INSTRUCTIONS and PARTS DATA

for the

Linde

HW-13 (Series 3)

MACHINE-WELDING TORCH

for HELIARC or SIGMA Welding

Be sure this information reaches the operator. You can get extra copies through any Linde office.
Introduction

The basic HW-13 Torch, Part No. 40V59, is a heavy-duty torch designed for both HELIARC and SIGMA machine welding. It has a maximum current capacity of 500 amperes, and is insulated and shielded for high-frequency applications.

For HELIARC welding with the HW-13, refer to Section I. For SIGMA welding with the HW-13, refer to Section VI.

Both ceramic cups and metal nozzles can be used with the HW-13. The nozzles are cooled through the main torch body by conduction. The torch body, water jacket, and power cable are cooled by internal water flow passages. Torch body passages are readily accessible for cleaning.

In HELIARC welding, quick-release collets are used for gripping the electrode. The electrode is adjusted by turning the torch cap; no wrenches or special tools are needed. Standard electrodes from .040-in. to 1/4-in. diameter are accommodated.

This booklet covers the Series 3 torch. To use this booklet with earlier models, refer to Section VIII.
I. Setting Up the HW-13 Torch for HELIARC Welding

A. Required Torch Accessories

1. An electrode, collet, and collet body of corresponding size. See Table I for selection of proper electrode size for different welding current ranges.

2. A ceramic cup or metal nozzle of the correct size for the welding current you intend to use (see Table I). If a ceramic cup is to be used, a cup adaptor, Part No. 19Z71, will be required.

3. A torch cap, Part No. 56Y63, and a collet body back-up ring, Part No. 11N60.

B. Power, Argon, and Water Supply Equipment

1. A suitable welding transformer, motor-generator, or rectifier plus welding cable, cable lugs, and a ground clamp.

2. A supply of argon and an OXWELD R-502 Argon Regulator and Flowmeter, Part No. 03X90 OR a LINDE R-509 Argon Regulator, Part No. 05X37. The R-509 is a single-stage regulator containing a cylinder gauge and a flow gauge calibrated in c.f.h., whereas the R-502 is a two-stage regulator with a built-in flowmeter.

3. A source of cooling water. See Section I-H for cooling water requirements.

4. Argon and Water Hose Assemblies are available for lengthening the torch hose as illustrated in Figure 1.

5. A Flow Switch (Torch Saver II), Part No. 40V51, is available as an optional accessory. The flow switch protects the torch and cables against overheating in the event of failure or fluctuation of the cooling water supply.

Refer to F-9847, "How to Plan a HELIARC Manual Welding Installation," for detailed information on power, argon, and water supplies.

C. Hose Connections

Figure 1 illustrates the correct method of assembling the accessories used to supply argon and cooling water to the HW-13. Detailed instructions on each individual accessory are packed with the equipment. Adaptors have been included with the torch to allow connection to argon and water hose that do not have I.A.A. Inert Gas Connections.
D. Electrical Setup

1. Power Requirements
   a. For a.c. welding, a single-phase transformer requiring a 230- or 460-volt alternating current supply is generally used.
   b. For d.c. welding, a motor-generator or rectifier unit powered by a 230- or 460-volt, 3-phase alternating current supply is generally used.

NOTE: Be sure to obtain manufacturer's recommendations on power requirements for your transformer, rectifier or generator.

2. Special Control Circuits: Several special control circuits have been developed to automatically control various phases of the welding process. By use of these circuits, you can conserve argon and water, reduce radio interference when using high-frequency current, and provide greater convenience of operation. For specific details, call or write your nearest LINDE office. A booklet (Form 9067, Control Circuits for HELIARC Welding) giving descriptions of the circuits and specifications for the equipment needed is available upon request.

3. Electrical Connections (see Fig. 2). The torch power cable terminates in a power cable adaptor permitting you to connect the torch to the output terminal of a transformer, motor-generator, rectifier, or a high-frequency generator. When using high frequency, be sure to ground the work terminal of the high-frequency generator. MAKE NO OTHER GROUND CONNECTION. Connect the case of the high-frequency generator and the case of the transformer, motor-generator, or rectifier to the work terminal of the high-frequency generator.

Provision should be made for turning the high-frequency generator on and off as required.

E. Nozzles, Cups, Collet Bodies, and Collets

1. Collet Bodies: Two collet bodies are available: a 1/8-in. collet body (for .040 through 1/8-in. collets) and a 1/4-in. collet body (for 5/32 through 1/4-in. collets). A collet body back-up ring, Part No. 11N60, is used to eliminate any possibility of water leakage due to shearing of the insulator gasket (see Fig. 5). To install a collet body and back-up ring, proceed as follows:
   a. With the water jacket, Part No. 85Z98, removed, place the torch on a table with the nozzle end up.
   b. Insert the proper size collet body and tighten with the collet body wrench supplied.
   c. Place the back-up ring around the shoulder on the collet body as shown in Fig. 5.
   d. Insert insulator gasket, Part No. 86Z23, in place making sure it is centered properly and replace the water jacket.

2. Metal Nozzles and Ceramic Cups: Four sizes of metal nozzles and five sizes of ceramic cups are available for use with the HW-13. For the most effective argon protection, select the proper nozzle or cup size according to the recommendations in Table 1. (Nozzle and ceramic cup part numbers are shown in Table 3.) A nozzle insulating sleeve (Part No. 85Z99) must be inserted in the torch body as shown in Figure 3. If ceramic cups are to be used, a cup adaptor (Part No. 19Z71) will also be required.

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**Fig. 2** - Schematic Diagram for HELIARC Welding
Directly water-cooled metal nozzles are available which will increase the current capacity to approximately 700 amps. When using thoriated tungsten electrodes. When used, this nozzle replaces the water jacket as well as the standard nozzle.

3. Electrode Collets: Collets are available for seven standard electrode sizes (.040-in. to 1/4-in. diameter). To install a collet and an electrode, proceed as follows:

a. Remove the torch cap from the torch.

b. Insert a collet for the electrode size you intend to use into the top of the torch head. Mate the tapered end of the collet with the tapered seat in the collet body.

c. Insert an electrode of corresponding size into the top of the collet. Allow the electrode to protrude 1/8- to 3/16-in. beyond the end of the nozzle or cup for butt welding, and 1/4- to 3/8-in. for fillet welding. Then screw the torch cap onto the torch head and tighten it just enough to hold the electrode firmly.

F. Mounting the HW-13 for Machine Welding

The HW-13 has a smooth, straight barrel section that permits the torch to be readily mounted for mechanized welding. When using the torch with Cold Wire Guide Attachment 39V38, Clamp Assembly 39V37 may be used to mount both the torch and the wire guide on a rack and tube assembly. See Fig. 4. Consult F-9932 for a suggested method of mounting the torch when using Cold Wire Guide Attachment 40V71.

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**TABLE 1**

<table>
<thead>
<tr>
<th>Electrode Size (dia. inches)</th>
<th>Metal Nozzle No.</th>
<th>Ceramic Cup No.</th>
<th>ACHF Pure Tungsten</th>
<th>DCSP Pure or Thoriated Tungsten</th>
<th>DCRP Pure or Thoriated</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.040</td>
<td>6</td>
<td>4</td>
<td>10 - 60</td>
<td>15 - 80</td>
<td>15 - 80</td>
</tr>
<tr>
<td>1/16</td>
<td>6</td>
<td>4.5</td>
<td>50 - 100</td>
<td>70 - 150</td>
<td>70 - 150</td>
</tr>
<tr>
<td>3/32</td>
<td>6.8</td>
<td>6.7</td>
<td>100 - 160</td>
<td>140 - 235</td>
<td>150 - 250</td>
</tr>
<tr>
<td>1/8</td>
<td>6</td>
<td>6.7, 8</td>
<td>150 - 210</td>
<td>225 - 325</td>
<td>250 - 400</td>
</tr>
<tr>
<td>5/32</td>
<td>8</td>
<td>-</td>
<td>200 - 275</td>
<td>300 - 425</td>
<td>400 - 500</td>
</tr>
<tr>
<td>3/16</td>
<td>8.10</td>
<td>-</td>
<td>250 - 350</td>
<td>400 - 525*</td>
<td>500 - 800*</td>
</tr>
<tr>
<td>1/4</td>
<td>10.12</td>
<td>-</td>
<td>325 - 475</td>
<td>500 - 700*</td>
<td>800* - 1100*</td>
</tr>
</tbody>
</table>

* NOTE: These currents exceed rated capacity of the torch, unless directly water-cooled nozzles are used.

** In general, for DCSP, the lower end of specified current range applies to the pure tungsten electrodes and the upper end to the thoriated tungsten electrodes.
G. Safety Precautions

1. Use a standard welder's helmet with the proper shade of glass for the welding current to be used.
2. Wear suitable clothing to protect exposed skin from arc burns.
3. Be sure to shut off power before adjusting or replacing electrodes.
4. When welding copper, lead or zinc indoors provide good ventilation or use a respirator.
5. If you use chlorinated solvents for degreasing or cleaning the workpiece, do not weld near degreasing tanks.

H. Final Steps Before Welding

1. Check all argon and water connections for tightness. Turn on the cooling water supply. The 500-ampere rating of the torch is based on a cooling water flow of a minimum of one quart per 35 seconds (about 25-1/2 gallons per hour) at an inlet temperature of not higher than 60 deg. F., with about 25 psi inlet pressure. Water pressures up to 50 psi at the inlet of the torch hose can be used. If the inlet pressure is above 50 psi, a water regulator should be installed to prevent possible damage to the plastic hose.

2. With the regulator flow-adjusting valve closed, slowly open the argon cylinder valve (to prevent a sudden rush of gas into the regulator); then fully open the argon cylinder valve.

3. Open the regulator flow-adjusting valve until the desired flow is obtained.

4. Set the welding transformer, rectifier or generator for the desired welding current.

5. Close the foot or hand switch.

6. Draw a test arc on a heavy piece of scrap steel or copper.


For complete information on HELIARC welding, including recommended argon flows, welding currents and joint preparation, see F-6190, "How to Weld with HELIARC Torches."

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**TABLE 2 - WELDING CONDITIONS**

Values shown are average current ranges for making flat-but welds with square edges. Material 1/4-in. or more in thickness is usually prepared with single vee, or double-vee bevel.

<table>
<thead>
<tr>
<th>Material</th>
<th>Aluminum</th>
<th>Stainless Steel</th>
<th>Magnesium</th>
<th>Deoxidized Copper</th>
<th>Silicon Bronze</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Current</td>
<td>ACHF</td>
<td>DCSP</td>
<td>ACHF</td>
<td>DCSP</td>
<td>ACHF</td>
</tr>
<tr>
<td>1/16 in.</td>
<td>Current Argon Passes</td>
<td>60-80</td>
<td>80-100</td>
<td>60</td>
<td>110-140</td>
</tr>
<tr>
<td>1/8 in.</td>
<td>Current Argon Passes</td>
<td>125-145</td>
<td>120-140</td>
<td>115</td>
<td>175-225</td>
</tr>
<tr>
<td>3/16 in.</td>
<td>Current Argon Passes</td>
<td>190-220</td>
<td>200-250</td>
<td>120, 75</td>
<td>250-300</td>
</tr>
<tr>
<td>1/2 in.</td>
<td>Current Argon Passes</td>
<td>400-450</td>
<td>350-450</td>
<td>260</td>
<td>500-700</td>
</tr>
</tbody>
</table>

* Preheat to Temperature indicated.

Current values for vertical and overhead welding will range lower than those shown, according to the thickness of the metal.
II. General Notes on Torch Operation

A. Torch Cooling System

1. Use Clean Cooling Water.
   a. The cooling water that circulates through the torch body and power cable must be clean and free from dirt and other solid material. Otherwise the torch passages may become clogged, thereby cutting off or greatly reducing the flow of cooling water.
   
b. If torch water passages become clogged, first remove lower torch-end parts and collet body so that foreign particles may emerge freely. Then flush torch with water, or cleanflow passages by inserting a 3/32-in. diameter wire through the hose-connection fittings.
   
c. If you cannot avoid using dirty water and a flow switch is not used, install a suitable strainer at the cooling water inlet to prevent further clogging. A strainer is available from LINDE under Part No. 98W69 or from Hays Manufacturing Co., Cat. No. 2400.

2. Flow switch, Torch Saver II, Part No. 40V51. This accessory should be used to protect the torch from overheating in case of water supply fluctuation or failure. When water pressure falls below a safe limit, the flow switch shuts off the welding current until the pressure is restored. Instructions for installation and operation (Form 9748) are packed with each assembly. Additional copies are available without charge from your nearest LINDE office.

B. Torch Hose

1. Make certain that all argon hose connections and the nozzle or cup connections are gas-tight. If they are not, the argon may become diluted by air due to leakage, resulting in incomplete arc protection. The electrode should be silvery in color when it cools. A bluish color denotes air leakage. When welding aluminum, the presence of a dark gray deposit on or beside the weld, or a cloudy weld puddle also indicates air leakage.

2. Keep hose off hot metal. Plastic hose softens and begins to lose strength when heated to about 125 deg. F.

If the power cable, argon, or water hose becomes damaged, it is recommended that you purchase a new assembly or send the damaged assembly to the nearest Linde repair station for possible repair. DO NOT TRY TO REPAIR IT YOURSELF.

C. Do Not Let the Nozzle Touch the Work

If a nozzle touches the work, the arc may jump the gap from the electrode to the nozzle rather than to the work because of the conductivity of the hot gases.

D. Nozzle Compound

Metal nozzles are dipped in LINDE 65 Nozzle Compound prior to packing. The silicone coating prevents the adherence of spatter to the nozzles and ensures the maintenance of a complete and uniform gas shielding pattern. A four ounce can of this compound (Part No. 08N65) or a 1/2 qt. can (Part No. 08N75) should be obtained to maintain the protective coating on the nozzles.

E. Electrodes

1. If weld spatter sticks to the electrode, a black soot may appear when welding aluminum; or a reddish deposit may appear when you weld stainless steel. To clean the electrode, simply draw an arc for a few seconds on a heavy piece of scrap steel or copper (do not use a carbon block).

2. Should contamination of the electrode occur due to contact with the weld puddle, shut off the power and remove the electrode from the torch. Break off a small piece from the end, and then replace the electrode. Always remove the electrode before breaking it off, to minimize waste of electrodes.

3. It is advisable to nick the electrode slightly with a grinding wheel at the point where the break is to be made. Then remove the contaminated end with pliers gripped close to the nick.

F. Factors Affecting High-Frequency Starting in HELIARC Welding

Properly applied, high-frequency starting should give quick, clean, positive starts. However, there are many factors which influence starting performance. Since most of these factors are relatively easy to control, there should be no difficulty in obtaining good starts. The following are some of the items which should be checked.

1. Thoriated tungsten electrodes will usually provide better starting than straight tungsten electrodes.
2. Use the proper size electrode. Grinding a point on the end of the electrode will usually improve the starting performance of an oversize electrode.

3. If the torch uses a metal cup, ground the cup to the torch mounting or to the work through a resistor. The value of this resistor is not critical and a resistor on the order of 10,000 ohms, 25 watts, will be entirely satisfactory. Do not use the small radio-type resistor since they will usually be damaged by the high voltage, high frequency. The use of this grounding method will sometimes double the electrode-to-work distance over which a start can be consistently made and it usually eliminates failure to start.

4. Where a modern low-power high-frequency unit is used, and where the torch is equipped with a shielded cable, remove the shield from the torch cable. If this cannot be done easily, removing the ground connection from the shield will usually help.

5. Gas flow is an important factor. Too high or too low a gas flow will make high-frequency starting more difficult.

6. Some high-frequency units including the early model of Linde Part No. 22N36 use a small size bypass condenser. Increasing the size of this condenser to 10 or 20 mfd will usually improve the starting reliability because it permits more of the low frequencies generated by the high-frequency unit to pass through the spark. These low frequencies add considerable energy to the spark and help develop the cathode spot required for starting.

7. Check the spark gaps to make certain that they are clean and properly adjusted.

8. Periodically blow out the high-frequency unit to prevent accumulations of dust which might cause leakage.

9. Keep the length of cable between the high-frequency unit and the torch as short as possible. This cable should be suspended from insulated hangers and not run over the floor or over or near metal surfaces. Avoid loops in this cable. Also, keep this cable away from other cables to avoid high-frequency pick up by the other cables.

III. Disassembly

(See Figure 7.)

1. Unscrew torch cap (56Y63). Inspect "O" ring (85W50) for nicks, cracks, excessive distortion and flatness. Replace with a new part if defective. This "O" ring acts as a seal against argon leakage and air entrainment.

2. Remove the electrode and electrode collet.

3. a. Unscrew the nozzle from the water jacket (85Z98).
   
   OR

   b. Unscrew the cup from the cup adaptor (19Z71).
   
   Unscrew the cup adaptor from the water jacket (85Z98) and withdraw the insulating sleeve.

4. Hold the water jacket adaptor (84Z92) with a strap wrench to keep it from turning, and unscrew the water jacket (85Z98). Inspect insulator gasket (86Z23), backup ring (11N60), and "O" ring (lower 85W55). Replace if defective.

5. Using wrench (60Y04) supplied with the torch, unscrew collet body (84Z90 or 84Z99) from the torch body. Inspect "O" ring (85W07) without removing it from the torch body (use a beam of light). This "O" ring acts as an important seal between gas and water, but does not normally require replacement.

6. Unscrew water jacket adaptor (84Z92) from the torch body. Inspect "O" ring (upper 85W55). Replace if defective. THIS STEP IS NOT NECESSARY TO CHANGE OR REPLACE A COLLET BODY.

7. To reassemble, follow the preceding steps in reverse order. Moister the upper end of collet body before screwing into torch body (this assists passage through "O" ring 85W07). The shoulder on the collet body should fit tightly against the lower end of the torch body to assure good electrical contact. Be certain that water jacket (85Z98) is sufficiently tightened for a leakproof connection.
IV. Required Accessories

**TABLE 3 - TORCH ACCESSORIES FOR “HELIARC” WELDING**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrodes</td>
<td>as req'd.</td>
</tr>
<tr>
<td>Torch Cap</td>
<td>56Y63</td>
</tr>
<tr>
<td>Ceramic Cups▲</td>
<td></td>
</tr>
<tr>
<td>No. 4</td>
<td>85Z07</td>
</tr>
<tr>
<td>No. 5</td>
<td>85Z08</td>
</tr>
<tr>
<td>No. 6</td>
<td>85Z09</td>
</tr>
<tr>
<td>No. 7</td>
<td>85Z10</td>
</tr>
<tr>
<td>No. 8</td>
<td>85Z11</td>
</tr>
<tr>
<td>Ceramic Cup Adaptor</td>
<td>19Z71</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>Metal Nozzles</td>
<td></td>
</tr>
<tr>
<td>No. 6</td>
<td>86Z01</td>
</tr>
<tr>
<td>No. 8</td>
<td>86Z02</td>
</tr>
<tr>
<td>No. 10</td>
<td>86Z03</td>
</tr>
<tr>
<td>No. 12</td>
<td>86Z06</td>
</tr>
<tr>
<td>No. 8 (Water-Cooled)</td>
<td>08N93</td>
</tr>
<tr>
<td>No. 10 (Water-Cooled)</td>
<td>08N94</td>
</tr>
<tr>
<td>No. 12 (Water-Cooled)</td>
<td>08N95</td>
</tr>
<tr>
<td>Electrode Collets .040-in.</td>
<td>11N61</td>
</tr>
<tr>
<td>.16-in.</td>
<td>11N62</td>
</tr>
<tr>
<td>3/32-in.</td>
<td>11N63</td>
</tr>
<tr>
<td>1/8-in.</td>
<td>11N64</td>
</tr>
<tr>
<td>5/32-in.</td>
<td>85Z04</td>
</tr>
<tr>
<td>3/16-in.</td>
<td>85Z05</td>
</tr>
<tr>
<td>1/4-in.</td>
<td>85Z06</td>
</tr>
<tr>
<td>Collet Body</td>
<td></td>
</tr>
<tr>
<td>for .040, 1/16, 3/32, &amp; 1/8-in. electrodes</td>
<td>11N55</td>
</tr>
<tr>
<td>Collet Body Backup Ring</td>
<td>11N58</td>
</tr>
<tr>
<td></td>
<td>11N60</td>
</tr>
</tbody>
</table>

▲ Cup Adaptor 19Z71 required if ceramic cups are used.

V. HW-13 Torch

*for use in SIGMA Mechanized Welding*

**A. Introduction**

The basic HW-13 Torch, Part No. 40V59, plus the torch accessories listed in the tables below, is designed for SIGMA mechanized welding. The HW-13 can be used with the SEH-2 Welding Head, SWM-2 or SWM-3 type wire feed unit and will accommodate .030, 3/64, 1/16, and 3/32 in diam. wire. The HW-13 will operate at currents up to 500 amperes continuous duty.

When used with an SEH-2 Head, the HW-13 can employ either a contact tube or a contact tip, as shown in Figure 6. The contact tube, together with the water jacket-metal nozzle combination, is most suitable for applications requiring medium-current welding and standard duty cycles. The screw-in type contact tip, together with the directly water-cooled metal nozzle, will operate more satisfactorily where a high current range and high duty cycle require more efficient cooling.
B. Equipment Required

1. WHEN USED WITH A SWM-2 OR SWM-3 WIRE FEED UNIT (SEE FIG. 5).
   a. Collet, Part No. 85W06, is used for all sizes.
   b. Collet Body, Part No. 11N58, is used for all sizes.
   c. Proper size wire feed accessories listed in Table 5.
   d. Proper size metal nozzle or ceramic cup listed in Table 4.
   e. Collet Body Back-up Ring, Part No. 11N60.

2. WHEN USED WITH AN SEH-2 WELDING HEAD (SEE FIG. 6).
   a. Collet, Part No. 85Z06, is used for all sizes only when contact tube arrangement is employed.
   b. Collet Body, Part No. 11N58, is used for all sizes only when contact tube arrangement is employed.
   c. Collet Body, Part No. 49N26, is used for all sizes only when contact tip arrangement is employed.
   d. Proper size wire feed accessories listed in Table 6.
   e. Proper size metal nozzle listed in Table 4.
   g. Collet Body Back-Up Ring, Part No. 11N60.

C. Installation Instructions

1. WHEN USED WITH A SWM-2 OR SWM-3 WIRE FEED UNIT.

   To install the collet body and back-up ring, refer to Section 1-E-1.

   The wire guide and contact tube are secured in the torch body by the collet body and the flexible conduit nut. With the flexible conduit removed from the torch, insert the collet through the top of the torch.

   Install the conduit on the torch. Attach the proper outlet guide to the conduit and insert in the feed roll assembly on the wire feed unit.

2. WHEN USED WITH AN SEH-2 WELDING HEAD (SEE FIG. 6).

   If a contact tube arrangement is used, follow the instructions in paragraph 1 above to install the collet body, collet, wire guide, back-up ring, and contact tube. Note that the conduit nut is replaced by the mounting adaptor (49N27). Before inserting the adaptor, place an "O" ring (85W50) in the groove on the end of the adaptor. The nylon liner is inserted in the torch as shown.

   If a contact tip arrangement is used, the torch water jacket is removed, and a collet is not required. The collet body and back-up ring are installed as in Sect. 1-E-1. Insert the proper wire guide and contact tip and attach a water-cooled nozzle. Insert the adaptor and liner as above.

   Slip the proper inlet guide tip over the nylon liner and screw it into the top of the mounting adaptor. Place the insulator sleeve (14N14) over the top of the adaptor. Insert the mounting adaptor into the accessory and support assembly on the SEH-2 and tighten the two setscrews in the support clamp. The nylon liner must be cut, using a razor blade, to the proper length to ensure a continuous liner path from the feed roll to the contact tip.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramic Cup*</td>
<td></td>
</tr>
<tr>
<td>No. 4</td>
<td>85Z07</td>
</tr>
<tr>
<td>No. 5</td>
<td>85Z08</td>
</tr>
<tr>
<td>No. 6</td>
<td>85Z09</td>
</tr>
<tr>
<td>No. 7</td>
<td>85Z10</td>
</tr>
<tr>
<td>No. 8</td>
<td>85Z11</td>
</tr>
<tr>
<td>No. 12</td>
<td>86Z06</td>
</tr>
<tr>
<td>Water-Cooled Metal Nozzle No. 8</td>
<td>08N93</td>
</tr>
<tr>
<td>No. 10</td>
<td>08N94</td>
</tr>
<tr>
<td>No. 12</td>
<td>08N95</td>
</tr>
</tbody>
</table>

* Cup Adaptor 19271 is required if ceramic cups are used.
FIG. 5 – HW-13 Accessories for SIGMA Welding with a SWM-2 or SWM-3

TABLE 5 – WIRE FEED ACCESSORIES FOR SWM-2 OR SWM-3

<table>
<thead>
<tr>
<th>Wire Size</th>
<th>Wire Type</th>
<th>Contact Tube</th>
<th>Wire Guide</th>
<th>Flexible Conduit Assembly</th>
<th>Nylon Conduit Liner</th>
<th>Outlet Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>.030</td>
<td>I</td>
<td>85Z27</td>
<td>56Y71</td>
<td>38V90</td>
<td>12N71</td>
<td>See Note 1</td>
</tr>
<tr>
<td>.030</td>
<td>II, III</td>
<td>08N81</td>
<td>56Y71</td>
<td>38V90</td>
<td>12N71</td>
<td>See Note 1</td>
</tr>
<tr>
<td>.035</td>
<td>IV, V</td>
<td>85Z28</td>
<td>56Y72</td>
<td>38V90</td>
<td>11N72</td>
<td>12N76</td>
</tr>
<tr>
<td>.035</td>
<td>II, III</td>
<td>85Z27</td>
<td>56Y71</td>
<td>38V90</td>
<td>11N72</td>
<td>12N76</td>
</tr>
<tr>
<td>3/64 (.045)</td>
<td>IV, V</td>
<td>85Z28</td>
<td>56Y72</td>
<td>38V90</td>
<td>12N72</td>
<td>12N76</td>
</tr>
<tr>
<td>1/16</td>
<td>I</td>
<td>85Z29</td>
<td>56Y73</td>
<td>40V10</td>
<td>12N73</td>
<td>04N21</td>
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<td>09N87</td>
<td>56Y73</td>
<td>38V88</td>
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<td>56Y74</td>
<td>40V10</td>
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<td>56Y74</td>
<td>38V90</td>
<td>No Liner</td>
<td>04N21</td>
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**NOTE 1** – For all .030-in. applications, use outlet guide 12N21, insert 13N45, and guide tip 13N46.

**WIRE TYPES**

I – Aluminum & Magnesium

II – Copper Base Alloys

III – Heat & Corrosion Resistant Alloys

IV – Copper Coated Carbon Steel

V – Bare Low Alloy Steel

11
FIG. 6 – HW-13 SIGMA Torch Used with SEH-2 Head

TABLE 6 – WIRE FEED ACCESSORIES WHEN USING AN SEH-2

<table>
<thead>
<tr>
<th>Wire Size In.</th>
<th>Wire Type</th>
<th>Using, Contact Tip</th>
<th>Using Contact Tube</th>
<th>Inlet Guide Tip</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Contact Tip</td>
<td>Wire Guide</td>
<td>Contact Tube</td>
</tr>
<tr>
<td>.030</td>
<td>II, III</td>
<td>49N06</td>
<td>49N22</td>
<td>49N15</td>
</tr>
<tr>
<td></td>
<td>IV, V</td>
<td>49N05</td>
<td>49N23</td>
<td>49N10</td>
</tr>
<tr>
<td>.035</td>
<td>II, III</td>
<td>49N08</td>
<td>49N24</td>
<td>49N16</td>
</tr>
<tr>
<td>3/64</td>
<td>I</td>
<td>49N04</td>
<td>49N24</td>
<td>49N11</td>
</tr>
<tr>
<td>.045</td>
<td>II, III</td>
<td>49N02</td>
<td>49N25</td>
<td>49N09</td>
</tr>
<tr>
<td>(3/64)</td>
<td>IV, V</td>
<td>49N03</td>
<td>49N22</td>
<td>49N13</td>
</tr>
<tr>
<td>1/16</td>
<td>I</td>
<td>49N01</td>
<td>49N25</td>
<td>49N12</td>
</tr>
<tr>
<td>1/16</td>
<td>II, III</td>
<td>49N07</td>
<td>49N25</td>
<td>49N14</td>
</tr>
<tr>
<td>3/32</td>
<td>IV, V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/32</td>
<td>II, III</td>
<td></td>
<td></td>
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</tr>
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</table>

**WIRE TYPES**

I – Aluminum and Magnesium
II – Copper Base Alloys
III – Heat and Corrosion Resistant Alloys
IV – Copper Coated Carbon Steel
V – Bare Low Alloy Steel
VI. Replacement Parts Data

FIG. 7 - HW-13 Machine Welding Torch, Part No. 40V59 (Series 3) for HELIARC Welding
HARDWARE
6134-0113 5/16-in.-18 x 1-in. Lg. Socket-Head, Steel Cap Screw (4 used)
6134-0174 5/16-in.-18 x 1¼-in. Lg. Socket-Head, Steel Cap Screw (2 used)

FIG. 8 - Clamp Assembly - 39V37

HARDWARE
6130-3851 #6-32 x 3/8-in. Lg. Flat-Head Steel Machine Screw
(2 used)

FIG. 9 - Rack & Tube Assembly - 39V34(8"
39V35(12"
39V36(16"

HARDWARE
6330-0917 #10-32 American Standard Hex. Machine Nut - Steel
6134-0113 5/16"-18 x 1" long Socket Head Cap Screw - Steel
6133-5908 #10-32 x ¾" long Socket Head Setscrew - Oval Point - Steel
6133-5914 #10-32 x 1" long Socket Head Setscrew - Oval Point - Steel

FIG. 10 - Wire Guide Attachment - 39V38

ACCESSORIES (NOT SUPPLIED)

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
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<tbody>
<tr>
<td>04N76</td>
<td>GUIDE TIP FOR 0.30&quot; DIA. WIRE</td>
</tr>
<tr>
<td>04N77</td>
<td>GUIDE TIP FOR 0.364&quot; DIA. WIRE</td>
</tr>
<tr>
<td>04N78</td>
<td>GUIDE TIP FOR 0.16&quot; DIA. WIRE</td>
</tr>
<tr>
<td>04N79</td>
<td>GUIDE TIP FOR 0.32&quot; DIA. WIRE</td>
</tr>
</tbody>
</table>

# ALL PARTS WITH THIS SYMBOL ARE INCLUDED IN 39V27
Hose Repair and Replacement

Power Cable-and-Hose Assembly
If the power cable-and-hose assembly becomes damaged, we recommend that you (1) purchase a new assembly, or (2) turn the damaged cable-and-hose assembly over to your LINDE office, where it will be repaired. The only charge will be for parts, if such repair is advisable. DO NOT TRY TO REPAIR IT YOURSELF. The connection fittings at each end of the assembly are crimped to the cable and insulator hose by special crimping tools at the factory to obtain a strong and completely water-tight joint. A satisfactory repair job cannot be done without these tools.

Argon and Water Hose Assemblies
If the argon or water hose assemblies become damaged, we recommend that you purchase a new hose assembly or send the damaged hose assembly to the nearest LINDE repair station for possible repair. DO NOT ATTEMPT PERMANENT REPAIRS YOURSELF. As with the power cable-and-hose assembly, the connection fittings are crimped on at the factory by special crimping tools to assure a leakproof connection. A completely satisfactory job cannot be done without these tools. Improper repair of an argon hose connection, for example, could cause argon dilution, resulting in incomplete arc protection and consequent unsatisfactory welds.

VII. Series Change

This booklet covers the HW-13 (Series 3) torch. It may also be used with earlier models if changes which have been made are taken into consideration. The series number of a torch is the first digit of the serial number stamped on the torch body.

Series 2 - The Series 2 torch is similar to the Series 3 torch with the exception that it does not contain L.A.A. inert gas fittings (i.e., male fittings on torch hose for Series 3, whereas Series 2 contains female fittings).

Series 1 - The Series 1 torch is similar to the Series 3 torch except for the following:
1. Torch hose does not contain L.A.A. inert gas fittings.
2. Uses Metal Nozzles No. 6 (84Z96), No. 8 (84Z97), and No. 10 (84Z98), Water Jacket (56Y62), and Ceramic Cup Adaptor (18Z81).
3. Does not contain a Nozzle Insulating Sleeve (85Z99).
INDUSTRIAL GASES
LINDE Oxygen, Nitrogen, Argon, Neon, Helium, Krypton, Xenon, Hydrogen, and mixtures
PREST-O-LITE Acetylene

CALCIUM CARBIDE
UNION CARBIDE Calcium 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-LITE Welding and Cutting Apparatus
PREST-O-LITE Welding and Cutting Apparatus
PREST-O-LITE Air-Acetylene Apparatus and Small Tanks
PREST-O-LITE LP-Gas Apparatus

ELECTRIC WELDING AND CUTTING EQUIPMENT
HELIARC Welding and Cutting Equipment SIGMA Welding Equipment UNIONARC Welding Apparatus and Supplies UnIONMELT Automatic Welding Apparatus and Supplies

SPECIAL EQUIPMENT

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

NEW PRODUCTS
LINDE Synthetic Sapphire, Ruby, Spinel, and Titania Fine Alumina Abrasive Molecular Sieves Flame-Plating, Plasmarc


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