

PROCEDURES

STEEL PIPE WELDING - GENERAL

3.0 PURPOSE (192.245)

It is the purpose of this section to provide the procedures and requirements that must be used when safely performing welding. **Weld procedures shall conform to API 1104.**

There are a number of inherent hazards in the use of welding and cutting apparatus. It is, therefore, necessary that proper safety and operating procedures be understood prior to the use of such apparatus. Read the following thoroughly and carefully before attempting to operate welding and cutting apparatus. A thorough understanding of the proper safety and operating procedures should always be practiced.

3.1 SCOPE

- A. Welding Safety
- B. Equipment Care
- C. Work Area
- D. Fire Protection
- E. Requirements
- F. Segments

3.2 GENERAL SAFETY

The following precautions shall be taken prior to and during welding operations:

- A. Welders will be responsible during welding operations to ensure all Operator safety regulations and equipment are at the job site and used by other workers.
- B. Appropriate safety equipment must be worn by welders and anyone working near them. Caution must be exercised to protect the public from eye injuries at all times.
- C. No welding shall be performed on a main or service while under pressure test.
- D. Crew leaders shall assure themselves that no gas or gas-air mixture is present in the excavation before the welder begins work by using a CGI in confined areas. Flashing and sounding the bell hole with an acetylene torch is acceptable.

NOTE: The flashing and sounding procedure for a bell hole will be performed as follows:

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1. Light torch with a neutral flame and then pass the torch around the entire excavation.
 2. Turn torch off and turn on acetylene gas only. Pass torch around entire excavation. If torch does not light, it is safe to enter the excavation.
- E. When welding or cutting work is conducted in areas involving buildings and combustibles, special precautions must be taken to prevent possible fire from sparks.
- F. No welding on a given line shall be done within 12" of a transition fitting unless specifically authorized by a field supervisor. Plastic pipe shall be protected from welding sparks or open flame with wet rags.
- G. No welding on a given line shall be done within 12" or 1 pipe diameter, whichever distance is greater, of a line stopper fitting.

3.3 EQUIPMENT CARE AND SAFETY

A. Qualifications for Using Welding Equipment

Welders may use any welding equipment for which they have been properly trained and qualified. Welder helpers shall be under the direction and supervision of the welder.

B. Care of Equipment

Oil or grease of any kind shall never be used on any regulator, torch, hose, tank or other equipment used in acetylene welding. Extreme care shall be used to prevent any kind of oil or grease from accidentally contacting acetylene welding equipment.

C. Storing and Using Acetylene Tanks

Acetylene tanks shall be used and stored in an upright position. This is to prevent the liquid (acetone) from flowing from the tank.

D. Transporting Oxygen and Acetylene Tanks

Oxygen and acetylene tanks shall be handled with care. When being moved, except

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in carts and racks, gauges must be removed and the valve caps screwed on tight.

E. Opening Acetylene Tanks

Acetylene tank valves shall not be opened more than one turn.

3.4 WORK AREA

- A. The work area must have a fireproof floor of concrete or dirt.
- B. Heat-resistant shields or other approved material should be used to protect nearby walls or unprotected flooring from sparks and hot metal.
- C. Adequate ventilation is required to prevent the concentration of oxygen and toxic fumes. It is important to remember that oxygen itself will not burn, but the presence of pure oxygen will serve to accelerate combustion and cause materials to burn with great intensity. **OIL AND GREASE IN THE PRESENCE OF OXYGEN CAN IGNITE AND BURN VIOLENTLY.**
- D. Steel benches or tables to be used during oxy-fuel processes must have fireproof tops.
- E. Oxygen and fuel gas cylinders should be chained or otherwise secured to wall, bench, post, cylinder cart, etc., to protect them from falling and to hold them in an upright position.
- F. When welding or cutting on equipment, the fuel tank shall be protected.

NOTE: Before welding on equipment, refer to manufacturer's manual for any welding restrictions. Welding on equipment shall be performed by qualified welder utilizing the proper welding rod for that application.

- G. Welding and cutting shall not be done within 3' of oxygen or acetylene tanks or around any combustible material such as grass, lumber, poles, or other material that might catch fire.

3.5 FIRE PROTECTION

- A. Fire protection should be practiced whenever oxy-fuel operations are in process. A

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few simple precautions can prevent most fires and minimize damage in the event a fire does occur. The following rules and safety procedures should always be practiced:

1. Never use oil or grease on or around any oxy-fuel apparatus. Even a trace of oil or grease can ignite and burn violently in the presence of oxygen.
 2. Keep flames and sparks away from cylinders and hoses.
 3. Flying sparks can travel as much as 35', so move combustibles a safe distance away from areas when oxy-fuel operations are to be performed.
 4. Use approved heat-resistant shields to protect nearby walls, floors and ceilings.
- B. The operator should protect himself from sparks, flying slag, electric arc, or flame brilliance at all times. Select welding lens with correct tempered shade for particular welding process to protect eyes from injury and to provide good visibility of the work.

Protective gloves, sleeves, aprons, and shoes should be worn to protect skin and clothing from sparks and slag. **KEEP ALL CLOTHING AND PROTECTIVE APPAREL ABSOLUTELY FREE OF OIL OR GREASE.**

- C. When working in holes, manholes or vaults, welders shall be assisted by a helper. If they are not needed in the bell hole or the ditch, they shall remain on top of the excavation to attend the welder and watch for fire, cave-in, etc.
- D. When performing a Fire Control Tie-in the following shall be followed:
1. Have at least two 20-pound dry chemical fire extinguishers at the job during the entire operation.
 2. Before starting welding or cutting operations, flash bell hole before entering.
 3. During fire control tie-in operation allow only the minimum number of personnel in bell hole.
 4. Personnel shall wear appropriate protective clothing to protect against burns and flashes. At a minimum, safety equipment for welders shall include:
 - Eye protection
 - Hand protection
 - Ear protection

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In addition to the minimum, body protection (leather uppers and apron) may also be used.

- E. Pressure gauges shall be monitored at all times during entire operation.

3.6 REQUIREMENTS

- A. Field welding shall be done only by qualified welders using one or more of the API 1104 qualified weld procedure, **Section D-4**.
- B. Welding shall not be done when the quality of the completed weld may be impaired by the prevailing weather conditions, including airborne moisture, blowing sand, or high winds. The field supervisor or welder shall decide if weather conditions are suitable for welding.
- C. Pipe welding (butt welds), up to and including 8" IPS, will be done by the arc welding process.
- D. Short sections of pipe, such as those needed for tie-ins or to facilitate back welding should be at least 1 pipe diameter in length.
- E. Visual Inspection of **all** production welds shall be conducted by individuals qualified by appropriate training or experience to ensure that the welds are of high quality and that the welding is performed in accordance with the welding procedures.
- F. Nondestructive testing:
 - a. Shall be required over entire circumference of pipe, for pipelines 6 inches in diameter and greater to be operated at pressures that produce a hoop stress of 20% or more of SMYS
 - i. Class location 1, Minimum 10%
 - ii. Class location 2, Minimum 15%
 - iii. Class locations 3 and 4, railroad, river and highway crossings, 100% unless impractical in which case a minimum of 90% is required
 - iv. Tie-ins, 100 %
 - v. Records shall be retained for the life of pipeline
 - b. Shall **not** be required:
 - i. Where welds have been visually inspected by a qualified individual and,
 - ii. Pipeline is less than 6" in diameter
 - iii. Pipelines is operated at a pressure that produces a hoop stress of less than

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40% SMYS, and the number of welds are so limited that nondestructive testing is impractical

- G. The criteria for visual, destructive and nondestructive inspection shall be the requirements set forth by Section 9 of the API 1104 Standards.

3.7 SEGMENTS

Factory-wrought steel welding elbows or transverse segments cut from the elbows may be used for all angles in steel pipe. Segments shall be cut perpendicular to the tangent of the welding elbow. The arc length measured along the crotch of transverse segments of welding elbows shall be at least 1" on pipe sizes 2" - 8". The minimum segment size for each diameter welding elbow is shown in Table 2.

TABLE 2

Minimum Welding Elbow Segment Size *

Nominal Diameter <u>Inches</u>	Minimum Arc Length <u>(Degrees)</u>
2	32
3	21
4	16
6	11
8	8

* Based Upon: 1" along crotch on sizes 2" - 8"

The elbow selected for use shall have a design pressure equal to or greater than the intended operating pressure of the piping system.

Welding elbows and segments whose nominal wall thickness is different than the wall thickness of the pipe or fitting to which they are to be joined shall meet the end preparation requirements of this section.