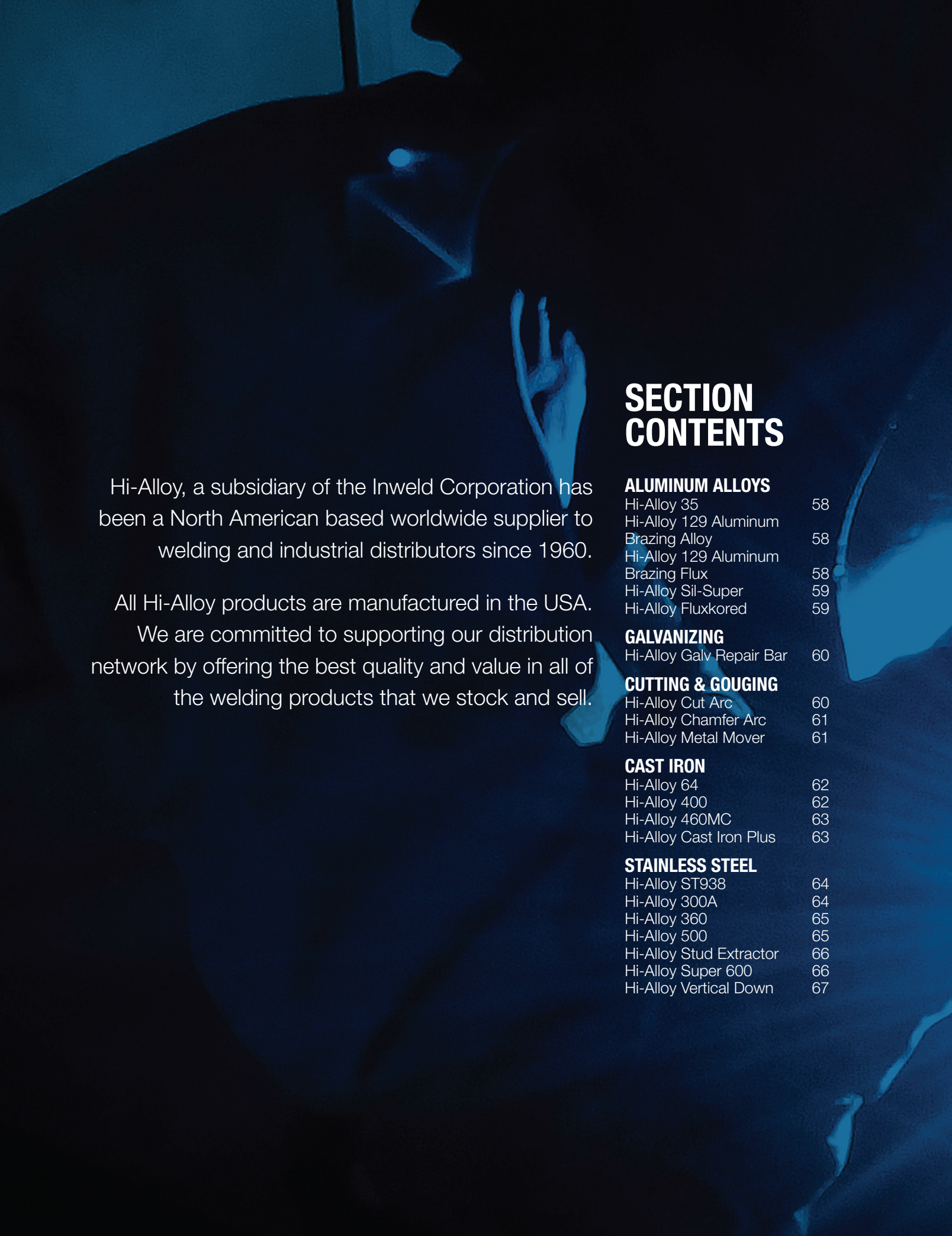
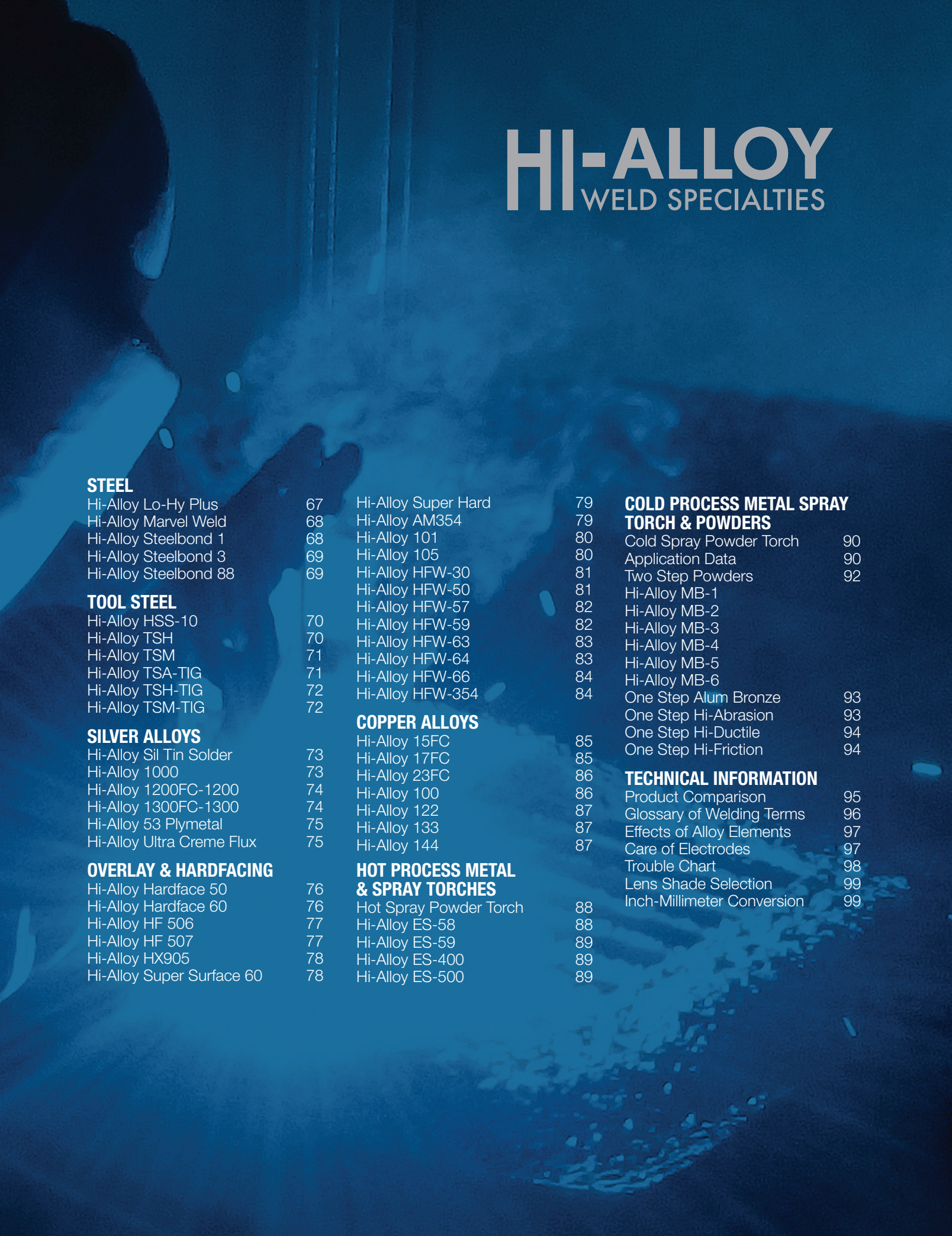


Hi-Alloy, a subsidiary of the Inweld Corporation has been a North American based worldwide supplier to welding and industrial distributors since 1960.

All Hi-Alloy products are manufactured in the USA. We are committed to supporting our distribution network by offering the best quality and value in all of the welding products that we stock and sell.

SECTION CONTENTS



HI-ALLOY
WELD SPECIALTIES

Product Information & Specs	Quantity	Part Number

HI-ALLOY 35
Dual Action Aluminum Electrode

DESCRIPTION: Hi-Alloy 35 is one of the most versatile extruded aluminum alloys available. The special "Dual Action Flux" insures usability on all weldable grades of aluminum. This special flux allows Hi-Alloy 35 to be used for both arc welding and gas brazing. Its highly active laboratory clean ingredients eliminate aluminum oxide and help control spatter, smoke, and arc stability.

TYPICAL APPLICATIONS: Aluminum truck and automobile components, ornamental aluminum parts, aluminum ladders, pipe, plate, and castings, aluminum door, window, and sign frames, and aluminum irrigation lines.

PROCEDURES: The aluminum work piece should not be contaminated with iron, rust, oil or grease. Use clean cutting tools, fast cut grinding wheels, or a clean stainless steel brush to prepare the weld area. Preheat parts over 1/8" thick to 400º F prior to welding. Hold the electrode at a 90º angle to the base metal, maintain a short arc length and move rapidly, remove slag between passes. When brazing with Hi-Alloy 35 set your torch to a carbonizing flame and carbonize the work piece, re-adjust to a neutral flame and heat the part broadly or indirectly until the carbon residues begin to fade then apply the 35 alloy. Use hot water and a stainless steel brush to remove flux residues.

1 lb. Tube X 3/32	2.4 mm	WE350931DP
1/8	3.2 mm	WE351251DP
10 lb. Box X 5/64	2.0 mm	WE35078
3/32	2.4 mm	WE35093
1/8	3.2 mm	WE35125
5/32	4.0 mm	WE35156

AMPERAGE RANGES:	**5/64**	**20-60**
	3/32	**50-80**
	1/8	**70-120**
	5/32	**100-150**
POLARITY:		**DC Reverse**
TENSILE STRENGTH:		**Up to 34,000 psi**
ELONGATION:		**Up to 18%**

HI-ALLOY 129
Aluminum Brazing Alloy

5 lb. Box X 1/16	1.6 mm	18129062
10 lb. Box X 3/32	2.4 mm	18129093
1/8	3.2 mm	18129125

HI-ALLOY 129
Aluminum Brazing Flux

DESCRIPTION: This low temperature aluminum brazing alloy can be used on numerous aluminum base metals. It is excellent for use on thin aluminum or aluminums of unknown chemical composition. One prominent feature is that it flows similar to silver brazing alloys into tight fitting joints. Deposit will darken if anodized.

TYPICAL APPLICATIONS: This alloy can be used in the repair and manufacturing of aluminum window frames, furniture, siding, refrigeration units, instruments, etc.

PROCEDURES: Carefully clean or grind off surface oxides, maintain tight joint tolerance, adjust to a carburizing flame, apply Hi-Alloy 129 Flux in powder form or mixed with alcohol to make a usable paste, heat broadly or indirectly until the flux turns into a clear liquid then apply the 129 alloy to the joint area. Add additional rod or heat as needed to complete the procedure.

To remove flux residues immerse part in hot running or agitated water while still warm, use a stiff brush to remove stubborn residues. A 5% nitric acid solution may be used if needed.

Tube X 1/4	0.1 Kg	129FLUX1/4#
1/2	0.2 Kg	129FLUX1/2#
14 oz	0.4 L	125FLUX14OZ
5 Gallon	19 L	129FLUX5#
35 Gallon	132 L	129FLUX35#

MELTING TEMPERATURE:	**1070º F**
TENSILE STRENGTH:	**Up to 33,000 psi**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity		Part Number

HI-ALLOY SIL-SUPER
Low Temperature Aluminum Solder

DESCRIPTION: Sil-Super Solder is one of the few alloys that will join aluminum to dissimilar metals such as copper, brass, bronze, steel, and nickel alloys. It will also join any of these alloys to each other providing a joint stronger and more corrosion resistant than typical lead solders. Sil-Super can be used to repair zinc die cast parts, but is not recommended for use on magnesium.

TYPICAL APPLICATIONS: Refrigeration and A/C units, radiator repair, instruments, repairing, filling, and sealing of aluminum sheets and castings.

PROCEDURES: Carefully clean joint area of contaminants, prepare a tight fitting joint, apply Hi-Alloy Sil-Super Flux, adjust torch to a soft carburizing flame, heat the parts indirectly if possible or play the flame back and forth being careful not to char the flux, (when the flux begins to bubble you are nearing the solder melting temperature,) continue heating and touch the solder to the joint, as the solder melts and flows continue to apply until the joint is filled. The solder can also be cut and positioned prior to heating. Remove flux residues while still warm by immersing part in hot running or agitated water. Use a stiff brush to remove stubborn residues.

CAUTION: This alloy CONTAINS CADMIUM. Do not use on lines for drinking water, in food service, or medical applications. Flux produces pungent odors, use only in well ventilated areas.

10 lb. Box X 1/16	1.6 mm	**SILS062**
3/32	2.4 mm	**SILS093**
Kit with 1/2 oz. Flux		**SILSKIT**
1/4 lb. Bottle	0.1 Kg	**SILSFLUX1/4#**

MELTING TEMPERATURE: **509º F**

TENSILE STRENGTH: **Up to 20,000 psi on Aluminum to Copper.**

Up to 30,000 psi on Aluminum to Aluminum.

HI-ALLOY FLUXKORED
Aluminum Brazing Alloy

DESCRIPTION: Hi-Alloy Fluxkored is a tubular filler rod with a highly active flux inside. Being inside the rod, the flux is protected from contamination and is released in the appropriate amount as the rod is melted. This alloy can be applied in all positions with an oxy-acetylene torch and can be used for either buildup or joining. Deposit will darken if anodized.

TYPICAL APPLICATIONS: Repair, buildup, and fabrication of all weldable grades of aluminum sheet, plate, and castings.

PROCEDURES: Carefully clean or grind off surface oxides and other contaminants. Heavier parts should be beveled to a 60º Vee. Adjust torch to a slightly carburizing flame. Preheat part to 1000º F then melt off a small amount of Fluxkored rod and allow it to drop onto the part. Continue heating until the flux turns clear and the drop begins to flow. Maintain working temperature and apply small amounts of Fluxkored as needed to complete your procedure. Reduce heat to build up, adds Hi-Alloy 129 Flux to increase capillary action if desired. Remove flux while warm by immersing the part in hot running or agitated water; use a stiff brush to remove stubborn residues.

2 lb. Tube X 1/8 X 32”	3.2 mm	**32FCAL125**

MELTING TEMPERATURE: **1100º F**

TENSILE STRENGTH: **Up to 32,000 psi**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY GALV REPAIR BAR

DESCRIPTION: Hi-Alloy Galv Repair Bar is used primarily to restore damaged galvanized surfaces. It may, however, be used to seal leaking water jackets, compressor housings, gear boxes and even cast iron radiators.

APPLICATION: To apply Galv Repair Bar, thoroughly clean the surface to be covered by sanding, brushing, filing, or grinding. Heat the area to 600º F, tin the surface with the bar using a rubbing motion, apply additional heat and rod to build up to desired thickness.

In some applications, use of Hi-Alloy Sil-Super or Sil-Tin flux may be necessary to ensure a good bond. In these cases, heat the base metal to 600º F, remove flame, apply flux, allow time to activate, and then tin the surface as indicated above. If the flux cools the base metal below application temperature, apply heat indirectly to avoid charring the flux. Remove flux residue while still warm using warm water and a soft brush.

10 lb. Box X 1/4 X 1/4 X 14”	6.4mm	**14GALVBAR250**

NOTE: A propane torch is recommended for use with this product.

HI-ALLOY CUT ARC

Airless Metal Cutting and Piercing Electrode

DESCRIPTION: Hi-Alloy Cut Arc was designed for cutting and piercing holes in metals which are not cuttable by the standard oxy-acetylene method. These metals include stainless steels, cast irons, aluminum, nickel alloys and copper base metals. The special flux coating burns slower than the core wire concentrating the arc at the electrode tip. Using this electrode requires no oxygen, compressed air, or other special equipment, only a standard welding machine capable of delivering the required amperage. Anyone who is familiar with standard stick welding practices can easily adapt to using this product with a little practice.

TYPICAL APPLICATIONS: Cutting up scrap metals, trimming pieces that are a little too big, cutting reinforcing bars, enlarging existing holes, removing rivets and frozen bolts.

PROCEDURES: Make sure there are no combustible materials in the area below the work piece. Set the machine at appropriate amperage for the selected electrode diameter. To cut, adjust the work piece and the electrode position for use similar to using a hand saw. Strike the arc on the edge of the work piece, maintain light contact and work the electrode up and down through the metal using a sawing motion. To pierce holes, hold the electrode at a 90º angle to the work piece, strike the arc and hold light downward pressure on the electrode. Pull it straight back out immediately after penetration. To enlarge the hole, move the electrode in a circular motion.

10 lb. Box X 1/8	3.2 mm	**WECUT125**
5/32	4.0 mm	**WECUT156**
3/16	4.8 mm	**WECUT187**
1/4	6.4 mm	**WECUT250**

AMPERAGE RANGES:	**1/8**	**150-350**
	5/32	**190-400**
	3/16	
	1/4	
POLARITY:	**DC Straight or AC**	

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY CHAMFER ARC
Airless Chamfering, Veeing and Beveling Electrode

DESCRIPTION: Hi-Alloy Chamfer Arc was designed for all position chamfering, veeing, gouging, and beveling of all metals except magnesium. This product may be used with any welding machine capable of delivering the required amperage. No special electrode holder, oxygen, or compressed air is required for use of this product. A special flux provides the forceful arc drive that quickly and easily pushes away slag and molten metal leaving clean, smooth, gouged or beveled metal ready for finishing or welding. Even though the process is quite different from welding, with a little practice the technique is easily mastered.

TYPICAL APPLICATIONS: Removing old weld metal, removing fatigued base metal prior to making repairs, gouging out cracks in cast iron parts prior to repair welding, removing excess metal prior to machining, removing sharp edges, beveling, gouging, veeing, and chamfering of steels, stainless steels, cast iron, aluminum, and various copper based alloys.

PROCEDURES: Make sure there are no other workers or combustible materials in the area where dropping or blowing molten metal might land. Position the electrode pointing straight out the end of the holder so you can push it forward. Set the machine at appropriate amperage for the selected electrode diameter. Strike the arc and quickly lower the electrode nearly parallel to the work piece (a 10º to 15º angle), maintain slight downward pressure on the electrode tip. Push the electrode rapidly forward for shallow cuts. Slow down or use multiple passes for deeper grooves

Quantity		Part Number
10 lb. Box X 1/8	3.2 mm	WECHAM125
5/32	4.0 mm	WECHAM156
3/16	4.8 mm	WECHAM187

AMPERAGE RANGES:	**3/32**	**100-170**
	1/8	**170-250**
	5/32	**220-320**
POLARITY:	**DC Straight or AC**	

HI-ALLOY METAL MOVER
Airless Cutting, Piercing and Gouging

DESCRIPTION: Hi-Alloy Metal Mover was designed to provide the ultimate in airless cutting, piercing, and gouging on all metals including stainless steels, aluminums, and copper alloys. Its special elemental coating allows for use on small AC machines, excellent re-strike capability, greater arc force, and less smoke than many other gouging electrodes.

TYPICAL APPLICATIONS: Removal of cracked welds, removal of frozen nuts, preparing cast irons for welding, and piercing holes, cutting and gouging of all metals.

PROCEDURES: Make sure there are no other workers or combustible materials in the areas where dropping or blowing molten metal might land. Set the machine at the appropriate amperage for the selected electrode. When piercing holes, hold the electrode perpendicular to the work surface and apply slight downward pressure. Selection of electrode diameter and amperage range will control hole size. When gouging, position the electrode pointing straight out the end of the holder so you so you can push it forward. Strike the arc and quickly lower the electrode to nearly parallel with the work surface (a 10º - 15º angle), maintain slight downward pressure on the electrode tip and push forward rapidly or use a slight back and forth motion. Make a series of shallow gouges rather than one deep gouge. To cut, adjust the work piece and the electrode position for use similar to that of a hand wood cutting saw. Strike the arc on the edge of the work piece, maintain light contact and work the electrode up and down through the metal with a sawing motion.

Quantity		Part Number
10 lb. Box X 3/32	2.4 mm	WEMM093
1/8	3.2 mm	WEMM125
5/32	4.0 mm	WEMM156
3/16	4.8 mm	WEMM187

AMPERAGE RANGES:	**3/32**	**100-170**
	1/8	**170-250**
	5/32	**220-330**
	3/16	**300-450**
POLARITY:	**DC Straight or AC**	

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY 64
Non-Machinable Cast Iron Electrode

DESCRIPTION: Hi-Alloy 64 is an all position electrode which can be used to repair cracks or breaks in cast iron where machining is not required after welding. The weld deposit will have a good color match to cast iron and will rust similarly when exposed to the elements.

APPLICATION: Hi-Alloy 64 may be used for welding of castings that are saturated with chemicals, oil, grease, or other contaminants which make welding seem impossible. It may be used for joining problem castings to steel, to salvage furnace grates, and to make butter passes on parts to prepare the surface for welding with a machinable electrode such as Hi-Alloy 400 or Hi-Alloy 460.

PROCEDURES: Clean the area to be welded as much as possible, grind a vee or use Hi-Alloy Metal Mover to gouge or bevel the area to be welded, preheat of 400° - 500° F should be used on heavier sections, (if repairing a crack, drill a small hole at each end to prevent spreading and use no preheat), use the lowest possible amperage to maintain a short stable arc, skip weld with beads of ½" to 1½" dependent on the length of repair and thickness of the part. Be careful not to overheat the casting, and provide for slow cooling after welding.

10 lb. Box X 3/32	2.4 mm	WE64093
1/8	3.2 mm	WE64125
5/32	4.0 mm	WE64156

AMPERAGE RANGES:	**3/32**	**50-80**
	1/8	**75-110**
	5/32	**95-150**
POLARITY:	**AC or DC Reverse**	
TENSILE STRENGTH:	**Up to 60,000 psi**	

HI-ALLOY 400
Ultra Machinable Alloy For Cast Iron Welding

DESCRIPTION: Hi-Alloy 400 is an all position electrode, with a non-conductive flux, developed to produce dense porosity free deposits on all weldable grades of cast iron. It is ideal for use on thin cast irons and castings contaminated by grease, oil, and dirt. This extraordinary product is also useful for the repair of most heat cycled castings. The high nickel content provides for the ultimate in machinability and the flexibility to join dissimilar metals such as stainless, nickel alloys, and carbon steels.

TYPICAL APPLICATIONS: Repair of cast iron manifolds, engine blocks, pump housings, and thin wall castings, also useful for, cladding, filling holes, and build-up. The non conductive flux allows for welding in tight areas and down in holes where most electrodes would side arc and cause damage to surrounding parts.

PROCEDURES: Remove cracked or worn metal with Hi-Alloy Metal Mover or by grinding. On heavy sections, oil or chemical contaminated base metals, preheat to 500° F, weld with the electrode at a steep angle and use the lowest amperage setting which allows for a short stable arc and good wetting. On thin sections the maximum weld bead should not exceed 1 to 1½" to minimize heat input. Use the skip welding technique on intricate castings, chip off slag when possible between passes, peen all welds with the ball end of a ball peen hammer to distribute stresses, and allow the finished part to cool slowly in still air.

1 lb. Tube X 3/32	2.4 mm	WE4000931DP
1/8	3.2 mm	WE4001251DP
10 lb. Box X 3/32	2.4 mm	WE400093
1/8	3.2 mm	WE400125
5/32	4.0 mm	WE400156
3/16	4.8 mm	WE400187

AMPERAGE RANGES:	**3/32**	**70-90**
	1/8	**80-120**
	5/32	**130-160**
	3/16	**170-210**
POLARITY:	**DC Reverse, DC Straight, or AC**	
TENSILE STRENGTH:	**Up to 50,000 psi**	
HARDNESS:	**Rockwell B 82 - 84**	

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity		Part Number

HI-ALLOY 460
High Strength alloy for Cast Iron

DESCRIPTION: Hi-Alloy 460 has a specially formulated core wire and flux coating that combine to provide a smooth stable arc and dense, porosity free, machinable welds on a variety of cast irons including ductile, nodular, and malleable irons. It is also commonly used for joining cast irons to steel and is especially suited for repairing meehanite dies, and castings contaminated by oil, grease, rust, dirt, or chemicals.
TYPICAL APPLICATIONS: Repairing cast iron machine bases, engine blocks, castings, pedestals, gear teeth and sprockets, pump housings, molds, sewer pipe, and valves.
PROCEDURES: Remove cracked or worn metal with Hi-Alloy Metal Mover or by grinding. On heavy sections, oil or chemical contaminated cast irons, preheat to 500º F. Weld with the lowest amperage setting which provides a short stable arc and good wetting action. On thin sections and when cold welding, the maximum weld bead should not exceed 1 to 1½" to minimize heat input. Peen all welds with the ball end of a ball peen hammer to distribute stresses, allow the finished part to cool slowly in still air.

10 lb. Box X	3/32	2.4 mm	WE4600931DP
	1/8	3.2 mm	WE4601251DP
	3/32	2.4 mm	WE460093
	1/8	3.2 mm	WE460125
	5/32	4.0 mm	WE460156

AMPERAGE RANGE:	**3/32**	**50 - 80**
VOLTAGE RANGE:	**1/8**	**70 - 110**
	5/32	**100 - 140**

POLARITY:	**DC Reverse or AC**
TENSILE STRENGTH:	**Up to 70,000 psi**
HARDNESS:	**Rockwell B 88 - 90**
ELONGATION:	**Up To 15%**

HI-ALLOY 460MC
Metal Cored Wire for Cast Iron Welding

DESCRIPTION: Hi-Alloy 460MC is a unique wire, with a powdered metal alloy core, that produces strong yet machinable weld deposits. This product will provide outstanding performance while joining or repairing all weldable grades of cast iron. A combination of high tensile strength and superior elongation allows for repair of nodular, malleable and grey cast irons. Continuous welding with this gas shielded alloy reduces porosity and the thermal stresses created by the frequent starts and stops encountered when welding with standard coated electrodes.
TYPICAL APPLICATIONS: Repair of cast iron dies, pumps, pump housings, cylinder heads, engine blocks, molds, gears, bearing seats, machine bases, and heavy equipment.
PROCEDURES: Clean the weld area and remove cracked, contaminated, or worn metal with Hi-Alloy Metal Mover or by grinding. On heavy sections preheat to 500º - 600º F. Peen deposit immediately with the ball end of a ball peen hammer to distribute stresses. Allow finished part to cool slowly in still air.

11 lb. Spool X .045		1.2 mm	10MG460MC045
33 lb. Spool X .045		1.2 mm	33MG460MC045

AMPERAGE RANGE:	**.045**	**220-260**
VOLTAGE RANGE:		**27 - 30**

POLARITY:	**DC Reverse**
SHIELDING GAS:	**98% Argon 2% Oxygen**
STICK OUT:	**1/2"**
TENSILE STRENGTH:	**Up to 74,000 psi**
HARDNESS:	**Up to Rockwell B 190**
ELONGATION:	**Up To 12%**

HI-ALLOY CAST IRON PLUS
Tri-Metallic Alloy for Cast Iron

DESCRIPTION: The unique Tri-Metallic design of this electrode creates the ultimate combination of characteristics desired for cast iron welding. This electrode will not overheat thus eliminating flux breakdown and preventing weld deposit defects. High tensile strength and superior elongation allow for repair of nodular, ductile, malleable, and gray cast irons. Flexibility of welding polarity provides for control of weld metal dilution and depth of the heat affected zone, resulting in exceptional machinability.
TYPICAL APPLICATIONS: Repair of cast iron dies, engine blocks, pump housings, gears, cylinder heads, heavy equipment parts, and joining cast and ductile irons.
PROCEDURES: Remove cracked, contaminated, or worn metal with Hi-Alloy Metal Mover or by grinding. Preheat heavy sections to 500º - 600º F. Weld with the lowest amperage which provides a short stable arc and good wetting. On thin sections and when cold welding, weld beads should not exceed 1 to 1½" to minimize heat input. Peen all welds immediately with the ball end of a ball peen hammer to distribute stresses. Allow finished weld to cool slowly in still air.

10 lb. Box X	3/32	2.4 mm	WECIPL093
	1/8	3.2 mm	WECIPL125
	5/32	4.0 mm	WECIPL156

AMPERAGE RANGES:	**3/32**	**50-75**
	1/8	**70-100**
	5/32	**100-300**

POLARITY:	**AC, DC Reverse, or DC Straight**
TENSILE STRENGTH:	**Up to 77,000 psi**
HARDNESS:	**Rockwell B 84 - 88**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY ST938
General Purpose Stainless Electrode

DESCRIPTION: Hi-Alloy ST938 is an exceptionally smooth running, spray transfer electrode that produces uniform spatter free welds. The unique dual flow coating greatly enhances welding speed, deposition and metal recovery rates. Deposits are highly ductile and crack resistant

APPLICATION: Hi-Alloy ST938 was developed for use on most common grades of stainless steel. Typically used to fabricate and repair food, dairy and chemical equipment; particularly good for use on stainless grades 301, 302, 302B, 305, 308, 308L, 321, 347, and all AISI 200 and 400 types.

PROCEDURES: Clean and prepare weld zone in accordance with standard welding practice. DO NOT PREHEAT. Tack the parts to maintain alignment and reduce distortion. Maintain a short arc length or drag while tilting the electrode 15º in the direction of travel. Prevent excessive heat build up by skip welding whenever possible. Remove slag between passes and allow finished part to slow cool.

10 lb. Box X 3/32	2.4 mm	WEST938093
1/8	3.2 mm	WEST938125
5/32	4.0 mm	WEST938156
3/16	4.8 mm	WEST938187

AMPERAGE RANGES:	**3/32**	**40-75**
	1/8	**50-105**
	5/32	**80-140**
	3/16	**100-175**
POLARITY:	**AC or DC Reverse**	
TENSILE STRENGTH:	**Up to 88,000 psi**	
YIELD STRENGTH:	**Up to 66,000 psi**	
ELONGATION:	**Up to 45%**	

HI-ALLOY 300A
Corrosion Resistant Stainless Alloy

DESCRIPTION: Hi-Alloy 300A was designed to make smooth corrosion resistant weld deposits all on common austenitic stainless steels. Its low carbon content minimizes carbide precipitation along the grain boundaries of the deposit and the addition of molybdenum increases resistance to pitting and cavitations caused by sulphuric and phosphoric acid solutions. This product is commonly used in the welding of 302, 304, 308, and 316 stainless steels as well as their low carbon counterparts.

TYPICAL APPLICATIONS: Fabrication and repair of tanks, pipes, and fittings found in chemical plants, textile mills, and paper mills. It is also commonly used in the food, dairy, and distillery industries and is excellent as an overlay on standard steels when additional corrosion resistance is required.

PROCEDURES: Thoroughly clean the area to be welded of all contaminants. Parts 3/16" or thicker should be beveled and tacked to maintain alignment. A short to medium arc length should be maintained and the electrode tilted 15º in the direction of travel. Use stringer beads rather than a weave technique and prevent overheating the base metal. Remove slag between passes and allow the part to cool slowly in still air.

1 lb. Tube X 3/32	2.4 mm	WE300A0931DP
1/8	3.2 mm	WE300A1251DP
10 lb. Box X 3/32	2.4 mm	WE300A093
1/8	3.2 mm	WE300A125
5/32	4.0 mm	WE300A156

AMPERAGE RANGES:	**3/32**	**55-75**
	1/8	**75-110**
	5/32	**90-140**
POLARITY:	**AC or DC Reverse**	
TENSILE STRENGTH:	**Up to 85,000 psi**	
YIELD STRENGTH:	**Up to 60,000 psi**	
ELONGATION:	**Up to 40%**	

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY 360
Heat and Corrosion Resistant Alloy

DESCRIPTION: Hi-Alloy 360 is designed for use in joining or overlay of steels and stainless steels where resistance to elevated temperatures, severe corrosion, and scaling is required. This product may also be used for welding dissimilar steels and unidentified grades of stainless steels.

TYPICAL APPLICATIONS: Furnace parts, heating plates, crucibles, ladles, combustion tubes, heat exchangers, oven linings & kilns up to 2100º F.

PROCEDURES: Clean the weld area, remove cracked, worn or corroded metal with Hi-Alloy Metal Mover or by grinding, bevel heavy sections, preheat high carbon steels to 300º – 500º F., maintain a short to medium arc length, use stringer beads, and remove slag between passes. Allow finished part to cool slowly in still air.

10 lb. Box X	3/32	2.4 mm	WE360093
	1/8	3.2 mm	WE360125
	5/32	4.0 mm	WE360156

AMPERAGE RANGES:	**3/32**	**55-75**
	1/8	**75-110**
	5/32	**90-140**
POLARITY:	**DC Reverse or AC**	
TENSILE STRENGTH:	**Up to 84,000 psi**	
YIELD STRENGTH:	**Up to 59,000 psi**	
ELONGATION:	**Up to 37%**	

HI-ALLOY 500
The Ultimate Problem Solver for All Steels

DESCRIPTION: Hi-Alloy 500 provides the ultimate performance in the repair of dissimilar steels and steels of unknown analysis. The unique complex alloy system of this product allows for dense porosity free welds to be made without danger of cracking. A special flux formulation gives this alloy exceptional arc stability even when used with AC “cracker box” welding machines.

TYPICAL APPLICATIONS: Use for the welding and repair of tool steels, spring steels, stainless steels, carbon steels, steels of unknown analysis, and dissimilar combinations of these metals. Also makes an excellent buildup and underlay for subsequent hardfacing procedures.

PROCEDURES: Clean the weld area; remove cracked or worn metal with Hi-Alloy Metal Mover or by grinding. Bevel heavy sections, preheat high carbon steels to 350° F, maintain a very short arc, use stringer beads and remove slag between passes. Allow finished part to cool slowly in still air.

1 lb. Tube X	1/16	1.6 mm	WE5000621DP
	3/32	2.4 mm	WE5000931DP
	1/8	3.2 mm	WE5001251DP
10 lb. Box X	1/16	1.6 mm	WE500062
	3/32	2.4 mm	WE500093
	1/8	3.2 mm	WE500125
	5/32	4.0 mm	WE500156
	3/16	4.8 mm	WE500187

AMPERAGE RANGES:	**1/16**	**25-35**
	3/32	**35-70**
	1/8	**60-110**
	5/32	**75-140**
	3/16	**130-200**
POLARITY:	**DC Reverse or AC**	
TENSILE STRENGTH:	**Up to 130,000 psi**	
YIELD STRENGTH:	**Up to 90,000 psi**	
ELONGATION:	**Up to 32%**	

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY STUD EXTRACTOR
Electrode for Removing Broken Bolt Stubs or Taps

DESCRIPTION: Hi-Alloy Stud Extractor was developed specifically for the purpose of removing bolts or taps broken off below the surface of their root metal. No special equipment is required for use of this product. Extractions can be done in the shop or in the field, anywhere there is access to a welding machine. This product is coated with a unique ceramic flux which protects existing threads during the down-hole buildup process. The complex alloy structure of this electrode allows it to be used on bolts and taps made of standard or hardened steels. Its deposited metal is stronger than most bolts and will even gain toughness as you torque it during the extraction process.

TYPICAL APPLICATIONS: Removal of broken bolt stubs or taps from engine blocks, industrial machinery, agricultural equipment, and wheel drums.

PROCEDURES:

1. Select electrode diameter & set machine to corresponding amperage.
2. Select a nut with the same size hole as the hole in the work piece and place it on the work piece hole to hole.
3. Insert Stud Extractor electrode through the nut and strike the arc onto the center of the broken bolt or tap.
4. Maintain a short arc and build up carefully in the center of the target piece straight up through the middle of the hole allowing the ceramic slag to surround the buildup and protect the existing threads.
5. Continue building up to the top of the nut but don't weld the nut to the buildup.
6. Allow part to cool then remove the nut and protruding portion of the slag.
7. Replace the nut around the buildup and weld the nut to the buildup with the Stud Extractor rod being careful not to weld the nut to the work piece.
8. Allow finished weld to cool to room temperature.
9. Lightly tap the nut to loosen slag then remove the broken piece by turning the nut with an appropriate wrench.

1 lb. Tube X 1/16	1.6 mm	WESTEX0621DP
3/32	2.4 mm	WESTEX0931DP
1/8	3.2 mm	WESTEX1251DP
10 lb. Box X 1/16	1.6 mm	WESTEX062
3/32	2.4 mm	WESTEX093
1/8	3.2 mm	WESTEX125

HOLE DIAMETER:	**5/32-1/4"**	**1/4-3/8"**	**3/8-1/2"**	**1/2"-UP**
ELECTRODE DIAMETER:	**1/16"**	**3/32"**	**1/8"**	**5/32"**
AMPERAGE RANGES:	**25-35**	**30-90**	**75-120**	**100-145**
POLARITY:	**AC or DC Reverse**			

HI-ALLOY 600
Super Alloy for High Nickel & Stainless Steels

DESCRIPTION: Hi-Alloy Super 600 is an outstanding alloy for cladding and joining nickel alloys, stainless steels, carbon steels, and dissimilar combinations of these alloys. Weld deposits can withstand temperature extremes from -140º to +1900º F. This electrode offers exceptional weld characteristics and bead appearance even when used with small AC machines. Deposits exhibit exceptional oxidation and corrosion resistant properties.

TYPICAL APPLICATIONS: A universal repair alloy for use in refineries, paper mills, and chemical plants.

PROCEDURES: Clean the weld area and remove oxides, grease, and oils. Use the lowest possible amperage which provides a short stable arc and good wetting characteristics. Use stringer beads or weave with 3 times the electrode diameter. Allow the part to cool in still air.

10 lb. Box X 3/32	2.4 mm	WE600093
1/8	3.2 mm	WE600125
5/32	4.0 mm	WE600156

AMPERAGE RANGES:	**3/32**	**70-95**
	1/8	**100-135**
	5/32	**130-175**

POLARITY:	**DC Reverse or AC**
TENSILE STRENGTH:	**Up to 136,000 psi**
YIELD STRENGTH:	**Up to 95,000 psi**
ELONGATION:	**Up to 40%**
HARDNESS:	**As Welded 22 RC** **Work Hardens Up to 45 RC**
IMPACT PROPERTIES:	**65 Joules at -320º F**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY VERTICAL DOWN STAINLESS STEEL
Special Alloy for Vertical Welding

DESCRIPTION: Hi-Alloy Vertical Down Stainless Steel alloy possesses an exceptional fast freeze action which provides optimum control when welding stainless steels vertical up or vertical down. This alloy is ideal for the repair of stainless steels when poor fit up joints are encountered and for filling holes in stainless steel parts or castings.

TYPICAL APPLICATIONS: Fabrication or repair of products made of most common 300 series stainless steels, molybdenum bearing stainless steels, and thin stainless steels. Numerous uses include the medical, chemical, textile, paper, food, dairy, and distillery industries.

PROCEDURES: Clean the area to be welded in accordance with good welding practice, do not preheat, maintain a short arc length and whip the electrode quickly back and forth while moving up or down. When welding vertical set the amperage at the high end of the range and maintain a sharp angle with the electrode pointing upward.

10 lb. Box	X 3/32	2.4 mm	WEVDSS093
	1/8	3.2 mm	WEVDSS125

AMPERAGE RANGES:	**3/32**	**60-80**
	1/8	**90-110**

POLARITY:	**DC Reverse or AC**
TENSILE STRENGTH:	**Up to 82,000 psi**
YIELD STRENGTH:	**Up to 58,000 psi**
ELONGATION:	**Up to 42%**

HI-ALLOY LO-HY PLUS
Unsurpassed Low Hydrogen Structural Steel Alloy

DESCRIPTION: Hi-Alloy Lo-Hy Plus is an electrode for all position welding designed with a special highly moisture resistant flux which results in superior weld deposit density and X-Ray quality welds. It offers outstanding performance and arc stability on either DC Reverse or AC polarity resulting in very finely rippled crack resistant beads.

TYPICAL APPLICATIONS: Cast steels, shipbuilding steels, tramp steels, boiler plate, pipe steels, construction steels, fabrication steels, and structural steels.

PROCEDURES: Clean the weld area in accordance with good welding practice. Heavy sections should be preheated to 300º - 500º F, maintain a short arc length, for vertical up welding use a slight weave technique pausing at the edges of the weld. Thoroughly remove slag between passes. Allow finished part to cool slowly in still air.

10 lb. Box	X 3/32	2.4 mm	WELOHYPLUS093
	1/8	3.2 mm	WELOHYPLUS125
	5/32	4.0 mm	WELOHYPLUS156
	3/16	4.8 mm	WELOHYPLUS187

AMPERAGE RANGES:	**1/16**	**25-35**
	3/32	**35-70**
	1/8	**60-110**
	5/32	**75-140**
	3/16	**130-200**

POLARITY:	**DC Reverse or AC**
TENSILE STRENGTH:	**Up to 84,000 psi**
YIELD STRENGTH:	**Up to 70,000 psi**
ELONGATION:	**Up to 32%**
IMPACT RESISTANCE:	**90 Joules at -22º F**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY MARVEL WELD
Universal Electrode for Mild Steel

DESCRIPTION: Simply marvelous is the best way to describe this electrode. With sizes from 1/16" through 3/16", amperage ranges from 20 through 220 amps, all position, any polarity capabilities, and the ability to weld through galvanizing, water, grease, oil, paint, and rust what else could it be called but Marvel Weld. You can even bend this electrode and keep it in contact with the base metal to weld in the most awkward and precarious of situations.

TYPICAL APPLICATIONS: Welding of sheet metal, plates, pipes, beams, angle iron, galvanized steel, plug welding, spot welding, tacking and general fabrication.

PROCEDURES: For best results, clean the base metal in accordance with good welding practice, use AC polarity for thin metals, DC Straight or DC Reverse for thicker metals, use a short to medium arc length for general welding and lean the electrode toward the direction of travel, use stringer beads or a slight weave technique.

1 lb. Tube X 1/16	1.6 mm	WEMARVEL0621DP
5/64	2.0 mm	WEMARVEL0781DP
3/32	2.4 mm	WEMARVEL0931DP
1/8	3.2 mm	WEMARVEL1251DP
10 lb. Box X 1/16	1.6 mm	WEMARVEL062
5/64	2.0 mm	WEMARVEL078
3/32	2.4 mm	WEMARVEL093
1/8	3.2 mm	WEMARVEL125
5/32	4.0 mm	WEMARVEL156
3/16	4.8 mm	WEMARVEL187

AMPERAGE RANGES:	**1/16**	**20-40**
	5/64	**30-50**
	3/32	**50-70**
	1/8	**70-110**
	5/32	**115-140**
	3/16	**150-220**

POLARITY:	**AC, DC Straight, or DC Reverse**
TENSILE STRENGTH:	**Up to 82,000 psi**
YIELD STRENGTH:	**Up to 70,000 psi**
ELONGATION:	**Up to 25%**

HI-ALLOY STEELBOND 1
All Position General Purpose Steel Electrode

DESCRIPTION: Steelbond 1 is ideally suited for difficult maintenance repairs. It excels at welding on carbon steels under the most adverse conditions. Its forceful arc can penetrate rust, grease, dirt, paint, and galvanizing. Steelbond 1 can also be used to weld poor fitting joints because of its ability to bridge gaps up to 3/8 of an inch. This electrode can even be bent without the flux chipping to help reach those hard to access areas.

TYPICAL APPLICATIONS: Poor fit-up joints, pipe welding, dirty or rusty steels, tack welding, general maintenance on carbon steels.

PROCEDURES: Clean the base metal in accordance with good welding practice if circumstances allow, weld with a short to medium arc length at low amperage. When surface preparation is not feasible, select the higher amperage range and use a medium to long arc length.

10 lb. Box X 3/32	2.4 mm	WESTB1093
1/8	3.2 mm	WESTB1125
5/32	4.0 mm	WESTB1156

AMPERAGE RANGES:	**3/32**	**70-95**
	1/8	**100-135**
	5/32	**130-175**

POLARITY:	**DC Reverse, DC Straight, or AC**
TENSILE STRENGTH:	**Up to 80,000 psi**
YIELD STRENGTH:	**Up to 68,000 psi**
ELONGATION:	**Up to 24%**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY STEELBOND 3
Special High Tensile Mild Steel Electrode

DESCRIPTION: Hi-Alloy Steelbond 3 is easy to use in all positions but excels at vertical welding. It is produced using a special chemistry which provides for very high tensile strength when compared to other electrodes for similar applications.

TYPICAL APPLICATIONS: This product is used to weld on carbon and mild steels where extra strength in the weld is a necessity. It is excellent for repair or fabrication of common steel structures, especially where vertical welds have to be made.

PROCEDURES: Prepare the area to be welded in accordance with good welding practice, maintain a very short arc or drag the electrode to produce the best weld characteristic for your specific application.

10 lb. Box X 1/8	3.2 mm		WESTB3125
5/32	4.0 mm		WESTB3156

AMPERAGE RANGES:	**1/8**	**70-110**
	5/32	**120-150**
POLARITY:		**DC Reverse or AC**
TENSILE STRENGTH:		**Up to 97,000 psi**
YIELD STRENGTH:		**Up to 78,500 psi**
ELONGATION:		**Up to 17%**

HI-ALLOY STEELBOND 88
High Strength Low Hydrogen Electrode

DESCRIPTION: Hi-Alloy Steelbond 88 is an all position nickel bearing electrode capable of making high strength crack free weld deposits where high elongation and excellent low temperature impact properties are required.

TYPICAL APPLICATIONS: Welding high strength steel structures, joining abrasion resistant plates to themselves or to steel, joining various low alloy steels to carbon steels.

PROCEDURES: Remove weakened metal, bevel heavy sections, maintain a short arc length, use stringer beads or a slight weaving technique and remove slag thoroughly between passes.

10 lb. Box X 3/32	2.4 mm		WESTB88093
1/8	3.2 mm		WESTB88125
5/32	4.0 mm		WESTB88156

AMPERAGE RANGES:	**3/32**	**65-100**
	1/8	**100-140**
	5/32	**140-190**
POLARITY:		**DC Reverse or AC**
TENSILE STRENGTH:		**Up to 92,000 psi**
YIELD STRENGTH:		**Up to 76,000 psi**
ELONGATION		**Up to 29%**
IMPACT VALUES:		**100 Joules at-76ºF** **90 Joules at-103ºF** **35 Joules at-148ºF**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY HSS-10
High Speed Tool Steel Alloy

DESCRIPTION: Hi-Alloy HSS-10 was designed specifically to maintain a tough, wear resistant, sharp edge at temperatures up to 1100º F. Additions of tungsten, molybdenum, and vanadium create the ultimate weld deposit for high speed tool and die repair.

TYPICAL APPLICATIONS: Build up and hardfacing of molding plates, mill cutters, cutting tools, lathe tools, punches, turning and planing tools, drawing mandrels and dies, trimming plates, reamers, and hot shears.

PROCEDURES: Prepare the weld area by grinding out cracks and other defects, remove oxides and other contaminants. When welding tool steel, preheat to 800º - 1100º F and maintain temperature during the entire procedure. No preheat is required when welding low carbon steels but a minimum of 3 layers is necessary to overcome dilution. Do not quench the part after welding, remove slag and reheat to 1000º F, allow to cool slowly in still air.

10 lb. Box X 3/32	2.4 mm	WEHSS10093
1/8	3.2 mm	WEHSS10125
5/32	4.0 mm	WEHSS10156

AMPERAGE RANGES:	**3/32**	**80-120**
	1/8	**110-160**
	5/32	**160-210**

POLARITY: **DC Straight, DC Reverse, or AC**

HARDNESS: **As Welded 58 - 62 RC**
After Heat Treating 63 - 65 RC
Approximately 56 RC at 1100° F

HI-ALLOY TSH
Hot Work Tool Steel Electrode

DESCRIPTION: This electrode is designed for repair welding in both hot and cold work tooling applications when subsequent heat treatment is not required. It has a special flux coating which promotes excellent re-strike, and porosity free high density weld deposits.

TYPICAL APPLICATIONS: Hi-Alloy TSH electrodes work well for repairing hot or cold work trimmers, shears, blanking and forming dies where chipping, spalling, and cracking are a problem. Some hot work uses are forging dies, coining dies, header dies, punches, extrusion mandrels and tong bits. Cold work applications include forming dies, blanking dies, sledge hammer faces, cutting edges of hatchets, and punches.

PROCEDURES: Prepare the area to be welded by removing all cracks, heat checks or other defects by grinding or gouging with Hi-Alloy Metal Mover electrode. Clean surface of any slag, scale, rust, oil, or drawing compounds. Preheat die blocks and other parts where the entire working surface is to be welded to 800º F. On other alloys preheat and post heat to specifications for the base metal. Maintain temperature during welding, hold the electrode on a slight angle in the direction of travel and maintain a short arc gap, use stringer bead technique and peen the weld while hot to relieve stresses. After welding allow to cool in still air to 300º F, post heat to 1000º F, hold at temperature for one hour per inch of thickness, and allow cooling in still air to room temperature to obtain the ultimate grain refinement and uniform hardness in the weld deposit.

10 lb. Box X 3/32	2.4 mm	WETSH093
1/8	3.2 mm	WETSH125
5/32	4.0 mm	WETSH156

AMPERAGE RANGES:	**3/32**	**65-100**
	1/8	**100-140**
	5/32	**140-190**

POLARITY: **AC or DC Reverse**

HARDNESS: **Rockwell C 52 - 55 as Welded**

THE DEPOSIT IS HEAT TREATABLE. USE H-12 PROCEDURE

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY TSM
Unique Multipurpose Alloy for High Speed Tool Steels

DESCRIPTION: Hi-Alloy TSM provides the ultimate in welding versatility and performance when welding on tools and dies made of high speed steels. A smooth stable arc, extremely low spatter, and instant re-strike allow for maximum control of alloy deposition making this the perfect electrode for welding the most intricate of parts. The deposits maintain high hardness up to 1100º F.

TYPICAL APPLICATIONS: Cold trimming dies, piercing dies, blanking dies, shear blades, shaving knives, cutting knives, composite dies, hot trimming dies, and cladding wear areas on carbon steels.

PROCEDURES: Prepare the weld area by grinding out cracks and defects, remove oxides and contaminants, preheat high speed steels to 1000º F, on other steels preheat according to manufacturer specifications, maintain temperature during welding, deposit short stringer beads and peen to relieve stresses after welding. Allow to cool to 400º F in still air, remove slag, reheat part to 1020º F and maintain temperature for 1 hour per inch of thickness minimum to eliminate hard spots and reduce embrittlement of the heat affected zone. Allow to cool slowly in still air. Repeating the temper will maximize deposit hardness. When surfacing carbon steels 3 passes are needed to overcome base metal dilution.

10 lb. Box	X 3/32	2.4 mm	**WETSM093**
	1/8	3.2 mm	**WETSM125**

AMPERAGE RANGES:	**3/32**	**60-90**
	1/8	**75-125**

POLARITY: **AC or DC Reverse**

HARDNESS: **Rockwell C 60 - 63 as Welded**
Heat Treats up to Rockwell C 66

HI-ALLOY TSA-TIG
Air Hardening Tool Steel Wire

DESCRIPTION: Hi-Alloy TSA-TIG was designed for the repair of the A-type 5% chrome and D-type high chrome high carbon grades of air hardening tool steels. The high as welded hardness also makes this product good for hardfacing steels where resistance to high abrasion, mild impact, and metal to metal wear are required. It is also suitable for use in both hot and cold working applications.

TYPICAL APPLICATIONS: Repair of extrusion, blanking, coining and forming dies, punches, trimmers, mandrels, construction, mining, and farm equipment.

PROCEDURES: Completely clean the area to be welded, remove all fatigued metal, and round off sharp edges. Slowly and uniformly preheat according to base metal specifications and maintain temperature throughout the welding procedure. Try to position part so welding can be done on a slight incline. Use the smallest diameter filler rod and lowest amperage possible to minimize heating of the part yet providing for a stable arc and suitable weld penetration. Amperage will be dictated by the thickness of the base metal and tungsten diameter. Argon shielding gas is recommended. Skip weld if necessary to distribute heat evenly, do not heat base metal beyond the tempering temperature to avoid loss of hardness. Lightly peen each bead while still red hot to relieve stresses. Allow the part to cool slowly in still air. If welding in a cool environment take measures to provide for slow cooling of the finished part such as use of a furnace or a suitable insulating material. When part cools to about 200º F, post heat to base metal specifications and slow cool to ambient temperature.

10 lb. Box	X .035	0.9 mm	**36TSA035**
	.045	1.2 mm	**36TSA045**
	1/16	1.6 mm	**36TSA062**
	3/32	2.4 mm	**36TSA093**

POLARITY: **DC Straight**

HARDNESS: **As Welded Hardness 45 - 50 RC**

DEPOSIT IS HEAT TREATABLE. USE A-2 PROCEDURE.

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY TSH-TIG
Hot Work Tool Steel Wire

DESCRIPTION: Hi-Alloy TSH - TIG is a chromium, tungsten, molybdenum, alloy that is extremely abrasion resistant, very tough, and chip resistant. Designed for use on hot working tools, this product works equally well in cold cutting and trimming tool applications. It may also be used on many other types of steels for general fabrication, repair, or hardfacing when no post weld heat treatment is required.

TYPICAL APPLICATIONS: Hot working punches, headers, rams, shear knives, and cutting dies; cold cutting and trimming edges, blanking and forming dies.

PROCEDURES: Completely clean the area to be welded, remove all fatigued metal, and round off sharp edges. Slowly and uniformly preheat according to base metal specifications and maintain temperature throughout the welding procedure. Try to position part so welding can be done on a slight incline. Use the smallest diameter filler rod and lowest amperage possible to minimize heating of the part yet providing for a stable arc and suitable weld penetration. Amperage will be dictated by the thickness of the base metal and tungsten diameter. Argon shielding gas is recommended. Skip weld if necessary to distribute heat evenly. Do not heat base metal beyond the tempering temperature to avoid loss of hardness. Lightly peen each bead while still red hot to relieve stresses. Allow the part to cool slowly in still air. If welding in a cool environment take measures to provide for slow cooling of the finished part such as use of a furnace or a suitable insulating material. When part cools to about 200º F, post heat to base metal specifications and slow cool to ambient temperature.

10 lb. Box X	.035	0.9 mm	**36TSH035**
	.045	1.2 mm	**36TSH045**
	1/16	1.6 mm	**36TSH062**
	3/32	2.4 mm	**36TSH093**

POLARITY: **DC Straight**

HARDNESS: **As Welded Hardness 54 - 56 RC**

DEPOSIT IS HEAT TREATABLE. USE H-12 PROCEDURE

HI-ALLOY TSM-TIG
High Speed Tool Steel Wire

DESCRIPTION: Hi-Alloy TSM - TIG was designed for the repair of M2 and other grades of high speed tool steels. It may also be used for fabrication and overlay of composite dies and tools. The deposits retain their hardness and impact resistance up to 1100º F. The high as welded hardness also makes this product useful for hardfacing steels where extra resistance to abrasion and metal to metal wear are required.

TYPICAL APPLICATIONS: Repair of cutting and shaving knives, shear blades, blanking, punching, and piercing dies, drills and boring tools.

PROCEDURES: Completely clean the area to be welded, remove all fatigued metal, and round off sharp edges. Slowly and uniformly preheat according to base metal specifications and maintain temperature throughout the welding procedure. Try to position part so welding can be done on a slight incline. Use the smallest diameter filler rod and lowest amperage possible to minimize heating of the part yet providing for a stable arc and suitable weld penetration. Amperage will be dictated by the thickness of the base metal and tungsten diameter. Argon shielding gas is recommended. Skip weld if necessary to distribute heat evenly, do not heat base metal beyond the tempering temperature to avoid loss of hardness. Lightly peen each bead while still red hot to relieve stresses. Allow the part to cool slowly in still air, if welding in a cool environment take measures to provide for slow cooling of the finished part such as use of a furnace or a suitable insulating material. When part cools to about 200º F, post heat to base metal specifications and slow cool to ambient temperature.

10 lb. Box X	1/16	1.6 mm	**36TSM062**
	3/32	2.4 mm	**36TSM093**

POLARITY: **DC Straight**

HARDNESS: **As Welded Hardness 61 - 63 RC**

DEPOSIT IS HEAT TREATABLE. USE M-2 PROCEDURE

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY SIL-TIN
Silver Bearing Solder Alloy

DESCRIPTION: Hi-Alloy Sil-Tin is a low temperature silver bearing solder alloy containing no lead, zinc, or cadmium. Its deposits have a similar appearance to stainless steel, resist tarnishing, may be plated, and also have good electrical conductivity.

TYPICAL APPLICATIONS: This product will solder assemblies of copper, copper alloys, nickel, nickel alloys, steel, stainless steel and dissimilar combinations of these metals. Its deposits have better electrical conductivity and tensile strength higher than standard lead solders. These qualities make Sil-Tin solder useful in the electronics, refrigeration, instrumentation, and air conditioning industries. It conforms to pure food laws and may be used in food handling and preparation applications.

PROCEDURES: Thoroughly clean and degrease the joint area. Apply some Hi-Alloy Sil-Tin Flux and heat the parts indirectly with a soft flame or with an iron to avoid charring the flux. When the flux starts to bubble apply the solder alloy and continue heating until the solder has melted and flowed through the joint. Allow to cool slowly then remove the flux residue with hot running or agitated water.

The 1/16 is also available in a kit containing 10' of solder and ½ oz. of flux, or 1 lb spools of alloy with an acid flux core.

1 lb. Spool	3/64	1.2 mm	**SITNS046**
	1/16	1.6 mm	**SITNS062**
	1/16 AC	1.6 mm	**SITNS062AC**
	3/32	2.4 mm	**SITSN093**
	1/8	3.2 mm	**STISN125**
	Kit 1/16"		**SITNKIT**
	Flux 6 oz	0.3 L	**SITNFLUX6OZ**
	16 oz	0.5 L	**SITNFLUX16OZ**
	32 oz	0.9 L	**SITNFLUS32OZ**
	1 gal	3.8 L	**SITNFLUX1GAL**

MELTING TEMPERATURE: 430º F

TENSILE STRENGTH: Up to 14,000 psi on Copper and Copper Alloys
Up to 25,000 psi on Stainless Steels

Sil-Tin Flux is Available in 6 oz Bottle

HI-ALLOY 1000
Economical High Silver Cadmium Bearing Brazing Alloy

DESCRIPTION: Hi-Alloy 1000, like the 1200 alloy, is a free flowing cadmium bearing alloy for general purpose industrial use. Its lower silver content makes the 1000 more economical, and the chemical variations give it a broader melting range making it suitable for looser fitting joints.

TYPICAL APPLICATIONS: Joining stainless steels, carbon steels, copper alloys, nickel alloys, and dissimilar combinations of these metals. Useful for fabrication and repair of machine parts, hydraulic lines, gas or pressure lines, assembly of scale models and prototypes.

PROCEDURES: Prepare the work area by chemical or mechanical cleaning, maintain a joint clearance of .005" maximum, apply Hi-Alloy Sil Squeeze or Hi-Alloy Ultra Crème flux to the joint area, heat the parts broadly and uniformly with a neutral to slightly carburizing flame. When the flux turns clear and flows through the joint apply the 1000 alloy and it will follow the flux filling the joint. Allow the part to cool slowly in still air. Remove flux residue with hot water and a stainless steel brush.

10 lb. Box X	1/16	1.6 mm	**181000062**
	3/32	2.4 mm	**181000093**

TENSILE STRENGTH:	**Up to 59,000 psi**
ELONGATION:	**Up to 22%**
BRAZING TEMPERATURE:	**1295º - 1550º F**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity		Part Number

HI-ALLOY 1200FC & 1200 BARE
High Silver, Cadmium Bearing Brazing Alloy

DESCRIPTION: Hi-Alloy 1200 alloy is a thin flowing, high strength, alloy for general purpose low temperature industrial brazing. The addition of cadmium provides for exceptional wetting and capillary action, making this alloy an excellent choice for use on intricate parts, thin metals, and tight fitting joints. The highly active flux on the 1200FC provides excellent oxide neutralization, acts as a temperature indicator, and helps keep work areas clean.

TYPICAL APPLICATIONS: Joining stainless steels, carbon steels, copper alloys, nickel alloys, and dissimilar combinations of these metals. Useful for fabrication and repair of machine parts, hydraulic lines, gas or pressure lines, assembly of scale models and prototypes.

PROCEDURES: Prepare the work area by chemical or mechanical cleaning, maintain a joint clearance of .003" maximum, heat the parts broadly and uniformly with a neutral to slightly carburizing flame, heat the flux coated rod and apply drops of the flux to the joint area, (when using 1200 Bare rod apply Hi-Alloy Sil Squeeze or Ultra Crème flux). When the flux turns clear and flows through the joint apply the 1200 alloy and it will follow the flux filling the joint. Allow the part to cool slowly in still air. Remove flux residue with hot water and a stainless steel brush.

10 lb. Box Bare X	1/32	0.8 mm	**181200031**
	1/16	1.6 mm	**181200062**
	3/32	2.4 mm	**181200093**
10 lb. Box Flux Coated X	1/16	1.6 mm	**181200FC062**
	3/32	2.4 mm	**181200FC093**

TENSILE STRENGTH:	**Up to 53,000 psi**
ELONGATION:	**Up to 22%**
BRAZING TEMPERATURE:	**1125º - 1400º F**

HI-ALLOY 1300FC & 1300 BARE
High Silver, Cadmium Free Brazing Alloy

DESCRIPTION: Hi-Alloy 1300FC has a unique, ultra active, fast flowing flux, potent enough to clean oxidized stainless steel. This special flux provides a clear, clean path through tight fitting joints for the 1300 alloy to freely flow assuring complete wetting of all surfaces. Another feature of this flux is its ability to be bent without breaking off of the rod enabling you to reach the alloy into awkward places.

TYPICAL APPLICATIONS: This F. D. A. approved alloy may be used for applications involving the medical, food, dairy, and pharmaceutical industries, as well as any other application where the use of cadmium bearing products is prohibited. It easily joins stainless steels, copper alloys, carbon steels, nickel alloys, and dissimilar combinations of these metals.

PROCEDURES: Prepare the work area by chemical or mechanical cleaning, maintain a joint clearance of .003" maximum, heat the parts broadly and uniformly with a neutral to slightly carburizing flame, heat the flux coated rod and apply drops of melted flux to the joint area, (when using 1300 Bare rod apply Hi-Alloy Sil-Squeeze or Ultra Crème flux). When the flux turns clear and flows through the joint apply the 1300 alloy and it will follow the flux filling the joint. Allow the part to cool slowly in still air. Remove flux residue with hot water and a stainless steel brush.

10 lb. Box Bare X	1/32	0.8 mm	**181300B031**
	1/16	1.6 mm	**181300B062**
10 lb. Box Flux Coated X	1/16	1.6 mm	**181300FC062**
	3/32	2.4 mm	**181300FC093**

TENSILE STRENGTH:	**Up to 76,000 psi**
ELONGATION:	**Up to 22%**
BRAZING TEMPERATURE:	**1205º - 1400º F**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY ULTRA CRÉME
Flux for Silver Brazing

DESCRIPTION: Ultra Crème Flux is a white paste type flux made of finely ground potassium fluoride, potassium bifluoride, and boric acid. This flux readily breaks down and absorbs the detrimental oxides on all metals which can be joined by silver brazing. (Not for use on aluminum, magnesium, titanium, or other light metals).

APPLICATION: Ultra Crème Flux may be used with Hi-Alloy silver brazing alloys 1000, 1200, 1300, 1400, and 53 Plymetal. You may apply the flux straight from the container by brushing or dipping, or if the paste is too thick for your particular application Ultra Crème may be thinned by mixing with water. Since the primary function of Ultra Crème Flux is to remove oxides, the parts should be cleaned prior to application of the flux. After brazing is completed, but while the part is still warm, flux residues may be easily removed using hot water.

CAUTION: Ultra Crème Flux contains potassium bifluoride which gives off fumes that may irritate eyes, nose, and throat. Avoid any direct contact with eyes and skin. If contact is made, flush area with copious amounts of water. Avoid fumes by using only in well ventilated places. Do Not Take Internally. Keep Out of the Reach of Children.

	1 lb. Jar	0.045 kg	**UCFLUX**

ACTIVE TEMPERATURE:	**800º F**
BRAZING TEMPERATURE RANGE:	**1050º - 1600º F**

HI-ALLOY HARDBASE 30
Superior Build-Up Alloy

DESCRIPTION: Hi-Alloy Hardbase 30 was designed to offer tough yet machinable deposits which are exceptionally compression and impact resistant. It is an excellent choice for mild abrasion environments and as a cushion layer for harder overlays such as Hi-Alloy Super Surface 60. The weld deposit thickness is unlimited, may be forged and can be flame cut.

TYPICAL APPLICATIONS: Mine car wheels, rope winches, gear teeth, steel mill wobblers, tractor rollers, brake drums, couplings, and hardfacing underlay.

PROCEDURES: Clean base metal and remove all prior deposits of hardfacing material, weld using stringer or weave beads, remove slag between passes, allow part to cool in still air.

	1 lb. Tube X 1/8	3.2 mm	**WEHB301251DP**
	5/32	4.0 mm	**WEHB301561DP**
	10 lb. Box X 1/8	3.2 mm	**WEHB30125**
	5/32	4.0 mm	**WEHB30156**
	3/16	4.8 mm	**WEHB30187**

AMPERAGE RANGES:	**1/8**	**90-110**
	5/32	**120-140**
	3/16	**160-180**

POLARITY:	**DC Reverse, DC Straight, or AC** **Use DC Straight to Accelerate Deposition Rate**
HARDNESS:	**Up to Rockwell C 38**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity		Part Number

HI-ALLOY HARDFACE 50
Medium Duty Hardfacing Electrode

DESCRIPTION: Hi-Alloy Hardface 50 is designed to produce deposits which have medium property characteristics for hardness, and resistance to impact and abrasive wear. It is primarily for flat and horizontal welding but its superior arc stability helps it perform well out of position also. This product may be used on alloyed steels, carbon steels, manganese steels, and cast irons.

TYPICAL APPLICATIONS: Overlay and repair of worn edges on scraper blades, feed screws, crusher rolls, auger points, disc plows, grain chutes, and mill hammers.

PROCEDURES: Clean the base metal and remove prior deposits of hardfacing material and fatigued base metal. Full hardness is normally achieved with 2 - 3 passes. If required, buildup soft or badly worn areas with Hi-Alloy Hardbase 30. Deposit using stringer or weave techniques but be careful not to overheat manganese steels.

10 lb. Box X	1/8	3.2 mm	**WEHF50125**
	5/32	4.0 mm	**WEHF50156**
	3/16	4.8 mm	**WEHF50187**

AMPERAGE RANGES:	**1/8**	**100-130**
	5/32	**120-175**
	3/16	**140-200**
POLARITY:		**AC or DC Reverse**
HARDNESS:		**Up to Rockwell C 53**

HI-ALLOY HARDFACE 60
Resists Abrasion and Impact

DESCRIPTION: Hi-Alloy Hardface 60 was designed to create a deposit which is resistant to severe abrasion coupled with light to moderate impact. It may be used on cast iron; manganese steels and low alloy steels as well as standard carbon steels. The deposit has very good resistance to small particle erosion and will polish smoothly to aid against frictional wear. This product also has excellent out of position surfacing characteristics and hot hardness retention up to 1000° F.

TYPICAL APPLICATIONS: Bucket teeth, cement chutes and augers, scraper blades, crusher jaws and rolls, conveyors and many other uses in the mining, earth moving and brick making industries.

PROCEDURES: Clean the base metal and remove all prior deposits of hardfacing material. Limit buildups to 2 passes, for heavy buildup or impact applications use Hi-Alloy Hardbase 30 for buildup or cushioning layers. Deposit using stringer or weave technique but be careful not to overheat the base metal especially if welding on manganese steels. A butter layer of Hi-Alloy 400 is recommended before use on cast iron. Finished part should be allowed to cool slowly.

10 lb. Box X	1/8	3.2 mm	**WEHF60125**
	5/32	4.0 mm	**WEHF60156**
	3/16	4.8 mm	**WEHF60187**

AMPERAGE RANGES:	**1/8**	**90-130**
	5/32	**120-170**
	3/16	**140-200**
POLARITY:		**AC or DC Reverse**
HARDNESS:		**Up to Rockwell C 60**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY HARDFACE 506

Resistant to High Impact & Moderate Abrasion

DESCRIPTION: Hi-Alloy HF506 is a high chromium, high manganese, nickel bearing alloy used for building up and joining austenitic manganese steel, low alloy quenched and tempered steel, and all carbon steels. Its highly alloyed deposits are extremely tough and shock resistant. It is able to withstand extreme impact loading along with moderate abrasion. This electrode has excellent weldability in all positions and produces smooth even beads with very low spatter. Weld deposits will work harden rapidly. Deposits are not flame cuttable.

TYPICAL APPLICATIONS: Formulated for high impact environments such as rail frogs, switch points, crusher cones, hammers, grousers, bucket teeth, and most other applications where manganese steels are used. HF506 is also an excellent base for harder wear facing alloys.

PROCEDURES: Clean the base metal and remove all prior deposits of hardfacing material and fatigued base metal. DO NOT PREHEAT. Maintain a short to medium arc length while keeping it concentrated on the base metal. Avoid exceeding a 600° F interpass temperature. If excessive heat build up occurs, quenching with water is allowed.

10 lb. Box	X 1/8	3.2 mm	WEHF506125
	5/32	4.0 mm	WEHF506156
	3/16	4.8 mm	WEHF506187
	1/4	6.4 mm	WEHF506250

AMPERAGE RANGES:	**1/8**	**110-135**
	5/32	**125-190**
	3/16	**150-250**
	1/4	**210-350**

POLARITY:	**AC or DC Reverse**
HARDNESS:	**As Welded Up To Rockwell C 19** **Work Hardens Up To Rockwell C 48**
TENSILE STRENGTH:	**Up to 116,000 psi**
YIELD STRENGTH:	**Up to 89,000 psi**

HI-ALLOY HARDFACE 507

For Joining & Surfacing Components Subject to High Impact

DESCRIPTION: Hi-Alloy HF507 has a high deposition rate (metal recovery rate 160%), and uses a spray transfer to produce smooth, non-cracking welds with an outstanding resistance to heavy impact.

TYPICAL APPLICATIONS: Since the deposited metal is not affected by heat treatment, HF 507 is ideally suited for repair and build-up of tools, dies, non-magnetic chrome and heat resistant steels. This product may also be used for joining of high alloyed to low alloyed steels and for surfacing of manganese steels, crusher hammers, rolls and mantles.

PROCEDURES: Clean the base metal and remove prior deposits of hardfacing material and fatigued metal. DO NOT PREHEAT. Prevent excessive heat build up of the work piece by maintaining a short arc length, particularly on manganese steels. Allow the finished part to cool slowly.

10 lb. Box	X 1/8	3.2 mm	WEHF507125
	5/32	4.0 mm	WEHF507156

AMPERAGE RANGES:	**1/8**	**90-130**
	5/32	**120-160**

POLARITY:	**AC or DC Reverse**
HARDNESS:	**As Welded Up To Rockwell C 20** **Work Hardens Up To Rockwell C 45**
TENSILE STRENGTH:	**Up to 105,000 psi**
YIELD STRENGTH:	**Up to 62,000 psi**
ELONGATION:	**Up to 40%**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY HX905
Tubular, Multi Carbide Hardfacing Electrode

DESCRIPTION: Hi-Alloy HX905 features a unique spray fusion metal transfer. The tubular construction allows this electrode to be operated at very low amperages. The low amperage characteristic and low heat input to the base metal make this product perfect for use on manganese steels. Multi-Carbide deposits provide resistance to extreme abrasion accompanied by moderate impact..

TYPICAL APPLICATIONS: Dredge bucket lips, crusher jaws, mantles and liners, swing hammers, screen plates, grizzly bars, shovel buckets, railway ballast sleds and tempers.

PROCEDURES: Clean the base metal and remove prior deposits of hardfacing material and fatigued metal. Deposit alloy using a moderately long arc length and a slow weave bead. Maximum deposit thickness is two layers. Be careful not to overheat manganese steels. For out of position welding weld down hand, or at a slight up hand angle for heavier build-up. Cross bead checking will occur as the deposit relieves itself of internal stresses.

10 lb. Box X	1/4	6.4 mm	**WEHX905250**
	3/8	9.5 mm	**WEHX905375**
	1/2	12.7 mm	**WEHX905500**

AMPERAGE RANGES:	**1/4**	**80-150**
	3/8	**120-250**
	1/2	**150-290**

POLARITY: **AC, DC Straight or DC Reverse**

HARDNESS: **Up to Rockwell C 62**

HI-ALLOY SUPER SURFACE 60
Abrasion Resistant Overlay

DESCRIPTION: Hi-Alloy Super Surface 60 was designed to deposit a rare ripple free bead of complex carbides suspended in a tough alloy matrix. It may be used on most iron base metals to protect against sliding metal to metal wear, moderate impact, and severe abrasion. The alloy content allows for use in high temperature and corrosive wear environments. The unique coating allows for use on low amperage machines and AC equipment.

TYPICAL APPLICATIONS: Surfacing of augers, feed screws, cement chutes, scrapper blades, auger points, disc plows, bucket teeth, pump liners, brush hog blades, bucket liners, conveyor screws, and grain chutes.

PROCEDURES: Clean the base metal and remove all prior deposits of hardfacing material, use a stringer or wide weave technique, remove slag between passes, limit deposit thickness to a maximum of three passes. 3/32 and 1/8 inch electrodes may be used out of position, 5/32 and 3/16 inch weld only flat or horizontal.

1 lb. Tube X	3/32	2.4 mm	**WESS600931DP**
	1/8	3.2 mm	**WESS601251DP**
	5/32	4.0 mm	**WESS601561DP**
10 lb. Box X	3/32	2.4 mm	**WESS60093**
	1/8	3.2 mm	**WESS60125**
	5/32	4.0 mm	**WESS60156**
	3/16	4.8 mm	**WESS60187**

AMPERAGE RANGES:	**3/32**	**65-95**
	1/8	**110-140**
	5/32	**160-200**
	3/16	**210-270**

POLARITY: **DC Reverse or AC**

HARDNESS: **Up to Rockwell C 60**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY SUPER HARD
The Ultimate in Wear Protection

DESCRIPTION: Hi-Alloy Super Hard deposits are alloy rich containing a complex carbide mixture of chromium, molybdenum, niobium, vanadium, manganese, and tungsten. These elements combine to offer excellent hardness retention up to 1600º F, and the ultimate in abrasion resistance. For use on all iron based metals subject to severe fine particle erosion, these deposits exhibit wear properties superior to standard tungsten carbide deposits.

TYPICAL APPLICATIONS: Sinter handling equipment, cement handling equipment, earth moving equipment, coal handling equipment, ore processing equipment, crushers, grates, and conveyors.

PROCEDURES: Remove all foreign material from the weld area, rebuild severely worn areas with Hi-Alloy Hardbase 30, select a lower amperage range, and maintain a medium arc gap, for the best bead profile weld using a 3 X weave, minimal slag may be welded over, maximum of two passes; cross crack stress relief is normal.

1 lb. Tube X 1/8	3.2 mm		WESUPHD1251DP
5/32	4.0 mm		WESUPHD1561DP
10 lb. Box X 1/8	3.2 mm		WESUPHD125
5/32	4.0 mm		WESUPHD156

AMPERAGE RANGES:	**1/8**	**105-135**
	5/32	**130-170**

POLARITY:	**DC Reverse, DC Straight, or AC**
HARDNESS:	**Up to Rockwell C 68**

HI-ALLOY AM354
For Joining & Surfacing Components Subject to High Impact

DESCRIPTION: Hi-Alloy AM354 was designed to be used as a build-up alloy capable of resisting extreme impact and compressive wear on both carbon and austenitic manganese steels. It may also be used for joining carbon steel and mild steel to manganese steel with high tensile strength. Welds are flame cuttable, crack resistant, dense, and porosity free.

TYPICAL APPLICATIONS: Hammermill hammers, rock crusher mantles and rolls, impactor bars, swing hammers, railroad frogs, railroad crossovers, rail ends, and various quarry and stone crushing operations.

PROCEDURES: Clean the base metal and remove all prior deposits of hardfacing material. Do not preheat manganese steels, select lower amperage range to minimize heat input. Interpass temperature should not exceed 500º F, maintain a short arc length, use skip weld technique with about 4" beads, peen the beads to distribute stresses, allow the finished part to cool slowly in still air.

1 lb. Tube X 1/8	3.2 mm		WE3541251DP
5/32	4.0 mm		WE3541561DP
10 lb. Box X 1/8	3.2 mm		WE354125
5/32	4.0 mm		WE354156
3/16	4.8 mm		WE354187

AMPERAGE RANGES:	**1/8**	**85-125**
	5/32	**110-140**
	3/16	**130-170**

POLARITY:	**AC or DC Reverse**
TENSILE STRENGTH:	**Up to 125,000 psi**
HARDNESS:	**As Welded Rockwell C 35 - 38**
	Work Hardens Up To Rockwell C 50

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY 101
Tungsten Carbide Tube Metal

DESCRIPTION: Hi-Alloy 101 is produced as a mild steel tube filled with crushed and sized granules of tungsten carbide. The deposited metal is typically 60% carbide and 40% tube by weight. The deposited material is surprisingly tough, very abrasion resistant, and will withstand moderate impact. A number of different granule (mesh) sizes are available to suit most any requirement. The standard granule size is 30-40 but other mesh sizes are available by special request. Some restrictions may apply.

PROCEDURES:
BARE ROD: Adjust torch to an excess acetylene flame, 3X of inner cone. Use a tip one size larger than normally used to weld the same diameter mild steel rod. Sweat the deposit to the base metal with minimum penetration. Avoid puddling.

COATED ROD: Use minimum amperage; consistent with good penetration. May be applied using AC or DC Reverse polarity. Apply in flat or slightly inclined position.

10 lb. Box	X 1/8	3.2 mm	**28101B1253040**
	5/32	4.0 mm	**25101B1563040**
	3/16	4.8 mm	**25101B1873040**

AMPERAGE RANGES:	**1/8**	**80-100**
	5/32	**100-120**
	3/16	**120-150**

ADDITIONAL MESH SIZES AVAILABLE:

8 -10 Horseshoe rod ¼" only

14 - 24	**60 - 100**
20 - 30	**80 - 200**
40 - 60	

HI-ALLOY 105
Tungsten Carbide Composite Rod

DESCRIPTION: Hi-Alloy 105 is a composite type tungsten carbide brazing alloy consisting of 60% cobalt grade, sintered, tungsten carbide particles suspended in a matrix of nickel silver. The tungsten carbide particles provide the ultimate in abrasive wear resistance and the nickel silver matrix has up to 100,000 psi tensile strength to hold the carbides in place for the long haul.

The tungsten carbide particles are available in a variety of sizes to meet the requirements of almost any application. Some restrictions may apply.

PROCEDURES: Make sure the surface to be coated is free of surface contaminates. Pre-application tinning with a flux coated nickel silver, or bare rod and a borax type flux is recommended. Adjust torch to a low pressure neutral flame. Preheat metal to 600º - 800º F. Concentrate heat in the starting area to a dull cherry red (1600º F.), continue heating and begin application of the tinning rod, use appropriate heat to make the molten metal flow out to 1/32 - 1/16 inch thickness. After tinning melt off the 105 alloy in 1/2 to 1 inch sections and use a circular motion with the torch to spread the molten matrix out and bond it with the surface. Use the end of the rod or the tinning rod to arrange the tungsten carbide particles in the desired pattern. If a particle does not appear to be bonding it should be removed and discarded.

10 lb. Box	X 1/8 X 1/16	3.2 X 1.6 mm	**18105B125062**
	1/8 X 3/16	3.2 X 4.8 mm	**18105B187125**
	1/4 X 3/16	6.4 X 4.8 mm	**18105B250187**
	5/16 X 1/4	7.9 X 6.4 mm	**18105B375250**

PARTICLE SIZES:

1/8 X 1/16"
1/8 X 3/16"
1/4 X 3/16"
5/16 X 1/4"

TYPICAL ANALYSIS OF THE MATRIX:	**Copper**	**48.0%**
	Nickel	**10.0%**
	Silicon	**0.1%**
	Zinc	**Remainder**

MELTING TEMPERATURE IS APPROXIMATELY 1680º F

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY HFW-30
Build-Up Wire

DESCRIPTION: Hi-Alloy HFW-30 is a metal cored, gas shielded, low alloy wire with very good compressive strength and resistance to plastic deformation. It can be used on both carbon and low alloy steels, is an ideal base for subsequent overlay with a more wear resistant alloy, and it is also good for use where a tough but machinable weld deposit is required.

TYPICAL APPLICATIONS: Sinter handling equipment, cement handling equipment, earth moving equipment, coal handling equipment, ore processing equipment, crushers, grates, and conveyors.

PROCEDURES: Remove all foreign material from the weld area, rebuild severely worn areas with Hi-Alloy Hardbase 30, select a lower amperage range, and maintain a medium arc gap, for the best bead profile weld using a 3 X weave, minimal slag may be welded over, maximum of two passes; cross crack stress relief is normal.

10 lb. Spool X .045	1.2 mm	10HFW30045
25 lb. Spool X .045	1.2 mm	25HFW30045
1/16	1.6 mm	25HFW30062

WELDING PARAMETERS: Use DC Reverse Polarity

	Short Arc		Spray Arc	
Diameter	**.045**	**.062**	**.045**	**.062**
Amps	**90-200**	**150-220**	**250-325**	**300-375**
Volts	**15-21**	**18-21**	**27-30**	**27-30**
Stick-out	**1/2”**	**3/4”**	**5/8”**	**3/4”**
Shielding Gas	**Ar/CO_2**	**Ar/CO_2**	**Ar/Ox**	**Ar/Ox**
CFH	**25-30**	**25-30**	**40-45**	**40-45**

NOTE: When welding out of position use lower ranges of volts and amps.

TYPICAL WELD METAL PROPERTIES:

Hardness: 32 - 38 RC	**Unlimited Buildup Capability**
May Be Flame Cut	**Machinable with Carbide Tools**

HI-ALLOY HFW-50
Medium Chrome Carbide Alloy

DESCRIPTION: Hi-Alloy HFW-50 is a metal-cored alloy that can be used either with or without a gas shield. It has a medium percentage of chrome carbide particles combined with a tough bonding matrix. It is useful for applications involving high impact and moderate abrasion. The deposited metal is tougher than standard chromium carbide alloys and will stress relieve with fewer check cracks.

TYPICAL APPLICATIONS: Use as a final overlay for applications involving high impact and crushing such as; Impact breaker bars and pulverizing hammers, hammer mill hammers, crusher jaws, and cone and roll shells.

10 lb. Spool X .045	1.2 mm	10HFW50045
25 lb. Spool X .045	1.2 mm	25HFW50045

WELDING PARAMETERS: Use DC Straight or Reverse Polarity

Diameter	**.045**	**.062**
Amps	**100-250**	**160-300**
Volts (DCRP)	**15-26**	**20-25**
Stick-out	**¾-1”**	**1-1½”**
Shielding Gas	**NOT REQUIRED**	

TYPICAL WELD METAL PROPERTIES:

Hardness:	**47 - 52 RC**
Deposit Thickness:	**3 - 5 Layers**
Non-Machinable	
Cannot Be Flame Cut	

NOTE: There may be situations where a shielding gas may be helpful. On these occasions use of Argon/CO_2 or a 100% CO_2 shielding gas is recommended. This will cause amperages to go up by about 10% and the stick-out should be shortened. When welding out of position is required use the lower ranges of the volts and amps, a gas shield may also be helpful.

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY HFW-57
Hardfacing Wire

DESCRIPTION: Hi-Alloy HFW-57 is an excellent general purpose, metal-cored, gas shielded hardfacing alloy. This product features good resistance to abrasion, exceptional toughness, and good metal to metal wear. The deposits are not brittle and exhibit characteristics similar to H-13 tool steel when in service, these characteristics allow the deposits to resist chipping and maintain a good cutting edge. The deposits are also heat resistant at temperatures up to 1100° F.

TYPICAL APPLICATIONS: Buckets and bucket teeth, coal chutes, augers, screw conveyors, dozer and scraper blades, hot shear blades, gripper dies, shearing and piercing dies, trim dies, forging dies, recycling knives and cutting tools.

10 lb. Spool X .035	0.9 mm	10HFW57035
.045	1.2 mm	10HFW57045
25 lb. Spool X .045	1.2 mm	25HFW57045

TYPICAL WELD METAL PROPERTIES:

Hardness:	**55 - 59 RC**
Maximum Deposit Thickness:	**3 Layers**
Non-Machinable	
May be Flame Cut	

WELDING PARAMETERS: Use DC Reverse Polarity

	Short Arc		Spray Arc	
Diameter	**.045**	**.062**	**.045**	**.062**
Amps	**90-200**	**150-220**	**250-325**	**300-375**
Volts	**15-21**	**18-21**	**27-30**	**27-30**
Stick-out	**1/2”**	**3/4”**	**5/8”**	**3/4”**
Shielding Gas	**Ar/CO_2**	**Ar/CO_2**	**Ar/Ox**	**Ar/Ox**
CFH	**25-30**	**25-30**	**40-45**	**40-45**

HI-ALLOY HFW-59
Hardfacing Wire

DESCRIPTION: Hi-Alloy HFW-59 is an excellent general purpose, metal-cored, gas shielded hardfacing alloy. This product combines outstanding resistance to abrasion and impact with exceptional resistance to chipping and spalling. This very versatile alloy is for use on carbon and low alloy steels, develops full hardness in its first pass but may be applied up to 3 passes, provides excellent out of position weldability, and the deposits are heat resistant at temperatures up to 1100° F.

TYPICAL APPLICATIONS: Buckets and bucket teeth, coal chutes, augers, screw conveyors, dozer and scraper blades; hot shear blades and has a variety of agricultural uses.

10 lb. Spool X .045	1.2 mm	10HFW59045
25 lb. Spool X .045	1.2 mm	25HFW59045
1/16	1.6 mm	25HFW59062

TYPICAL WELD METAL PROPERTIES:

Hardness:	**58 - 60 RC**
Maximum Deposit Thickness:	**3 Layers**
Non-Machinable	
May be Flame Cut	

WELDING PARAMETERS: Use DC Reverse Polarity

	Short Arc		Spray Arc	
Diameter	**.045**	**.062**	**.045**	**.062**
Amps	**125-175**	**160-200**	**200-260**	**240-290**
Volts	**17-19**	**19-21**	**26-29**	**28-30**
Stick-out	**1/2”**	**3/4”**	**5/8”**	**3/4”**
Shielding Gas	**Ar/CO_2**	**Ar/CO_2**	**Ar/Ox**	**Ar/Ox**
CFH	**30-35**	**25-30**	**40-45**	**35-40**

NOTE: When welding out of position use lower ranges of volts and amps.

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY HFW-63
Premium Chrome Carbide Alloy

DESCRIPTION: Hi-Alloy HFW-63 is a metal-cored alloy that can be used either with or without a gas shield. It has a high percentage of chrome carbide particles combined with a hard bonding matrix. It is useful for applications involving high abrasion and moderate impact. This alloy is for use on carbon and low alloy steels, is heat resistant at temperatures up to 1000º F, and the deposit will polish to a highly friction resistant surface.

TYPICAL APPLICATIONS: Buckets and bucket teeth, coal chutes, augers, screw conveyors, dozer and scraper blades, tilling tools, fan and mixer blades.

10 lb. Spool X .045	1.2 mm	10HFW63045
25 lb. Spool X .045	1.2 mm	25HFW63045
1/16	1.6 mm	25HFW63062

TYPICAL WELD METAL PROPERTIES:	
Hardness:	58 - 62 RC
Maximum Deposit Thickness:	2 Layers
Non-Machinable	
Cannot Be Flame Cut	

WELDING PARAMETERS: Use DC Straight or Reverse Polarity

Diameter	.045	.062
Amps	140-200	170-300
Volts (DCRP)	18-24	22-28
Stick-out	¾-1”	1-1½”
Shielding Gas	NOT REQUIRED	

NOTE: When welding out of position is required use .045 diameter with DC Reverse polarity and the lower ranges of volts and amps. Welding vertical down is accomplished with ¾” weave beads; use of a 100% CO_2 or 75% Argon 25% CO_2 gas shield will be helpful.

HI-ALLOY HFW-64
High Hardness Overlay

DESCRIPTION: Hi-Alloy HFW-64 is a metal-cored alloy that can be used either with or without a gas shield. It is useful for applications involving high abrasion and moderate impact, and retains good hot hardness up to 1100º F. This alloy is well suited for use on carbon and alloy steels, manganese steels, and cast irons where a non-machinable deposit may be employed.

TYPICAL APPLICATIONS: Buckets and bucket teeth, coal chutes, augers, screw conveyors, dozer and scraper blades, tilling tools, fan and mixer blades.

10 lb. Spool X .045	1.2 mm	10HFW64045
25 lb. Spool X .045	1.2 mm	25HFW64045

TYPICAL WELD METAL PROPERTIES:	
Hardness	60 - 65 RC
Non-Machinable	
Maximum Deposit Thickness	2 Layers
Cannot Be Flame Cut	

WELDING PARAMETERS: Use DC Straight or Reverse Polarity

	Short Arc		Spray Arc	
Diameter	.045	.062	.045	.062
Amps	130-180	160-210	200-280	260-320
Volts	17-23	19-23	28-30	29-31
Stick-out	3/4”	1”	5/8”	3/4”
Shielding Gas	Not required for short arc		98% Argon/2% Oxygen	
CFH	N/A	N/A	40-45	40-45

NOTE: While short arc welding, you may find applications where use of a shielding gas may be helpful. For these applications 75% Argon 25% CO2 or 100% CO_2 would be recommended. If a shielding gas is used the amperages will go up by about 10% and the stick out should be shortened. When out of position welding is required, use the lower range of amps and volts, and a gas shield may also be helpful.

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY HFW-66
Premium Multi-Carbide Alloy

DESCRIPTION: Hi-Alloy HFW-66 is a metal-cored alloy that can be used either with or without a gas shield. It has a high percentage of mixed multi-carbide particles combined with a hard bonding matrix. It is useful for applications involving severe abrasion coupled with high stress grinding, and even low stress scratching and gouging. This alloy is for use on carbon and low alloy steels. The deposits are heat resistant at temperatures up to 1400º F., will likely double the wear resistance of chrome carbide overlays and in some applications HFW-66 may be used to replace tungsten carbide overlay products.

TYPICAL APPLICATIONS: Cement mill parts, coke pusher shoes, tong bits, brick making equipment, grain processing equipment, coal chutes, augers, screw conveyors, agricultural equipment, tilling tools, ash fans and mixer paddles.

10 lb. Spool X .045	1.2 mm	10HFW66045
25 lb. Spool X .045	1.2 mm	25HFW66045

TYPICAL WELD METAL PROPERTIES:

Hardness	**63 - 67 RC**
Non-Machinable	
Maximum Deposit Thickness	**2 Layers**
Cannot Be Flame Cut	

WELDING PARAMETERS: Use DC Reverse Polarity

	Short Arc		Spray Arc	
Diameter	**.045**	**.062**	**.045**	**.062**
Amps	**90-200**	**150-220**	**250-325**	**300-375**
Volts	**15-21**	**18-21**	**27-30**	**27-30**
Stick-out	**1/2”**	**3/4”**	**5/8”**	**3/4”**
Shielding Gas	**Ar/CO_2**	**Ar/CO_2**	**Ar/Ox**	**Ar/Ox**
CFH	**25-30**	**25-30**	**40-45**	**40-45**

NOTE: Even though a gas shield is not required with this product, there may be applications where a shielding gas may be helpful. For these situations use of 75% Argon 25% CO2 or 100% CO2 would be recommended. Use of shielding gas causes the amperage to increase so the stick-out should be shortened. When welding out of position is required use the lower ranges of volts and amps.

HI-ALLOY HFW-354
Manganese Alloy Joining & Buildup Wire

DESCRIPTION: Hi-Alloy HFW-354 is a premium quality, fluxcored, open arc wire with excellent operating characteristics. This wire is an austenitic manganese steel, alloyed with chrome and nickel for advanced weld deposit qualities. This product may be used for joining and buildup of manganese steel, and for surfacing of carbon, and low alloy steels. The deposits work hardens readily and may be flame cut.

TYPICAL APPLICATIONS: Joining of manganese steels, and buildup of impact hammers, crusher rolls, bucket teeth, and railroad frogs and crossovers.

10 lb. Spool X .045	1.2 mm	10HFW354045
25 lb. Spool X .045	1.2 mm	25HFW354045
1/16	1.6 mm	25HFW354062
5/64	2.4 mm	25HFW354078

TYPICAL MECHANICAL PROPERTIES:

As Welded Hardness:	**15 - 20 RC**
Work Hardens to:	**50 - 55 RC**
Tensile Strength:	**120,000 psi**
Yield Strength:	**75,000 psi**
Elongation:	**45%**

WELDING PARAMETERS: Use DC Reverse Polarity & Globular Metal Transfer

Diameter	**.045**	**1/16**	**7/64**
Amps	**100-200**	**150-300**	**200-400**
Volts	**19-27**	**23-28**	**23-30**
Stick-out	**3/4-1 1/2”**	**1-1 1/2”**	**1 1/2”**

100% CO2 gas at 40-45 CFH and DC Straight Polarity. No preheat is required, the heat input should be kept to a minimum, and the part should be allowed to cool slowly.

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY 15FC
Hi Strength Nickel Silver Brazing Alloy

DESCRIPTION: Hi-Alloy 15FC was designed for joining most ferrous and non ferrous metals, cast irons, steels, stainless, nickel alloys and copper based alloys. It is also superior for joining dissimilar metal combinations with the exception of aluminum and the white metals. The deposits are fully machinable and posses excellent corrosion resistance at normal and elevated temperatures. 15FC may also be used as a build-up or cushion layer prior to hardfacing.

TYPICAL APPLICATIONS: Fabrication or repair of bicycle frames and tubular steel furniture, repairing cast iron castings, overlay and joining of steels, nickel alloys, stainless steels, copper based alloys and dissimilar combinations of these metals.

PROCEDURES: Clean or grind the base metal. Bevel heavier sections. Preheat broadly to 900º F. Concentrate heat in the joint area to 1300º F. Melt a small amount of flux from the rod onto the joint area and continue heating indirectly until the flux turns clear and flows. Apply the 15 alloy, continue to heat and add alloy as needed to complete the procedure. Allow finished part to cool slowly in still air. Remove flux residues with hot water and a stainless steel brush.

Quantity		Part Number
10 lb. Box X 3/32	2.4 mm	**1815FC093**
1/8	3.2 mm	**1815FC125**

BRAZING TEMPERATURE:	**1720º - 1800º F**
TENSILE STRENGTH:	**Up to 70,000 psi**
HARDNESS:	**Up to 120 Brinell**

HI-ALLOY 17FC
Ultimate High Strength Brazing Alloy

DESCRIPTION: Hi-Alloy 17FC is an excellent choice for high strength joining, overlay, or buildup of all ferrous and nonferrous metals except aluminum and the white metals. By making slight adjustments in procedure you can make this alloy flow out thin to braze tubing or buildup bead over bead to restore a broken gear tooth. This alloy also has outstanding resistance to frictional wear.

TYPICAL APPLICATIONS: Repair of cast iron castings, broken drill bits, damaged cutting tools, and broken gear teeth, carbide tipping, joining steels, copper alloys, nickel alloys, cast irons, and dissimilar combinations of these materials, overlaying steel surfaces subject to metal to metal wear.

PROCEDURES: Clean the area to be brazed, bevel sections over 1/8", adjust torch to neutral flame and hold flame cone close to the joint area. Preheat to 1500º F. Melt a small amount of flux from the rod onto the joint area and continue heating indirectly until the flux turns liquid and flows. For thin flow continue concentrating heat and add additional flux with the filler rod. For buildup, back off heat and turn flame away from molten metal heating just enough to melt the filler rod onto the previously deposited metal. Allow finished part to cool slowly in still air. Remove flux residues with hot water and a stainless steel brush.

Quantity		Part Number
10 lb. Box X 3/32	2.4 mm	**1817FC093**
1/8	3.2 mm	**1817FC125**

BRAZING TEMPERATURE:	**1583º - 1640º F**
TENSILE STRENGTH:	**Up to 100,000 psi**
HARDNESS:	**Up to 200 Brinell**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY 23FC

Ultimate Low Temperature, Low Fuming, Flux Coated Brazing Alloy

DESCRIPTION: Hi-Alloy 23FC was formulated as a universal high strength alloy for brazing of all metals except aluminum and white metals. Its low working temperature reduces distortion and buckling of thin metal and allows for brazing of galvanized steels without damage to the coating. Fast freeze action makes it ideal for vertical and overhead brazing. Low smoke emissions help keep the fumes in the work area to a minimum.

TYPICAL APPLICATIONS: Fabrication or repair of copper based alloys, nickel alloys, steels, galvanized steels, cast irons, malleable irons, and dissimilar combinations of these metals.

PROCEDURES: Clean the area to be brazed, bevel sections over 1/8", adjust torch to neutral flame and hold flame cone close to the joint area. Preheat to 1500º F. Melt a small amount of flux from the rod onto the joint area and continue heating indirectly until the flux turns liquid and flows. For thin flow continue concentrating heat and add additional flux with the filler rod. For buildup, back off heat and turn flame away from molten metal heating just enough to melt the filler rod onto the previously deposited metal. Allow finished part to cool slowly in still air. Remove flux residues with hot water and a stainless steel brush.

10 lb. Box	X 3/32	2.4 mm	1823FC093
	1/8	3.2 mm	1823FC125

BRAZING TEMPERATURE:	**1583º - 1640º F**
TENSILE STRENGTH:	**Up to 100,000 psi**
HARDNESS:	**Up to 200 Brinell**

HI-ALLOY 100

Special Aluminum Bronze Electrode

DESCRIPTION: Hi-Alloy 100 is alloyed with nickel and manganese making it far superior to common aluminum bronze electrodes. It is an excellent choice for joining and buildup of most steels and copper based metals, for repair of bearing surfaces, and for surfacing of parts subjected to sea water or corrosive chemicals. Deposits are fully machinable and will work harden in service.

TYPICAL APPLICATIONS: Stirrer blades, valves, ship propellers, thrust bearings, turbines, hydraulic equipment parts, joining dissimilar metals, structural joining, and machinery construction.

10 lb. Box	X 3/32	2.4 mm	WE100093
	1/8	3.2 mm	WE100125
1 lb. Tube	X 3/32	2.4 mm	WE1000931DP
	1/8	3.2 mm	WE1001251DP

AMPERAGE RANGES:	**3/32**	**70-100**
	1/8	**90-125**

POLARITY:	**DC Reverse**
TENSILE STRENGTH:	**Up to 100,000 psi**
HARDNESS:	**Up to 200 Brinell**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY 122
Bronze Electrode

DESCRIPTION: Hi-Alloy 122 is an all position electrode used extensively for the welding of copper, brass, bronze, cast iron, steel, and for joining dissimilar combinations of these metals. It is excellent for overlay and build-up where resistance to corrosion by sea water or chemical solutions is required. 122 is alloyed with nickel so its deposits are harder and more wear resistant than other bronze electrodes, yet remain machinable.

TYPICAL APPLICATIONS: Repair and resurfacing of gear wheels, impellers, bearings, turbines, valve bodies, and defects in castings.

PROCEDURES: The edges of heavy material should be beveled to form a 45º vee. Preheat is not required but is always desirable. Normal arc length should produce a good solid weld. Slag is removed easily after the bead is allowed to cool slightly.

Quantity		Part Number
10 lb. Box X 3/32	2.4 mm	WE122093
1/8	3.2 mm	WE122125
5/32	4.0 mm	WE122156

AMPERAGE RANGES:	**3/32**	**80-120**
	1/8	**110-160**
	5/32	**120-200**
POLARITY:		**DC Reverse**
TENSILE STRENGTH:		**Up to 60,000 psi**
HARDNESS:		**Up to 120 Brinell**

HI-ALLOY 133
Copper Electrode

DESCRIPTION: Hi-Alloy 133 is an all position, high purity copper electrode. This product welds with a smooth stable arc on all common grades of copper and copper alloys.

TYPICAL APPLICATIONS: Hi-Alloy 133 is commonly used in the fabrication, buildup, and surfacing of electrolytic and deoxidized copper parts and in applications where thermal and electrical conductivity or high corrosion resistance is required. Hi-Alloy 133 is also a good choice for copper cladding of steel and cast iron.

PROCEDURES: Clean all oxides, contaminants, and weakened metal from the area to be welded. Sections heavier than 3/16" should be beveled and preheated to 750º - 1100º F. Thin sections need not be preheated. For best results maintain a short arc length during welding and allow the part to cool before removing the slag.

Quantity		Part Number
10 lb. Box X 1/8	3.2 mm	WE133125

AMPERAGE RANGES:	**1/8**	**100-130**
POLARITY:		**DC Reverse**
TENSILE STRENGTH:		**Up to 31,000 psi**

HI-ALLOY 144
AC/DC Bronze Electrode

DESCRIPTION: Hi-Alloy 144 is an all position electrode used extensively for the welding of copper, brass, bronze, cast iron, steel, and for joining dissimilar combinations of these metals. It is an excellent overlay and buildup electrode providing good resistance to corrosion from sea water and chemical solutions. This electrode welds smoothly and quietly producing dense, porosity free, fully machinable deposits.

TYPICAL APPLICATIONS: Repair and resurfacing of turbines, gear wheels, bearings, valve bodies, impellers, and defects in castings.

PROCEDURES: The edges of heavy materials should be beveled to form a 45º vee. Preheat is not required but is always desirable. Normal arc length should produce a good solid weld. Slag is removed easily after the bead is allowed to cool slightly.

Quantity		Part Number
10 lb. Box X 3/32	2.4 mm	WE144093
1/8	3.2 mm	WE144125

AMPERAGE RANGES:	**3/32**	**80-100**
	1/8	**100-140**
POLARITY:		**AC or DC Reverse (Use DC Reverse on cast iron)**
TENSILE STRENGTH:		**Up to 55,000 psi**
HARDNESS:		**Up to 100 Brinell**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

MODEL 7800
Hot Spray Powder Torch

DESCRIPTION: The Hi-Alloy Model 7800 Hot Spray Powder Torch is essentially a modified oxygen-acetylene brazing torch. In the middle of the torch, attached to the handle, is a powder dispensing unit. Specially cut and blended metal powders are gravity fed into the torch and propelled out through the tip end by the pressure of the oxygen and acetylene gases. By depressing and releasing a powder feed control lever the operator is able to control the size, shape, and thickness of the deposited metal.

TYPICAL APPLICATIONS: The Model 7800 Hot Spray Powder Torch is used primarily for buildup and hardfacing of steel parts but possible applications are numerous and depend largely on the desired result and the type of metal powder being used. See the following pages for descriptions of the available Hi-Alloy Easy Spray Powders and their typical applications.

PROCEDURES: Thoroughly clean and degrease the work piece to a bright, clean, bare metal. Make sure the number stamped on the tip end matches the number stamped on the mixer which is located in the powder dispensing unit. (The torch comes standard with a #8 tip end and #8 mixer installed.) Adjust the acetylene regulator output pressure to 14 pounds and the oxygen regulator output pressure to 18 pounds. Attach a bottle of the desired powder to be deposited onto the hopper of the powder dispensing unit. Light the torch as you would a standard oxygen-acetylene brazing torch and adjust to a neutral flame. Preheat the work piece to 600º F and spray a thin coating of powder over the entire surface approximately .004 to .007" thick. Go back over the entire surface with only the flame heating the part until the pre-sprayed powder melts and bonds to the surface, (approximately 1900º - 2000º F). Go back and continue to heat and spray small amounts of powder melting and bonding the deposited metal as you go until the procedure is completed. Allow the finished part to cool slowly in still air.

1 ea.		7800ST
1 Kit		7800STKIT

7800 ST INCLUDES:
1 Handle
1 Powder Dispensing Unit
1 Empty Powder Bottle
1 #8 Mixer
1 8" Gooseneck
1 #8 Tip

7800 ST KIT INCLUDES:
All of 7800 above plus adds a choice of 5 lb. of Easy Spray Hot Spray Powder (limit 1 lb. of ES-58)

HI-ALLOY ES-58
Hot Process - Metal Spray Powder

DESCRIPTION: Hi-Alloy ES-58 Hot Spray Powder is a blend of tungsten carbide particles and a tough nickel base alloy matrix. This alloy may be used on steel, stainless steel, nickel alloys, and cast iron. In the deposited metal the tungsten carbide particles are held firmly in place by the already corrosion, heat, and wear resistant matrix, combining for the ultimate in resistance to abrasive environments such as sand, gravel and cement.

TYPICAL APPLICATIONS: Mixer blades and paddles, augers, cane knives, plow shares, conveyor screws, mower blades, de-barkers and cement chutes.

PROCEDURES: See the Model 7800 Hot Spray Powder Torch.

5 lb. Bottle	2.3 Kg	ES58
1 lb. Bottle	0.5 Kg	ES58-1

MELTING TEMPERATURE: **1900º F (Matrix)**
HARDNESS: **Rockwell C 62 - 66**
COVERAGE ESTIMATE: **650 Grams to Cover 250 Square Inches .010" Thick**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY ES-59
Hot Process - Metal Spray Powder

DESCRIPTION: Hi-Alloy ES-59 Hot Spray Powder is a high hardness nickel base alloy which may be used on steel, stainless steel, nickel alloys and cast iron. The deposited metal is non machinable, has excellent resistance to abrasion and corrosion, retains its hardness at elevated temperatures, resists galling and scaling and has a low coefficient of friction.

TYPICAL APPLICATIONS: Valves and valve seats, blades, extrusion screws, dies, chain saw guides, impellers, cams, camshafts, mandrels and nozzles.

PROCEDURES: See the Model 7800 Hot Spray Powder Torch.

Quantity		Part Number
5 lb. Bottle	2.3 Kg	ES59
1 lb. Bottle	0.5 Kg	ES59WA
		ES59-1

MELTING TEMPERATURE:	**1900º F**
HARDNESS:	**Rockwell C 60 - 64**
COVERAGE ESTIMATE:	**500 Grams to Cover 58 Square Inches 1/16" Thick**

HI-ALLOY ES-400
Hot Process - Metal Spray Powder

DESCRIPTION: Hi-Alloy ES-400 Hot Spray Powder is a nickel base alloy which may be used on steel, stainless steel, nickel alloys and cast iron. This powder is very similar to the ES-500 powder and is used for many of the same applications but is slightly harder for applications that require the extra hardness.

TYPICAL APPLICATIONS: Arms, bars, blocks, bushings, cams, conveyors, crankcases, dies, drums, gears, journals, levers, links, lugs, manhole covers, molds, pumps, rods and rolls.

PROCEDURES: See the Model 7800 Hot Spray Powder Torch.

Quantity		Part Number
5 lb. Bottle	2.3 Kg	ES400

MELTING TEMPERATURE:	**1975º F**
HARDNESS:	**Rockwell C 22 - 28**
COVERAGE ESTIMATE:	**550 Grams to Cover 64 Square Inches 1/16" Thick**

HI-ALLOY ES-500
Hot Process - Metal Spray Powder

DESCRIPTION: Hi-Alloy ES-500 Hot Spray Powder is a very soft nickel base alloy which may be used on steel, stainless steel, nickel alloys and cast iron. Because of its excellent machinability and ductility, this alloy is primarily used to repair cast iron. Its deposits possess high impact resistance, so it makes a good buildup or cushion for subsequent hardfacing, high tensile strength, making it suitable for joining, and its high nickel content makes an excellent corrosion resistant cladding and sealing material.

TYPICAL APPLICATIONS: Arms, bars, blades, blocks, bushings, cams, chutes, collars, dies, drums, forks, gears, keyways, molds, mandrels, and plungers.

PROCEDURES: See the Model 7800 Hot Spray Powder Torch.

Quantity		Part Number
5 lb. Bottle	2.3 Kg	ES500
1 lb. Bottle	0.5 Kg	ES500-1

MELTING TEMPERATURE:	**2000º F**
HARDNESS:	**Rockwell C 13 - 18**
COVERAGE ESTIMATE:	**575 Grams to Cover 130 Square Inches 1/32" Thick**

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY COLD SPRAY POWDER TORCH

DESCRIPTION: This torch is used to apply the Hi-Alloy "Cold Spray" metal alloy spray powders. It is a triangular shaped unit. The torch butt and tip make the base of the triangle. The handle grip makes the back of the triangle. At the top is the powder hopper/dispensing assembly. A gravity fed powder drop tube makes the front of the triangle.

OPERATIONAL CHARACTERISTICS: A trigger mechanism in the powder dispensing assembly releases the powder into the drop tube, the powder falls through the tube and drops directly into the flame, the flame melts the powder and the gas pressure propels it onto the work piece. The molten powder splatters onto the preheated work piece using the irregularities of the pre-machined/roughened surface to aid in the bonding process.

PROCEDURES: There are two distinctly different groups of powders which may be applied using this torch; "Two Step" group and the "One Step" group. The following 4 pages describe the application processes for both groups. Please read and follow the application process instructions carefully.

POWDERS: The pages following the application processes provide details on the variety of different "Cold Process" metal alloy spray powders we have available.

Torch w/ Carry Case	MBST
Torch	MBSTKIT
Cleaner	MBSTSPRAYCLEANER

MBSTKIT INCLUDES:

- **1 Carrying Case**
- **1 Aerosol Container**
- **1 ea. 200° and 600° Temp Stick**
- **1 Module of MB-1 Powder**
- **4 Module of MB-2 Powder**
- **2 Module of MB-3 Powder**
- **1 Module of MB-4 Powder**

HI-ALLOY COLD SPRAY APPLICATION

METAL ALLOY POWDER APPLICATION PROCESS

The Hi-Alloy "Cold Spray" metal alloy powder application process is a process by which a worn or undersized part may be renewed without danger of warpage, distortion, and/or metallurgical changes in the part to be built-up. This is called a "Cold" process because tiny metal alloy particles are sprayed onto a part preheated to 200º - 300º F., and the base metal temperature is held to under 650º F. during the application process.

There are two distinctly different powder groups, the Two Step group and the One Step group. The Two Step process is the original cold spray process. The powders in this group are designed specifically for the restoration of shafts turning in a machine lathe and require the application of a Bond Coat or Base Powder prior to application of the Top Coat or Finish Powder. The One Step process is based on newer technology. The powders in this group are self-bonding and, in most cases, do not require the application of a base powder. They work equally well to the Two Step powders for shaft restoration in the machine lathe, but may also be applied to flat, contoured, or round parts which cannot be turned in a machine lathe. Surfaces to be built-up can be undercut in the lathe, rough ground, grit blasted, filed, or sanded with coarse grit paper or cloth to prepare them for powder application.

TWO STEP PROCESS - APPLICATION PROCEDURES

STEP 1 - SURFACE PREPARATION:

A. The worn area of the part to be restored should be thoroughly cleaned.

B. The part should be situated in the machine lathe to turn as true as possible.

C. Using a 90º point on a cutting tool; undercut the worn area a minimum of at least .020" depth on the radius. The undercut should extend at least ½" beyond both ends of the worn area. Note: brass and bronze should be undercut a minimum of .030" on the radius.

D. CAUTION: DO NOT TOUCH THE UNDERCUT AREA AFTER MACHINING.

E. Bevel shoulders at both ends of the undercut area with a 45º angle.

CONTINUED...

For all trade name references, please refer to the last page for further information.
Images may vary.

F. Threading the undercut area is important. Using a 60º angle, thread the undercut area according to the following table:

Depth of Undercut (on radius)	Pitch	Depth of Thread	Threads per Inch
0.015”	0.015”	0.0075”	67
0.025”	0.025”	0.0125”	40
0.040”	0.040”	0.020”	25
0.050”	0.050”	0.025”	20
0.060” and above	0.060”	0.030”	16

G. Thoroughly clean and degrease the area to be built-up with a non residue cleaner and do not touch the area after cleaning, even the small amount of residue left by a fingerprint can cause a failure.

NOTE: Leave a small land, about 1/16”, between the end of the threads and the end of the beveled shoulders at the ends of the undercut.

STEP 2 - APPLICATION

A. Recommended Work Speeds

Diameter of Work piece	Recommended RPM
Up To ½”	130-280
2”	100-235
3”	70-165
4”	50-115
5”	40-95
6”	30-80
7”	26-66
8”	23-57

For larger shafts adjust the RPM to produce surface speed of 55-130’ per minute.

NOTE: Higher RPM’s usually produce more dense deposits.

B. Set lathe to the recommended work speed.

C. Set a pair of calipers to approximately .030” over the desired finish diameter.

D. Attach a container of MB-1 BONDCOAT powder to the torch hopper.

E. Set the Oxygen regulator to 6-7 lbs. of pressure and the acetylene regulator pressure to 5-6 lbs. Light the torch and adjust the flame to neutral or slightly carburizing. (Allow a slight feather on the inner cone of the flame).

NOTE: When using MB-4 Finishing or Top Coat powder or One Step Aluminum Bronze Powder, adjust flame to excess oxygen to eliminate excessive smoking.

F. PREHEATING

1. Apply cleaning solvent again to assure cleanliness of the part.

2. With work piece turning in the lathe, preheat the work area to 200º F. (Use a Tempil Stick to test)

NOTE: Shafts of 2” and larger take longer to fully absorb preheat. Allow such sizes to turn in the lathe for 2 minutes after preheating, and then test again for 200º F.

G. CAUTION: MAINTAIN A WORK DISTANCE OF 6” TO 7” FROM TORCH TIP TO WORKPIECE.

H. Starting about ¾” before the undercut area; apply a thin coat of MB-1 BONDCOAT to the work piece and continue approximately ¾” beyond the end of the undercut area.

NOTE: By moving slowly across the work area a thin layer of .005” to .007” of BONDCOAT will be achieved in one pass producing a strong autogenic bond.

I. Remove the container of MB-1 BONDCOAT from the torch hopper and attach a container of the powder selected for the Finishing or Top Coat.

J. CAUTION: MAINTAIN A WORK DISTANCE OF 6” TO 7” FROM TORCH TIP TO WORKPIECE.

K. Moving slowly, start spraying at one end of the BONDCOAT toward the other end, and continue applying pass-on-pass until the build-up is approximately .020” over the desired finished diameter.

CAUTION: DO NOT OVERHEAT.

The bond is adversely affected when temperature in the work piece exceeds 750º F. Use a 600º to 650º F. Tempil Stick to check the temperature of the work piece during the spraying operation. Should the work piece temperature reach 650º F., stop spraying for several minutes and allow the work piece to cool in the lathe to around 250º F. before continuing.

STEP 3 - FINISHING

Starting in the center of the build-up area, and using the same turning speeds, machine toward the outside using a sharp carbide tool to machine build-ups of MB-2, MB-4, and MB-6. MB-3 and MB-5 must be finished by grinding due to their high hardness and wear resistance.

For all trade name references, please refer to the last page for further information.
Images may vary.

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ONE STEP PROCESS - APPLICATION PROCEDURES

FOR MACHINE LATHE APPLICATION

Follow the Two Step Process Application Procedures through Step 1 - Surface Preparation, and Step 2 - Application through “G”. Beginning with “H” the procedures should read as follows for the “One Step Process.”

H. Starting about ¾” before the undercut area, apply two thin coats of powder to the work piece moving the torch back and forth rapidly and continuing approximately ¾” beyond the end of the undercut area.

I. Spraying slowly, continue applying pass-on-pass until a build-up of approximately .020” over the finish diameter is achieved. CAUTION: DO NOT OVERHEAT. The bond is adversely affected when temperature in the work piece exceeds 750º F. Use a 600º - 650º F. Tempil Stick to check the temperature of the work piece during the spraying operation. Should the work piece temperature reach 650º F., stop spraying for several minutes and allow the work piece to cool in the lathe to around 250º F. before continuing.

STEP 3 - FINISHING

The Hi-Ductile powder is easily machinable with conventional cutting tools. Start in the center of the buildup area and machine toward the outside using the same lathe speed used for powder application.

The Hi-Friction powder is difficult to machine, will dull tools rapidly, and will leave a rough surface because of the carbides in the deposit. Grinding would be the preferred finishing method.

The Hi-Abrasion powder is not machinable and must be ground to finished size.

The One Step Aluminum Bronze powder is easily machinable with conventional cutting tools and will work harden during the machining process.

FOR NON-LATHE APPLICATION

On flat, round, or contoured surfaces, the base metal surface must be roughened by sanding, filing, grinding, or grit blasting to a roughness at least equal to 80 grit sandpaper. The surface must then be thoroughly cleaned and degreased. Position the part so the torch may be held upright. Preheat work area to 200º - 250º F. Move the torch back and forth slowly spraying the entire area until the desired build-up is achieved. CAUTION: DO NOT OVERHEAT. (See Section I above).

HI-ALLOY COLD SPRAY

TWO STEP - METAL ALLOY SPRAY POWDERS

MB-1 BONDCOAT is the base powder used as the foundation for all of the MB Top Coat or Finishing powders. This composite metal powder alloy will adhere to properly prepared steels, cast irons, stainless steels, nickel alloys, aluminum, brass and bronze.

MB-2 is a machinable, nickel chrome, top coat or finishing alloy. This is the most versatile of the MB powders. It provides tough but machinable coatings, which have excellent resistance to frictional wear, and its corrosion resistance is superior to most stainless steels. These characteristics make it useful for building up corrosion resistant steels and high nickel alloys. This powder may be built-up to 1/8” thick, has a hardness of Rockwell B 80, and is easily machined with carbide tipped cutting tools.

MB-3 is a non-machinable, nickel chrome, top coat or finishing alloy. Corrosion resistance of this alloy is excellent and similar to MB-2. The deposits are dense and extremely hard resulting in outstanding resistance to wear from abrasion, friction, cavitations and erosion. This powder may be built-up to .100” thick, has a hardness of Rockwell C 38, and must be ground to finished size.

MB-4 is a machinable, aluminum bronze, top coat or finishing alloy. This alloy’s deposits are extremely dense, exhibit good corrosion resistance, excellent metal to metal wear resistance, and are widely used to repair worn bearing surfaces. This powder may be built-up to ¼” thick, has a hardness of Rockwell B 80, is easily machinable with carbide tipped cutting tools, and will work harden during machining.

MB-5 is a top coat or finishing alloy which is a non-machinable mixture of a nickel chrome alloy and a tungsten carbide powdered metal. These ultra hard carbide particles make this the hardest and most abrasion resistant of the MB top coat powders. This powder may be built-up to .100” and its coarse carbide particles, if left unfinished will provide a rough gripping surface. If finishing is required it should be done with silicon carbide grinding wheels.

MB-6 is a machinable, nickel chrome, top coat or finishing alloy. This alloy is similar to the MB-2 alloy but its deposits provide greater resistance to highly corrosive chemicals. It may be built-up to 1/8” thick, has a hardness of Rockwell B 90 and is easily machinable with carbide tipped cutting tools.

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY ALUMINUM BRONZE
One Step Metal Alloy Spray Powder

2.5 lb. Bottle 1.1 Kg — **1STEPALBR**

DESCRIPTION: Hi-Alloy One Step Aluminum Bronze spray powder is a self bonding, metal alloy, build-up spray powder designed to be applied at very low temperatures (200º - 250º F) eliminating distortion or metallurgical changes in the base metal. The deposited metal offers high integrity coatings providing low shrinkage, unlimited deposit thickness, good wear resistance, and high bond strength.

CONVENIENCE: This powders one-step application process eliminates the need to change powders, gas pressures, and eliminates laminations in the deposit which can result in coating failures.

VERSATILITY: One Step Aluminum Bronze powder can be applied to rough ground, grit blasted, or machined, carbon steel, stainless steel, cast iron, free cutting brass and bronze.

METALLURGICAL BONDING: One Step Aluminum Bronze powder is designed to react exothermically in the flame producing high strength integrated metallurgical bonds with the parent metal.

MACHINABILITY: The deposit macro-hardness is Rockwell B 50. Excellent finishes may be attained using standard carbide cutting tools. Good dry machining results were obtained on both large and small diameter shafts under the following conditions:

Tool:	Standard Tungsten Carbide cutting tool .75mm (.030") radius positioned perpendicular to the center line of the shaft.
Work Speed:	3.1 - 4.1m/sec. (600 - 800 surface feet per minute)
Traverse Speed:	.04mm/rev. (.0017"/rev.)
Infeed:	.25mm (.010") roughing, .13mm (.005") finish cut

HI-ALLOY HI-ABRASION
One Step Metal Alloy Spray Powder

2.5 lb. Bottle 1.1 Kg — **1STEPHIABR**

DESCRIPTION: Hi-Alloy Hi-Abrasion spray powder is a self-bonding, metal alloy, build-up spray powder designed to be applied at very low temperatures (200º - 300º F) eliminating distortion or metallurgical changes in the base metal. The deposited metal is capable of withstanding service temperatures of up to 1600º F, and provides excellent resistance to high stress grinding and abrasion.

CONVENIENCE: Hi-Abrasion's one-step application process eliminates the need to change powders, gas pressures, and eliminates laminations in the deposit which can result in coating failures.

VERSATILITY: Hi-Abrasion powder can be applied to rough ground, grit blasted, or machined, carbon steel, stainless steel, cast iron, and aluminum parts.

METALLURGICAL BONDING: Hi-Abrasion powder is designed to react exothermically in the flame producing deposits which exhibit superior resistance to high stress grinding, abrasion, and particle cavitations from moving liquids and air.

MACHINABILITY: The deposit hardness is Rockwell C 35 - 40 for the matrix, Rockwell C 70 - 75 for the laminar carbides, and Rockwell C 70 - 75 for the acicular carbides. Deposits are non-machinable and must be ground to final size or shape.

APPLICATIONS: Exhaust fans, feed screws, mixing augers and blades, gripper rolls, coal and grain chutes, pump sleeves, fly ash separators, wire drawing capstans, drive rolls, roller guides, pump housings, foundry patterns, and agricultural equipment such as discs, harrow and cultivator points.

For all trade name references, please refer to the last page for further information.
Images may vary.

Product Information & Specs	Quantity	Part Number

HI-ALLOY HI-DUCTILE
One Step Metal Alloy Spray Powder

DESCRIPTION: Hi-Alloy Hi-Ductile metal alloy spray powder is a self-bonding, metal alloy, build-up spray powder designed to be applied at very low temperatures (200º F) eliminating distortion or metallurgical changes in the base metal. This is the easiest to use, and most versatile of the one step powders. High internal strength, combined with low shrink rates, eliminates the need for very close temperature control, and spray distances can very within reasonable limits.

CONVENIENCE: Hi-Ductile one-step application process eliminates the need to change powders, gas pressures, and eliminates laminations in the deposit which can result in coating failures.

VERSATILITY: Hi-Ductile can be applied to flat, round, or contoured parts of steel, stainless steel, cast iron, and many bronze alloys.

METALLURGICAL BONDING: Hi-Ductile powder is designed to react exothermically in the flame producing high strength integrated metallurgical bonds with the parent metal.

MACHINABILITY: The deposit hardness is Rockwell C 22 - 24 for laminar carbides and is easily machined and finished with conventional machine tools.

APPLICATIONS: Machining errors, adding metal for part modifications and restoring original dimensions to worn parts.

Quantity	Part Number
2.5 lb. Bottle 1.1 Kg	**1STEPHIDUCT**

HI-ALLOY HI-FRICTION
One Step Metal Alloy Spray Powder

DESCRIPTION: Hi-Alloy Hi-Friction spray powder is a self-bonding, metal alloy, build-up spray powder designed to be applied at very low temperatures (200º F) eliminating distortion or metallurgical changes in the base metal. The deposited metal is capable of withstanding service temperatures of up to 1600º F, and provides good resistance to low stress frictional wear and abrasion.

CONVENIENCE: Hi-Friction's one-step application process eliminates the need to change powders, gas pressures, and eliminates laminations in the deposit which can result in coating failures.

VERSATILITY: Hi-Friction powder can be applied to rough ground, grit blasted or machined, carbon steel, stainless steel, cast iron, and aluminum parts.

METALLURGICAL BONDING: Hi-Friction powder is designed to react exothermically in the flame producing deposits which exhibit good resistance to low stress sliding and abrasion, and superior resistance to galling, seizing and scoring.

MACHINABILITY: The deposit hardness is Rockwell C 30 - 35 for the matrix and Rockwell C 70 - 75 for the laminar carbides. Deposits can be machined using a single point tungsten carbide tool or ground to final size or shape.

APPLICATIONS: Cylinders, rolls, pistons, pump plungers, crank shaft bearings, bearing seats, fan shafts, motor shafts, pump shafts and sleeves, pump seals, mechanical seals, spindles, propeller shafts, conveyor rolls, shafts and journals.

Quantity	Part Number
2.5 lb. Bottle 1.1 Kg	**1STEPHIFRIC**

For all trade name references, please refer to the last page for further information.
Images may vary.

HI-ALLOY MAINTENANCE ALLOY COMPARISON INDEX

The following product comparison information is provided as a service to our customers. Our research indicates that these competitors' products may be similar to and be used for applications similar to our products. We do not claim, infer, or imply that they are identical.

Hi-Alloy	MG	Rockmount	Welco	UTP	Allstate	Certanium	Cronatron	Eutectic
TSH	-	Midas H12	4HW	-	HW	219	345	6 HW
TSM	700	Midas M2	4HSS	69/690	HSS	211	344	6 HSS
TSA-TIG	710	-	3AH	-	AH	15	346	6 SH
TSH-TIG	-	Midas H12-T	3HW	A67S	HW	19	345-T	6 HW-T
TSM-TIG	700-T	Midas M2-T	-	-	HSS	11	-	6 HSS
Sil-Tin	120	Gemini S	5	570	430	34	92	157
1000	-	-	101CD	-	-	-	-	1828
1200/1200FC	-	-	201CD	3	101FC	57FC	43FC	1030
1300/1300FC	106	Gemini G	203	306	155FC	54FC	40FC	1020
1400	-	-	-	-	-	56	-	1801
53 Plymetal	-	-	-	-	Bi-Metal	-	-	Shims 3
Hardbase 30	740	-	9B	620	Roll Matrix	-	-	2B
Hardface 50	755	-	-	-	-	-	-	-
Super Surf. 60	765	Omega N	180	711-B	HS-2C	297	711	6006
Super Hard	790	Olympia-B	-	-	HS-65W	-	-	N6715
AM354	750	Apollo W	240	7200	S-Join M	706	777/7770	4/40
HF506	745	-	-	-	Ni Matrix	-	-	-
HF507	-	-	-	-	HS-1	298	-	-
THS-1	-	-	-	-	-	235	7230	N-112
HX905	7070	Zeta-B	-	-	6000	247	7350	-
15FC	130	Olympia G	17FC	-	11FC	70F	-	185XFC
17FC	-	Brutus G	14FC	6M	13FC	87F	30F	16XFC
23FC	350	Jupiter G	40FC	1M	41FC	83F	23F	18XFC
100	300	-	55	34N	20	425	625	1851
122	320DC	Venus A	-	32	24DC	423	-	28
133	390	-	-	39	26	427	667	-
144	310AC	Venus B	23	-	24AC/DC	429	666	2800
Stud Ex.	-	-	-	-	Stud Plus	-	-	-

Hi-Alloy	MG	Rockmount	Welco	UTP	Allstate	Amtec	Cronatron	Eutectic
ES 40	-	Polaris P	1000	HA 06	RC 30	P444	840	10185
ES 58	-	Olympia P	1300	HA 8	-	P666	880	10112
ES 59	-	Apollo P	1500	HA 7	RC 60	P139	860	10009
ES 400	-	-	-	HA 2	RC 20	P333	-	10224
ES 500	-	Jupiter P	1100	HA 6320	-	P350	820	10680

Hi-Alloy	MG	Rockmount	Welco	UTP	Allstate	Certanium	Cronatron	Eutectic
MB-1	-	Cryo. Bond	CS 100	1001	Top Bond	-	805/806	50000
MB-2	-	Cryotherm S	CS 200	2001	Top Chrome 1	-	865	19985
MB-3	-	Cryotherm G	CS 300	2002	-	-	885	19910
MB-4	-	CryothermAB	CS 400	2003	Top Bronze 1	-	835	19850
MB-5	-	-	CS 500	2005	-	-	-	-
MB-6	-	Cryotherm M	CS 600	2007	Top Chrome 2	-	845	19300

Hi-Alloy	MG	Rockmount	Welco	UTP	Allstate	Certanium	Cronatron	Eutectic
Hi-Abrasion	-	-	-	-	-	-	-	19171
Alum-Bronze	-	-	-	-	-	-	8835	-
Hi-Ductile	-	Cryo. M1	-	-	-	-	8865	19121
Hi-Friction	-	Cryo. G1	-	-	-	-	-	-
105	788	Olympia GT	-	Composite	Ruf-Kut	-	-	Drill Tec 88
101	-	-	-	7560	-	-	7722	-

Hi-Alloy	Hi-Alloy Elec.	Stoody	Lincoln	UTP	Allstate	Postle	Mckay	Eutectic
HFW-30	Hardbase 30	Super Buildup	33	OA-1020	3038	2892	BU-G	-
HFW-50	-	121	50	OA-2010	-	2820	240-O	4625
HFW-57	-	102	-	OA-2020	-	2899	258-O	-
HFW59	-	965	55	OA-1015	5659	2898	260-G	-
HFW63	Super Surf. 60	101HC	60-0	OA-2030	-	2832	255-G	DO-10
HFW64	-	-	65-0	OA-2040	6065	2829	-	-
HFW-66	Super Hard	Super 20/145	-	OA-2040	-	2836	A45-O	DO-33/3952
HFW354	AM 354	SANicromang	M	OA-1010	-	2850	218-O	OA-3220

GLOSSARY OF WELDING TERMS

DC: Direct Current. Produced by most motor driven arc welding machines and the newer "rectifier" sets.

AC: Alternating Current. Produced by all transformer type welding machines.

STRAIGHT POLARITY: The machine will operate on straight polarity when the electrode holder cable is connected to the terminal marked NEGATIVE, ELECTRODE, or MINUS SIGN. The ground clamp is connected to the terminal marked POSITIVE, GROUND, WORK, or PLUS SIGN. If the machine is equipped with a polarity change switch, the switch should be in the position marked NORMAL, NEGATIVE, or STRAIGHT.

REVERSE POLARITY: The machine operates on reverse polarity when the electrode holder cable is connected to the terminal marked POSITIVE, GROUND, WORK, or PLUS SIGN. The cable to the ground clamp should be connected to the connection marked NEGATIVE, ELECTRODE, or MINUS SIGN. If the machine possesses a polarity changing switch, the switch should be in the position marked POSITIVE or REVERSE.

WEAVING: When wider beads are required the electrode is moved from side to side in a weaving motion. The greatest efficiency results from a weave of not more than 2½ times the diameter of the electrode.

DIRECTION OF TRAVEL: The direction of travel is the direction in which the deposits are going. The angle at which the electrode is held, in relation to the direction of travel, is the angle between the electrode and the surface of the part not yet welded. Procedure sheets give the recommended angle, and this should be followed as closely as possible.

SKIP WELDING: Skip welding is, as its name implies, welding intermittently. Each pass is applied as far from the last pass as possible. The unconnected beads are finally joined with another series of passes. This method is used on heat sensitive material to prevent a local build-up of heat. It is possible to keep a casting to a com-hand-heat throughout the welding operation if this technique is used.

STRAIGHT BEADS: When the width of the weld deposit is approximately the same as the diameter of the electrode the beads are known as straight beads. This applies also to oxyacetylene torch welding. Beads deposited without weaving are called STRAIGHT or STRINGER beads.

PEENING: The mechanical working of metal by light hammering with a round nose hammer. Peening has the effect of stretching the surface of the metal and this relieves contractual stresses.

SLAG REMOVAL: This is a term given to loosening and removing the slag adhering to the weld deposits. The deposit is struck with a chisel-shaped or pointed hammer and then brushed with a wire brush. This removes the slag and exposes the weld deposit. The slag forms a protective covering to prevent oxidation of deposits and should never be chipped or brushed until all signs of color have disappeared.

FLUX: Flux is applied to metal to prevent oxidation during the joining operations; to reduce surface tension; to promote the flow of the alloy and to facilitate the bonding action between the base metal and the deposited metal. The flux may be in the form of a paste, powder or liquid. Flux should not be used to clean dirty, oxidized, or oily metal. If used for this purpose, its bonding characteristics will be weakened and joint failure result. All foreign matter should be removed by mechanical means (chipping, grinding or wire brushing), or by chemical means (tetrachloride, trisodium phosphate, trichlorethylene, etc.). Heavily greased parts may be subjected to steam jets, followed by mechanical or chemical cleaning.

GROUND CONNECTION: An essential requirement for maximum welding efficiency, is a good ground connection between the welding machine and the work. This is often overlooked and pieces of scrap steel or iron are used as a connection to the work table. Such haphazard connections are a constant source of voltage drop and loss of current. This makes the arc perform erratically. The first beads may be perfect and yet beads at the end of the same pass may show signs of overheated and burned metal. The ground cable of insulated copper wire should be as thick as or thicker than the cable to the electrode. If two pieces of cable have to be joined to obtain the necessary length, this should be done by a competent electrician and be well insulated. High resistance and sparking will occur when a mild steel plate is bolted to the cable and laid loosely upon the work table.

BEVELED BUTT JOINTS: When a butt joint is to be made with sections too heavy to permit a square butt joint, the sections are beveled, or chamfered, to an angle of approximately 90°.

The choice of a single or double bevel will depend upon the thickness of the metal and whether the sections can be welded from both sides. A double bevel uses approximately one-half the amount of weld metal required for a single bevel.

The essential factor, in the preparation for welding, is that no part of the joint is left unwelded. This applies equally to single or double bevels.

The sections should be separated by a distance of 1/16" to 3/32" to allow the weld metal to flow through the joint without burning the base metal. Sections should never be beveled or chamfered to a knife-edge because the sharp edge will inevitably be burned. An important precautionary measure is to clean the metal adjoining the weld area for a distance of at least 2". This prevents oxides or foreign matter contaminating the weld.

FERROUS ALLOYS: Metallic alloys which are predominantly iron such as cast iron, wrought iron, steel and stainless steel.

NON-FERROUS ALLOYS: Alloys with little or no iron, such as copper, brass, bronze, nickel, Monel, magnesium or aluminum.

PHYSICAL PROPERTIES: The qualities of a material which are inherent characteristics of the material such as thermal conductivity, electrical conductivity, coefficient of expansion, density and color.

MECHANICAL PROPERTIES: The properties of a material which makes it withstand external forces or effects, such as yield strength, tensile strength, ductility, impact resistance and hardness.

ELASTICITY: The ability of a material to change dimensions without breaking when an external force is applied and then to return to the original dimensions when the force is removed.

STRESS AND STRAIN: Stress is the measurement of external forces applied to a material. Strain is the deformation of the material by the external force.

YIELD STRENGTH: In tensile testing, the yield strength is measured by the applied load, which permanently deforms the specimen. Many steels will, when tested, continue to elongate under a critical load without the addition of further load. This critical load is called Yield Point. The yield point can be observed during tensile testing by the drop of the beam or the drop of the indicator of the testing machine.

HOMOGENEOUS MATERIALS: Those materials which, to the naked eye, or at low magnification, are uniform and composed of only one distinct material.

HETEROGENEOUS MATERIALS: Those materials which, to the naked eye, or at low magnification, are composed of two or more distinct materials.

CRITICAL TEMPERATURE RANGE: A temperature range usually between 1450° – 1650°F in which carbon steels, low alloy steels and martensitic stainless steels transform to austenite on heating and reverse on cooling. Each composition of steel has its own critical temperature range.

ANNEAL: To soften by heating and cooling. To anneal carbon steels, low alloy steels and martensitic stainless steels, the steels are heated to a temperature greater than the critical temperature range and cooled slowly, usually by a controlled cooling rate in the furnace. To anneal austenitic stainless and manganese steel, the steel is heated to at least 1850°F and cooled rapidly, usually by quenching in water.

HARDENING: Carbon steel, low alloy steel and martensitic stainless steels are hardened by heating to a temperature above the critical temperature range and cooling at a controlled rate. The rate of cooling depends on the composition of the steel. The cooling may be accomplished by quenching in water (normally the fastest cooling rate), by quenching in oil or cooling in air.

TEMPERATURE OR DRAWING: A heat treating operation or reheating hardened steel to a temperature less than the critical temperature. Tempering usually increases the toughness and lowers the hardness of the steel.

STRESS RELIEVING: The heating of a weldment to a temperature usually higher than 1050°F, but lower than the critical temperature range and holding at heat (called soaking) to allow stresses, residual from heating and cooling during welding, to be relieved.

For all trade name references, please refer to the last page for further information.
Images may vary.

EFFECTS OF ALLOYING ELEMENTS ON CORROSION RESISTING & HEAT RESISTING ALLOY WELD METAL

MADE IN USA

Al ALUMINUM
Aluminum is not usually used in weld metal because the efficiency of transfer from electrode to weld metal is very low

C CARBON
A strong austenite former.

Cb COLUMBIUM
Forms very stable carbides. Added to weld metal to stabilize the carbon and prevent harmful carbide precipitation. Used in some applications because it increases the strength of the weld metal at elevated temperatures. Tends to form ferrite.

Co COBALT
Used to increase the strength of the weld metal at high temperatures, particularly in the super alloys. It is very similar to nickel, an austenite former.

Cr CHROMIUM
Imparts corrosion and scaling resistance to stainless weld metal. In amounts up to 16% in straight chromium weld metals it makes the material air hardenable. It forms carbides and causes formation of ferrite. Little or no increase in strength at elevated temperatures is obtained from chromium alone.

Cu COPPER
Not often used, it imparts age hardening properties to chromium-nickel weld metals. Copper will improve the resistance to corrosion by sulfur acids, such as sulphuric acid.

Mn MANGANESE
Used largely as a weld metal deoxidizer; Manganese behaves about half as strong as nickel, as an austenite former.

N NITROGEN
Recovery of nitrogen in weld metal is erratic and cannot be depended upon for the properties it imparts to certain base steels.

Ni NICKEL
Nickel is the primary austenite former; it helps to improve the corrosion resistance against non-oxidizing media. Used in high temperature weld metals for strength and assistance in providing scaling resistance.

P PHOSPHORUS
This residual element (never deliberately added) is very potent in increasing weld metal cracking in austenitic welds.

S SULFUR
Another residual element in weld metal. High sulfur contents promote weld metal porosity.

Se SELENIUM
This element along with sulfur may be added to the base steel to improve machinability. The addition of either alloy increases the difficulty of obtaining porosity free welds.

Si Silicon
Primarily used as a weld metal deoxidizer. Tends to increase weld metal cracking in austenitic welds. It is a ferrite former.

Ti TITANIUM
Cannot be satisfactorily used in manual arc welding because it is burned out during transfer from electrode to weld.

CARE OF ELECTRODES

The coated arc welding electrodes used by your company are very important item of your production. To better serve your needs we are listing below a few precautions to be observed in the proper handling and storage of coated arc welding electrodes.

PLEASE

DO store in a DRY place

DO place on pallets or wooden boards when storing on concrete

DO have free air circulation around stock piles

DO store in a well ventilated area

DO rotate stock, use old stock first

AND,

DON'T store where rain, snow or dew will fall on the containers

DON'T store on dirty floor

DON'T store on concrete that is laid on ground, moisture will come through the concrete and be absorbed by the product

DON'T store in a damp room or near a damp wall

DON'T store on or against metal walls or floors that are subjected to rapid temperature changes, rapid temperature changes cause moisture to condense on the metal and will be absorbed by the container

DON'T store damp or wet containers with dry ones

DON'T open electrode packages (or containers) until ready for use

DON'T Don't open more electrodes than are needed for the job or that will be used per day or shift

DON'T Don't let opened or unused electrodes lay around unprotected

DON'T Don't store different grades of opened, unused electrodes together in one box or cabinet (different grades of electrodes are manufactured to have different water contents in their coatings)

For all trade name references, please refer to the last page for further information.
Images may vary.

POOR FUSION

Causes:

1. Current setting too low.
2. Wrong type electrode.
3. Incorrect electrode manipulation.
4. Too long an arc.
5. Improper preparation of work for welding.

Solutions:

1. Correct current setting.
2. Use proper electrode.
3. Adjust electrode weaving and speed of travel to insure melting of both sides of joint.
4. Hold correct arc gap.
5. Make sure that joint is clean and, if necessary, properly veed or grooved.

UNDERCUTTING

Causes:

1. Welding current setting too high.
2. Excessive speed of travel.
3. Excessive arc length.
4. Incorrect electrode-to-work angle.
5. Wrong size electrode.

Solutions:

1. Reduce current setting.
2. Reduce speed of travel.
3. Use proper arc length.
4. Adjust electrode angle so that arc force will “hold” molten metal until undercut fills.
5. Use correct size electrode.

POROSITY

Causes:

1. Incorrect current setting.
2. Excessive speed of travel.
3. Impurities in or on base metal.

Solutions:

1. 1. & 2. Correct current setting and speed of travel to prevent gas entrapment.
3. Properly clean and prepare joint for welding – keep penetration at a minimum.

ROUGH APPEARANCE

Causes:

1. Current setting too high or too low.
2. Incorrect manipulation of electrode.
3. Overheated work.
4. Incorrect speed of travel.
5. Wrong type of electrode.

Solutions:

1. Correct current setting.
2. Adjust electrode-to-work angle, use weaving technique where needed.
3. Allow work to cool between passes.
4. Adjust speed of travel so that the proper bead contour is formed.
5. Use proper type electrode and polarity.

EXCESSIVE SPATTER

Causes:

1. Current setting too high.
2. Holding too long an arc.
3. Arc blow.
4. Incorrect polarity for electrode being used.

Solutions:

1. Correct current setting.
2. Use proper arc length.
3. Minimize arc blow (See “Arc Blow”).
4. Use proper type electrode and polarity.

ARC BLOW

Causes:

1. Magnetic field set up by DC welding current deflects the arc from its proper path.

Solutions:

1. Use AC machine.
2. Use very short arc and point electrode in direction of blow.
3. Relocate ground connection or use two ground cables.
4. Use non-magnetic back up strip or plate as ground.

SLAG INCLUSIONS

Causes:

1. Current setting too low.
2. Too short an arc.
3. Incorrect manipulation of electrode.

Solutions:

1. Adjust welding current upward.
2. Use proper arc length.
3. Use correct electrode-to-work angle so that arc force prevents molten metal from overtaking slag.

ARC HARD TO START

Causes:

1. Current setting too low.
2. Flux covered electrode tip.
3. Work not properly cleaned.
4. Work not properly grounded.

Solutions:

1. Correct current setting.
2. Clean electrode tip.
3. Remove paint, heavy oxide, etc.
4. Clamp ground cable securely to bare metal.

WARPING OR DISTORTION

Causes:

1. Incorrect placement of pieces to be joined.
2. Poor structural design.
3. Improper jigging.
4. Overheating.
5. Incorrect welding procedure.

Solutions:

1. Adjust pieces, so they “warp into position”.
2. Redesign to allow for warp.
3. Use proper clamping, chill plates, etc.
4. Use short beads, allow cooling between welds.
5. Use proper bead placements and weld sequence. Keep weld deposits at a minimum.

CRACKED WELDS

Causes:

1. Incorrect size and/or shape of bead.
2. Faulty design and/or pre-weld preparation of joint.
3. Rigidity of structure.
4. Wrong type of electrode.
5. Too rapid chilling of weld deposit.

Solutions:

1. Adjust size of puddle and speed of travel in keeping with the weight of welded section.
2. Prepare joint to insure proper penetration and fusion.
3. Pre heat and post heat – use skip-back or other welding technique to prevent buildup of stresses.
4. “Match” electrode to metal and/or job.
5. Preheat and post-heat – use non-ferrous electrode. On alloy steel, use austenitic rather than air hardening deposit.

For all trade name references, please refer to the last page for further information.
Images may vary.

LENS SHADE SELECTION CHART

Operation	Shade Selection
Soldering	2
Torch Brazing	3 or 4
Oxygen Cutting	
up to 1”	3 or 4
1” to 6”	4 or 5
6” and over	5 or 6
Gas Welding	
up to 1/8”	4 or 5
1/8” to 1/2”	5 or 6
1/2” and over	5 or 6
Shielded Metal-Arc Welding	
1/16 thru 5/32” electrodes	10
Gas Tungsten-Arc Welding (Non-Ferrous)	11
Gas Metal-Arc Welding (Non-Ferrous	
1/16 thru 5/32” electrodes	12
Shielded Metal-Arc Welding	
3/16 thru 1/4” electrodes	12
5/16 thru 3/8” electrodes	14

INCH/MILLIMETER CONVERSION CHART

INCH & MILLIMETER DECIMAL EQUIVALENTS OF FRACTIONS OF AN INCH

Fraction/Inch	Inch	Millimeter	Fraction/Inch	Inch	Millimeter
1/64	0.015625	00.396875	33/64	0.515625	13.096875
1/32	0.031250	00.793750	17/32	0.531250	13.493750
3/64	0.046875	01.190625	35/64	0.546875	13.890625
1/16	0.062500	01.587500	9/16	0.562500	14.287500
5/64	0.078125	01.984375	37/64	0.578125	14.684375
3/32	0.093750	02.381250	19/32	0.593750	15.081250
7/64	0.109375	02.778125	39/64	0.609375	15.478125
1/8	0.125000	03.175000	5/8	0.625000	15.875000
9/64	0.140625	03.571875	41/64	0.640625	16.271875
5/32	0.156250	03.968750	21/32	0.656250	16.668750
11/64	0.171875	04.365625	43/64	0.671875	17.065625
3/16	0.187500	04.762500	11/16	0.687500	17.462500
13/64	0.203125	05.159375	45/64	0.703125	17.859375
7/32	0.218750	05.556250	23/32	0.718750	18.256250
15/64	0.234375	05.953125	47/64	0.734375	18.653125
1/4	0.250000	06.350000	3/4	0.750000	19.050000
17/64	0.265625	06.746875	49/64	0.765625	19.446875
9/32	0.281250	07.143750	25/32	0.781250	19.843750
19/64	0.296875	07.540625	51/64	0.796875	20.240625
5/16	0.312500	07.937500	13/16	0.812500	20.637500
21/64	0.328125	08.334375	53/64	0.828125	21.034375
11/32	0.343750	08.731250	27/32	0.843750	21.431250
23/64	0.359375	09.128125	55/64	0.859375	21.828125
3/8	0.375000	09.525000	7/8	0.875000	22.225000
25/64	0.390625	09.921875	57/64	0.890625	22.621875
13/32	0.406250	10.318750	29/32	0.906250	23.018750
27/64	0.421875	10.715625	59/64	0.921875	23.415625
7/16	0.437500	11.112500	15/16	0.937500	23.812500
29/64	0.453125	11.509375	61/64	0.953125	24.209375
15/32	0.468750	11.906250	31/32	0.968750	24.606250
31/64	0.484375	12.303125	63/64	0.984375	25.00312
32/64	0.5	12.7	1	1	25.4