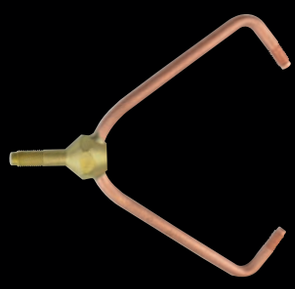
AT A GLANCE

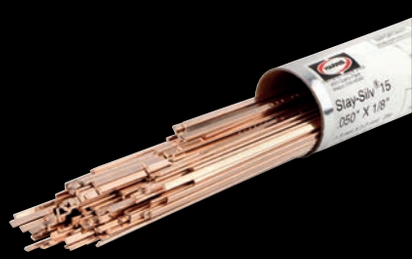
- BRAZING PROCEDURES
- WIRE
- ROD
- PREFORMS
- STRIP
- PASTE
- POWDER
- FLUX
- RETURN BENDS
- TORCHES
- TIPS
- MIXERS
- REGULATORS
- MANIFOLDS
- ACCESSORIES

HARRIS®

A LINCOLN ELECTRIC COMPANY

Production Brazing Catalog





THE GLOBAL LEADER IN PRODUCTION BRAZING

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 PROS – TURN TO HARRIS.**

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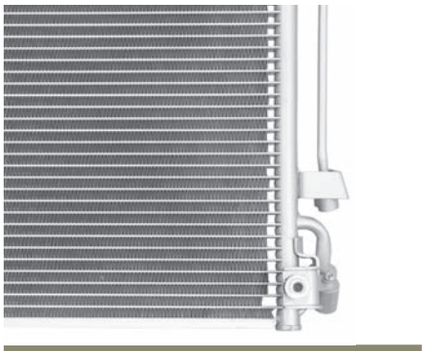
CUSTOMER SEGMENTS

HVAC/R

APPLIANCE

TUBE MANUFACTURING



AUTOMOTIVE

PLUMBING

AEROSPACE

SHIP BUILDING

CARBIDE/MINING TOOLS

HEAVY EQUIPMENT

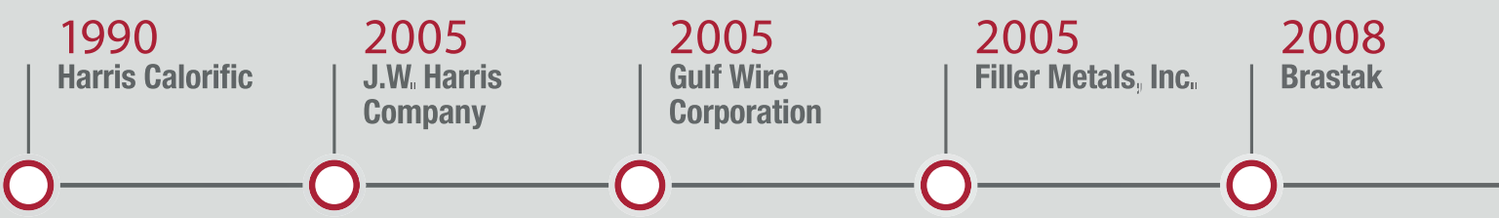
THE HARRIS PRODUCTS GROUP

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
- Gas distribution systems
- 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 Electric has 71 manufacturing and automation locations, including operations and joint ventures in 21 countries, and a worldwide network of distributors and sales offices reaching over 160 countries.

THE MERGER RESULTED FROM A SERIES OF



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MANUFACTURING FACILITIES

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

ACQUISITIONS BY THE LINCOLN ELECTRIC COMPANY

2019
Worthington Industries
(Solder Products)

2021
Portugal Brazing Facility

2021
Overstreet-Hughes Company, Inc.
(Fabricated Tube Products)

2021
Shoals Tubular, Inc.

ABOUT THE HARRIS PRODUCTS GROUP

The Harris Products Group has been manufacturing quality braze filler metals in the United States for over 100 years. We are leaders in developing brazing and soldering products to meet the industry needs for new metal joining methods. We have developed proprietary manufacturing technology to ensure the highest standards of quality and traceability.

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. Harris is backed by the financial strength and technical resources of The Lincoln Electric Company - **THE GLOBAL LEADER IN WELDING SYSTEMS AND FILLER METALS.**

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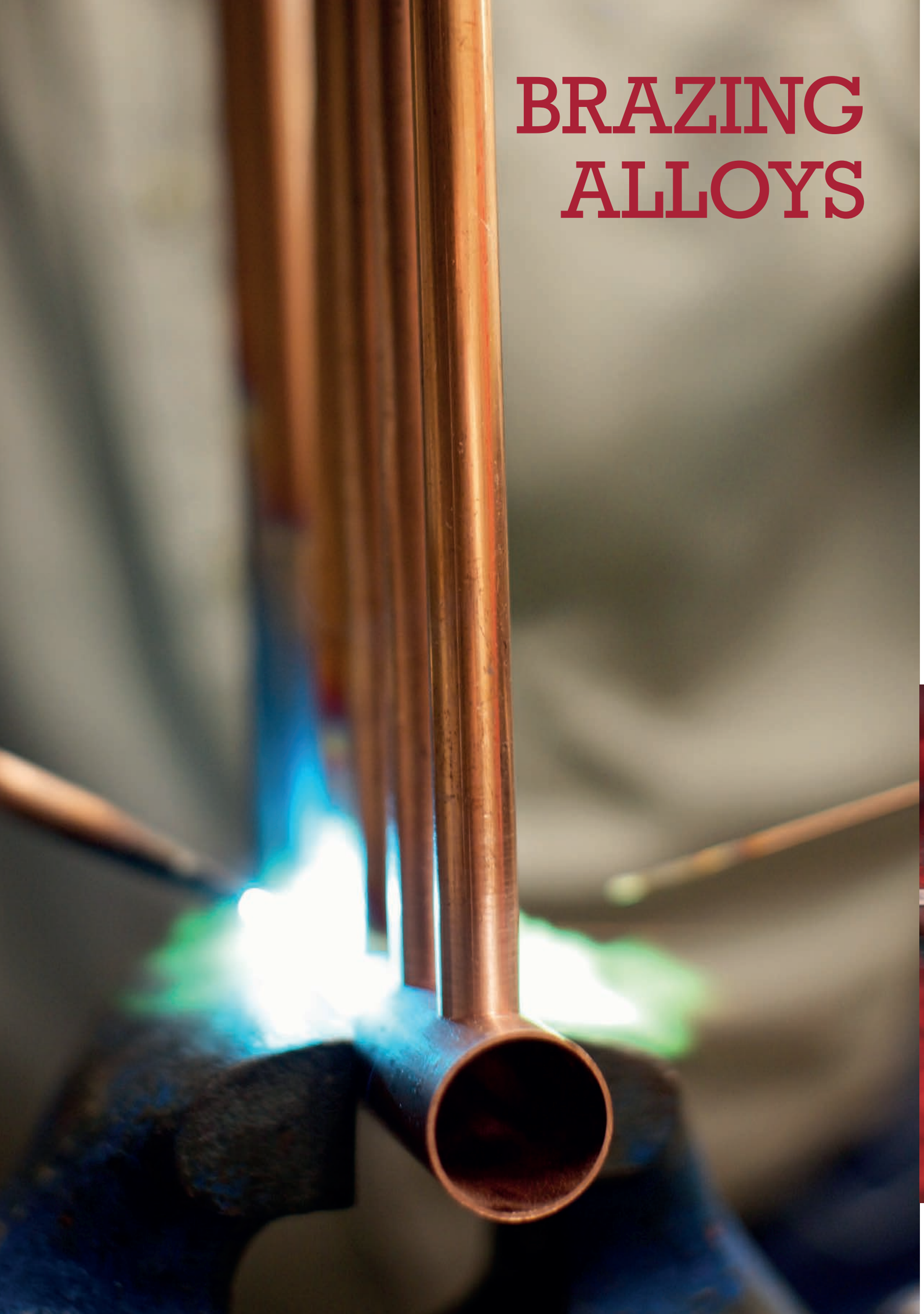
BRAZING ALLOYS



THE HARRIS PRODUCTS GROUP
IS THE BRAZING INDUSTRY'S FRONT RUNNER IN DEVELOPING THE TECHNOLOGY TO CONTROL PHOSPHORUS CONTENT.

The melting range is so precise that brazing operators no longer need to make temperature adjustments from one batch of filler metals 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 ± 3,3°C (± 6°F) - a much tighter standard than industry requires.

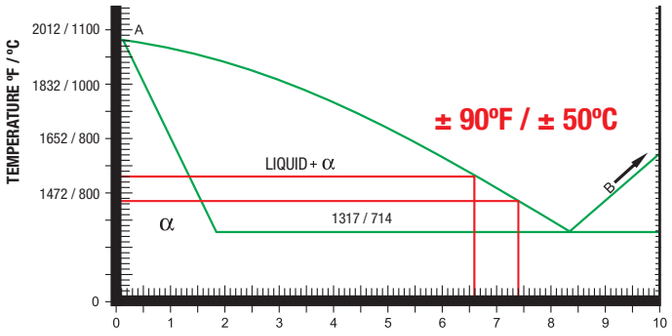
Over the decades many things have changed in our industry. But our dedication to making the world's purest and most consistent brazing alloys has not changed; we are committed to giving you the best tool to do your job.

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

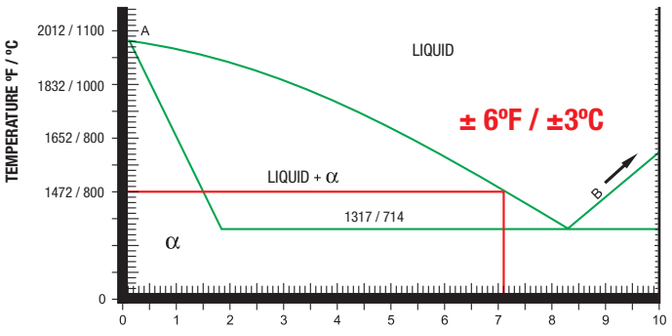
SAVE MONEY

USING HARRIS PHOSPHORUS CONTROLLED PRODUCTS. ± 3,3ºC (± 6º F) liquidus point fluctuation from batch to batch.

Standard ISO 17672 CuP 181 Quality



Harris P7



CHANGE IS GOOD

BLOCKADE®
IS ENGINEERED TO JOIN COPPER, BRASS, OR BRONZE.

Blockade®'s innovative composition provides the ability to form a large shoulder or cap at the braze connection.

Blockade® is a low melting temperature alloy which is very fluid and fast flowing. Best for tight fitting connections under two inches diameter and great for copper to brass applications like solenoid valves, ball valves, distributors, and schrader valves.

Blockade® is a copper, phosphorus, tin, and silicon alloy which is a low cost alternative to silver bearing alloys.

Available in flux-coated and bare rods, solid wire in spool and ring form.

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CHANGE IS PROFITABLE

DYNAFLOW®
IS AN EXCEPTIONALLY PURE PHOSPHORUS/COPPER/SILVER BRAZING ALLOY RECOMMENDED FOR ALL COPPER-TO-COPPER AND COPPER-TO-BRASS APPLICATIONS.

This alloy has provided decades of durability and savings to our customers.

Dynaflow® is a premium, medium range, silver alloy developed to mirror the melting range and strength performance characteristics of 15% silver brazing alloys.

Excellent for brazing both tight and loose fitted applications. It is a fantastic choice for OEM operators and service technicians.

HARRIS PHOS COPPER BRAZING ALLOYS

ARE THE RESULT OF PROPRIETARY TECHNOLOGY THAT PRECISELY CONTROLS THE PHOSPHORUS CONTENT ABOVE MARKET STANDARDS.

The advantage is apparent in automated brazing operations where control of flow temperatures can significantly reduce the incidence of rejects.

BLOCKADE™

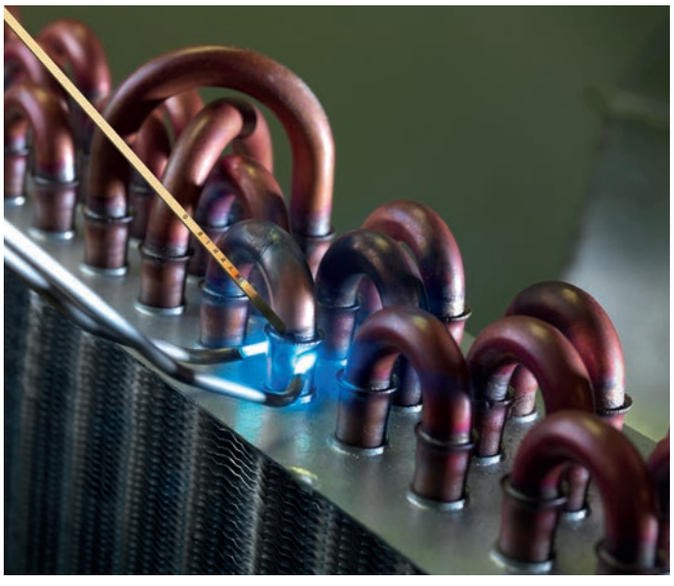
Blockade™ is a proprietary phosphorus-tin-silicon alloy engineered to provide a low cost alternative to silver bearing filler metals. It is self- fluxing on copper and its lower melting temperature makes it an excellent choice for brass. Blockade™ flows rapidly but can be used to “cap” brazed joints.

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 CuP 284 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.



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HARRIS
DYNAFLOW
GASTIC

PHOS COPPER ALLOYS SELECTION CHART

ALLOY	ISO 17672	AWS A5.8	Cu %	P %	Ag %	Sn %	OTHER
HARRIS P6	CuP 179	-	R/B*	6,50	-	-	-
HARRIS 0™	-	-	R/B*	7,10	-	-	-
HARRIS P7	CuP 181	BCuP-2	R/B*	7,40	-	-	-
HARRIS P8	CuP 182	-	R/B*	8,10	-	-	-
Blockade®	-	-	R/B*	6,50	-	6,50	Si 0,02
HARRIS PSN7	CuP 386	-	R/B*	6,50	-	6,80	-
HARRIS 2P	CuP 279	-	R/B*	6,40	2,00	-	-
HARRIS 5P	CuP 281	-	R/B*	5,90	5,00	-	-
Dynaflow®	-	-	R/B*	6,10	6,00	-	-
HARRIS 15P	CuP 284	BCuP-5	R/B*	5,00	15,00	-	-
HARRIS 18P	CuP 286	-	R/B*	7,30	18,00	-	-

* R/B - Remainder/balance
Other alloys compositions (including spark free) available upon request.

LOOKING FOR MORE?

STAY-SILV® range of alloys available in the US alloy catalog.

Download it here:

https://www.harrisproductsgroup.com/Catalogs

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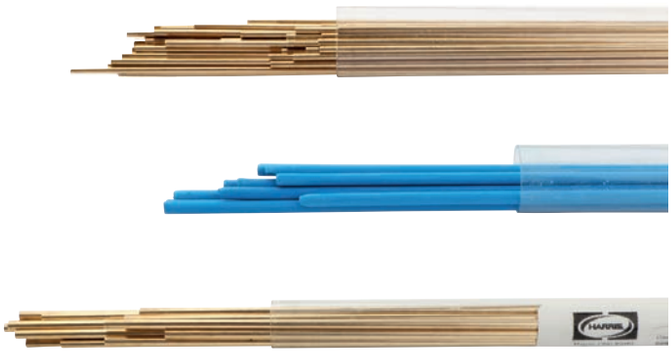
MELTING RANGE ^0C	SPECIFIC WEIGHT g/cm^3	FLUIDITY RATING**	CHARACTERISTICS & TYPICAL APPLICATIONS
710 - 890	8,10	4	For copper. Good choice where joint tolerances cannot be maintained.
710 - 802	8,05	5	For copper. Requires medium fit- up 0,05 – 0,178 mm (.002 – .007") clearance.
710 - 785	8,05	6	For copper. Fluid alloy, requires good fit- up 0,05 – 0,152 mm (.002 – .006") clearance.
710 - 727	8,00	8	For copper. Very fluid for close joint tolerances 0,05 – 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. Can be used to replace certain silver containing alloys 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.
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").
645 - 815	8,10	3	For copper or brass. Use to bridge gaps where close fit-up cannot be maintained.
643 - 796	8,20	3	Premium alloy for copper or brass. Excellent strength and ductility, use as replacement for 15% silver alloys.
645 - 800	8,40	3	Copper or brass. Useful for wide clearance of 0,05 – 0,178 mm (.002 – .007). Good ductility.
645 - 645	8,60	8	Copper to copper or copper to brass. Eutectic alloy with low temperature and high fluidity. Suited for automated brazing operation such as those with rings.

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

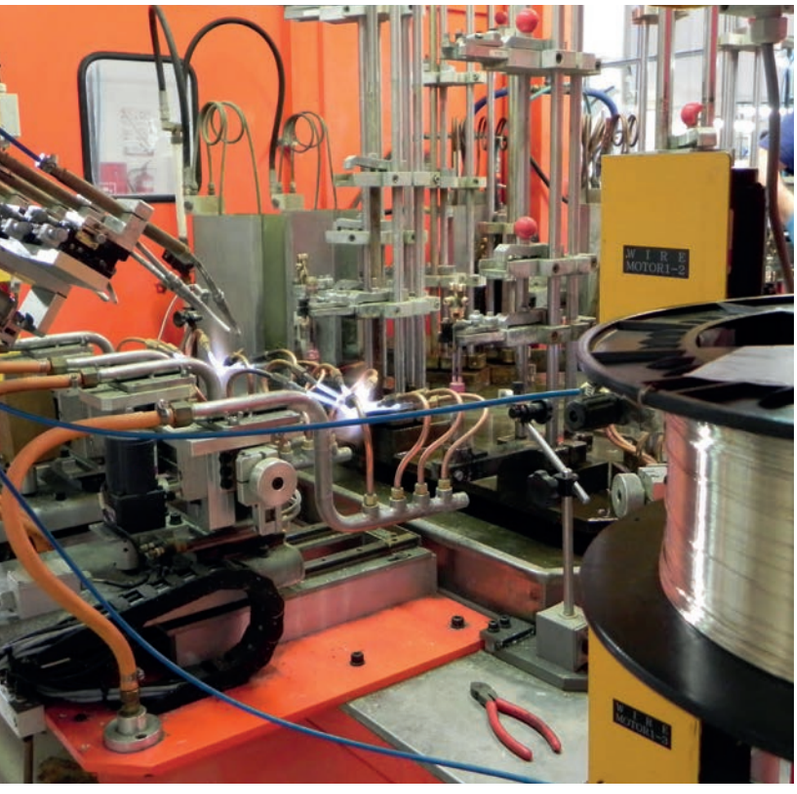
WE MANUFACTURE
A COMPLETE LINE OF CADMIUM-FREE, HIGH SILVER BRAZING ALLOYS.



Harris utilizes only pure base metals. Precision production procedures ensure consistency in product quality, composition, chemistry, dimension, and performance.

Our cadmium-free alloys offer excellent performance characteristics and dependable results, while eliminating hazardous cadmium fumes.

High silver alloys are available in solid wires and rods, flux-coated rods and flux-cored wires and rods (with ECO SMART® flux), rings and preforms.



TURN TO THE PROS – TURN TO HARRIS.
To learn more about high silver applications and techiniques

VISIT OUR YOUTUBE CHANNEL
Go to www.youtube.com/harrisproductsgroup

HARRIS 25T
A low cost, general purpose silver brazing alloy. Exhibits moderate ductility and slightly higher melting temperature than alloys containing higher percentages of silver.

HARRIS 30T
A cadmium free alloy with a with good flow and good fillet forming quality. It produces high strength and ductile joints.

HARRIS 34T
This smooth flowing alloy exhibits good ductility on ferrous and nonferrous base materials. It is often used as an economical alternative to higher silver content alloys.

HARRIS 38T
Low temperature, free-flowing alloy with exceptional fillet forming quality for ferrous and non-ferrous metals.

HARRIS 40T
Similar to 38T in its ability for excellent fillets and maintain good mechanical properties while flowing at a lower temperature.

HARRIS 45T
Lower melting temperature than Ag 140. Excellent fillet forming qualities. Produces high strength, ductile joints.

HARRIS 56T
High silver content alloy that makes premium quality brazes. Free flowing with unsurpassed capillary attraction and deep penetration. Ductility is high and corrosion resistance is excellent. Offers highest elongation of silver brazing alloys. Can be used in the food processing industry. Silver color is an excellent match for stainless steel and silverware applications.

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ALUXCOR™

Flux Cored

AVAILABILITY

- Wide variety of wire diameter in spools and cut lengths in imperial and metric sizes
- Preforms
- Rings
- Return bends and Crossovers

UNIQUE DESIGN

- Cored ring design offered with a selection of flux chemistries
- Seam prevents flux loss during shipping, loading onto the return bends, and in wire feed applications
- Helps with return bend ring retention to prevent rings from moving or falling off return bends and crossovers

PERFECT PERFORMANCE

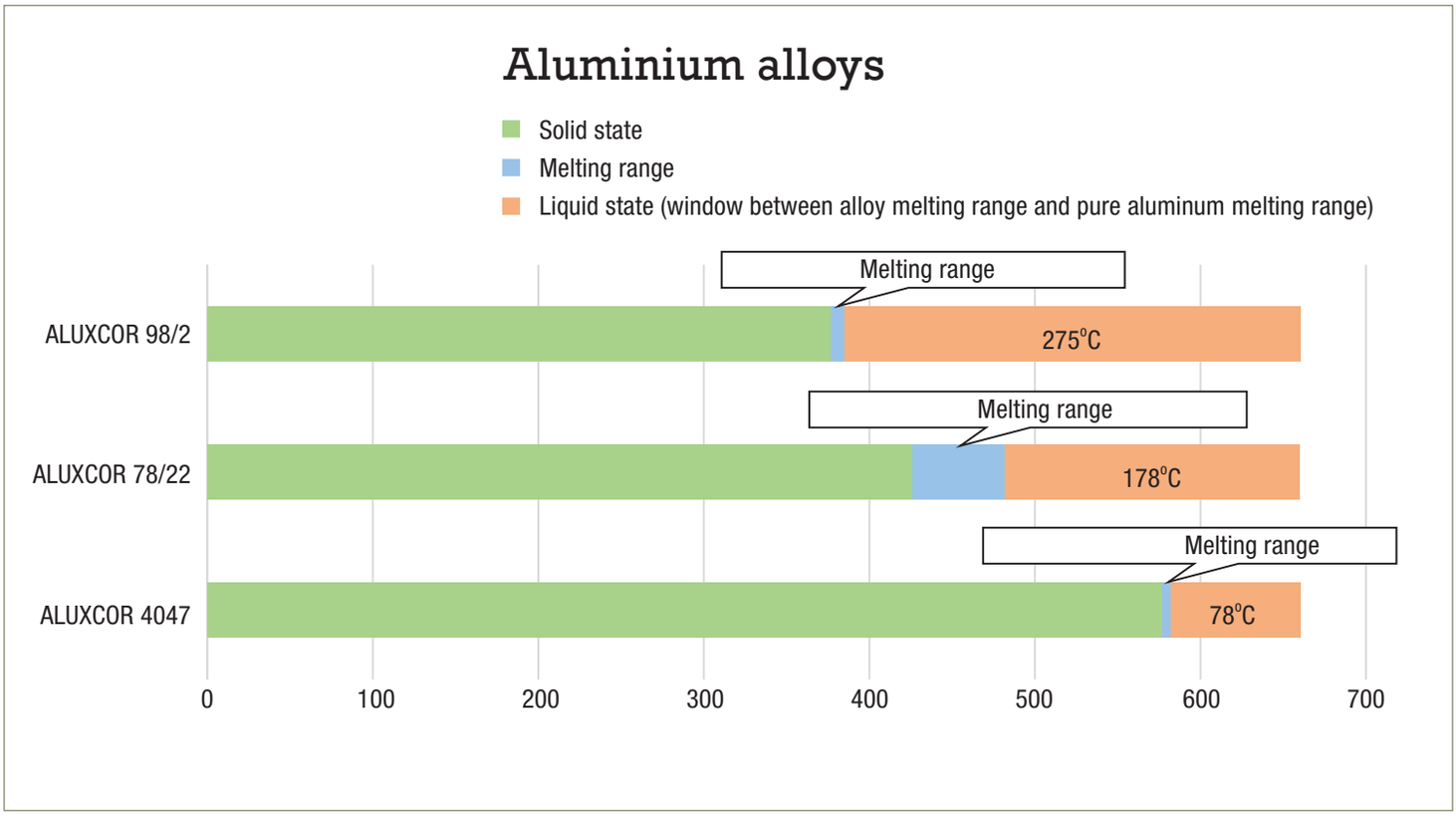
- Core design ensures flux release at the optimum time in the brazing cycle and helps direct flux flow into the capillary, what promotes full braze penetration with a corresponding reduction in leaks.
- Proprietary custom flux blends available for customer specific applications
- Strict flux percentage tolerance ensures that the flux is consistent throughout the wire for repeatable high performance flow of the alloy
- We only use non-corrosive and non-hygroscopic flux with no binder

COMPETITIVE COSTING

- In house manufacturing
- Capability of manufacturing wire, flux cored rings, ring loaded return bends which helps lower costs and shorten the supply chain

MARKETS

- Residential HVAC manufactures
  Fabricated Parts Manufacturers
  Coil Manufacturers
- Automotive
- Appliances



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ALUXCOR™

Flux Cored

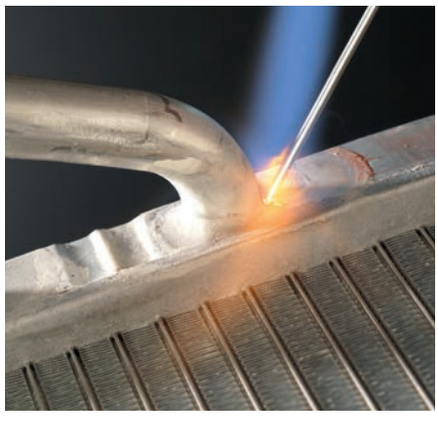
SUPERIOR BRAZING ALLOYS

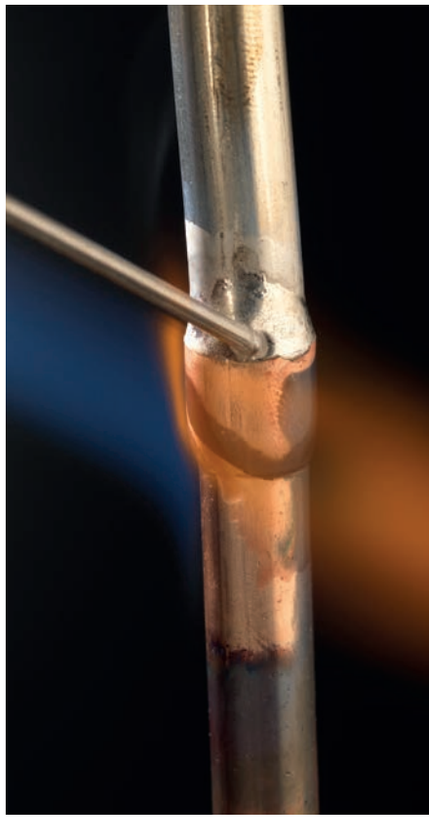
With excellent strength and corrosion resistance for joining aluminum-to-aluminum or aluminum-to-copper or brass. Free flowing with unequaled capillary attraction, ductility, and penetration. ALUXCOR 4047 has four different non-corrosive and non-hygroscopic flux combinations with no binder to fit your customer specific heating applications. The different formulas flux's release at increasing speeds in order from 15.1 being the slowest, to 15.4 being the fastest. The 15.3 formula is our most common for hand brazing applications but Harris now offers different formulas to best optimize flux release in controlled auto brazing heat applications. Our 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 SELECTION CHART

ALLOY	AWS CLASSIFICATION	Al %	Si %	Mg %	Zn %	Sn %	OTHER %	MELTING RANGE °C	FLUX CORE
ALUXCOR 4047	BAlSi-4	88	12					577-582	Flux Formula 15.1* - Pure, premium, non-corrosive, and non-hygroscopic
ALUXCOR 4047	BAlSi-4	88	12					577-582	Flux Formula 15.2* - Premium, non-corrosive, and non-hygroscopic
ALUXCOR 4047	BAlSi-4	88	12					577-582	Flux Formula 15.3* - Premium, non-corrosive, and non-hygroscopic
ALUXCOR 4047	BAlSi-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

***The higher the number (15.1 – 15.4), the faster the flux releases.**





HIGH SILVER ALLOYS SELECTION CHART

ALLOY	ISO 17672	AWS A5.8	Ag %	Cu %	Zn %	OTHER %
HARRIS 20	Ag 220	-	20,0	44,0	35,8	Si 0,2
HARRIS 25T	Ag 125 Si	BAg-37	25,0	40,0	33,0	Sn 2,0
HARRIS 30	Ag 230 Si	BAg-20	30,0	38,0	32,0	-
HARRIS 30T	Ag 130 Si	-	30,0	36,0	32,0	Sn 2,0
HARRIS 34T	Ag 134 Si	-	34,0	36,0	27,5	Sn 2,5
HARRIS 38T	Ag 138 Si	BAg-34	38,0	32,0	28,0	Sn 2,0
HARRIS 40T	Ag 140 Si	BAg-28	40,0	30,0	28,0	Sn 2,0
HARRIS 45T	Ag 145 Si	BAg- 36	45,0	27,0	25,5	Sn 2,5
HARRIS 49NIMN	Ag 449	BAg-22	49,0	16,0	23,0	Mn 7,5 Ni 4,5
HARRIS 55T	Ag 155 Si	-	55,0	21,0	22,0	Sn 2,0
HARRIS 56T	Ag 156 Si	BAg- 7	56,0	22,0	17,0	Sn 5,0

Other alloys compositions available upon request.

SAFETY-SILV® range of alloys available in the US alloy catalog.

Download it here:

https://www.harrisproductsgroup.com/Catalogs

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THE HARRIS PRODUCTS GROUP
www.harrisproductsgroup.eu

MELTING RANGE ^0C	SPECIFIC WEIGHT g/cm^3	FLUIDITY RATING*	CHARACTERISTIC & TYPICAL APPLICATIONS
690 - 810	8,7	5	Economical alloy with large melting range. The wetting and flow characteristics make Harris 20 an appropriate choice to join similar and dissimilar base metals (excluding aluminum). Colour Brass - Yellow.
680 - 760	8,7	5	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	A moderate temperature filler metal with flow characteristics useful for wider gaps.
665- 755	8,8	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	
660 - 718	8,8	7	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.
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.
646 - 685	9,2	7	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	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.
630 - 660	9,4	7,5	High silver content alloy: for high quality brazing of steel, nickel and nickel alloys, cast iron, copper and copper alloys. Highly resistant to overheating. Lower mechanical properties on carbon steel. Excellent color match when brazing stainless steel.
620 - 655	9,4	8	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.

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

FLUX CORED HIGH SILVER

AVAILABILITY

- Wide variety of wire diameter in spools and cut lengths in imperial and metric sizes
- Preforms
- Rings

IMPROVED DESIGN

- New round flux cored ring design
- Protects the flux inside the wire until proper preheat
- Seam prevents flux loss during shipping and in wire feed applications

TURN TO THE PROS – TURN TO HARRIS.

Contact a Harris representative today to learn about how to improve efficiency and save money by changing from a **Solid High Silver Alloy** to a **Flux Cored High Silver Alloy**.

BETTER PERFORMANCE

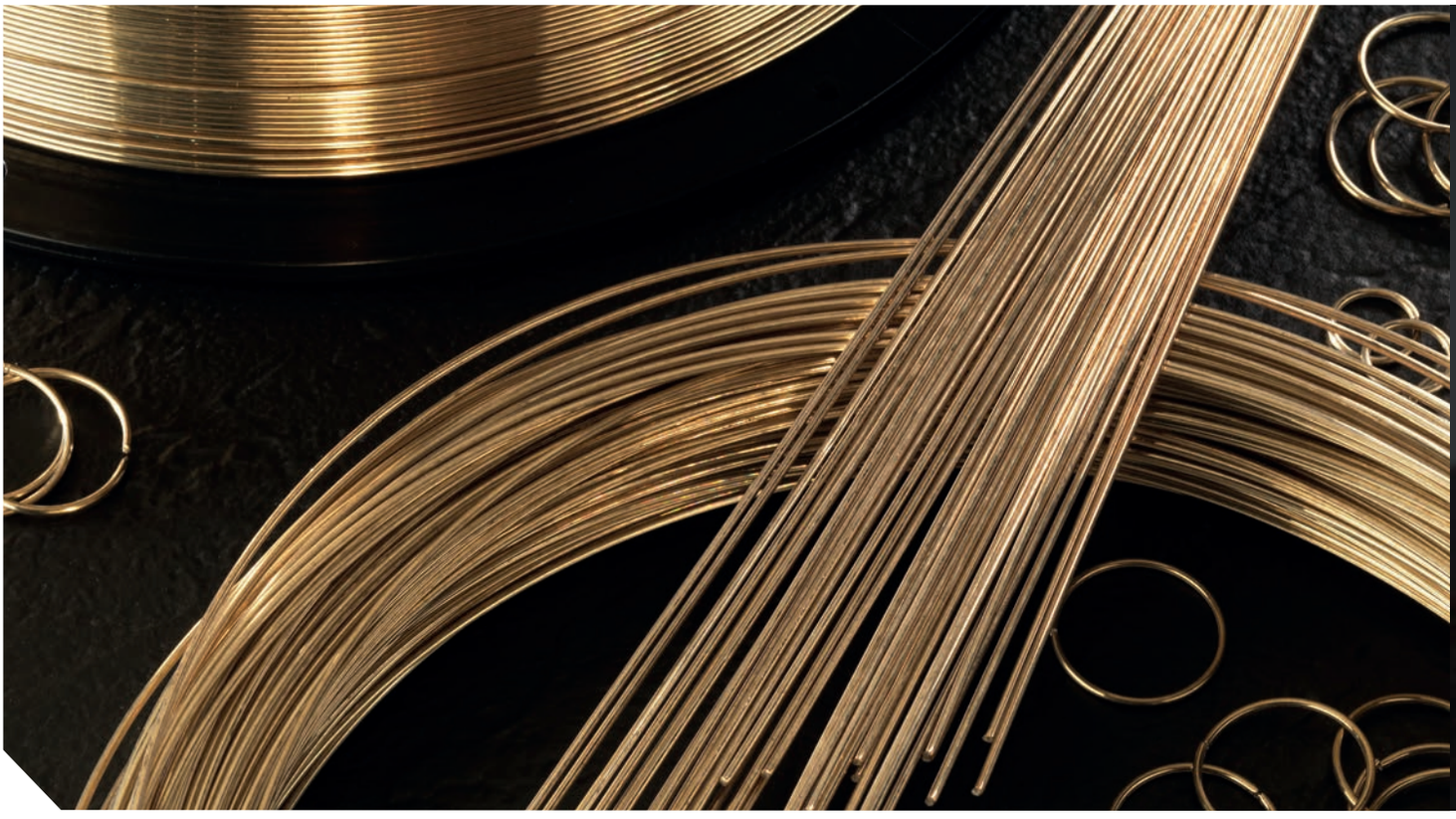
- A very easy to use alloy with ecoSMART BORIC ACID FREE FLUX – environmentally-friendly Boric Acid Free Brazing Flux inside the wire. HIGH HEAT or standard wire with FH-12 or FH-10 flux options can be chosen.
- Eliminates manual fluxing, increases throughput
- Controlled flux application for more consistent parts
- Reduces post-braze cleaning operations by controlling flux
- Less flux inclusions by reducing the chance of burnt flux in the capillary during the preheat cycle

COMPETITIVE COSTING

- In house manufacturing
- Carry less inventory with no need to stock both alloys and flux

MARKETS

- Appliance manufacturing
- Thermal expansion valve manufacturing
- Compressor manufacturing



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FLUX CORED
HIGH SILVER

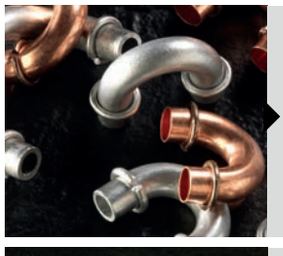
FLUX CORED HIGH SILVER ALLOYS

Eliminate the need for a secondary fluxing operation. Normally 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 SELECTION CHART

Alloy	AWS Classification	ISO 17672	Ag %	Cu %	Zn %	Ni %	Sn %	Other %	Melting Range °F	Melting Range °C	Flux Core
Safety-Silv® 30 CW	BAg-20	Ag 230	30	38	32				1250-1410	677-766	ECO SMART BORIC ACID FREE FLUX
Safety-Silv® 34T CW	-	Ag 134	34	36	27,5		2,5		1166-1346	630-730	ECO SMART BORIC ACID FREE FLUX
Safety-Silv® 38T CW	BAg-34	Ag 138	38	32	28		2		1220-1325	660-718	ECO SMART BORIC ACID FREE FLUX
Safety-Silv® 45 CW	BAg-5	Ag 245	45	30	25				1225-1370	663-743	ECO SMART BORIC ACID FREE FLUX
Safety-Silv® 50N CW	BAg-24	Ag 450	50	20	28	2			1220-1305	660-707	ECO SMART BORIC ACID FREE FLUX
Safety-Silv® 56 CW	BAg-7	Ag 156	56	22	17		5		1145-1205	618-652	ECO SMART BORIC ACID FREE FLUX

Other alloys and flux combinations available upon request.

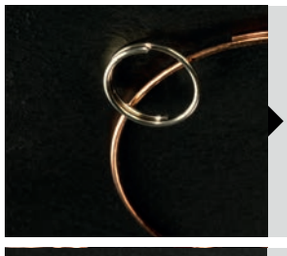


RETURN BENDS

Aluminum or Copper, with and without rings, manufactured to meet your specifications.

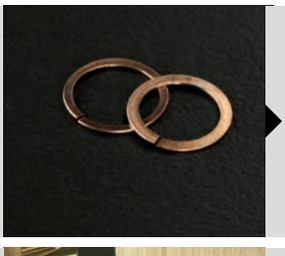
SEGMENT OR ARC RINGS

Can be formed to any degree of a circle and provide a “snap” fit on a tube.



LAP RINGS

Formed with an overlap to allow a compression “cling” within the fitting.



EDGEWOUNDS

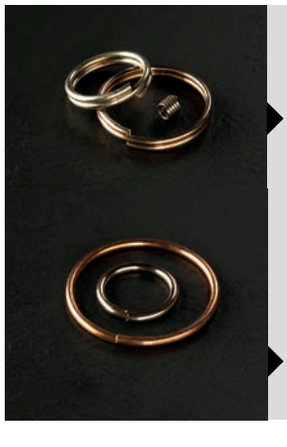
Are an economical alternative to a washer. They are made by winding flat wire on edge.

IPS BAND RINGS / GAP RINGS:

Often used for ship building applications for pipe fittings with an alloy ring insert groove / Allows a compression “cling” where wire overlap is undesirable.

STRIP

Filler metal rolled into a thin sheet. These products are frequently used in the carbide industry.



MULTI-TURN RINGS

Rings are used when a joint requires a volume of filler that cannot be provided by a single turn ring.

BUTT END RINGS

Will not tangle and lay flat without a helix.

WASHERS, DISCS, AND SHIMS

Fabricated from Brazing Strip and used where joint clearances or join design prevents the use of wire pre-forms. These products are frequently used in the carbide industry.

SLUGS

Manufactured from braze rod or wire and cut to a specific length.

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HARRIS OFFERS A WIDE RANGE OF SOLDERING ALLOYS FOR MULTIPLE APPLICATIONS.

Solders are available in cored wire, bar form, preform, as well as solid wire. Each solder product meets the highest standard for consistency and performance.

TURN TO THE PROS – TURN TO HARRIS.
To learn more about solder applications and techinques

YouTube **VISIT OUR YOUTUBE CHANNEL**
Go to www.youtube.com/harrisproductsgroup

STAY-BRITE® & STAY-BRITE® 8

Silver-bearing solders are often used throughout the air conditioning industry as an alternative to 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 annealment from high brazing heat. Stay-Brite® solders bond with all of the ferrous and nonferrous alloys. Stay-Brite® 8 is especially effective in filling loose-fitted couplings.
Use with all metals except aluminum.

BRIDGIT

Lead-free solder widely used in plumbing applications where lead-bearing solders are prohibited. Contains nickel to increase joint strength. A wide melting range makes Bridgit® an excellent alloy for large diameter fittings and non-concentric pipes. Fills gaps and caps off easily and effectively.

SOLDERS SELECTION CHART

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

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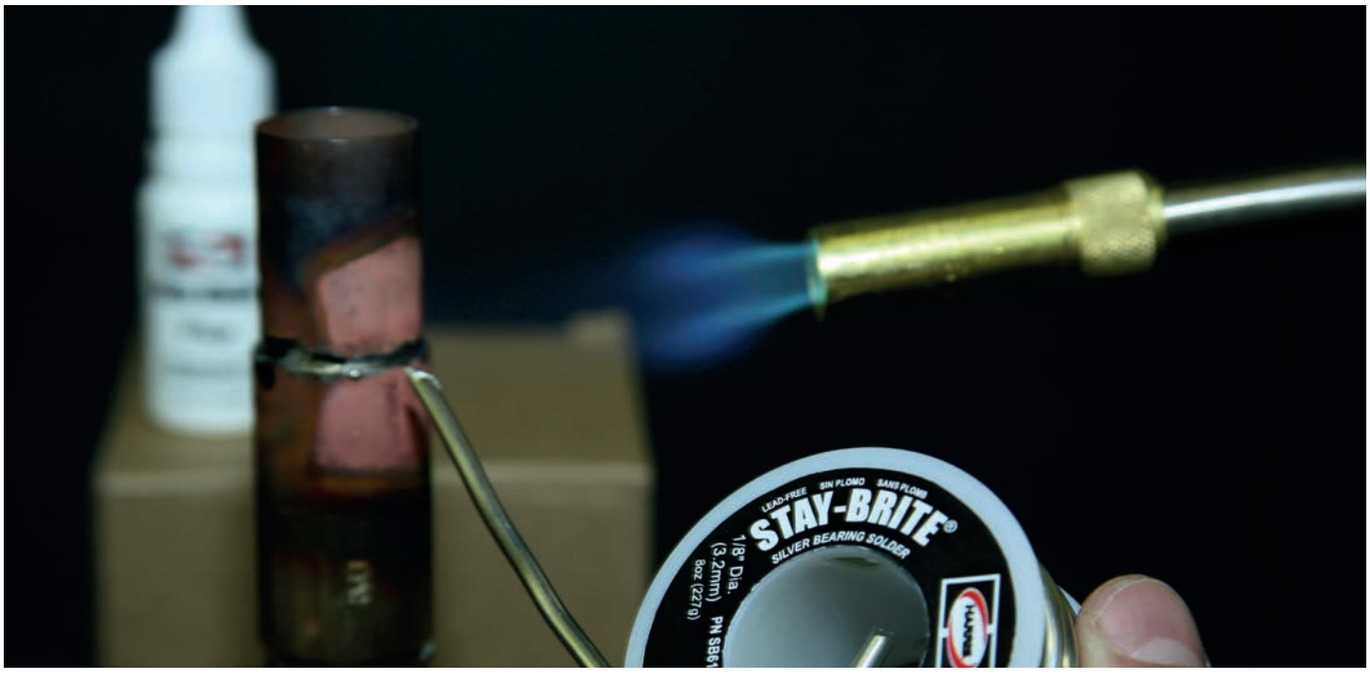
HARRIS OFFERS A WIDE RANGE OF SOLDER FLUX FOR MULTIPLE APPLICATIONS.

SOLDERING FLUXES SELECTION CHART

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.



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ECO SMART™
BORIC ACID FREE FLUX

ECO SMART® IS THE UNIQUE, BORIC ACID AND BORAX FREE, PATENT - PENDING NEW RANGE OF ENVIRONMENTALLY - FRIENDLY FLUXES.

Quality brazed joints require flux to protect the joint during heating and promote complete braze alloy flow. To ensure the best connections Harris designed, developed, and produced a variety of fluxes for specific applications to meet our customer's needs.

FEATURES

- Environmentally-friendly boric acid and borax free
- Smooth consistency for easy application
- 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

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 Counsel) found that these chemicals can damage the reproductive systems and fetal development.

DYNAFLOW® FLUX

Auto dispense flux for brazing copper, brass, mild and stainless steel, and other ferrous and non-ferrous alloys. Good fluidity provides excellent joint penetration, it is nonflammable, has a long shelf life, good dispensing performance and is cosmetically superior.

STAY-SILV® WHITE FLUX

An all purpose, low temperature flux for use in silver brazing. Use with most ferrous and non-ferrous base metals, not recommended on aluminum, magnesium, and titanium.

STAY-SILV® BLACK FLUX

An all purpose, high-temperature flux for use in silver brazing. Formulated for applications where the work is subjected to rapid, localized heating. Particularly useful in applications where large amounts of refractory oxides may form, such as with stainless steel alloys. Use with stainless steel, carbide, heavy parts, and prolonged heating cycles.

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.

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BRAZING EQUIPMENT

HANDLES

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

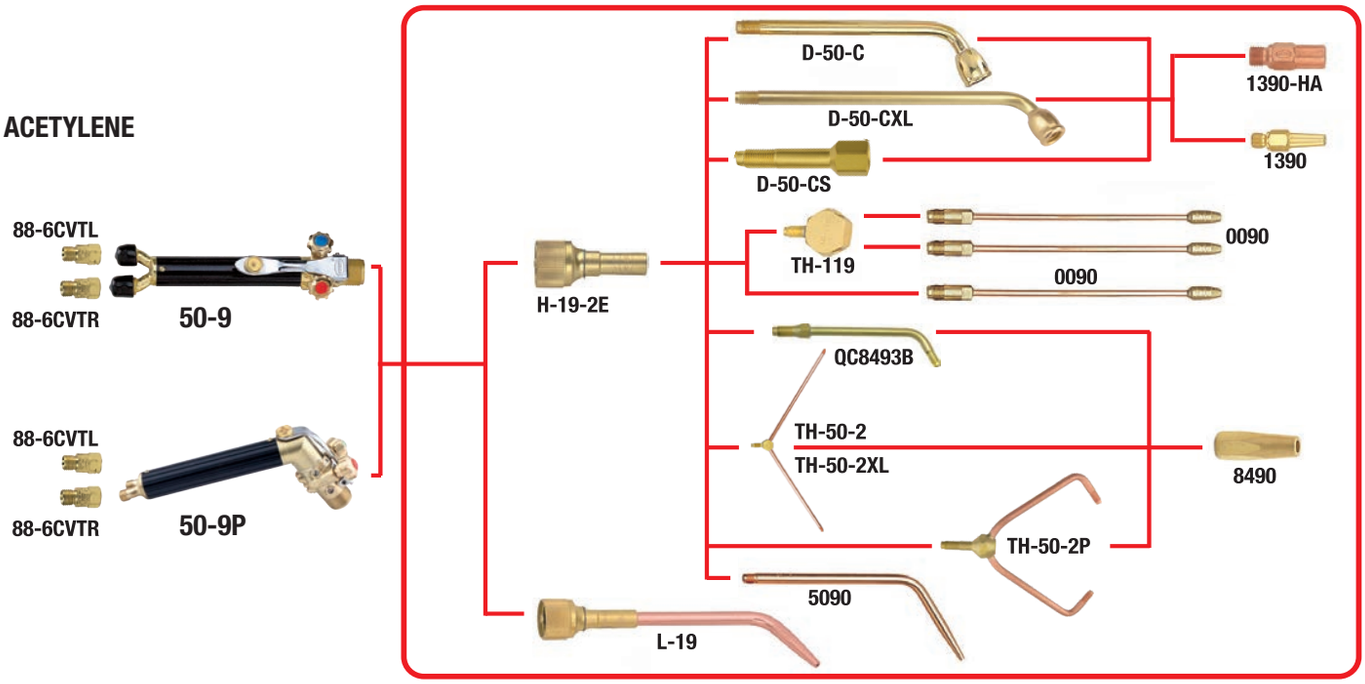
50-P MODEL

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



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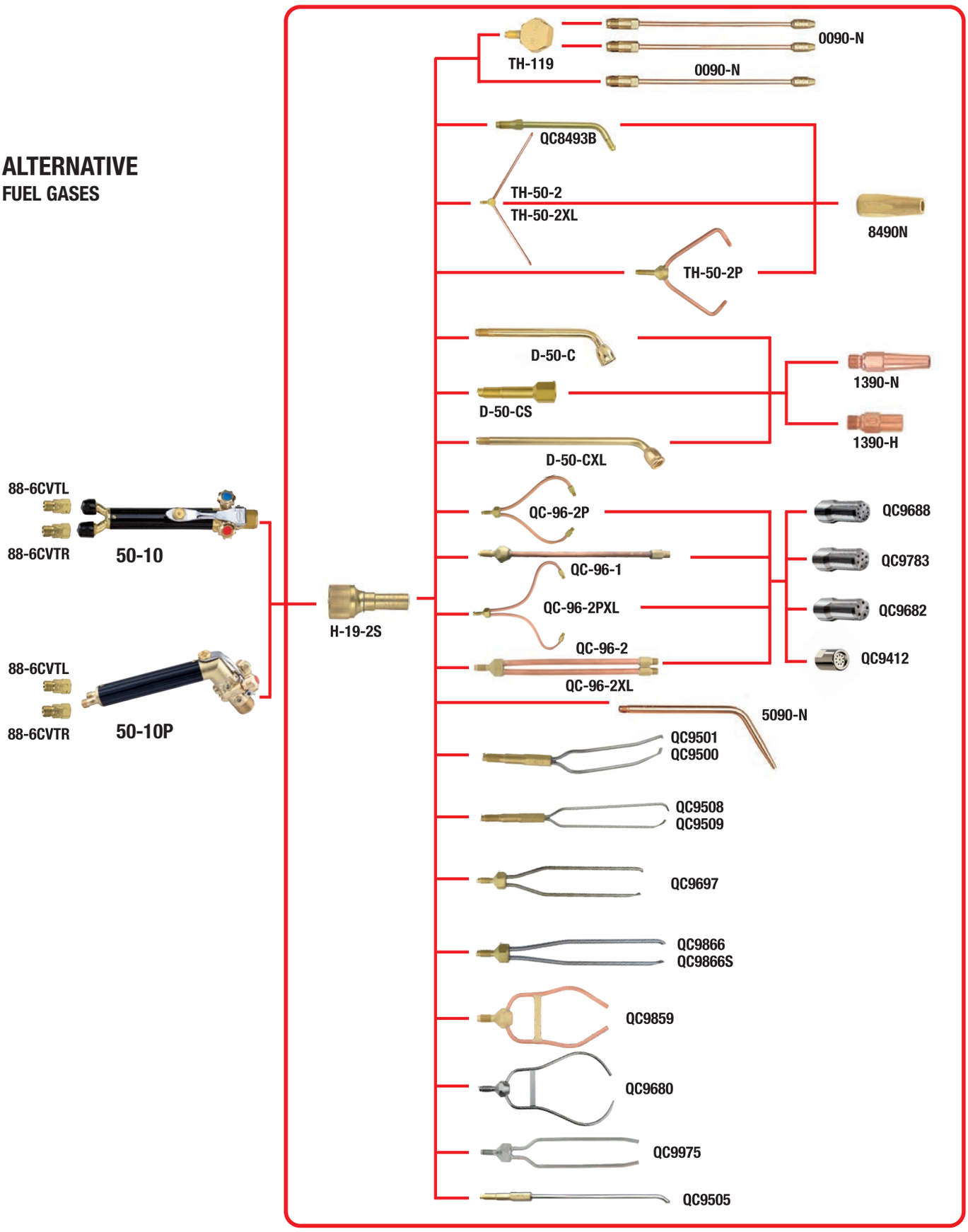
HANDLES

ALTERNATIVE
FUEL GASES



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HANDLES

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

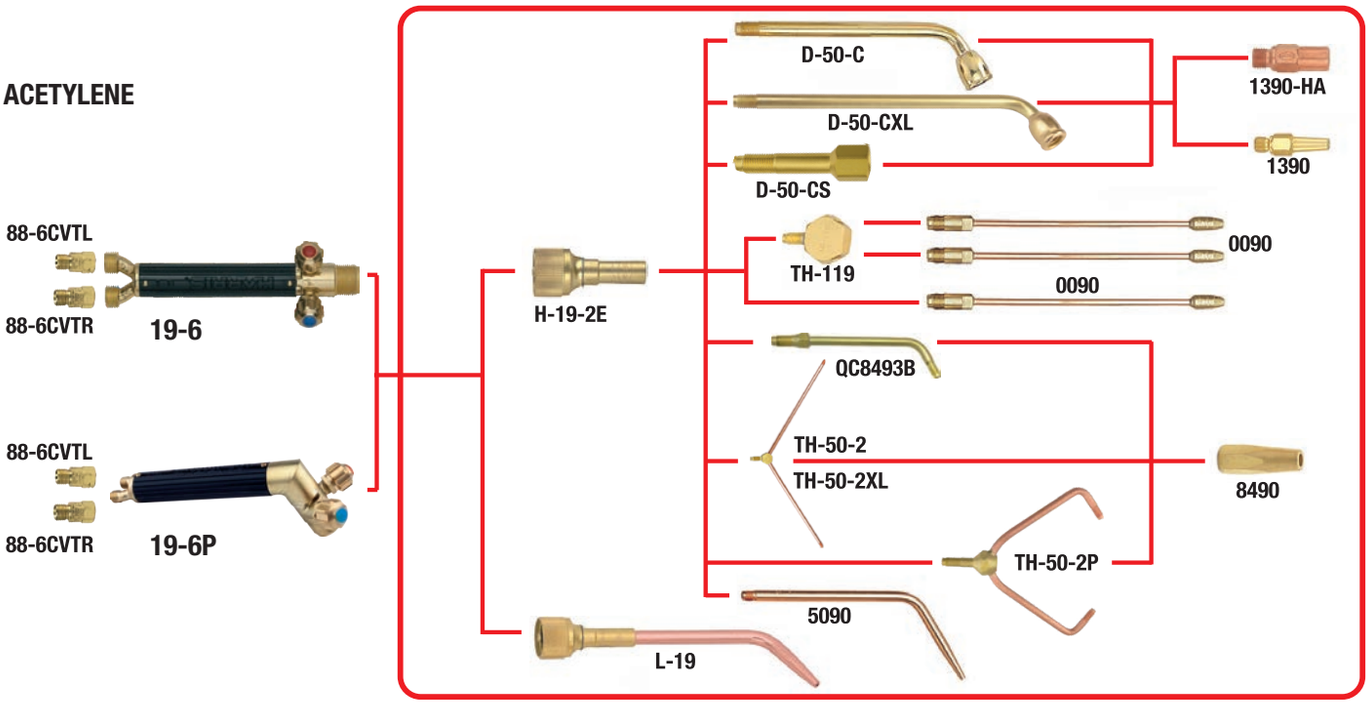
19-P MODEL — PISTOL TORCH

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



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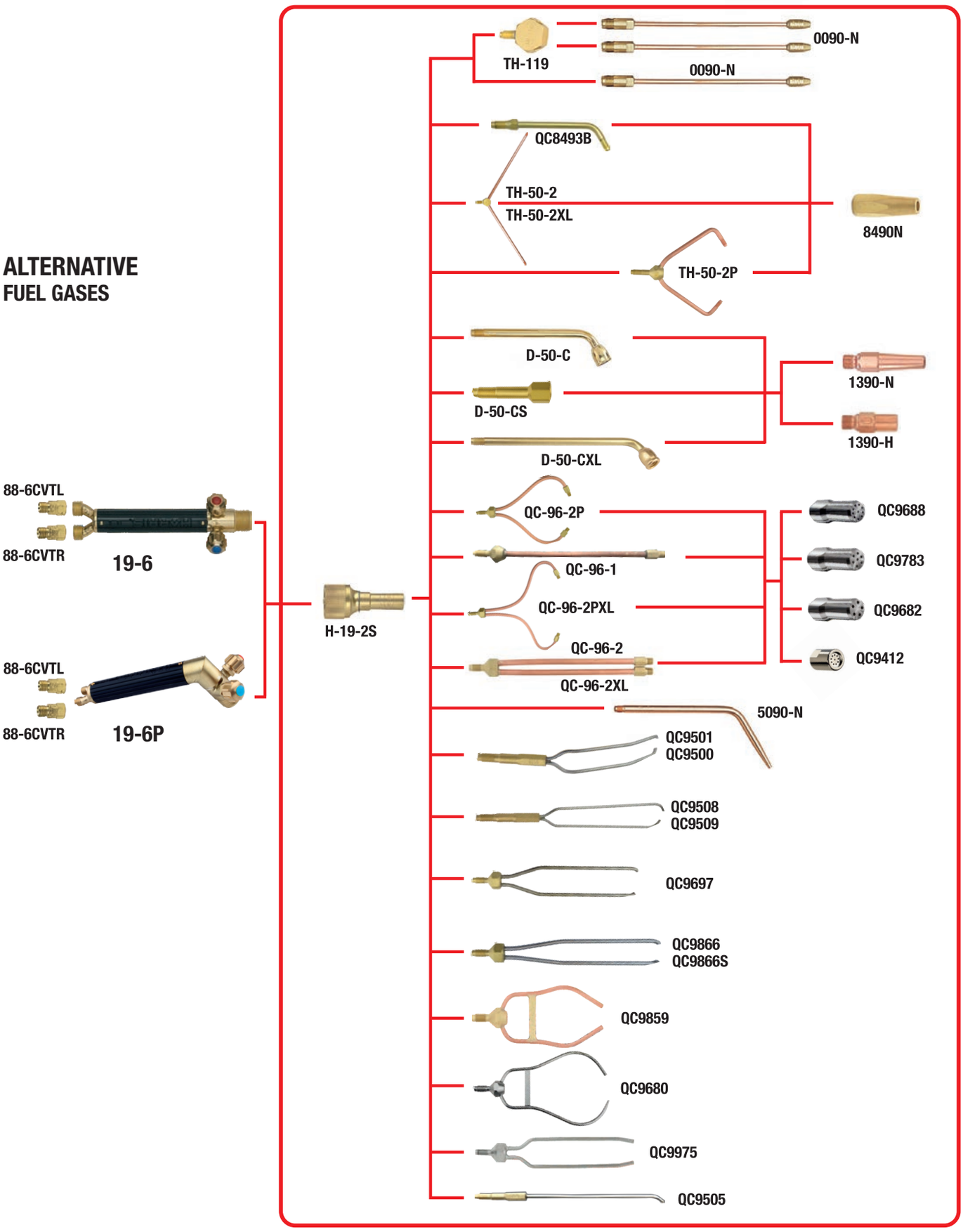
HANDLES

ALTERNATIVE
FUEL GASES



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15 MODEL

LIGHTWEIGHT TORCH HANDLE

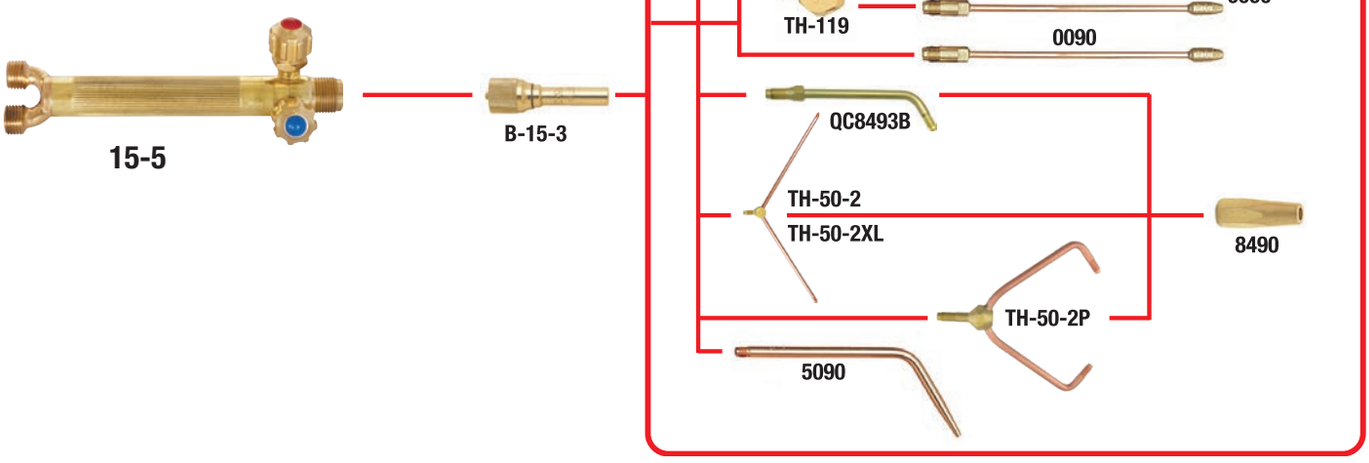
The model 15 is a lightweight handle with front valves for more convenient adjustment. It is designed to permit changing flame settings with one hand. The model 15 is compatible with all fuel gases. It can be used for welding, brazing and light heating.

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)
15-5	3/8”- 24 - UNF	3/8”- 24 - UNF	0,227	146
15-5GB	G 1/4” A-RH-UNI ISO 228	G 1/4” A-LH-UNI ISO 228	0,227	146

ACETYLENE



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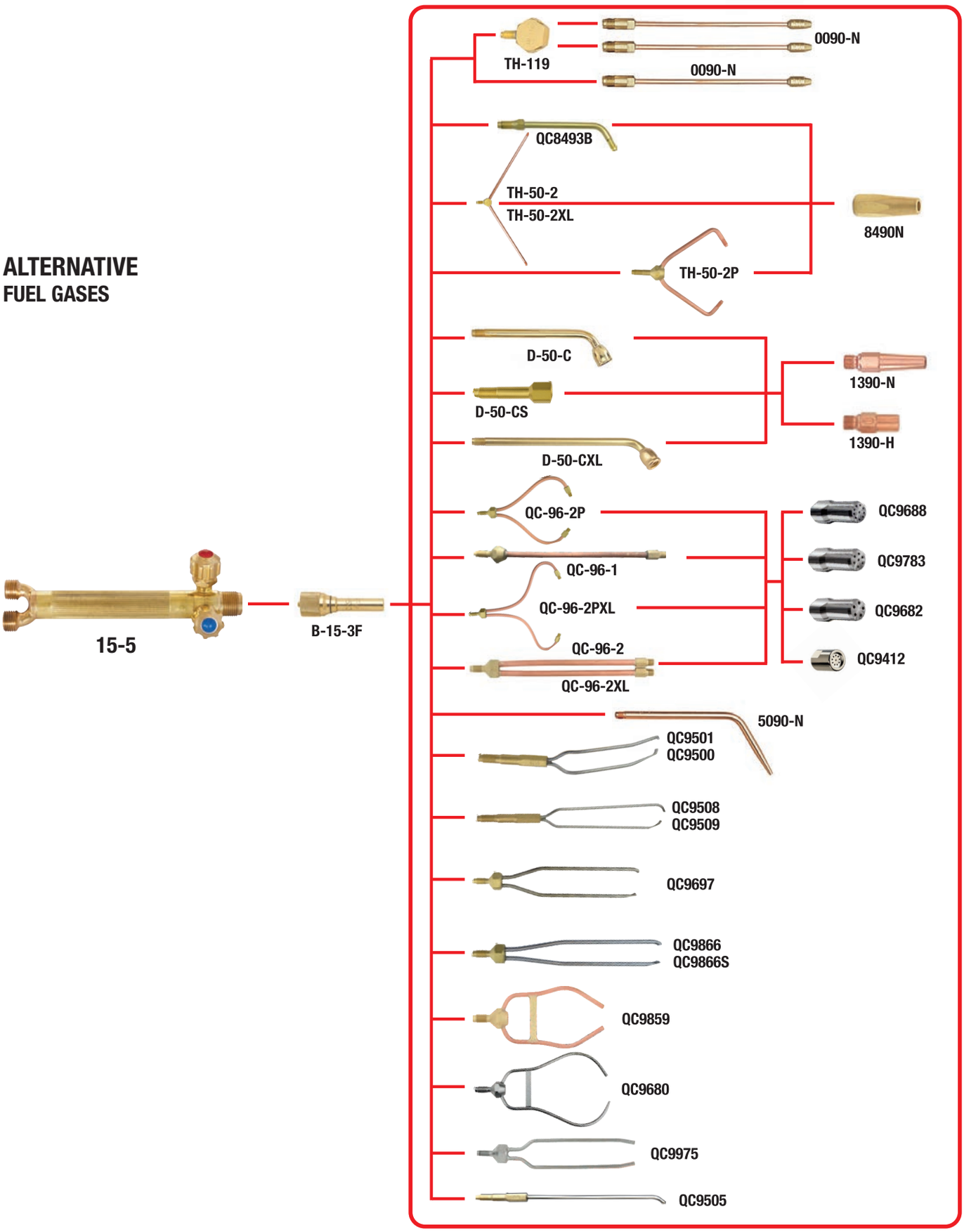
HANDLES

ALTERNATIVE
FUEL GASES



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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.
In order to use a full range of Harris brazing tips connect the 10501 adapter to the mixer or replace the M105 mixer by B-15-3 (B-15-3F).

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 105901 105903 105905 105906	105900N 105901N 105903N 105905N 105906N
105B	3,2						

ACETYLENE

ALTERNATIVE FUEL GASES

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HANDLES

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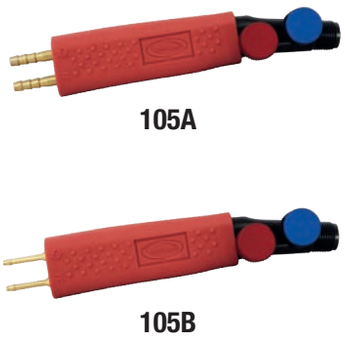
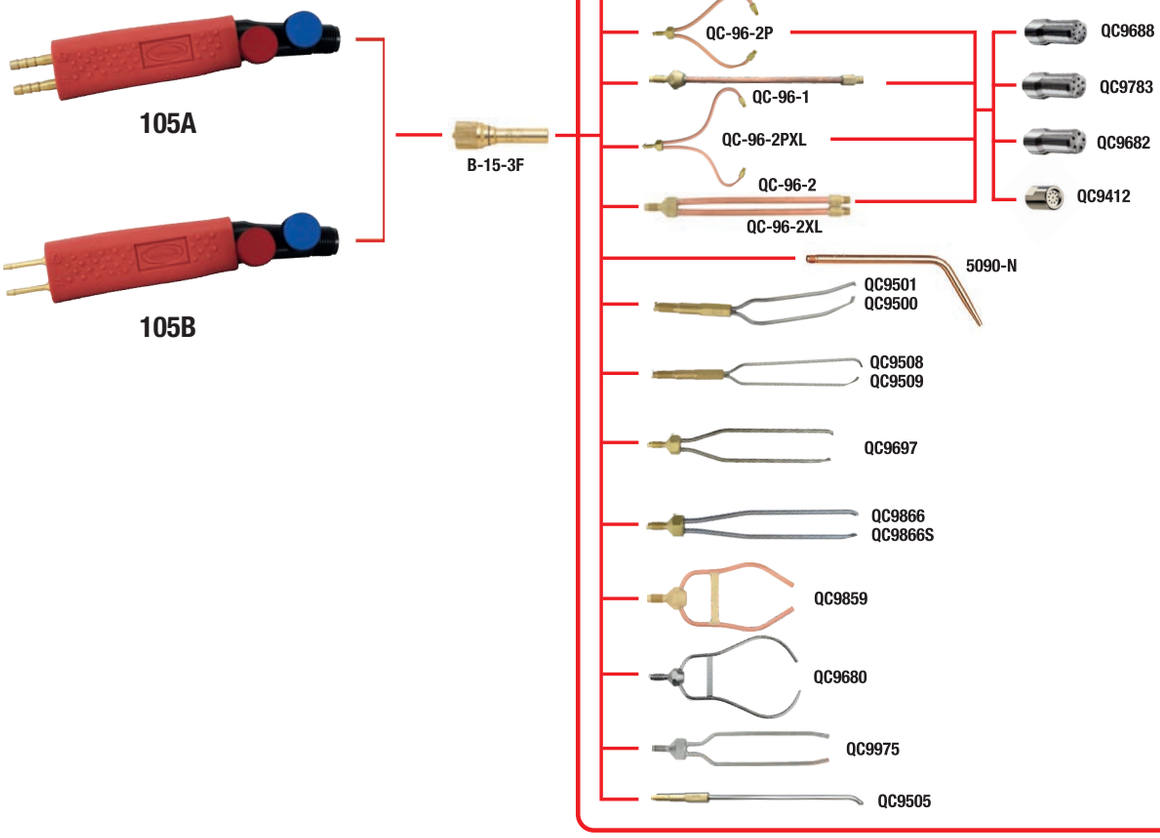


ALTERNATIVE FUEL GASES

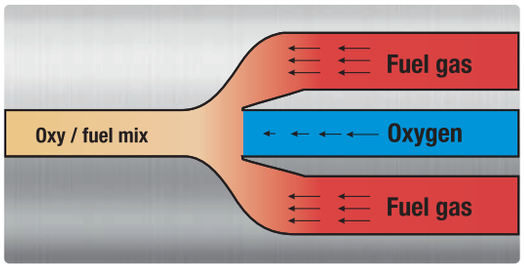


“EQUAL PRESSURE” mixer vs. “LOW PRESSURE” mixer

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.

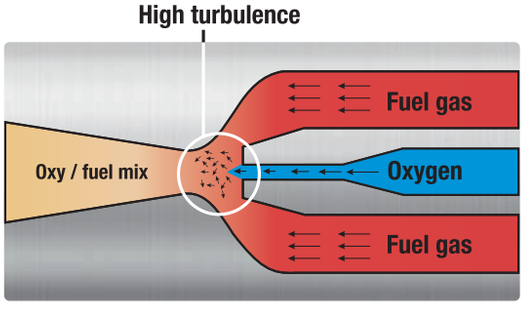
TYPICAL “EQUAL PRESSURE” MIXER DESIGN

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.



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MIXERS

EQUAL PRESSURE TYPE MIXERS

H-19-2E

B-15-3

M105

MODEL NO.	GAS	FITS HANDLE
H-19-2E	Oxy-acetylene/Oxy-hydrogen/Oxy-alternative gases*	19-6, 50-9
B-15-3	Oxy-acetylene/Oxy-hydrogen/Oxy-alternative gases*	15-3, 15-4, 15-4GB, 15-5, 15-5GB
M105	Oxy-acetylene/Oxy-hydrogen/Oxy-alternative gases*	105

LOW PRESSURE MIXERS

H-19-2S

B-15-3F

MODEL NO.	GAS	FITS HANDLE
H-19-2S	Oxy-alternative gases*	19-6, 50-10
B-15-3F	Oxy-alternative gases*	15-3, 15-4, 15-4GB, 15-5, 15-5GB

*Alternative gases include i.e. Propane, Butane, Methane, Natural Gas

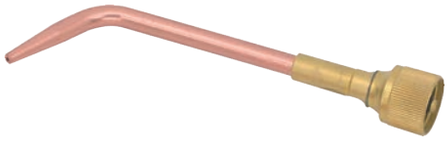
WELDING, BRAZING AND SOLDERING TIPS, TUBES AND ASSEMBLIES

L-19 Model

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

WELDING AND BRAZING TIPS AND ASSEMBLIES

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	WEIGTH	GAP	SHAPE
TH119	TH-119	Twin tip holder	0090 0090N	28	6 g	Adjustable	Adjustable

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WELDING AND BRAZING TIPS AND ASSEMBLIES

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	ALTERNATIVE 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

WELDING AND BRAZING TIPS AND ASSEMBLIES

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

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WELDING AND BRAZING TIPS AND ASSEMBLIES

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)	PROPANE/LPG LOW PRESSURE* (bar)	OXYGEN EQUAL PRESSURE (bar)	PROPANE/LPG EQUAL PRESSURE* (bar)	OXYGEN FLOW (l/h)	PROPANE/LPG 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

*for natural gas the value is almost twice as high

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

WELDING AND BRAZING TIPS AND ASSEMBLIES

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

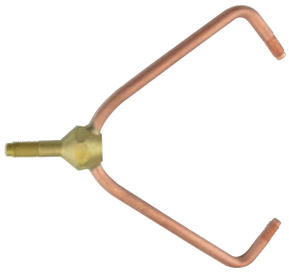
PART NO.	MODEL NO.	DESCRIPTION	TIP MODELS USED	LENGTH (cm)	WEIGHT (g)	GAP	SHAPE
1601590	TH-50-2	Adjustable Twin Tip Tube	8490 and 8490N	13,97	73	Adjustable	Adjustable
1601596	TH-50-2XL	Adjustable Twin Tip Tube	8490 and 8490N	18,42	91	Adjustable	Adjustable

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

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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

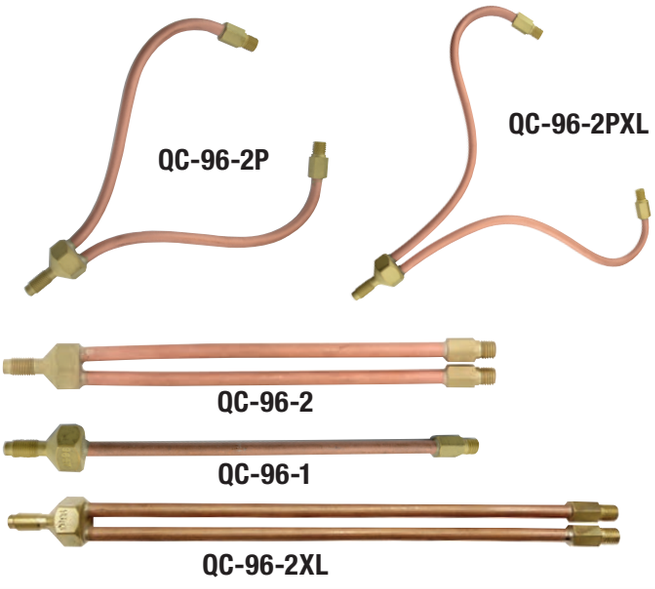
WELDING AND BRAZING TIPS AND ASSEMBLIES

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

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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

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MODEL QC9866 QC9866S

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

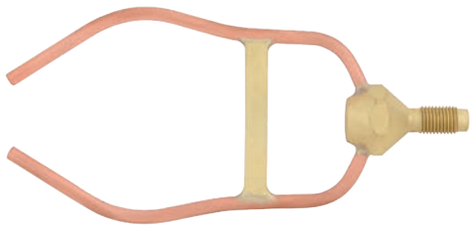
PART NO.	LENGTH (cm)	DESCRIPTION	ALTERNATIVE FUEL PRESSURE RANGE (bar)	ALTERNATIVE FUEL FLOW RANGE (l/h)	OXYGEN PRESSURE RANGE (bar)	OXYGEN FLOW RANGE (l/h)
QC9866	18,42	Preformed Twin Tip	0,69 – 1,38	99 – 184	1,03 – 1,72	255 – 552
QC9866S	13,33	Preformed Twin Tip	0,69 – 1,38	99 – 184	1,03 – 1,72	255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

MODEL QC9859

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

MODEL QC9680

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

WELDING AND BRAZING TIPS AND ASSEMBLIES

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 FUEL GAS PRESSURE (bar)	EQUAL PRESSURE OXYGEN PRESSURE (bar)	EQUAL PRESSURE FUEL GAS PRESSURE (bar)	OXYGEN FLOW (l/h)	FUEL GAS FLOW (l/h)
1390H	**1390-H**	3,5	0,5	3,5	0,1 – 0,5	4200	1050

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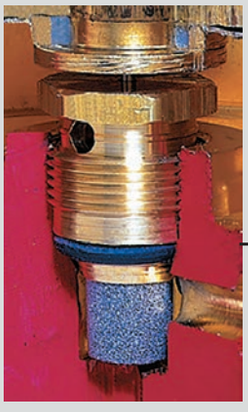
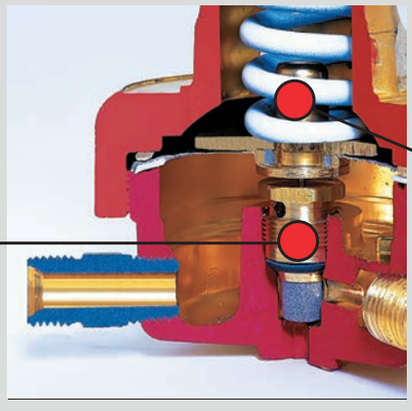
GAS REGULATORS

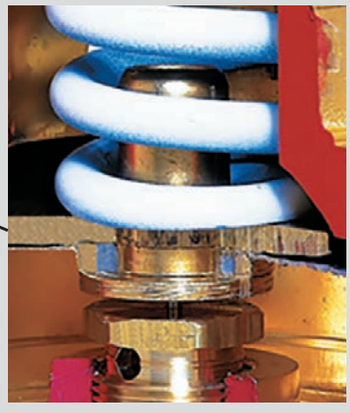
GENERAL FEATURES:

- 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 REGULATOR

MODEL SHOWN: **601-1,5-AC**

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

MODEL NO.	VERSION	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m^3/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-OX	-	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.

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REGULATORS

801 MODEL

SINGLE STAGE CYLINDER REGULATOR

MODEL SHOWN:
801-1,5-AC

APPLICATIONS:
Medium duty cutting, heating and welding

FEATURES:
- Maximum inlet pressure of 230 bar
- 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

MODEL NO.	VERSION	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m^3/h)	DELIVERY PRESSURE GAUGE (bar)	SUPPLY PRESSURE GAUGE (bar)
801-1.5-AC **801B-1.5-AC**	-	Acetylene	25	0 – 1,5	30	0 – 2,5	0 – 40
801-4-LP **801B-4-LP**	-	Propane	25	0 – 4	16,5	0 – 6	0 – 40
801P-4-LP **801BP-4-LP**	one gauge	Propane	25	0 – 4	16,5	0 – 6	
801D-4-OX **801DB-4-OX**	-	Oxygen	230	0 – 4	100	0 – 6	0 – 315
801D-4 * **801DB-4 ***	-	Argon, CO_2, Nitrogen, Air, Helium, Hydrogen, Methane	230	0 – 4	100	0 – 6	0 – 315
801D-10-OX **801DB-10-OX**	-	Oxygen	230	0 – 10	155	0 – 16	0 – 315
801D-10 * **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.

842 MODEL

SINGLE STAGE CYLINDER REGULATOR

MODEL SHOWN:
842D-10-OX

APPLICATIONS:
Medium duty cutting, heating and welding applications

FEATURES:
- Maximum inlet pressure of 230 bar
- Smooth adjustment, with high precision

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m^3/h)	DELIVERY PRESSURE GAUGE (bar)	SUPPLY PRESSURE GAUGE (bar)
842-1.5-AC	Acetylene	25	0-1,5	30	0 – 2,5	0 – 40
842-4-LP	Propane	25	0-4	16,5	0 – 6	0 – 40
842D-4-OX	Oxygen	230	0-4	100	0 – 6	0 – 315

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REGULATORS

25GX MODEL

SINGLE STAGE CYLINDER REGULATOR

MODEL SHOWN:
25GX-1.5-AC

APPLICATIONS:

Heavy duty, large, strong regulator for the professionals

FEATURES:

- Forged brass body for maximum strength
- Maximum inlet pressure of 230 bar
- Large Ø 70 mm diaphragm stabilizes working pressure
- Durable chromed bonnet
- Side entry

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m^3/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-OX	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 REGULATOR DEDICATED TO HVAC&R APPLICATIONS

MODEL SHOWN:
601 HVAC

APPLICATIONS:

HVAC purging, pressure testing and blanketing with nitrogen or other 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®)*

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	DELIVERY PRESSURE GAUGE (bar)	SUPPLY PRESSURE GAUGE (bar)
601-55	Nitrogen / CO_2 / Forming Gas	230	55	0 – 100	0 – 315
601-30	Nitrogen / CO_2 / Forming Gas	230	30	0 – 40	0 – 315

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REGULATORS

801-FN MODEL

CYLINDER FLOMETER REGULATOR FOR NITROGEN

MODEL SHOWN:
801-15FLGN

APPLICATIONS:

- Nitrogen flow control

FEATURES:

- Forged brass body for maximum strength
- Maximum inlet pressure 230 bar
- Factory pre-set outlet pressure at 3,5 bar
- Flowmeter with easy-to-read polycarbonate outer tube cover for strength and 360° visibility
- One-piece encapsulated seat design with internal filter and PTFE (Teflon®*) seat
- 7 year warranty

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	FLOWMETER (lpm)
801-15FLGN	Nitrogen	25	0 – 1,5	15

845 MODEL

PIPELINE REGULATOR

MODEL SHOWN:
845-AR

APPLICATIONS:

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

FEATURES:

- High flow
- Outlet pressure (up to 10 bar)
- Forged brass body for maximum strength
- Maximum inlet pressure 25 bar
- One-piece encapsulated seat design with internal filter and PTFE (Teflon®*) seat
- 7 year warranty

MODEL NO.	GAS	MAX INLET PRESSURE (bar)	DELIVERY PRESSURE (bar)	MAX AIR FLOW (m^3/h)	DELIVERY PRESSURE GAUGE (bar)
845-1.5-AC	Acetylene	25	0 – 1,5	13	0 – 2,5
845-4-LP	Propane	25	0 – 4	76	0 – 6
845-10-OX	Oxygen	25	0 – 10	95	0 – 6
845-10 **	Argon, CO_2, Nitrogen, Air, Helium, Hydrogen, Methane	25	0 – 10	95	0 – 16

Teflon® is a registered trademark of DuPont™
**The regulator is available for all the listed gases. When ordering always specify gas.

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REGULATORS

846 MODEL

PIPELINE REGULATOR

MODEL SHOWN:
846-4-LP

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

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-OX	Oxygen	25	0 – 4	76	0 – 6	-	25
846-10-OX	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 MODEL

PIPELINE REGULATOR-

MODEL SHOWN:
847-4-LP

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 CO_2

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-OX	Oxygen	25	0 – 4	76	0 – 6	-
847-10-OX	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.

KITS EASY TO USE

EASY TO USE KITS FULLY ASSEMBLED KITS FOR BRAZING

KIT EASY TO USE 1 for acetylene brazing and welding up to 2 mm

INCLUDES:

- Models 601D-10-OX oxygen and 601-1.5-AC acetylene regulators
- Regulator flashback arrestors: 188-RGB for oxygen and 188-LGB for acetylene
- Torch handle 19-6
- 88-6SVL and 88-6SVR check valves
- L-19-3 acetylene welding and brazing tip
- Twin gas hose for acetylene and oxygen 6 mm, with fittings, lengh 5 m or 10 m

KIT EASY TO USE 2
for alternative fuel brazing

INCLUDES:

- Models 601D-10-OX oxygen and 601-4-LP propane regulators
- Regulator flashback arrestors: 188-RGB for oxygen and 188-LGB for fuel gas
- Torch handle 19-6
- 88-6SVL and 88-6SVR check valves
- L-19-3N propane brazing tip
- Twin gas hose for fuel gas and oxygen 6 mm, with fittings, lengh 5 m or 10 m

Other options upon request

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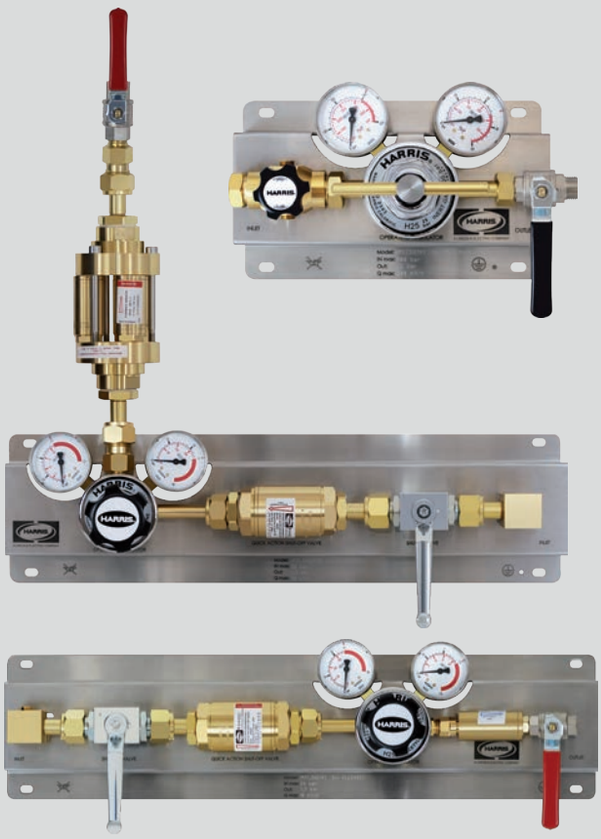
GAS CONTROL SYSTEMS

LET THE EXPERTS AT HARRIS SHOW YOU HOW YOU CAN RAISE PRODUCTIVITY, LOWER OPERATIONAL COST, AND IMPROVE THE QUALITY OF YOUR PRODUCTS BY CHOOSING THE RIGHT GASES AND EQUIPMENT FOR YOUR SPECIFIC APPLICATION. WHETHER YOU ARE WORKING WITH OXYGEN, HYDROGEN, NITROGEN, OR ANY OF THE FUEL GASES, HARRIS OFFERS A COMPLETE LINE OF GAS CONTROL SYSTEMS COUPLED WITH EXPERIENCED ENGINEERS AND TECHNICAL SPECIALIST THAT ARE READY TO ASSIST YOU FROM THE GAS SUPPLY TO THE FLAME.

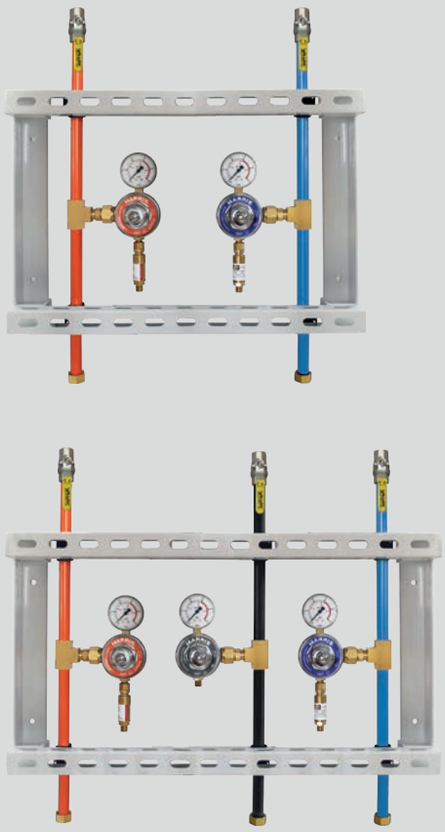
GAS SUPPLY MANIFOLDS

the first stage of a gas reduction, provide continuous gas flow from a single cylinder or bank of cylinders.



BRAZING STATION PANELS

the second stage of a gas reduction, are installed directly off the pipeline.



INTRODUCING:

THE FIRST PERFECT ENGINEERED FLAME

BRAZE LIKE A PRO WITH THE NEW PERFECT FLAME®. ITS PATENTED DESIGN ALLOWS THE USE OF PRE-SAVED FLAME SETTINGS WHEN AND WHERE YOU NEED THEM. THIS SMART TECHNOLOGY ENSURES QUALITY AND CONSISTENCY THROUGH YOUR ENTIRE PROCESS.

Featuring built-in software that sets and monitors an engineered flame. The Perfect Flame's game-changing software captures each operator's "torch on time" and flame settings. This information is available on a custom dashboard which allows your engineering and quality teams to analyze this information for the first time.

ANALYZE

Use data generated to compare to the current process data to find the perfect flame for your specific application and operation.

DEFINE

Define the different flames you need for your production with our software.

MEASURE

Using the software program, you can now measure the exact energy (BTU or KCAL) of your flame.

IMPROVE

Make detailed, repeatable adjustments to the flames for each specific application to achieve maxium operational efficiency.

CONTROL

Multi-tier security features allow management to lock settings in to produce a consistent flame from operator to operator, shift to shift, and location to location.

The built-in software analyzes the flame of any operator, measuring chemistry, flow rates, temperature, BTU, and flame types. This data is stored for analysis and future use to consistently produce the ideal production flames needed for each application. These saved flames can be reproduced anywhere a Perfect Flame is being used, so all operators are using the same flame and producing the same, perfect results.

WHAT DOES THIS MEAN FOR YOU AND YOUR BUSINESS?

- Fewer leaks
- Flame control and standardization
- Less rework
- Improved throughput
- Less gas usage
- Data analytics
- Improved quality
- Maxium operational efficiency
- Less operator training and requalification
- Reduce brazing expertise needed

WHICH OF THESE INCREDIBLE BENEFITS WILL AFFECT YOUR BOTTOM LINE THE MOST?

Try our Documented Cost Reduction (DCR) Program. Our team will conduct a full operational audit, including Clearance, Filler Metal, Cleaning, Heat Input, Flux, and Post Braze Processes, to help you identify potential areas for improvement. After completion, we will provide a DCR report, which will outline projects and solutions for potential improvements, as well as the savings associated with them, including leak reduction programs, material cost reductions, operator training programs and optimal equipment selection.

PERFECT — DOWN TO THE LAST DETAIL.

EASY-TO-USE INTERFACE

SET YOUR FLAME

CREATE YOUR JOB

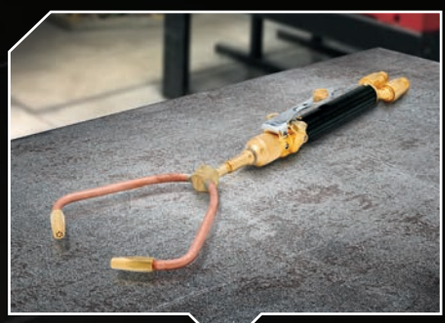
MONITOR, TRACK, AND CONTROL IN PRODUCTION

CONTROL TECHNOLOGY

- Thermal mass based Mass Flow Controller (MFC)
- Control based on flow of gas in CFH or LPM
- Gases supported: Natural Gas/Methane, Propane/LPG, Propylene, Butane, Acetylene, and Hydrogen
- Custom CPU & power supply — 80v to 240v and 50 – 60Hrz — ensures the Perfect Flame can be used anywhere in the world
- Draws just 1.5 amps

FIRMWARE FEATURES

- Flame settings are stored on the local machine memory
- Operators can select from approved flame settings stored on their units, but only a supervisor with a password can change any pre-saved flame settings and control what flames are available to the operator
- Ability to save different settings unique to each job being performed
- Collects and stores data from several parameters
- Wi-Fi relays data to custom dashboard for review and analysis



TORCH

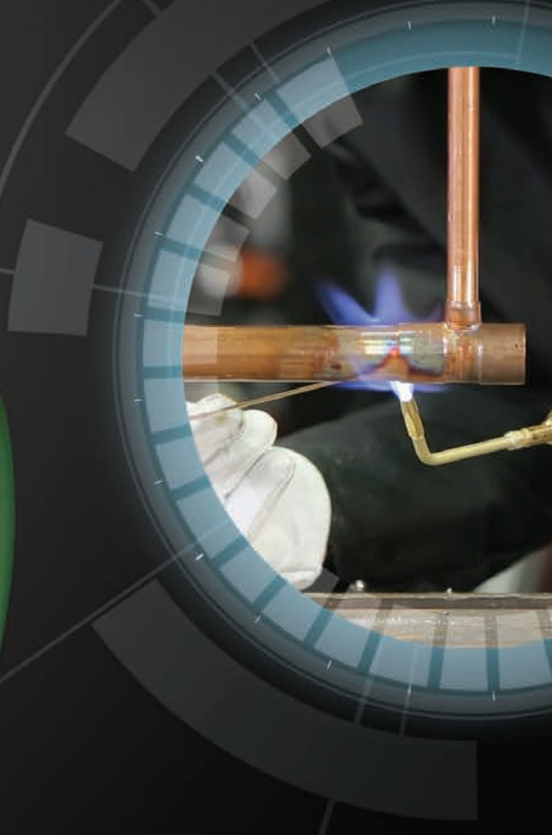
- Adjustment knobs have been removed so operators cannot change the flame
- Turn off the flame using a Harris 50-10 torch with automatic on/off switch or a Harris gas block

ENCLOSURE

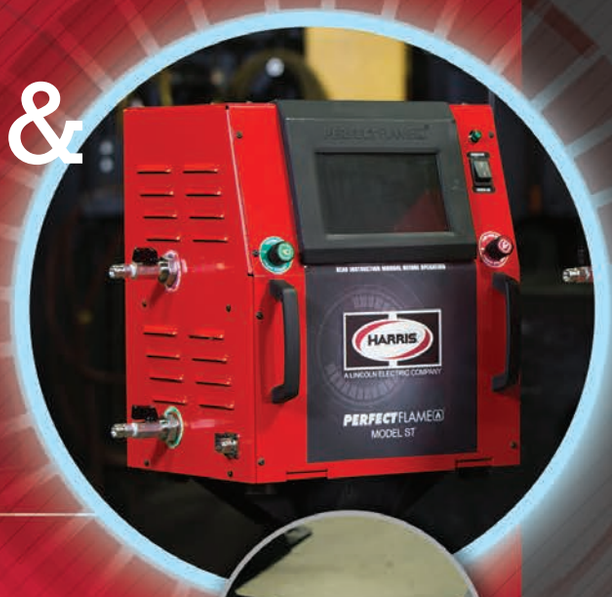
- Industrial design and water-resistant
- Manufactured to IP-1921 spec — the same as Lincoln Electric® welders

MOUNTING

- Back mountable to hang on a wall
- Capable of mounting to a pedestal or table top
- Rubber legs absorb vibration



SINGLE-TORCH & MULTI-TORCH DESIGNS



FIND THE PERFECT SOLUTION FOR YOUR UNIQUE NEEDS

SINGLE-TORCH
MODEL ST

The single-torch configuration allows the brazer to toggle between five different settings to quickly and seamlessly switch between different preset flames for different braze connections. Hands-free technology allows users to switch between flames via foot pedal, selecting up to 5 preset flames from a library of up to 100. This configuration is perfect for the brazing operator who has multiple different braze joints per job and needs to quickly adjust the flame settings.

MULTI-TORCH
MODEL MT

This configuration is best suited for high production operations where individual operators are brazing the same or different joints. Three operators can be using the same or different flames, each controlled by one Model MT unit.

PART NO.	DESCRIPTION	INCLUDES
4301945	SYSTEM, COMPLETE PF2ST	PERFECT FLAME (PF) SINGLE TORCH (ST) BOX WITH FOOT SWITCH ONLY
4404951	KIT,15APF2 ST STD	PF ST BOX WITH FOOT SWITCH & MODEL 15 VALVELESS TORCH HANDLE
4404949	KIT,50PF2 ST STD	PF ST BOX WITH FOOT SWITCH & MODEL 50B VALVELESS TORCH HANDLE
4404950	KIT,50APF2 ST STD	PF ST BOX WITH FOOT SWITCH & MODEL 50A VALVELESS TORCH HANDLE
4301946	SYSTEM,COMPLETE PF2MT	PERFECT FLAME (PF) MULTI TORCH (MT) BOX ONLY
4404954	KIT,15APF2 MT STD	PF MT BOX WITH THREE (3) MODEL 15 VALVELESS TORCH HANDLES
4404952	KIT,50PF2 MT STD	PF MT BOX WITH THREE (3) MODEL 50B VALVELESS TORCH HANDLES
4404953	KIT,50APF2 MT STD	PF MT BOX WITH THREE (3) MODEL 50A VALVELESS TORCH HANDLES
4301947	PEDESTAL PF2	ACCESSORY ITEM, NOT INCLUDED IN ANY PART NO.'S ABOVE
9104521	FOOT-SWITCH-ASSY PF2	REPLACEMENT ITEM, FOOT SWITCH IS INCLUDED IN ALL ST PN'S ABOVE
9009624*	COMPLETE FILTER ASSEMBLY, PF2 10-15 MICRON SS W/HOUSING	COMPLETE FILTER ASSEMBLY
9009622	FILTER,PF2 10-15 MICRON SS	REPLACEMENT ITEM
9009623	GASKET,PF2 FILTER HOUSING	REPLACEMENT ITEM

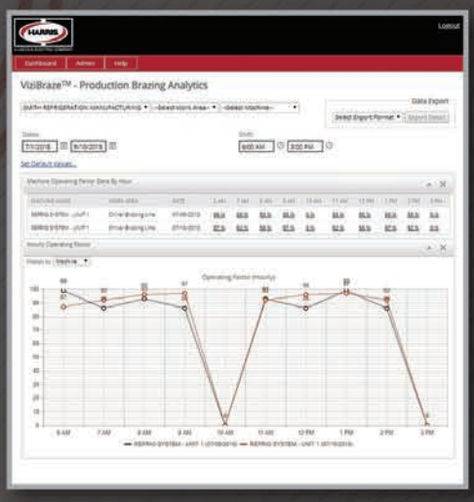
P/N: 9009624*
COMPLETE FILTER ASSEMBLY

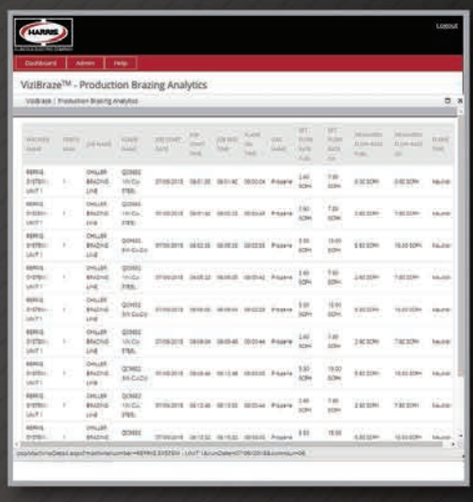
* Recommeded with all Perfect Flame® purchases. One required for fuel, one required for oxygen to be installed on the gas inlet side.

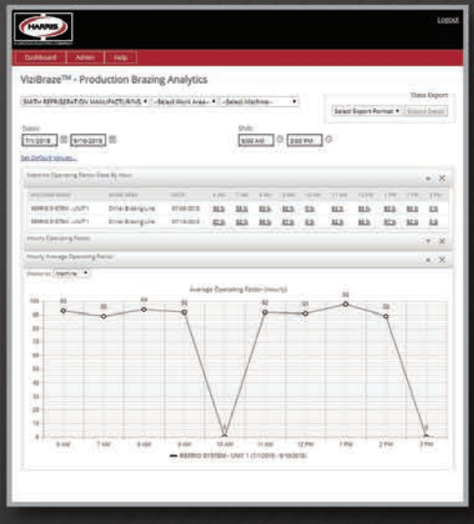
Perfect Flame® hardware purchases and the continuous use of our free software is only available to customers who also purchase a mutually agreed amount of Harris brazing alloys annually.

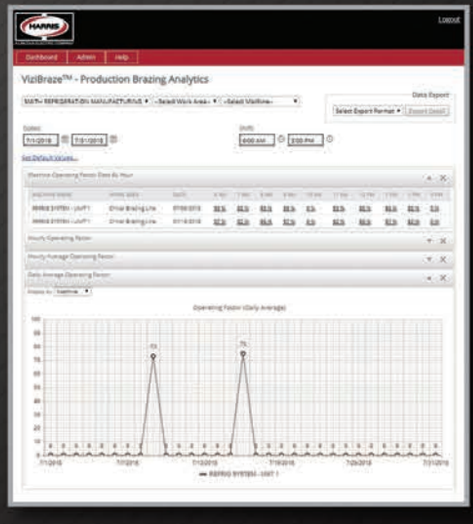
MONITOR, TRACK, AND CONTROL

GET THE CLEAREST VIEW INTO THE EFFICIENCY AND QUALITY OF YOUR PRODUCTION









ViziBraze™

Now that the Perfect Flame® has given you full control over the flame settings, our new firmware technology, ViziBraze™, gives management the ability to track the "torch on time" for each individual operator. Now, for the first time, you can track the "Operating Factor" or the amount of time each torch is being used. Imagine setting a standard brazing time for any braze connection and being able to ensure that your operators are following procedure. With multiple Perfect Flames in operation, you can monitor, track, and control operating factor for one operator, one shift, one line, one facility, or over your entire organiztion. With this information, you can see where quality and consistency can be improved, waste can be cut, time can be saved, and profits can be grown.

We know security is paramount. Perfect Flame data is stored and secured in the cloud, and is accessible to you from any place, at any time. Usage data is owned by you and never shared outside your organization.

PERFECT FLAME™

The patent-pending technology inside the Perfect Flame is the result of our longstanding history of improving operations across the brazing industry. Our expertise is unrivaled and the Perfect Flame's ability to revolutionize your brazing operation's efficiency is unmatched.

READY FOR THE NEXT ERA OF BRAZING?

CONTACT HARRIS TODAY.

+48 74 646 23 52 OR https://www.harrisproductsgroup.eu/ OR marketingharris@lincolnelectric.eu

Ask about our Documented Cost Reduction (DCR) Program and see just how impactful the Perfect Flame can be for your bottom line.

GAS BLOCK™

1YR WARRANTY

DESCRIPTION

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 a 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.

DETAILS

Capacity: Heavy Duty

Where Used: Brazing stations, gas welding stations, test labs, schools, and training centers

Weight: 2 Gas - 1,59 kg / 3,5 lbs 3 Gas - 2,22 kg / 4,9 lbs

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™

FEATURES AND BENEFITS

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
4301000	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)
4301001	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)

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LIGHTPRO SPARK II IGNITOR

DESCRIPTION

The LightPro Spark II™ 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.

DETAILS

Capacity: Medium duty
Housing: Zinc die cast
Where used: Brazing and welding operations
Weight: 0,43 lbs / 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 II	14K	100,000

* Estimated savings of $5,00/mth. For more information about gas cost savings please contact your Harris representative.

LIGHTING PROCEDURE

The LightPro Spark II™ 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 picture.
✗ Improper lighting will cause failures.

HARRIS
A LINCOLN ELECTRIC COMPANY

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.

ACCESSORIES

FLUX GRADE TWIN HOSE

RED & BLUE FLUX GRADE TWIN HOSE – International standard for all fluxed fuel gases.

Hose Diameters: Available in 3 and 6 meter lengths.

TA4X4FLX

TA6X6FLX

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

SAFETY DEVICES: 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)

		MAX PRESSURE (bar) *					
PART NO.	**GAS**	**OX**	**AC**	**LPG**	**H_2**	**INLET THREAD**	**OUTLET THREAD**
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

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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. Flashback arrestors (T-versions, as listed below) have three safety functions:

- Prevent reverse flow of gases with built-in check valve
- Extinguish flashback fire with sintered metal filter
- Thermal cut-off valve prevents excessive temperatures

REGULATOR TYPE								
			MAX PRESSURE (bar) *					
PART NO.	GAS	MAX FLOW (l/h)	OX	AC	LPG	H_2	INLET THREAD	OUTLET THREAD
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

188-T (L & R)

*1 bar=100 kPa *Torch type , hose to hose and resettable flashback arrestors available on the request

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

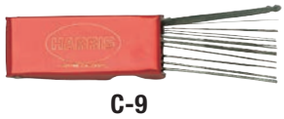
OTHER ACCESSORIES

WRENCH

D-1013

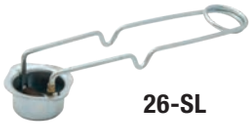
TIP CLEANER

Calibrated tip cleaner for brazing tips



C-9

LIGHTER WITH FLINT



26-SL

BRAZING GOGGLES

APS010

BRAZING PROCEDURES

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 sandpaper. 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 catalog section of alloys for recommended brazing filler metal selection. When brazing copper to copper, alloys such as Dynaflow®, HARRIS 2P, HARRIS 5P, HARRIS 15P or HARRIS 18P are recommended. These alloys contain phosphorus and are self-fluxing on copper.

When brazing brass or bronze fittings, STAY-SILV® or ECO SMART® 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. Phosphorus bearing alloys should only be used for copper and brass.

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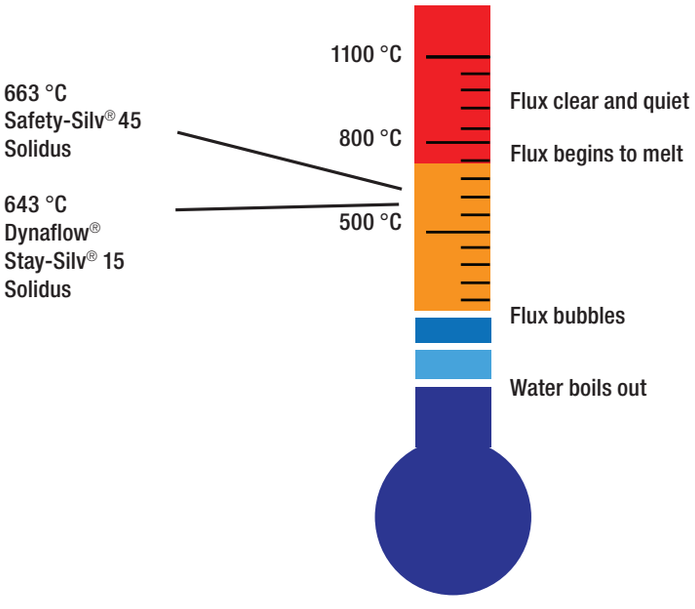
PERFORM PROPER FLUXING

Proper fluxing is important because the flux absorbs oxides formed during heating and promotes the flow of the filler metal. 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. Stir flux before use. If flux is dried out add a small amount of water until flux reaches a paste consistency.

TORCH FLAME
ADJUSTMENT

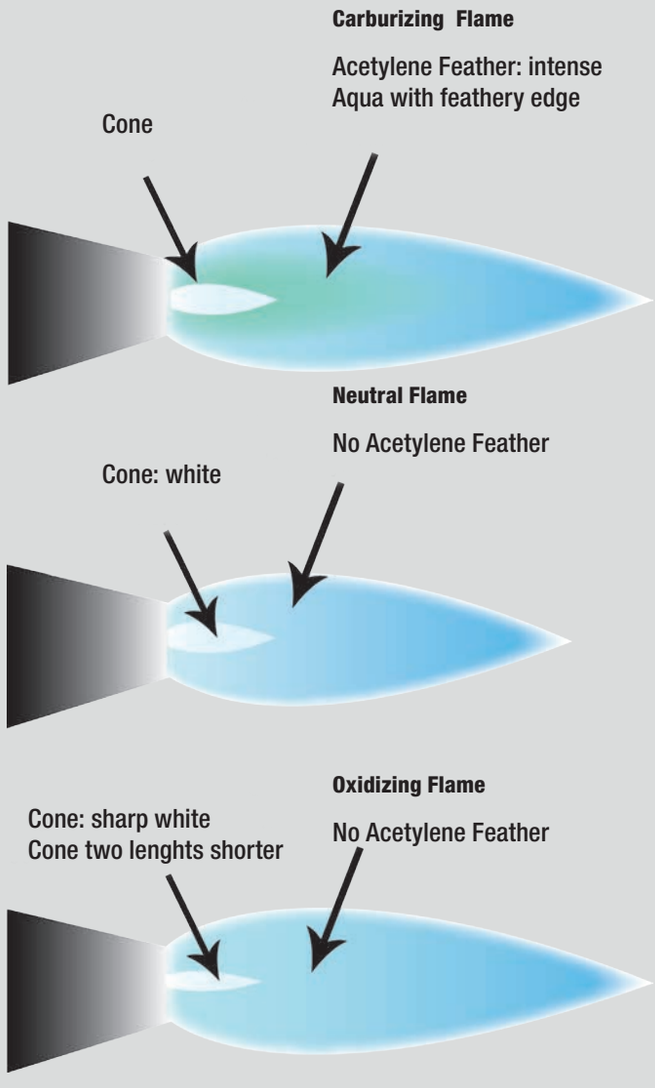
OXYGEN / FUEL
Alternate fuel gases such as propane, propylene, butane, and natural gas / methane mixed with oxygen is the most common method used for production brazing globally. This is due to these gases higher Kcal content, increased safety, and reduced cost when compared to acetylene. Refer to the 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.



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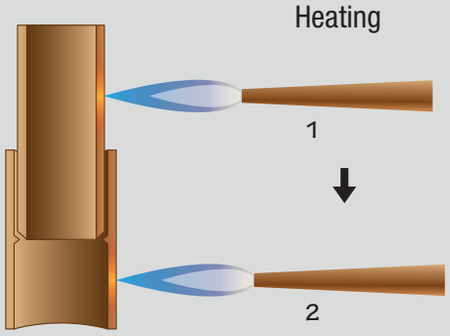
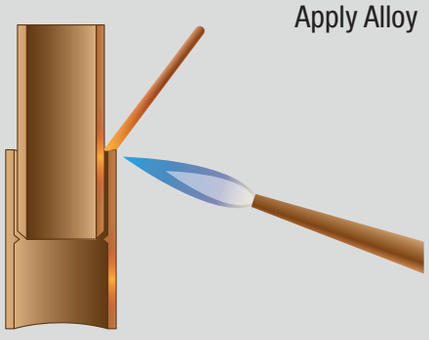


HEATING TUBE

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.

ENSURE HEATING

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.

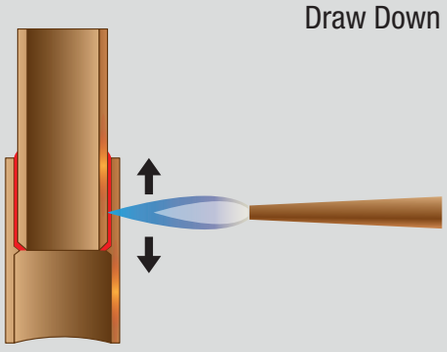


APPLY THE ALLOY

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

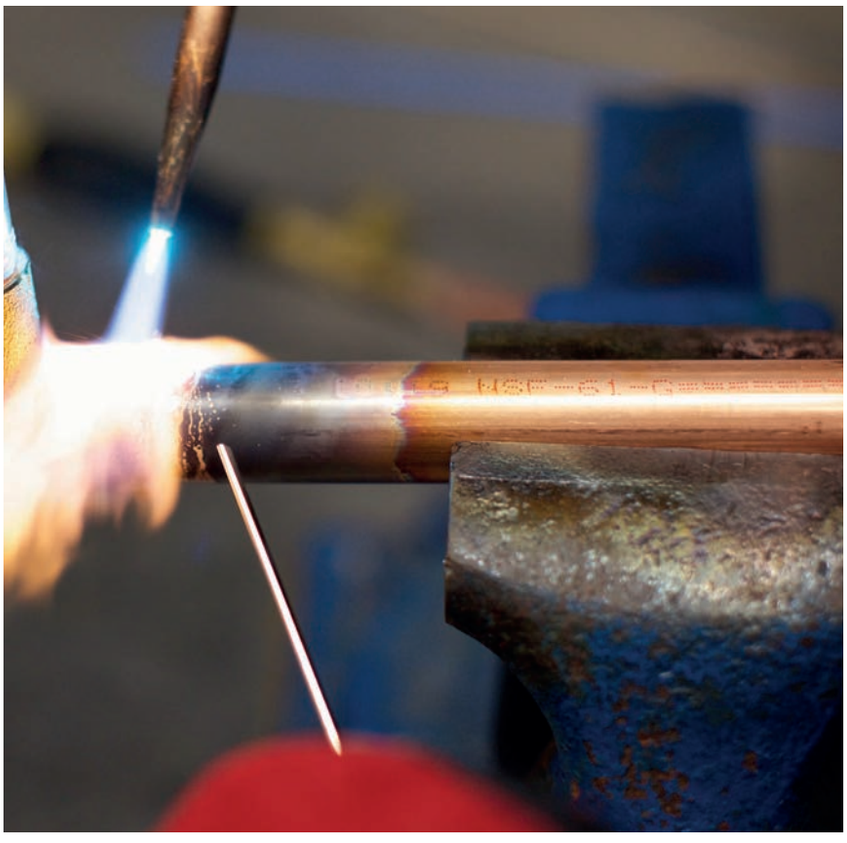
UNIFORM HEAT

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.



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.

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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 it is common to 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.

Without nitrogen purge **With nitrogen purge**

DEVICES FOR NITROGEN FLOW CONTROL

Please refer to the Harris International Equipment Catalog
for complete nitrogen gas flow solutions.

FLOWMETER

FLOWMETER REGULATOR (INLET 300 BAR)

FLOWMETER REGULATOR (INLET 230 BAR)

VALUE ADDED SERVICES

Production Brazing manufacturers are constantly seeking ways to improve production while lowering their overall costs. Harris is dedicated to helping our customers achieve their operational goals. We offer a full suite of value-added, cost reduction services that maximize a facilities brazing operation while minimizing cost. ASK US HOW.

HARRIS DOCUMENTED COST REDUCTION (DCR) PROGRAM

The Harris Products Group is committed to going above and beyond the expectations of a normal supplier by helping our customers improve their brazing operations. We strive to help you lower costs, decrease leaks, increase production, and improve quality. To do this, we have created the DCR or Documented Cost Reduction Program to help you identify potential areas for improvements.

This program begins with a Facility Brazing Audit so we can better understand your specific operations. Our full brazing audit is a detailed audit aimed at either validating your current process or identifying deficiencies for future improvement. We spend additional time on the floor thoroughly auditing six steps in the brazing process: Clearance, Filler Metal, Cleaning, Heat Input, Flux, and Post Braze Processes. After completing the full audit and gathering the required technical information, we will provide you with a DCR Report. This report will outline projects for potential improvement and the savings associated with these projects. Examples include: leak reductions programs, material cost reductions, operator training programs, and optimal brazing equipment selection.

Finally, if you decide to move forward with some or all of these identified projects, we will then help you design and implement a program to achieve results.

BRAZING EQUIPMENT PROCESS IMPROVEMENT SOLUTIONS

The Harris Products Group offers the best variety of hand brazing equipment options of any manufacturer globally. We have tools like the Perfect Flame™ which gives your engineering team, for the first time, the ability to use the Six Sigma DMAIC methodology (Define, Measure, Analyze, Improve, Control) for your manual hand brazing operations so we can help you find the perfect brazing flames for your specific applications. We have a variety of custom designed brazing tips stocked and can even manufacture custom tips for your specific application to help speed up production, evenly distribute the heat on your parts, and lower leak rates.

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