INTRODUCTION

When you cut iron or steel with a conventional torch that uses oxygen and fuel gas two things happen. The preheat flames from the cutting nozzle heat the steel red-hot, than a stream of oxygen burns the steel. When the flame first touches the steel, a scum, called oxide (material that won't burn), forms on top of the steel. This oxide is melted by the flame and floats away from the cut. All this happens without you realizing it, and the cut is made quickly and easily.

Non-ferrous metals and some kinds of steel cannot be cut easily, or at all, with just oxygen and fuel gas. The reason is that these metals (such as stainless steel) tend to resist burning action. Also the oxide that forms on top is so tough that it won't melt in an ordinary oxy-acetylene flame and an oxygen jet cannot get through it.

The answer to this problem is to get the flame hotter to make the oxide melt easier. To do this, iron powder is blown through the flames at the tip of the cutting nozzle and into the oxygen stream. The powder burns when it meets the oxygen. The burning powder gives off a great amount of heat and "fluxes" the oxide. With this additional help, the oxygen jet cuts into stainless steel as though it were ordinary steel. With this additional help, the oxygen jet also cuts through many non-ferrous metals.

APPARATUS

The apparatus necessary for a powder cutting operation with a powder-cutting attachment includes a powder dispenser, standard cutting torches, standard cutting nozzles, hoses, oxygen and fuel gas.

In addition to these instructions, be sure to read those supplied with your dispenser, torch and regulators.

Powder-cutting attachments are made up of three separate units: powder valve, tubing, and adaptor (or powder nozzle).

There are three basic types of powder cutting attachments:

1. Single-Tube - This type of attachment has a single tube which leads the cutting nozzle and discharges a single stream of powder into the cutting oxygen.
2. Multi-Jet - This type of attachment has a nozzle adaptor which fits over a standard cutting nozzle. A ring of ports in the adaptor encircles the cutting nozzle and feeds powder through the preheat flames into the cutting oxygen.
3. Dual-Tube - This type of attachment has two powder tubes with discharge powder into the cutting oxygen and is used for extra heavy duty cutting.
SAFETY PRECAUTIONS

WARNING

These Safety Precautions are for your protection. They summarize precautionary information contained in the references in item 6 and as noted herein. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in injury or death.

1. PROTECT YOURSELF AND OTHERS — Some welding, cutting, and gouging processes are noisy and require ear protection. Hot metal can cause skin burns and heat rays may injure eyes. Training in the proper use of the processes and equipment is essential to prevent accidents. Also:
   a. Always wear safety glasses with side shields in any work area, even if welding helmets, face shields, or goggles are also required.
   b. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes, and a welding helmet or cap for hair protection, to protect against hot sparks and hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
   c. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned, and open pockets eliminated from the front of clothing.
   d. Protect other personnel from hot sparks with a suitable non-flammable partition or curtains.
   e. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can travel considerable distances. Bystanders should also wear goggles over safety glasses.

2. FIRES AND EXPLOSIONS — Heat from a flame can act as an ignition source. Hot slag or sparks can also cause fires or explosions. Therefore:
   a. Keep all combustible materials well away from the work area or completely cover the materials with a protective non-flammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints and coatings, paper, etc.
   b. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a sudden smoldering fire on the floor below. Make certain that such openings are protected from hot sparks and metal.
   c. Do not weld, cut, or perform any other hot work on materials, containers, or piping until it has been completely cleaned so that no substances on the material can produce flammable or toxic vapors. Refer to AWS F4.1 in item 6 below for specific recommendations.
   d. Do not do hot work on closed containers. They may explode violently and kill you.
   e. Have fire extinguishing equipment handy for instant use, such as a garden hose, a pail of water or sand, or portable fire extinguisher. Be sure you are trained in its use.
   f. After completing operations, inspect the work area to be sure that there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.
   g. For additional information, refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", which is available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

3. FUMES AND GASES — Fumes and gases, particularly in confined spaces, can cause discomfort or Injury. Do not breathe fumes or gases from welding or cutting. Therefore:
   a. Always provide adequate ventilation in the work area by natural or mechanical ventilation means. Do not weld, cut, or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead, beryllium, or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes and gases from these materials.
   b. If you develop momentary eye, nose, or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work at once and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.
   c. Refer to ANSI/AISC Standard Z49.1 in item 6 below for specific ventilation recommendations.

4. EQUIPMENT MAINTENANCE — Faulty or improperly maintained equipment, such as torches, hoses and regulators, can result in poor work, but even more important, it can cause injury or death through fires. Therefore:
   a. Always have qualified personnel perform the installation, troubleshooting, and maintenance work. Do not operate or repair any equipment unless you are qualified to do so.
   b. Keep all oxy-fuel equipment free of grease or oil. Grease, oil, and other similar combustible materials, when ignited, can burn violently in the presence of oxygen.
   c. Do not abuse any equipment or accessories. Keep equipment away from heat and wet conditions, oil or grease, corrosive atmospheres and inclement weather.
   d. Keep all safety devices in position and in good repair.
   e. Use equipment for its intended purpose. Do not modify it in any manner.

5. GAS CYLINDER HANDLING — Gas cylinders, if mishandled, can rupture or explode violently. Sudden rupture of a cylinder, valve, or relief device can injure or kill you. Therefore:
   a. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors to mount the regulator on the cylinder. Maintain hoses and fittings in good condition. Follow manufacturer's operating instructions for mounting the regulator to the gas cylinder.
   b. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, benches, walls, post, or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
   c. When not in use, keep cylinder valves closed. Have the valve protection cap in place on top of the cylinder if no regulator is installed. Secure and move cylinders by using suitable hand trucks. Avoid rough handling of cylinders.
   d. Locate cylinders away from heat, sparks, or flame of a welding, cutting, or gouging operation. Never strike an arc on a cylinder.
   e. For additional information, refer to CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", which is available from the Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

6. ADDITIONAL SAFETY INFORMATION — For more Information on safe practices for setting up and operating oxy-fuel welding and cutting equipment and on good working habits, ask your distributor for a copy of "Precautions and Safe Practices for Gas Welding, Cutting, and Heating", Form 2035. Gas apparatus safety guidelines are also available on VHS video cassettes from your distributor.

The following publications, which are available from the American Welding Society, 550 N.W. LeJeuene Road, Miami, FL 33126, are recommended to you:
   a. ANSI/AWS Z49.1 — "Safety in Welding and Cutting"
   b. AWS F4.1 — "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances"
**WARNING**

Powder cutting and scarfing should be done in well-ventilated locations due to the volume of fumes produced by these operations. The fumes are generally of low toxicity; however, they may be irritating to the operators' nose, throat, and eyes unless controlled by ventilation or by use of approved respirators. If respirators are used, select those specified for the particular fumes encountered in your work.

Remember that in the powder cutting of certain metals (chromium lead, cadmium, beryllium), or where sand is being removed from castings, toxic fumes or dangerous sand dust may be evolved. Extra precautions against excessive exposure to these materials should be adopted. Approved air-supplied helmets or canister masks for the particular material involved are recommended.

The Multi-Jet Powder Attachments

For Use With 1500 Series Nozzles

Here are the attachment assemblies used on the C-32 and C-66 torches. There are four different assemblies: Part Nos. 61Y60, 61Y58, 61Y59 and 61Y61. All four have a common powder tube assembly and a common powder valve assembly. They include two adapter and manifold assemblies as follows:

Part No. 61Y60 includes 61Y37 (ACA-1) and 61Y50 (75°); Part No. 61Y58 includes 61Y49 (90°).
Part No. 61Y59 includes 61Y40 (ACA-2) and 61Y50 (75°); Part No. 61Y61 includes 61Y40 and 61Y49 (90°).

Here are the attachment assemblies (Part Nos. 61Y57 and 61Y56) used on the C-37, C-39 and C-67 torches. They can also be adapted for use on C-58 and older Oxweld torches by cutting the powder tube to suit the individual torch. The two assemblies differ only in the nozzle adaptors as follows:

Part No. 61Y57 includes 61Y37 (ACA-1); Part No. 61Y56 includes 61Y40 (ACA-2).
To Assemble Attachment To Torch

1. Select the proper nozzle from Tables on Page 6. Insert the nozzle into the nozzle adaptor. Screw the assembly into the torch and tighten securely. Remove the nuts and ferrules from the adaptor elbows and slip them onto the manifold tubes. (The thin-walled section of the ferrule should face the end of the tube.) Assemble the manifold to the elbows and tighten the connections securely.

2. Loosely assemble the powder valve to the torch.

On C-32 and C-66, connect the powder tube assembly (61Y43) to the oxygen inlet connection on the torch and to the inlet of the powder valve. Connect the manifold to the outlet of the powder valve and tighten all connections. Tighten the powder valve on the torch.

On the C-37 and C-39, connect the powder tube to the manifold assembly and the powder valve. Tighten the connections, then tighten the powder valve on the torch.

NOTE: When connecting used equipment be sure to clean loose powder from threads and seating surfaces to obtain a gas-tight seal.

OPERATING INSTRUCTIONS

To adjust powder flow, consult tables on Page 6 for recommended flows. Follow adjustment instructions in the booklet supplied with dispenser.

To light the torch, follow instructions in booklet supplied with torch.

To shut off, close the various valves in the following order:

1. powder valve,
2. water valve,
3. cutting oxygen valve,
4. fuel valve, and
5. preheat oxygen valve.

Shut off the nitrogen or air supply line valve or back out the air regulator adjusting screw. Open the torch powder valve. Vent the dispenser by opening the pet cock on the cover.

Operating Precautions: Observe the usual backfire and flashback precautions and operating instructions outlined in the instruction book packed with the torch. Cutting should be done in a well-ventilated location.
The Single Tube Powder Attachments

Part No. 60Y98 is for use on C-37, C-39 and C-67 torches. It can be adapted for use on other 1500 series model torches by cutting the powder tube to suit the individual torch.

Part No. 60Y01 (not illustrated) is for use on the discontinued C-62 pad washing torch.

Replacement Part No. 60Y01

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
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<tbody>
<tr>
<td>61Y05</td>
<td>Powder Adaptor</td>
</tr>
<tr>
<td>17Z76</td>
<td>Powder Tube</td>
</tr>
<tr>
<td>2119749</td>
<td>Powder Valve</td>
</tr>
<tr>
<td>61Y53</td>
<td>Powder Inlet Tube</td>
</tr>
</tbody>
</table>

To Assemble Attachment To Torch

Select proper nozzle from tables on Page 6 and install in the torch in the usual manner. Locate the powder nozzles as shown above - so that it "leads" the cutting nozzle and so that the inside edge of the powder nozzle is even with the face of the cutting nozzle. Assemble the powder valve loosely to the torch. Then connect the powder tube to the powder nozzle and valve. Tighten powder valve on torch.

Operating Instructions

1. The table on page 6 shows recommended powder flows and approximate cutting speeds. * For complete instructions on how to adjust and operate the dispenser, consult the booklet supplied with the dispenser.

2. For instructions on lighting and operating the torch, consult the torch booklet.

3. See also Operating Instructions on Page 4 of this booklet.

To get instantaneous, flying, or running starts on low-carbon steel rounds, do the following after lighting:

1. Start torch or machine travel toward the round.

2. Start powder flow and turn on the cutting oxygen before the cutting nozzle is over the edge of the round. The powder burns in the cutting oxygen. (The start is made at the moment the leading edge of the cutting oxygen and burning powder is tangent to the round.)

3. Gradually turn off the powder immediately after making the start. (This prevents gouging within the kerf.)
**OPERATION DATA TABLES**

*IMPORTANT: This table does not differentiate the type of powder attachments. Nozzle size recommendations and powder flows are a guide to be used as a starting point. Different material compositions will affect nozzle selection, cutting speeds and powder flow required.*

<table>
<thead>
<tr>
<th>1500 SERIES NOZZLES</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>STEEL THICKNESS</td>
<td>NOZZLE SIZE*</td>
<td>POWDER (LB/HR.) FLOW</td>
<td>APPROXIMATE CUTTING SPEED (IPM)</td>
</tr>
<tr>
<td>1/4</td>
<td>1/2</td>
<td>15</td>
<td>20</td>
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<tr>
<td>1/2</td>
<td>1</td>
<td>18</td>
<td>14</td>
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<tr>
<td>STEEL THICKNESS</td>
<td>NOZZLE SIZE*</td>
<td>POWDER (LB/HR.) FLOW</td>
<td>APPROXIMATE CUTTING SPEED (IPM)</td>
</tr>
<tr>
<td>12</td>
<td>20</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
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<td>2</td>
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<td>24-28</td>
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<td>1-2</td>
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<th>1700 SERIES NOZZLES</th>
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</thead>
<tbody>
<tr>
<td>STEEL THICKNESS</td>
<td>NOZZLE SIZE*</td>
<td>POWDER (LB/HR.) FLOW</td>
<td>APPROXIMATE CUTTING SPEED (IPM)</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
<td>60</td>
<td>2-3</td>
</tr>
<tr>
<td>40</td>
<td>50</td>
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<tr>
<td>60</td>
<td>70</td>
<td>90</td>
<td>1-1/2-2</td>
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<table>
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<tr>
<th>C-100 SERIES NOZZLES</th>
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<tbody>
<tr>
<td>STEEL THICKNESS</td>
<td>NOZZLE SIZE*</td>
<td>POWDER (LB/HR.) FLOW</td>
<td>APPROXIMATE CUTTING SPEED (IPM)</td>
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<tr>
<td>60-75</td>
<td>80</td>
<td>90-100</td>
<td>1-2</td>
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<tr>
<td>75-100</td>
<td>100</td>
<td>90-100</td>
<td>1-2</td>
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</table>

* Nozzle size is listed as material thickness normally cut, under standard conditions.
Replacement Parts

Powder Valve - Part No. 2119749

Powder Valve - Part No. 2119750

Manifold Assembly - Part No. 61Y50 (75°)
Part No. 61Y49 (90°)

Manifold Assembly - Part No. 61Y48 (C-37, C-39)
Nozzle Adaptor Assembly - Part No. 61Y37 (ACA-1)  
Part No. 61Y40 (ACA-2)

* APPLY PIPE JOINT COMPOUND ON THREADS

Nozzle Adaptor Assembly - Part No. 61Y02

5278722 * Includes The Following:
(2) Powder Nozzles .... P/N 61Y03
(3) Tube Fitting .......... P/N 185W04
(2) Screw ................. P/N 2030177
(2) Ferrule ............... P/N 185W35
(2) Nut .................... P/N 185W40

# See Replacement Parts on Previous Page

Powder Attachment - Part No. 5278721

5278722 * Includes The Following:
(2) Powder Nozzles .... P/N 61Y03
(3) Tube Fitting .......... P/N 185W04
(2) Screw ................. P/N 2030177
(2) Ferrule ............... P/N 185W35
(2) Nut .................... P/N 185W40

# See Replacement Parts on Previous Page

Powder Attachment - Part No. 2030210
Powder Attachment - Part No. 2116229

POWDER INLET TUBE ASSEMBLY - 50Y76
- INCLUDES
  - CONNECTION: 102Z66
  - UNION NUT: 33A54

FRONT CLAMP - 68233
- SCREW: 6134.00115

POWDER YOKE - 50Y75
- INCLUDES
  - (2) UNION NUT: 33A54

POWDER VALVE ASSY. 2119750#
TUBING 2116232
TUBING CONNECTOR 2116233
POWDER NOZZLE 2114752

#See Replacement Parts On Page 9.

Powder Attachment Part No. 10Y95

(2) REAR CLAMP - 50Y76
(2) SCREW - 6134.00113
(2) NUT - 6330.0121

50L-18

Powder Attachment Part No. 2028213

REAR CLAMP ASSY - 60Y75
FRONT CLAMP ASSY - 3020215
POWDER OUTLET NY77

NUT - 33A54
YOKE ASSY - 80Y75

TUBE - 147226
FITTING - 85W78
TUBE - 147225
FITTING - 85W78

SILVER SOLDER
TUBE - 147225
FITTING - 85W78
TIN AND SWEAT

INLET TUBE - 2028214
CONNECTION - 102Z71
SILVER SOLDER
FITTING - 78Z18

Tin and Sweat (6 Places Pipe Tubs)

Powder Attachment - Part No. 61Y43

Tube Assembly - Part No. 61Y43
# ORDERING INFORMATION

## Single-Tube Attachments

<table>
<thead>
<tr>
<th>Type of Torch</th>
<th>Attachment Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-37, C-39, C-67</td>
<td>60Y98</td>
</tr>
<tr>
<td>(and other 1500 series models)</td>
<td></td>
</tr>
<tr>
<td>C-62 (pad washing)</td>
<td>61Y01</td>
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## Dual-Tube Attachments

<table>
<thead>
<tr>
<th>Torch</th>
<th>Attachment Part No.</th>
<th>Accessory Powder Valve Part No.</th>
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</thead>
<tbody>
<tr>
<td>C-66-1400 Hand Torch</td>
<td>2030210</td>
<td>not req'd</td>
</tr>
<tr>
<td>C-63 Hand Torch</td>
<td>5278721</td>
<td>not req'd</td>
</tr>
<tr>
<td>C-43 Machine Torch</td>
<td>2116229</td>
<td>not req'd</td>
</tr>
<tr>
<td>C-60 Machine Torch</td>
<td>10Y95</td>
<td>16X36</td>
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<tr>
<td>C-100 Machine Torch</td>
<td>2028213</td>
<td>16X36</td>
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## Multi-Jet Attachments

<table>
<thead>
<tr>
<th>Type of Torch</th>
<th>Attachment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Part No.</td>
</tr>
<tr>
<td>C-31, C-32 or C-66</td>
<td>1500 ACA-2</td>
</tr>
<tr>
<td>Hand Torch, 75° Head</td>
<td>1500 ACA-1</td>
</tr>
<tr>
<td>C-31, C-32 or C-66</td>
<td>1500 ACA-2</td>
</tr>
<tr>
<td>Hand Torch, 90° Head</td>
<td>1500 ACA-1</td>
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<tr>
<td>C-37, C-39, or C-67</td>
<td>1500 ACA-2</td>
</tr>
<tr>
<td>Machine Torch</td>
<td>1500 ACA-1</td>
</tr>
</tbody>
</table>

*Note: Select the correct model based on the type of nozzle being used.*

The 1500 ACA-2 attachment is limited to one piece acetylene nozzles having a tapered front end as follows:

- 1514 Series through No. 60
- 1564 Series (MAPP gas)
- 1563 Series through No. 6
- 1565 Series through No. 3

The 1500 ACA-1 attachment accepts all other 1500 Series Cutting Nozzles.