INSTRUCTIONS for Purox W-201 and W-202 Welding Torches and CW-202 Cutting Attachment

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for oxy-fuel gas equipment, we urge you to read Linde’s free booklet “Precautions and Safe Practices,” Form 2035. The same information appears in the “Oxy-Acetylene Handbook” which may be purchased from any Linde Distributor. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these Instructions. If you do not fully understand these Instructions, contact your supplier for further information.

OPERATING INSTRUCTIONS

CONNECTING

1. Attach regulators to the oxygen and fuel gas cylinders. Follow all instructions supplied with your regulators.

2. Attach oxygen and fuel gas hoses (see Note 1 in Operating Data section on pg. 3 for recommended hose sizes) to the regulators and to the torch handle, after making sure all metal seating surfaces are clean. Tighten all connection nuts with a wrench.

3. Using Welding Head: Remove welding head connection nut from torch handle. Insert welding head into handle using slight back and forth twisting motion as you push. Slip connection nut over the head and hand-tighten to handle.

Using Cutting Attachment: Set the welding head connection nut aside and insert the cutting attachment to the torch handle in the same manner as the welding head. Remove nozzle nut and insert cutting nozzle into the cutting attachment head. Slip nut over the nozzle and tighten with a wrench.

4. Check valve stem packing nuts for tightness.

ADJUSTING GAS PRESSURES

Fuel Gas: With oxygen valve closed, open the fuel gas valve on the torch handle about one turn. Turn in the pressure-adjusting screw on the fuel gas regulator until its delivery-pressure gauge indicates the desired pressure (refer to operating tables on page 4). Then immediately close the torch fuel gas valve.

Oxygen, Using Welding Head: Open the torch oxygen valve WIDE (about 1-1/2 turns). Adjust oxygen pressure at the regulator to the desired pressure (refer to Table 1 or 2) and then close the torch oxygen valve.

Oxygen, Using Cutting Attachment: Open the torch oxygen valve WIDE and leave the preheat oxygen valve on the cutting attachment closed. Depress the cutting oxygen valve lever on the cutting attachment. Adjust the oxygen pressure at the regulator to the desired pressure (refer to Table 3 or 4). Shut off the oxygen flow by releasing the cutting oxygen valve lever only.

TESTING FOR LEAKS

Every welding and cutting outfit should be thoroughly tested for leaks after it is first hooked up, and at regular intervals thereafter. After all connections have been made, make sure both valves on the torch handle are closed. Then turn in the regulator pressure-adjusting screws clockwise until the oxygen delivery-pressure gauge registers 50 psi, the fuel gas delivery-pressure gauge registers 10 psi. Using Leak Test Solution suitable for oxygen service, such as P/N 998771 (8 oz. container), check for leaks at the cylinder valves, the cylinder-to-regulator connections, the regulator-to-hose connections, and the hose-to-torch connections. If bubbling at any point indicates leakage, tighten the connection. If this does not stop the leakage, close the appropriate cylinder valve, open the torch valve to remove all pressure from the line, and finally release the regulator pressure-adjusting screw by turning it counterclockwise. Then break
the leaky connections, wipe metal seating surfaces with a
clean, dry cloth, and examine them for nicks and scratches.
Remake the connection(s) and retest. Do not try to light
the torch until you are satisfied that all connections are
gas-tight.

LIGHTING & FLAME ADJUSTMENT

With Welding Head:
1. Open oxygen valve a fraction of a turn.
2. Open fuel gas valve one full turn and light the gas at
   the torch tip with a friction lighter. DO NOT USE A
   MATCH. Use of a match can seriously burn your hand.
3. Open the oxygen valve wide and adjust the fuel gas valve
to secure the desired flame. If flame is larger and harsher
than desired, reduce the oxygen flow by throttling the
oxygen valve and then readjust the fuel gas valve.

With Cutting Attachment:
   If using acetylene:
1. Make sure the torch handle oxygen valve is WIDE open
   (at least one and one-half turns) and that the preheat
   oxygen valve on the cutting attachment is closed.
2. Open the acetylene valve on the torch handle about 1/4
   turn, and light the gas at the nozzle with a friction
   lighter. DO NOT USE A MATCH. Use of a match can
   seriously burn your hand.
3. When lit, flame will be yellow and quite long. Slowly
   close the acetylene throttle valve until the yellow flame
   starts to throw off black smoke (carbon particles).
4. Open preheat oxygen valve SLOWLY until the flame
   shows only excess acetylene 'feathers'.
5. Finally, open the cutting oxygen valve and adjust for
   neutral flames by turning preheat oxygen valve.

The flame now has the proper strength for any cutting job.
With this flame, acetylene is being consumed economically
and the cutting attachment will be operating at best resis-
tance to flashback. If greater preheat flame temperature is
desired for faster starts or piercing, open the cutting oxygen
valve and adjust the preheat oxygen valve until the flame
inner cones shorten about 10 percent and become sharply
pointed.

If using FG-2 or other fuel gases but acetylene:
1. Open the preheat oxygen valve on the cutting attach-
ment about a 1/2 turn.
2. Open the fuel gas valve on the torch about 1/8 turn and
   light the gas at the nozzle with a friction lighter. DO
   NOT USE A MATCH. Use of a match can seriously burn
   your hand.
3. Open fuel gas valve until flame just starts to leave the
   end of the nozzle and then open the preheat oxygen
   valve until the flames are at their shortest length. Dep-
   press the cutting oxygen valve lever and then readjust

the preheat flames to the shortest length by opening
the preheat oxygen valve gradually.

The above procedure usually provides adequate preheat
for the nozzle in use. If desiring to change the preheat
flames, always hold the cutting oxygen valve open while
readjusting the preheat oxygen and fuel gas valves.

After lighting the torch, and adjusting the flames, use
leak test solution to check for leakage at all torch valves,
and at the connection between the torch handle and the
welding head or cutting attachment.

SHUTTING OFF

Close the fuel gas valve first, then the oxygen valve whether
you are using a welding head or cutting attachment. However,
if the cutting attachment is to be relighted within
a half-hour, you may close the preheat oxygen valve on the
attachment instead of the oxygen valve on the torch handle.
If operations are to be stopped for a half-hour or more,
you should release all pressure from regulators. To do this,
first close both cylinder valves. Then open the torch valves.
Finally, back out the regulator pressure-adjusting screws
until they turn freely.

OPERATING PRECAUTIONS

Backfire: Improper operation of the torch or cutting attach-
ment may cause the flame to go out with a loud 'pop'. (If
you are welding, the flame will often reignite instantly.)
Such a backfire may be caused by contact of tip or nozzle
with the work, by spatter from the work, by the use of in-
correct gas pressures, or by leakage at the cutting nozzle
seats due to dirt or nicks on seats or to a loose nozzle nut.
After a backfire, you can normally relight the flames
immediately. However, if backfires occur repeatedly, shut
off the torch. Check the 'O'-ring seals between the welding
head or cutting attachment and the handle, and the nozzle
seats (if cutting). Readjust operating pressures and relight.

Flashback: Under certain exceptional circumstances, the
flame may not 'pop' out (backfire) but instead burn back
inside the torch with a shrill hissing or squeal. This is called
a 'flashback'. A flashback should never occur if (1) the
equipment is in good condition; (2) preheat ports on cut-
ting nozzles or welding tips are cleaned frequently; and (3)
operating pressures are correct. Should a flashback occur,
IMMEDIATELY shut off the torch. Allow it to cool off
for at least a minute. Then check your nozzle or tip, gas
pressures, readjust regulators if necessary, and relight the
torch. If flashback recurs, send the torch handle and weld-
ing head or cutting attachment to a Linde repair station or
to your distributor for repair.
OPERATING DATA

GENERAL NOTES

1. Pressures given in the tables that follow are measured at the torch; therefore, pressure drop through hose should be considered when setting pressure at the regulator. Generally, 1/4-in. hose, 25-ft. long or less, are suitable for operating any welding heads up through size 30 or any cutting nozzle up through size 7. For larger heads or nozzles or if longer hose lengths are required, 3/8-in. hoses are recommended.

2. Head size number on each welding and heating head indicates the rated acetylene flow capacity in cubic feet/hour (cfh). For example, No. 55A requires about 55 cfh of acetylene at the given operating pressures. However, on heating heads designed for other fuel gases, the size indicates the approximate equivalent heating capacity in terms of acetylene flow. For example, note from Table 2 that No. 100A and No. 100FG provide the same average heating output (147,000 Btu/hr) but No. 100FG head really requires about 62 cfh of FG-2, 57 cfh of propane, or 147 cfh of natural gas.

For consumption purposes, the following are the oxygen/fuel gas ratios normally required for welding and heating:

- 1.1 to 1.5 cfh oxygen/1.0 cfh acetylene
- 3.2 to 3.6 cfh oxygen/1.0 cfh FG-2
- 3.5 to 4.5 cfh oxygen/1.0 cfh propane
- 1.7 to 2.0 cfh oxygen/1.0 cfh natural gas

3. Acetylene cylinders should be manifoldered if the hourly flow rate exceeds one-seventh of the capacity of the cylinder. For example, acetylene from a “WTL” cylinder (capacity of 390 cu. ft.) should not be withdrawn at a rate greater than about 55 cfh. Higher acetylene flow may withdraw acetone from cylinders which may then cause erratic torch operation. Therefore, when operating head sizes 70 and 100, two or more “WTL” acetylene cylinders should be manifoldered using an M-2 or M-4 manifold or cylinder couplers and flash arrestor tees. Manifold at least three cylinders for head size 150; at least four cylinders for head size 200.

4. The tables show average values based on typical conditions. The type and quality of steel, its surface condition, the purity of oxygen, etc., will always have a bearing on the end results.

MAINTENANCE INSTRUCTIONS

For all repairs other than those covered below, send the apparatus to the nearest Linde Division apparatus repair station or to your UNION CARBIDE Welding Products distributor. Improperly repaired apparatus is hazardous.

Torch Handle and Cutting Attachment Needle Valves – Leakage around valve stem can almost always be corrected by tightening the packing nut slightly. If necessary, replace the complete needle valve assembly as directed below.

If a valve will not shut off completely, loosen the packing nut and unscrew the valve stem assembly from the body. Wipe the stainless steel ball seat on the valve stem, and the seating surface in the body, with a clean cloth. Then reinstall the valve, retighten the packing nut, and operate the valve several times, closing it with maximum force. If this does not end the leakage, install a new valve stem assembly. When you do so, tighten the packing nut until you find it extremely difficult to turn the valve wheel. Set the unit aside for a few hours to set the packing. Then loosen the packing nut until the valve stem turns easily.

Cutting Valve – If leakage is detected around the cutting valve stem, or if the valve does not shut off completely when cutting lever pressure is released, unscrew the lock screw (see illustration on pg. 6) with a spanner wrench. When the thread is fully disengaged, lift out the valve assembly. Then tilt the attachment and let the valve spring drop out in your hand.

Now pull the lock screw off the valve stem and remove seat and retainer from the stem. Examine the stem carefully. If either the seating surface or the cylindrical section that runs in the valve screw is marred, replace the stem with a new part. Always replace the seat with a new part. Replace the small ‘O’-ring in the lock screw with a new part if there has been leakage around the valve stem. Inspect the large ‘O’-ring and replace it if it is not in excellent condition. Place new seat on stem, slide on the retainer, and insert stem in lock screw (be sure the lock screw has both ‘O’-rings in position). Finally, slide valve spring into body, insert valve assembly, and tighten lock screw.

Cutting Attachment Mixer – To remove the mixer for cleaning or replacement, back off locknut 56K07 until it reaches the end of the threads on the adaptor (19K07). Continue turning it, with a wrench, to unscrew the adaptor from the attachment body. Then remove the mixer by grasping the end of the mixer carefully with a pair of pliers and pulling it out. Clean mixer center orifice with a No. 55 cleaning (cont. on pg. 5)
### Table 1 - Acetylene Welding Heads (Single-Flame)

<table>
<thead>
<tr>
<th>Complete Head Assembly</th>
<th>Steel Thickness, in.</th>
<th>Pressure, psig (Oxygen, Acetylene)</th>
<th>Replacement Parts (See Fig. 2)</th>
<th>Accessories (Chrome-Plated)</th>
<th>Tip Extension Drill Size</th>
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</thead>
<tbody>
<tr>
<td>Size</td>
<td>Part No.</td>
<td></td>
<td>Tip (Unplated)</td>
<td>Mixer Throat</td>
<td>Mixer</td>
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<tr>
<td>1A</td>
<td>639438</td>
<td>to 32 ga.</td>
<td>639682</td>
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<td>639885</td>
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<tr>
<td>2A</td>
<td>639439</td>
<td>32 - 25 ga.</td>
<td>639683</td>
<td>---</td>
<td>639885</td>
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<tr>
<td>4A</td>
<td>639440</td>
<td>25 ga. - 1/32</td>
<td>639684</td>
<td>---</td>
<td>639885</td>
</tr>
<tr>
<td>6A</td>
<td>639441</td>
<td>1/32 - 1/16</td>
<td>639685</td>
<td>---</td>
<td>639887</td>
</tr>
<tr>
<td>9A</td>
<td>639442</td>
<td>1/16 - 1/8</td>
<td>639686</td>
<td>---</td>
<td>639887</td>
</tr>
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<td>15A</td>
<td>639443</td>
<td>1/8 - 3/16</td>
<td>639687</td>
<td>5 - 7</td>
<td>639887</td>
</tr>
<tr>
<td>30A</td>
<td>639444</td>
<td>3/16 - 3/8</td>
<td>639688</td>
<td>5 - 7</td>
<td>639887</td>
</tr>
<tr>
<td>55A</td>
<td>998085</td>
<td>3/8 - 5/8</td>
<td>639806</td>
<td>6 - 8</td>
<td>639893</td>
</tr>
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<td>70A</td>
<td>998086</td>
<td>5/8 - 1</td>
<td>998061</td>
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<td>639893</td>
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<tr>
<td>100A</td>
<td>998087</td>
<td>over 1</td>
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<td>6 - 8</td>
<td>639893</td>
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### Table 2 - Standard Multiflame Heating Heads

<table>
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<tr>
<th>Complete Head Assembly</th>
<th>Type of Fuel Gas</th>
<th>Pressure, psig (Oxy, Fuel Gas)</th>
<th>No. of Flames</th>
<th>Avg. Heat Output, Btu/hr</th>
<th>Replacement Parts (See Fig. 2)</th>
<th>Accessories (Chrome-Plated)</th>
<th>Tip Extension Drill Size</th>
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<tr>
<td>Size</td>
<td>Part No.</td>
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<td></td>
<td>Tip (Unplated)</td>
<td>Mixer Throat</td>
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<td>998090</td>
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<td>998091</td>
<td>FG-2</td>
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<td>100A</td>
<td>998092</td>
<td>Prop., or Nat. Gas</td>
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<td>FG-2</td>
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<td>Prop., or Nat. Gas</td>
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<td>37</td>
<td>9</td>
<td>9</td>
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<tr>
<td>150FG</td>
<td>998096</td>
<td>Nat. Gas</td>
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### Table 3 - Rosebud Style Multiflame Heating Heads

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<tr>
<th>Complete Head Assembly</th>
<th>Type of Fuel Gas</th>
<th>Pressure, psig (Oxy, Fuel Gas)</th>
<th>No. of Flames</th>
<th>Avg. Heat Output, Btu/hr</th>
<th>Replacement Parts</th>
<th>Accessories</th>
<th>Tip Extension Drill Size</th>
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<td>Size</td>
<td>Part No.</td>
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<td>Tip Assy.</td>
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<td>Mixer Throat</td>
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<td>11 - 14</td>
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*Requires extension coupling 998838.
Table 4 - 4202 Series Acetylene Cutting Nozzles

<table>
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<tr>
<th>Size</th>
<th>Nozzle Part No.</th>
<th>Steel Thickness, in.</th>
<th>Pressure, psig</th>
<th>Gas Consumption ft³/hr</th>
<th>Cleaning Drill Size</th>
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<tr>
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<td>Oxygen</td>
<td>Acetylene</td>
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<td>3</td>
<td>16K08</td>
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<td>3</td>
<td>15 - 20</td>
<td>5</td>
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<td></td>
<td></td>
<td>1/4</td>
<td>6</td>
<td>25 - 30</td>
<td>5</td>
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<tr>
<td>4</td>
<td>16K09</td>
<td>1/2</td>
<td>13</td>
<td>30 - 40</td>
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<td>5</td>
<td>16K10</td>
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<td>7</td>
<td>16K11</td>
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<td></td>
<td></td>
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<td>75</td>
<td>45 - 60</td>
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<td>200</td>
<td>90 - 100</td>
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Table 5 - 4213 Series Fuel Gas Two-Piece Cutting Nozzles

NOTE: DO NOT use with Acetylene.

<table>
<thead>
<tr>
<th>Nozzle Size</th>
<th>Nozzle Part No.</th>
<th>Sleeve (External)*</th>
<th>Part No.</th>
<th>Steel Thickness, in.</th>
<th>Pressure, psig</th>
<th>Gas Consumption ft³/hr</th>
<th>Cleaning Drill Size Cutting*</th>
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<tr>
<td></td>
<td></td>
<td>Long</td>
<td>Medium</td>
<td>Short</td>
<td>Oxygen</td>
<td>Fuel Gas</td>
<td>Oxygen</td>
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<tr>
<td>3</td>
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<td>16K74</td>
<td>998562</td>
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<td>6</td>
<td>25 - 30</td>
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<td>4</td>
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<td>16K74</td>
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<td></td>
<td>4</td>
<td>100</td>
<td>60 - 65</td>
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</table>

* Long - For use with natural gas, propane, and butane.
Medium - For use with methylecetylene-propadiene (MPS) and propylene-based fuel gases where high preheat intensity is desired.
Short - For use with methylecetylene-propadiene (MPS) and propylene-based fuel gases for general purpose cutting.
# Consumption of MAPP or propane is approximately the same as FG-2.
* Use soft-bristled brush (750F90) to clean preheat slots of internal nozzles.

If a welding tip requires replacement, secure the front end of the mixer throat in a vise and unscrew the tip. Before installing a new tip, be sure it matches the mixer throat in size (both parts are size-stamped). Always tighten the new tip as much as you can without bending it.

To clean a welding head mixer, unscrew it from the mixer throat, soak it overnight in a solution of OXWELD Nozzle Cleaning Compound, rinse with clear water, dry with a jet of air.

Check the condition of 'O'-rings on the welding heads periodically. If they appear to be in poor condition, or are so worn that the head can be inserted in the handle without noticeable resistance, replace them.

drill and the cross-drillings with a No. 66 drill, or soak the mixer overnight in a solution of OXWELD Nozzle Cleaning Compound (P/N 761F00), rinse, and blow dry with clean air.

Inspect all 'O'-rings and replace them if they are not in good condition. Reassemble in reverse order, and tighten locknut against body securely.

Welding Heads and Cutting Nozzles – Welding heads and cutting nozzle orifices should be cleaned by hand, using OXWELD tip cleaners, whenever a flame distortion is noticed. Maintaining clean orifices is highly recommended for reducing any incidence of flashbacks. If you do not have tip cleaners, twist drills of the correct sizes (see Tables) may be used. Insert the drill carefully, and push it back and forth. DO NOT TWIST THE DRILL.
PARTS INFORMATION

All parts which can be replaced without breaking soldered or brazed joints are illustrated below. When ordering parts, please give both part number and description.

ROLL PIN – 3/16-in. x 3/4-in.
P-IN-150260
SPRING-28Z01
LEVER-25257

VALVE STEM-09M12
(2) VALVE STEM-09M12

SPRING-23K08
STEM-09K13
SEAT-32Z01
RETAINER-57K03
"O"RING-14K07
"O"RING-85W11
LOCK SCREW-57K02
VALVE ASSEMBLY 08M06
"O"RING-14K10
MIXER-22K41
LOCKNUT-56K07
NUT-998582
ADAPTOR-19K07

W-201 WELDING TORCH (7" HANDLE) . . . . P/N 03L14
W-202 WELDING TORCH (8-1/2" HANDLE) . . . . P/N 03L16

CW-202 CUTTING ATTACHMENT:
WITH 90 deg. HEAD . . . . P/N 05L09
WITH 75 deg. HEAD . . . . P/N 05L13

Fig. 1 - Replacement Parts - Torches and Cutting Attachment

MIXER THROAT (See Table 1, 2, or 3)
-RING-13K02@
-NUT-998580@
"O" RING-14K05
MIXER (See Table 1, 2, or 3)
"O" RING-14K06

TIP (see table 1)
TIP (see table 2)
TIP ASS'Y (See Table 3)

WELDING HEAD
MULTI-FLAME HEATING HEAD
"ROSEBUD" HEATING HEAD

* Not included with No. 1 thru 70 welding head assemblies. Welding and heating head sizes 100 and above are equipped with 639995 Nut and 639970 Ring.

NOTE: Apply X-Pando Compound (7398-950) on stem threads before assembly.

Fig. 2 - Replacement Parts - Welding and Heating Head Assemblies

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