

## **WELDING, CUTTING, & BRAZING (PWD & MECHANICS)**

### **OBJECTIVES**

- Staff will learn safe practices, regulatory requirements, and policy.
- Upon completion, staff will inspect equipment.

### **INTRODUCTION**

Welding, cutting, and brazing are hazardous activities that pose a combination of both safety and health risks to more than 500,000 workers in a wide variety of industries. General hazards of welding include impact, penetration, harmful dust, smoke fumes, heat, and light radiation.

### **TYPES OF WELDING**

- Gas Welding
  - The energy for gas welding comes from the combustion of a fuel and oxygen or air.
  - A few of the most popular fuels are acetylene, mapp gas, and hydrogen.
  - Gas welding is slower and easier to control than electric arc welding; gas welding is often used in applications such as general maintenance work, brazing and soldering.
- Arc Welding
  - The arc energy is provided by a power supply unit that furnishes direct or alternating current.
  - When the arc is struck using a coated electrode, the intense heat melts the top of the electrode.
- Oxygen and Arc Cutting
  - The most common cutting processes are:
  - Oxygen Cutting; metal is heated by a gas flame and an oxygen jet does the cutting.
  - Arc Cutting; intense heat of electrode arc melts away the metal.

### **ARC WELDER SAFETY**

- Electrode holders when not in use shall be placed so they cannot make electrical contact with persons, conducting objects, fuel or compressed gas tanks.

- Cables with splices within ten feet of the holder shall not be used; cables need to be replaced.
- The welder should not coil or loop the welding electrode cable around parts of their body.
- Employees should report any equipment defect or safety hazard to their supervisor; the equipment should not be used until proper repairs have been made (repairs should be made only by qualified individuals).
- Equipment that has become wet needs to be thoroughly dried and tested before being used.
- Cables with damaged insulation or exposed conductors shall be replaced (they cannot be repaired with electrical tape).
- Electrodes must be removed from holder when the welder is not in use and welder should be disconnected from the power source.

## **GAS WELDING SAFETY**

- Inspect equipment for leaks at all connections using an approved leak test solution (soapy water will also work).
- Check hoses for leaks and work areas; replace damaged hoses.
- Protect hoses and cylinders from sparks, flames, and hot metals.
- Use the proper igniter to light the flame (do not use a match or cigarette).
- Securely chain cylinders.
- Store extra gas and oxygen cylinders separately.
- Open cylinder valves slowly to keep sudden high pressures from exploding at the regulators.
- Open and light acetylene valve first, then open and adjust oxygen; when shutting off, close the acetylene valve first.
- When finished, bleed the lines to take pressure off the regulators.

## **PERSONAL PROTECTIVE EQUIPMENT (PPE)**

- Eye and Face Protection:
  - Proper eye and face protection varies depending on the task being performed; helmet, face shield, goggles and safety glasses are acceptable protection in most applications.

- Helmets should protect the face, forehead, neck, and ears to a vertical line behind the ears.
- Helmets with filter lenses (must meet ANSI Standards) and cover plates shall be used by welders and anyone who is assisting or observing the welding being done.
- Protective Clothing:
  - Clothing shall provide sufficient coverage and be made of suitable materials to minimize skin burns caused by sparks, splatter or radiation; covering all parts of the body is recommended to protect against ultraviolet and infrared ray flash burns.
  - All welders and cutters are required to wear protective flame-resistant gloves, such as leather welder's gloves.
  - Other protective clothing would include flame resistant aprons.

## **VENTILATION**

- Proper ventilation can be obtained either naturally or mechanically.
  - Natural Ventilation – This is considered sufficient for welding, cutting, and brazing if the work area meets these requirements:
    - Space of more than 10,000 square feet is provided to the welder
    - A ceiling height of more than 16 feet
    - Welding is not done in a confined space
    - Welding area does not contain structured barriers or partitions obstructing cross ventilation.
- Mechanical Ventilation – If the welding job and area does not fall within the natural ventilation guidelines, mechanical ventilation is required.

## **POLICY**

*Discuss policy related to welding, cutting and brazing.*

## **CLOSING**

- *Staff should review and understand all organization's policies related to welding, cutting and brazing.*
- *Encourage discussion about the presentation.*
- *Upon completion, staff should inspect equipment for hazards.*