



OM-262659E


2020-08

Processes



Oxy-Fuel

Welding
Cutting

 **Protect yourself and others from injury — read, follow, and save these important safety precautions and operating instructions.**

Warranty Information Inside



SAFETY MANUAL


Rev 2020-01

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SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

OXY FUEL 2020-07

-  Protect yourself and others from injury — read, follow, and save these important safety precautions and operating instructions.

1-1. Symbol Usage

-  **DANGER!** – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

-  Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE – Indicates statements not related to personal injury.


 Indicates special instructions.





This group of symbols means Warning! Watch Out! **ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS** hazards. Consult


symbols and related instructions below for necessary actions to avoid these hazards.


1-2. Welding, Cutting, Brazing, Heating Hazards

-  The symbols shown in this section are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Principal Safety Standards listed in Section 1-4. Read and follow all Safety Standards.

-  Only qualified persons should install, operate, maintain, and repair this equipment. A qualified person is defined as one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project and has received safety training to recognize and avoid the hazards involved.

-  During operation, keep everybody, especially children, away.

-  Do not use this equipment unless you are trained in its proper use or are under competent supervision. Follow the procedures described in this booklet every time you use the equipment. Failure to follow these instructions can cause fire, explosion, asphyxiation, property damage, or personal injury. This equipment must be used in accordance with all Federal, State, and local regulations as well as DOT (Department of Transportation) and CGA (Compressed Gas Association) regulations. Contact your gas supplier for more information on the proper use of compressed gases.

 In this document, the phrase “welding and cutting” also refers to other oxy-fuel operations like brazing and heating.



READ INSTRUCTIONS.

- Read and follow all labels and the Owner’s Manual carefully before installing, operating, or servicing equipment. Read the safety information at the beginning of the manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform installation, maintenance, and service according to the Owner’s Manuals, industry standards, and national, state, and local codes.



HOT PARTS can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



FUMES AND GASES can be hazardous.

Welding and cutting produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- Ventilate the work area and/or use local forced ventilation at the flame to remove welding and cutting fumes and gases. Some gases (natural gas and acetylene) are lighter than air and will collect in high areas. Other gases (propane and butane) are heavier than air and will collect in low areas. Heavier-than-air gases are more difficult to diffuse and are more likely to accumulate. The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer’s instructions for adhesives, coatings, cleaners, consumables, coatings, cleaners, degreasers, fluxes, and metals.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding and cutting fumes and gases can displace air and lower the oxygen level, causing injury or death. Be sure the breathing air is safe. Test atmospheres in confined areas for explosive and toxic gases before using oxy-fuel equipment.
- Do not weld or cut in locations near degreasing, cleaning, or spraying operations. The heat from welding or cutting flame can react with vapors to form highly toxic and irritating gases.
- Do not weld or cut on coated metals, such as galvanized, lead, or cadmium-plated steel unless the coating is removed from the affected area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded or cut.
- Do not weld or cut on sealed air conditioning or refrigeration systems unless all refrigerants have been removed from the system.



BUILDUP OF GAS can injure or kill.

- Shut off compressed gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



LIGHT RAYS can burn eyes and skin.

Light rays from the welding and cutting process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear approved face protection fitted with a proper shade of filter lenses to protect your face and eyes from light rays and sparks when welding, cutting, or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear welding goggles, or wear welding helmet/welding face-shield over approved goggles/safety glasses with side shields.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the welding or cutting.
- Wear body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.



WELDING AND CUTTING can cause fire or explosion.

Welding and cutting on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding or cutting operations. The torch flame, flying sparks, hot workpiece, and hot equipment can cause fires and burns. Check and be sure the area is safe before doing any welding or cutting.

- Do not use this welding and cutting equipment with gases and pressures other than those for which it is intended. Oxygen is not flammable; however, the presence of pure oxygen will drastically increase the speed and force with which burning takes place. Oxygen must never be allowed to contact grease, oil, or other petroleum-based substances; therefore, be sure there is no oil or grease on the regulator, cylinder, valves, or equipment. Do not use petroleum-based pipe sealants. Do not use sealants on metal-to-metal seals, such as hose and CGA cylinder connections; use PTFE-based sealant (PTFE tape) on pipe threads. Do not use or store near excessive heat (above 125° F/51.5° C) or open flame. Do not refer to oxygen as air and do not use oxygen as a substitute for compressed air. Do not use oxygen to clean clothes or work area, for ventilation, or to operate pneumatic tools. Open oxygen cylinder valves slowly. Be sure regulator adjusting handle is in the full out (off) position before opening oxygen cylinder valve.
- Inspect all equipment before use. Do not use damaged, defective, or improperly adjusted welding and cutting equipment. Make sure levers and valves work properly, threads on equipment are clean (no grease or oil) and not deformed, gauges are intact and easy to read, regulator is clean and free of oil or dirt, and fittings are properly sized for the cylinder. Make sure hoses are clean (no grease or oil) and ferrules are properly installed so the fitting does not slip inside the hose. Be sure all connections are tight.

- It is recommended that a reverse-flow check valve or a flashback arrestor be installed between the torch handle and the regulator. Check valves do not prevent the propagation of a flame upstream (flashback) but are designed to prevent the unintentional backflow of gases into the cutting attachment, torch, hoses, or regulator which could cause an explosion or fire. A flashback arrestor can be installed on the torch handle instead of a check valve. Miller flashback arrestors have a reverse flow check valve and prevent the propagation of a flame upstream. If a flashback arrestor is installed, a check valve is not necessary. Using a flashback arrestor and a check valve can reduce gas flow and affect torch operation. To help prevent the reverse flow of gases, be sure the cylinders contain enough gas to complete the work.
- Understand the properties and applications of a gas, and how to safely use a gas, before placing it in service.
- Perform work only in an area with a fireproof floor (concrete). Do not heat concrete because it can expand and explode violently.
- Perform work on a fireproof surface. Use heat resistant shields to protect nearby walls and flooring.
- Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repared by a qualified person.
- Do not open a cylinder valve quickly or the regulator can be damaged and cause a fire.
- Do not open acetylene cylinder valve more than 3/4 turn. (For all gases except acetylene, open cylinder valve fully to backseat the cylinder valve.) Keep cylinder wrench on the cylinder for quick shut-off.
- Do not slightly open or “crack” fuel cylinder valve to blow debris from the valve outlet. Remove the debris using nitrogen, air, or a clean, oil-free rag.
- Always purge gas from the system before lighting torch. Purge gas in a well-ventilated area and away from flame or sparks.
- Keep torch flame or sparks away from cylinder, regulator, and gas hose.
- Use only the gases recommended by the manufacturer of the oxy-fuel equipment being used.
- Never light a torch with matches or a lighter. Always use a striker.
- Do not use acetylene above 15 psi (103 kPa) flowing. It is acceptable to use acetylene regulators that indicate a static pressure up to 22 psi (151 kPa).
- Do not withdraw acetylene from a cylinder at a rate exceeding 1/7 of the cylinder capacity per hour (50 SCFH for a 350 ft³ cylinder). Maximum withdrawal rate for a half-full 100 lb propane cylinder at 70°F is 75 SCFH (2124 lph).
- When required flows (SCFH) exceed the recommended withdrawal rate from one cylinder, then additional cylinders must be manifolded to provide safe and efficient operation.
- When using liquid oxygen, tips may require greater gas volume than a single cylinder is capable of producing. External evaporators or manifolding multiple cylinders may be necessary to supply sufficient gas flows.
- Do not use long gas hoses or hoses with multiple connections because they restrict gas flow and reduce gas pressure. These conditions can cause backfires and flashbacks, and reduce equipment efficiency.
- Do not use torch if you smell gas. Check oxy-fuel system for leaks with an approved leak detection solution or leak detector. Never test for gas leaks with a flame.

- Remove all flammables within 35 ft (10.7 m) of the welding or cutting operation. If this is not possible, tightly cover them with approved covers.
- Do not weld or cut where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding and cutting sparks and hot materials from welding and cutting can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding or cutting on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not cut or weld on tire rims or wheels. Tires can explode if heated. Repaired rims and wheels can fail. See OSHA 29 CFR 1910.177 listed in Safety Standards.
- Do not weld or cut on containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Do not weld or cut where the atmosphere can contain flammable dust, gas, or liquid vapors (such as gasoline).
- Wear body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Do not use fuel gases to clean clothes or work area.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding or cutting.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



CYLINDERS can explode if damaged.

Compressed gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding or cutting process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, and sparks.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping. Do not lay acetylene cylinders on their sides or acetone will flow out of the cylinder and damage the equipment.
- Keep cylinders away from any arc welding, cutting, or other electrical circuits.
- Never drape a welding or cutting torch over a gas cylinder.
- Never weld or cut on a pressurized cylinder – explosion will result.
- Use only correct compressed gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition. Do not use compressed gas cylinder unless an approved gas regulator is attached to the gas valve.
- Turn face away from valve outlet when opening cylinder valve. Do not stand in front of or behind the regulator when opening the valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the proper equipment, correct procedures, and sufficient number of persons to lift, move, and transport cylinders.
- Store compressed gas and oxygen cylinders in separate locations.

- Store empty cylinders with valves closed and caps in place.
- Do not modify or repair cylinders or valves. Store leaking acetylene cylinders outdoors in a safe area. Identify leaking cylinders and return them to the supplier.
- Dispose of used disposable cylinders according to the manufacturer's recommendations. Do not throw cylinders in fire.
- Follow instructions provided by the gas supplier and on compressed gas cylinders, associated equipment, and in Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.



FLYING METAL or DIRT can injure eyes.

- Welding, cutting, chipping, wire brushing, and grinding cause sparks and flying metal.
- Wear welding goggles, or wear welding helmet/welding face-shield over approved goggles/safety glasses with side shields.

1-3. California Proposition 65 Warnings



WARNING: This product can expose you to chemicals including lead, which are known to the state of California to cause cancer and birth defects or other reproductive harm.

For more information, go to www.P65Warnings.ca.gov.

1-4. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, American Welding Society standard ANSI Standard Z49.1. Website: www.aws.org.

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1 from Global Engineering Documents. Website: www.global.ihs.com.

Safe Practices for Welding and Cutting Containers that have Held Combustibles, American Welding Society Standard AWS A6.0 from Global Engineering Documents. Website: www.global.ihs.com.

Recommended Practices for Safe Oxyfuel Gas Cutting Torch Operation, American Welding Society Standard C4.2/C4.2M, and *Recommended Practices for Safe Oxyfuel Gas Heating Torch Operation*, American Welding Society Standard C4.3/C4.3M from Global Engineering Documents. Website: www.global.ihs.com.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association. Website: www.cganet.com.

Acetylene, CGA Pamphlet G-1 from Compressed Gas Association. Website: www.cganet.com.

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2 from Canadian Standards Association. Website: www.csagroup.org.

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1 from American National Standards Institute. Website: www.ansi.org.

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B from National Fire Protection Association. Website: www.nfpa.org.

OSHA Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910.177 Subpart N, Part 1910 Subpart Q, and Part 1926, Subpart J. Website: www.osha.gov.

OSHA *Important Note Regarding the ACGIH TLV, Policy Statement on the Uses of TLVs and BEIs*. Website: www.osha.gov.

Applications Manual for the Revised NIOSH Lifting Equation from the National Institute for Occupational Safety and Health (NIOSH). Website: www.cdc.gov/NIOSH.

Notes

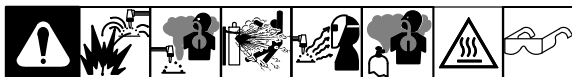
SECTION 2 – INTRODUCTION



- ⚠ Inspect all equipment before use. Do not use damaged, defective, or improperly adjusted welding and cutting equipment. Make sure levers and valves work properly, threads on equipment are clean (no grease or oil) and not deformed, gauges are intact and easy to read, regulator is clean and free of oil or dirt, and fittings are properly sized for the cylinder. Make sure hoses are clean (no grease or oil) and ferrules are properly installed so the fitting does not slip inside the hose. Be sure all connections are tight and there are no leaks in the system.**

We ask you to work like a pro – and pros weld and cut safely. Please read and comply with the sample safety procedures outlined in this booklet and the equipment Owner's Manual.

SECTION 3 – HAZARDOUS EVENTS



The following events are very hazardous and can occur in any oxy-fuel system. It is important to understand these hazards and know how to prevent them.

Backfire: The return of the flame into the torch, usually accompanied by a popping sound. The flame may be extinguished or it may re-appear at the tip end.

Sustained Backfire: The return of the flame into the torch that continues to burn inside the torch with a hissing or squealing sound.

Flashback: The return of a flame into and through the torch or into the hose. In some instances it can reach the regulator and even enter the cylinder. This is generally caused by the mixing of the oxygen and fuel gas in the system. This is a very dangerous situation that can cause an explosion anywhere in the system. This is why purging is so important (see Section 6-1).

SECTION 4 – ASSOCIATED HAZARDS OF RECOMPRESSING PURE OXYGEN



- ⚠ Open oxygen cylinder valves slowly. Opening an oxygen cylinder valve quickly can cause a fire or explosion. Be sure regulator adjusting handle is in the full out (off) position before opening an oxygen cylinder valve.**

Recompressing high pressure oxygen in a low pressure cavity may create heat, resulting in combustion. For combustion to occur, oxygen, fuel, and kindling temperatures must be present. All of these components may be present when oxygen is recompressed by opening the tank valve too quickly.

Oxygen: High purity oxygen accelerates the rate of combustion, increases heat output, and lowers the combustible point at which various materials will burn.

Fuel: The fuel for combustion may be the regulator itself if enough heat is produced to reach the kindling temperature of the regulator's components.

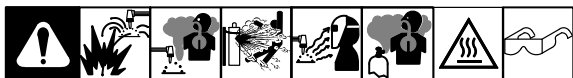
Kindling Temperatures: Enough heat may be generated to ignite the regulator components by the friction created when recompressing high-pressure oxygen. This heat is known as the heat of recompression.

⚠ If an internal fire or flashback occurs (indicated by a whistling sound or inverted flame), do the following:

- Turn off the torch oxygen valve immediately.
- Turn off the torch fuel valve.
- Turn off the oxygen cylinder valve.
- Turn off the fuel gas cylinder valve.

Do not relight the torch until the equipment has cooled to the touch and the flashback cause has been determined and corrected.

SECTION 5 – EQUIPMENT SET UP



Follow these steps to set up oxy-fuel equipment.

5-1. Installing Cylinders

⚠ Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping. Maintain a clear path from the cylinders to the work area.

⚠ Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repared by a qualified person.

⚠ Do not slightly open or “crack” acetylene cylinder valve to blow debris from the valve outlet. Remove the debris using nitrogen, air, or a clean, oil-free rag.

1. Remove the protective cap from the cylinder valve.
2. For all cylinders except acetylene: Stand to one side or behind the valve. Open the cylinder valve slightly (cracking) for an instant and then close the valve. This will help clear the valve of any dust or dirt that may have collected. These particles can damage regulators or cause a fire or explosion. Direct the flow of gas away from people.

5-2. Installing Regulators On Cylinder Valves

⚠ Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repared by a qualified person.

⚠ Do not handle oxygen regulators with oily hands and never apply oil to any part of an oxygen regulator.

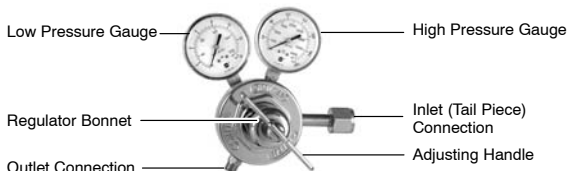
⚠ Do not use lubricant or thread tape on cylinder fittings.

⚠ Select regulators with sufficient flow capacity. Be sure there are no restrictions that could impede gas flows (such as length and diameter of hoses).

NOTICE – Do not use cylinder adaptors to connect regulators to cylinders. Regulators have CGA connections (manufactured to standards

of the Compressed Gas Association) which allow the regulator to only be installed on the appropriate cylinder valve for the intended gas.

Pressure regulators are control devices used to reduce high pressure to desired working pressure. There are two types of pressure regulators used for oxy-fuel applications. One type is for use on cylinders and the other type is used for connection to a gas piping system, or station regulator. The service temperature range for these regulators is 0° F to 140° F (18° C – 60° C). Shown below is a cylinder regulator.



1. Examine the pressure reducing regulators that will be connected to the cylinders. Make sure that the regulator is clean and the inlet filter is clean and installed properly.
2. Connect the oxygen regulator to the cylinder valve, using the appropriate cylinder wrench to tighten the inlet nut. Connect the fuel gas regulator to the fuel gas cylinder.
3. When replacing a pressure gauge, use only a UL-listed gauge. PTFE thread tape is the only thread sealant approved for use on oxygen regulators.

5-3. Installing Hoses On Regulators

⚠️ Replace hoses at the first sign of any defects, flaws, or damage. The hoses should otherwise be replaced every four years. Inspect hoses for damage or leaks before each operation. Do not allow hoses to come in contact with hot metal, molten solder, or corrosive chemicals. Do not expose hoses to fluxing agents as these agents will deteriorate the hose materials and cause them to leak.

⚠️ Do not splice or use damaged oxy-fuel hoses.

Use only industrial grade welding hose for welding, brazing, cutting, and heating with oxy-fuel equipment. These hoses are generally color coded green for oxygen and have a right hand threaded connection; fuel hoses are red in color and have a left hand threaded connection with a groove around the nut. Use grade R and RM hoses only for acetylene. T grade hose can be used for acetylene and must be used for other fuel gases.

1. Connect the oxygen hose to the oxygen regulator and tighten firmly with a wrench.
2. Connect the fuel hose to the fuel regulator and tighten firmly with a wrench.
3. Make sure the regulator adjusting handles are turned counterclockwise to the off position and there is no resistance on the adjusting handles.

5-4. Installing Check Valves



Reverse flow check valves should be installed in the system either on the regulator or on the torch handle.

Check valves are designed to provide some protection against the reverse flow of one gas into the hose and regulator of the other gas when there is a sudden loss of pressure of one of the gases. Check valves do not stop a flashback. Check valves do restrict flow. Do not use check valves with large heating and cutting tips.

Check valves should be tested or replaced at regularly scheduled intervals as any debris may cause them to malfunction.

Check valves are designed for installation between the regulator outlet fittings and the hoses, or between the torch butt and the hoses.

5-5. Installing Flashback Arrestors

NOTICE – When using add-on flashback arrestors, make sure the unit can supply enough gas flow to support the tip being used. Insufficient gas flow can cause equipment failure.

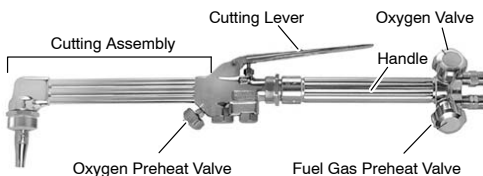


Flashback arrestors are designed to stop a flashback from going beyond the point where they are installed.

There are several types and styles available. Flashback arrestors are recommended in all oxy-fuel welding, cutting, brazing, and heating applications. Ideally, these units should be mounted on the welding handles. If Miller add-on flashback arrestors are used, additional check valves are not necessary.

5-6. Combination Torch Components

A combination torch consists of a welding handle and cutting attachment. When equipped with the proper tips, these torches are used for welding, cutting, and heating.



5-7. Installing Hoses On Torch Handle

⚠ Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repaired by a qualified person.

Torch handles are used in conjunction with welding tips, heating tips, and cutting attachments. The illustration above shows a torch handle with a cutting attachment.

1. Attach the green oxygen hose to the oxygen inlet fitting of the welding handle (right hand threads) and firmly tighten with a wrench. If a check valve or flashback arrestor is being used at the torch, attach the hose to the inlet of these devices (see Sections 5-4 and 5-5).
2. Attach the red fuel hose to the fuel inlet fitting of the welding handle (left hand threads) and firmly tighten with a wrench. If a check valve or flashback arrestor is being used at the torch, attach the hose to the inlet of these devices.

5-8. Installing Cutting Attachment

⚠ Do not use cutting attachment if the o-rings are missing or damaged.

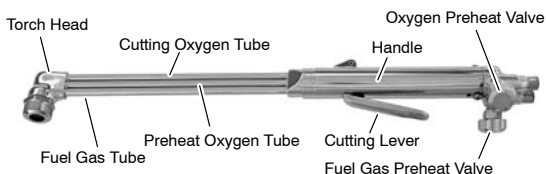
- ⚠ Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repaired by a qualified person.**

Cutting attachments are used in conjunction with welding handles to perform oxy-fuel cutting of ferrous metals. See illustration of combination torch in Section 5-6.

5-9. Installing Straight (Hand) Cutting Torch

- ⚠ Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repaired by a qualified person.**

Cutting torches are used to cut ferrous metals using oxygen and a fuel gas. Set-up the equipment as described in Sections 5-1 thru 5-7.



5-10. Installing Cutting Tips



Acetylene Cutting Tip



Alternative Fuel Cutting Tip

Cutting tips are available in many styles and sizes depending on the metal thickness and fuel gas being used. Refer to the tables in this manual for tip selection and operating specifications. Prior to use, inspect cutting tips for damage and to ensure that the cutting orifice and preheat holes are not blocked with dirt or slag. Insert tip into the torch head and tighten the tip nut.

5-11. Installing Welding Tips



Welding tips consist of a mixer and a copper tip. These tips are available in different sizes to weld various metal thicknesses. Refer to the tables in this manual for tip selection and operating specifications.

Inspect o-rings for damage and replace if necessary. Insert the welding tip into the torch handle by exerting light pressure on the welding tip with a twisting motion until seated. Position the tip and hand tighten the tip nut into the torch handle.

5-12. Installing Multi-Flame Heating Tips



Heating tips have several flame orifices in the end. The tips consist of a mixer, heating tube, and head, and are available for use with several types of gas. Refer to the tables in this manual for tip selection and operating specifications.

5-13. Testing The Equipment For Leaks

After the correct tip has been installed in the handle, cutting attachment, or cutting torch, perform a leak test on the system before lighting the torch. Follow this process every time the system is set-up and when a cylinder is changed.

⚠ Use an approved oil-free leak detection fluid to locate possible leaks.

⚠ Do not stand in front of or behind the regulator when opening the cylinder valve. Never open a cylinder valve suddenly as this can damage a regulator or cause an oxygen regulator fire.

1. Verify that both regulator adjusting handles are turned counter-clockwise to the off position.
2. Close both the fuel and oxygen valves on the torch handle.
3. While standing to the side of the regulator slowly open oxygen cylinder valve. Open the oxygen cylinder valve completely.
4. Adjust regulator by turning in the adjusting handle to deliver 20 psig (138 kPa).
5. When using acetylene, do not open the fuel cylinder valve more than 1/2–3/4 turn. If the cylinder has a wrench, leave it in place so the cylinder can be quickly shut off if needed.
6. Adjust regulator by turning the adjusting handle clockwise to deliver 15 psig (103 kPa).
7. Check every connection and joint from the cylinder valve to the torch tip with an approved leak detection solution. If leaks are detected, eliminate them before proceeding. If leaks cannot be eliminated, do not put the equipment into service until it has been repaired or replaced.

SECTION 6 – WELDING TIP ADJUSTMENTS AND LIGHTING INSTRUCTIONS



⚠ Inspect all equipment before use. Do not use damaged, defective, or improperly adjusted welding and cutting equipment. Make sure levers and valves work properly, threads on equipment are clean (no grease or oil) and not deformed, gauges are intact and easy to read, regulator is clean and free of oil or dirt, and fittings are properly sized for the cylinder. Make sure hoses are clean (no grease or oil). Be sure all connections are tight and there are no leaks in the system.

Select the proper size welding tip required for the work being performed. Refer to the tables in this manual for tip selection and operating specifications.

6-1. Purging The System

⚠ Always purge gas from the system before lighting torch to prevent a possible mixed-gas explosion. Purge gas in a well ventilated area and away from flame or sparks.

1. Purge the oxygen from the system by opening the oxygen torch valve 1/4 turn, allowing oxygen to pass through the torch for 3–5 seconds for every 25 ft (8 m) of hose, and then closing the valve. With the oxygen flowing, set the recommended pressure on the oxygen regulator.

2. Close the oxygen valve on the torch handle.
3. Purge the fuel gas by opening the fuel valve 1/4 turn, allowing fuel to pass through the torch for 3–5 seconds for every 25 ft (8 m) of hose, and then closing the valve. Set the fuel regulator while the gas is flowing to the recommended pressure.
4. Close the fuel valve on the torch handle.
5. The system is now purged and ready for operation.

6-2. Lighting And Adjusting Acetylene/Oxygen Welding Tips

Follow the set-up instructions explained in Section 5 before lighting the torch.

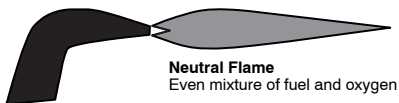
1. Purge the hoses (see Section 6-1).
2. Open the torch fuel valve 1/8 turn and ignite the acetylene using an approved friction spark lighter.

⚠ Do not use matches or a cigarette lighter to ignite the gas.

3. Increase the acetylene gas flow until the flame is no longer producing (soot) smoke.

⚠ Failure to force a sufficient amount of fuel gas through the tip will cause the tip to overheat and may cause a flashback or backfire.

4. Open the torch oxygen valve until you achieve a neutral flame.



6-3. LP Fuel Gas/Oxygen Tips (Other Than Acetylene)

Follow these steps for lighting and adjusting alternate fuel gas tips. These tips require a different procedure be followed than for acetylene tips to ensure proper performance. Follow the set-up instructions explained in Section 5 before lighting the torch.

1. Purge the hoses (see Section 6-1).
2. Open the fuel gas valve 1/8 turn and ignite the gas using an approved friction spark lighter.

⚠ Do not use matches or a cigarette lighter to ignite the gas.

3. Slowly open the torch oxygen valve until the flame is neutralized.
4. Increase the fuel gas another 1/8 turn.
5. Increase the oxygen flow until the flame is neutralized.
6. Repeat this procedure until the maximum volume of fuel is used and the desired flame is achieved. This is important to obtain the most efficient flame and to cool the tip during operation.

⚠ Failure to force a sufficient amount of fuel gas through the tip will cause the tip to overheat and may cause a flashback or backfire.

6-4. Extinguishing The Torch Flame

1. Turn torch oxygen gas valve clockwise to the closed position.
2. Turn the torch fuel gas valve clockwise to the closed position.

6-5. System Shut Down

1. Turn the oxygen and fuel gas cylinder valves clockwise to the closed position.
2. Open the torch oxygen valves 1/2 turn and allow the gas to flow out of the torch until both gauges indicate zero (0) pressure.

3. Close the torch oxygen valve and turn the regulator adjusting handle counterclockwise to the off position.
4. Open the torch fuel valves 1/2 turn and allow the gas to flow out of the torch until both gauges indicate zero (0) pressure. Close the torch fuel valve and turn the regulator adjusting handle counterclockwise to the off position.

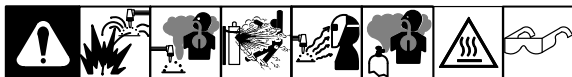
SECTION 7 – MULTI-FLAME HEATING TIP ADJUSTMENT AND LIGHTING INSTRUCTIONS



Heating tips are set up and adjusted the same as welding tips. Follow the safety and operating instructions explained in Section 6.

- ⚠ Be sure to force the gases through the heating tips to eliminate the possibility of gas starvation, which can result in overheating the tip and the possibility of backfire, sustained backfire, or flashback.**

SECTION 8 – CUTTING ATTACHMENT ADJUSTMENT AND LIGHTING INSTRUCTIONS



Cutting attachments are used in conjunction with torch handles to perform oxy-fuel cutting of ferrous metals.

8-1. Setting Up Cutting Attachment

- ⚠ Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repaired by a qualified person.**
 - ⚠ Do not use cutting attachment if the o-rings are missing or damaged.**
 - ⚠ Always purge gas from the system before lighting torch to prevent a possible mixed-gas explosion. Purge gas in a well ventilated area and away from flame or sparks.**
1. Insert the cutting attachment into the torch handle and hand tighten the connection nut.
 2. Select the proper cutting tip for the application (see tip tables in this manual).
 3. If inserting a new cutting tip into the cutting assembly, use a wrench to tighten tip 1/8–1/4 turn. Tips that have been set to the torch can be hand-tightened.
 4. Adjust the oxygen regulator to the recommended pressure setting (from the tip table) by turning the regulator adjusting handle clockwise. Open the oxygen valve on the torch handle completely so flow to the cutting attachment is not restricted.

5. Adjust the fuel regulator to the recommended pressure setting (from the tip table) by turning in the regulator adjusting handle clockwise.
6. Purge the fuel gas by opening the preheat valve on the torch handle, allowing gas to flow for 3–5 seconds for every 25 ft (8 m) length of hose, and then closing the fuel gas valve.
7. Purge the oxygen by opening the preheat valve on the cutting attachment, allowing gas to flow for 3–5 seconds for every 25 ft (8 m) length of hose, then closing the oxygen valve.

8-2. Adjusting The Acetylene Cutting Tip Flame (Cutting Assembly)

This procedure is for use with acetylene cutting tips. Make sure the system has been set-up and purged according to Section 8-1.

1. Open the fuel valves on the torch handle 1/8 turn and light the fuel gas using a friction lighter.

 **Do not use matches or a cigarette lighter to ignite the gas.**

2. Continue to open the acetylene torch valve until the sooty smoke produced by the flame completely disappears or the flame just begins to separate from the end of the tip.
3. Slowly open the preheat oxygen valve on the cutting attachment; a long white flame will appear; this is known as the acetylene feather. Continue to add oxygen and reduce the feather until it just disappears into the small, bright, inner cones at the end of the tip. This will produce what is known as a neutral flame.
4. Preheat the metal by positioning the bright inner cones approximately 1/8–1/4 in. (3–6 mm) away from the steel surface.
5. When the metal turns bright red (approx. 1500° F/816° C), slowly depress the cutting lever until the metal is pierced. While holding the lever down completely, slowly move the torch in the direction to be cut.

8-3. Adjusting Alternate Fuel Gas Cutting Tip Flame (Other Than Acetylene)

This procedure is for use with alternate fuel gas tips such as propane, propylene, and natural gas cutting tips. Make sure the system has been set-up and purged as described in Section 8-1).

1. Open the fuel valves on the torch handle 1/8 turn and light the fuel gas using a friction lighter.

 **Do not use matches or a cigarette lighter to ignite the gas.**

2. Continue to open the torch fuel valve until the flame is about to leave the tip.
3. Slowly open the preheat oxygen valve on the cutting attachment until the bright preheat cones are reduced to their shortest length.
4. Continue to readjust the fuel valve until the preheat flame is about to leave the tip.
5. Slowly open the preheat oxygen valve until the preheat cones are at the shortest length.
6. Repeat this process until the fuel valve is nearly or completely open.
7. Preheat the metal by positioning the bright inner cones approximately 1/2–3/4 in. (13–19 mm) away from the steel surface.
8. When the metal turns bright red (approx. 1500° F/816° C), slowly depress the cutting lever until the metal is pierced. While holding the lever down completely, slowly move the torch in the direction to be cut.

8-4. Extinguishing The Torch Flame

Follow this procedure to shut down the system when finished cutting.

1. Turn the oxygen preheat valve clockwise to the closed position.
2. Turn the torch fuel valve clockwise to the closed position.
3. Turn the oxygen and fuel cylinder valves clockwise to the closed position.
4. Open the torch fuel valves 1/2 turn and allow the gas to flow out of the torch until both gauges indicate zero (0) pressure. Close the torch fuel valve and turn the fuel regulator adjusting handle counterclockwise to the off position.
5. Open the torch preheat oxygen valve 1/2 turn and allow the gas to flow out of the torch until both gauges indicate zero (0) pressure. Close the torch oxygen preheat valve. Close the oxygen valve on the torch handle and turn the oxygen regulator adjusting handle counterclockwise to the off position.
6. The system is now properly shut down.

SECTION 9 – STRAIGHT (HAND) CUTTING TORCH ADJUSTMENTS AND LIGHTING INSTRUCTIONS



9-1. Setting Up Straight (Hand) Cutting Torch

Cutting torches are used to cut ferrous metals using oxygen and a fuel gas. Set-up the equipment as described in Section 8.

- ⚠ Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repared by a qualified person.**
 - ⚠ Do not use cutting torch if the o-rings are missing or damaged.**
 - ⚠ Always purge gas from the system before lighting torch to prevent a possible mixed-gas explosion. Purge gas in a well ventilated area and away from flame or sparks.**
 - ⚠ For larger high-volume cutting tips, certain check valve designs may restrict gas flow and cause the tips to overheat. These high-flow tip applications require 3/8 in. (9.5 mm) or larger diameter hoses.**
1. Select the recommended cutting tip from the tables in this manual for the metal thickness being cut.
 2. When inserting a new tip into the torch head, tighten with a wrench 1/8–1/4 turn. Tips that have been set to the torch head can be hand-tightened.
 3. Adjust the oxygen and fuel regulators to the recommended pressure settings from the tip table by turning the regulator adjusting handle clockwise.
 4. Purge the fuel gas by opening the preheat valve on the torch, allowing gas to flow for 3–5 seconds for every 25 ft (8 m) length of hose, and then closing valve.
 5. Purge the oxygen by opening the preheat valve on the torch, allowing gas to flow for 3–5 seconds for every 25 ft (8 m) length of hose, and then closing valve.

9-2. Adjusting Acetylene Cutting Tip Flame (Hand Torch)

This procedure is for use with acetylene cutting tips. Make sure the system has been set-up and purged according to Section 9-1.

1. Open the fuel valves on the torch handle 1/8 turn and light the fuel gas using a friction lighter.

⚠ Do not use matches or a cigarette lighter to ignite the gas.

2. Continue to open the acetylene torch preheat valve until the sooty smoke produced by the flame completely disappears, or the flame just begins to separate from the end of the tip.
3. Slowly open the preheat oxygen valve; a long white flame will appear. This is known as the acetylene feather. Continue to add oxygen and reduce the feather until it just disappears into the small, bright, inner cones at the end of the tip. This will produce what is known as a neutral flame.
4. Preheat the metal by positioning the bright inner cones approximately 1/8–1/4 in. (3–6 mm) away from the steel surface.
5. When the metal turns bright red (approx. 1500°F/816°C), slowly depress the cutting lever until the metal is pierced. Holding the lever down completely, slowly move the torch in the direction to be cut.

9-3. Adjusting Fuel Gas Cutting Tip Flame (Other Than Acetylene)

This procedure is for use with alternate fuel gas tips such as propane, propylene, and natural gas cutting tips. Make sure the system has been set-up and purged according to Section 9-1.

1. Open the fuel valves on the torch handle 1/8 turn and light the fuel gas using a friction lighter.

⚠ Do not use matches or a cigarette lighter to ignite the gas.


2. Continue to open the torch preheat fuel valve until the flame is about to leave the tip.
3. Slowly open the preheat oxygen valve until the bright preheat cones are reduced to their shortest length.
4. Continue to readjust the fuel valve open until the preheat flame is about to leave the tip.
5. Slowly open the preheat oxygen valve until the preheat cones are at the shortest length.
6. Repeat this process until the fuel valve is nearly or completely open.
7. Preheat the metal by positioning the bright inner cones approximately 1/2–3/4 in. (13–19 mm) away from the steel surface.
8. When the metal turns bright red (approx. 1500°F/816°C), slowly depress the cutting lever until the metal is pierced. While holding the lever down completely, slowly move torch in the direction to be cut.

9-4. Extinguishing The Torch Flame

Follow this procedure to shut down the system when finished cutting.

1. Turn the oxygen valve clockwise to the closed position.
2. Turn the torch fuel valve clockwise to the closed position.
3. Turn the oxygen and fuel cylinder valves clockwise to the closed position.
4. Open the torch fuel valves 1/2 turn and allow the gas to flow out of the torch until both gauges indicate zero (0) pressure. Close the torch fuel valve and turn the fuel regulator adjusting handle counterclockwise to the off position.
5. Open the torch oxygen valves 1/2 turn and allow the gas to flow out of the torch until both gauges indicate zero (0) pressure. Close the torch oxygen valve and turn the oxygen regulator adjusting handle counterclockwise to the off position.

Table 1. SC12 Series Heavy-Duty Cutting Tips – Acetylene (One Piece)

 High gas withdrawal rates will require cylinder manifolding. Consult your gas supplier.

Tip Number	Metal Thickness		Cutting Oxygen			Pressure – psig		Kerf Width	Consumption – scfh		Speed IPM	Drill Size	
	in.	mm	Reg.	Torch	Oxygen	Preheat	Acetylene		Preheat	Cutting		Preheat	Cutting Jet
SC12-00	3/16	5	20	20	10†	10	.050	24	7	6.5	26	68	75
SC12-0	1/4	6	30	30	10†	10	.055	40	7.5	7	22	62	74
SC12-0	3/8	10	35	35	10†	10	.055	50	7.5	7	20	62	74
SC12-1	1/2	13	35	35	10†	10	.080	75	11	9.5	19	56	71
SC12-1	5/8	16	40	40	10†	10	.080	85	11	9.5	17	56	71
SC12-2	3/4	19	36	35	10†	10	.095	105	12	10.5	16	54	70
SC12-2	1	25	41	40	10†	10	.095	115	12	10.5	14	54	70
SC12-2	1-1/4	32	51	50	10†	10	.095	135	12	10.5	13	54	70
SC12-3	1-1/2	38	42	40	10†	10	.100	170	14	12	12	51	68
SC12-3	2	51	47	45	10†	10	.100	180	14	12	10	51	68
SC12-4	2-1/2	64	38	35	10†	10	.125	240	15	13	9	45	62
SC12-4	3	76	44	40	10†	10	.125	265	15	13	8	45	62
SC12-4	4	102	54	50	10†	10	.125	315	16	14	7	45	62
SC12-5	5	127	56	50	10†	10	.150	420	30	26*	7	41	57
SC12-5	6	152	67	60	10†	10	.150	485	30	26*	6	41	57
SC12-5	8	203	78	70	10†	10	.150	550	30	26*	5.5	41	57
SC12-6	10	254	83	70	10†	10	.230	750	32	28*	5	32	57
SC12-6	12	305	125	90	10†	10	.230	975	32	28*	4.5	32	57

† Listed pressure for 3-hose machine cutting torches only. * Minimum of one 350 cubic ft. cylinder

Table 2. SC56 Series Heavy-Duty, Heavy-Preheat Cutting Tips – Acetylene (One Piece)

Tip Number	Metal Thickness		Pressure – psig				Kerf Width	Consumption – scfh				Drill Size		Recm'd No. Of Cylinders*
	in.	mm	Cutting Oxygen		Preheat			Oxygen Cutting	Acetylene Preheat	Speed IPM	Cutting Jet	Preheat		
			Reg.	Torch	Oxygen	Acetylene								
SC56-1	1/2	13	35	35	10†	10	.080	75	33	30	19	56	65	1
SC56-1	5/8	16	40	40	10†	10	.080	85	33	30	17	56	65	1
SC56-2	3/4	19	36	35	10†	10	.095	105	33	30	16	54	60	1
SC56-2	1	25	41	40	10†	10	.095	115	33	30	14	54	60	1
SC56-2	1-1/4	32	51	50	10†	10	.095	135	33	30	13	54	60	1
SC56-3	1-1/2	38	42	40	10†	10	.100	170	43	39	12	51	57	1
SC56-3	2	51	47	45	10†	10	.100	180	50	45	10	51	57	1
SC56-5	2-5	127	56	50	10†	10	.150	420	57	52	7	41	54	2
SC56-5	6	152	67	60	10†	10	.150	485	66	60	6	41	54	2
SC56-5	8	203	78	70	10†	10	.150	550	72	65	5.5	41	54	2
SC56-7	8-14	356	100	85	10†	10	.250	1250	110	100	4	28	54	2
SC56-9	14-20	508	110	70	14†	12	.350	2150	145	130	3	3	54	3
SC56-9	24	610	130	85	15†	13	.360	2600	175	160	2.5	3	54	4

† Listed pressure for 3-hose machine cutting torches only. Pressures shown are for 25 ft (7.6 m) or less of 3/8 in. (10mm) I.D. hose. Increase pressures if longer hose is used. Use 1/2 in. (13mm) I.D. hose when hose length exceeds 100 ft (31 m).

* Cylinders required, based on 350 cubic ft. cylinder.

Table 3. MC12 Series Medium Duty Cutting Tips – Acetylene (One Piece)

Tip Number	Metal Thickness		Pressure – psig		Kerf Width	Consumption – scfh				Drill Size	
	in.	mm	Oxygen	Acetylene		Oxygen		Acetylene Preheat	Cutting Jet	Preheat	
						Cutting	Preheat				
MC12-00	1/8	3	20*	10	.050	30	7	6	68	75	
MC12-00	3/16	5	20*	10	.050	30	7	6	68	75	
MC12-0	1/4	6	35*	10	.055	40	7	6	62	75	
MC12-0	3/8	10	40*	10	.055	46	7	6	62	75	
MC12-1	1/2	13	45*	10	.080	75	9	7	55	74	
MC12-1	5/8	16	50*	10	.080	81	9	7	55	74	
MC12-2	3/4	19	50*	10	.095	107	11	9	54	71	
MC12-2	1	25.4	55*	10	.095	118	11	9	54	71	
MC12-3	1-1/2	38	55*	10	.100	170	12	10	51	70	
MC12-3	2	51	60*	10	.100	181	12	10	51	70	
MC12-4	2-1/2	64	65*	10	.125	249	14	12	45	70	
MC12-4	3	76	70*	10	.125	267	14	12	45	70	
MC12-4	4	102	65	10	.125	320	15	13	45	70	
MC12-5	5	127	80	10	.150	420	15	13	41	70	
MC12-5	6	152	90	10	.150	485	15	13	41	70	

* Increase pressure 10–15 psig when using AC309 cutting attachments.

Table 4. SC And MC Series Special Purpose Tips For Hand Torches And Cutting Assemblies – Acetylene

Tip Number	Purpose	Capacity (Width x Depth)		Pressure – psig At Regulator		Consumption – scfh		Drill Size	
		in.	mm	Oxygen	Acetylene	Oxygen	Acetylene	Cutting Jet	Preheat
SC13-3	Gouging	3/8 x 1/4	10 x 6	20	10	151	35	50 29	59
SC13-5	Gouging	1/2 x 3/8	13 x 10	25	10	246	50	39 10	55
SC14-3	Riser	1-1/2 Rivets	38 mm Rivets	35–40	10	190	20	51	56
SC15-2	Washing	1/2 x 3/8	13 x 10	30	10	336	40	3	57
SC17-0	Plate Or Thin Sheet Cutting	3/8	10	20	10	55	4	62	62
SC83	Heating	83,000 BTUs	N/A	15	10	58	52*	N/A	56
MC13-3	Gouging	3/8 x 1/4	10 x 6	20	10	115	24*	50 29	60
SC12-4x9	Cutting	4	102	50	10	331	14	45	62

* 2 cylinders required; based on 350 cubic ft. cylinders.

Table 5. Heating Tips – Acetylene

NOTICE When using add-on flashback arrestors, make sure the unit can supply enough gas flow to support the tip being used. Insufficient gas flow can cause equipment failure.

Stock Number	No. Of Flames	Drill Size	Pressure – psig		Consumption – scfh		Average BTU/Hr	Recommended Number Of Cylinders*	Overall Length	
			Oxygen	Fuel Gas	Oxygen	Fuel Gas			in.	mm
ST602	6	64	15	15	31	28	40,125	1	16	406
ST603	6	56	15	15	55	50	71,750	1	16	406
ST605	12	57	15	15	96	87	124,670	2	19	483
ST610	12	54	15	15	150	136	194,890	3	19	483
MT603	6	64	15	15	31	28	40,125	1	10	254
MT605	6	56	15	15	57	51	73,085	1	16	406
MT610	12	57	15	15	100	90	128,970	2	18	457
AT605	6	64	15	15	32	29	41,550	1	10	254

 Data is based on 25 ft (7.6 m) of 1/4 in. (6 mm) I.D. hose. Pressure must be increased if hose unions, longer hose, or smaller ID hose is used. All pressure settings are flowing pressures. Pressures shown are optimum settings for all regulators and not minimal operating pressures for torch equipment.

* Cylinders required, based on 350 cubic ft. cylinder.

Table 6. Welding/Brazing Tips – Acetylene

Tip Number	Welding Range		Drill Size	Pressure Of Each Gas At Regulator – psig	Consumption – scfh
	in.	mm			
SW201	1/32	0.7	71	10	2.3
SW203	5/64	1.9	67	10	3.2
SW205	1/8	3	57	10	6
SW207	3/16	5	54	10	12
SW209	3/8	10	49	10	23
SW210	1/2	13	44	15	36
MW201	1/32	0.7	71	10	2.3
MW203	5/64	1.9	67	10	3.2
MW205	1/8	3	57	10	6
MW207	3/16	5	54	10	12
MW209	3/8	10	49	10	23
AW201	Up to 1/32	0.7	71	10	2.3
AW203	5/64	1.9	67	10	3.2
AW205	1/8	3	57	10	6
AW207	3/16	5	54	10	12
AW209	3/8	10	49	10	23
AW210	1/2	13	44	10	36

Table 7.A Effect Of Hose Diameter And Length On Flow And Pressure At Torch

Hose Diameter in. (mm)	Hose Length ft (m)	Cutting Tip Size	Regulator Pressure Static - psig	Regulator Pressure Flowing - psig	Torch Inlet Pressure - psig	Pressure Drop In Hose - psig	Flow - scfh
3/16 (5)	50 (15.2)	3	50	47	37-1/2	9-1/2	169
	100 (30.4)*	3	51	47	26	21	129
	50 (15.2)	5	84-1/2	78	44	34	370
	100 (30.4)*	5	83-1/2	78	22	56	215
	50 (15.2)	7	108	100	24	76	510
	100 (30.4)*	7	106-1/2	100	9	91	270
	50 (15.2)	9	138-1/2	130	19-1/2	110-1/2	735
	100 (30.4)*	9	136-1/2	130	7	123	405

* Two 50 ft (15.2 m) lengths of hose connected together with standard hose unions.

(Continued)

Table 7.B Effect Of Hose Diameter And Length On Flow And Pressure At Torch

Hose Diameter in. (mm)	Hose Length ft (m)	Cutting Tip Size	Regulator Pressure Static – psig	Regulator Pressure Flowing – psig	Torch Inlet Pressure – psig	Pressure Drop In Hose – psig	Flow – scfh
1/4 (6)	50 (15.2)	3	50-1/2	47	44-1/2	2-1/2	194
	100 (30.4)*	3	50	47	42-1/2	4-1/2	188
	50 (15.2)	5	86	78	68-1/2	9-1/2	540
	100 (30.4)*	5	85	78	58-1/2	19-1/2	470
	50 (15.2)	7	114	100	68	32	1140
	100 (30.4)*	7	110	100	49	51	870
	50 (15.2)	9	149-1/2	130	65	65	2010
	100 (30.4)*	9	144	130	36-1/2	93-1/2	1290
	100 (30.4)**	3	50	47	36	11	164
	100 (30.4)**	5	84-1/2	78	42	36	360
	100 (30.4)**	7	108	100	25	75	560
	100 (30.4)**	9	140	130	18	112	795

* Two 50 ft (15.2 m) lengths of hose connected together with standard hose unions.

** Four 25 ft (6.1 m) lengths of hose connected together with standard hose unions.

(Continued)

Table 7.C Effect Of Hose Diameter And Length On Flow And Pressure At Torch

Hose Diameter in. (mm)	Hose Length ft (m)	Cutting Tip Size	Regulator Pressure Static - psig	Regulator Pressure Flowing - psig	Torch Inlet Pressure - psig	Pressure Drop In Hose - psig	Flow - scfh
3/8 (10)	50 (15.2)	3	51	47	46	1	190
	50 (15.2)	5	86	78	74-1/2	3-1/2	580
	50 (15.2)	7	117	100	86	14	1400
	50 (15.2)	9	163-1/2	130	89-1/2	40-1/2	2700
	100 (30.4)*	3	51	47	46	1	198
	100 (30.4)*	5	86	78	72	6	570
	100 (30.4)*	7	115	100	77	23	1280
	100 (30.4)*	9	155	130	75	55	2280

* Two 50 ft (15.2 m) lengths of hose connected together with standard hose unions.

Table 8. SC40 Series Heavy-Duty Cutting Tips – Propane (Two Piece)

Tip Number	Metal Thickness		Pressure – psig				Kerf Width	Consumption – scfh			Speed IPM	Drill Size Cutting Jet
	in.	mm	Cutting Oxygen		Preheat			Cutting Oxygen	Preheat			
			Reg.	Torch	Oxygen	Propane			Oxygen	Propane		
SC40-0	1/4	6	30	30	10†	10	.055	40	38	8	22	62
SC40-0	3/8	10	35	35	10†	10	.055	50	38	8	20	62
SC40-1	1/2	13	35	35	10†	10	.080	75	38	8	19	56
SC40-1	5/8	16	40	40	10†	10	.080	85	38	8	17	56
SC40-2	3/4	19	36	35	10†	10	.095	105	38	8	16	54
SC40-2	1	25	41	40	10†	10	.095	115	38	8	14	54
SC40-2	1-1/4	32	51	50	10†	10	.095	135	38	8	13	54
SC40-3	1-1/2	38	42	40	10†	10	.100	170	38	8	12	51
SC40-3	2	51	47	45	10†	10	.100	180	38	8	10	51
SC40-4	2-1/2	64	38	35	12†	10	.125	240	65	15	9	45
SC40-4	3	76	44	40	12†	10	.125	265	65	15	8	45
SC40-4	4	102	54	50	12†	10	.125	315	65	15	7	45

† Listed pressure for 3-nose machine cutting torches only.

Table 9. SC50 Series Heavy-Duty, Heavy-Preheat Cutting Tips – Propane (Two Piece)

Tip Number	Metal Thickness		Pressure – psig				Kerf Width	Consumption – scfh				Speed IPM	Drill Size Cutting Jet	Recm'd No. Of Cylinders*
	in.	mm	Cutting Oxygen		Preheat			Cutting Oxygen	Preheat		Propane			
			Reg.	Torch	Oxygen	Propane	Oxygen		Propane					
SC50-00	3/16	5	20	20	10†	10	.050	24	47	13	13	26	68	1
SC50-0	1/4	6	30	30	10†	10	.055	40	47	13	13	22	62	1
SC50-0	3/8	10	35	35	10†	10	.055	50	47	13	13	20	62	1
SC50-1	1/2	13	35	35	10†	10	.080	75	70	15	15	19	56	1
SC50-1	5/8	16	40	40	10†	10	.080	85	70	15	15	17	56	1
SC50-2	3/4	19	36	35	10†	10	.095	105	70	15	15	16	54	1
SC50-2	1	25	41	40	10†	10	.095	115	70	15	15	14	54	1
SC50-2	1-1/4	32	51	50	10†	10	.095	135	75	16	16	13	54	1
SC50-3	1-1/2	38	42	40	10†	10	.100	170	75	16	16	12	51	1
SC50-3	2	51	47	45	10†	10	.100	180	75	16	16	10	51	1
SC50-4	2-1/2	64	38	35	10†	10	.125	240	75	16	16	9	45	1
SC50-4	3	76	44	40	10†	10	.125	265	75	16	16	8	45	1
SC50-4	4	102	54	50	10†	10	.125	315	80	17	17	7	45	1
SC50-5	5	127	56	50	10†	10	.150	420	80	17	17	7	41	1
SC50-5	6	152	67	60	10†	10	.150	485	80	17	17	6	41	1
SC50-5	8	203	78	70	10†	10	.150	550	90	20	20	5	41	1
SC50-6	10	254	83	70	40†	10	.230	750	230	50	50	5	32	1
SC50-6	12	304	125	90	40†	12	.230	975	280	60	60	4.5	32	1
SC50-7	14	354	125	90	60†	20	.250	1250	330	62	62	4.0	28	1
SC50-8	16	406	125	90	60†	18	.300	1500	375	80	80	3.5	17	2
SC50-8	18	457	125	90	60†	20	.340	1800	400	85	85	3.5	17	2
SC50-9	20	508	125	90	60†	23	.350	2150	420	90	90	3.0	3	2

† Listed pressure for 3-hose machine cutting torches only.

* Cylinders required, based on 100 lb cylinders.

Table 10. SC50 Series Heavy-Duty, Heavy-Preheat Cutting Tips – Natural Gas (Two Piece)

Tip Number	Metal Thickness		Pressure – psig				Kerf Width	Consumption – scfh			Speed IPM	Drill Size Cutting Jet
	in.	mm	Cutting Oxygen		Preheat			Cutting Oxygen	Preheat			
			Reg.	Torch	Oxygen	Natural Gas			Oxygen	Natural Gas		
SC50-00	3/16	5	20	20	6†	5	.050	24	58	36	26	68
SC50-0	1/4	6	30	30	6†	5	.055	40	62	38	22	62
SC50-0	3/8	10	35	35	6†	5	.055	50	62	38	20	62
SC50-1	1/2	13	35	35	8†	6	.080	75	70	40	19	56
SC50-1	5/8	16	40	40	8†	6	.080	85	70	40	17	56
SC50-2	3/4	19	36	35	8†	6	.095	105	70	40	16	54
SC50-2	1	25	41	40	8†	6	.095	115	70	40	14	54
SC50-2	1-1/4	32	51	50	8†	6	.095	135	70	40	13	54
SC50-3	1-1/2	38	42	40	8†	6	.100	170	70	40	12	51
SC50-3	2	51	47	45	8†	6	.100	180	70	40	10	51
SC50-4	2-1/2	64	38	35	8†	6	.125	240	75	45	9	45
SC50-4	3	76	44	40	8†	6	.125	265	75	45	8	45
SC50-4	4	102	54	50	8†	6	.125	315	75	45	7	45
SC50-5	5	127	56	50	8†	6	.150	420	82	50	7	41
SC50-5	6	152	67	60	8†	6	.150	485	82	50	6	41
SC50-5	8	203	78	70	8†	6	.150	550	82	50	5	41
SC50-6	10	254	83	70	10†	8	.230	750	120	75	5	32
SC50-6	12	304	125	90	15†	12	.230	975	165	100	4.5	32
SC50-7	14	354	125	90	20†	16	.250	1250	200	120	4	28
SC50-8	16	406	125	90	20†	18	.300	1500	220	135	3.5	17
SC50-8	18	457	125	90	25†	23	.340	1800	250	150	3.5	17
SC50-9	20	508	125	90	25†	23	.350	2150	250	150	3	3

† Listed pressure for 3-hose machine cutting torches only.

Table 11. SC46 Series Heavy-Duty Cutting Tips – Propane (One Piece)

Tip Number	Metal Thickness		Pressure – psig				Kerf Width	Consumption – scfh			Speed IPM	Drill Size	
	in.	mm	Cutting Oxygen		Preheat			Cutting Oxygen	Preheat			Cutting Jet	Preheat
			Reg.	Torch	Oxygen	Propane			Oxygen	Propane			
SC46-2	3/4	19	36	35	20†	10	105	70	15	16	54	56	
SC46-2	1	25	41	40	20†	10	115	70	15	14	54	56	
SC46-2	1-1/4	32	51	50	20†	10	135	70	15	13	54	56	
SC46-4	2-1/2	64	38	35	20†	10	240	70	15	9	45	56	
SC46-4	3	76	44	40	20†	10	265	70	15	8	45	56	
SC46-4	4	102	54	50	20†	10	315	70	15	7	45	56	
SC46-5	5	127	56	50	20†	10	420	105	22	7	41	54	
SC46-5	6	152	67	60	20†	10	485	105	22	6	41	54	
SC46-5	8	203	78	70	20†	10	550	105	22	5	41	54	
SC46-6	10	254	83	70	20†	12	750	105	22	5	32	54	
SC46-6	12	305	125	90	20†	12	975	105	22	4.5	32	54	

† Listed pressure for 3-nose machine cutting torches only.

Table 12. SC46 Series Heavy-Duty Cutting Tips – Natural Gas (One Piece)

Tip Number	Metal Thickness		Pressure – psig				Kerf Width	Consumption – scfh			Drill Size		
	in.	mm	Cutting Oxygen		Preheat			Cutting Oxygen	Preheat		Speed IPM	Cutting Jet	Preheat
			Reg.	Torch	Oxygen	Natural Gas			Oxygen	Nat. Gas			
SC46-2	3/4	19	36	35	20†	10	.095	105	70	41	16	54	56
SC46-2	1	25	41	40	20†	10	.095	115	70	41	14	54	56
SC46-2	1-1/4	32	51	50	20†	10	.095	135	70	41	13	54	56
SC46-4	2-1/2	64	38	35	20†	10	.125	240	70	41	9	45	56
SC46-4	3	76	44	40	20†	10	.125	265	70	41	8	45	56
SC46-4	4	102	54	50	20†	10	.150	315	70	41	7	45	56
SC46-5	5	127	56	50	20†	10	.150	420	90	52	7	41	54
SC46-5	6	152	67	60	20†	10	.150	485	90	52	6	41	54
SC46-5	8	203	78	70	20†	10	.150	550	90	52	5	41	54
SC46-6	10	254	83	70	20†	12	.200	750	90	52	5	32	54
SC46-6	12	305	125	90	20†	12	.230	975	90	52	4.5	32	54

† Listed pressure for 3-hose machine cutting torches only.

Table 13. SC60 Series Heavy-Duty Cutting Tips – Propylene (Two Piece)

Tip Number	Metal Thickness		Pressure – psig						Kerf Width	Consumption – scfh			Speed IPM	Drill Size Cutting Jet
			Cutting Oxygen			Preheat				Cutting Oxygen	Preheat			
			Reg.	Torch	Oxygen	Oxygen	Propylene	Oxygen			Propylene			
SC60-0	1/4	6	30	30	10†	10	10	.053	40	38	9	22	62	
SC60-0	3/8	10	35	35	10†	10	10	.055	50	38	9	20	62	
SC60-1	1/2	13	35	35	10†	10	10	.080	75	38	9	19	56	
SC60-1	5/8	16	40	40	10†	10	10	.080	85	38	9	17	56	
SC60-2	3/4	19	36	35	10†	10	10	.095	105	38	9	16	54	
SC60-2	1	25	41	40	10†	10	10	.095	115	38	9	14	54	
SC60-2	1-1/4	32	51	50	10†	10	10	.095	135	38	9	13	54	
SC60-3	1-1/2	38	42	40	10†	10	10	.100	170	38	9	12	51	
SC60-3	2	51	47	45	10†	10	10	.100	180	38	9	10	51	
SC60-4	2-1/2	64	38	35	12†	10	10	.125	240	58	15	9	45	
SC60-4	3	76	44	40	12†	10	10	.125	265	58	15	8	45	
SC60-4	4	102	54	50	12†	10	10	.125	315	58	15	7	45	
SC60-5	5	127	56	50	12†	10	10	.150	420	58	15	7	41	
SC60-5	6	153	67	60	12†	10	10	.150	485	58	15	6	41	
SC60-5	8	203	78	70	12†	10	10	.150	550	58	15	5	41	
SC60-6	10	254	83	70	12†	10	10	.230	750	58	15	5	32	
SC60-6	12	305	125	90	12†	10	10	.230	975	58	15	4.5	32	

† Listed pressure for 3-hose machine cutting torches only.

Table 14. SC36 Series Heavy-Duty Cutting Tips – Propylene (One Piece)

Tip Number	Metal Thickness		Pressure – psig				Kerf Width	Consumption – scfh			Speed IPM		Drill Size	
	in.	mm	Cutting Oxygen		Preheat			Cutting Oxygen	Preheat		Speed IPM	Cutting Jet	Preheat	
			Reg.	Torch	Oxygen	Propylene			Oxygen	Propylene				
SC36-1	1/2	13	35	35	20†	10	.080	75	70	15	19	56	56	
SC36-1	5/8	16	40	40	20†	10	.080	85	70	15	17	56	56	
SC36-2	3/4	19	36	35	20†	10	.095	105	70	15	16	54	56	
SC36-2	1	25	41	40	20†	10	.095	115	70	15	14	54	56	
SC36-2	1-1/4	32	51	50	20†	10	.095	135	70	15	13	54	56	
SC36-3	1-1/2	38	42	40	20†	10	.100	170	70	15	12	51	56	
SC36-3	2	51	47	45	20†	10	.125	180	70	15	10	51	56	
SC36-4	2-1/2	64	38	35	20†	10	.125	240	70	15	9	45	56	
SC36-4	3	76	44	40	20†	10	.125	265	70	15	8	45	56	
SC36-4	4	102	54	50	20†	10	.150	315	70	15	7	45	56	
SC36-6	10	254	83	70	20†	12	.200	750	105	22	5	32	54	
SC36-6	12	305	125	90	20†	12	.230	975	105	22	4.5	32	54	

† Listed pressure for 3-hose machine cutting torches only.

Table 15. SC Series Heavy-Duty Special Purpose Tips – Propane/Propylene

Tip Number	Purpose	Capacity (Width x Depth)		Fuel Gas	Pressure – psig		Consumption – scfh		Oxygen Drill Size	Fuel Gas Configuration	Recm'd No. Of Cylinders**
		in.	mm		Oxygen	Fuel Gas	Oxygen	Fuel Gas			
SC2-2	Gouging (General)	5/16 x 1/8	8 x 3	Propane	60	22	389	53	53 31	Slots	1
SC2-4	Gouging (General)	3/8 x 1/4	10 x 6	Propane	75	22	564	53	44 28	Slots	1
SC112*	Heating	289,000 BTUs	N/A	Propane	60	25	495	125	N/A	Slots	2
SC23-3	Gouging (Heavy)	3/8 x 1/4	10 x 6	Propane	50-60	12-18	174	31	50 29	Slots	1
SC23-3M	Gouging	3/8 x 1/4	10 x 6	Propylene	50-60	10-15	174	31	50 29	Slots	1

* Use with hand (straight) torches only. Do not use in cutting attachments.

** Cylinders required, based on 100 lb cylinders.

Table 16. MC40 Series Medium-Duty Cutting Tips – Propane (Two Piece)

Tip Number	Metal Thickness		Pressure – psig		Kerf Width	Consumption – scfh			Drill Size Cutting Jet
	in.	mm	Oxygen	Propane		Cutting Oxygen	Preheat		
							Oxygen	Propane	
MC40-00	3/16	5	30*	10	.050	24	35	7	68
MC40-0	1/4	6	35*	10	.055	40	35	7	62
MC40-0	3/8	10	40*	10	.055	46	35	7	62
MC40-1	1/2	13	45*	10	.080	75	35	7	55
MC40-1	5/8	16	50*	10	.080	81	35	7	55
MC40-2	3/4	19	50*	10	.095	107	35	7	54
MC40-2	1	25	55*	10	.095	118	35	7	54
MC40-2	1-1/4	32	60*	10	.095	133	35	7	54
MC40-3	1-1/2	38	55*	10	.100	170	35	7	51
MC40-3	2	51	60*	10	.100	181	35	7	51
MC40-4	2-1/2	64	65*	10	.125	249	35	7	51
MC40-4	3	76	70*	10	.125	267	35	7	51
MC40-4	4	102	75*	10	.125	320	35	7	51

* Increase pressure 10–15 psig when using AC305 or AC309 cutting attachment.

Table 17. MC60 Series Medium-Duty Cutting Tips – Propylene (Two Piece)

Tip Number	Metal Thickness		Pressure – psig		Kerf Width	Consumption – scfh			Drill Size Cutting Jet
	in.	mm	Oxygen	Propylene		Cutting Oxygen	Preheat		
							Oxygen	Propylene	
MC60-0	1/4	6	35*	10	.055	40	26	7	62
MC60-0	3/8	10	40*	10	.055	46	26	7	62
MC60-1	1/2	13	45*	10	.080	75	26	7	55
MC60-1	5/8	16	50*	10	.080	81	26	7	55
MC60-2	3/4	19	50*	10	.095	107	26	7	54
MC60-2	1	25	55*	10	.095	118	26	7	54
MC60-2	1-1/4	32	60*	10	.095	133	26	7	54
MC60-3	1-1/2	38	55*	10	.100	170	42	11	51
MC60-3	2	51	60*	10	.100	181	42	11	51
MC60-4	2-1/2	64	65*	10	.125	249	42	11	45
MC60-4	3	76	70*	10	.125	267	42	11	45
MC60-4	4	102	75*	10	.125	320	42	11	45

* Increase pressure 10–15 psig when using AC305 or AC309 cutting attachment.

Table 18. Heavy-Duty Heating Tips -Propane/Propylene

Stock Number	No. Of Flames	Uses	Pressure – psig		Consumption – scfh		Average BTU/Hr	Recm'd No. Of Cylinders*	Overall Length		Head Part No.
			Oxygen	Fuel Gas	Oxygen	Fuel Gas			in.	mm	
ST800	Fluted	Propane	30-40	20-25	107-108	22-24	58,000	1	15-1/2	394	16317
		Propylene	30-40	20-25	118-138	31-34	75,000	1			
ST815	Fluted	Propylene	37-77	13-37	390-655	120-235	273,000	1-2	15-1/2	394	4642
ST825	Fluted	Propylene	60-110	20-35	580-1500	225-525	830,000	2-5	31	787	4639

* Cylinders required, based on 100 lb cylinders.

Table 19. Heavy-Duty Heating Tips – Natural Gas/Propane/Propylene

Stock Number	No. Of Flames	Uses	Pressure – psig		Consumption – scfh		Average BTU/Hr	Recm'd No. Of Cylinders*	Overall Length		Head Part No.
			Oxygen	Fuel Gas	Oxygen	Fuel Gas			in.	mm	
ST615	Fluted	Propane	23-65	10-28	225-535	70-160	244,000	1-2			
		Natural Gas	18-55	10-28	175-450	96-267	155,145	N/a	15-1/2	394	1495
ST625	Fluted	Propylene	20-60	10-28	235-430	100-160	280,000	1			
		Propane	50-110	17-28	480-1000	140-280	455,000	2-3	31	787	1504
ST635		Natural Gas	43-80	18-28	390-785	200-450	313,950	n/a			
		Propane	70-115	18-40	670-1580	185-480	614,195	2-5	31	787	1499

* Cylinders required, based on 100 lb cylinders.

Table 20. Medium-Duty Heating Tips – Propane/Propylene/Natural Gas

Stock Number	No. Of Flames	Uses	Pressure – psig		Consumption – scfh		Average BTU/Hr	Fuel Cylinders Required*	Overall Length		Head Part No.
			Oxygen	Fuel Gas	Oxygen	Fuel Gas			in.	mm	
MT800	Fluted	Propylene	30–40	20–25	135–146	51–56	123,000	1	14	356	16317
		Propane	30–40	20–25	119–121	36–38	93,000	1			
MT805	Fluted	Propylene	50–60	20–25	242–270	120–135	280,000	1	14	356	4642
		Propane	50–60	20–25	206–230	80–100	208,000	1			
MT615	Fluted	Propylene	20–60	10–25	235–430	100–160	280,000	1	14	356	1495
		Propane	20–60	10–25	225–535	70–160	269,000	1–2			
		Natural Gas	15–50	10–25	175–450	96–267	182,000	N/a			

* Cylinders required, based on 100 lb cylinders.

Table 21. Brazing Tips

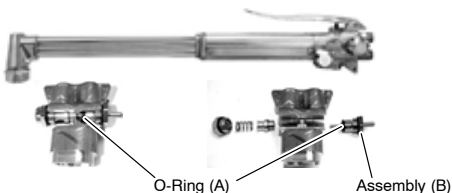
Tip Number	Welding Range		Pressure – psig		Consumption – scfh	
	in.	mm	Oxygen	Propane	Oxygen	Propane
MW411	1/2–5/8	13–16	11	11	52	13

SECTION 10 – SC900 SERIES GAS AXE – HAND CUTTING TORCH



10-1. Reversing The Cutting Lever

When reversing the high pressure seat valve assembly during this procedure, remove the components shown below and reinstall them in opposite sides of torch butt.



- ⚠** When removing Assembly (B) from the torch butt, o-ring (A) may slide off the assembly and remain lodged inside the torch butt. This condition will cause the oxygen cutting and oxygen preheat gases to cross-leak. Be sure to remove O-ring and insert it with the assembly into the opposite port.

SECTION 11 – NEW YORK CITY FIRE DEPARTMENT REGULATIONS

Torch Operations

- §38-01 Issuance of City-Wide Permits for the Storage, Use and/or Transport of Oxygen and Combustible Gases During Temporary or Emergency Torch Operations
- §38-01.1 Issuance of Permits for the Storage and Use of Oxygen and Combustible Gases for any Torch Operations during Construction, Alteration or Demolition Work
- §38-02 Operators of Heating Torches Used in the Manufacture of Jewelry
- §38-03 Fire Guards During Torch Operations
- §38-01 Issuance of City-Wide Permits for the Storage, Use and/or Transport of Oxygen and Combustible Gases During Temporary or Emergency Torch Operations.
- (a) Torches used in conjunction with oxygen and combustible gases shall be of a type approved by the Fire Department, or type previously approved by the Board of Standards and Appeals.
- (b) Operators of torches and required fire guards shall have Certificates of Fitness issued by the Fire Department in their possession during torch operations.
- (c) Torches shall not be used above or within 25 feet of combustible material or construction, unless such material or construction is protected by non-combustible shields or covers from possible sparks or fire. All floor or wall openings within 25 feet of torch operations shall be protected in a similar manner.

- (d) Torches shall not be used in areas or locations wherein hazardous gases, vapors or dust may be present.
- (e) Torches shall not be used on containers formerly used for storage of flammable liquids or gases, unless such containers have been purged of all flammable vapors.
- (f) Compressed gas cylinders shall, when in use, be properly supported and placed a safe distance from torch operations.
- (g) Cylinder(s) shall, when not in use, be properly supported and stored in a safe location protected from damage or exposure to fire.
- (h) Fully charged water hose(s) or a sufficient number of water type extinguishers of adequate size shall be provided at the location and exposed areas of the torch operations maintained and ready for immediate use by fire guards.
- (i) Except as otherwise specified by the commissioner, qualified fire guards shall be on continuous duty during torch operations. One fire guard shall be required for each torch operator and an additional fire guard shall be provided on the floor or level below the torch operations. Such persons shall be assigned no other duties than to remain alert, guard against fire from sparks or transmission of heat and ignition of combustible material or construction; also the placement and operation of fire extinguishment equipment. Fire guards shall make an initial inspection of fire extinguishment equipment. Fire guards shall make an initial inspection one-half hour later, for the purpose of detecting fire. A signed inspection report shall be filed with the person in charge of torch operations, and made available for inspection by the Fire Department.
- (j) Each vehicle used by a burning contractor to transport torches and cylinders containing oxygen and combustible gases for use during temporary or emergency torch operations shall be inspected prior to the issuance of a permit. Cylinders must bear stamps indicating that they have been hydrostatically tested within the last ten years and must be safely secured with metal brackets or chains. Legible signs indicating that flammable materials are being carried must appear on both sides and on the back of the vehicle. A fire extinguisher must be carried in an easily accessible position on the vehicle.
- (k) The owner, operator or person who manages or controls the premises for the owner on which the torch operations are to be conducted shall be notified in writing by the permittee at least forty-eight hours in advance of intended torch operations on any job locations, and said owner or operator, or person who owns or maintains or controls the premises, or his designated representative who shall not be the burning contractor shall be responsible for supervising the conduct of the operations so that they are carried out in accordance with this rule. A copy of the rule shall be furnished the owner by the contractor at the time of notification.
- (l) The permittee shall provide the owner or person in charge of premises wherein torch operations are to be conducted with a copy of this rule. Such owner or person in charge of premises shall be responsible for the full compliance with such rule.
- (m) Any violation of this rule shall be subject to enforcement in accordance with the provisions of §§27-4020 and 27-4254 of the Administrative Code.
- (n) The Permit for any one particular job site location shall be valid for thirty (30) days maximum; however, said permit shall remain in effect for one year with regard to its use on other job sites.
- (o) City-Wide Permit shall not include the storage and use of oxygen and combustible gases during the course of construction, alteration

or demolition work. A separate permit shall be required for such storage and use.

§38-01 Issuance of Permits for the Storage and Use of Oxygen and Combustible Gases for any Torch Operations during Construction, Alteration or Demolition Work

- (a) Torches used in conjunction with oxygen and combustible gases shall be a type approved by the Fire Department, or type previously approved by the Board of Standards and Appeals.
- (b) Operators of torches and required fire guards shall have Certificates of Fitness issued by the Fire Department in their possession during torch operations.
- (c) Torches shall not be used above or within 25 feet of combustible material or construction unless such material or construction is protected by non-combustible shields or covers from possible sparks or fire. All floor or wall openings within 25 feet of torch operations shall be protected in a similar manner.
- (d) Torches shall not be used in areas or locations wherein hazardous gases, vapors or dusts may be present.
- (e) Torches shall not be used on containers formerly used for storage of flammable liquids or gases, unless such containers have been purged of all flammable vapors.
- (f) Compressed gas cylinders shall, when in use, be properly supported and stored in a safe location protected from damage or exposure to fire.
- (g) Cylinder(s) shall, when not in use, be properly supported and stored in a safe location protected from damage or exposure to fire.
- (h) Fully charged water hose(s) or sufficient number of water type extinguishers of adequate size shall be provided at the location and exposed areas of the torch operations maintained and ready for immediate use by fire guards.
- (i) Except as otherwise specified by the commissioner, qualified fire guards shall be on continuous duty during torch operations. One fire guard shall be required for each torch operator and an additional fire guard shall be provided on the floor or level below the torch operations. Such persons shall be assigned no other duties than to remain alert, guard against fire from sparks or transmission of heat and ignition of combustible material or construction; also the placement and operation of fire extinguishment. Fire guards shall make an initial inspection of exposed areas one-half hour after completion of torch operations. Such inspection shall be followed up by another final inspection one-half hour later, for the purpose of detecting fire. A signed inspection report shall be filed with the person in charge of torch operations, and made available for inspection by the Fire Department.
- (j) The owner, operator or person who manages or controls the premises for the owner on which torch operations are to be conducted shall be notified in writing by the permittee at least forty-eight hours in advance of intended torch operations on any job locations, and said owner or operator, or person who owns or maintains or controls the premises, or his designated representative who shall not be the burning contractor shall be responsible for supervising the conduct of the operations so that they are carried out in accordance with this rule.
- (k) The permittee shall provide the owner or person in charge of premises wherein torch operations are to be conducted with a copy of this rule. Such owner or person in charge of premises shall be responsible for the full compliance with such rule.

- (l) Any violation of this rule shall be subject to enforcement in accordance with the provisions of §§27-4020 and 27-4254 of the Administrative Code.
- (m) City-Wide Permit shall not include the storage and use of oxygen and combustible gases during the course of construction, alteration or demolition work. A separate permit shall be required for such storage and use.

§38-02 Operators of Heating Torches Used in the Manufacture of Jewelry.

- (a) Operators of heating torches used in the manufacture of jewelry shall not be required to obtain individual Certificates of Fitness for the operation of such torches.
- (b) A Certificate of Fitness shall be required of a person in such occupancies, who shall be responsible for the following:
 - (1) Regulation of pressure and flow of oxygen and city gas to the individual operators of heating torches:
 - (2) Supervision of the individual heating torch operation.

§38-03 Fire Guards During Torch Operations. A person holding a Certificate of Fitness issued by the Fire Department shall be required to act in the capacity of fire guard during torch operations in course of construction, alteration, or demolition work; also, during temporary or emergency torch operations. Such persons shall provide required fire extinguishing equipment at torch operation locations; guard against fire in exposed areas, and make a complete inspection of exposed areas for possible fire.



Effective January 1, 2020

(For Oxy-Fuel and Pressure Regulation Equipment with a date code of CAA or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY - Subject to the terms and conditions below, Miller Electric Mfg. LLC, Appleton, Wisconsin, warrants to authorized distributors that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS. Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed. Miller shall honor warranty claims on warranted equipment listed below in the event of a defect within the warranty coverage time periods listed below. Warranty time periods start on the delivery date of the equipment to the end-user purchaser, or 12 months after the equipment is shipped to a North American or international distributor, whichever occurs first.

- 1. 5 Years – Parts and Labor
 - * Torch Handles, Cutting Attachments, Straight Cutting Torches and Machine Torches. The use of tips other than genuine Miller tips voids the warranty.
- 2. 3 Years – Parts and Labor
 - * Toughcut Outfits, Series 22, 30, 32, 35, 36, 40, 46 Regulators, and all Flowmeters, Flow Gauges, and Flowmeter Regulators

3. 2 Years – Parts and Labor
 - * Series 250, 820, and Branded Specialty Gas Regulators
4. 1 Year – Parts and Labor
 - * Gas Axe Cutting Torches, HVAC/Purge Regulators, 3-Stage Nitrogen Low-Pressure Blanketing Regulators, Gas Savers, Gas Mixers, and all other Oxy-Fuel Products
 - * The Little Torch, Quickbraze Torch, Handi-Heat/Silver Smith Torch
5. 90 Days – Parts and Labor
 - * Corrosive Service Regulators

Miller's True Blue® Limited Warranty shall not apply to:

1. Consumable components; oxy-fuel cutting, welding, and heating tips, or parts that fail due to normal wear.
2. Items furnished by Miller, but manufactured by others. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.
4. Defects caused by accident, unauthorized repair, or improper testing.

MILLER PRODUCTS ARE INTENDED FOR COMMERCIAL AND INDUSTRIAL USERS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

The exclusive remedies for warranty claims are, at Miller's option, either: (1) repair; or (2) replacement; or, if approved in writing by Miller, (3) the pre-approved cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon use). Products may not be returned without Miller's written approval. Return shipment shall be at customer's risk and expense.

The above remedies are F.O.B. Appleton, WI, or Miller's authorized service facility. Transportation and freight are the customer's responsibility. TO THE EXTENT PERMITTED BY LAW, THE REMEDIES HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES REGARDLESS OF THE LEGAL THEORY. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT) REGARDLESS OF THE LEGAL THEORY. ANY WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY, OR REPRESENTATION, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, ARE EXCLUDED AND DISCLAIMED BY MILLER.

Some US states do not allow limiting the duration of an implied warranty or the exclusion of certain damages, so the above limitations may not apply to you. This warranty provides specific legal rights, and other rights may be available depending on your state. In Canada, some provinces provide additional warranties or remedies, and to the extent the law prohibits their waiver, the limitations set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary by province.

Mill oxy-fuel warr 2020-01

Safety Pack

Order Form No. 5145 w/DVD

This Kit Includes:

- 30 "37 Violations Safety Quiz" Brochures
- 30 Safety Meeting Guides (English, French, Spanish)
- 1 41 Minute Oxy-Fuel Safety Video
- 1 Set of 6 Miller Cartoon Safety Posters
- 1 Post-Safety Video Test and Answer Key
(may be duplicated)



**To Order Safety Materials, Contact
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