

## **WELDING, CUTTING & BRAZING**

### **1.0 PURPOSE**

The purpose of this policy is to establish standards for welding, cutting, brazing and burning operations for the City of Wilson. This policy will meet the requirements as set forth by 29 CFR 1910.252.

### **2.0 ORGANIZATIONS AFFECTED**

This policy applies to all employees and visiting contractors while working and providing services throughout all work sites under the authority of the City of Wilson. This policy will regulate not only welding and cutting, but all forms of spark or heat producing operations occurring in work areas where the potential for ignition or combustion of materials is possible.

### **3.0 RESPONSIBILITIES**

3.1 Management will be responsible for the safe usage of welding and cutting equipment.

3.1.1 A Hot Work Permit will be filled out when performing welding/brazing where danger may exist as set forth in this policy.

3.1.2 The Superintendent/Manager or designee, will authorize welding and cutting operations.

3.2 The Superintendent/Manager will ensure that welders or cutters are suitably trained in the safe operation of their equipment and the safe use of the process.

3.3 The Project Coordinator will inform all contractors about flammable materials or hazardous conditions and ensure a safety briefing has been given to the main contracting manager or foreman.

3.4 The Supervisor and employees will be responsible for the following:

3.4.1 Safe handling of the welding or cutting equipment and the safe use of the welding or cutting process.

3.4.2 Determining the combustible materials and hazardous areas present or likely to be present in the work location.

3.4.3 Protecting combustibles from ignition by the following:

3.4.3.1 Have the work moved to a location free from dangerous combustibles,

3.4.3.2 If the work cannot be moved, have the combustibles moved to a safe distance from the work or have the combustible properly shielded against ignition,

- 3.4.3.3 Monitor air and properly ventilate the working space of toxic or flammable gasses or vapors prior to work, or
- 3.4.3.4 See that welding and cutting are so scheduled that facility operations that might expose combustibles to ignition are not started during welding or cutting.
- 3.4.4 Securing authorization for welding or cutting operations from the designated management representative.
- 3.4.5 Ensuring that the welder secures his approval that conditions are safe before going ahead.
- 3.4.6 Ensuring that fire protection and extinguishing equipment are properly located at the site.
- 3.4.7 Ensuring that fire watchers are on the site when they are required.
- 3.5 All supervisors, employees, and contractors performing welding/cutting/brazing will be trained in the proper procedures. The training program will include topics covered in Section IV of this policy.
- 3.6 Safety procedures and hazards associated with specific areas of the City of Wilson sections, will be reviewed with all employees and contractors performing welding & cutting work on site.
- 3.7 Welding/cutting/brazing in a posted confined space will require securing a confined space permit in addition to a Hot Work Permit.

## 4.0 PROCEDURES

### 4.1 BASIC PRECAUTIONS

- 4.1.1 To prevent inadvertent fire damage, employees will provide a safe area to weld or grind in accordance to specific steps. The basic precautions for fire prevention in welding or cutting work are listed below and should be followed in the order listed.

Step 1:

If the object to be worked on cannot readily be moved, all movable fire hazards such as solids, liquids, or gases in the vicinity, will be ventilated or objects taken to a safe place.

Step 2:

If objects to be worked cannot be moved *and* if all fire or explosion hazards cannot be removed, then guards will be used to confine the heat, sparks, and slag, and protect the immovable fire hazards.

### NOTICE

**If the requirements stated in steps 1 and 2 above cannot be followed, then welding/cutting/brazing will not be performed.**

- 4.1.2 Wherever there are floor openings or cracks in the flooring that cannot be closed, precautions will be taken so that no readily combustible materials on the floor below will be exposed to sparks which might drop through the floor. The same precautions will be observed with regard to cracks or holes in walks, open doorways, and open or broken windows.
- 4.1.3 Fire extinguishing equipment will be maintained in a state of readiness for instant use.

## 4.2 **FIRE WATCHERS**

- 4.2.1 Fire watchers will be required whenever welding/cutting/brazing is performed where any of the following conditions exist:
  - 4.2.1.1 Appreciable combustible material in building construction or contents that is closer than 35 feet to the point of operation.
  - 4.2.1.2 Appreciable combustible materials are more than 35 feet away but are easily ignited by sparks.
  - 4.2.1.3 Wall or floor openings within a 35 foot radius which expose combustible material in adjacent areas concealed spaces in walls or floors, and
  - 4.2.1.4 Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.
- 4.2.2 Fire watchers will:
  - 4.2.2.1 Have fire extinguishing equipment readily available and be trained in its use.
  - 4.2.2.2 Be familiar with facilities for sounding an alarm in the event of a fire.
  - 4.2.2.3 Watch for fires in all exposed areas, try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm.

## 4.3 **RESTRICTIONS**

Welding/cutting/brazing **will not** be permitted in the following situations:

- 4.3.1 In areas not authorized by the Superintendent/Manager.
- 4.3.2 In sprinkler buildings while such protection is impaired.
- 4.3.3 In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids, or dust with air), or explosive atmospheres that may develop inside uncleaned or improperly prepared tanks or equipment which have previously

contained such materials, or that may develop in areas with an accumulation of combustible dust.

4.3.4 In any posted CONFINED SPACE without first securing a CONFINED SPACE PERMIT.

4.3.5 In areas near the storage of large quantities of exposed, readily ignitable materials.

#### 4.4 **PROTECTION OF PERSONNEL**

Personal Protective Equipment Requirements:

4.4.1 A welder or helper working on platforms, scaffolds, manholes, or runways will be protected against falling. This may be accomplished by the use of railings, safety belts, life lines, or some other equally effective safeguards.

4.4.2 Helmets or hand shields will be used during all arc welding or cutting operations. Helpers or standby persons will be provided with eye protection that is approved for welding.

4.4.3 Goggles or other suitable eye protection will be used during all gas welding, oxygen cutting, and/or brazing operations.

4.4.4 All operators and attendants of welding, brazing, burning equipment are required to use transparent face shields or goggles, depending on their particular job. This is to protect their faces and/or eyes.

4.4.5 Helmets and hand shields will be worn by employees to protect the face, neck and ears from direct radiant energy from the arc.

4.4.6 Goggles will be ventilated to prevent fogging of the lens as much as practicable.

4.4.7 Employees exposed to the hazards created by welding, cutting, brazing or burning operations will be protected by personal protective equipment. Personal protective clothing is required for all welding operation and will vary with the size, nature, and location of the work to be performed.

#### 4.5 **SAFE WELDING AND CUTTING PRACTICES**

4.5.1 Each operator will be acquainted with the welding equipment and its safe operation, the gases to be used, and the materials to be worked on before any welding or cutting is done.

4.5.2 All fittings, hose connections, regulators, valves, and safety devices must be checked for leaks and proper working condition. Soap suds (never open flame) should be used for leak detection tests.

- 4.5.3 Hose, valves, regulators and other apparatus must be kept clean. In no case should oil or grease be permitted to come in contact with any portion of the oxygen equipment.
- 4.5.4 When parallel lengths of oxygen and fuel hose are taped together for convenience, and to prevent tangling, not more than 4 inches out of 12 will be covered by tape.
- 4.5.5 Hose connections will be clamped or otherwise securely fastened in a manner that will withstand, without leaking, twice the pressure they are normally subjected to, but in no case less than 300 psi.
- 4.5.6 Hoses showing leaks, burns, worn places, or other defects must be repaired or replaced before being used.
- 4.5.7 The generally recognized colors are: red for acetylene and other fuel gas hoses, green for oxygen hoses, and black for inert gas, an air hose.
- 4.5.8 Pressure from cylinders should be reduced through regulators designed and marked for the product being used.
- 4.5.9 Matches or hot metal will not be used to light a torch. A friction lighter or pilot is the only safe method.
- 4.5.10 All torches must have flash back protection installed to prevent flash back into the torch and/or cylinders.
- 4.5.11 Acetylene will never be used at pressures in excess of 15 psi unless special job requirements dictate otherwise.
- 4.5.12 Suitable eye, face and body protection must be worn at all times.
- 4.5.13 Adequate protective clothing should be used as the job requires.
- 4.5.14 Cylinder valves should be opened slowly and keys or handles should be left on the valve stem while in service. Operators must stand clear of the face of the regulators when cracking a cylinder valve.
- 4.5.15 Only approved wrenches will be used. Valves must not be hammered or forced open.
- 4.5.16 All cylinders will be securely fastened to a cart, or other carrier, in an upright position during and after use.
- 4.5.17 The acetylene and oxygen hose should never be left inside tanks, vessels or enclosed areas when not in use.
- 4.5.18 Proper fire extinguishing equipment must be readily available at all times. Work should be supported on non-combustible material.
- 4.5.19 Proper ventilation must be provided or respiratory equipment used when brazing or welding where toxic fume conditions are present.

- 4.5.20 Welding or cutting must never be done in an explosive or fire hazardous area. Tanks or manholes which have contained flammable materials should be thoroughly purged or ventilated and instrument tested before welding or cutting.
- 4.5.21 Atmospheric conditions must be checked at least hourly for combustible levels.

## 5.0 EYE PROTECTION GUIDELINES

- 5.1 Employees performing welding/brazing operations are required to wear the appropriate personal protective equipment (PPE) for the eyes. This policy also applies to all apprentices and helpers assisting in welding tasks.
- 5.2 The following table provides guidelines on the filter lens requirements as related to specific welding types.

### FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY

Operation Shade (Comfort)	Electrode Size inches (mm)	Arc Current (Amps)	Minimum Protective Shade	Suggested Number
<i>Shielded metal arc welding</i>	< 3 in. (< 2.5 mm)	< 60 amps	7	7
	3-5 in. (2.5-4 mm)	60-160 amps	8	10
	5-8 in. (4-6.4 mm)	160-250 amps	10	12
	> 8 in. (> 6.4 mm)	250-550 amps	11	14
<i>Gas metal arc welding &amp; flux cored arc welding</i>		< 60 amps	7	7
		60-160 amps	10	11
		160-250 amps	10	12
		250-550 amps	10	14
<i>Gas tungsten arc welding</i>		< 50 amps	8	10
		50-150 amps	8	12
		150-500 amps	10	14
<i>Air carbon arc cutting</i>	(Light)	< 500 amps	10	12
	(Heavy)	500-1000 amps	11	14
<i>Plasma arc welding</i>		< 20 amps	6	8
		20-100 amps	8	10
		100-400 amps	10	12
		500-800 amps	11	14
<i>Plasma arc cutting</i>	(Light)	< 300 amps	8	9
	(Medium)	300-400 amps	9	12
	(Heavy)	400-800 amps	10	14

## 6.0 RESPONSIBILITIES FOR HOT WORK PERMIT SYSTEM:

### 6.1 Superintendent/Manager will:

- 6.1.1 Inspect area for which permit will apply and ensure all precautions listed on permit have been performed.
- 6.1.2 Sign Permit in "Permit Approval" block authorizing work.
- 6.1.3 Perform final inspection 30 minutes after last welding or cutting work was performed, examining for any signs of sparks, open flame, or combustion.
- 6.1.4 Retain original copy for file.

### NOTICE

Superintendent/Manager may authorize designees to perform the above duties. Designees may only be: Supervisors, Foremen, Engineers. **Original copy of Hot Work Permit must still be forwarded to Superintendent/Manager for file when work is completed.**

### 6.2 Welder/Cutter will:

- 6.2.1 Obtain permit for any hot work to be performed.
- 6.2.2 Fill out top section of Hot Work Permit.
- 6.2.3 Post Hot Work Permit at work area.
- 6.2.4 Provides a Fire Watch individual for all work meeting requirements as set in Section IV B, "Fire Watchers."
- 6.2.5 Leave Hot Work Permit in work area up to 30 minutes after work has completed for fire watch notification.
- 6.2.6 Return Hot Work Permit to Section Head/Manager (or designee) for final inspection of area.

### 6.3 Fire Watch will:

A fire watch will be provided and trained in accordance with Section IV, "Fire Watchers."