Employees operating welding equipment also have the responsibility to ensure they are protecting employees working within the vicinity of their welding operations. At no time shall employees perform a weld without the appropriate firefighting equipment available to them at the location of the weld.

## HOT WORK IN OR ON CONFINED SPACES

All welding work performed in confined spaces shall be subject to the Confined Space Policy and hot work permitting. At no time may an employee perform welding in a confined space without first receiving a hot work permit.

## HOT WORK

Hot work shall only be performed after positive verification that all explosive, flammable, or otherwise combustible gases have been appropriately purged from the tanker vessel. In addition, all liquids or solids which may be subject to explosion or combustion will also be appropriately removed and neutralized prior to any hot work being performed.

## AIRFLOW AND VENTILATION

Active welding can produce toxic fumes known as poisonous plumes. Employees performing welding shall ensure through natural or mechanical ventilation that the appropriate amount of airflow and ventilation is available to remove any hazardous fumes, dusts, or vapors.

Welding stations shall be outfitted with the appropriate welding curtains. Airflow shall be maintained by ensuring that welding curtains have a gap at the bottom and at the top to ensure airflow velocity of 100 lineal feet per minute in the welding zone.

## HAZARD COMMUNICATION

As noted above, toxic substances can be generated or existent during welding operations. These come in many forms:

- A. Beryllium
- B. Cadmium
- C. Chromium
- D. Fluorides
- E. Lead
- F. Mercury
- G. Zinc
- H. Inert-gas metal-arc welding or oxygen cutting of stainless steel

All employees performing welding operations shall receive training and hazard communication. In addition, welding rods and other equipment utilized in the welding process will be subject to the County's Hazard Communication Program. As such, safety data sheets will be maintained on welding

materials. Employees shall read and understand the safety data sheet for the materials they are utilizing.

## PERSONAL PROTECTIVE EQUIPMENT

Welding presents unique personal protective equipment challenges for employees performing welding operations. As such employees will ensure proper personal protective equipment is utilized during the welding operations. This includes tinted lens shields, leather gloves, leather aprons, leather boots, respirators, and the like.

All employees performing welding operations shall also wear fire-resistant clothing and at a minimum all cotton undergarments.

## LENS SELECTION

Welding helmets and the appropriate lens shall be selected based on the type of welding being performed and the materials utilized in that weld. At no time shall an employee perform welding without the appropriate welding hood and proper lens. It is important to understand that the intensity of light generated from welding is considered radiation and as such requires specialized lenses.

Employees should select lenses based on the below table:

TABLE EP-1--FILTER LENS SHADE NUMBERS FOR PROTECTION AGAINST RADIANT ENERGY

Shade	number
Welding operation	
Shielded metal-arc welding 1/16-, 3/32-, 1/8, 5/32-inch diameter electrodes.....	10
Gas-shielded arc welding (nonferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes.....	11
Gas-shielded arc welding (ferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes.....	12
Shielded metal-arc welding 3/16-, 7/32-, 1/4-inch diameter electrodes.....	12
5/16-, 3/8-inch diameter electrodes.....	14
Atomic hydrogen welding.....	10-14
Carbon-arc welding.....	14
Soldering.....	2
Torch brazing.....	3 or 4
Light cutting, up to 1 inch.....	3 or 4
Medium cutting, 1 inch to 6 inches.....	4 or 5
Heavy cutting, over 6 inches.....	5 or 6
Gas welding (light), up to 1/8-inch.....	4 or 5
Gas welding (medium), 1/8-inch to 1/2-inch.....	5 or 6
Gas welding (heavy), over 1/2-inch.....	6 or 8

## 1-4. Lens Shade Selection Table

Process	Electrode Size in. (mm)	Arc Current in Amperes	Minimum Protective Shade No.	Suggested Shade No. (Comfort)*
Shielded Metal Arc Welding (SMAW)	Less than 3/32 (2.4) 3/32-5/32 (2.4-4.0) 5/32-1/4 (4.0-6.4) More than 1/4 (6.4)	Less than 60	7	--
		60-160	8	10
		160-250	10	12
		250-550	11	14
Gas Metal Arc Welding (GMAW) Flux Cored Arc Welding (FCAW)		Less than 60	7	--
		60-160	10	11
		160-250	10	12
		250-500	10	14
Gas Tungsten Arc Welding (TIG)		Less than 50	8	10
		50-150	8	12
		150-500	10	14
Air Carbon Arc Cutting (CAC-A)	Light Heavy	Less than 500	10	12
		500-1000	11	14
Plasma Arc Cutting (PAC)		Less than 20	4	4
		20-40	5	5
		40-60	6	6
		60-80	8	8
		80-300	8	9
		300-400	9	12
Plasma Arc Welding (PAW)		Less than 20	6	6-8
		20-100	8	10
		100-400	10	12
		400-800	11	14

Reference: ANSI Z49.1:2012

\* Start with a shade that is too dark to see the weld zone. Then, go to a lighter shade which gives a sufficient view of the weld zone without going below the minimum.

## FIREFIGHTING MEASURES

Prior to performing any welding operation, the employee shall ensure that the appropriate firefighting measures are in place and ready to deploy in the event a fire results from the weld. Firefighting measures can include fire extinguishers which should be of the appropriate D class for metals. In addition, ABC fire extinguishers may be required and should be available for nearby objects that may catch fire as a result of welding operations.

All flammable items should be removed from the welding area to ensure that no accidental ignition is created. Where those items cannot be removed such as fixed structures, they may be covered with a fire blanket. Fire blankets may be utilized and placed over items which cannot be removed from the area.

Where serious risks of fire exist, the welding employee shall ensure that a secondary employee acting in a fire watch capacity is at the ready to extinguish any fire that may result.

## TRAINING

All employees performing welding operations, performing fire watch duties, or assisting with the welding operation shall attend the appropriate welding training. In addition, employees shall attend hazard communication training and fire extinguisher training.

## DISCIPLINE

Employees failing to comply with this policy may be subject to disciplinary action in accordance with County union agreements and County policy.

## RECORDKEEPING

All records related to this policy will be kept in accordance with the County Record Retention Policy and its Injury and Illness Prevention Program.

## REFERENCES

<u><i>Agency</i></u>	<u><i>Section</i></u>	<u><i>Link</i></u>
Cal-OSHA	Title 8	<a href="https://www.dir.ca.gov/samples/search/query.htm">https://www.dir.ca.gov/samples/search/query.htm</a>
Cal-OSHA	Article 90	<a href="https://www.dir.ca.gov/title8/sb7g11a90.html">https://www.dir.ca.gov/title8/sb7g11a90.html</a>