

WELDING AND/OR CUTTING
CERTIFICATE OF FITNESS
STUDY GUIDE



OFFICE OF THE FIRE MARSHAL
NASSAU COUNTY, NEW YORK
(516) 573-9901

(revised 5/2017)

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NOTICE:

The information presented and contained within this study guide is believed to be correct and is presented in good faith to assist persons, business entities, groups and/or corporations to plan for and use safe practices in the area of welding and/or cutting operations. The guide and the subject matter therein are believed to be correct as of the date of this publication.

The Office of the Fire Marshal (Nassau County) is an agency with code enforcement, fire prevention, and law enforcement responsibilities, working as a governmental entity for public safety within the County of Nassau. The Fire Marshal makes no representations or warranties as to the completeness or accuracy of the information presented. The act of welding and/or cutting is a skill that requires training. The training required to perform welding and/or cutting is the responsibility of each person doing such work, and their employer.

It is not the purpose of the welding and/or cutting Certificate of Fitness to evaluate the skill of any person performing these procedures. It is not to evaluate how good a weld or cut a person can do. It is a concern of the Office of the Fire Marshal that any person and business performing welding and/or cutting do so in a safe manner so as to protect life and property.

The Office of the Fire Marshal does not endorse or promote the products, merchandise, or services of any particular business or group involved in the welding and/or cutting business, or supplying such equipment. However, equipment that is available from numerous suppliers should meet the specification standards and testing as set forth by nationally recognized testing organizations, such as Underwriters' Laboratories, Inc or Factory Mutual [Engineering Division]. For further information on regulations and/or standards regarding welding and/or cutting, you may wish to consider contacting the following;

U.S. Department of Labor
Occupational Safety and Health Administration
Long Island Area Office
1400 Old Country Road, Ste 208
Westbury, New York 11590
(516) 334-3344
(516) 334-3326 FAX

National Fire Protection Association (NFPA)
I Batterymarch Park, PO Box 9 101
Quincy, MA 022619
(800) 344-3555

WELDING AND/OR CUTTING CERTIFICATE OF FITNESS

Welding and cutting processes may use gas (oxy-fuel gas flame) or electric (electric arcs), and these processes are a necessary part of our industrial world. Too often, the person(s) who use, hire, or supervise the use of welding and/or cutting processes do not fully appreciate that improper use can and has resulted in the loss of life and property by fire or explosion. Approximately six percent (6%) of fires at industrial properties and many fires in other properties have been caused by welding and/or cutting, primarily with portable equipment in areas not specifically approved or designed for such work. Cutting and certain arc welding operations produce thousands of ignition sources in the form of sparks, heat and hot slag. Electric arcs or gas flames and hot work pieces are also potential ignition sources.

Personnel performing welding and/or cutting, as well as those who supervise these operations and management, are responsible to be familiar with applicable standards, rules and regulations relating to such operations. It is the responsibility of management to instruct employees in safe methods, to know the standards and laws, and make sure employees are protected. These standards and regulations include, but are not limited to the Nassau County Fire Prevention Ordinance, OSHA Subpart Q - 29 CFR 1910. 252, and the National Fire Protection Association (NFPA) Standard 51- 2013 / 51-B- 2014.

There are numerous welding and/or cutting operations and techniques, and each of them has hazards. Welding generates extreme heat that can cause fire and explosion. Compressed gas tanks, if not properly handled or safeguarded, can explode; or suffer physical stress that may cause damage, serious injury, or death. Gas flame and electric arc exposure can burn the skin and damage the eyes. Breathing fumes and gases can damage your lungs or lead to other health problems. Gases produced include nitrogen dioxide, carbon monoxide and ozone.

GENERAL REQUIREMENTS FOR ALL WELDING AND/OR CUTTING

Fire Prevention and Protection

Welding and/or cutting can cause fire and explosion if it is not done properly. The electric arc and gas flame produces tremendous heat; compressed gas tanks can explode if not handled properly and employees can suffer severe burns or other injuries from these processes.

Welding and cutting can only be done in fire safe areas. Combustible materials (materials that may burn) must be moved at least thirty-five (35) feet from any welding. Combustibles on the floor must be swept up or swept at least thirty-five (35) feet away from the welding and/or cutting. Floors in areas where welding and/or cutting are being done shall be clean, free from oil and, if of wooden construction shall be covered with fire resistive material.

Cutting and/or welding shall be permitted (allowed) ONLY in areas that are approved by an authorized person, and the welder, before such work begins.

Within an operating plant or building, the cutting and/or welding work area shall be either:

- (1) a specific area designed or approved for such work, like a maintenance shop or a detached outside location that is either of noncombustible or fire-resistive construction [essentially free of combustible and flammable contents and separated from adjacent areas], or
- (2) where work cannot practically be moved (like in much of construction work), an area made fire safe by removing combustibles or protecting combustibles from ignition sources. Cracks or openings in floors, holes in walls, open doorways and broken windows must all be covered to prevent sparks from igniting other spaces.

Cutting and/or welding **SHALL NOT** be permitted:

- (a) In areas not authorized by management prior to such work
- (b) In sprinklered buildings while such (fire) protection system is impaired (not working or of questionable readiness to work);
- (c) in the presence of explosive atmospheres or possible explosive atmospheres (e. g. , mixtures of flammable gases, vapors, liquids, or dusts within air) or explosive atmospheres that can develop inside uncleaned or improperly prepared drums, tanks, or other containers and equipment that have previously contained such materials or that can develop in areas with an accumulation of combustible dusts.
- (d) in areas near the storage of large quantities of exposed, readily ignitable materials.

Personal Precautions

Workers should wear appropriate clothing for welding/cutting operations. Flame resistant gloves and aprons, helmets or goggles, and safety shoes are recommended. Also, clothing with pockets or cuffs should not be worn while working. Sparks or pieces of hot metal might catch in the cuffs or pockets.

Other Precautions

1. A suitable, maintained fire extinguisher must be available for use. Suitable generally means the proper type and size of extinguisher for the class or type of material that may ignite if problems develop. Maintained means charged, tagged to show last service date (must within 1 year of marked date), and meeting the standard for extinguishers as adopted in Nassau County - NFPA Standard # 10 - 2013. The person or persons involved in any welding and/or cutting operation who may be expected to use an extinguisher in case of fire, shall be trained in the proper use of the extinguisher(s) on hand. The minimum rating on the fire extinguisher is 2-A, 20-B:C and must be within thirty (30) feet of the cutting and/or welding.
2. The individual responsible for authorizing welding and/or cutting operations shall inspect the authorized area before such operations begin, and at least once per day while said operation continues.
3. Where the area in which welding and/or cutting operations are accessible to persons other than the operator of the equipment, conspicuous signs must be posted to warn others before they enter the work area. Signs should read, "CAUTION – HOT WORK IN PROGRESS – STAY CLEAR. "
4. When there is arc welding, the welder must be protected from shock.

5. When welding or cutting near combustible walls, ceilings or roofs, they must be covered with fire resistant covers.
6. Combustibles on the other side of non-combustible walls, partitions, ceilings, or roofs must be moved to prevent ignition.
7. Before cutting or welding, hollow spaces, cavities or containers must be vented and purged to eliminate dangerous gases.

WELDING AND/OR CUTTING : REQUIREMENTS FOR A FIRE WATCH

A "Fire Watch" is an employee or employees exclusively (only) assigned to make sure that welding sparks do not ignite combustible surfaces while another employee is welding.

A "Fire Watch" is required when:

- (a) Covered combustibles are closer than 35 feet from the area of welding and/or cutting;
- (b) Easily ignitable combustibles are more than 35 feet from welding and/or cutting;
- (c) Welding is being performed on one side of a metal partition, wall, ceiling, or roof and there are combustibles on the other side;
- (d) A major fire may develop (locations other than where a minor fire might develop); or
- (e) Wall or floor openings are within a 35-foot radius of welding and/or cutting, and expose combustible material in adjacent areas.

"Fire Watch" personnel must

- (a) have fire extinguishing equipment available and know how to use it;
- (b) know the facility layout and how to report a fire;
- (c) keep watch at least one-half hour after welding and/or cutting is completed.

GENERAL REQUIREMENTS FOR OXYGEN - FUEL GAS WELDING AND/OR CUTTING

1. Only Underwriters Laboratory (UL), Factory Mutual (FM), or American Welding Society (AWS) torches, regulators, pressure reducing valves, acetylene generators and manifolds can be used.
2. Under no circumstances can acetylene be generated, piped (except in approved cylinder manifolds) or utilized at a pressure in excess of fifteen (15) psig [pounds per square inch gauge] or thirty (30) psia [pounds per square inch absolute]. Acetylene is very unstable at pressures above 15 psig and 30 psia and could decompose with a violent explosion.
3. Mixtures of fuel gases and air or oxygen are prohibited at the torch or burner.

Cylinders and Containers

Compressed gas cylinders present certain hazards. If compressed gas cylinders are knocked over, all their powers can be unleashed through an opening no larger than a pencil. Under certain conditions, these cylinders can take off like a missile; they can smash through brick walls or ricochet and crash through anything in its path. Oxygen cylinders can be pressurized at 2200 pounds per square inch (psi). They are made of steel and contain 100% oxygen. The cylinder is painted green and has the word "OXYGEN" on it. Acetylene cylinders are made of steel, painted black and have the word "ACETYLENE" on them. They have a special honeycomb material inside the cylinder. The cylinder also contains acetone. The acetylene is dissolved in the acetone. The dissolved acetylene is stored at pressures up to 250 psi. This high pressure is needed to keep a sufficient amount of acetylene available for torch operations. The acetylene could not be stored at this pressure if the honeycomb material and the acetone were not present.

Storage of Cylinders

1. Cylinders must be kept away from radiators and other heat sources.
2. Cylinders stored indoors must be protected, ventilated and kept in dry locations at least twenty (20) feet from highly combustible materials.
3. Cylinders are to be stored away from elevators, stairs, or path of exit where they may obstruct safe exit in case of emergency, or where they can be knocked over, damaged or subject to tampering.
4. Valves must be closed on "empty" cylinders to prevent residual gas leak.
5. Indoor fuel gas cylinder such as acetylene storage is limited to a total of 2,000 cubic feet gas capacity, unless attached for use. A separate room or compartment must be provided for storage in excess of 2,000 cubic feet total cylinder capacity.
6. Oxygen and acetylene cylinders must be adequately secured against tipping and/or falling. A non-combustible material should be used to secure the cylinder to a substantial object.
7. Protective caps, collars or similar devices must be in place to protect valves from physical damage.
8. Oxygen and acetylene cylinders (empty or full) must not be stored together. Cylinders must be either:
 - a. Separated by a distance of twenty (20) feet; or
 - b. Isolated by a non-combustible partition extending not less than 18 inches above and to the sides of the cylinders; or
 - c. Stored in separate compressed gas cabinets or exhausted enclosures.
9. Cylinders must be properly labeled as to their contents with both accepted color-coding and the name of the material.

PROPANE and other Liquefied Petroleum Gases (i. e. Butane) shall **NOT** be stored within a structure in Nassau County. Persons using propane and other applicable liquefied petroleum gases should be familiar with the requirements of Article VI of the Nassau County Fire Prevention Ordinance.

Cylinders in Use

1. Acetylene or other gas cylinders and the attendant oxygen cylinders used for welding or cutting shall be fastened in place or shall be attached to a carrier provided with wheels and handles for easy transportation.
2. Cylinders, valves, couplings, regulators, hose and apparatus must be kept free from oily and greasy substances. Oxygen cylinders or apparatus must not be handled with oily hands or gloves.
3. Cylinders must not be roughly handled or struck or be allowed to strike each other. Cylinder valve(s) could be damaged causing the cylinder to become a missile that could penetrate steel or concrete and cause danger to workers.
4. Cylinders, frozen or fixed in the ground must be loosened by using warm (not boiling) water. Do not use any other means to loosen cylinders.
5. Cylinders must be kept sufficiently far enough from welding and/or cutting operations so that sparks, hot slag or flame will not reach them. If this cannot be done, fire resistant shields must be provided to protect the cylinders.
6. Fuel gas cylinders must be valve end up at all times, and a regulator must always be used on a cylinder when in use. Cylinders being transported shall comply with the requirements of the U. S. Department of Transportation, as well as State and County laws.

GENERAL REQUIREMENTS FOR ELECTRIC ARC WELDING AND/OR CUTTING

1. The frame or case of electric welders shall be grounded, unless the machine is driven by an internal combustion engine.
2. Ground connections must be mechanically strong and electrically adequate.
3. Current return circuits from the work to the machine must have proper electrical contact at joints. This contact must be periodically inspected.
4. Electrodes must be removed from holders when electric arc welding/cutting is discontinued for any period greater than one (1) hour. The holders must be located so as to prevent accidental contact and machines must be disconnected from the power source.
5. Where an electric welding machine is separated from the source of electric power, all wiring and installation of fixtures shall conform to generally accepted good practice, and only electric welding machines tested and approved by a competent testing laboratory shall be used.
6. A switch or circuit breaker must be provided so that fixed electric welders and control equipment can be disconnected from the supply circuit in an emergency.
7. Damaged cable must be removed from service until properly repaired/replaced.

SPECIAL REQUIREMENTS OF THE NASSAU COUNTY FIRE MARSHAL

(Welding and/or Cutting; Industrial)

1. **NO** maintenance or repair work shall be commenced in a flammable or combustible liquid storage or handling area, unless and until authorized by the Nassau County Fire Marshal. No hot work, including but not limited to, welding or cutting operations, the use of spark producing power tools, and chipping operations shall be permitted only and until all operating procedures have fully satisfied the safety requirements promulgated by the Fire Marshal.
2. The Nassau County Fire Marshal shall be notified prior to the commencement (start) of any hot work, which shall, as a minimum, comply with but not be limited to the following limitations:
 - a. No welding or cutting shall be permitted within two hundred (200) feet of a transfer of flammable liquid or within one hundred (100) feet of a transfer of combustible liquid unless specifically authorized by the Fire Marshal
 - b. No welding and cutting shall be permitted in flammable (explosive) atmospheres; near large quantities of exposed readily ignitable materials; or in any unsafe areas or areas not authorized by management, the welder him/her self or the Fire Marshal;
 - c. The performance of maintenance work in oxidizer (Chemical) storage areas shall be subject to prior review and approval by supervisory personnel with cutting and welding being in conformance with NFPA. Standard 51-B (2014 edition)
3. It shall be unlawful to discharge flammable or combustible liquids upon any roadway, on the surface, or into the sub-surface land, aquifer, or waterway anywhere in the County of Nassau by whatever method such discharge may occur.
4. Any person with knowledge of a spill, leak, or discharge of flammable or combustible liquid must report the incident to the Fire Marshal within two (2) hours of discovery.