INSTRUCTIONS for

HW-13
MECHANIZED TIG
WELDING TORCH

REQUIRED ACCESSORIES OR SERVICES:

—Collet, collet body, electrode, cup.
—Torch Cap (56Y63) and collet body back-up ring (11N60).
—Water hose (to connect from power cable adaptor to drain).
  Recommended Part No. 40V76.
—Shielding gas regulator/flowmeter (if cylinder gas is used)
  or flowmeter (if shielding gas is piped).
—Adequate Water Supply - at maximum rating, the minimum
  cooling water flow of 1-3/4 qts./min. is required at inlet
  temperature of less than 60 degrees F. and inlet pressure
  of at least 25 psi. [If flow switch is used in the system, 5 psi
  more upstream of switch is needed.] To prevent damaging
  the plastic hose, pressure should not exceed 50 psi, measured
  at the inlet of the torch hose.
—Welding power and shielding gas supplies.

OPTIONAL ACCESSORIES

NO LONGER AVAILABLE

—Service Line Extensions:
  Water Hose, 12-1/2-ft. (40V76)
  Water Hose Coupling (11N18)
  Gas Hose, 12-1/2-ft. (40V77)
  Gas Hose Coupling (11N17)
  Power Cable, 12-1/2-ft. (40V78)
  Power Cable Coupling (11N19)
  Power Cable Insulator Sleeve (10N27)

RATING: 500 amps AC or DC, continuous duty; insulated
and shielded for high frequency applications. Up to 700
amps using water-cooled metal nozzles.

COOLING: Closed-loop water cooling system, no joints
within torch body to leak.

ELECTRODES: Uses 7-in. long x .040-in. through 1/4-in.
dia. electrodes.

COLLETS: Available for seven electrode sizes (see table 1).

COLLET BODIES: Two sizes available (see table 1).

CUPS: Five sizes (No. 4 thru 8) are available in standard
ceramic and high-impact ceramic; standard metal nozzles are
available in sizes 6, 8, 10, & 12; water-cooled nozzles avail-
able in sizes 6, 10, & 12.

TORCH DIMENSIONS:
  Height - 7-11/16-in. (195 mm.)
  Barrel Diameter - 1-3/8-in. (35 mm.)

Be sure this information reaches the operator.
You can get extra copies through your supplier.

ESAB
ESAB Welding & Cutting Products
- Fuse Assembly, Part No. 45V34: Can be used in place of Power Cable Adaptor (45V11) supplied with the torch.

- Mounting Accessories (See Fig. 3)
  Torch Clamp Assembly (39V32)
  Cold Wire Guide Assembly (39V38)

- Rack and Tube Assembly: available in following lengths: 8-in. (39V34), 12-in. (39V35), and 16-in. (39V36).
- Torch Adjustment Assembly (40V29) not illustrated - controls vertical movement of rack and tube assembly.

**Fig. 1 - Connection Diagram for the HW-13 Torch.**

**TABLE 1 - HW-13 TORCH ACCESSORIES**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrodes</td>
<td>As Required</td>
</tr>
<tr>
<td>Torch Cap</td>
<td>56Y63</td>
</tr>
<tr>
<td>Electrode Collet: .040-in.</td>
<td>39B54</td>
</tr>
<tr>
<td>1/16-in.</td>
<td>39B52</td>
</tr>
<tr>
<td>3/32-in.</td>
<td>14N65</td>
</tr>
<tr>
<td>1/8-in.</td>
<td>14N94</td>
</tr>
<tr>
<td>5/32-in.</td>
<td>14N58</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: for .040-, 1/16-, 3/32-, and 1/8-in.</td>
<td>11N58</td>
</tr>
<tr>
<td>for 5/32-, 3/16-, and 1/4-in.</td>
<td>11N60</td>
</tr>
<tr>
<td>Collet Body Backup Ring</td>
<td></td>
</tr>
<tr>
<td>Ceramics or High-Impact Cups: No. 4</td>
<td>85Z07</td>
</tr>
<tr>
<td>No. 5</td>
<td>14N68</td>
</tr>
<tr>
<td>No. 6</td>
<td>14N58</td>
</tr>
<tr>
<td>No. 7</td>
<td>14N60</td>
</tr>
<tr>
<td>No. 8</td>
<td>14N91</td>
</tr>
<tr>
<td>Standard or Water-Cooled Metal Nozzles: No. 6</td>
<td>86Z01</td>
</tr>
<tr>
<td>No. 8</td>
<td>08N92</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 required if ceramic cups are used.
TABLE 2 - ELECTRODE AND CAP SIZE FOR DIFFERENT WELDING CURRENTS

<table>
<thead>
<tr>
<th>Welding Currents, Amps</th>
<th>ACHF*</th>
<th>DCSP</th>
<th>DCRP</th>
<th>Electrode Diameter</th>
<th>Cup No.</th>
<th>Metal Nozzle No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Using pure tungsten electrodes</td>
<td>Using thoriated electrodes</td>
<td>Using thoriated tungsten electrodes † †</td>
<td>in.</td>
<td>mm.</td>
<td></td>
</tr>
<tr>
<td>10-60</td>
<td>60-80</td>
<td>15-80</td>
<td>----</td>
<td>.040</td>
<td>1.0</td>
<td>4</td>
</tr>
<tr>
<td>50-100</td>
<td>100-150</td>
<td>70-150</td>
<td>10-20</td>
<td>1/16</td>
<td>1.6</td>
<td>4, 5</td>
</tr>
<tr>
<td>100-160</td>
<td>160-235</td>
<td>150-250</td>
<td>15-30</td>
<td>3/32</td>
<td>2.4</td>
<td>7</td>
</tr>
<tr>
<td>150-210</td>
<td>225-325</td>
<td>250-400</td>
<td>25-40</td>
<td>1/8</td>
<td>3.2</td>
<td>6-8</td>
</tr>
<tr>
<td>200-275</td>
<td>300-425</td>
<td>400-500</td>
<td>40,55</td>
<td>5/32</td>
<td>4.0</td>
<td>----</td>
</tr>
<tr>
<td>250-350</td>
<td>400-525 a</td>
<td>500-800 b</td>
<td>55-80</td>
<td>3/16</td>
<td>4.8</td>
<td>----</td>
</tr>
<tr>
<td>325-475</td>
<td>500-700 b</td>
<td>800-1100 b</td>
<td>80-125</td>
<td>1/4</td>
<td>6.4</td>
<td>----</td>
</tr>
</tbody>
</table>

*Values bases on use of unbalanced wave transformer. If a balanced wave transformer is used, reduce maximum values in the table by about 30 per cent or use the next larger size electrode.

a. - Exceeds the rated capacity of torch when a high impact cup is used.
b. - Exceeds the rated capacity of the torch.

†Balled electrode tip ends can best be formed and maintained at these a.c. current levels.

‡To avoid damaging the gas lens collet bodies, pure tungsten electrodes are not recommended for d.c. welding operations.

SET-UP AND INSTALLATION

1. Set up the torch and accessories following Figure 1 and observing all instructions supplied with regulator/flowmeter, fuse, and flow switch. (In the simplest installation, the torch gas hose is attached directly to the flowmeter outlet, and the water hose is attached to a water line utilizing accessory adaptor 11N16.) Various mechanical mounting arrangements utilizing the HW-13 for mechanized welding are covered in the following section.

2. Connect the fuse assembly or power cable adaptor (45V11) to the welding power source, either directly or through a suitable length of welding cable fitted with lugs. Run a hose from the fuse or adaptor to a water drain.

3. 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 3/32 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. 4). 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. 4.
d. Insert insulator gasket. Part No. 86Z23, in place making sure it is centered properly and replace the water jacket.

4. Metal Nozzles and Cups: Four sizes of metal nozzles and five sizes of ceramic or high-impact cups are available for use with the HW-13. For the most effective argon protec-

Fig. 2 - Nozzle and Ceramic Cup Assembly for HW-13 Torch.
PRECAUTIONS

A. Use a standard welder's helmet with the proper shade of glass for the welding current to be used.
B. Wear suitable clothing to protect exposed skin from arc burns.
C. Be sure to shut off power before adjusting or replacing electrodes.
D. When welding copper indoors, provide good ventilation or use a respirator.
E. If you use chlorinated solvents for degreasing or cleaning the workpiece, do not weld near degreasing tanks.
F. Shield your welding station to protect neighboring workers from ultra-violet radiation.

OPERATING INSTRUCTIONS

1. Make sure that all argon and water connections in the system have been securely tightened, and that the ribbed insulator has been well-tightened.

2. Turn on the water. (See Page 1 for pressure and flow requirements.)

3. With the regulator flow-adjusting valve closed, open the shielding gas cylinder or station valve.

4. Set the power supply for the desired welding current. See Table 2 for typical welding conditions.

5. Open regulator flow-adjusting valve and set shielding gas flow to the desired level, as registered on flowmeter tube or gauge.

6. Close control switch at work position or at power supply.

7. Draw a test arc on a heavy piece of scrap steel or copper. (Do not use a carbon block, which will tend to contaminate the electrode.)

8. If the test arc is satisfactory, commence welding.

OPERATION AND MAINTENANCE HINTS

1. A poor shielding gas connection, or a leaky hose, will not only waste gas but permit the entry of minute amounts of air, sufficient to contaminate both the electrode and the weld. Trouble signs: a bluish cast on the electrode after it has cooled; in welding aluminum, a dark gray deposit on or beside the weld bead.

2. Keep the torch hose away from hot metal. The plastic hose begins to lose strength at 125 deg. F.

3. Don't try to repair a damaged power cable or gas or water hose. Replace it. Then send the damaged assembly, if it appears worth salvage, to a Linde repair station, which has special tools for making up tight connections.

4. If torch water passages become clogged, remove lower torch-end parts and collect body so that foreign particles may emerge freely. Flush torch with water and if necessary, clean flow passages by inserting a 3/32-in. dia. wire through the hose-connection fittings. A strainer in the water inlet line (such as Hays Mfg. Co., Cat No. 2400) is good insurance against clogging.

5. If an electrode becomes contaminated, shut off power, then remove electrode from torch. Break off the contaminated end (nicking with a grinding wheel first will help) and replace electrode.

6. Before metal nozzles are placed in service, it is recommended that they be dipped in Linde 65 nozzle compound. The silicon coating obtained helps to minimize spatter adherence, thus assuring longer life and a complete and uniform gas pattern. The compound is available in either a 4 oz. can (P/N 08N65)
DISASSEMBLY (See Fig. 4)

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. Unscrew the nozzle from the water jacket (85Z98).
   OR
   Unscrew the cup from the cup adaptor (19271). 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 (11N58) from the torch. 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. Moisten the upper end of the collet body before screwing into torch body (this assists passage through "O"-ring 85W07). This 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.

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SERIES CHANGES:

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.

Series 2 - The Series 2 torch is similar to the Series 3 torch with the exception that it does not contain 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 inert gas fittings.
2. Uses Metal Nozzles No. 6 (84Z96), No. 8 (84Z97), and No. 10 (84Z98), Water Jacket (56Y62). Ceramic Cup Adaptor (19261), and Collet Bodies (84Z90 or 84Z99). NOTE: The above nozzles are no longer available. To use present nozzles with the Series 1 torch, water jacket (56Y62) must be replaced by (85Z98).
3. Does not contain a Collet Body Back-Up Ring (11N60) and Nozzle Insulating Sleeve (85Z99).