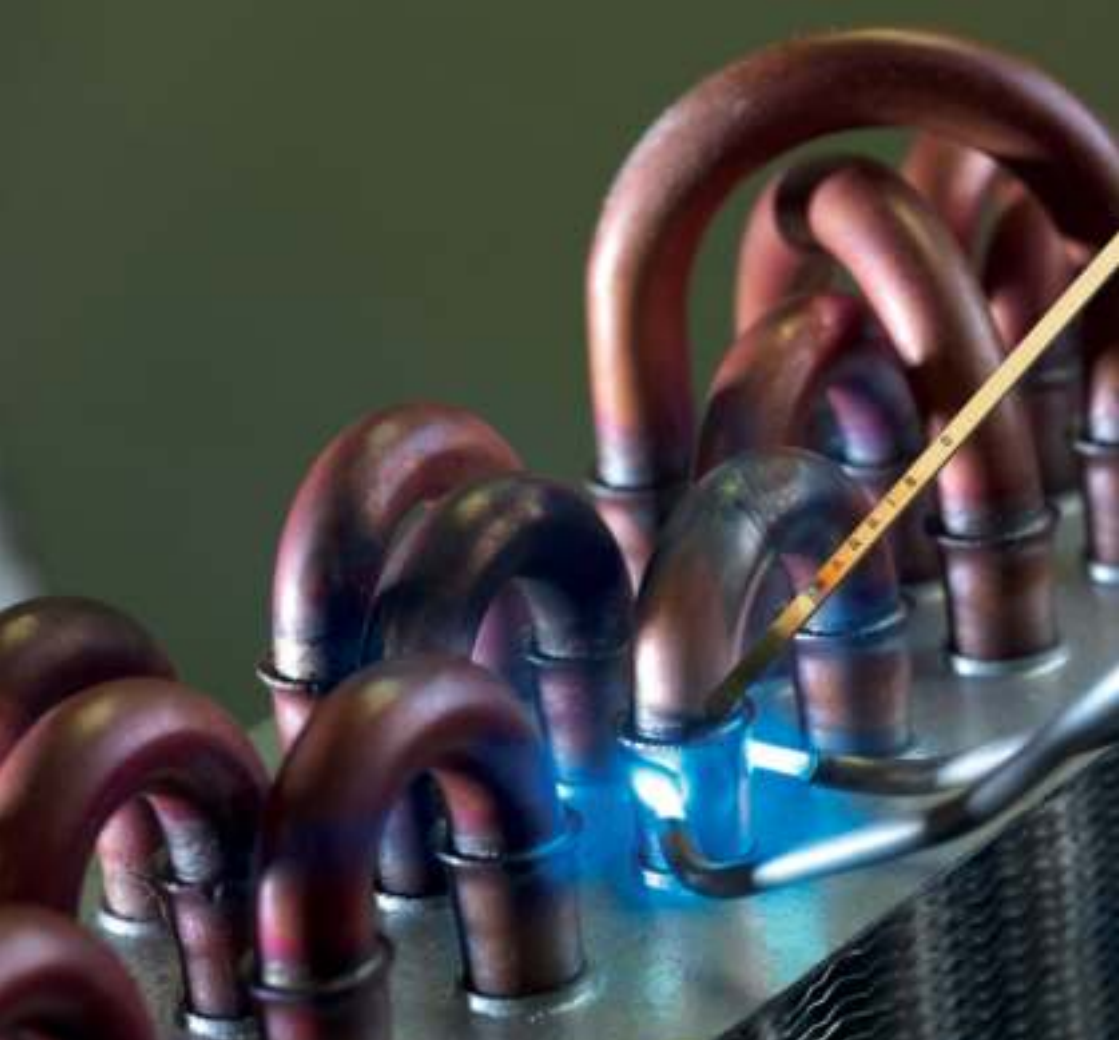




INTERNATIONAL GUIDE



A LINCOLN ELECTRIC COMPANY

Brazing & Soldering



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*Full offer of Harris Equipment available
in International Equipment Catalogue
or on www.harrisproductsgroup.com

Troubleshooting

75



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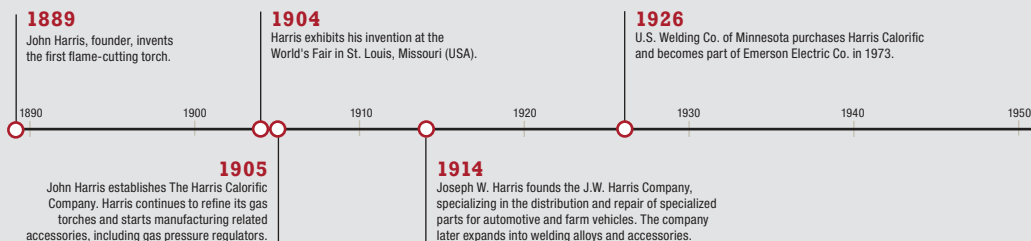
The Harris Products Group was formed by combining two strong names in the welding business - Harris Calorific and J.W. Harris. The Harris Products Group is a world leader in metalworking products used in the brazing, soldering, welding, cutting and gas distribution industries. The combined company offers excellence in the manufacture of:

- Gas welding and cutting equipment
- Industrial and specialty gas regulation equipment
- Brazing and soldering alloys
- Welding alloys
- Pre-formed bends, rings and return bends



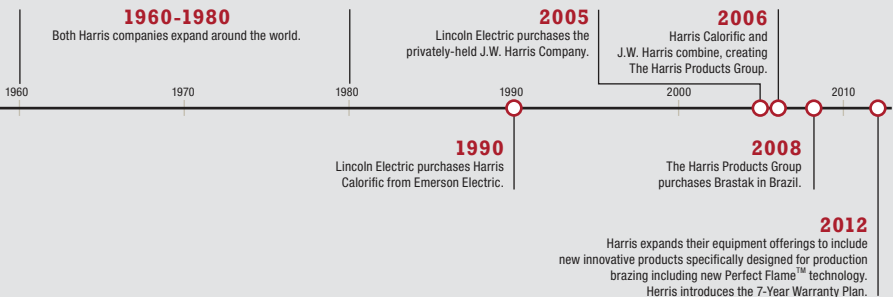
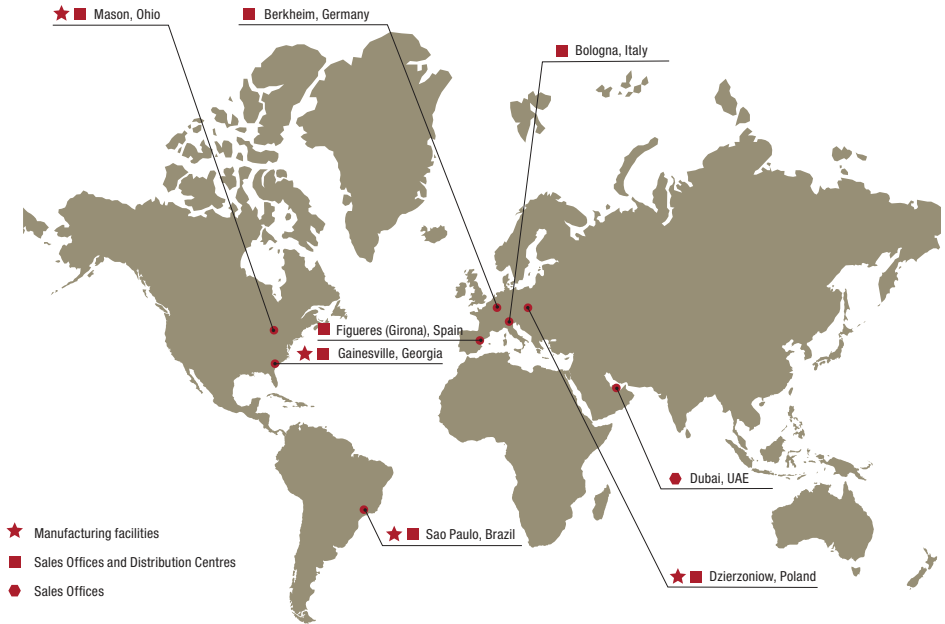
The Harris Products Group is a wholly-owned subsidiary of The Lincoln Electric Company. Lincoln has more than 40 manufacturing locations, including operations and joint ventures in 20 countries and a worldwide network of distributors and sales offices covering more than 160 countries.

THE HARRIS PRODUCTS GROUP HISTORY



MANUFACTURING FACILITIES

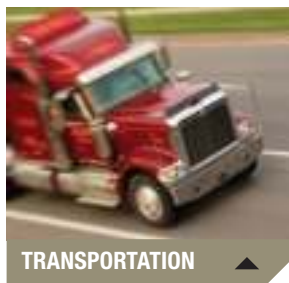
Based in Mason, Ohio, The Harris Products Group has five manufacturing locations in four countries and a worldwide network of distributors and sales offices covering more than 90 countries.



THE LEADER IN METAL JOINING

THE HARRIS PRODUCTS
GROUP HAS BEEN
MANUFACTURING
QUALITY BRAZING
PRODUCTS FOR
OVER 100 YEARS.

EACH DAY, HARRIS SETS OUT TO MAKE THE BEST AND MOST COMPLETE LINE OF BRAZING PRODUCTS IN THE WORLD. WHY? HARRIS IS THE WORLD LEADER IN DEVELOPING BRAZING AND SOLDERING PRODUCTS TO MEET THE INDUSTRY NEEDS FOR METAL JOINING METHODS. WE HAVE DEVELOPED PROPRIETARY MANUFACTURING TECHNOLOGY TO ENSURE THE HIGHEST STANDARDS OF QUALITY AND TRACEABILITY. ALL HARRIS MANUFACTURING FACILITIES ARE CERTIFIED TO ISO 9001 AND ISO 14000 STANDARDS. **TURN TO THE PROFESSIONALS – TURN TO HARRIS.**



TRANSPORTATION ▲



PLUMBING ▲



TUBE MANUFACTURING ▲



SHIP BUILDING ▲



CARBIDE/MINING TOOLS ▲



ELECTRONICS ▲



REFRIGERATION ▲



HVAC ▲



CONSTRUCTION ▲

OUR EXPERIENCED SALES AND TECHNICAL PERSONNEL ARE TRAINED TO ASSIST OUR CUSTOMERS IN PRODUCING SOUND, COST EFFECTIVE BRAZED ASSEMBLIES. OUR INTERNATIONAL PRESENCE MEANS WE CAN ASSIST OUR CUSTOMER'S OPERATION ANYWHERE IN THE WORLD. BEHIND US IS THE FINANCIAL STRENGTH AND TECHNICAL RESOURCES OF THE LINCOLN ELECTRIC COMPANY - **THE GLOBAL LEADER IN WELDING SYSTEMS AND FILLER METALS.**

PROCEDURES AND TECHNICAL INFORMATION



CUT TUBE SQUARE

Cut to the exact length required using a tube cutter or hacksaw. If a hacksaw is used, a sawing fixture should also be used to ensure square cuts. Remove all inside and outside burrs with a reamer, file, or other sharp edge scraping tool. If tube is out of round, it should be brought to true dimension and roundness with a sizing tool.



CLEAN TUBE END AND INSIDE SURFACE OF FITTING

The joint surface areas should be clean and free from oil, grease, or oxide contamination. Surfaces may be properly cleaned for brazing by brushing with a stainless steel wire brush or by a stiff rubbing with emery cloth or Scotch-Brite®*. If oil or grease is present, clean with a commercial solvent. Remember to remove small foreign particles such as emery dust, by wiping with a clean dry cloth. The joint surface **MUST** be clean.



SELECT BRAZING ALLOY

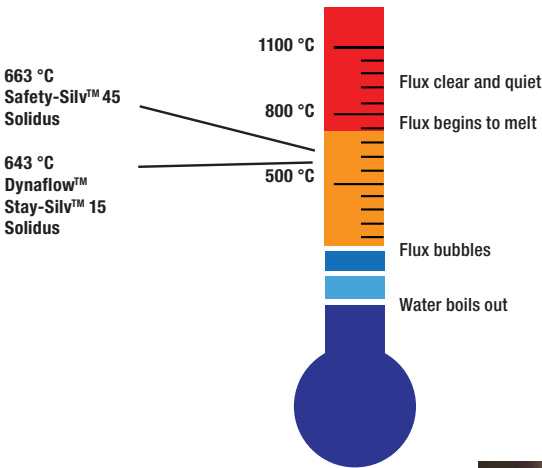
Refer to the Alloys Selection Tables for recommended brazing filler metal selection. When brazing copper to copper, alloys such as Dynaflow™, Stay-Silv™ 5, or Stay-Silv™ 15 are recommended. These alloys contain phosphorus and are self-fluxing on copper. When brazing brass or bronze fittings, Stay-Silv™ white or EcoSmart® flux is required with these alloys. When brazing iron, steel or other ferrous metals, select one of the Safety-Silv™ brazing alloys such as Safety-Silv™ 45 or Safety-Silv™ 56 with Stay-Silv™ white or Eco Smart® flux. Do not use phosphorus bearing alloys as the joint may be brittle.

*Scotch-Brite® is a registered trademark of 3M Company



PERFORM PROPER FLUXING

Proper fluxing is important because the flux absorbs oxides formed during heating and promotes the flow of the filler metal. Stir paste flux before use. If flux is dried out add a small amount of water until flux reaches a paste consistency. When using Stay-Silv™ white flux, apply it only with a brush. To prevent excess flux residue inside refrigeration lines, apply a thin layer of flux to only the male tubing. Insert the tube into the fitting and, if possible, rotate the fitting once or twice on the tube to ensure uniform coverage.



Flux at brazing temperature

FLUX APPLICATION

White flux is used for most applications. Black flux is helpful for long heating cycles or localized heating with induction. It is also used when brazing stainless steel.

Flux goes through physical changes during heating and turns clear at about 593°C. This is an indication that parts are close to brazing temperature.



OXYGEN / FUEL

Alternate fuel gases such as propane, propylene, butane, and natural gas / methane mixed with oxygen is the most common method used for production brazing globally. This is due to these gases higher Kcal content, increased safety, and reduced cost when compared to acetylene. Refer to the Harris® equipment section of this catalog or website for equipment and setting information.

For most brazing jobs using oxy-acetylene gases, a slightly carburizing or neutral flame should be used. The neutral flame has a well-defined inner cone. Avoid an oxidizing flame.

AIR / ACETYLENE TORCHES

Brazing with air/acetylene torches is a popular alternative to oxygen mixed fuel gas. The fuel gas flow aspirates air into a mixer that contains an internal vane that spins the gas to improve combustion and increase flame temperature.

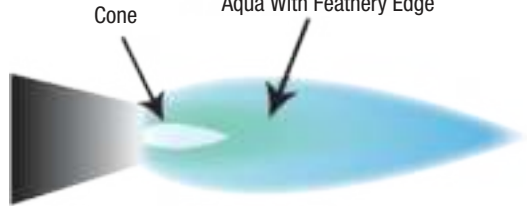
If the tank has a delivery pressure gauge, set the delivery pressure at 0,97 – 1,03 bar. If the tank has only a contents gauge delivery pressure is preset at the factory. Open the regulator adjusting screw all the way by turning it clockwise until it bottoms.

OPEN THE TORCH VALVE

Opening the torch valve about 3/4 of a turn will provide sufficient fuel gas delivery. Do not try to meter pressure (reducing the flame) by using the torch handle valve. If a higher or lower flame is required, change to a different tip size.

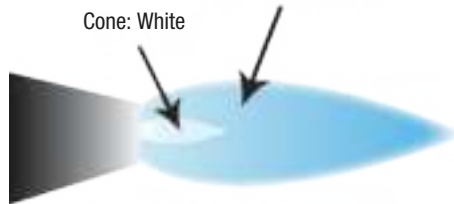
Carburizing Flame

Acetylene Feather: Intense
Aqua With Feathery Edge



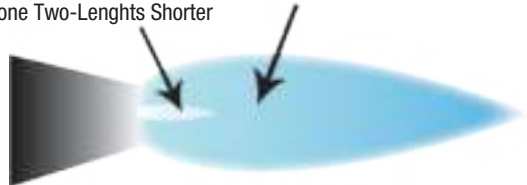
Neutral Flame

No Acetylene Feather



Oxidizing Flame

Cone: Sharp White
Cone Two-Lengths Shorter
No Acetylene Feather



Always keep the torch in short motion.

1

Start heating the tube, by first applying the flame to a point just adjacent to the fitting. Work the flame alternately around the tube and fitting until both reach brazing temperature, before applying the brazing filler metal.

2

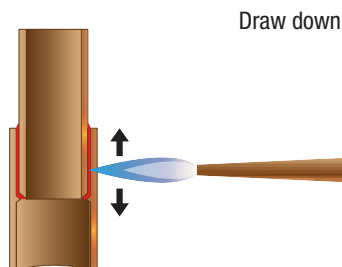
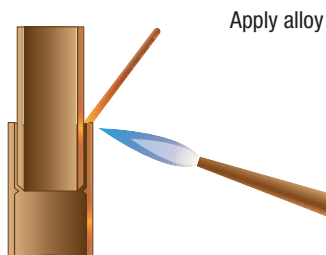
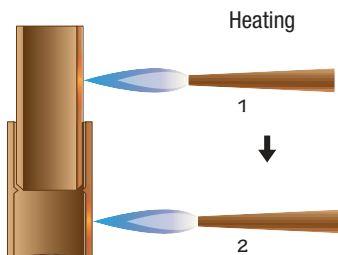
When a flux is used, it will be a good temperature guide. Continue heating the tube until the flux passes the “bubbling” temperature range and becomes quiet, completely fluid and transparent. Watch for this on both sides of the joint to ensure even heating.

3

Direct the flame from the tube to the fitting. When alloy is applied it should quickly melt and flow into the joint.

4

Sweep the flame back and forth along the axis of the assembled joint, tube, and fitting to reach and then maintain uniform heat in both parts.





APPLY THE BRAZING ALLOY

Feed the alloy into the joint between the tube and the fitting. Only after the base metals have been heated to brazing temperatures should the filler metal be added. At that time, the flame may be deflected momentarily to the tip of the filler metal to begin the melting process. Always keep both the fitting and the tube heated by playing the flame over the tube and the fitting as the brazing alloy is drawn into the joint. The brazing alloy will diffuse into and completely fill all joint areas. Do not continue feeding brazing alloy after the joint area is filled. Excess fillets do not improve the quality or the dependability of the braze and are a waste of material.

CLEANING AFTER BRAZING



CLEAN AFTER BRAZING

All flux residue must be removed for inspection and pressure testing. Immediately after the brazing alloy has set, quench or apply a wet brush or swab to crack and remove the flux residue. Use emery cloth or a wire brush, if necessary.

WHEN MAKING VERTICAL ALLOY-UP JOINTS

Heat the tube first, then apply heat to the fitting. It is important to bring both pieces up to temperature evenly. Keep the flame directed toward the fitting. If the tube is overheated, the brazing alloy may run down the tube rather than into the joint.

SEPARATION OF A BRAZING JOINT

TO SEPARATE A BRAZING JOINT

First clean the joint thoroughly, then flux the visible alloy and all adjacent areas of the tube and fitting. Next, heat the joint (tube and fitting) evenly, especially the flange of the fitting. When brazing alloy becomes fluid throughout the joint area, the tube can be easily removed. To re-braze the joint, clean the tube end and the inside of the fitting and proceed as directed to make a new brazed joint.

NITROGEN PURGE



after
nitrogen
purge

before
nitrogen
purge

NITROGEN PURGE

During braze heating, oxide scale forms on the inside of the copper tube.

These dark scales flake off and are carried by refrigerant and can potentially clog small orifices.

For HVAC/R and medical gas installations flow nitrogen through the tube during brazing to prevent internal scale formation. Use a low flow rate to avoid excess pressure inside the tube. A small hole at the line end will allow the nitrogen to escape.

PRODUCTS AND SPECIFICATIONS



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TMI

The Perfect Flame

THE PERFECT FLAME

With a history that includes the invention of flame-cutting torches and more than 100 years of manufacturing excellence, Harris Products Group continues to design and develop new products and processes to improve the quality of the products it manufactures. The Perfect Flame™ technology is one of the latest products that Harris developed to assist customers with the most effective and efficient method of creating and controlling the perfect oxy-fuel flame*, every time.

DEFINE exactly what type of flame you are currently using

MEASURE what the BTU/Kcal and temperature are

ANALYZE which type of flame is best for each process

IMPROVE flame

CONTROL flame by locking the box so the operators cannot change the setting



PERFECT FLAME™

THE PERFECT FLAME™

- ▶ Increased production speed by adjusting the flame Kcal;
- ▶ Lower leak and failure rates by adjusting a neutral flame and having a consistent flame for multiple operators;
- ▶ Decreased training time by eliminating the adjustment valves on the torch;
- ▶ Decreased gas usage by controlling the flow and temperature of the flame with the software;
- ▶ Lowering factory noise to schedule acceptable decibel levels;
- ▶ Extremely helpful on aluminum brazing where temperature is more critical.

*Kcal, flame temperature, flame mixing ratio.

The Power Brazer™

The Power Brazer™

The Power Brazer™ is a semi-automatic adjustable speed braze wire feeder that can be used in a variety of applications. The PowerBrazer has been designed with the operator in mind to improve their ability to handle the brazing process and help reduce manufacturing time.

The Power Brazer™ has been designed with the flexibility to give the operator unlimited brazing material at the touch of a button. It is ruggedly constructed of components that are currently used in the most demanding applications and can stand up to tough manufacturing environments. It comes with a number of adjustments so it can be used with a number of wire sizes by simply changing out the wire spools in the enclosed cabinet.



THE POWER BRAZER™

ADVANTAGES:

- ▶ Increased manufacturing throughput in all brazing applications;
- ▶ Applying better brazing techniques to your products;
- ▶ Improved joints to aid in leak elimination;
- ▶ Better control of your entire brazing process;
- ▶ Application of more and diverse alloy materials.

FEATURES:

- ▶ Unique drive roll design provides feeding and quick reloading by simply starting wire into guide tube. The drive rolls and guide tubes are designed for long life, quick reloading and precise wire feeding.
- ▶ Four-roll wire drive system available for additional wire feeding force.
- ▶ Completely enclosed case protects heavy duty wire drive mechanism from damage, but allows easy access to drive rolls.
- ▶ Spool protection cover protects brazing wire against shop dirt and other contaminants.
- ▶ Low voltage (24 volts) gun trigger circuit.
- ▶ Dynamic braking system stops wire feed motor quickly to control.

Model

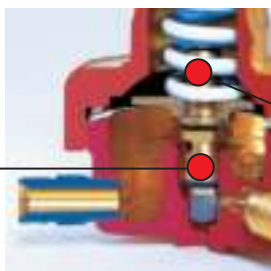
PRODUCT NAME	INPUT POWER	WIRE FEED SPEED RANGE (m/min)	WIRE SIZE RANGE (mm)	H x W x D (mm)	NET WEIGHT (kg)
The Power Brazer™	220 V AC 50/60 Hz	1,3 – 12,7	Solid 0,6 – 1,6 Cored 0,8 – 2,0	277 x 249 x 244	10,9

General features:

- ▶ Harris regulators are designed and manufactured according to the most recent international standards:
 - ISO 2503 for cylinder pressure and flow regulators;
 - Pressure gauges conform to ISO 5171.
- ▶ All industrial regulators are covered by 7 years warranty.
- ▶ Every Harris industrial regulator has a unique, one-piece encapsulated seat with an internal filter.
- ▶ High pressure capsule seat with PTFE (Teflon®)* sealing surface;
- ▶ Compressed gas regulators „D” version have tamperproof self-reseating internal safety relief valve (IRV);
- ▶ All regulators supplied with inlet and outlet to suit country.



One piece encapsulated seat with internal filter



Tamper proof, self reseating internal safety relief valve IRV

601

Model

Compact single stage cylinder pressure regulator

APPLICATIONS:

Light duty cutting, welding and brazing.

FEATURES:

- ▶ Maximum inlet pressure of 230 bar;
- ▶ Forged brass body and bonnet;
- ▶ Rear inlet connection (side entry optional);
- ▶ 50 mm safety gauge.



601-1.5-AC

MODEL NO.	VERSION	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m³/h)	DELIVERY PRESSURE GAUGE (bar)	SUPPLY PRESSURE GAUGE (bar)
601-1.5-AC	-	Acetylene	25	0-1,5	7	0-2,5	0-40
601-4-LP	-	Propane	25	0-4	20	0-6	0-40
601P-4-LP	one gauge	Propane	25	0-4	20	0-6	
601D-4-0X	-	Oxygen	230	0-4	20	0-6	0-315
601-4*	-	Argon, CO ₂ , Nitrogen, Air, Helium, Hydrogen, Methane	230	0-4	20	0-6	0-315

*The regulator is available for all the listed gases. When ordering always specify gas.

Teflon® is a registered trademark of DuPont™



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www.harrisproductsgroup.com

801

Model

Single stage cylinder regulator

APPLICATIONS:

Medium duty cutting, heating and welding.

FEATURES:

- ▶ Maximum inlet pressure of 230 bar;
- ▶ Enough flow to cut up to 300 mm steel;
- ▶ Smooth adjustment, with high precision;
- ▶ Side inlet connection;
- ▶ Standard version with chromed bonnet, gold painted gauge case;
- ▶ "B" version fitted with black bonnet and black gauge case.



801DB-10-0X

MODEL NO.	VERSION	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m³/h)	DELIVERY PRESSURE GAUGE (bar)	SUPPLY PRESSURE GAUGE (bar)
801-1.5-AC	-	Acetylene	25	0-1,5	30	0-2,5	0-40
801B-1.5-AC	-	Acetylene	25	0-1,5	30	0-2,5	0-40
801-4-LP	-	Propane	25	0-4	16,5	0-6	0-40
801B-4-LP	-	Propane	25	0-4	16,5	0-6	0-40
801P-4-LP	one gauge	Propane	25	0-4	16,5	0-6	
801BP-4-LP	-	Propane	25	0-4	16,5	0-6	
801D-4-0X	-	Oxygen	230	0-4	100	0-6	0-315
801DB-4-0X	-	Oxygen	230	0-4	100	0-6	0-315
801D-4 *	-	Argon, CO ₂ , Nitrogen, Air, Helium, Hydrogen, Methane	230	0-4	100	0-6	0-315
801DB-4 *	-	Argon, CO ₂ , Nitrogen, Air, Helium, Hydrogen, Methane	230	0-4	100	0-6	0-315
801D-10-0X	-	Oxygen	230	0-10	155	0-16	0-315
801DB-10-0X	-	Oxygen	230	0-10	155	0-16	0-315
801D-10 *	-	Argon, CO ₂ , Nitrogen, Air, Helium, Hydrogen, Methane	230	0-10	155	0-16	0-315
801DB-10 *	-	Argon, CO ₂ , Nitrogen, Air, Helium, Hydrogen, Methane	230	0-10	155	0-16	0-315

*The regulator is available for all the listed gases. When ordering always specify gas.

841

Model

Single stage cylinder regulator

APPLICATIONS:

Medium duty cutting, heating and welding applications.

FEATURES:

- ▶ Maximum inlet pressure of 230 bar;
- ▶ Enough flow to cut steel up to 300 mm thickness;
- ▶ Smooth adjustment, with high precision;
- ▶ Chromed bonnet and gold painted gauge case.



841D-4-0X

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m³/h)	DELIVERY PRESSURE GAUGE (bar)	SUPPLY PRESSURE GAUGE (bar)
841-1.5-AC	Acetylene	25	0-1,5	30	0-2,5	0-40
841-4-LP	Propane	25	0-4	16,5	0-6	0-40
841D-4-0X	Oxygen	230	0-4	100	0-6	0-315

25GX

Model

Single stage cylinder regulator

APPLICATIONS:

Heavy duty, large, strong regulator for the professionals.

FEATURES:

- ▶ Forged brass body for maximum strength;
- ▶ Maximum inlet pressure of 230 bar;
- ▶ Enough flow to cut up to 400 mm steel;
- ▶ Large Ø 70 mm diaphragm stabilizes working pressure;
- ▶ Durable chromed bonnet;
- ▶ Side entry.



25GX-1.5-AC

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m³/h)	DELIVERY PRESSURE GAUGE (bar)	SUPPLY PRESSURE GAUGE (bar)
25GX-1.5-AC	Acetylene	25	0-1,5	52	0-2,5	0-40
25GX-4-LP	Propane	25	0-4	25	0-6	0-40
25GX-D4-0X	Oxygen	230	0-4	112	0-6	0-315
25GX-D4 *	Argon, CO ₂ , Nitrogen, Air, Methane	230	0-4	112	0-6	0-315
25GX-AD-4 *	Helium, Hydrogen	230	0-4	112	0-6	0-315

*The regulator is available for all the listed gases. When ordering always specify gas.

601 HVAC

Model

Compact single stage cylinder pressure regulator dedicated to HVAC&R applications

APPLICATIONS:

HVAC purging, pressure testing and blanketing with nitrogen or other inert gases.

FEATURES:

- ▶ Allows to perform leak test (HVAC&R pressure testing): maximum delivery pressure 55 bar;
- ▶ Compact and economical;
- ▶ Forged brass body and bonnet;
- ▶ Maximum inlet pressure of 230 bar;
- ▶ Side inlet connection (rear entry optional);
- ▶ Valve seat in PTFE (Teflon®)*.



601 HVAC

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	DELIVERY PRESSURE GAUGE (bar)	SUPPLY PRESSURE GAUGE (bar)
601-55	Nitrogen	230	55	0-100	0-315
601-30	Nitrogen	230	30	0-40	0-315

Teflon® is a registered trademark of DuPont™



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846

Pipeline regulator

APPLICATIONS:

- ▶ Specially designed to allow high flow rate from industrial and laboratory pipeline points.

FEATURES:

- ▶ High flow and outlet pressure (up to 10 bar) line regulator;
- ▶ Forged brass body for maximum strength;
- ▶ Sintered alloy inlet filter to trap impurities;
- ▶ Maximum inlet pressure 25 bar.



846-10-0X

Model

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m ³ /h)	DELIVERY PRESSURE GAUGE (bar)	FLOWGAUGE (Lpm)	MAX LINE PRESSURE (bar)
846-1.5-AC	Acetylene	25	0-1,5	13	0-2,5	-	25
846-4-LP	Propane	25	0-4	76	0-6	-	25
846-4-0X	Oxygen	25	0-4	76	0-6	-	25
846-10-0X	Oxygen	25	0-10	95	0-16	-	25
846-10 *	Argon, CO ₂ , Nitrogen, Air, Helium, Hydrogen, Methane	25	0-10	95	0-16	-	25

*The regulator is available for all the listed gases. When ordering always specify gas.

847

Pipeline regulator

APPLICATIONS:

- ▶ Specially designed to allow high flow rate from industrial and laboratory pipeline points;
- ▶ Particularly suited to machine cutting where more than one torch is used. Also for heavy cutting and heating.

FEATURES:

- ▶ High flow and outlet pressure (up to 15 bar) line regulator;
- ▶ Forged brass body for maximum strength;
- ▶ Sintered alloy inlet filter to trap impurities;
- ▶ Maximum inlet pressure 25 bar;
- ▶ 15 Lpm, 30 Lpm and 50 Lpm versions available for argon and CO₂.



847-4-0X

Model

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m ³ /h)	DELIVERY PRESSURE GAUGE (bar)	FLOWGAUGE (Lpm)
847-1.5-AC	Acetylene	25	0-1,5	13	0-2,5	-
847-4-LP	Propane	25	0-4	76	0-6	-
847-4-0X	Oxygen	25	0-4	76	0-6	-
847-10-0X	Oxygen	25	0-10	95	0-16	-
847-10 *	Argon, CO ₂ , Nitrogen, Air, Helium, Hydrogen, Methane	25	0-10	95	0-16	-

*The regulator is available for all the listed gases. When ordering always specify gas.



50

Model

Straight torch

Automatic Torch Handle. The Harris 50-9 and 50-10 automatic torch handles feature a unique gas control system to reduce operating and improve safety and convenience. The thumb operated on/off gas control and adjustable pilot light eliminate relighting and flame readjustment each time the torch is used. The on/off feature can be used for cutting, brazing, and welding with all oxy fuel gases. The pilot flame light feature is not recommended when using cutting attachments or heating tips. Select model 50-9 for acetylene and 50-10 for other fuel gases.

FEATURES:

- ▶ Automatic on/off gas control;
- ▶ Adjustable pilot light.



MODEL NO.	THREAD OXYGEN	THREAD FUEL GAS	WEIGHT (kg)	LENGTH (mm)
50-9	9/16"-18-UNF-3A-RH	9/16"-18-UNF-3A-LH	0,310	169
50-9-GB	G 1/4" A-RH-UNI ISO 228	G 1/4" A-LH-UNI ISO 228	0,308	169
50-10	9/16"-18-UNF-3A-RH	9/16"-18-UNF-3A-LH	0,310	169
50-10-GB	G 1/4" A-RH-UNI ISO 228	G 1/4" A-LH-UNI ISO 228	0,308	169

50-P

Model

Pistol torch

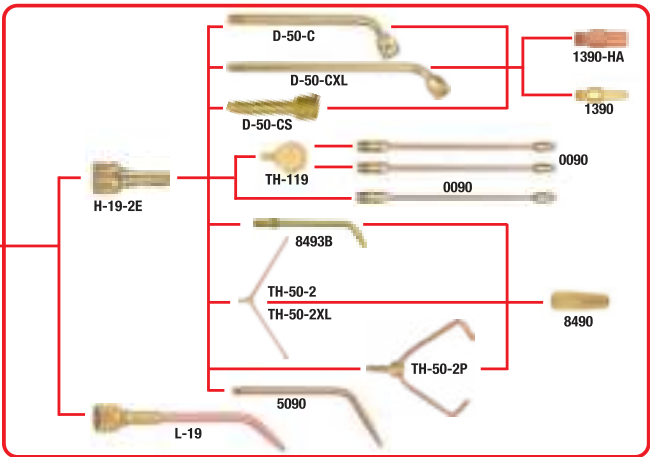
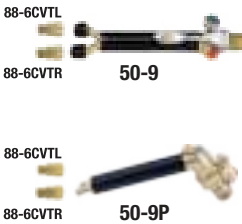
The model 50-P's are an ergonomically designed automatic brazing torches with a pistol grip. The new design retains all the features of the original model 50 but with a pistol grip design for greater operator comfort in specific applications.

The handle features a unique on/off gas control system to reduce operating cost and improve safety and convenience as well as an adjustable pilot light feature and can be used with all fuel gases. The thumb operated on/off gas control eliminates flame readjustment each time the torch is used.

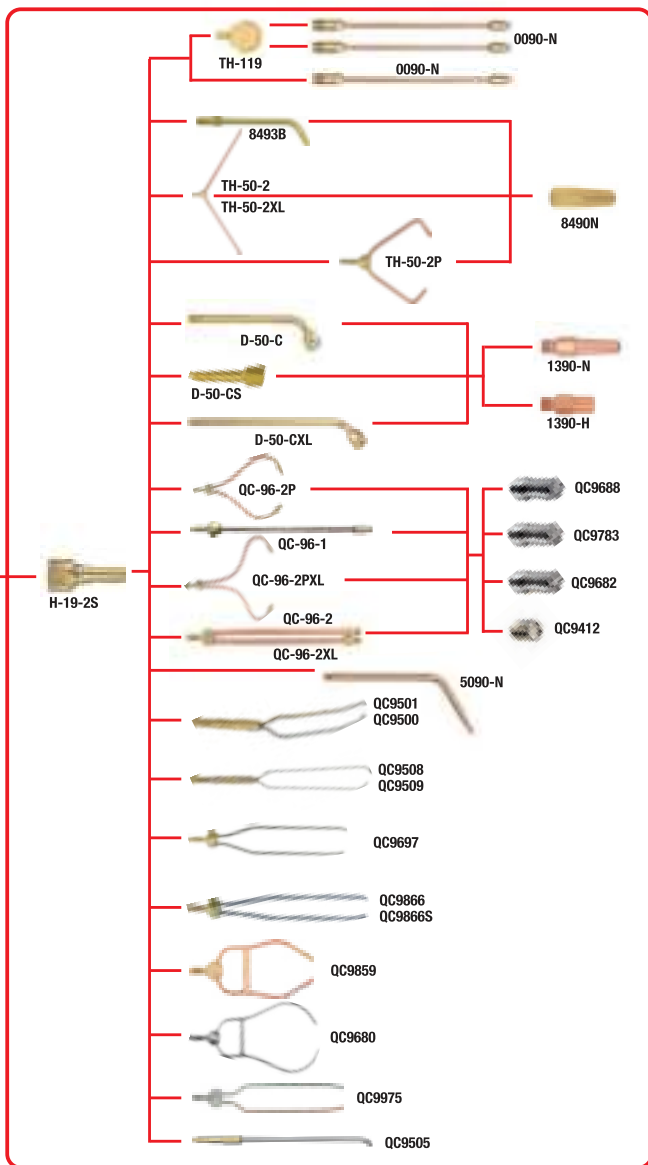
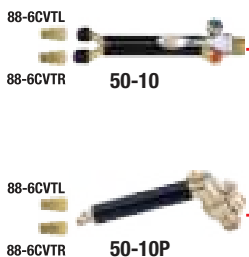


MODEL NO.	THREAD OXYGEN	THREAD FUEL GAS	WEIGHT (kg)	LENGTH (mm)
50-9P	9/16"-18-UNF-RH	9/16"-18-UNF-LH	0,358	143 handle + 70 neck (110° angle)
50-10P	9/16"-18-UNF-3A-RH	9/16"-18-UNF-3A-LH	0,358	143 handle + 70 neck (110° angle)

ACETYLENE



ALTERNATIVE FUEL GASES



19
Model

Straight torch

The model 19-6 combination torch handle for cutting, welding, brazing and heating. It can be used with oxy-acetylene or other fuel gases. The model 19-6 features silver brazed twin tube construction. Valves are located at the front of torch handle for more precise control while brazing.

FEATURES:

- ▶ Light weight handle;
- ▶ Silver brazed twin tube construction for safety and durability;
- ▶ Ball valve for fast and accurate flame adjustment.



MODEL NO.	THREAD OXYGEN	THREAD FUEL GAS	WEIGHT (kg)	LENGTH (mm)
19-6	9/16"-18-UNF-3A-RH	9/16"-18-UNF-3A-LH	0,240	154
19-6-GB	G 1/4" A-RH-UNI ISO 228	G 1/4" A-LH-UNI ISO 228	0,238	154

19-6P
Model

Pistol torch

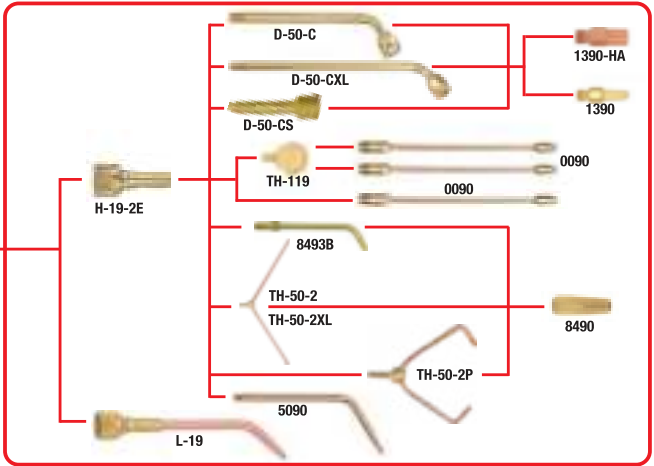
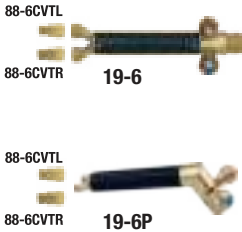
The newly designed model 19-AP Pistol torch is an ergonomically designed, light weight, front valve medium duty torch for welding, brazing and heating. The pistol grip, "A" class hose fittings and light weight are for operator comfort and to help eliminate the unnatural hand position that causes fatigue and often results in carpal tunnel syndrome.

The model 19-6AP also features silver brazed twin tube construction and front valves for more precise control while welding, soldering and brazing. The 19-6AP is suitable for use with any fuel gas.

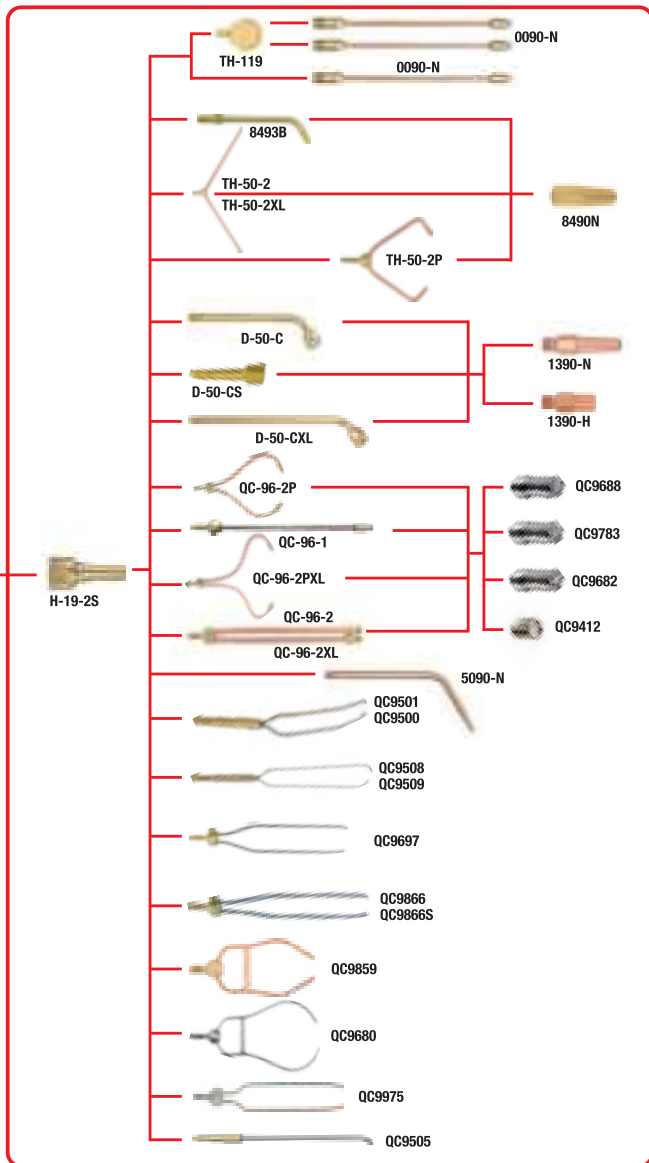
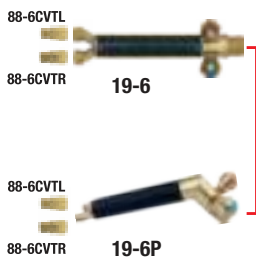


MODEL NO.	THREAD OXYGEN	THREAD FUEL GAS	WEIGHT (kg)	LENGTH (mm)
19-6P	9/16"-18-UNF-3A-RH	9/16"-18-UNF-3A-LH	0,313	143 handle + 56 neck (110° angle)

ACETYLENE



ALTERNATIVE FUEL GASES



15
Model

Lightweight torch handle

The model 15 is a lightweight handle with front valves for more convenient adjustment. It is designed to permit changing flame settings with one hand. The model 15 is compatible with all fuel gases. It can be used for welding, brazing and light heating.

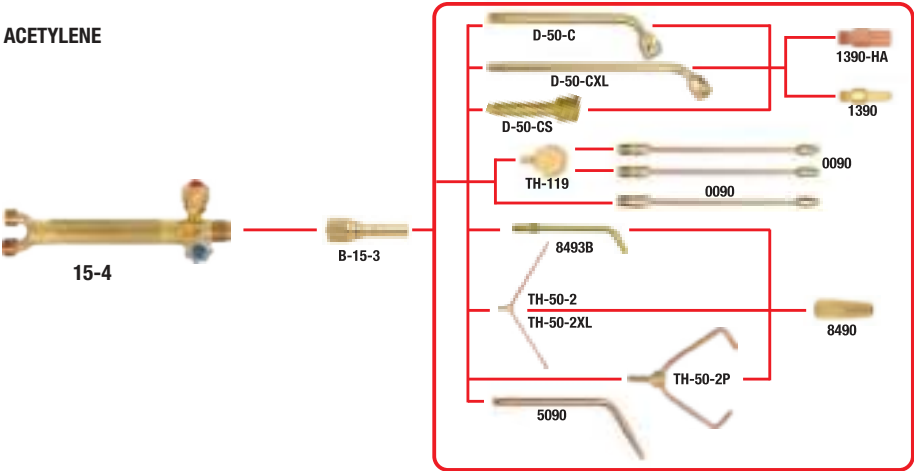
FEATURES:

- ▶ Welds up to 7,9 mm;
- ▶ Lightweight and compact design;
- ▶ Ergonomic;
- ▶ Versatile, for all gasses.

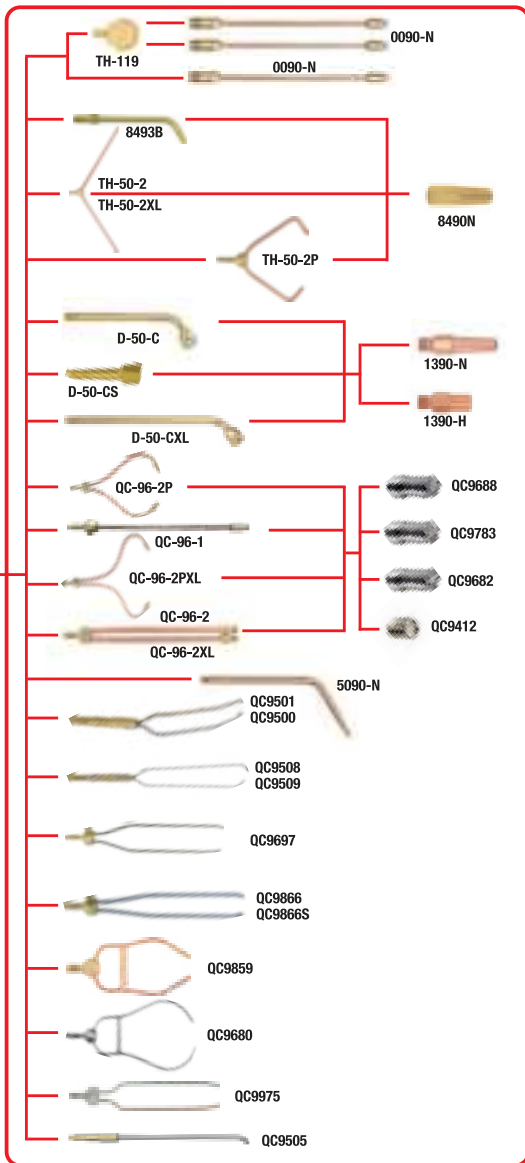


MODEL NO.	THREAD OXYGEN	THREAD FUEL GAS	WEIGHT (kg)	LENGTH (mm)
15-4	3/8"- 24 - UNF	3/8"- 24 - UNF	0,227	146
15-4GB	G 1/4" A-RH-UNI ISO 228	G 1/4" A-LH-UNI ISO 228	0,227	146

ACETYLENE



ALTERNATIVE FUEL GASES



105

Model

Lightweight handle for welding and brazing

The model 105 is a lightweight, ergonomic handle with front valves. The compact design allows to adjust brazing parameters by using only one hand. The handle can be used with 5 mm (105A) or 3,2 mm (105B) hose.

The model 105 can used for brazing, soldering and light heating with acetylene or alternative fuel gases and welding up to 6 mm with acetylene.

FEATURES:

- ▶ Lightweight – only 115 g (model 105B);
- ▶ Length – 150 mm;
- ▶ High flow;
- ▶ Ergonomic;
- ▶ Excellent for production brazing.



MODEL 105A



MODEL 105B

MODEL NO.	HOSE CONNECTION (mm)	FUEL GAS	MIXER	MIXING SYSTEM	TIP TUBE	ACETYLENE WELDING/ BRAZING TIPS	ALTERNATIVE GASES BRAZING TIPS
105A	5	Acetylene Alternative gases	M105	E	10593	105900	105900N
						105901	105901N
						105903	105903N
105B	3,2					105905	105905N
						105906	105906N

ACETYLENE



ALTERNATIVE FUEL GASES





“EQUAL PRESSURE” mixer vs. “LOW PRESSURE” mixer

Harris offers two types of oxy/fuel mixers. Equal pressure or positive mixers are referred to as “E” type mixers while, low pressure injector mixers are referred to as “S” or “F” mixers. The type of mixer which best suits the need depends on the application and the available fuel gas supply. The following explains some of the features and benefits of each mixer design.

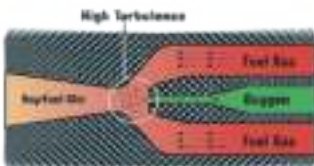
TYPICAL “EQUAL PRESSURE” MIXER DESIGN

To thoroughly mix the oxygen and fuel gas, an equal pressure mixer designs rely on the positive pressure control of both oxygen and fuel gas. Both gases enter the mixing chamber at controlled pressures. “E” mixers allow the end-user greater control of the oxy/fuel ratio. This feature has an advantage in applications where a very carburizing or oxidizing flame is required. Also because of their higher potential flow rates, “E” mixers are required for high flow heating applications. This design to be used with both acetylene and alternate fuels when positive pressure control of the fuel gas is available.



TYPICAL “LOW PRESSURE” MIXER DESIGN

Low pressure injector mixers require that only the oxygen has a positive pressure control. The oxygen exits a specially designed chamber at a very high velocity which causes the fuel gas to be aspirated into the mixing chamber. Because of the aspirating effect on the fuel gas, positive control of the fuel gas is not required. In fact, the mixers in the Harris line are designed to operate at fuel gas pressures as low as 0,015 Bar. Low pressure mixers tend to have a narrower operating range than “E” so “S” or “F” mixers are used primarily with low pressure natural gas/methane.



Equal pressure type mixers



H-19-2E



B-15-3



M105

MODEL NO.	GAS	FITS HANDLE
H-19-2E	Oxy-acetylene	19-6, 50-9
B-15-3	Oxy-acetylene	15-3, 15-4, 15-4GB
M105	Oxy-acetylene Oxy-alternative gases	105

Low pressure mixers



H-19-2S



B-15-3F

MODEL NO.	GAS	FITS HANDLE
H-19-2S	Oxy-propane	19-6, 50-10
B-15-3F	Oxy-hydrogen Oxy-propane / butan Oxy-natural gas / methan	15-3, 15-4, 15-4GB

WELDING, BRAZING AND SOLDERING TIPS, TUBES AND ASSEMBLIES

Welding and brazing assembly

The model L-19 are welding and brazing assemblies consisting of a mixer and a tip that can be used with acetylene. They are compatible with 50-9 and 19-6 handles.

► **Material:** Copper and Brass



ACETYLENE LOW PRESSURE					
PART NO.	MODEL NO.	FLOW (l/h)	THICKNESS (mm)	OXYGEN LOW PRESSURE (bar)	ACETYLENE LOW PRESSURE (bar)
L190	L-19-0	45	0,2 – 0,5	2,5	0,015 – 0,2
L191	L-19-1	65	0,5 – 1,0	2,5	0,015 – 0,2
L193	L-19-3	160	1,0 – 2,0	2,5	0,015 – 0,2
L195	L-19-5	350	2,0 – 4,0	2,5	0,015 – 0,2
L196	L-19-6	500	4,0 – 6,0	2,5	0,015 – 0,2
L198	L-19-8	1000	6,0 – 9,0	2,5	0,015 – 0,2
L199	L-19-9	1500	9,0 – 14,0	2,5	0,015 – 0,2
L1910	L-19-10	2000	14,0 – 20,0	2,5	0,015 – 0,2

ACETYLENE EQUAL PRESSURE					
PART NO.	MODEL NO.	FLOW (l/h)	THICKNESS (mm)	OXYGEN EQUAL PRESSURE (bar)	ACETYLENE EQUAL PRESSURE (bar)
1601650	L-19-0-E	45	0,2 – 0,5	0,3 – 0,8	0,3 – 0,8
1601651	L-19-1-E	65	0,5 – 1,0	0,3 – 0,8	0,3 – 0,8
1601653	L-19-3-E	160	1,0 – 2,0	0,3 – 0,8	0,3 – 0,8
1601655	L-19-5-E	350	2,0 – 4,0	0,3 – 0,8	0,3 – 0,8
1601656	L-19-6-E	500	4,0 – 6,0	0,3 – 0,8	0,3 – 0,8
1601658	L-19-8-E	1000	6,0 – 9,0	0,3 – 0,8	0,3 – 0,8
1601659	L-19-9-E	1500	9,0 – 14,0	0,3 – 0,8	0,3 – 0,8
1601660	L-19-10-E	2000	14,0 – 20,0	0,3 – 0,8	0,3 – 0,8

0090

Model

Tip

The 0090 tips are adjustable tips that can be screwed directly into the mixer for single tip use or into the TH-119 twin tip holder for a twin tip application. These tips allow our customer to easily preform their tips to fit their specific application.

► **Material:** Copper and Brass



ACETYLENE FUEL SINGLE TIP

PART NO.	MODEL NO.	FLOW (l/h)	THICKNESS (mm)	OXYGEN EQUAL PRESSURE (bar)	ACETYLENE EQUAL PRESSURE (bar)	OXYGEN LOW PRESSURE (bar)	ACETYLENE LOW PRESSURE (bar)
00901	0090-1	65	0,5 - 1,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
00903	0090-3	160	1,0 - 2,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
00905	0090-5	350	2,0 - 4,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
00906	0090-6	500	4,0 - 6,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
00908	0090-8	1000	6,0 - 9,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2

ALTERNATIVE FUEL SINGLE TIP

PART NO.	MODEL NO.	OXYGEN LOW PRESSURE (bar)	FUEL GAS LOW PRESSURE (bar)	OXYGEN EQUAL PRESSURE (bar)	FUEL GAS EQUAL PRESSURE (bar)	OXYGEN FLOW (l/h)	FUEL GAS FLOW (l/h)
00902N	0090-2N	1,0	0,015-0,2	0,3-1	0,3-1	300	75
00904N	0090-4N	1,4	0,015-0,2	0,3-1	0,3-1	700	175
00906N	0090-6N	1,8	0,015-0,2	0,3-1	0,3-1	1100	275
00908N	0090-8N	2,1	0,015-0,2	0,3-1	0,3-1	1500	375

TH-119

Model

Twin tip holder

The TH-119 is a twin tip holder for our 0090 series adjustable tips. This allows the customer to easily preform their tips to fit their specific application and replace/change the size of the tip without the cost of replacing the twin tip holder.

► **Material:** Brass



PART NO.	MODEL NO.	DESCRIPTION	TIP MODELS USED	LENGTH	WEIGHT	GAP	SHAPE
TH119	TH-119	Twin tip holder	0090 0090N	28	6 g	Adjustable	Adjustable

5090

Model

Single piece brazing tips

The model 5090 tips are manufactured using environmentally-friendly tellurium copper that has excellent machining properties resulting in a higher quality tip. They are swaged for more precise and consistent flames. They use a universal mixer for all sizes eliminating the expense of using a different mixer for every tip size. All 5090 tips have a metal-to-metal mixer seat virtually eliminating the possibility of leaks and the need for thread sealants.

- **Material:** Copper



ACETYLENE FUEL SINGLE TIP						
PART NO.	MODEL NO.	TIP SIZE	ACETYLENE PRESSURE RANGE (bar)	ACETYLENE FLOW RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
1601753	5090-3	3	0,20	146	0,20	160
1601755	5090-5	5	0,34	318	0,34	350
1601758	5090-8	8	0,55	909	0,55	1000

ALTERNATIVE FUEL SINGLE TIP						
PART NO.	MODEL NO.	TIP SIZE	ACETYLENE PRESSURE RANGE (bar)	ACETYLENE FLOW RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
50903N	5090-3N	3N	0,34 – 1,03	142	0,34 – 1,03	550
50905N	5090-5N	5N	0,34 – 1,03	227	0,34 – 1,03	900
50908N	5090-8N	8N	0,34 – 1,03	368	0,34 – 1,03	1500

QC9505

Model

Repair tip

The model 9505 is commonly used for maintenance, general brazing and repair stations. The curved end design allow this tip to get into tight spaces and direct the short flame only where needed.

- **Length:** 21,59 cm
 ► **Weight:** 40,86 g
 ► **Material:** Stainless steel with brass base



PART NO.	MODEL NO.	DESCRIPTION	ALTERNATE FUEL PRESSURE RANGE (bar)	ALTERNATE FUEL RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
1601612	QC9505	Alternate Fuel Repair Tip	0,34 – 1,03	85 – 156	0,69 – 1,72	198 – 368

D-50-C Model

Single tip tube

This gooseneck tip tube is most commonly used with 1390 separable tips which give you a wide variety of flame sizes to choose from. Using the separable tip tube design reduces the extra cost associated with additional tip sizes and/or replacement tips. You can also use the 8490 or 9690 tips with this tip tube using the correct adaptor on the following page.

► **Material:** Brass



PART NO.	MODEL NO.	DESCRIPTION	TIP MODELS USED	LENGTH (cm)	WEIGHT (g)	GAP	SHAPE
9100379	D-50-C	Gooseneck Tip Tube	1390, 1390-N	10,16	44	NONE	Gooseneck

D-50-CXL Model

Single tip tube

This gooseneck tip tube is most commonly used with 1390 separable tips which give you a wide variety of flame sizes to choose from. Using the separable tip tube design reduces the extra cost associated with additional tip sizes and/or replacement tips. You can also use the 8490 or 9690 tips with this tip tube using the correct adaptor on the following page.

► **Material:** Brass



PART NO.	MODEL NO.	DESCRIPTION	TIP MODELS USED	LENGTH (cm)	WEIGHT (g)	GAP	SHAPE
9100872	D-50-CXL	Gooseneck Tip Tube	1390, 1390-N	17,78	68	NONE	Gooseneck

D-50-CS Model

Single straight tip tube

This straight tip tube is most commonly used with pistol grip torches and 1390 separable tips which give you a wide variety of flame sizes to choose from. Using the separable tip tube design reduces the extra cost associated with additional tip sizes and/or replacement tips. You can also use the 8490 or 9690 tips with this tip tube using the correct adaptor on the following page.

► **Material:** Brass



PART NO.	MODEL NO.	DESCRIPTION	TIP MODELS USED	LENGTH (cm)	WEIGHT (g)	GAP	SHAPE
QCDC2ST	D-50-CS	Straight Tip Tube	1390, 1390-N	5,08	18	NONE	Straight

1390

Model

Separable brazing tips

The model 1390 tips are manufactured using environmentally-friendly tellurium copper that has excellent machining properties resulting in a higher quality tip. They are precision drilled for more precise and consistent flames. They use a universal separable tip tube and mixer system for tip sizes 0-10 eliminating the expense when replacing tips or changing to a different size. All 1390 tips have a metal to metal tip contact seat virtually eliminating the possibility of leaks and the need for thread sealants.

- Length: 2,54 - 5,08 cm
- Weight: 18 - 27 g
- Material: Copper



1390-5 1390-5N

ACETYLENE							
PART NO.	MODEL NO.	FLOW (l/h)	THICKNESS (mm)	OXYGEN EQUAL PRESSURE (bar)	ACETYLENE EQUAL PRESSURE (bar)	OXYGEN LOW PRESSURE (bar)	ACETYLENE LOW PRESSURE (bar)
139000	1390-00	25	-	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
13900	1390-0	45	0,2 - 0,5	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
13901	1390-1	65	0,5 - 1,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
13902	1390-2	100	-	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
13903	1390-3	160	1,0 - 2,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
13904	1390-4	250	-	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
13905	1390-5	350	2,0 - 4,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
13906	1390-6	500	4,0 - 6,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
13907	1390-7	700	-	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
13908	1390-8	1000	6,0 - 9,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
13909	1390-9	1500	9,0 - 14,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2
139010	1390-10	2000	14,0 - 20,0	0,3 - 0,8	0,3 - 0,8	2,5	0,015 - 0,2

ALTERNATIVE FUELS							
PART NO.	MODEL NO.	OXYGEN LOW PRESSURE (bar)	FUEL GAS LOW PRESSURE (bar)	OXYGEN EQUAL PRESSURE (bar)	FUEL GAS EQUAL PRESSURE (bar)	OXYGEN FLOW (l/h)	FUEL GAS FLOW (l/h)
13902N	1390-2N	1,0	0,015-0,2	0,3-1	0,3-1	300	75
13903N	1390-3N	1,0	0,015-0,2	0,3-1	0,3-1	550	140
13904N	1390-4N	1,4	0,015-0,2	0,3-1	0,3-1	700	175
13905N	1390-5N	1,8	0,015-0,2	0,3-1	0,3-1	900	225
13906N	1390-6N	1,8	0,015-0,2	0,3-1	0,3-1	1100	275
13907N	1390-7N	2,1	0,015-0,2	0,3-1	0,3-1	1350	345
13908N	1390-8N	2,1	0,015-0,2	0,3-1	0,3-1	1500	375
13909N	1390-9N	2,5	0,015-0,2	0,3-1	0,3-1	1650	415
139010N	1390-10N	2,8	0,015-0,2	0,3-1	0,3-1	2000	500

Use adaptors below with your selected D-50 tip tubes for models 8490 and 9690

Model shown:
D-50 Tip tubes
to 8490 tips
Model: QC9679



Model shown:
D-50 Tip tubes
to 9690 tips P. 43
Model: QC9681



8493B

Model

Medium duty single tip tube

This gooseneck tip tube is most commonly used with 8490 separable tips which give you a wide variety of flame sizes to choose from. Using the separable tip tube design reduces the extra cost associated with additional tip sizes and/or replacement tips.

- **Material:** Brass



PART NO.	MODEL NO.	DESCRIPTION	TIP MODELS USED	LENGTH (cm)	WEIGHT (g)	GAP	SHAPE
QC8493B	8493-B	Gooseneck Tip Tube	8490 and 8490N	10,16	45	NONE	Gooseneck

TH-50

Model

Medium duty twin tip tube

This adjustable twin tip is used with 8490 tips which give you a variety of flame sizes to choose from. The TH-50 tubes come straight and are annealed so they can be reformed and / or adjusted to your specific application needs.

- **Material:** Copper



PART NO.	MODEL NO.	DESCRIPTION	TIP MODELS USED	LENGTH (cm)	WEIGHT (g)	GAP	SHAPE
1601590	TH-50-2	Adjustable Twin Tip Tube	8490 and 8490N	13,97	73	Adjustable	Adjustable
1601596	TH-50-2XL	Adjustable Twin Tip Tube	8490 and 8490N	18,42	91	Adjustable	Adjustable

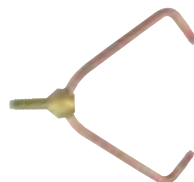
TH-50P

Model

Medium duty twin tip tube

This preformed twin tip is used with 8490 tips which give you a variety of flame sizes to choose from. This tip is preformed at the factory to cover a wide variety of applications, but can still be adjusted to fit specific needs of your application.

- **Material:** Copper



PART NO.	MODEL NO.	DESCRIPTION	TIP MODELS USED	LENGTH (cm)	WEIGHT (g)	GAP (cm)	SHAPE
1601714	TH-50-2P	Preformed Twin Tip Tube	8490 and 8490N	12,70	64	7,62	Pre-bent

8490

Model

Medium duty acetylene brazing tips

The model 8490 series separable brazing tips are made of high-quality brass bar stock. The 8490 series tips also include a special multi-flame heating tip, 8490-6-65.

► Material: Brass



ACETYLENE						
PART NO.	TIP SIZE	DESCRIPTION	ACETYLENE PRESSURE (bar)	ACETYLENE FLOW RANGE (l/h)	OXYGEN PRESSURE (bar)	OXYGEN FLOW RANGE (l/h)
1601990	2	8490-2	0,14	85 – 227	0,14	85 – 255
1602010	4	8490-4	0,28	170 – 396	0,28	198 – 425
1602030	6	8490-6	0,41	283 – 566	0,41	312 – 623
1602060	8	8490-8	0,55	453 – 906	0,55	510 – 991
1602040	6-65	8490-6-65	0,55	1274 - 1586	0,55	1426 - 1756

8490N

Model

Medium duty alternate fuel brazing tips

The model 8490-N series separable brazing tips are made of high-quality brass bar stock. The 8490-N series tips are designed with a counter bored tip end for maximum performance with alternate fuels. They are stable over a broad BTU range, consequently, one tip size can be used over a wide range of joint sizes. The 8490-N series also includes a special multi-flame heating tip, 8490-6-65.

► Material: Brass



ALTERNATIVE FUELS						
PART NO.	TIP SIZE	DESCRIPTION	ALTERNATIVE FUEL PRESSURE (bar)	ALTERNATIVE FUEL FLOW (l/h)	OXYGEN PRESSURE (bar)	OXYGEN FLOW (l/h)
1602090	4N	8490-4N	0,07	57	0,14	227
1602100	5N	8490-5N	0,07	71	0,14	283
1602110	6N	8490-6N	0,07	85	0,21	340
1602120	7N	8490-7N	0,07	113	0,28	566
1602130	8N	8490-8N	0,14	170	0,34	680
1602040	6-65	8490-6-65	0,55	227	0,55	850

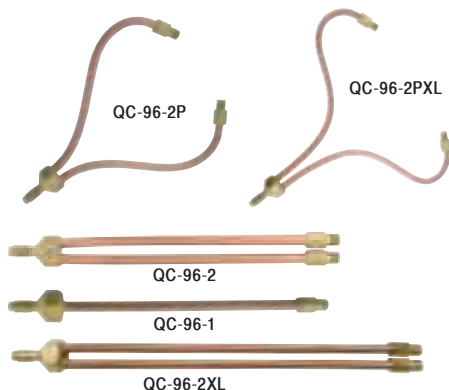
QC-96

Model

Heavy duty twin tubes

This heavy duty tip tube series is used with the 9690 series tips and can be used for brazing large diameter tubing or other applications requiring a lot of heat. Options include pre-bent tip tubes for convenience or straight tip tubes which can be easily bent to fit your specific application.

► **Material:** Annealed copper



PART NO.	MODEL NO.	DESCRIPTION	TIP MODELS USED	LENGTH (cm)	WEIGHT (g)	GAP (cm)	SHAPE
1601716	QC-96-2P	Preformed Twin Tip Tube	9690 Style Tips	17,78	118	5,72	Pre-bent
1601715	QC-96-2	Adjustable Twin Tip Tube	9690 Style Tips	20,32	118	Adjustable	Adjustable
1601627	QC-96-1	Single Adjustable Tip Tube	9690 Style Tips	20,32	68	None	Adjustable
1601614	QC-96-2PXL	Preformed Twin Tip Tube	9690 Style Tips	19,05	140,61	11,43	Pre-bent
1601628	QC-96-2XL	Adjustable Twin Tip Tube	9690 Style Tips	25,40	140,61	Adjustable	Adjustable

QC9690

Model

Heavy duty tips

The model 9690 series separable multi-flame brazing tips are made for brazing large diameter tubing or other applications requiring a lot of heat. They can be used with all fuel gases and are chrome plated to resist contamination.

► **Length:** 1,9 - 2,89 cm
 ► **Weight:** 9 - 14 g
 ► **Material:** Chrome Plated Brass



PART NO.	MODEL NO.	TIP SIZE	ALTERNATIVE FUEL PRESSURE RANGE (bar)	ALTERNATIVE FUEL FLOW RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
1601611	9690-5	5	0,34 – 1,03	396 – 1359	0,69 – 2,76	1642 – 5437
QC9783	9690-7	7	0,34 – 1,03	396 – 1359	0,69 – 2,76	1642 – 5437
1601629	9690-10	10	0,34 – 1,03	396 – 1359	0,69 – 2,76	1642 – 5437
QC9412	9690-10C	10C	0,34 – 1,03	396 – 1359	0,69 – 2,76	1642 – 5437

10593

Model

Light duty single tip tube

The model 10593 is a gooseneck tip tube used with 1090 tips which give you a variety of flame sizes to choose from. Using the separable tip tube design reduces the extra cost associated with additional tip sizes and/or replacement tips. All together with model 105 handles creates ergonomic and lightweight set for welding and brazing.

► **Material:** Brass



PART NO.	MODEL NO.	DESCRIPTION	TIP MODELS USED	LENGTH (cm)	WEIGHT (g)	GAP	SHAPE
9007620	10593	Gooseneck Tip Tube	10590	11,5	20,4	None	Gooseneck

10590

Model

Light duty single tip tube

The model 10590 series separable brazing tips are made of high-quality brass bar stock. They are precision drilled for more precise and consistent flames. They use a universal separable tip tube and mixer system eliminating the expense when replacing tips or changing to a different size.

► **Material:** Brass



10590



10590N

ACETYLENE					
PART NO.	MODEL NO.	FLOW (l/h)	THICKNESS (mm)	EQUAL PRESSURE (bar)	
				OXYGEN	ACETYLENE
1601160	105900	45	0,2 - 0,5	0,3 - 0,8	0,3 - 0,8
1601161	105901	65	0,5 - 1	0,3 - 0,8	0,3 - 0,8
1601163	105903	160	1 - 2	0,3 - 0,8	0,3 - 0,8
1601165	105905	350	2 - 4	0,3 - 0,8	0,3 - 0,8
1601166	105906	500	4 - 6	0,3 - 0,8	0,3 - 0,8

ALTERNATIVE FUELS					
PART NO.	MODEL NO.	FLOW (l/h)		EQUAL PRESSURE (bar)	
		OXYGEN	FUEL GAS	OXYGEN	FUEL GAS
1601170	105900N	120	30	0,3 - 1	0,3 - 1
1601171	105901N	200	50	0,3 - 1	0,3 - 1
1601173	105903N	550	140	0,3 - 1	0,3 - 1
1601175	105905N	900	225	0,3 - 1	0,3 - 1
1601176	105906N	1100	275	0,3 - 1	0,3 - 1

QC9501
QC9500
Model

Alternative fuel preformed twin brazing tips

Preformed twin tip design for return bend brazing where the tip can rest on the coil base plate protecting the plate and directing the flame on the joint. Also used for other applications where space is limited and heat needs to be precisely directed.

- **Weight:** 32 - 36 g
- **Material:** Stainless steel tip and brass base
- **Gap:** 1,57 cm
- **Flame Angle:** Up



PART NO.	MODEL NO.	LENGTH (cm)	DESCRIPTION	ALTERNATIVE FUEL PRESSURE RANGE (bar)	ALTERNATIVE FUEL FLOW RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
1601606	QC9501	17,78	Preformed Twin Tip	0,34 – 1,03	71 – 113	0,69 – 1,38	170 – 283
QC9500	QC9500	22,86	Preformed Twin Tip	0,34 – 1,03	71 – 113	0,69 – 1,38	170 – 283

QC9508
QC9509
Model

Alternative fuel preformed twin brazing tips

Preformed twin tip designed for smaller diameter tubing usually less than 1".

- **Weight:** 53 g
- **Material:** Stainless steel tip and brass base
- **Gap:** 0,89 cm
- **Flame Angle:** Flat



PART NO.	LENGTH (cm)	DESCRIPTION	ALTERNATIVE FUEL PRESSURE RANGE (bar)	ALTERNATIVE FUEL FLOW RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
QC9508	18,42	Preformed Twin Tip	0,34 – 1,03	71 – 113	0,69 – 1,38	170 – 283
QC9509	23,49	Preformed Twin Tip	0,34 – 1,03	71 – 113	0,69 – 1,38	170 – 283

QC9697
Model

Alternative fuel preformed twin brazing tips

Preformed twin tip designed for medium diameter tubing usually 0,5" to 2".

- **Weight:** 53 g
- **Material:** Stainless steel tip and brass base
- **Gap:** 2,35 cm
- **Flame Angle:** Flat



PART NO.	MODEL NO.	LENGTH (cm)	DESCRIPTION	ALTERNATIVE FUEL PRESSURE RANGE (bar)	ALTERNATIVE FUEL FLOW RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
1601609	QC9697	18,42	Preformed Twin Tip	0,69 – 1,38	99 – 184	1,03 – 1,72	255 – 552

QC9866
QC9866S
Model**Alternative fuel preformed twin brazing tips**

Preformed twin tip designed for medium diameter tubing usually 0,5" to 2".

- ▶ **Weight:** 68 g
- ▶ **Material:** Stainless steel tip and brass base
- ▶ **Gap:** 2,03 cm
- ▶ **Flame Angle:** Up



PART NO.	LENGTH (cm)	DESCRIPTION	ALTERNATIVE FUEL PRESSURE RANGE (bar)	ALTERNATIVE FUEL FLOW RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
QC9866	18,42	Preformed Twin Tip	0,69 – 1,38	99 – 184	1,03 – 1,72	255 – 552
QC9866S	13,33	Preformed Twin Tip	0,69 – 1,38	99 – 184	1,03 – 1,72	255 – 552

QC9859
Model**Alternative fuel preformed twin brazing tips**

Preformed twin tip designed for medium diameter tube brazing for standard HVAC applications. Includes cross bar for distance control and easy hang up.

- ▶ **Weight:** 57 g
- ▶ **Material:** Copper tip and brass base
- ▶ **Gap:** 2,54 cm
- ▶ **Flame Angle:** Flat

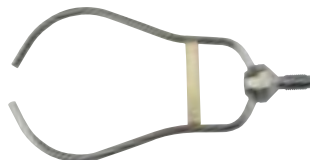


PART NO.	LENGTH (cm)	DESCRIPTION	ALTERNATIVE FUEL PRESSURE RANGE (bar)	ALTERNATIVE FUEL FLOW RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
QC9859	14,60	Preformed Twin Tip	0,34 – 1,03	85 – 241	0,69 – 1,38	170 – 580

QC9680
Model**Chrome alternative fuel preformed twin brazing tips**

Preformed twin tip designed for medium diameter tube brazing for standard HVAC applications. Includes cross bar for distance control and easy hang up.

- ▶ **Weight:** 57 g
- ▶ **Material:** Chrome plated copper and brass
- ▶ **Gap:** 2,54 cm
- ▶ **Flame Angle:** Flat



PART NO.	LENGTH (cm)	DESCRIPTION	ALTERNATIVE FUEL PRESSURE RANGE (bar)	ALTERNATIVE FUEL FLOW RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
QC9680	13,33	Chrome Preformed Twin Tip	0,34 – 1,03	85 – 241	0,69 – 1,38	170 – 580

QC9975 Model

Chrome alternative fuel preformed twin brazing tips

Chrome plated design is sometimes preferred for aluminum brazing applications.



PART NO.	LENGTH (cm)	DESCRIPTION	ALTERNATIVE FUEL PRESSURE RANGE (bar)	ALTERNATIVE FUEL FLOW RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
QC9975	15,88	Chrome Preformed Twin Tip	0,34 – 1,03	142 – 212	0,69 – 1,38	255 – 510

1390H 1390HA Model

Heating tips

The model 1390H and 1390HA tips are manufactured using environmentally-friendly tellurium copper that has excellent machining properties resulting in a higher quality tip. They are precision drilled for more precise and consistent flames. They use a universal separable tip tube and mixer system. All 1390 tips have a metal to metal tip contact seat virtually eliminating the possibility of leaks and the need for thread sealants.

► **Material:** Copper



1390-HA 1390-H

ACETYLENE					
PART NO.	MODEL NO.	OXYGEN PRESSURE (bar)	ACETYLENE PRESSURE (bar)	OXYGEN FLOW (l/h)	ACETYLENE FLOW (l/h)
1390HA	1390-HA	0,35	0,35	1100	1000

ALTERNATIVE FUELS							
PART NO.	MODEL NO.	LOW PRESSURE OXYGEN PRESSURE (bar)	LOW PRESSURE ACETYLENE PRESSURE (bar)	EQUAL PRESSURE OXYGEN PRESSURE (bar)	EQUAL PRESSURE ACETYLENE PRESSURE (bar)	OXYGEN FLOW (l/h)	ACETYLENE FLOW (l/h)
1390H	1390-H	3,5	0,5	3,5	1,0 - 0,5	4200	1050

Light duty heating, brazing, soldering torches

APPLICATIONS:

Heating, brazing, soldering with butane and propane- butane mixtures.

LightPro HD**FEATURES:**

- ▶ Solid forged brass body for maximum strength;
- ▶ Push button auto - ignition system (piezo);
- ▶ Long life adjusting valve;
- ▶ High quality EN417 connection.



LightPro HD

PART NO.	FUEL FLOW (kg/h)	CALORIES (kcal/m)
1400098	0,109	642,95

LightPro EZY**FEATURES:**

- ▶ Push button auto - ignition system;
- ▶ Long life adjustment valve;
- ▶ High quality bayonet connection.



LightPro EZY

PART NO.	FUEL FLOW (kg/h)	CALORIES (kcal/m)
1400096	0,0956	549,78

LightPro EKO**FEATURES:**

- ▶ Economical solution for heating, brazing and soldering;
- ▶ Stainless steel tip tube;
- ▶ Long life adjusting valve and high quality bayonet connection.



LightPro EKO

PART NO.	FUEL FLOW (kg/h)	CALORIES (kcal/m)
-	0,118	704,46

Thermo Kits

Portable air-fuel kit for brazing and soldering.

FEATURES:

- ▶ Piezo ignition;
- ▶ Adjustable flame;
- ▶ Anti-flare system;
- ▶ Ergonomic design;
- ▶ Changeable tips;
- ▶ Turbo flame;
- ▶ Lock bottom for continuous flame;
- ▶ Security system against accidental lighting;
- ▶ Body in die-casted aluminum;
- ▶ Fuel flow: 136 g/h;
- ▶ Power: 1,9 KW.



PRODUCT NO.

HTK

KIT CONTENTS

Heating torch with piezo ignition
2 Cartridges „Harris Propane-Mix“ non-refillable HTKLPC (UN 1978), 750 ml / 385 g
Adapter EU-US connections (HTK-Adapter)
Portable case

Oxygen Thermo Kits

Lightweight, portable kit for brazing and soldering with a high performance flame
Professional portable welding and brazing equipment for the welding of iron and steel, brazing and soldering with copper, silver or brass alloys. Oxygen Thermo Kit works with a special fuel gas “Harris Propane mix”. If this is mixed with oxygen, produces a very hot flame that up to 3300°C, more than oxygen-acetylene flame (3100°C) and an oxygen-propane flame (2500°C).



PRODUCT NO.

HTK0X

KIT CONTENTS

Torch
Hoses
Regulator oxygen and fuel gas
Check valves
Oxygen cylinder, non-refillable (UN 1072), 930 ml / 136 g
“Harris Propane-Mix” cartridge, non-refillable (UN 1978), 750 ml / 385 g
2 Tips (Ø 0,50 und Ø 0,65 mm)
Welding goggles
Stand

Professional air-fuel torch: HTK TORCH



PRODUCT NO.	CONNECTION THREAD
HTK Torch	7/16"

Adaptor for gas cartridge

EU – USA



PRODUCT NO.
HTK-ADAPTOR

Harris Oxygen

Oxygen non-refillable cylinder

- Diameter: 70 mm;
- Pressure: 110 bar.

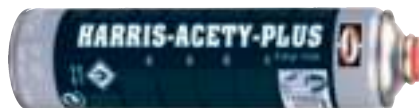


PRODUCT NO.	UN-CLASSIFICATION	VOLUME	CONNECTION THREAD	PCS PER PACKAGE
HTK0XC	1072	930 ml / 136 g	M10x1	12

Harris Acety-Plus

Non-refillable gas cartridge

- Upside-Down System: fully functional in any position (360°);
- For the best results please use with HTK TORCH.



PRODUCT NO.	UN-CLASSIFICATION	VOLUME	CONNECTION THREAD	PCS PER PACKAGE
HTKPLUSC	2037	380 ml / 220 g	7/16"	12

Harris Propan-Mix

Non-refillable gas cartridge

- High-performance gas additive "Chemtane 2";
- Flame temperature up to 3300°C with oxygen.



PRODUCT NO.	UN-CLASSIFICATION	VOLUME	CONNECTION THREAD	PCS PER PACKAGE
HTKLPC	1978	380 ml / 220 g	7/16"	6

KIT EASY TO USE 1

KITEASY1AC & KITEASY1AC-10

**Fully assembled kit
for oxygen - acetylene brazing**



THE KIT EASY TO USE 1 INCLUDES:

► Model 601 oxygen and acetylene regulators:

- for light duty welding and brazing;
- cylinder gas supplied;
- maximum inlet pressure 230 bar;
- compact, single stage;
- rugged construction;
- forged brass body and bonnet;
- 50 mm solid and safety gauges;
- 7 years warranty;
- rear inlet connection.



601-1.5-AC



601D-10-0X

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m³/h)	DELIVERY PRESSURE GAUGE (bar)	SUPPLY PRESSURE GAUGE (bar)
601-1.5-AC	Acetylene	25	0 - 1,5	7	0 - 2,5	0 - 40
601D-10-0X	Oxygen	230	0 - 10	42	0 - 16	0 - 315

► Yoke for acetylene assembly.

► Regulator flashback arrestors

- 188-RGB for oxygen and 188-LGB for acetylene:

- prevent reverse flow of gases with built-in check valve;
- extinguish flashback fire with sintered metal filter;
- maximum gas flow up to 30 000 l/h for fuel gas and 100 000 l/h for oxygen;
- maximum gas pressure 1,5 bar for acetylene and 15 bar for oxygen.



YOKE

188-(RGB & LGB)

► Torch handle 19-6:

- light weight handle (only 240 g);
- silver brazed twin tube construction for safety and durability;
- ball valve for fast and accurate flame adjustment.



19-6

► 88-6SVL and 88-6SVR check valves:

- help prevent dangerous reverse flow mixing of gas in the hose;
- compact light weight design;
- maximum gas pressure: acetylene 1,5 bar; oxygen 20 bar.

► L-19-3 acetylene welding and brazing tip:

- welding up to 2 mm;
- flow 160 l/h;
- gas pressure: 2,5 bar oxygen and 0,015 – 0,2 fuel gas.



L-19

► Gas hose: twin hose for acetylene and oxygen 6 mm, with fittings:

- 5 m: KITEASY1AC;
- 10 m: KITEASY1AC-10.

KIT EASY TO USE 2

KITEASY2LP & KITEASY2LP-10

**Fully assembled kit
for oxygen - alternative fuel
brazing**

**THE KIT
EASY TO USE 2
INCLUDES:**



► **Model 601 oxygen and propane regulators:**

- for light duty welding and brazing;
- cylinder gas supplied;
- maximum inlet pressure 230 bar;
- compact, single stage;
- rugged construction;
- forged brass body and bonnet;
- 50 mm solid and safety gauges;
- 7 years warranty;
- rear inlet connection.



601-4-LP



601D-10-0X

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m³/h)	DELIVERY PRESSURE GAUGE (bar)	SUPPLY PRESSURE GAUGE (bar)
601-4-LP	Propane	25	0 - 4	20	0 - 6	0 - 40
601D-10-0X	Oxygen	230	0 - 10	42	0 - 16	0 - 315

► **Regulator flashback arrestors
- 188-RGB for oxygen and 188-LGB for fuel gas:**

- prevent reverse flow of gases with built-in check valve;
- extinguish flashback fire with sintered metal filter;
- maximum gas flow up to 30 000 l/h for fuel gas and 100 000 l/h for oxygen;
- maximum gas pressure 5 bar for propane, 3,5 for hydrogen and 15 bar for oxygen.



188-(RGB & LGB)

► **Torch handle 19-6:**

- light weight handle (only 240 g);
- silver brazed twin tube construction for safety and durability;
- ball valve for fast and accurate flame adjustment.



19-6

► **88-6SVL and 88-6SVR check valves:**

- help prevent dangerous reverse flow mixing of gas in the hose;
- compact light weight design;
- maximum gas pressure: propane 5 bar; oxygen 20 bar.

► **L-19-3N propane brazing tip:**

- flow - oxygen 550 l/h and 140 l/h fuel gas;
- gas pressure: 1,0 bar oxygen and 0,015 – 0,2 fuel gas.



L-19

► **Gas hose: twin hose for fuel gas and oxygen 6 mm, with fittings:**

- 5 m: KITEASY2LP;
- 10 m: KITEASY2LP-10.

	OXY – FUEL	AIR FUEL
General applications	Suited for production brazing and soldering	Suited for installation and repair in field
	Fast / high-volume work	Confined spaces, portability and versatility
	Thicker base metals	Thinner base metals
Cost	More expensive	Less expensive
Performance	Higher temperature: up to 3300°C	Lower temperature: up to 1600°C
	High flame intensity - heat transfer fast	Low flame intensity – heat transfer slow
	Confined heat zone	Broad heat zone
	Generally tips have a narrow operating range	Tips have a wide operating range
	Larger size and weight - less convenient to use	Smaller size and weight - more convenient to use
Safety	Less safe due to possibility of flashbacks	Very stable
	More expensive to repair	Durable and less expensive to repair
	Rules and regulation pertaining to safe transport of gases more complex	Gases can be transported with less restrictions

The full range of Harris equipment available in the International Equipment Catalogue and on www.harrisproductsgroup.com

GAS BLOCK™

GAS BLOCK™

The lever on the Gas Block™ acts as an on/off control which eliminates the need to reset the torch each time it is used and offers quick ignition. The Gas Block™ comes equipped with a set screw and lock nut which allows the user to easily adjust the shut off lever. The Gas Block™ is a safer option than other competitive models that pose a safety risk with open flames. It is available in two and three gas version. The three gas version offers control of the nitrogen purge line for brazing applications.

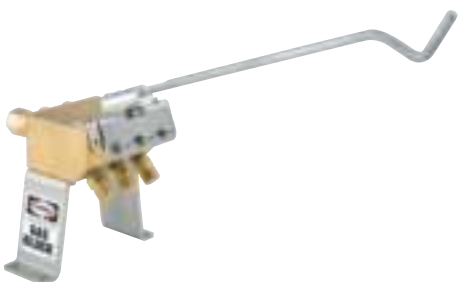
Ask the Pros at Harris to help document a nitrogen gas cost savings today.

- ▶ **Capacity:** Heavy Duty
- ▶ **Where Used:** Brazing stations, gas welding stations, test labs, schools, and training centers
- ▶ **Weight:** 2 Gas - 1,59 kg 3 Gas - 2,22 kg
- ▶ **Related Items:** LightPro Spark P/N: 4304535

FEATURES AND BENEFITS:

BOTH 2 GAS VERSION
& 3 GAS VERSION

- ▶ Heavy-duty rigid design with a laser cut and formed 10 gauge stainless steel base
- ▶ Welded stainless steel swivel bracket and stainless steel plunger
- ▶ Can be used with the LightPro Spark, Harris' electric ignitor, and the valveless torches on the Perfect Flame™



ADDITIONAL BENEFITS 3 GAS VERSION

- ▶ Offers control of the nitrogen purge line for brazing applications
- ▶ Ensures nitrogen use compliance – when the torch is lit, the nitrogen is on
- ▶ Offers nitrogen cost reduction – gas won't flow when the operator is away
- ▶ Offers greater control of nitrogen usage with the ability to turn the purge line on and off with the flame

PART NO.	DESCRIPTION	GAS	INLET CONNECTION	OUTLET CONNECTION
4300943	Gas Block, 2 Gas Assembly	Propane, Natural Gas, Hydrogen, Propylene, Acetylene	Fuel 9/16" - 18 (LH) Oxy 9/16" - 18 (RH)	Fuel 9/16" - 18 (LH) Oxy 9/16" - 18 (RH)
4300944	Gas Block, 3 Gas Assembly	Propane, Natural Gas, Hydrogen, Propylene, Acetylene	Fuel 9/16" - 18 (LH) Oxy 9/16" - 18 (RH)	Fuel 9/16" - 18 (LH) Oxy 9/16" - 18 (RH)
		Nitrogen	Inert 5/8" - 18 (F)	Inert 1/4" NPT (M)

Check Valves

- ▶ Torch type;
- ▶ Help prevent dangerous reverse flow mixing of gas in the hose;
- ▶ Compact light weight design add extra operator safety.



88-6CVT (L&R)

PART NO.	FUEL GAS	MAX PRESSURE (bar) *				INLET THREAD	OUTLET THREAD
		OX	AC	LPG	H ₂		
88-6SVL	Fuel gas	-	1.5	5	20	G 1/4" A-LH-UNI ISO 228	G 1/4"-LH-UNI ISO 228
88-6SVR	Ox	20	-	-	-	G 1/4" A-RH-UNI ISO 228	G 1/4"-RH-UNI ISO 228
88-4CVL**	Fuel gas	-	1.5	5	20	9/16"-18-UNF-2A-LH	9/16"-18-UNF-3B-LH
88-4CVR**	Ox	20	-	-	-	9/16"-18-UNF-2A-RH	9/16"-18-UNF-3B-RH
88-6AL	Fuel gas	-	1.5	5	20	.622"-18-UN-2A-LH	9/16"-18-UNF-3B-LH
88-6AL1	Fuel gas	-	1.5	5	20	.622"-18-UN-2A-LH	.622"-18-UN-LH
88-6AR	Ox	20	-	-	-	.622"-18-UN-2A-RH	9/16"-18-UNF-3B-RH
88-6AR1	Ox	20	-	-	-	.622"-18-UN-2A-RH	.622"-18-UN-RH
88-6CTL	Fuel gas	-	1.5	5	20	M16x1.5-6G-LH	M16x1.5-6G-LH
88-6CTR	Ox	20	-	-	-	M16x1.5-6G-RH	M16x1.5-6G-RH
88-6CVTL	Fuel gas	-	1.5	5	20	9/16"-18-UNF-2A-LH	9/16"-18-UNF-2B-LH
88-6CVTR	Ox	20	-	-	-	9/16"-18-UNF-2A-RH	9/16"-18-UNF-2B-RH
88-6FL	Fuel gas	-	1.5	5	20	M16x1.5-6G-LH	9/16"-18-UNF-3B-LH
88-6FR	Ox	20	-	-	-	M16x1.5-6G-RH	9/16"-18-UNF-3B-RH
88-6GBL	Fuel gas	-	1.5	5	20	G 3/8" A-LH-UNI ISO 228	G 3/8"-LH-UNI ISO 228
88-6GBR	Ox	20	-	-	-	G 3/8" A-RH-UNI ISO 228	G 3/8"-RH-UNI ISO 228
88-6GBR1	Ox	20	-	-	-	G 3/8" A-RH-UNI ISO 228	9/16"-18-UNF-3B-RH
88-6GL	Fuel gas	-	1.5	5	20	G 3/8" A-LH-UNI ISO 228	9/16"-18-UNF-3B-LH
88-6GR	Ox	20	-	-	-	G 1/4" A-RH-UNI ISO 228	9/16"-18-UNF-3B-RH

*1 bar=100 kPa

**Regulator type



**AS MANUFACTURERS
STRIVE TO REDUCE
OVERALL COSTS,**

**HARRIS CAN ASSIST IN
THOSE EFFORTS.**

**OUR TECHNICAL TEAM IS
FOCUSED ON COST REDUCTION
SOLUTIONS FOR SPECIFIC
APPLICATIONS IN YOUR PLANT.**

Please contact us: marketingharris@lincolnelectric.eu



THE HARRIS PRODUCTS GROUP
www.harrisproductsgroup.com

Flashback Arrestors

Harris® flashback arrestors are manufactured to international standards (EN 730-1 / ISO 5175) and regulations (TRAC207- flashback arrestors) and are independently certified by leading institutes like the German BAM and the American UL.

- ▶ Prevent reverse flow of gases with built-in check valve;
- ▶ Extinguish flashback fire with sintered metal filter;
- ▶ Thermal cut-off which positively shuts off the gas in case of hose fire, burn or repeated flashbacks (only T versions);
- ▶ Pressure operated cut-off which positively shuts off the gas when pressure exceeds (only 3T versions).



Regulator type

PART NO.	GAS	MAX FLOW (l/h)	MAX PRESSURE (bar) *				INLET THREAD	OUTLET THREAD
			OX	AC	LPG	H ₂		
188-L	Fuel gas	30,000	-	1,5	5	3,5	9/16"-18-UNF-2B-LH	9/16"-18-UNF-2A-LH
188-R	Ox	100,000	25	-	-	-	9/16"-18-UNF-2B-RH	9/16"-18-UNF-2A-RH
188-LGB	Fuel gas	30,000	-	1,5	5	3,5	G 3/8"-LH-UNI ISO 228	G 3/8" A-LH-UNI ISO 228
188-RGB	Ox	100,000	15	-	-	-	G 3/8"-RH-UNI ISO 228	G 3/8" A-RH-UNI ISO 228
188-2L	Fuel gas	60,000	-	1,5	5	4,0	9/16"-18-UNF-2B-LH	9/16"-18-UNF-2A-LH
188-2R	Ox	180,000	25	-	-	-	9/16"-18-UNF-2B-RH	9/16"-18-UNF-2A-RH
188-2AL	Fuel gas	60,000	-	1,5	5	4,0	5/8"-18-UNF-LH	5/8"-18-UNF-LH
188-2AR	Ox	180,000	25	-	-	-	5/8"-18-UNF-RH	5/8"-18-UNF-RH
188-2LGB	Fuel gas	60,000	-	1,5	5	4,0	G 3/8"-LH-UNI ISO 228	G 3/8" A-LH-UNI ISO 228
188-2RGB	Ox	180,000	25	-	-	-	G 3/8"-RH-UNI ISO 228	G 3/8" A-RH-UNI ISO 228
188-GL	Fuel gas	30,000	-	1,5	5	3,5	G 1/4"-LH-UNI ISO 228	G 1/4" A-LH-UNI ISO 228
188-GR	Ox	100,000	25	-	-	-	G 1/4"-RH-UNI ISO 228	G 1/4" A-RH-UNI ISO 228
188-FFL	Fuel gas	30,000	-	1,5	5	3,5	M16x1,5-6H-LH	M16x1,5-6G-LH
188-FFR	Ox	100,000	15	-	-	-	M16x1,5-6H-RH	M16x1,5-6G-RH

*1 bar=100 kPa

PART NO.	GAS	MAX FLOW (l/h)	MAX PRESSURE (bar) *				INLET THREAD	OUTLET THREAD
			OX	AC	LPG	H ₂		
188-TL	Fuel gas	30,000	-	1,5	5	3,5	9/16"-18-UNF-2B-LH	9/16"-18-UNF-2A-LH
188-TR	Ox	100,000	25	-	-	-	9/16"-18-UNF-2B-RH	9/16"-18-UNF-2A-RH
188-TAL	Fuel gas	30,000	-	1,5	5	3,5	5/8"-18-UNF-LH	5/8"-18-UNF-LH
188-TAR	Ox	100,000	25	-	-	-	5/8"-18-UNF-RH	5/8"-18-UNF-RH
188-TLGB	Fuel gas	30,000	-	1,5	5	3,5	G 3/8"-LH-UNI ISO 228	G 3/8" A-LH-UNI ISO 228
188-TRGB	Ox	100,000	15	-	-	-	G 3/8"-RH-UNI ISO 228	G 3/8" A-RH-UNI ISO 228
188-2TAL	Fuel gas	60,000	-	1,5	5	4,0	5/8"-18-UNF-LH	5/8"-18-UNF-LH
188-2TAR	Ox	180,000	25	-	-	-	5/8"-18-UNF-RH	5/8"-18-UNF-RH
188-2TL	Fuel gas	60,000	-	1,5	5	4,0	9/16"-18-UNF-2B-LH	9/16"-18-UNF-2A-LH
188-2TR	Ox	180,000	25	-	-	-	9/16"-18-UNF-2B-RH	9/16"-18-UNF-2A-RH
188-2TLGB	Fuel gas	60,000	-	1,5	5	4,0	G 3/8"-LH-UNI ISO 228	G 3/8" A-LH-UNI ISO 228
188-2TRGB	Ox	180,000	25	-	-	-	G 3/8"-RH-UNI ISO 228	G 3/8" A-RH-UNI ISO 228

*1 bar=100 kPa

PART NO.	GAS	MAX FLOW (l/h)	MAX PRESSURE (bar) *				INLET THREAD	OUTLET THREAD
			OX	AC	LPG	H ₂		
188-3TLGB	Fuel gas	60,000	-	1,5	5	4,0	G 3/8"-LH-UNI ISO 228	G 3/8" A-LH-UNI ISO 228
188-3TRGB	Ox	180,000	15	-	-	-	G 3/8"-RH-UNI ISO 228	G 3/8" A-RH-UNI ISO 228

*1 bar=100 kPa

Hose to Hose type

PART NO.	GAS	MAX FLOW (l/h)	MAX PRESSURE (bar) *				INLET THREAD	OUTLET THREAD
			OX	AC	LPG	H ₂		
188-TTL6	Fuel gas	20,000	-	1,5	4	4,0	Ø hose 1/4"(6 mm)	Ø hose 1/4"(6 mm)
188-TTR6	Ox	65,000	20	-	-	-	Ø hose 1/4"(6 mm)	Ø hose 1/4"(6 mm)
188-TTL8	Fuel gas	20,000	-	1,5	4	4,0	Ø hose 5/16"(8 mm)	Ø hose 5/16"(8 mm)
188-TTR8	Ox	65,000	20	-	-	-	Ø hose 5/16"(8 mm)	Ø hose 5/16"(8 mm)

*1 bar=100 kPa



188- (L & R)



188-2 (L & R)



188-T (L & R)



188-3T (LGB & RGB)



188-TT (L6 & R6)

Flashback Arrestors

Torch type

PART NO.	GAS	MAX FLOW (l/h)	MAX PRESSURE (bar) *				INLET THREAD	OUTLET THREAD
			OX	AC	LPG	H ₂		
188-1GBL6	Fuel gas	20,000	-	1,5	4	4,0	Ø hose 1/4"(6 mm)	G 3/8"-LH-UNI ISO 228
188-1GBR6	Ox	65,000	20	-	-	-	Ø hose 1/4"(6 mm)	G 3/8"-RH-UNI ISO 228
188-1GBL8	Fuel gas	20,000	-	1,5	4	4,0	Ø hose 5/16"(8 mm)	G 3/8"-LH-UNI ISO 228
188-1GBR8	Ox	65,000	20	-	-	-	Ø hose 5/16"(8 mm)	G 3/8"-RH-UNI ISO 228
188-1GL6	Fuel gas	20,000	-	1,5	4	4,0	Ø hose 1/4"(6 mm)	G 1/4"-LH-UNI ISO 228
188-1GR6	Ox	65,000	20	-	-	-	Ø hose 1/4"(6 mm)	G 1/4"-RH-UNI ISO 228
188-1L6	Fuel gas	20,000	-	1,5	4	4,0	Ø hose 1/4"(6 mm)	9/16"-18-UNF-2A-LH
188-1R6	Ox	65,000	20	-	-	-	Ø hose 1/4"(6 mm)	9/16"-18-UNF-2A-RH
188-1L8	Fuel gas	20,000	-	1,5	4	4,0	Ø hose 5/16"(8 mm)	9/16"-18-UNF-2A-LH
188-1R8	Ox	65,000	20	-	-	-	Ø hose 5/16"(8 mm)	9/16"-18-UNF-2A-RH
188-GGAL	Fuel gas	20,000	-	1,5	4	4,0	5/8"-18-UNF-LH	5/8"-18-UNF-LH
188-GGAR	Ox	65,000	15	-	-	-	5/8"-18-UNF-RH	5/8"-18-UNF-RH
188-GGBL	Fuel gas	20,000	-	1,5	4	4,0	G 3/8" A-LH-UNI ISO 228	G 3/8"-LH-UNI ISO 228
188-GGBR	Ox	65,000	15	-	-	-	G 3/8" A-RH-UNI ISO 228	G 3/8"-RH-UNI ISO 228
188-GGL	Fuel gas	20,000	-	1,5	4	4,0	G 1/4" A-LH-UNI ISO 228	G 1/4"-LH-UNI ISO 228
188-GGR	Ox	65,000	15	-	-	-	G 1/4" A-RH-UNI ISO 228	G 1/4"-RH-UNI ISO 228
188-GGL	Fuel gas	20,000	-	1,5	4	4,0	9/16"-18-UNF-2A-LH	9/16"-18-UNF-2B-LH
188-GGR	Ox	65,000	15	-	-	-	9/16"-18-UNF-2A-RH	9/16"-18-UNF-2B-RH

*1 bar=100 kPa



188-1G (L6 & R6)



188-GG (L & R)

Converters

PART NO.	FROM (FEMALE)	TO (MALE)
38-2AL	9/16"-18-UNF-3B-LH	.622"-18-UN-LH
38-2AR	9/16"-18-UNF-3B-RH	.622"-18-UN-RH
38-2FL	9/16"-18-UNF-3B-LH	M16x1,5-6G-LH
38-2FR	9/16"-18-UNF-3B-RH	M16x1,5-6G-RH
38-2GBL	9/16"-18-UNF-3B-LH	G 3/8" A-LH-UNI ISO 228
38-2GBR	9/16"-18-UNF-3B-RH	G 3/8" A-RH-UNI ISO 228
38-2GR	9/16"-18-UNF-3B-RH	G 1/4" A-RH-UNI ISO 228
38-4GL	9/16"-18-UNF-3B-LH	G 1/4" A-LH-UNI ISO 228
38-3FL	M16x1,5-4H-LH	9/16"-18-UNF-2A-LH
38-3FR	M16x1,5-4H-RH	9/16"-18-UNF-2A-RH
38-5GL	G 1/4"-LH-UNI ISO 228	9/16"-18-UNF-2A-LH
38-5GR	G 1/4"-RH-UNI ISO 228	9/16"-18-UNF-2A-RH
38-6GL	G 3/8"-LH-UNI ISO 228	9/16"-18-UNF-2A-LH
38-6GR	G 3/8"-RH-UNI ISO 228	9/16"-18-UNF-2A-RH



38-2GBL



38-2GBR

Stems & Nuts

Inlet stems & Nuts are supplied according to country specification.



Flux grade twin hose

RED & BLUE FLUX GRADE TWIN HOSE – International standard for all fluxed fuel gases. Available in 3 and 6 meter lengths.

Hose Diameters:

3,2 mm : TA3.2X3.2FLX

4 mm : TA4X4FLX

6 mm : TA6X6FLX



TA3.2x3.2FLX with 15-4 torch

*Orange & Blue and Red & Blue Non-FLUX Grade hoses also available upon request.

**HAVING THE RIGHT TOOLS FROM
HARRIS® WILL RESULT IN**

**A JOB
WELL DONE,
EVERY TIME**

LightPro Spark

The LightPro Spark is a portable, hands-free piezoelectric ignitor for use in repetitive brazing operations. When the lever is depressed the piezoelectric ignitor is engaged and a spark is created. It offers a quicker and more reliable ignition compared to typical hand held strikers and offers greater safety than open pilot lights used in some production areas. The unit is battery powered and eliminates the need for an external power source.

APPLICATION:

- ▶ Brazing and welding operations
- ▶ **Capacity:** Medium duty
- ▶ **Housing:** Zinc die cast
- ▶ **Weight:** 0,20 kg

FEATURES AND BENEFITS:

- ▶ Safer and less expensive than an open pilot light;
- ▶ Replaces manual hand-held strikers;
- ▶ Shock proof, metal housing;
- ▶ Powered by two standard AA batteries (not included);
- ▶ Compact design – 5,08 x 7,62 x 10,16 cm;
- ▶ No need to replace striker flint;
- ▶ Not recommended for use with large multi-flame heating tips.



PART NO.	DESCRIPTION	OUTPUT	IGNITION CYCLES
4304535	Ignitor, LightPro Spark	14K	100,000

LIGHTING PROCEDURE

- ✓ The LightPro Spark includes plastic components under the trigger mechanism that can melt and cause failures if lit improperly.
- ✗ To ensure maximum life out of each unit make sure to light the torch properly as shown in the figures to the right. Improper lighting will cause failures.



Other accessories

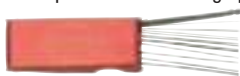
WRENCH



D-1013

TIP CLEANER

Calibrated tip cleaner for brazing tips



C-9

LIGHTER WITH FLINT



26-SL



P/N: 9005591



P/N: 9001436

BRAZING AND SOLDERING ALLOYS



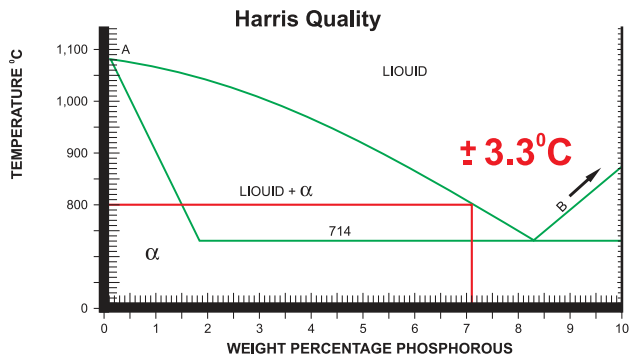
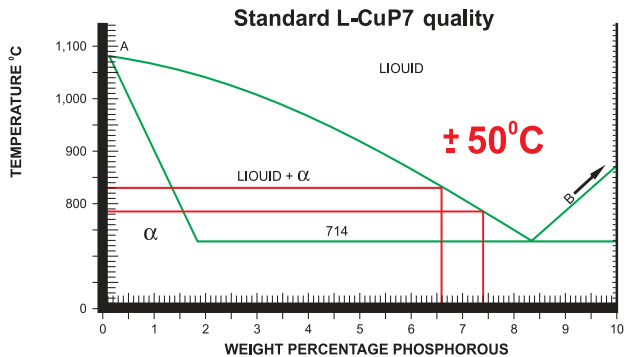
The Harris Products Group is the brazing industries frontrunner in developing the technology to control phosphorous content. The melting range is so precise, that brazing operators no longer need to make temperature adjustments from one batch to the next. Operators know that with Harris alloys, the result will be the same with every batch, every time. Its technology is so accurate that The Harris Products Group guarantees users a liquidus temperature variation of no more than $\pm 3,3^{\circ}\text{C}$ - a much tighter standard than industry requires.

Over the decades many things have changed in our industry. But our dedication to making the world's purest and most consistent brazing alloys has not changed; we are committed to giving you the best tool to do your job.

All alloys are available in rods, solid wires and rings in both metric and imperial sizes according to European and American standards.

SAVE MONEY USING HARRIS PHOSPHOROUS CONTROLLED PRODUCTS

$\pm 3,3^{\circ}\text{C}$ liquidus point fluctuation from batch to batch.



BLOCKADE™

Copper-phosphorous alloy engineered to join copper, brass or bronze

- cost saving alternative to silver-bearing copper brazing alloy, such as L-Ag2P and L-Ag5P and silver solders in many different applications;
- low melting temperature;
- high flow.

DYNAFLOW™

Copper-phosphorous alloy with 6% silver to join copper, brass or bronze

- cost saving alternative to alloys with 15% silver content;
- excellent strength and ductility;
- wide melting range.

BLOCKADE™

Blockade™ is a proprietary phosphorus-tin-silicon alloy engineered to provide a low cost alternative to silver bearing filler metals. It is self-fluxing on copper and its lower melting temperature makes it an excellent choice for brass. Blockade™ flows rapidly but can be used to “cap” brazed joints.

HARRIS 0™

This low cost alloy is suitable for most copper to copper or brass joints where good fit-up exists, and the assemblies are not subject to excessive vibration nor movement.

DYNAFLOW™

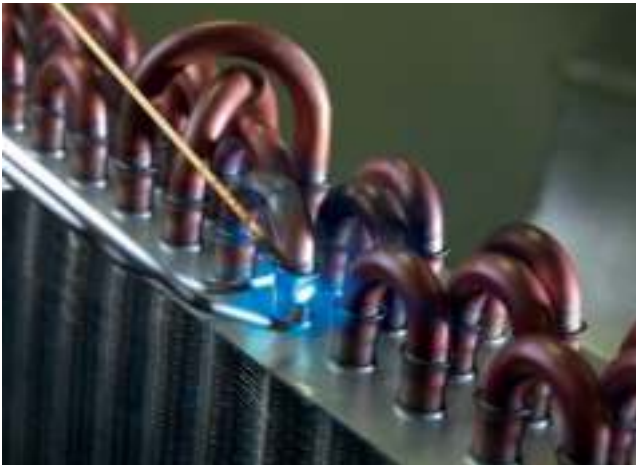
Dynaflow™ melts and flows at temperatures very close to L-Ag15P and provides comparable brazed mechanical properties. This makes Dynaflow™ an excellent cost effective alternative to the 15% silver alloys. This premium, medium range silver alloy has been meticulously formulated to even tighter specifications than our standard copper-to-copper alloys.

STAY-SILV™2HP

This low silver, high phosphorus content alloy is an excellent choice for OEM customers who want to reduce silver content. The alloy flows quickly and melts at a very low temperature of 643-763°C to ensure flow into the capillary.

STAY-SILV™15HP

One of our most forgiving alloys with a wide melting range that helps our customers where wide gap clearance in the capillary from 0,05-0,015 mm are a concern. Very common in both OEM and aftermarket business for its ability to reduce leaks.



COPPER PHOSPHOROUS ALLOYS

ALLOY	DIN ISO17672	EN-1044	AWS A5.8	Cu %	P %	Ag %	Sn %	OTHER
L-CuP6	CuP 179	CP 203	-	R/B*	6,50	-	-	0,25
Harris 0™	-	-	-	R/B*	7,10	-	-	-
L-CuP7	CuP 180	CP 202	BCuP-2	R/B*	7,40	-	-	-
Harris 0™HP	CuP 181	CP 202	BCuP-2	R/B*	7,40	-	-	-
L-CuP8 (Flash™)	CuP 182	CP 201	-	R/B*	8,10	-	-	-
Blockade™	-	-	-	R/B*	6,50	-	6,50	Si 0,2
L-CuPSn7	CuP 386	CP 302	-	R/B*	6,50	-	6,80	-
Phoson	-	-	-	R/B*	7,30	0,10	-	-
Stay Silv™ 01T	-	-	-	R/B*	6,10	1,10	-	0,05
Stay Silv™ 2LP	CuP 279	-	-	R/B*	6,60	2,00	-	-
L-Ag2P	CuP 279	CP 105	-	R/B*	6,40	2,00	-	-
Stay Silv™ 2	CuP 280	-	BCuP-6	R/B*	7,00	2,00	-	-
Stay Silv™ 2HP	-	-	-	R/B*	7,40	2,00	-	-
Stay Silv™ 5LP	-	-	-	R/B*	5,70	5,00	-	-
Stay Silv™ 5	CuP 281	-	BCuP-3	R/B*	6,00	5,00	-	-
L-Ag5P	CuP 281	CP 104	-	R/B*	5,90	5,00	-	-
Stay Silv™ 5HP	-	-	-	R/B*	6,40	5,00	-	-
Dynaflow™	-	-	-	R/B*	6,10	6,00	-	-
L-Ag15P (Stay Silv™15)	CuP 284	CP 102	BCuP-5	R/B*	5,00	15,50	-	-
L-Ag18P	CuP 286	CP 101	-	R/B*	7,30	18,00	-	-

TABLE FOR COPPER PHOSPHOROUS ALLOYS

MELTING RANGE °C	SPECIFIC WEIGHT g/cm ³	FLUIDITY RATING*	TYPICAL APPLICATION
710 - 890	8,10	4	For copper. Good choice where joint tolerances cannot be maintained.
710 - 802	8,05	5	For copper. Requires medium fit- up 0,05 – 0,178 mm (.002 – .007") clearance.
710 - 785	8,05	6	For copper. Fluid alloy, requires good fit- up 0,05 – 0,152 mm (.002 – .006") clearance.
710 - 785	8,00	6,5	For copper. Most popular for brazing copper return bends in automated process.
710 - 727	8,00	8	For copper. Very fluid for close joint tolerances 0,50 – 0,102 mm (.002 – 0.004") clearance. Excellent for speeding up the brazing of Return Bends.
637 - 674	8,00	7	For copper or brass. Lower brazing temperature, excellent replacement for silver bearing phosphorus alloys. Can also be used to replace some high silvers for copper to copper or copper to brass joints. It has good fluidity, yet it has the unique ability to form a cap at the joint.
650 - 700	8,00	6	For copper or brass connections. Low brazing temperature. Good fluidity for close joint tolerances.
710 - 785	8,00	6	Nominal addition of silver helps to enhance flow and handling properties. Ideally suited for brazing copper, brass and bronze where its high fluidity permits penetration into the close fit ups encountered in most applications.
699 - 846	8,00	3	Economical brazing of copper and brass. Requires medium fit- up 0,05 – 0,127 mm (.002 – .005") clearance.
643 - 816	8,00	3	Sluggish flow, used for copper joints with wider clearance 0,076 – 0,152 mm (.003 – .006")
645 - 825	8,00	3,5	Broadens melting range of Harris 0. For copper or brass. Clearance range 0,076 – 0,127 mm (.003 – .005").
643 - 788	8,00	4	Broadens melting range of Harris 0. For copper or brass. Clearance range 0,05 – 0,127 mm (.002 – .005")
643 - 763	8,00	5	For copper or brass. More fluid. Clearance range 0,05 – 0,127 mm (.002 – .005")
643 - 835	8,10	2	For copper or brass. Use when fit-up cannot be controlled. Clearance range 0,076 – 0,127 mm (.003 – .005")
643 - 816	8,10	3	For copper or brass. Use to bridge gaps where close fit-up cannot be maintained.
645 - 815	8,10	3	For copper or brass. Use to bridge gaps where close fit-up cannot be maintained.
643 - 785	8,10	4	For copper or brass. Slightly more fluid, use with clearance of 0,076 – 0,127 mm (.003 – .005")
643 - 796	8,20	3	Premium alloy for copper or brass. Excellent strength and ductility, use as replacement for L-Ag15P.
645 - 800	8,40	3	Copper or brass. Useful for wide clearance of 0,05 – 1,78 mm (.002 – .007). Good ductility.
645 - 645	8,60	8	Copper to copper or copper to brass. Eutectic alloy with low temperature and highly fluidity. Suited for automated brazing operation such as those with rings.

R/B*- Remainder/ balance

Fluidity Rating*- the higher the fluidity rating, the faster the alloy flows within the melting range.



THE HARRIS PRODUCTS GROUP
www.harrisproductsgroup.com

ALUMINUM ALLOYS



Aluminum and aluminum alloys are brazed using similar procedure to those used for brazing other metals except that different fluxes, different filler metals and generally lower brazing temperatures are used. Not all aluminum alloys can be brazed, the high strength wrought aluminum alloys and certain casting alloys contain high amount of alloying ingredients that often prevent adequate wetting due to their unique oxide film combination.

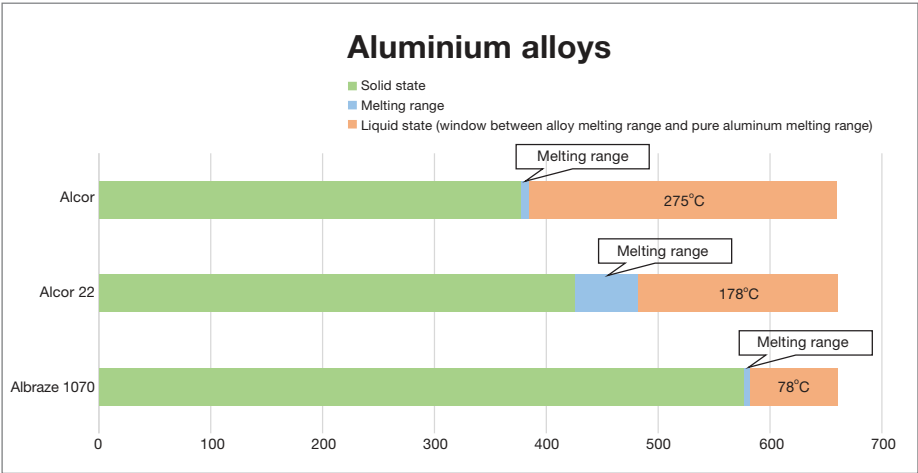


TABLE FOR ALUMINUM ALLOYS

ALLOY	Al %	Si %	Mg %	Zn %	Sn %	OTHER %	MELTING RANGE °C	TYPICAL APPLICATION
Al-Braze™ 1070	88	12	-	-	-	-	577-582	Superior brazing alloy for joining aluminum to aluminum. Free - flowing with unequaled capillary attraction, ductility and penetration. Not recommended for brazing Aluminum directly to non-aluminum alloys as the joint may become brittle. Excellent corrosion resistance with a tensile strength up to 241N/mm ² .
Alcor™	2	-	-	98	-	-	377-385	Very easy to use aluminum alloy with non corrosive flux inside the wire; no external flux is required. Designed for the repair of heat exchangers, air conditioners, aluminum alloy condensers and other applications. Very good fluidity with good capillary attraction. Tensile strength up to 241 N/mm ² .
Alcor™ 22	22	-	-	78	-	-	426-492	New approach for joining aluminum. A low temperature flux cored alloy recommended for brazing aluminum. Wider melting range than aluminum silicon alloys. Useful for both wide and close clearances.
Coral™	87	6	6	0,5	-	0,5	568-623	Flux cored aluminum alloys which is able to produce either this flowing of bead forming characteristics. Aluminum to aluminum; Not recommended for brazing directly to non-aluminum alloys. By adjustment of the temperature of the torch flame, it can be applied out of position with absolute control. Tensile strength up to 207 N/mm ² .
AlSolder™ 500	-	-	-	15	85	-	199-248	Solder alloy for torch on iron. Used to join all solderable aluminum alloys to each other and to dissimilar metals. Also for zinc die cast. Forms excellent, corrosion resistant joints. Not recommended for magnesium. Tensile strength up to 138N/mm ² .

FLUXES FOR ALUMINUM JOINING

FLUX	ACTIVE RANGE °C	APPLICATION
Al-Braze™ flux	500 - 700	Flux designed to be used in aluminum joints 4043 / 4047.
Stay Clean™ Aluminum Flux	177- 288	To be used with AlSolder 500 alloys (Sn Zn). Forms excellent corrosion resistant joints on the tough-to-solder aluminum alloys.





Flux Cored

ALUXCOR® is a new family of aluminum flux cored alloys with excellent strength and corrosion resistance for joining aluminum to aluminum or aluminum-to-copper or brass. Free flowing with unequaled capillary attraction, ductility, and penetration.

ADVANTAGES:

- ▶ Core design releases the flux only after sufficient preheating so both the flux and alloy flows at the right time into the capillary;
- ▶ Strict flux percentage tolerance ensures that the flux is consistent throughout the wire for repeatable high performance flow of the alloy;
- ▶ Non-corrosive and non-hygroscopic flux with no binder;
- ▶ Proprietary custom flux blends available for customer specific applications;
- ▶ Available in wide variety of wire diameter in spools and cut lengths in imperial and metric sizes, preforms, rings, return bends and crossovers.

ALUXCOR® 4047 has four different non-corrosive and non-hygroscopic flux combinations with no binder. The different formulas flux's release at increasing speeds in order from 15.1 being the slowest, to 15.4 being the fastest. ALUXCOR® zinc aluminum alloys also have non-corrosive and non-hygroscopic cesium flux with a lower melting temperature and wider melting range than aluminum silicon alloys.

FLUX CORED ALUMINUM AND ZINC/ALUMINUM ALLOYS								
ALLOY	AWS CLASSIFICATION	Al %	Si %	Mg %	Zn %	OTHER %	MELTING RANGE °C	FLUX CORE
ALUXCOR 4047	BAISi-4	88	12				577-582	Flux Formula 15.1* - Pure, premium, non-corrosive, and non-hygroscopic
ALUXCOR 4047	BAISi-4	88	12				577-582	Flux Formula 15.2* - Premium, non-corrosive, and non-hygroscopic
ALUXCOR 4047	BAISi-4	88	12				577-582	Flux Formula 15.3* - Premium, non-corrosive, and non-hygroscopic
ALUXCOR 4047	BAISi-4	88	12				577-582	Flux Formula 15.4* - Premium, non-corrosive, and non-hygroscopic
ALUXCOR 98/2		2			98		377-385	Cesium Flux Formula - Non-corrosive and non-hygroscopic
ALUXCOR 78/22		22			78		426-492	Cesium Flux Formula - Non-corrosive and non-hygroscopic

Other alloys and flux combinations available upon request.
*The higher the number (15.1 – 15.4) the faster the flux releases.

The Harris Products Group manufactures a complete line of cadmium-free, high silver brazing alloys. Only pure base metals are used. Precision production procedures ensure consistency in product quality, composition, chemistry, dimensions and performance.

These filler metals are used for joining most ferrous and nonferrous metals, except aluminum and magnesium. Most of the high silver alloys composition are copper, zinc, and silver based but other additions as manganese, nickel or Tin can be added.

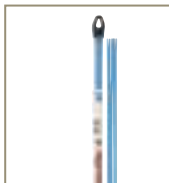
Tin can effectively reduce the brazing temperature, and is used to replace zinc or cadmium in filler metals.

Nickel is added to assist in wetting tungsten carbides and provides greater corrosion resistance. Brazing alloys containing nickel are especially recommended for joining stainless steels because they reduce susceptibility to interfacial corrosion.

Manganese is sometimes added to improve wetting on stainless steel, other nickel-chromium alloys and cemented carbides.

Flux like Stay Silv™ white, black flux or Eco Smart® acid boric free flux is required when torch brazing, even if vapor flux introduced through a flame is used.

All high silver alloys are available in bare rods, flux coated rods, solid wires and rings, in both metric and imperial sizes according to European and American standards.



ALLOY	DIN ISO17672	EN-1044	AWS A5.8	Ag %	Cu %	Zn %	OTHER %
L-AG20	-	AG 206	-	20,0	44,0	35,8	Si 0,2
L-Ag25Sn Safety-Silv™ 25	AG 125	AG 108	BAG-37	25,0	40,0	33,0	Sn 2,0
Safety-Silv™ 30	AG 230	-	BAG-20	30,0	38,0	32,0	-
L-Ag30Sn	AG 130	AG 107	-	30,0	36,0	32,0	Sn 2,0
L-Ag34Sn Safety-Silv™ 34T	AG 134	AG 106	-	34,0	36,0	27,5	Sn 2,5
L-AG35 Safety-Silv™ 35	AG 235	-	BAG-35	35,0	32,0	33,0	-
L-AG38SN Safety-Silv™ 38T	AG 138	-	BAG-34	38,0	32,0	28,0	Sn 2,0
Safety-Silv™ 40	-	-	-	40,0	30,5	29,5	-
L-Ag40Sn Safety-Silv™ 40T	AG 140	AG 105	BAG-28	40,0	30,0	28,0	Sn 2,0
Safety-Silv™ 40Ni	AG 440	-	BAG-4	40,0	30,0	28,0	Ni 2,0
L-Ag44	AG 244	AG203	-	44,0	30,0	26,0	-
Safety-Silv™ 45	AG 245	-	BAG-5	45,0	30,0	25,0	-
L-Ag45Sn Safety-Silv™ 45T	AG 145	AG 104	BAG- 36	45,0	27,0	25,5	Sn 2,5
L-Ag49NiMn	AG 449	AG 502	BAG-22	49,0	16,0	23,0	Mn 7,5 Ni 4,5
Safety-Silv™ 50	AG 250	-	BAG-6	50,0	34,0	16,0	-
Safety-Silv™ 50N	AG 450	-	BAG-24	50,0	28,0	20,0	Ni 2,0
L-Ag55Sn	AG 155	AG 103	-	55,0	21,0	22,0	Sn 2,0
L-Ag56Sn Safety-Silv™ 56	AG 156	AG 102	BAG- 7	56,0	22,0	17,0	Sn 5,0

TABLE FOR HIGH SILVER ALLOYS

MELTING RANGE °C	SPECIFIC WEIGHT g/cm ³	FLUIDITY RATING*	TYPICAL APPLICATION
690 - 810	8,7	5,0	Economical alloy with large melting range. The wetting and flow characteristics make L-Ag20 an appropriate choice to join similar and dissimilar base metals (excluding aluminum). Colour Brass - Yellow.
680 - 760	8,7	5,0	A low cost, general purpose silver brazing alloy. Exhibits moderate ductility and slightly higher melting temperature than alloys containing higher percentages of silver and or tin.
677 - 766	8,8	6,0	A moderate temperature filler metal with flow characteristics useful for wider gaps.
665- 755	8,8	5,5	Steel and copper to copper and copper to brass. Good wetting and fluidity. Can be used for equipment and tools in the food industry. Also to be used in the refrigeration industry. Recommended clearance 0.05 to 0,13 mm (.002- .005")
630 - 730	9,0	6,0	
685 - 755	9,0	6,0	Mainly used in the refrigeration industry.
660 - 718	8,8	7,0	This tin-bearing alloy combines excellent fillet-forming characteristics with good flow properties. The addition of a small amount of tin provides qualities normally associated with alloys containing greater quantities of silver.
677 - 732	8,9	5,0	Ductile, free – flowing alloy that offers economy, good penetration into tight connections and medium temperature. Silver to light yellow color as in polished brass.
650 - 710	9,1	6,5	Good flow properties. Suitable for ferrous and nonferrous base materials. Good results with bigger gaps, even with a narrower melting range.
660 - 779	8,9	4,5	For stainless steel, nickel alloy for corrosion resistance and strength. Good choice for tungsten carbide.
675 - 735	9,1	6,5	Excellent general purpose brazing alloy. Good ductility and capillarity flow.
663 - 743	9,1	4,5	
646 - 685	9,2	7,0	Performs like a 45% silver cadmium bearing alloy but is cadmium – free. Excellent filler forming qualities produces high strength, ductile joints.
680 - 705	8,9	7,0	Highly appropriate on tungsten carbides – high alloyed steels applications. These filler metals provide excellent flow characteristics on carbides getting strong / large resistance joints becoming an excellent choice where high stress working conditions are required.
688 - 774	9,0	5,0	Useful in brazing electrical connections. It has a wide melting range suitable for bridging gaps where poor fit ups are encountered.
660 - 707	9,0	7,0	It is especially helpful where low brazing temperature must be maintained. It can be used to braze tungsten carbide, stainless steel, as well as other steel, copper and nickel alloys.
630 - 660	9,4	8,0	High silver content alloy; makes premium-quality brazes. Free- flowing with unsurpassed capillary attraction and deep penetration with high ductility. Suitable for use in the food processing industry. Silver color is excellent match for stainless steel and silverware applications. For ferrous and nonferrous alloys. Often used to braze stainless steel.
620 - 655	9,4	8,0	

Fluidity Rating*- the higher the fluidity rating, the faster the alloy flows within the melting range.



FLUX CORED HIGH SILVER

Flux cored high silver alloys contain a flux what eliminates the need for a secondary fluxing operation. The flux is released only after sufficient preheating.

ADVANTAGES:

- ▶ Contain Eco Smart® flux, environmentally-friendly and Boric Acid free;
- ▶ Protected the flux inside the wire until proper pre-heat, less flux inclusions by reducing the chance of burnt flux in the capillary during the preheat cycle;
- ▶ Increase throughput;
- ▶ Controlled flux application for more consistent parts;
- ▶ Reduced post-braze cleaning operations by controlling flux;
- ▶ Carry less inventory with no need to stock both alloys and flux;
- ▶ Available in wide variety of wire diameter in spools and cut lengths in imperial and metric sizes, preforms, rings, return bends and crossovers.

Flux cored high silver alloys are usually used in high production brazing applications for dissimilar metals. Optimal for automatic wire feed applications including use with the Harris PowerBrazer™.



FLUX CORED HIGH SILVER

ALLOY	AWS CLASSIFICATION	ISO17672	Ag %	Cu %	Zn %	Ni %	Sn %	Other %	MELTING RANGE °C	FLUX CORE
Safety-Silv™ 30 CW	BAg-20	AG 230	30	38	32				677-766	Eco Smart® Non-hygroscopic
Safety-Silv™ 34T CW	-	AG 134	34	36	27,5		2,5		630-730	Eco Smart® Non-hygroscopic
Safety-Silv™ 38T CW	BAg-34	AG 138	38	32	28		2		660-718	Eco Smart® Non-hygroscopic
Safety-Silv™ 45 CW	BAg-5	AG 245	45	30	25				663-743	Eco Smart® Non-hygroscopic
Safety-Silv™ 50N CW	BAg-24	AG 450	50	20	28	2			660-707	Eco Smart® Non-hygroscopic
Safety-Silv™ 56 CW	BAg-7	AG 156	56	22	17		5		618-652	Eco Smart® Non-hygroscopic

Other alloys and flux combinations available upon request.



RINGS, PREFORMS AND RETURN BENDS

Preformed Brazing rings and other preforms have become a staple of many original equipment manufacturers, helping them improve consistency, quality, efficiency and productivity. The Harris Products Group, is an industry leader in producing these custom alloys in a wide variety of shapes and sizes. The Harris Products Group for over 100 years is dedicated to creating innovative products that allow customers to braze more quickly and efficiently, resulting in cost savings and a competitive advantage.

We recognize our customers have a wide variety of applications and requirements. Our engineering team can assist you in developing or designing the shape that fits your needs. Or if you already have specifications, The Harris Products Group can meet your requirements and provide a production and delivery schedule that coincides with your inventory needs.

Since The Harris Products Group brazing rings are designed for specific part, there is no waste from excess filler metals applications. Rings can be located externally or buried inside and drawn out during brazing.



The purpose of a brazing flux is to protect the formation of a brazed joint by protecting the base metal and filler metal from oxidation. The brazing flux may also serve to remove surface oxides and therefore reduce surface tension to promote freer flow of filler metal.

Fluxes are not designed or intended for the primary removal of oxides, coatings, oil, grease, dirt, or other foreign materials from the parts to be brazed.

Eco Smart®

Eco Smart® is the unique, Boric Acid and Borax free, patent-pending new range of an environmentally friendly fluxes.

PRODUCT FEATURES:

- ▶ Boric Acid and Borax free - environmentally friendly;
- ▶ Homogeneous mix that stays in solution or suspended paste;
- ▶ Powder flux has excellent adherence when heated rod is dipped into flux;
- ▶ Dissolves surface oxides and protects against oxidation during heating;
- ▶ Wide activation range;
- ▶ Excellent flux coverage during heating;
- ▶ Easy flux residue removal;
- ▶ Water soluble.

Eco Smart® COLOR CHANGE is designed with color change technology: a green color that changes to clear when the flux becomes active.

Eco Smart® HIGH HEAT is designed to extend the temperature and life of the flux. This is helpful during longer part heating cycles, or in cases of intense localized heating, such as induction brazing.

Eco Smart® is Boric acid and Borax (sodium-borate salts) free and meets the requirements of the REACH* regulation.



* The use of boric acid and sodium-borate salts is subject to restrictions within the European Union per Article 57 (c) of Regulation (EC) 1907/2006 - REACH (Registration, Evaluation, Authorization and Restriction of Chemicals). Studies performed for the EC (European Council) found that these chemicals can damage the reproductive systems and fetal development.

FLUXES FOR BRAZING

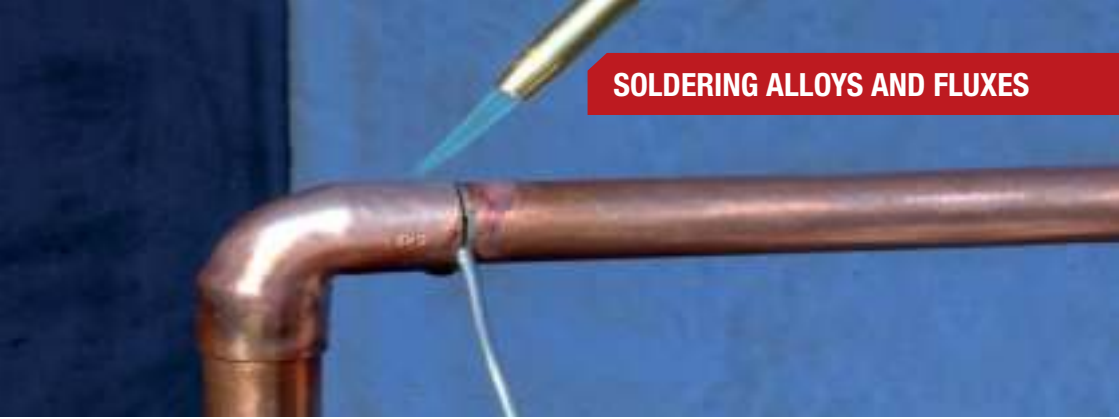
FLUX	ACTIVE RANGE °C	APPLICATION
Eco Smart® BRAZING FLUX - COLOR CHANGE: Green Paste and Powder	427 - 871	For brazing steel, stainless steel, Monel®, nickel, copper, brass, bronze and other ferrous and non-ferrous metals and alloys. Use with Stay-Silv™, Safety-Silv™ and other brazing filler metals. Extremely fluid. Will penetrate the tightest joints. Not subject to recrystallization (lumpiness-hardening). May be water thinned.
Stay-Silv™ White Brazing Flux	566 - 871	Common flux to be used with ferrous and nonferrous alloys.
Eco Smart® BRAZING FLUX - HIGH HEAT: Black Paste and Black Powder	371 - 982	For brazing steel, stainless steel, Monel®, nickel, copper, brass, bronze and other ferrous and non-ferrous metals and alloys. Use with Stay-Silv™, Safety-Silv™ and other brazing filler metals. High Heat flux is designed to extend the temperature and life of the flux. This is helpful during longer part heating cycles, or in cases of intense localized heating, such as induction brazing. Extremely fluid. Will penetrate the tightest joints. Not subject to recrystallization (lumpiness-hardening). May be water thinned.
Stay-Silv™ Black Brazing Flux	566 - 982	Recommended for stainless steel.
Dynaflow™ Brazing Flux	566 - 871	Excellent joint penetration. Recommended for nonferrous alloys.

PLEASE ALWAYS REMEMBER TO REMOVE ALL FLUX RESIDUE ON COMPLETION OF BRAZING.

PASTE VS. POWDER FLUX

PASTE FLUX	POWDER FLUX
Brazing rod can be dipped in the flux or flux can be brushed on the surface of the braze joint.	Powder flux has excellent adherence when heated rod is dipped into flux.
Paste can be diluted if desired.	Can be mixed with water or alcohol as needed.
Creates very little spatter for undiluted flux.	Can be applied to base metal.
Better protection of base metal than powder flux.	No spatter for undiluted flux.

* Monel® is a registered trademark of Special Metals Corporation.



There is evidence that soldering was used 5000 years ago to make jewelry items, cooking ware and tools. Over the years many things have changed but soldering alloys are still widely used making possible the 20th and 21st century commercial and digital revolution.

The Harris Products Group offers a wide range of soldering alloys for HVAC&R, plumbing and electronic applications. Each solder product meets the highest standards for consistent performance.

STAY-BRITE™ SILVER SOLDER

Silver-bearing solders are often used throughout the refrigeration/ air conditioning industry instead of brazing alloys. Both Stay-Brite™ and Stay-Brite™ 8 produce an overall component with greater strength than a brazed component whose base metals are weakened by high brazing heat. Stay-Brite™ solders bond with all of the ferrous and nonferrous alloys. Joints soldered with Stay-Brite™ solders exhibit considerably higher than necessary elongation for sound, dissimilar metal joints and vibration applications.

Stay-Brite™ 8 is especially effective in filling loosely fitted couplings. Use for all metals with the exception of aluminum. This is a low temperature solder excellent for many HVAC connections.

BRIDGIT™

Lead-free solder widely used in plumbing. Contains nickel, making joints tremendously strong. Wide range makes Bridgit an excellent alloy for large diameter fittings and ill-fitted or non-concentric pipes. Fills gaps and caps off easily and effectively.

NICK™

Nick™ has a wide melting range (225°C-387°C) that allows operators to fill small tight fitting pipe connections and also to bridge gaps in large, loose fitting or non-concentric pipe. Its ease of application in all types of copper joints, makes it the preferred solder of experienced operators and is the most forgiving in the hands of the less experienced.

SPEEDY™

Speedy™ has a faster melting range, which allows operators to fill small, tight-fitting pipe connections quickly. Speedy™'s low temperature, free flowing nature decreases cycle time while reducing setup time. Speedy™ can be used with Stay-Clean™ paste or liquid flux, as well as Bridgit™ paste flux. Speedy™ is a lead-free, low temperature alloy formulated for joining copper pipe in potable water systems.



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TABLE FOR SOLDERING ALLOYS

ALLOY	ISO 9453	Sn %	Ag %	Cu %	Ni %	Sb %	MELTING RANGE °C	FLUIDITY RATING	TYPICAL APPLICATION
Stay-Brite™	703	96	4	-	-	-	221-221	10	Low temperature solder for all metals except aluminum. Particularly used in refrigeration joints.
Stay-Brite™ 8	-	94	6	-	-	-	221- 279	8	Similar to Stay-Brite™. Plastic range useful in bridging wider gaps.
Stay-Brite™ ULTRA	703	96,5	3,5	-	-	-	221 - 221	10	Low temperature solder for all metals except aluminum. Particularly used in refrigeration joints.
Bridgit™	-	R/B*	0,15	2,5-3,5	0,05-2	4,5- 5,5	238- 332	6	Lead free, nickel & silver bearing solder of exceptional strength& capping ability.
95/5	201	95	-	-	-	5	233-240	9	Lead free solder recommended for small diameter installations. Not recommended for use on brass.
Speedy™	402	97	-	3	-	-	232 - 290	8	Lead free low temperature alloy formulated for joining copper pipes in portable water systems.
Nick™	-	R/B*	0,05- 0,15	3,5- 4,5	0,05- 0,15	-	225- 387	5	Nickel & copper silver- bearing lead free solder with wide melting range.

R/B* - Remainder/ balance

FLUXES FOR SOLDERING

FLUX	ACTIVE RANGE °C	APPLICATION
Stay-Clean™ Liquid Soldering Flux and Paste Soldering Flux	Up to 371	For all base materials other than Al, Mg or Ti.
Bridgit™ Burn Resistant Flux	93 - 427	Designed to be used in lead free soldering.
Bridgit™ Water Soluble Flux	121 - 315	Designed to be used in lead free soldering.



The copper welding alloys differs from brazing alloys in that the filler metal are distributed by deposition rather than by capillarity action (brazing procedure).

The copper welding alloys are normally used for joining steel and gray cast iron, however it can also join copper, nickel and nickel alloys, providing a convenient way to join similar and dissimilar metals.

Brazing procedure requires less heat than arc welding procedures to accomplish the bonding, producing less distortion from thermal expansion and contractions and reducing the potential for cracking.



TABLE FOR COPPER WELDING ALLOYS

ALLOY	AWS A5.8	AWS A5.7	Cu %	Zn %	Sn %	Fe %	Mn %	Ni %	P %	Si %	Al %	MELTING RANGE °C	TYPICAL APPLICATION
HA Low Fuming Bronze	-	-	60	BAL	0,4	-	0,1	-	-	0,1	-	865 - 887	Developed for braze welding, steel, cast iron, nickel, and copper alloys. HA LFB flows faster with less build up compared to LFB. Deposits can be machined and have excellent ductility. Harris bronze can be deposited using standard oxy-fuel torches.
Low Fuming Bronze	RBCuZn-C	-	60	BAL	1,0	0,7	0,3	-	-	0,1	-	910 - 954	Designed for repair and fabrication applications on steel, copper, copper alloys nickel and nickel alloys. Good machinability. Tensile strength up to 448N/mm ² .
Silicon Bronze	-	ERCuSi-A	BAL	1,0	1,0	0,5	1,5	-	-	2,8 - 4,0	-	971 - 1027	Alloy used to weld similar composition base metals, brass and to weld copper alloys to steel. Frequently used in GMAW "braze welding" of coated sheet steels. Use with Argon holding Gas.
Aluminum Bronze A2	-	ERCuAl-A2	BAL	0,2	-	-	0,5	-	-	0,1	8,5-11	1046	Wire designed for joining aluminum bronze base metals, welding brass, steel and a variety of dissimilar metals applications.
Aluminum Bronze A1	-	ERCuAl-A1	BAL	0,2	-	-	0,5	-	-	0,1	6,5-8,5	1046	Wire designed for weld overlays for bearing and wear resistant surfaces. It is iron-free and is often used to protect parts exposed to salt water and certain acid conditions. Not recommended for joining.
Deox Copper	-	ERCu	BAL	-	0,1	-	0,5	-	0,2	0,5	0,01	1075	Developed for welding applications on high copper content base metals. This alloy produces trouble free welds that are a good color match to copper and have high electrical conductivity. Can also be used for welding copper to steel.
Phos Bronze	-	ERCuSN-C	BAL	0,2	8,0	-	-	-	0,2	-	0,01	882 - 1027	Used to weld base metals of steel, cast iron, copper, brass and bronze. It is the ideal overlay on shafts, propellers, housings, couplings, bushings, valve seats, pumps and other surfaces needing a bronze wearing surface.
Alloy 170	RBCuZn-D	-	46,0 - 50,0	BAL	<3,0	<1,5	<1,5	10,0	-	<3,5	-	938 - 982	Developed for braze welding steel and cast iron. It can also be used for brazing tungsten carbide to steel where higher joining temperature is not objectionable. The nickel addition provides hardness and strength compared to the standard bronze alloys.

TROUBLESHOOTING



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The art of brazing is relatively simple, and the rules of common sense apply. Occasionally, however, things do go wrong, and the brazing process fails to do its job satisfactorily. The check lists below have been prepared to assist in such instances. They are intended to provide practical tips on what to look for and steps to correct them.

IF BRAZING ALLOY DOES NOT FLOW INTO THE JOINT, EVEN THOUGH IT MELTS AND FORMS A FILLET

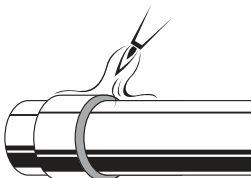
- 1 The outside of the joint is hot, but the inside is not up to brazing temperature.**
Review correct heating procedure on page 10. Remember to heat the tube first to conduct heat inside the fitting.
- 2 There is a flux breakdown due to excessive heat.**
If overheated, the flux can become saturated with oxides and the brazing alloy won't flow. Try using a softer flame and/or applying a heavier coating of flux. On thick sections where heating is prolonged, or on stainless steel, Eco Smart® High Heat or Stay-Silv™ black flux is recommended.

IF BRAZING ALLOY DOES NOT WET SURFACES BUT BALLS UP INSTEAD OF RUNNING INTO THE JOINT

- 1** Review heating techniques:
 - ▶ The base metals are not up to brazing temperature, and the alloy has been melted by the torch flame.
 - ▶ The joint has been overheated and the flux is no longer active.
- 2** Base metals have not been properly cleaned.

IF BRAZING ALLOY FLOWS AWAY FROM INSTEAD OF INTO THE JOINT

- 1** Make sure fitting is up to temperature and the flame is directed towards the fitting.



IF THE FILLER METAL CRACKS AFTER IT SOLIDIFIES

- 1 When brazing dissimilar metals, the different coefficient of expansion may put the filler metal in tension just below the liquidus temperature during cooling. This sometimes occurs in a copper-to-steel joint. The copper expands and contracts at a greater rate than the steel. Brazing alloys are stronger in compression, so a steel-to-copper assembly would help alleviate the problem.
- 2 Brazing steel (or other ferrous metals) with an alloy containing phosphorus can lead to formation of a brittle phosphide, that is prone to cracking. Braze ferrous metals with non-phosphorus content alloys.
- 3 Excessive joint clearance can lead to filler metals cracking under stress or vibration. Make sure clearances are held to 0,05 – 0,15 mm at brazing temperature (depending on alloy).
- 4 Too rapid quenching can sometimes cause cracking. Let joint cool more before washing off flux residue.

IF JOINT LEAKS IN SERVICE

90% of “leakers” in service are due to incorrect brazing techniques. The most common causes are:

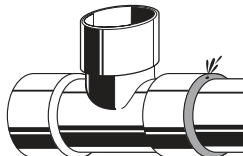
- 1 Improper or uneven heating of joint. The effect of this is inadequate or incomplete penetration by the filler metal. Review proper techniques on page 10.
- 2 Overheating, causing volatilization of elements (phosphorus, zinc, etc.).
- 3 Incorrect torch flame adjustment, leading to deposition of carbon or causing excessive oxidation.
This can be solved by using the Perfect Flame™ technology.

REPAIR OF LEAKS

Pinhole leaks in copper-to-copper joints brazed with phosphorus/copper or phosphorus/copper/silver filler metals can often be repaired using Blockade™. If care is taken, you can re-braze the joint with Blockade™ without re-melting the original braze. Clean thoroughly before brazing.

We **DO NOT** recommend brazing over joints previously soldered with tin/lead solders. The low melting elements in the solder may prevent proper filler metal / base metal alloying.

Pinhole leaks in joints brazed with either the phosphorus or high silver alloys can usually be repaired with Stay-Brite™ solder. Clean the joint thoroughly before soldering and use Stay-Clean™ liquid flux.





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