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**Your New METALMASTER OUTFIT Contains**

- **PRESTOWELD**
  - Welding Blowpipe
  - Cutting Attachment
  - Oxygen Regulator
  - Acetylene Regulator

- **Oxweld**
  - Welding Rods and Supplies

- **Prest-O-Lite**
  - Air-Acetylene Torch

This booklet is intended only to supplement the individual instructions packed with the blowpipe and with each regulator in the METALMASTER Outfit. We suggest you follow the instructions in this booklet to set up, test and adjust your outfit for welding and cutting. For replacement parts lists, parts drawings, and repair and maintenance instructions, use the booklets packed with the blowpipe and regulators.

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If this Booklet is Lost or Destroyed, You Can Get Another Copy on Request to Any Linde Office.
LIST OF EQUIPMENT AND SUPPLIES IN THE "METALMASTER" OUTFIT

PREST-O-WELD W-121 Welding Blowpipe with Five Welding Heads
PREST-O-WELD CW-122 Cutting Attachment with Two Cutting Nozzles
PREST-O-WELD R-125 Oxygen Regulator
PREST-O-WELD R-127 Acetylene Regulator
PREST-O-LITE Soldering and Heating Torch
Oxygen and Acetylene Hose (25 feet of each)
OXWELD Tip Cleaner Kit
Goggles, Lighter, and Wrenches
OXWELD Steel and Bronze Welding Rod
HAYNES Hard-Facing Rod
BRAZO Flux
Complete Instructions for Operation and Maintenance
"Welding and Cutting Handbook"

To remind you daily of some of the more important safety precautions to observe in using oxy-acetylene equipment, you will find a list of Do’s and Don’ts on page 8. More detailed information is included in LINDE’S booklet "Precautions and Safe Practices." You can get a copy of "Precautions and Safe Practices" (F-2035) without charge from any LINDE office.

Included in your METALMASTER Outfit is a copy of the "Welding and Cutting Manual." If your copy is the second printing (1950) you will notice that the instructions in chapter 10 ("Setup and Operation of Equipment") are for an earlier make of equipment than shown in this booklet. Therefore the instructions in that chapter differ slightly with these instructions. For example, the Manual says to use a wrench to tighten welding head connections, but the new blowpipe has an improved seating arrangement that needs to be tightened only by hand. The tables of recommended welding heads and gas pressures in this booklet also are later than those in the second printing of the "Welding and Cutting Manual." Except for these few differences, you will find the Manual a valuable part of your outfit. It is crammed with suggestions to increase your skill, and ideas to save you money.

You may wish to obtain also "The Oxy-Acetylene Handbook," a basic handbook on welding and cutting, especially helpful for self-instruction or for classroom work. "The Oxy-Acetylene Handbook" may be purchased from any LINDE office, from any LINDE distributor, or from your PREST-O-WELD jobber.

A FINAL REMINDER before you start to use this equipment: DO NOT USE OIL OR GREASE ON OXY-ACETYLENE EQUIPMENT—it will never need oiling. Keep all forms of oil and grease away. Oil and grease may catch fire and burn violently in or near concentrations of pure oxygen.
To Set Up the Outfit for Welding and Cutting

1. **SECURE CYLINDERS IN UPRIGHT POSITION**

   GOOD—Chained to post or workbench

   BETTER—Secured on cylinder truck

2. **UNSCREW OXYGEN CYLINDER CAP**
   If it sticks

   DO

   NEVER

3. **BLOW OUT CYLINDER VALVES**

   OXYGEN
   Quickly (with a twist of the wrist) open and close each cylinder valve to blow out dirt and dust. Stand to the side of the valve when you open it.

   ACETYLENE

4. **ATTACH THE REGULATORS**

   Turn the pressure-adjusting screws to the left until they turn freely.
ATTACH THE REGULATORS (Continued)

Open each cylinder valve slowly until the hand on the cylinder pressure gauge just starts to move upward. When the hand stops moving, open the oxygen cylinder valve all the way; open the acetylene cylinder valve only 1-1/2 turns.

5. TEST REGULATOR CONNECTIONS FOR LEAKS
Use Ivory soap and water (see step 9 on page 5). If a connection leaks, close the cylinder valve, disconnect the regulator, and wipe the surfaces of the connection with a clean rag. Repeat steps 4 and 5.

6. CONNECT HOSES TO REGULATORS AND BLOWPIPE

7. ATTACH WELDING HEAD TO BLOWPIPE HANDLE
Head size depends on the thickness of the steel to be welded. See Table I on page 10.

Remove the connection nut from the blowpipe handle. Slide the nut over the welding head. Push the head all the way into the handle. Tighten the nut by hand – never use a wrench.

8. TO ADJUST GAS PRESSURES FOR WELDING

Ordinarily, pressures will be 5 to 7 lb. per sq. in. for head sizes up to 40, and 6 to 8 lb. per sq. in. for larger welding heads.

a. Check packing nuts to be sure they are snug.

b. Open blowpipe valves one full turn.

c. Open the oxygen regulator until the delivery pressure gauge shows the correct pressure. Close the blowpipe oxygen valve.

d. Open the acetylene regulator until the delivery pressure gauge shows the correct pressure. Close the blowpipe acetylene valve.
9. **TEST FOR LEAKS**

Paint all these points generously with an Ivory soap solution, using a clean brush. Bubbling indicates leakage. Fix it before you start to work. Leakage at connections usually can be eliminated by tightening the connections more.

10. **TO LIGHT THE BLOWPIPE**

Put your goggles on before you light the blowpipe. Keep them on while you weld.

a. Open valves.

b. Light the gases with a lighter—NEVER use a match.

11. **TO ADJUST THE FLAME TO NEUTRAL**

Slowly open the blowpipe oxygen valve until the blue flame, or "feather," around the inner cone just disappears. This is the flame adjustment most commonly used. If the flame pops out when you light it: (1) increase the acetylene valve opening and immediately relight the blowpipe, (2) adjust the oxygen valve to obtain a neutral flame.

**How Long Should the Inner Cone Be?**

The length of the inner cone to use is something you will learn only with experience. The inner cone may be long (a harsh flame) or short (soft flame) depending on the amount of the balanced gas mixture being burned. A harsh flame usually will put too much heat into the weld, making it hard to control. A soft flame usually will not be hot enough.

Make a few practice welds using first a soft flame and then a harsh flame. Notice what happens. Then adjust the flame until, somewhere in between, you get a flame that is easiest for you to handle. Make this test on several thicknesses of steel until you are familiar with the effects of different flame lengths.

12. **TO SHUT OFF**

For a short time

For long periods (such as overnight):

a. Close both cylinder valves.

b. Open both blowpipe valves to release the gases in the apparatus; close the valves.
13. TO ATTACH THE CUTTING ATTACHMENT
a. Remove the welding head and the connection nut. Put the connection nut where it will not get lost.

b. Screw the connection nut (a part of the attachment) onto the blowpipe handle. Tighten the nut by hand — DO NOT USE A WRENCH.

c. Select a cutting nozzle (see Table II on page 11). Slip the nozzle nut over the nozzle. Screw the nut and nozzle into the head. Tighten the nut with a wrench.

14. TO ADJUST GAS PRESSURES FOR CUTTING
(Refer to the Cutting Table II on page 11 for correct pressures to use.)

a. Open the blowpipe oxygen valve wide. KEEP IT OPEN FULLY when the cutting-attachment is being used.

b. Open (press down) the cutting oxygen valve.

c. Open the oxygen regulator until the correct pressure shows on the delivery-pressure gauge. Release the cutting-oxygen valve.

d. Open the blowpipe acetylene valve one full turn.

e. Open the acetylene regulator until the correct pressure shows on the delivery-pressure gauge.

f. Immediately close the acetylene valve.
15. **TEST FOR LEAKS**

Follow the directions in step 9, on page 5.

16. **TO LIGHT THE CUTTING ATTACHMENT**

a. Open preheat oxygen valve just a little.

b. Open blowpipe acetylene valve one full turn.

c. Light the gas. Use a lighter — NEVER a match.**

d. Open cutting oxygen valve wide.

e. Adjust flames to neutral with preheat oxygen valve. Open the valve until the acetylene “feather” just disappears. See step 11.

f. Release cutting oxygen valve. Put your goggles on—you are ready to start cutting.

**NOTE:** If the flames burn away from the end of the nozzle or blow off, decrease the acetylene valve opening and immediately relight the gases at the tip.

17. **TO SHUT OFF THE CUTTING ATTACHMENT**

\[\text{RELEASE} \]

\[\text{CLOSE} \]

\[\text{CLOSE} \]
Operating Precautions

BACKFIRE
Bad handling of your blowpipe may make the flame backfire—go out with a snap. When this happens the blowpipe may be relighted as soon as the trouble has been corrected. A backfire may be caused by touching the work with the tip, by overheating the tip, by operating the blowpipe at incorrect pressures, by a loose welding head or cutting nozzle, or by dirt on the head or nozzle seats.

FLASHBACK
A flashback means that there is a fire inside the blowpipe. You can always tell when this happens because there will be a loud whistling noise coming from the blowpipe.

If you are cutting, IMMEDIATELY:  If you are welding, IMMEDIATELY:

1. CLOSE
2. CLOSE

After a minute or so relight the blowpipe in the usual way. Flashbacks can be avoided by using the correct gas pressures for each welding head or cutting nozzle. If you get a lot of flashbacks, the blowpipe or cutting attachment should be sent to the nearest apparatus repair station of Linde Air Products Company for a complete factory checkup. You may send it either directly, or through the PREST-O-WELD jobber from whom you purchased the outfit.
PRECAUTIONS AND SAFE PRACTICES

ALWAYS DO THESE THINGS

1. Always keep cylinder valves closed unless you are using them. Keep the cap on the oxygen cylinder unless you are using it.

2. If an acetylene cylinder valve should be frozen shut, heat it with warm water or warm wet cloths. The fusible metal safety plug in the cylinder will melt and release all the acetylene in the cylinder if boiling water is poured on it. NEVER USE A FLAME.

3. Examine your hose for leaks often. Dipping it in a bucket of clean water, with the working pressure on, is the quickest and easiest way.

4. If a flashback goes as far as the hose, throw away the charred section and replace it with new hose.

5. If you are working with the oxy-acetylene equipment on a wooden floor, either wet the floor down or cover it with asbestos or tin.

6. When welding brass, bronze, or galvanized iron indoors or outdoors, be very sure you have good ventilation. When cutting metal coated with lead, or paint containing lead, always wear a suitable air-line mask.

7. Use goggles and gauntlet gloves when welding or cutting.

DON'T DO THESE THINGS

8. DON'T use oxygen as a substitute for compressed air.

9. All cylinders containing gas under pressure are built to withstand a lot of hard usage. However, DON'T abuse, drop, or handle cylinders roughly.

10. DON'T let the cylinders get too hot or too cold. Keep them out of the sun in the summer and under cover in the winter. DON'T let ice or snow accumulate on the cylinders. Keep cylinders where it is dry and where a fire can't start.

11. DON'T use an air or water-hose in place of the hoses supplied with the outfit.

12. DON'T make any repairs to an oxygen cylinder valve. DON'T make any repairs to an acetylene cylinder valve, except to tighten the gland nut.

NEVER DO THESE THINGS

13. NEVER lay a torch down unless both gases are shut off.

14. NEVER use cylinders as rollers.

15. NEVER use a cylinder with a leaking valve.

16. NEVER attempt to mix gases in a cylinder, or fill one cylinder from another.

17. NEVER repair hose with makeshift material, tape, etc. Always cut the hose and splice it.

18. NEVER connect an oxygen regulator to an acetylene cylinder, or vice versa.

19. NEVER weld any container unless it is vented and, if possible, filled with water.

NEVER! NEVER! NEVER! weld or cut any container which has held combustible material (oil, gasoline, kerosene, anti-freeze, etc.) unless it has been correctly cleaned and prepared. THIS IS VERY IMPORTANT. Space does not permit detailed instructions here. If you wish to do such work, write to: American Welding Society, 29 West 39th Street, New York, N.Y. for their Pamphlet No. A-6.0.40, titled "American Welding Society - Recommendations Describing Procedure to be Followed in Preparing for Welding or Cutting Containers Which Have Held Combustibles."
### Table 1
WELDING HEAD SIZES AND GAS PRESSURE

<table>
<thead>
<tr>
<th>Thickness of Metal</th>
<th>Steel Welding Head Size</th>
<th>Steel No. 1 H.T. Steel Rod or No. 7 Drawn Iron Rod</th>
<th>Cast Iron Welding Head Size</th>
<th>Cast Iron Rod Size (No. 9 C.I. Rod)</th>
<th>Oxygen and Acetylene Pressure (lb. per sq. in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inches (Gage)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>5-7</td>
</tr>
<tr>
<td>26</td>
<td>4</td>
<td>1/16</td>
<td></td>
<td></td>
<td>5-7</td>
</tr>
<tr>
<td>24</td>
<td>4</td>
<td>1/16</td>
<td></td>
<td></td>
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<tr>
<td>1/32</td>
<td>22</td>
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<td>1/16</td>
<td></td>
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<td>1/16</td>
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</tr>
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<tr>
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<td>11</td>
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<td>15-20</td>
<td>3/16</td>
<td>5-7</td>
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<td>20-30</td>
<td>1/8</td>
<td>20-30</td>
<td>3/16</td>
<td>5-7</td>
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</tr>
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<td>3/8</td>
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<td>1/4</td>
<td>5-7</td>
</tr>
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<td>30-40</td>
<td>1/4</td>
<td>30-40</td>
<td>5/16</td>
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<tr>
<td>9/16</td>
<td>55</td>
<td>1/4</td>
<td>6-8</td>
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<tr>
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<td>1/4</td>
<td>6-8</td>
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<tr>
<td>3/4</td>
<td>70</td>
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<td>6-8</td>
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<td>1</td>
<td>100*</td>
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<td>6-8</td>
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</table>

*Only for use with W-122 Blowpipe.

### Table 2
THIS TABLE SHOWS YOU THE RECOMMENDED WELDING HEAD SIZE, ROD SIZE, AND GAS PRESSURE

<table>
<thead>
<tr>
<th>Thickness of Metal</th>
<th>Aluminum Fusion Welding of #23 Aluminum Rod</th>
<th>Bronze Bronze-Welding or Brazing of #25M Bronze Rod</th>
<th>Welding Pressures in lb. per sq. in.</th>
<th>Oxygen and Acetylene Pressure</th>
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</thead>
<tbody>
<tr>
<td>Inches (Gage)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
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<td></td>
<td>2</td>
<td>1/16</td>
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<tr>
<td>26</td>
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<td>1/16</td>
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<td></td>
<td>4</td>
<td>1/16</td>
</tr>
<tr>
<td>1/32</td>
<td></td>
<td></td>
<td>4-6</td>
<td>1/16</td>
</tr>
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<td>1/16</td>
<td></td>
<td></td>
<td>6-9</td>
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<tr>
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<td>1/4</td>
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### Cleaning Drills

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<th>6</th>
<th>9</th>
<th>12</th>
<th>15</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>55</th>
<th>70</th>
<th>85</th>
<th>100</th>
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<tr>
<td>Tip Drill Size</td>
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<td>64</td>
<td>58</td>
<td>55</td>
<td>54</td>
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<td>45</td>
<td>40</td>
<td>33</td>
<td>30</td>
<td>28</td>
<td>24</td>
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</table>

10
### TABLE II

STEEL CUTTING CHART (FOR 4201 AND 4202 SERIES NOZZLES)

<table>
<thead>
<tr>
<th>Steel Thickness, in.</th>
<th>1/8</th>
<th>1/4</th>
<th>3/8</th>
<th>1/2</th>
<th>5/8</th>
<th>3/4</th>
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<th>2</th>
<th>3</th>
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<tr>
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<td>7</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Oxygen, lb. per sq. in.</td>
<td>15-20</td>
<td>25-31</td>
<td>21-29</td>
<td>31-38</td>
<td>40-46</td>
<td>24-29</td>
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<td>47-59</td>
<td>35-40</td>
<td>43-50</td>
<td>67-76</td>
<td>60-65</td>
<td>70-76</td>
<td>71-77</td>
</tr>
<tr>
<td>Acetylene, lb. per sq. in.</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Total Oxygen Flow, cfm*</td>
<td>34</td>
<td>45</td>
<td>61</td>
<td>72</td>
<td>83</td>
<td>99</td>
<td>122</td>
<td>169</td>
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<td>234</td>
<td>327</td>
<td>405</td>
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<td>640</td>
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<tr>
<td>Total Acetylene Flow, cfm*</td>
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<td>10</td>
<td>11</td>
<td>12</td>
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<td>14</td>
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<td>22</td>
<td>25</td>
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<tr>
<td>Preheat Drill Size</td>
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<td>69</td>
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<td>60</td>
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<td>Cutting Drill Size</td>
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<td>50</td>
<td>43</td>
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<td></td>
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</tr>
</tbody>
</table>

*The flow rates shown are based on the use of maximum pressures. The pressures are measured at the regulators and are based on the use of 25-ft. lengths of 3⁄8-in. hose. Longer lengths require somewhat higher pressures.

**NOTE:** In normal cutting, choose a point midway in the oxygen pressure range indicated for the particular thickness of steel being cut. When cutting clean steel, a lower point in the range may be used. When cutting dirty or heavily scaled steel, a higher point in the range should be used.

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**To Use the PREST-O-LITE Air-Acetylene Torch**

The PREST-O-LITE torch is used for light heating and most soldering jobs. Permanent soldered connections in copper tubing and thin sheet metal can be made quickly and easily. You will find dozens of other jobs for this torch, especially as you obtain additional stem sizes. Your PREST-O-LITE distributor or PREST-O-WELD jobber has five other sizes of open flame stems, a paint-burner stem and a soldering stem with a conventional copper tip.

The PREST-O-LITE torch has an acetylene connection only—no oxygen supply is needed. Air is drawn into the torch at the stem-to-handle connection and mixed with the acetylene before it is burned.

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**To Set Up and Light the Air-Acetylene Torch**

Attach the acetylene regulator to the acetylene cylinder as described in steps 3, 4 and 5 on pages 3 and 4. Attach one end of the red acetylene hose to the regulator and the other end to the torch. Tighten the connections with a wrench. Open the acetylene regulator until the delivery pressure gauge shows 5 to 10 lb. per sq. in. pressure.

Now open the needle valve on the torch handle and light the gas with a friction lighter. Adjust the torch needle valve until the flame length is best suited for the job to be done.

The flame should show a bright sharp inner cone and a pale blue outer flame—similar to the neutral welding flame shown at the top of page 5. A yellow flame shows that the acetylene pressure is too low, or the torch needle valve is not open wide enough, or the torch is clogged.
LINDE Supplies These Quality Products to the Nation’s Industries

INDUSTRIAL GASES
LINDE Oxygen, Nitrogen, Argon, Neon, Helium, Krypton, Xenon, Hydrogen
PREST-O-LITE Acetylene
CALCIUM CARBIDE
UNION Carbide
CARBIC Processed Carbide

OXY-ACETYLENE EQUIPMENT
OXWELD Apparatus for Cutting, Joining, Treating, and Forming Metals Acetylene Generators Manifolds, Regulators and Valves Welding Rods and Supplies
PREST-O-WELD Welding and Cutting Apparatus
PUROX Welding and Cutting Apparatus
PREST-O-LITE Air-Acetylene Apparatus and Small Tanks
CARBIC Acetylene Flood Lights Acetylene Generators

ELECTRIC WELDING EQUIPMENT
UNIONMELT Automatic Welding Apparatus and Supplies
HELIARC Welding Torches
LINDE Sigma Welding Equipment

SPECIAL EQUIPMENT
LINDE Jet-Piercing Equipment Plate-Edge Preparation Equipment Polyethylene Powder and Flame-Spraying Equipment Steel-Conditioning Machines Sub-Zero Cold Treatment Equipment
OXWELD Oxy-Acetylene Cutting Machines Pressure-Welding Machines

OXYGEN THERAPY SUPPLIES
LINDE Oxygen U.S.P. Oxygen Therapy Regulators Oxygen Therapy Manifolds and Valves

SYNTHETIC CRYSTALS
LINDE Synthetic Sapphire, Ruby, Spinel, and Titania Synthetic Calcium- and Cadmium Tungstates Fine Alumina Abrasive

ORGANOSILICONS
LINDE Silane Monomers Polysiloxane Polymers and Resins


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