APPARATUS REPAIR MANUAL

SECTION E

WELDING TORCHES

GENERAL INFORMATION

FACILITIES AND PERSONNEL

Welding torches must be repaired, reassembled, and tested only by qualified personnel in adequately equipped repair facilities. Brazing operations must be performed only by persons familiar with the art of brazing (or silver-soldering). All personnel must be familiar with safe practices in handling gases and gas equipment. The facilities should be clean, well lighted, and well ventilated, providing optimum protection for all working personnel.

REPAIR AND TESTING

When a welding torch is turned in for repair, valve stem assemblies should always be replaced as noted in the parts information section (E-2). Torch identification decals should also be replaced unless the handle of the torch is rolled stamped with the torch model number.

Other parts if damaged should be replaced by a person skilled in brazing techniques. Before deciding to replace a part(s) requiring brazing, determine whether the cost of repairing a torch will be less than 50% of the cost of a new torch. If estimate exceeds 50%, the welding torch should be considered unrepairable. The customer should be encouraged to purchase a new welding torch for replacement.

Use only recommended replacement parts covered in this section. DO NOT substitute unauthorized parts.

NOTE: Hose connections on old welding torches were soft-soldered to the rear body. These hose connections should be replaced and silver-brazed to the body.

Every remanufactured torch must be tested for leakages as covered in Item 4 of this section. Operation of the torch can be checked by using the largest welding or heating head assembly available for the particular torch. (Refer to the appropriate operating instructions, see Item 5 for listing, for proper oxygen and fuel gas pressures.)

DISCONTINUED TORCHES

Torch handles such as the W-22 and W-26 which have been discontinued over five years ago are not illustrated in this repair manual since unique parts are no longer available. The valve stem assemblies, however, may be interchangeable with the current ones and seating surfaces may still be reseatable. If in doubt, check with your ESAB parts supplier. If the discontinued torch handle requires replacement of a tube, body, or other parts requiring brazing, then it should be considered unrepairable.

TOOLS AND SUPPLIES

Only standard wrenches are required for minor repairs on a welding torch. Most taps and dies can be purchased locally for rethreading work. An adequate repair facility should have at least all the tools listed in the General Tool List for repairing regulators (see Section H-1, Item 4). In addition, the following tables list tools and consumable supplies which should be on hand for repairing OXWELD and PUROX welding torches.

RESEATING TOOLS

Part No.	Purpose
5230016	For reseating f.g. valve seat — W-17, -24R, -47, -500
5230017	For reseating front body seats — W-17
5230031	For reseating oxy. valve seat — W-24R
5230054	For reseating front body seats — W-24R
5230129	For reseating "B"-size hose connections — all except W-200
5230136	For reseating "A"-size hose connections — W-200
5230149	For reseating oxy. valve seat — W-17, -47, -500
5230149	For reseating both valve seats (5/16"—24) — W-201, -202, -275, -300, -400
5230150	For reseating both valve seats — W-200
• 5230201	For reseating both valve seats (5/16"—32) — W-300, -400

NOTE: Use Anchorlube G-771, P/N 95330113 (1 qt. container) for lubrication and for maintaining tool sharpness.

SPECIAL DIES

5180033	9/16-in.—18 RH	For rethreading
5180034	9/16-in.—18 LH	torch hose connections.

ADAPTORS

For testing a W-24R torch or any other torch with special 41/64"-18 fittings made for the railroad industries, the following hose connection adaptors are available:

Part No.	Description
5150072	ORS-B Oxy. hose adaptor
5150073	ORS-B F.G. hose adaptor

• Added

CONSUMABLE SUPPLIES

Part No.	Description
10251854	0.062-in. diam. Silver Solder (1125° F melt, 1145° F flow), 1 oz.
10291854	0.062-in. diam. Silver Solder (1195° F melt, 1270° F flow), 1 oz.
13K31	Silver Solder Ring (for W-200 gas tubes)
13K36	Silver Solder Ring (for W-200 handle)
23250001	White A-1 Silver Solder Flux
• 73585271	Loctite Compound No. 271
76550013	Oxweld No. 13 Soft Solder Flux
73585064	Anti-Friction Compound No. 64, 2 oz.
73585065	Anti-Friction Compound No. 64, 1 lb.
73585070	Oxweld No. 70 Bright Dip Compound, 20 lb.
73585081	Oxweld No. 81 Cleaning Compound, 20 lb.
95330113	Anchorlube G-771 Tool Lubricant, 1 qt.

• Revised

REPAIR PROCEDURES

DISASSEMBLY AND INSPECTION

1. Remove and discard both valve stem assemblies.
2. Inspect torch to determine if any other part(s) should be replaced. A part requiring brazing should be replaced under the following conditions:
   a. If part is dented or nicked more than 25% of the original diameter or wall thickness.
   b. If threads are damaged extensively making rethreading or retapping impossible.
   c. If seating surfaces are impossible to reseat due to distortion or heavy scoring.
   d. If part is damaged due to excess spatter.

REPLACING BRAZED PARTS

1. Remove handle screws and then slide off handle. Some old torches may have handle soft-soldered to the front and rear bodies in which case apply enough heat to soften the solder so that handle can slide off. If handle is dented enough making it impossible to remove, it will be necessary to heat the front or rear body to a dull or cherry red color to melt the solder joints between the gas tubes and body. Remove the body and handle immediately with a pair of pliers.
2. Apply silver solder flux (23250001) on the brazed joint with an acid brush. The flux will help break the old solder joint and aid in cleaning the part that will be retained.
3. If a part is to be retained, reheat and brush off as much excess solder as possible with a wire brush.
4. Parts to be silver brazed must be free of oil, dirt, lacquer, etc. Parts can be cleaned by sand blasting, scratch brushing, or washing with No. 81 cleaning compound.
5. Assemble the parts making sure tubes or hose connections are fully seated in the sockets.
6. Position torch in vise or fixture and then apply plenty of flux around the joint to be brazed.
7. Slowly heat the joint and surrounding metal with a soft flame to prevent blowing off flux. When the parts start turning dull red or when the flux is watery, just touch the 1/16-in. diam. silver solder wire to the joint. A piece of the solder should then melt and start to flow. Do not apply too much solder. Only a thin film is needed for a good strong neat-appearing joint. Melted solder can be teased to flow by moving the flame and heating the parts just ahead of the flow. Push down on assembly with pliers or some tool to make sure parts are fully seated.

   NOTE: W-24R - Higher melt (1195° F) silver solder is recommended for brazing the center oxygen tube to front or rear body. Then braze fuel gas tube and bushing with lower melt (1125° F) solder. Solder should be applied inside the bushing at the rear joint.

   W-200 - Must be completely blind soldered. Each gas tube to front and rear body requires the use of solder ring 13K36. The front and rear bodies are grooved for solder ring 13K31 for joining handle. Torch must be assembled (excluding valve stems) and then body should be heated sufficiently to assure complete melting of the solder rings.
8. If necessary, brush the joint while the solder is still molten with an acid brush to remove any excess solder.
9. Allow the brazed joint to air cool. Do not dip the hot assembly in cold water. Examine the joint. Pin holes in the finished joint may be caused by too much or not enough heat, or lack of fluxing. Solder balling may be due to dirty parts, improper fluxing, or lack of heating. Appearance of the brazed joint should be neat.
10. Clean and bright-dip the brazed assembly as described below.

RESEATING AND RETHREADING:

Examine seating surfaces of valve body, hose connections, and welding head connections. The seats should be smooth. If scratched or slightly nicked, or tests indicate leakage, it can be reseated with the proper reseating tools (see Item 2).

To use reseating tool:

1. Make sure the cutting edge of tool is sharp and in good condition.
2. Apply few drops of Anchorlube G-771 to the cutting edge.
3. Connect bushing part of the tool to the mating threads on torch and just tighten the bushing with a wrench slightly.
4. Turn cutting tool stem at least one complete turn. You should feel the cutting and then it should turn rather freely after cutting is completed.
5. Remove reseating tool and examine the seating surfaces. If not quite smooth enough, repeat the above reseating procedures. You should only remove about 0.001 to 0.002-in. of metal at a time.

Check all connecting threads for nicks that would prevent or hinder connecting a mating part. Retap or rethread with proper tap or die using Anchorlube G-771 for lubrication. (See appropriate parts illustration in Section E-2 for proper thread size.) Most threads are standard. Special dies are available for rethreading the hose connections (see Item 2).

CLEANING

All welding torches turned in for repair, even if it only involves replacing the valve stem assemblies, should be thoroughly degreased. Cleaning Compound No. 81 (P/N 73585081) is a suitable cleaning solution. For brighter finish of brass parts, Bright-Dip Compound No. 70 (P/N 73485070) may be used. This solution should be used if brazing was involved. Welding torches should be cleaned and bright-dipped with the valve stems removed. The compounds are available in 20 lb. containers. The solutions should be made up as directed on the containers.

INSTALLING NEW HANDLES

With the exception of W-24R and W-200, the handles on most welding torches were at one time or another soft-soldered to the front and rear bodies. Currently, the handle is secured by four No. 6–32 x 1/4-in. self-tap, flat-head screws. Replacement bodies do not include holes for the screws but replacement handles do have the holes. With handle properly centered, locate and mark the holes to the body, and then drill no more than 19/64-in. deep with a No. 31 (0.120-in. diam.) drill bit.

W-24R handle is still soft-soldered to the rear body. W-200 handle is silver brazed internally.

The torch handle (except W-200) may be installed after leak testing (see Item 4) so that any possible leak at a brazed joint can be detected easily.

•When installing the handle, apply one drop of Loctite Compound No. 271 (73185271) into each hole before turning in the handle mounting screws.

REASSEMBLY

1. Apply a dab of No. 64 Anti-Friction Compound on the male threads of each valve stem assembly.
2. Install valve stem assembly to torch. Tighten packing nut with a wrench until snug so that valve stem can turn smoothly but not too freely.
3. Test torch as described in Item 4.

• Revised

TEST PROCEDURES AND SPECIFICATIONS

Each remanufactured torch must be tested for valve seat, external, and cross seat leakages as specified below before returning to customer or stocking for sales. The torch may be flame tested with the largest appropriate head specified after performing the leakage tests.

Nitrogen only should be used on all leakage tests. Use appropriate regulator and accessories. Testing should be performed by those familiar with precautions and safe practices of gas cylinder handling and operating regulating equipment.

On all three leakage tests **no leakage should be permitted.**

Valve Seat Leakage Test - With torch oxygen valve closed finger tight, supply at least 50 psig of nitrogen to the oxygen hose connection of the torch. Submerge torch in container of water. Bubbling emerging from the front end indicates leakage past the torch oxygen valve. Check ball seat on stem or reseat valve body, and then retest.

Check for fuel gas valve seat leakage by repeating the above test with at least 50 psig supplied to the fuel gas connection.

External Leakages - Connect an appropriate welding head assembly with its tip plugged with solder to the torch. Plug fuel gas connection using standard hose nipple plugged with solf-solder and hose nut. Open both torch valves and supply at least 50 psig to the torch oxygen hose connection. Submerge the torch in water and check for leakages. Bubbling from the valve packing nut indicates leakage past the packing washer which can be corrected simply by tightening the packing nut. Steady stream of bubbles emerging from the vent hole of handle indicates leakage at a solder joint.

Cross Seat Leakage Test - Plug center orifice or all orifices on the mixer part of a welding head assembly with rubber plug or washer, or soft-solder. Use plugged tip if all orifices on mixer are not plugged. With plugged mixer connected to torch, nothing connected to the torch fuel gas hose connection, both valves wide open, supply at least 50 psig of nitrogen to the oxygen side and submerge torch in water. Bubbles emerging from the fuel gas hose connection indicate small diameter leakage at head connection. Bubbling at the head connection indicates large diameter leakage. Check O-rings on the plugged mixer. If in good condition, then the double seats in the torch front body should be reseated. Retest after replacing O-rings or reseating.

NOTE: Mixers on all OXWELD and PUROX welding heads are now fitted with O-rings. Reseating should not be necessary.

Flame Testing - This test is optional since the mixer is part of the welding head assembly, not the welding torch. If there is a question of excess solder possibly blocking a gas passage, then check the torch with its largest head assembly (multi-flame type preferred) using standard oxygen and acetylene equipment. Refer to the appropriate instruction booklet (see listing in Item 5) for proper operating pressures. You should be able to end up with one torch valve wide open and adjust with the other from oxidizing to carburizing type flame with ease.

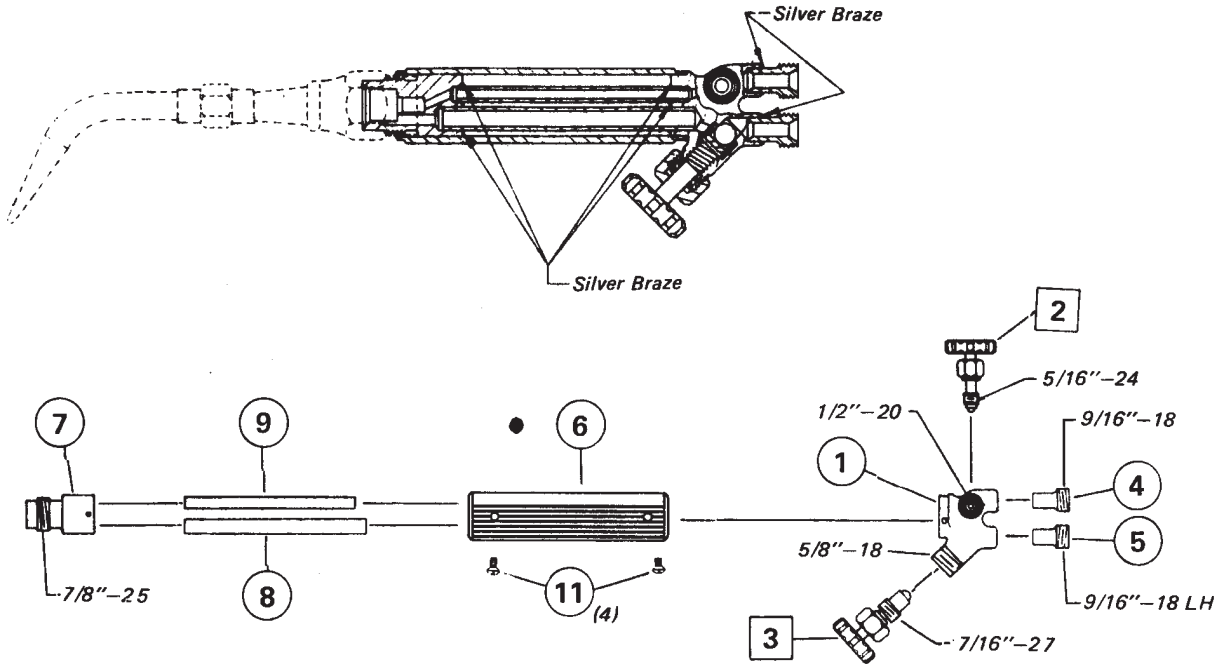
PACKING

When testing is completed, do the following:

1. Apply UL label (if qualified).
2. Stamp or mark on a tamper-proof, permanent adhesive decal the month and year the torch was remanufactured.
3. Attach warning tag P/N 953039.
4. Pack torch with the latest appropriate operating instructions (see Item 5) in a suitable carton.
5. Label the carton with the proper torch model number and remanufactured part number.

LISTING OF OPERATING INSTRUCTIONS

• Added

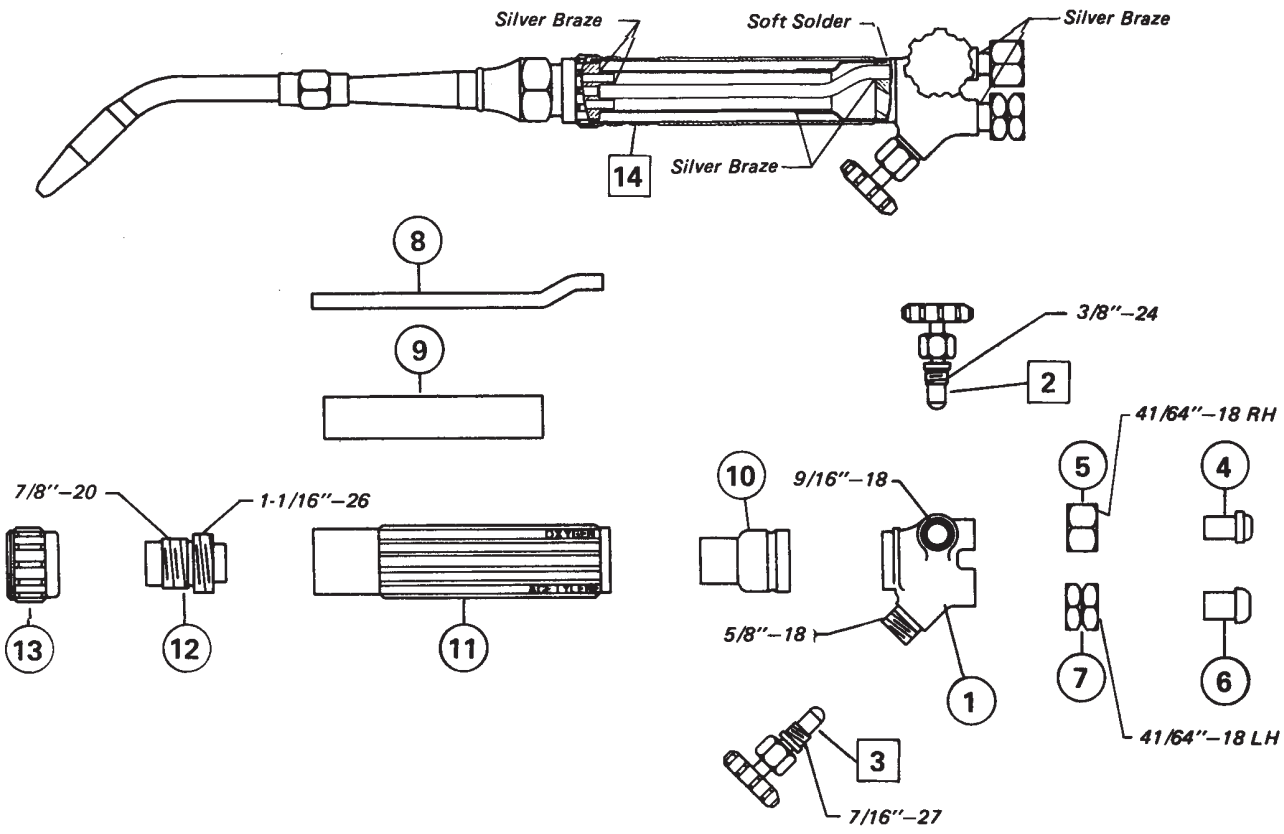


W-17 Welding Torch - P/N 4250

Parts which should always be replaced are indicated by ☐.

Item No.	Description	Part No.
1	BODY, Rear	100Z05
☐ 2	STEM ASSEMBLY, Oxy. Valve	54A82
☐ 3	STEM ASSEMBLY, F.G. Valve	54A91
4	CONNECTION, Oxy.	999083
5	CONNECTION, F.G.	999082
6	HANDLE	24Z69
7	BODY, Front	4266
8	TUBE, F.G.	4314
9	TUBE, Oxy	4313
11	SCREW, No. 6–32 x 1/4" (4)	61027849

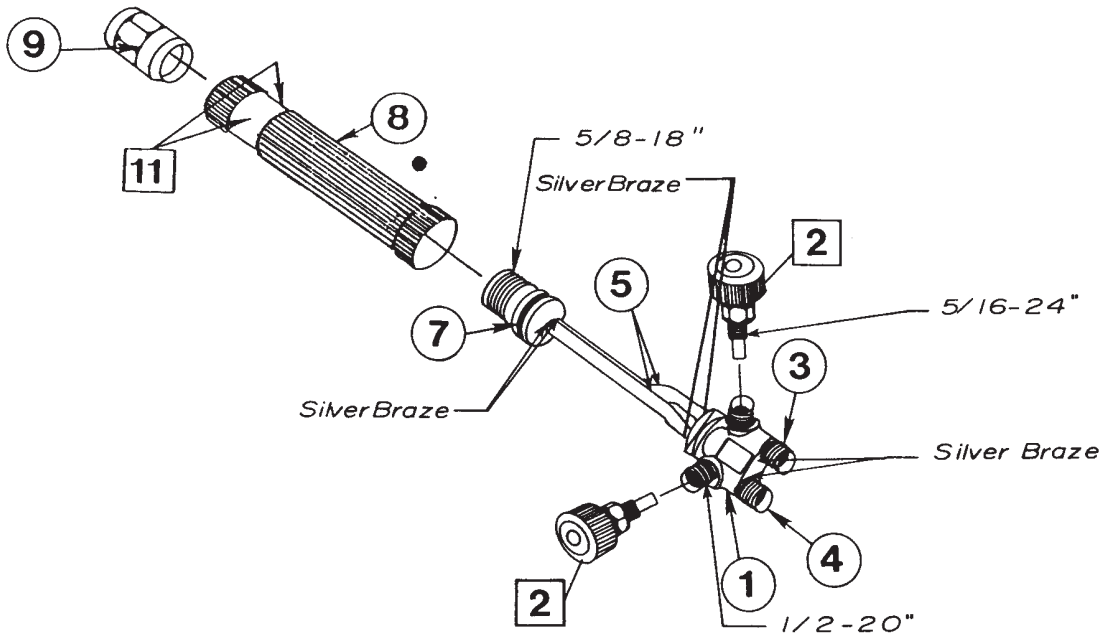
• Revised



W-24R Welding Torch - P/N 10A48 (Orig,); P/N 51F49 (Remanuf.)

Parts which should always be replaced are indicated by ☐.

Item No.	Description	Part No.
1	BODY, Rear	16A71
☐ 2	STEM ASSEMBLY, Oxy. Valve	54A90
☐ 3	STEM ASSEMBLY, F.G. Valve	54A91
4	NIPPLE, Oxy. Conn.	32A41
5	NUT, Oxy. Conn.	33A61
6	NIPPLE, F.G. Conn.	32A42
7	NUT, F.G. Conn..	33A64
8	TUBE, Oxy.	28A34
9	TUBE, F.G.	28A35
10	BUSHING	57A19
11	HANDLE.	30A81
12	BODY, Front	16A67
13	NUT, Retaining.	33A60
☐ 14	LABEL, Torch Ident..	995148

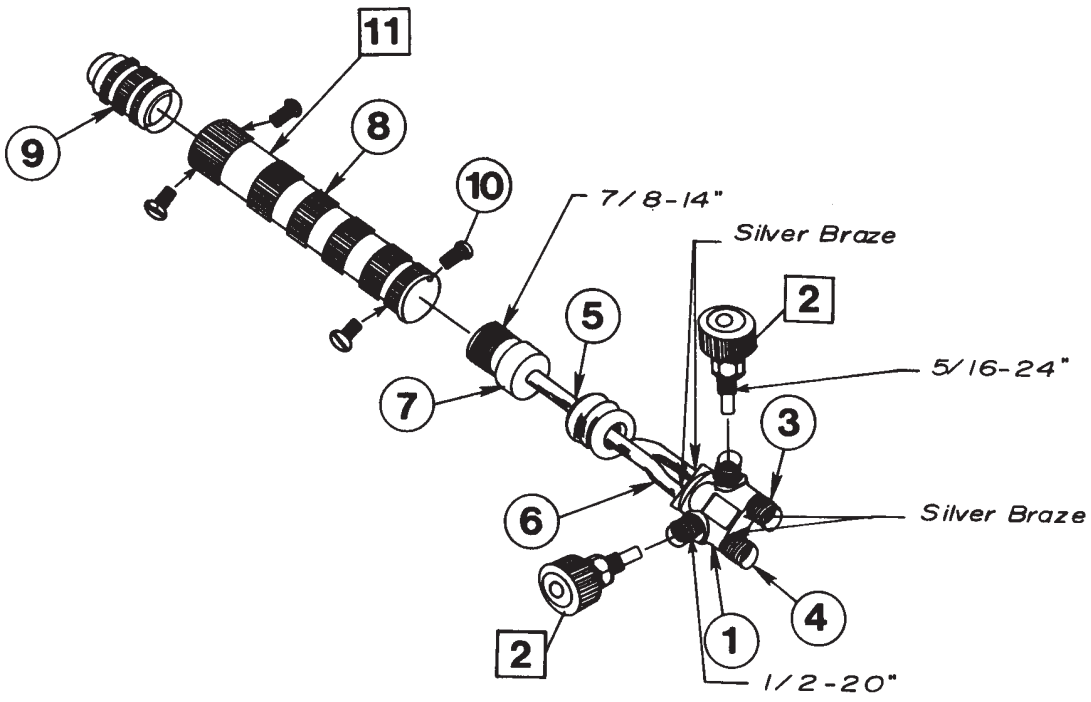


W-25 Welding Torch - P/N 18875

Parts which should always be replaced are indicated by □.

Item No.	Description	Part No.
1	BODY, Rear	999047
□ 2	STEM ASSEMBLY, Valve (2)	18710
3	CONNECTION, Oxy.	18K02
4	CONNENCTION, F.G.	18K03
5	TUBE (2)	18883
7	BODY, Front	18879
8	HANDLE	18878
9	NUT, Head Connecting	12K15
10	SCREW, No. 6-32 x 1/4" (4)	61027849
□ 11	DECAL	953658

• Revised

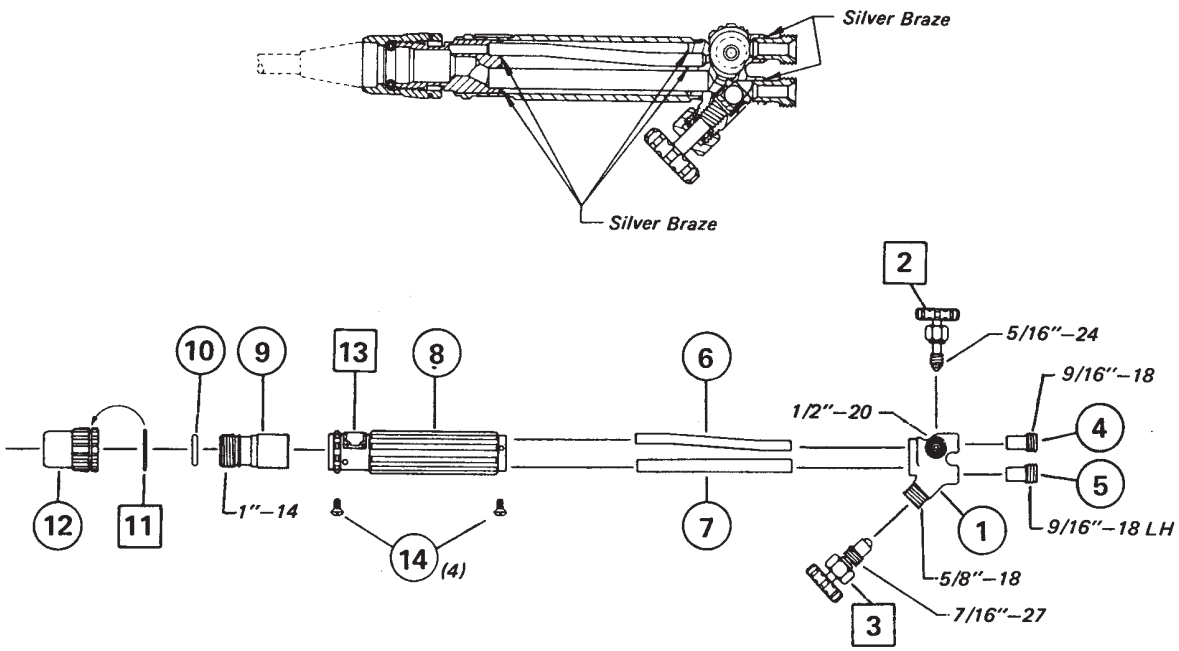


W-35 Welding Torch - P/N 18711

Parts which should always be replaced are indicated by ☐.

Item No.	Description	Part No.
1	BODY, Rear	999047
☐ 2	STEM ASSEMBLY, Valve (2)	18710
3	CONNECTION, Oxy.	18K02
4	CONNENCTION, F.G.	18K03
5	TUBE, Oxy.	05K13
6	TUBE, F.G.	05K09
7	BODY, Front	998575
8	HANDLE	18712
9	NUT, Head Connecting	18709
10	SCREW, No. 6-32 x 1 1/4" (4)	61027849
☐ 11	DECAL	953641

New Page



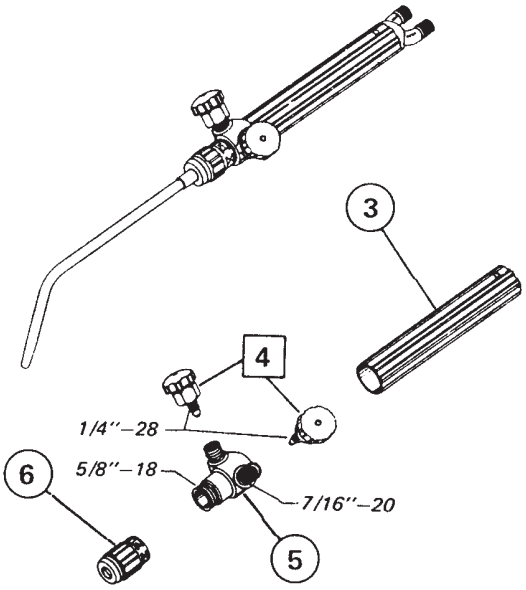
W-47 Welding Torch - P/N 639414 (Orig.); P/N 51F09 (Remanuf.)
Discontinued (Replaced by W-500) •

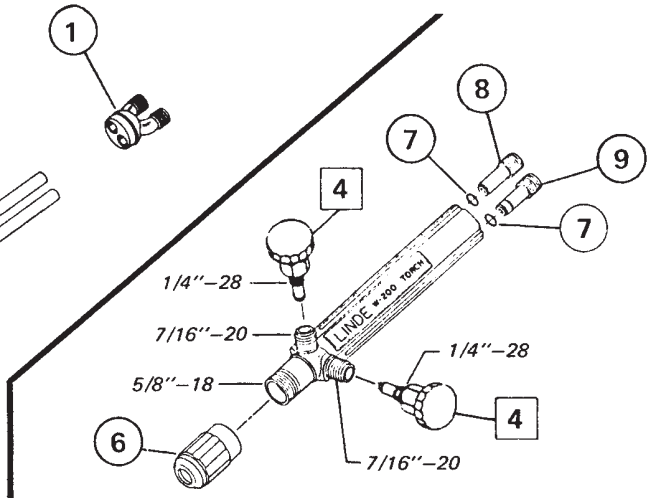
Parts which should always be replaced are indicated by □.

Item No.	Description	Part No.
1	.BODY, Rear	100Z05
□ 2	.STEM ASSEMBLY, Oxy. Valve	54A82
□ 3	.STEM ASSEMBLY, F.G. Valve	54A91
4	.CONNECTION, Oxy.	999083 •
5	.CONNECTION, F.G.	999082 •
6	.TUBE, Oxy.	47Z80
7	.TUBE, F.G.	47Z81
8	.HANDLE	124Z12
9	.BODY, Front	100Z02
10	.SPRING, Head Locking	29Z60
□ 11	.SPRING, Retaining	93Z23
12	.NUT, Head Connecting	136Z13
13	.LABEL, Torch Ident.	995087
14	.SCREW, No. 6–32 x 1/4" (4)	61027849

NOTE: W-47 torches (series 2) made in 1971 – 1973 were equipped with "packless" valve stem assemblies (P/N 133Y10 for oxygen; P/N 133Y11 for fuel gas). They are not interchangeable with the P/N 54A82 and P/N 54A91 assemblies. If necessary to replace the rear body, it must be replaced by P/N 100F05 which uses P/N's 54A82 and 54A91 valve stem assemblies as illustrated above.

• Revised





NOTE: Gas tubes are silver brazed to front and rear bodies using 13K36 solder ring for each joint. Handle is silver brazed to front and rear body using 13K31 solder ring.

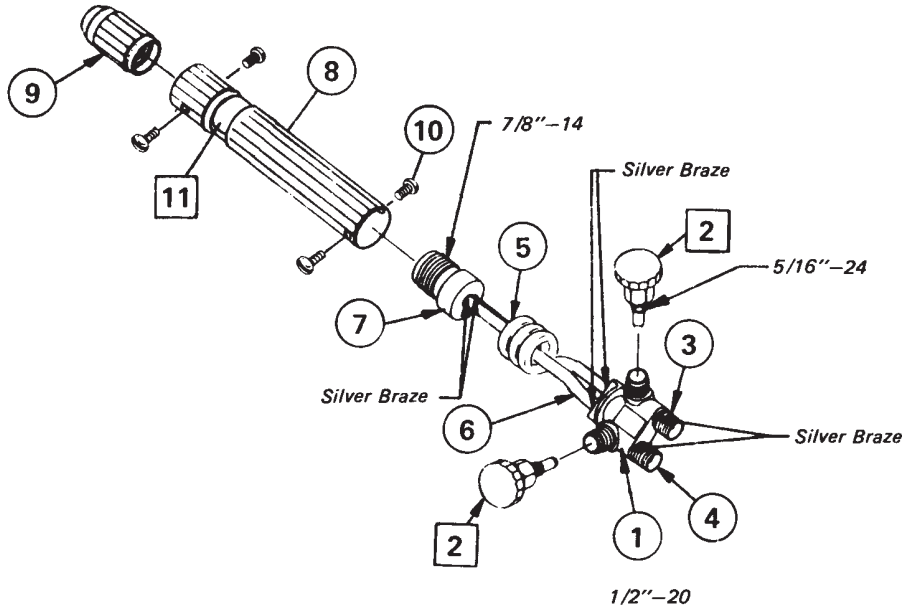
W-200 Welding Torch - P/N 03L25 (Replaced by 999805); P/N 50F91 (Remanuf.)

• W-200 Welding Torch - P/N 999805

Parts which should always be replaced are indicated by □.

	Item No.	Description	Part No.
	1	.BODY, Rear	04K41
	2	.TUBE, Gas (2)	05K31
	3	.HANDLE	06K03
□	4	.STEM ASSEMBLY, Valve	09M24
	5	.BODY, Front	998395•
	6	.NUT, Head Connecting	12K15
	7	.RING, Silver Braze	637713•
	8	.CONNECTION, Oxy	999803•
	9	.CONNECTION, F. G.	999804•

•Added/Revised



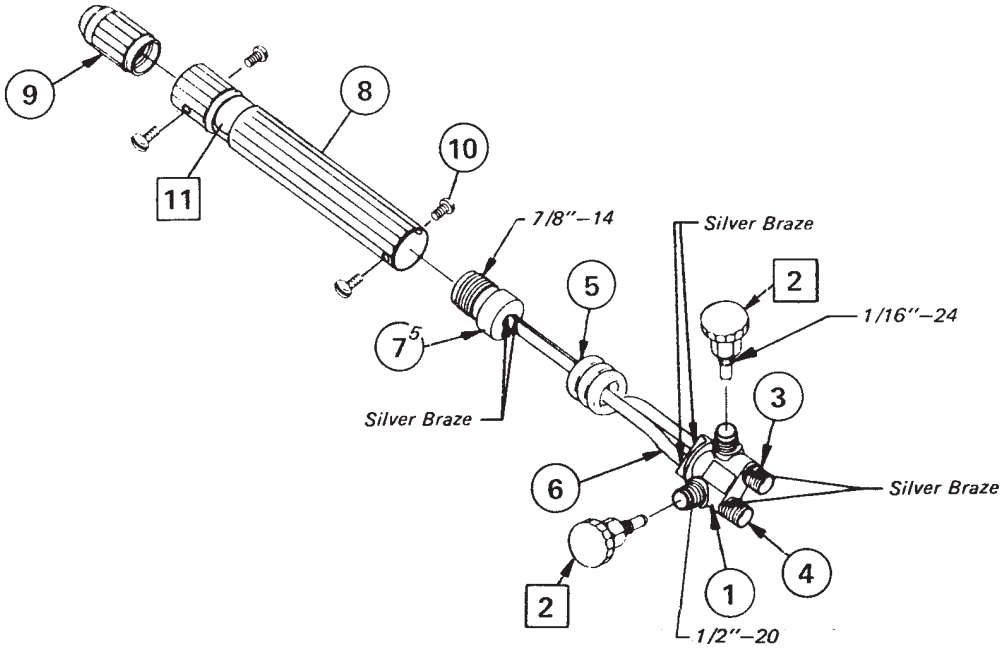
W-201 Welding Torch - P/N 03L13 (Orig,); P/N 50F89 (Remanuf.)

Parts which should always be replaced are indicated by ☐.

Item No.	Description	Part No.
1	BODY, Rear	998576*
☐ 2	STEM ASSEMBLY, Valve (2)	09M12
3	CONNECTION, Oxy.	18K02
4	CONNECTION, F.G.	18K03
5	TUBE, Oxy.	05K13
6	TUBE, F.G.	05K09
7	BODY, Front	998575*
8	HANDLE.	998578*
9	NUT, Head Connecting.	998580*
10	SCREW, No. 6–32 x 1/4" (4)	61027849
☐ 11	LABEL, Torch Ident.	995078

*Handle P/N 998578 has the scallop pattern of a W-17/W-47 torch handle which was implemented in manufacturing since early 1980. It cannot replace a handle on a prior manufactured torch which had a different scallop and slightly smaller I.D. The head connecting nut P/N 998580 has matching scallop pattern but it is interchangeable with the old nut. The following are the combination of parts used on older W-201 torches:

Rear Body – 04K14
Front Body – 04K15
Handle – 06K13
Nut – 12K10



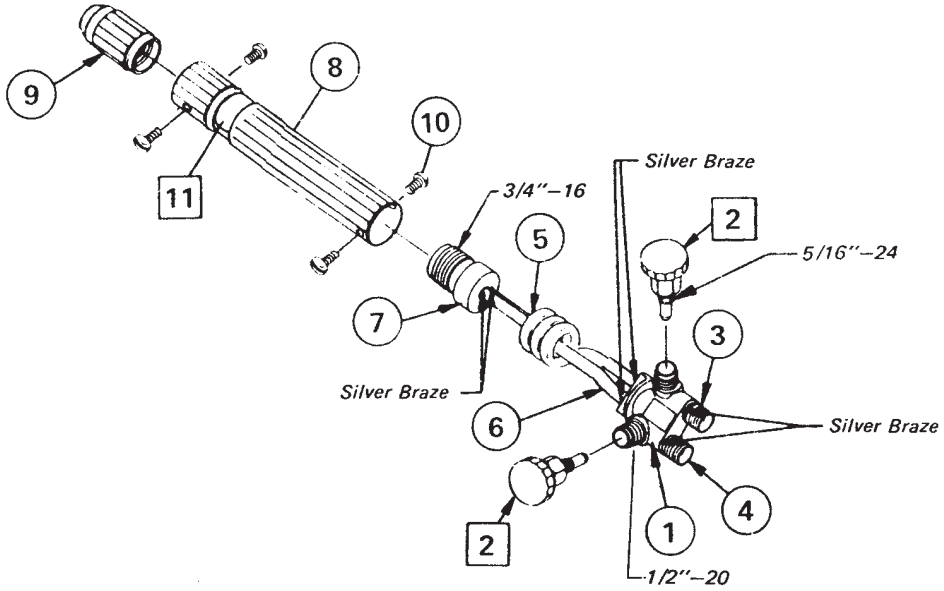
W-202 Welding Torch - P/N 03L16 (Orig,); P/N 51F33 (Remanuf.)

Parts which should always be replaced are indicated by ☐.

Item No.	Description	Part No.
1	BODY, Rear	998576*
☐ 2	STEM ASSEMBLY, Valve (2)	09M12
3	CONNECTION, Oxy.	18K02
4	CONNECTION, F.G.	18K03
5	TUBE, Oxy.	05K15
6	TUBE, F.G.	05K11
7	BODY, Front	998575*
8	HANDLE.	998579*
9	NUT, Head Connecting.	998580*
10	SCREW, No. 6–32 x 1/4" (4)	61027849
☐ 11	LABEL, Torch Ident.	995079

*Handle P/N 998579 has the scallop pattern of a W-17/W-47 torch handle which was implemented in manufacturing since early 1980. It cannot replace a handle on a prior manufactured torch which had a different scallop and slightly smaller I.D. The head connecting nut P/N 998580 has matching scallop pattern but it is interchangeable with the old nut. The following are the combination of parts used on older W-202 torches:

Rear Body – 04K14
Front Body – 04K15
Handle – 06K14
Nut – 12K10



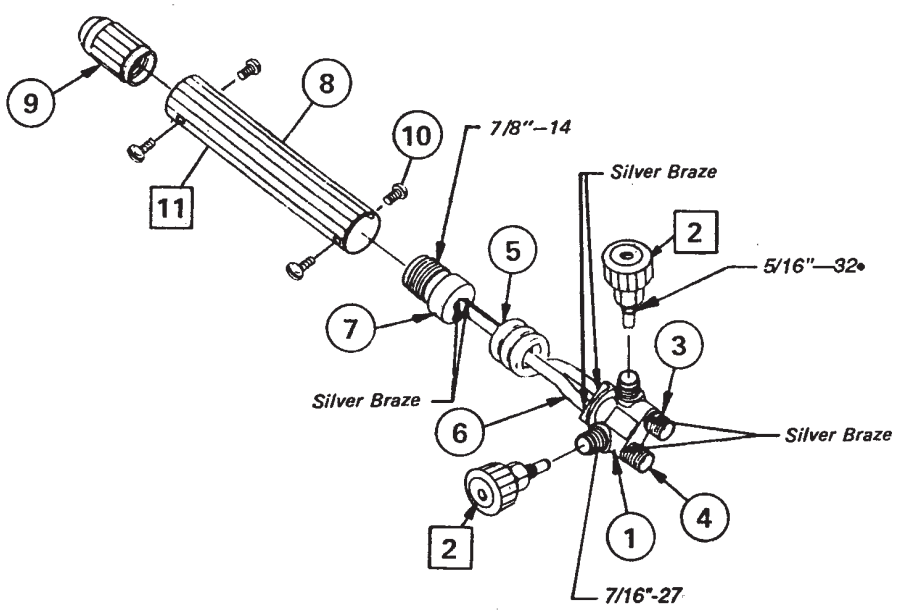
W-275 Welding Torch - P/N 03L27 (Discont.); P/N 50F92 (Remanuf.)

Parts which should always be replaced are indicated by ☐.

Item No.	Description	Part No.
1	BODY, Rear	04K14
☐ 2	STEM ASSEMBLY, Valve (2)	09M12
3	CONNECTION, Oxy.	18K02
4	CONNECTION, F.G.	18K03
5	TUBE, Oxy.	05K13
6	TUBE, F.G.	05K09
7	BODY, Front	Not Available•
8	HANDLE.	639379
9	NUT, Head Connecting.	12K20
10	SCREW, No. 6–32 x 1/4" (4)	61027849
☐ 11	LABEL, Torch Ident.	995080

NOTE: Handle, front and rear bodies, and gas tubes for the smaller original W-275 (made prior to 1971) are no longer available. These torches did use the same valve stems, connections, and head connecting nut as those listed above.

• Revised



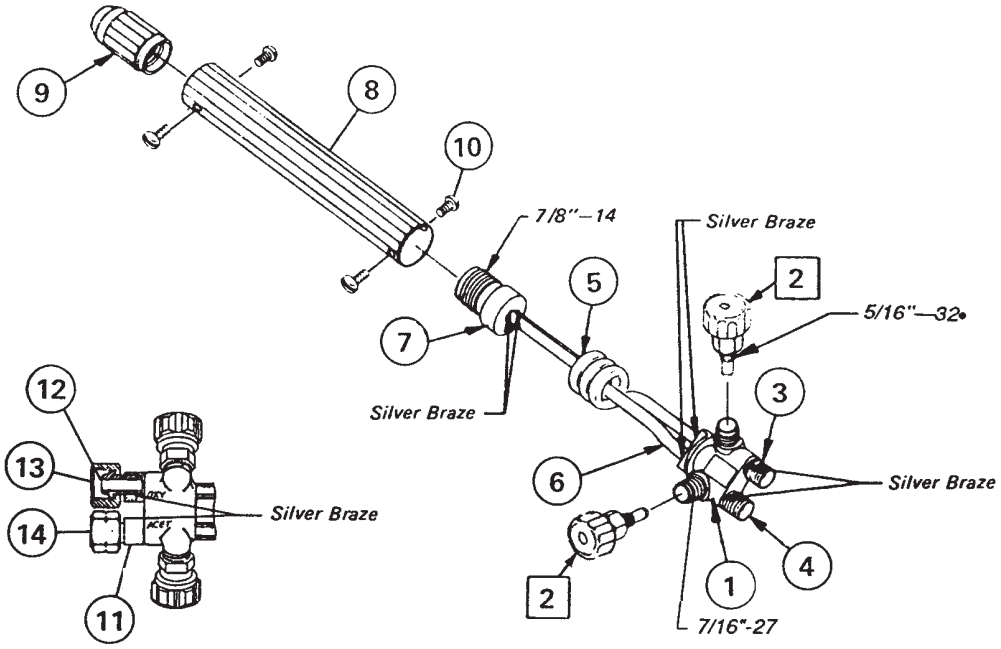
W-300 Welding Torch - P/N 999339
(Replaced W-201 Welding Torch)

Parts which should always be replaced are indicated by □.

	Item No.	Description	Part No.
	1	BODY, Rear	19844•
□	2	STEM ASSEMBLY, Valve (2)	18255•
	3	CONNECTION, Oxy.	18K02
	4	CONNECTION, F. G.	18K03
	5	TUBE, Oxy	05K13
	6	TUBE, F. G.	05K09
	7	BODY, Front	998575
	8	HANDLE	999338
	9	NUT, Head Connecting	998580
	10	SCREW, No. 6-32 x 1/4" (4)	61027849

• NOTE: Valve Stem P/N 18255 with 5/16"—32 threaded stem replaced P/N 999019, which had 5/16"— 24 threaded stem, for improved flow control in the 4th quarter, 1987. The two stems are not interchangeable. P/N 18255 is identified by having "32" stamped on the handwheel.

• Revised



W-400 Welding Torch - P/N 999045 (Replaced W-202)
W-400R Welding Torch - P/N 999833 (Discontinued)

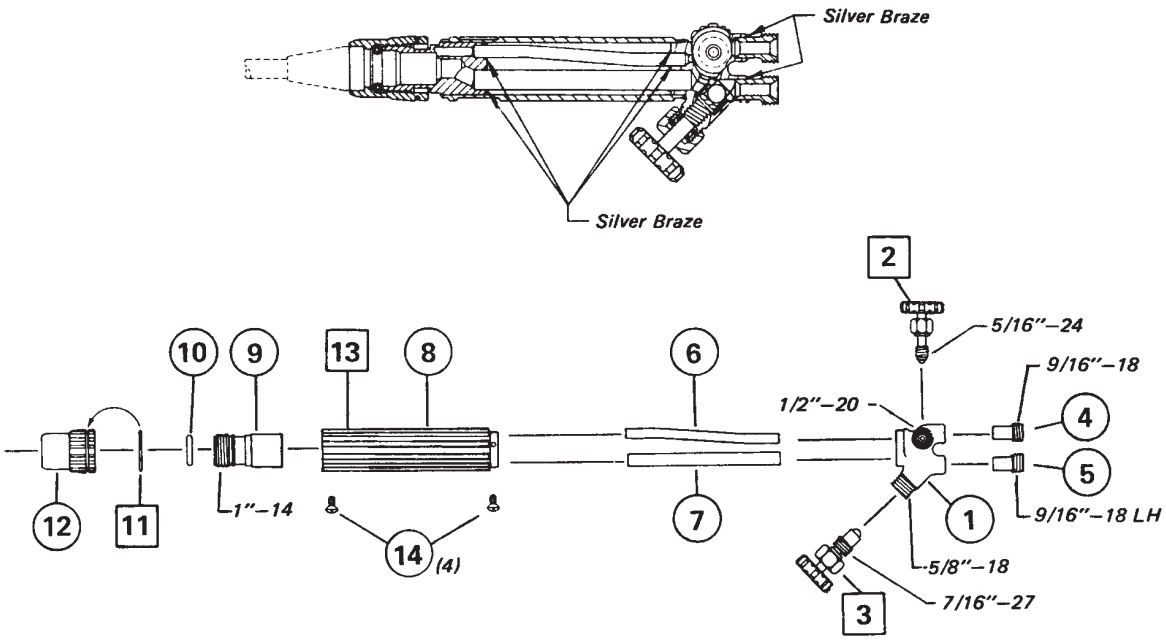
Parts which should always be replaced are indicated by ☐.

	Item No.	Description	Part No.
	1	BODY, Rear	19844•
☐	2	STEM ASSEMBLY, Valve (2)	18255•
	3	CONNECTION, Oxy. (W-400)	18K02
	4	CONNECTION, F.G. (W-400)	18K03
	5	TUBE, Oxy.	05K15
	6	TUBE, F. G.	05K11
	7	BODY, Front	998575

Item No.	Description	Part No.
8	HANDLE (W-400)	998954
	(W-400R)	999979
9	NUT, Head Connecting	998580
10	SCREW, No. 6—32 x 1/4" (4)	61027849
11	ADAPTOR (2) (W-400R)	999911
12	NIPPLE (2) (W-400R)	32A41
13	NUT, Oxy. (W-400R)	33A61
14	NUT, F. G. (W-400R)	33A64

• NOTE: Valve Stem P/N 18255 with 5/16"—32 threaded stem replaced P/N 999019, which had 5/16"— 24 threaded stem, for improved flow control in the 4th quarter, 1987. The two stems are not interchangeable. P/N 18255 is identified by having "32" stamped on the handwheel.

• Revised



W-500 Welding Torch - P/N 999079
(Replaced W-47 Torch)

Parts which should always be replaced are indicated by ☐.

Item No.	Description	Part No.
1	BODY, Rear	999081
☐ 2	STEM ASSEMBLY, Oxy. Valve	54A82
☐ 3	STEM ASSEMBLY, F.G. Valve	54A91
4	CONNECTION, Oxy.	999083
5	CONNECTION, F.G.	999082
6	TUBE, Oxy	999347
7	TUBE, F.G.	47Z81
8	HANDLE	999084
9	BODY, Front	999080
10	SPRING, Head Locking	29Z60
☐ 11	SPRING, Retaining	93Z23
12	NUT, Head Connecting	136Z13
14	SCREW, No. 6-32 x 1/4" (4)	61027849

WELDING & HEATING HEADS

TEST PROCEDURES AND SPECIFICATIONS

If one or more parts are replaced on a welding or heating head, it should be tested for flame appearance and stability, leakages, and flashback resistance as specified below using appropriate torch handle and oxy-fuel equipment. Testing should be performed by those familiar with precautions and safe practices of gas cylinder handling and operating gas regulating equipment.

EQUIPMENT & TEST SET-UP

The recommended set-up is shown schematically in Fig. 1. The basic requirement is to have a cylinder, regulator, and hose with proper fittings for each gas (oxygen and fuel gas) and the proper torch handle that the welding/heating head to be tested was designed to fit (W-17 head to the W-17 handle, etc.). The operating pressures given in the tables with the parts information of the heads are measured at the regulator using 25-ft. hose. Therefore, 25-ft. long hoses are recommended. Each hose should be 3/8-in. I.D. and the hose nipples should have at least a 1/4-in. I.D. orifice to minimize pressure drop through the hose. Two quick-closing shutoff valves are recommended at the torch connections so that gases can be quickly shutoff in the event of a flashback.

As noted in the schematic, flowmeters should be used since each head is designed for size marked in cubic feet per hour (cfh) of *acetylene* flow. For example, No. 55A is designed for 55 cfh of acetylene at a given operating pressure. On heads designed for fuel gases other than acetylene (Linde FG-2, propane, natural gas, etc.), the size indicates the approximate equivalent heating capacity in terms of acetylene flow. For exam-

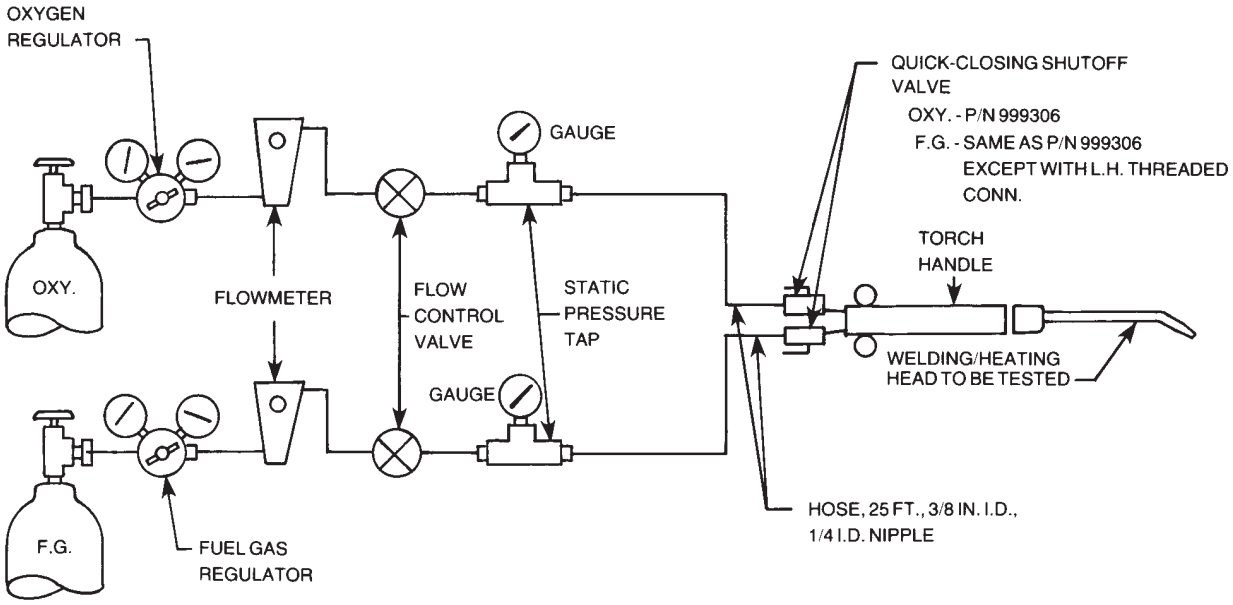


Fig. 1 - Welding/Heating Head Test Set-Up

ple, a No. 100A acetylene head and a No. 100FG fuel gas head have about the same nominal heating output (147,000 Btu/hr.); however, No. 100FG head requires 79 cfh of FG-2, 77 cfh of propane, or 127 cfh of natural gas. Flowmeters should have adequate flow capacity. Two or more different flowmeters may be required for each gas to handle the wide range of head sizes. The flow control valve and static pressure tap (1-in. tee or larger is recommended) should be large enough to prevent any flow restriction.

TESTING WELDING/HEATING HEAD:

With head connected to torch handle, proceed as follows:

1. Open both torch valves wide. Also open the quick-closing valves in the set up.
2. Adjust each regulator to the calibrated pressure of the flowmeter.
3. Crack open the fuel gas flowmeter control valve and light the gas at the tip of the welding/heating head with a friction lighter.
4. Then open the oxygen flowmeter control valve.
5. Adjust the fuel gas flowmeter valve and regulator pressure to the flow rate as size marked on the welding/heating head. (If you're testing a No. 6A head, set the acetylene flow rate to 6 cfh.)

   NOTE: If testing a head designed for fuel gases other than acetylene, then the flow rate should be the head size number times the following multiplying factor:

   Linde FG-2 — 0.62
   Propane — 0.57
   Natural — 1.47

6. Adjust oxygen flowmeter valve and oxygen regulator pressure until you obtain a neutral flame. If testing an acetylene head, the oxygen flow rate should be approximately 1.1 greater than the acetylene flow rate (e.g., 6.6 cfh oxygen: 6 cfh acetylene on a No. 6A head).

   NOTE: On fuel gas heads other than acetylene, there is no distinct neutral flame. The oxygen flow rate, however, should be as follows:

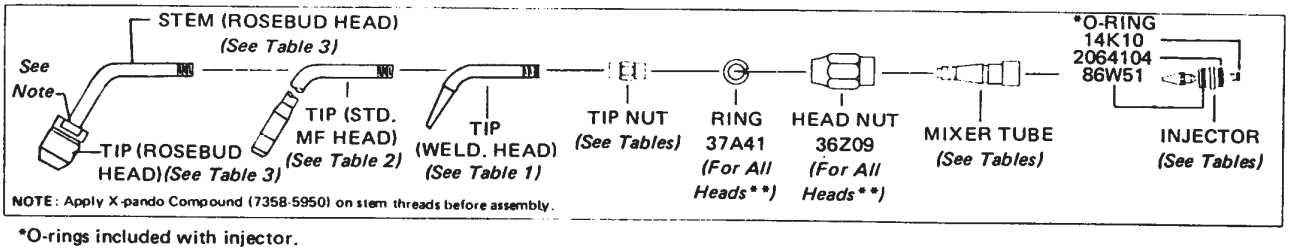
   3.2 x Linde FG-2 flow rate
   or 3.5 x propane flow rate
   or 1.7 x natural gas flow rate.

7. After flows have been adjusted, check for following:

   a. Pressure at each pressure tap should be within the range given in the table.
   b. Flame should be stable and uniform. There should be no bushiness, flickering, popping, etc. If testing multiflame head, flame appearance and length should all be uniform.
   c. Check joints with Leak Test Solution (998771). Joints should be bubble tight. Constant popping noise indicates leakage past the mixer seats (replace O-rings).
   d. Using a flashback test block (73110423) pop the flame(s) about 10 times in about 5 seconds. No flashback should occur. If it does occur, **immediately** close the quick-closing vlaves.

8. Increase the oxygen flow rate by about 10% to produce an "oxidizing" flame. Flame(s) should remain stable and uniform.
9. Increase both oxygen and fuel gas about 20% above the neutral conditions of step 7. Flame(s) should be much harsher but should remain stable and uniform.
10. Decrease both oxygen and fuel gas to about 20% below the neutral conditions of step 7. The flame(s) should be much softer and should remain stable and uniform.

W-17 WELDING AND HEATING HEADS



*O-rings included with injector.

**Except rosebud head assemblies 998822, 998823, and 998234 use head nut 998787 and retaining ring 998553.

Table 1 - Single-Flame Acetylene Welding Heads

Welding Head Assembly Size	Part No.	Oxygen Pressure psi ■	Replacement Parts: Tip (Plated) ♦	Tip (Unplated)	Tip Nut	Mixer Tube	Injector	Cleaning Drill (Size No.) for Tip	for Injector	Tip Extension (Accessory) Length	Part No.
4A	639865	7-18	639873	639684		16Z26	01Z06	64	79		
6A	639866	8-20	639874	639685		16Z27	01Z07	58	77		
9A	639867	10-24	639875	639686	639870	16Z28	01Z08	55	75		
12A	17270	10-25	17267	17266		16Z29	01Z09	54	73		
15A	639868	11-26	639876	639687		16Z30	01Z10	53	71		
30A	639869	18-29	998848	—	998847	16Z32	01Z12	45	65		
55A	998101	25-39	998064	998060	639969	639971	01Z14	33	59	12-in.	19X42
70A	998102	22-30	998065	998061	639969	639972	01Z15	30	57		
100A	10X03	45-55	64Z20	998062	33A59	16Z54	10Z21	25	56	15-in.	19X43
150A	10X05	50-60	64Z22	—	33A58	16Z56	01Z23	17	54	18-in.	19X44
250A	10X07	70-80	12Z80	—	33A63	16Z58	01Z25	1/4-in.	52	21-in.	19X45

■ Acetylene pressure is 1/2 to 5 psi.

♦ Chrome-plated tips are supplied with all welding head assemblies.

Table 2 - Standard Multiflame Heating Heads

Heating Head Assembly Size	Part No.	Oxygen Pressure, psi ■	Replacement Parts: Tip • (Plated)	Tip (Unplated)	Tip Nut	Mixer Tube	Injector	Tip Cleaning No. of Holes	Drill Size	Injector Cleaning Drill Size	Tip Extension (Accessory) Length	Part No.
For Acetylene Use												
70 A	998047	22 - 30	998046	998071	639969	639972	01Z15	7	56	57	12-in.	19X42
100 A	11X22	45 - 55	12Y35	998072	33A59	16Z54	01Z21	8	55	56	15-in.	19X43
150 A	11X24	50 - 60	12Y37	998073	33A58	16Z56	01Z23	12	55	54	18-in.	19X44
250 A	11X26	70 - 80	12Y44	----	33A63	16Z58	01Z25	20	55	52	21-in.	19X45
For FG-2 Use												
70 FG	998038	33 - 70	998037	998078	639969	639972	01Z25	7	54	52	12-in.	19X42
100 FG-2	998281	34 - 88	12Y56	998079	33A59	16Z54	01Z25	8	48	52	15-in.	19X43
150 FG-2	998265	32 - 70	12Y58	998036	33A58	16Z56	998286	12	48	46	18-in.	19X44
For Fuel Gases Other Than Acetylene & FG-2												
70 FG	998038	33 - 70	998037	998078	639969	639972	01Z25	7	54	52	12-in.	19X42
100 FG	11X32	45 - 55	12Y56	998079	33A59	16Z54	01Z21	8	48	56	15-in.	19X43
150 FG	11X34	50 - 60	12Y58	998036	33A58	16Z56	01Z23	12	48	54	18-in.	19X44
250 FG	11X36	70 - 80	12Y60	----	33A63	16Z58	01Z99	20	48	50	21-in.	19X45

■ Fuel Gas pressure is 1/2 to 5 psi.

• Chrome-plated tips supplied with all heating head assemblies.

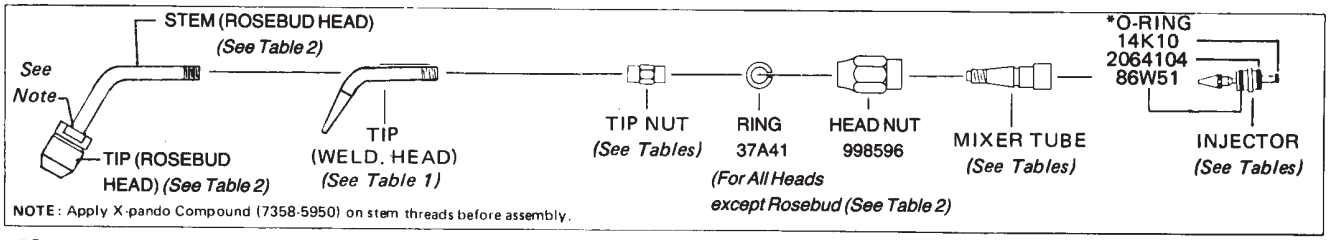
Table 3 - Rosebud-Style Multiflame Heating Heads

Heating Head Assembly		Operating Pressure		Replacement Parts					Tip Cleaning		Injector Cleaning	Tip Extension (Accessory)	
Size	Part No.	Oxygen	Fuel Gas	Tip Ass'y	Stem	Tip Nut	Mixer Tube	Injector	No. of Holes	Drill Size	Drill Size	Length	Part No.
For Acetylene Use													
55 O-A	998819	35 - 40	1/2 - 5	998797	998792	639969	639971	01Z14	9	61	59	12-in.	19X42
70 O-A	998820	45 - 50	1/2 - 5	998798	998792	639969	639972	01Z15	9	57	57	12-in.	19X42
100 O-A	998821	55 - 60	1/2 - 5	998799	998793	33A59	16Z54	01Z21	13	57	56	15-in.	19X43
200 O-A	998822	15 - 20	9 - 12	998800	998794	----	998830	998832	16	54	47	18-in.	998790†
250 O-A	998823	20 - 25	12 - 14	998827	998826	----	998831	998832	16	53	47	21-in.	998825†
For Fuel Gases Other Than Acetylene													
70 O-FG	999232	40 - 45	1/2 - 5	999224	998792	639969	639972	01Z23	8	51	54	12-in.	19X42
100 O-FG	999233	50 - 70	1/2 - 5	999227	998793	639969	16Z54	01Z99	8	52	56	15-in.	19X43
200 O-FG	999234	30 - 55	6 - 11	999230	998794	----	998830	998832	21	52	47	18-in.	998790†

*Tip only. Requires adaptor 639192 to complete tip assembly.

†This stainless steel extension requires coupling (998839 for No. 200; 998839 for No. 250).

W-24R WELDING AND HEATING HEADS



*O-rings included with injector.

**Except rosebud head assemblies 998822, 998823, and 998234 use head nut 998787 and retaining ring 998553.

Table 1 - Single-Flame Acetylene Welding Heads

Welding Head Assembly		Oxygen Pressure	Replacement Parts					Cleaning Drill (Size No.)		Tip Extension (Accessory)	
Size	Part No.	psi■	Tip (Plated) ◆	Tip (Unplated)	Tip Nut	Mixer Tube	Injector	for Tip	for Injector	Length	Part No.
4 A	639974	7-18	639873	639684		16Z26	01Z06	64	79	----	----
6 A	639975	8-20	639874	639685		16Z27	01Z07	58	77	----	----
9 A	639976	10-24	639875	639686	639870	16Z28	01Z08	55	75	----	----
12 A	17271	11-25	17267	17266		16Z29	01Z09	54	73	----	----
15 A	639977	11-26	639876	639687		16Z30	01Z10	53	71	----	----
30 A	639978	18-29	998848	----	998847	16Z32	01Z12	44	65		
55 A	639979	25-39	998064	998060	639969	639971	01Z14	33	59	1/2-in.	19X42
70 A	639981	22-30	998065	998061	639969	639972	01Z15	30	67		
100 A	11X71	45-55	64Z20	998062	33A59	16Z54	01Z21	25	56	15-in.	19X43
150 A	11X73	50-60	64Z22	----	33A58	16Z56	01Z23	17	54	18-in.	19X44
250 A	11X75	70-80	12Z80	----	33A63	16Z58	01Z25	1/4-in.	52	21-in.	19X45

■ Acetylene pressure is 1/2 to 5 psi.

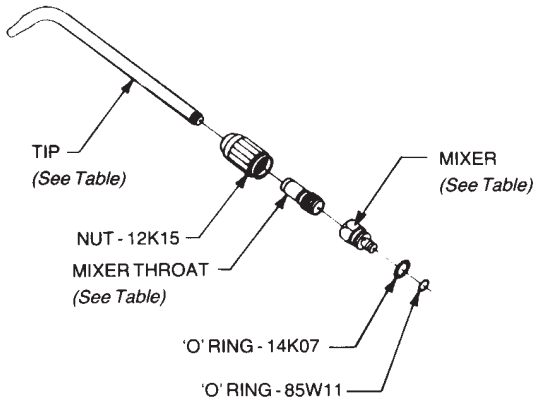
◆ Chrome-plated tips are supplied with all welding head assemblies.

Table 2 - Rosebud Style Heating Heads

Complete Head Assembly		Pressure, psig			Replacement Parts						Tip Extension (Accessory)		Tip Cleaning Drill Size
Size	Part No.	Oxy.	Fuel Gas	No. of Flames	Tip Assy.	Stem	Mixer Tube	Injector or Mixer	Head Nut	Retain. Ring	Length	P/N	
For Oxy-Acetylene Use													
100 O-A	999842	55-60	1/2-5	12	998799	998793	16Z54	01Z21	998596	37A41	15-in.	19X43	57
200 O-A	999844	15-20	9-12	16	998800	998794	998830	998832	999910	998553	18-in.	998790*	54
For Oxy-Fuel Gas - LINDE FG-2, propane, natural gas etc.													
100 O-FG	999843	50-70	1/2-5	8	999227	998793	16Z54	01Z99	998596	37A41	15-in.	19X43	49
200 O-FG	999845	30-55	6-11	21	999230	998794	998830	998832	999910	998553	18-in.	998790*	52

*Requires extension coupling 998838.

W-200 WELDING AND HEATING HEADS



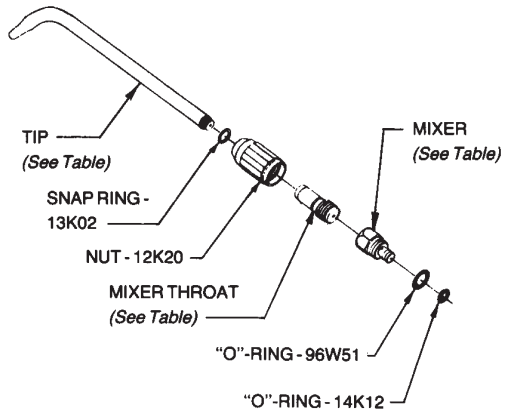
W-200 Acetylene Welding and Heating Heads

These heads may be used with other fuel gases for brazing.

Complete Head Assembly			Pressure, psig				Replacement Parts (See Parts Illustration)			Tip Cleaning Drill Size
			Oxy-Acetylene		Oxy-Fuel Gas■					
Size	Part No.		Oxy	Acet.	Oxy	F.G.	Tip	Mixer Throat	Mixer	
Single-Flame Welding Heads										
1	06L46						25K25	21K65	22K44	78
2	06L47						25K26	21K65	22K44	74
4	06L48						25K27	21K65	22K45	64
6	06L49		6 - 7	6 - 7	7 - 9	3 - 4	25K28	21K65	22K46	58
9	06L50						25K29	21K66	22K47	55
15	06L52						25K31	21K68	22K49	53
30	06L54						25K33	21K70	22K51	45
Multi-Flame Heating Heads										
15	07L13	8 flames	7 - 9	7 - 9	8 - 10	4 - 5	03M50	21K68	22K49	75
30	07L15						03M52	21K70	22K51	69
Twin-Flame Head										
40	07L18	2 flames	10 - 11	10 - 11	11 - 12	5 - 6	04M13	21K72	22K64	73

■ LINDE FG-2, MAPP, or propane. Natural gas is not recommended.

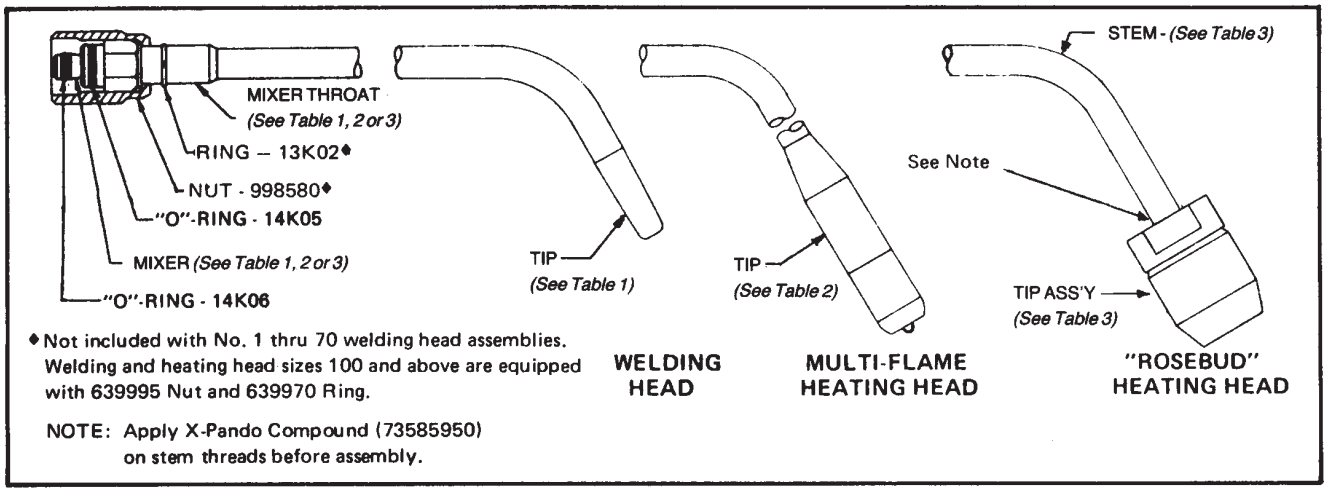
W-275 WELDING AND HEATING HEADS



W-275 Welding and Heating Heads

Complete Head Assembly		Replacement Parts			Accessories		Cleaning Drill Size		
					Tip			Mixer	
Size	Part No.	Tip (Unplated)	Mixer Throat	Mixer	(Chrome-Plated)	Tip Extension	Tip	Center Orifice	Outside Orifices
Single-Flame Acetylene Welding Heads									
1 A	639445	639682	----	639890	----	----	78	80	77
2 A	639446	639683	----	639890	----	----	72	80	77
4 A	639447	639684	----	639891	639873	----	64	76	75
6 A	639448	639685	----	639892	639874	----	58	73	77
9 A	639449	639686	----	639893	639875	----	55	69	74
15 A	639450	639687	639693	639429	639876	----	53	66	72
30 A	639451	639688	639694	639430	639877	----	45	53	61
55 A	06L66	998060	21K77	22K71	998064	19X42 (12")	33	45	52
70 A	06L67	998061	21K78	22K72	998065	19X42 (12")	30	41	52
Multi-Flame Acetylene Heating Heads									
15 A	07L20	03M59	639693	639429	----	----	59 (7 holes)	66	72
30 A	07L21	03M60	639694	639430	----	----	56 (7 holes)	53	61
55 A	07L22	03M61	21K77	22K71	----	19X42 (12")	55 (8 holes)	45	52
70 A	07L23	03M62	21K78	22K72	998046	19X42 (12")	55 (12 holes)	41	52

W-300/W-400 (W-201/W-202) WELDING AND HEATING HEADS



♦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 (73585950) on stem threads before assembly.

Table 1 - W-300 & W-400 Acetylene Welding Heads (Single-Flame)

Size	Complete Head Assembly Part No. with Plated Tip	Complete Head Assembly Part No. with Unplated Tip	Pressure, psig Oxy.	Pressure, psig Acet.	Replacement Parts Tip (Chrome-Plated)	Replacement Parts Tip (Unplated)	Replacement Parts Mixer Throat	Replacement Parts Mixer	Accessory Tip Extension	Tip Cleaning Drill Size
1A	999031	639438			999032	639682	—	639885	—	78
2A	999033	539439			999034	639683	—	639885	—	72
4A	999035	639440	5-8	5-8	639873	639684	—	639886	—	64
6A	999036	639441			639874	639685	—	639887	—	58
9A	999037	639442			639875	639686	17513●	19484●	—	55
12A	17269	17268			17267	17266	17513	17514	—	54
15A	999038	639443			639876	639687	639693	639436	—	53
30A	17282	17263			998848	17261	17262	639437	—	45
55A	999040	998085	7-9	7-9	998064	998060	21K77	639965	19X42 (12")	33
70A	999041	998086			998065	998061	21K78	639966	19X42 (12")	30
100A	999042	998087			64Z20	998062	639993	639992	19X43 (15")	25

●Revised

Table 2 - W-300 & W-400 Standard Multiflame Heating Heads

Complete Head Assembly		Pressure, psig			Replacement Parts			Accessories		Tip Clean, Drill Size
Size	Part No.	Oxy.	Fuel Gas	No. of Flames	Tip (Unplated)	Mixer Throat	Mixer	Tip (Chrome-plated)	Tip Extension	
For Oxy-Acetylene Use .										
55A	998089	7-9	7-9	7	998070	21K77	639965	---	19X42 (12")	59
70A	998090	7-9	7-9	7	998071	21K78	639966	998046	19X42 (12")	56
100A	998091	10-12●	10-12●	8	998072	639993	639992	12Y35	19X43 (15")	55
150A	998092	12-14●	12-14●	12	998073	639994	639992	12Y37	19X44 (18")	55
For Oxy-Fuel Gas Use - LINDE FG-2, propane, natural gas, etc.										
70FG	998093	16-20	7-10	7	998078	21K78	639966	998037	19X42 (12")	54
100FG	998278	35-39	7-10	8	998079	998035	998034	12Y56	19X43 (15")	48
150FG	998276	30-35	7-10	12	998036	639994	639992	12Y58	19X44 (18")	48

Table 3 - W-300 & W-400 Rosebud Style Multiflame Heating Heads

Complete Head Assembly		Pressure, psig			Replacement Parts						Tip Extension (Accessory)		Tip Cleaning Drill Size
Size	Part No.	Oxy.	Fuel Gas	No. of Flames	Tip Assy.	Stem	Mixer Throat	Mixer	Conn. Nut	Retain. Ring	Length	P/N	
For Oxy-Acetylene Use													
15 O-A	998773	5-8	5-8	6	998795	998791	639693	639436	998580	13K02	----	----	70
30 O-A	998774	5-8	5-8	6	998796	998791	639694	639437	998580	13K02	----	----	62
55 O-A	998775	7-9	7-9	9	998797	998792	21K77	639965	998580	13K02	12-in.	19X42	61
70 O-A	998776	7-9	7-9	9	998798	998792	21K78	639966	998580	13K02	12-in.	19X42	57
100 O-A	998777	13-16	8-10	13	998799	998793	639993	639992	639995	639970	15-in.	19X43	57
200 O-A	998778	19-22	11-14	16	998800	998794	998779	998780	639995	639970	18-in.	998790♦	54
For Oxy-Fuel Gas Use - LINDE FG-2, propane, nautral gas, etc.													
70 O-FG	999225	13-24	6-13	8	999224	998792	21K78	639966	998580	13K02	12-in.	19X42	49
100 O-FG	999228	18-31	8-15	8	999227	998793	998035	998034	639995	639970	15-in.	19X43	49
200 O-FG	999231	38-60●	9-17	24	999230	998794	998045	22K39	639995	639970	18-in.	998790♦	52

♦ Requires extension coupling 998838.

●Revised

W-500 (W-47) WELDING AND HEATING HEADS

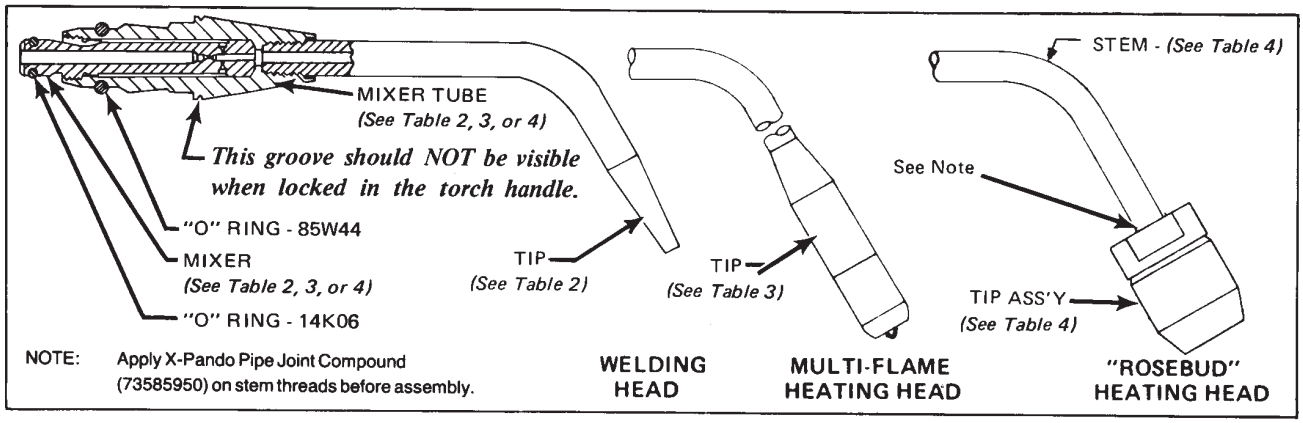


Table 1 - W-500 Acetylene Welding Heads (Single-Flame)

Complete Head Assembly		Pressure, psig		Replacement Parts Tip			Accessories		Tip Cleaning Drill Size
Size	Part No.	Oxygen	Acetylene	(Chrome-Plated)	Mixer Tube	Mixer	Tip (Unplated)	Tip Extension	
4A	639880	5	5	639873	639878	02Z53	639684	----	64
6A	639881			639874		02Z54	639685	----	58
9A	639882			639875		02Z55	639686	----	55
15A	639883			639876		02Z57	639687	----	53
30A	639884			639877		639973	639688	----	45
55A	998115	5	5	998064	116Z04	02Z61	998060	19X42 (12")	33
70A	998116			998065		02Z62	998061	19X42 (12")	30
100A	10X64	7	5	64Z20	116Z06	02Z64	998062	19X43 (15")	25
150A	10X68	12	6	64Z22	116Z08	02Z66	----	19X44 (18")	17
300A	10X76	28	10	64Z30	116Z12	02Z69	----	19X45 (21")	1/4"

Table 2 - W-500 Standard Multi-flame Heating Heads

Complete Head Assembly		Pressure, psig			Avg. Heat Output	Replacement Parts Tip			Accessories		Tip Cleaning Drill Size
Size	Part No.	Oxy.	Fuel Gas	No. of Flames	Btu/hr.	(Chrome-plated)	Mixer Tube	Mixer	Tip (Unplated)	Tip Extension	
For Oxy-Acetylene Use											
100A	10X85	8	6	8	147,000	12Y35	116Z06	02Z64	998072	19X43 (15")	55
150A	10X88	12	7	12	220,000	12Y37	116Z08	02Z66	998073	19X44 (18")	55
300A	10X91	30	11	24	441,000	12Y45	116Z12	02Z69	----	19X45 (21")	55
For Oxy-Fuel Gas Use - LINDE FG-2, propane, natural gas, etc.											
100FG	11X03	11	10	8	147,000	12Y56	116Z06	998034	998079	19X43 (15")	48
150FG	11X05	21	11	12	220,000	12Y58	116Z08	639992	998036	19X44 (18")	48
300FG	11X08	48	20	24	441,000	12Y61	116Z12	02Z89	----	19X45 (21")	48

Table 3 - Rosebud Style Multi-flame Heating Heads

Complete Head Assembly		Pressure, psig			Avg. Heat	Replacement Parts				Tip Extension (Accessory)		Tip Cleaning
Size	Part No.	Oxy.	Fuel Gas	No. of Flames	Output Btu/hr.	Tip Assy.	Stem	Mixer Tube	Mixer	Length	P/N	Drill Size
For Oxy-Acetylene Use												
55 O-A	998833	6-8	4-6	9	81,000	998797	998792	116Z04	02Z61	12-in.	19X42	61
70 O-A	998834	7-9	5-7	9	103,000	998798	998792	116Z04	02Z62	12-in.	19X42	57
100 O-A	998835	8-12	5-7	13	147,000	998799	998793	116Z06	02Z64	15-in.	19X43	57
200 O-A	998836	14-19	9-11	16	294,000	998800	998794	116Z08	998788	18-in.	998790 ◆	54
250 O-A	998837	18-24	9-11	16	368,000	998827	998826	116Z12	998789	21-in.	998825 ◆	53
For Oxy-Fuel Gas Use - LINDE FG-2, propane, natural gas, etc.												
100 O-FG	999235	17-22	8-15	8	148,000	999227	998793	116Z06	02Z93	15-in.	19X43	49
200 O-FG	999236	30-50	10-20	24	297,000	999230	998794	116Z08	02Z95	18-in.	998790 ◆	52
300 O-FG	999087■	40-65	8-15	23	441,000	999093	999095	999089	02Z89	21-in.	998825 ◆	51
500 O-FG	999088■	75-90	20-30	29	735,000	999094	999095	999089	999090	21-in.	998825 ◆	51

◆Requires extension coupling (998838 for No. 200; 998839 for No. 250, 300, and 500).
■ Assembly includes captive connecting nut (999101) and retaining ring (999102).