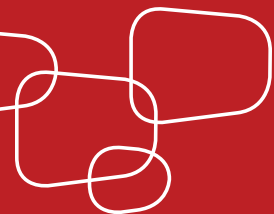


The Original
PLASTIC WELDERS
Made in the U.S.A.

Operating and Maintenance Instructions for
KAMWELD PLASTICS
Welding Equipment



Kamweld The Best in Plastic Welding



OPERATING & MAINTENANCE INSTRUCTIONS for KAMWELD PLASTICS WELDING EQUIPMENT

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TYPES OF KAMWELD PLASTIC WELDERS:

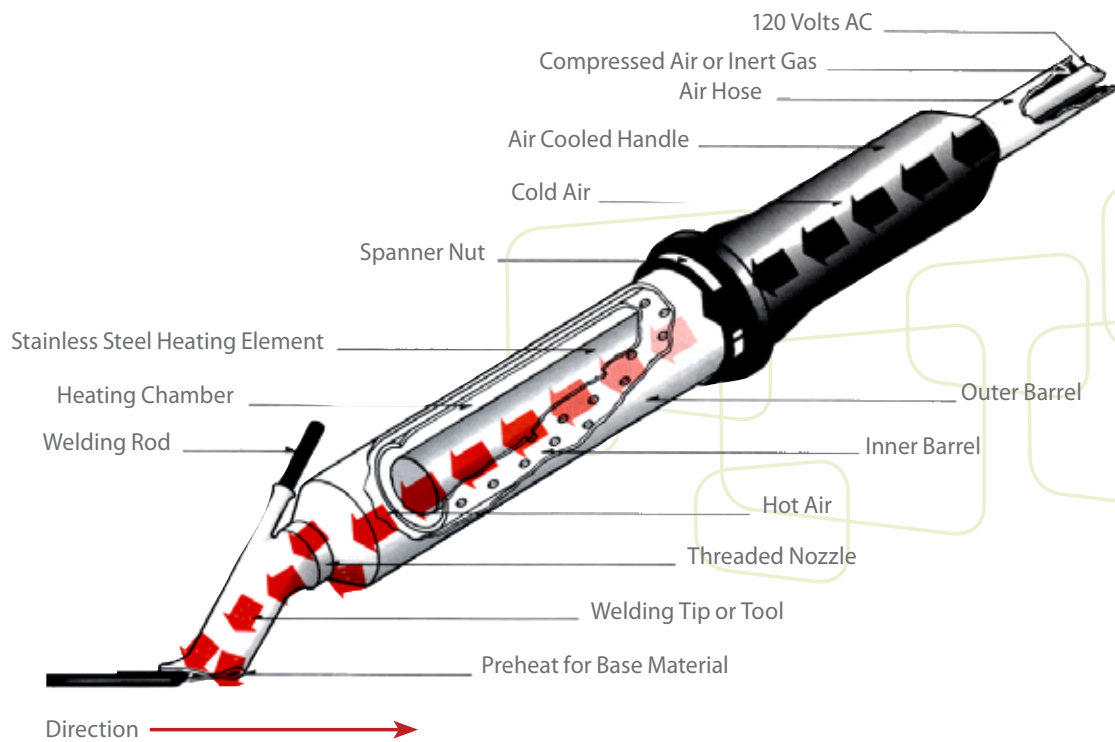
There are two basic types of Kamweld plastic welders. The first operates on standard compressed air supply, available in most shops, or on bottled inert gas. Models 41-HT, 42-TM, 43-HS and 44-A-W use compressed air. The second type of welder is self-contained with a built-in air compressor. Models 46-RW and 47-RW are self-contained units. Inert gas CANNOT BE USED. These portable units are for use in the field or in the shops, both indoors and outdoors.

WELDING TEMPERATURE:

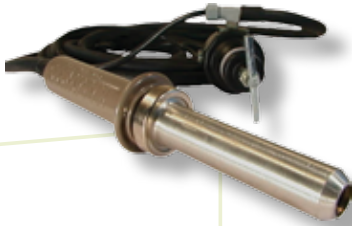
Most thermoplastics are weldable between 572°F and 752°F (300 °C and 400 °C) when hand welding, using the models such as KR and KRL or hi-speed welding, using tips such as

the KS-1-8 or KS-2C. The temperature is closely controlled by selecting the proper heating element and by changing the amount of air or inert gas by flow.

Most thermoplastic materials such as PVC (Polyvinyl Chloride), PE (Polyethylene), PP (Polypropylene), PS (Polystyrene), Acrylics, some blends of ABS (Acrylic-Butadiene, Styrene), PC (Polycarbonates) and others can be welded. In welding PE (Polyethylene) an inert gas (such as dry Nitrogen or Argon) MUST be used. In most cases, it is not practical to weld materials any thinner than 1/8" thick, because of heat distortion. In some cases, materials as thin as 1/18" can be welded if supported underneath the joint while welding. Doing so will prevent heat distortion.



MODEL 41-HT: The Job Welder



This model is used for tack or hand welding with round tips at speeds of approximately 12" (305 mm) per minute. It is ideally suited for back welding of pipe, short radii or hard-to-reach areas. It operates on shop air or insert gas.

A heavy-duty welder for medium and high-speed welding of thermoplastics with speeds up to 60" (1,524 mm) per minute, depending on the diameter of the rod. The standard stainless-steel heating element is rated at 600 watts. It operates on shop air or insert gas.

MODEL 44-AW: The All-purpose Welder



Model 44-AW has a double segment heating element. The rotary switch activates the 300 watt segment only at LOW setting, the 400 watt segment at the MEDIUM setting, and both segments at the HIGH setting (700 watts). When changing from one setting to another, the air or gas pressure must be adjusted slightly according to the chart BEFORE the switch is turned. It operates on shop air or inert gas.

MODEL 42-TM: Trainer & Maintenance Welder Kit



This plastics welding kit is a low cost, efficient and portable unit that contains a 41-HT welder, tips, welder stand and rugged carrying case. It's ideal for training as well as for fabricating, maintenance and back welding of pipe. It operates on shop air or inert gas.

MODELS 46-RW & 47-RW: The Self-Contained Welder



Both the 46-RW and the 47-RW models have a built-in air compressor. An inert gas supply CANNOT be connected. Both models have a selector valve which offers low to high heat. Operating instructions are mounted inside the case.

MODEL 43-HS: The High-Speed Production Welder



HOW TO SET UP A WELDER:

1. Close valve on air-pressure regulator by pulling upward on the plastic knob until a clicking sound is heard, and then proceeding to turn the knob counter clockwise. This will prevent possible damage to the gauge from a sudden surge of excessive air pressure.
2. Connect the regulator to a supply of either compressed air (which should be free of oil or moisture) or inert gas. The Kamweld air-pressure regulator is rated for 200 lbs. (90.72 kg) of line pressure. If inert gas is used, a pressure reducing is needed (obtainable from a gas supplier).
3. Turn the air supply on. The starting air pressure for each model is indicated in the chart on the next page. Please note that the heated air temperature depends on the wattage of the heating element AND the air pressure. The operating air pressure requires slightly less air. The chart shows the approximate temperatures obtainable with 120 volt AC supply:

Caution: if the round spanner nut (which holds the barrel to the handle) becomes too warm to the touch, the gun is overheating. If this occurs, increase the air pressure immediately, according to the instructions in the right column. By increasing the air pressure, the air temperature decreases.

4. Connect the welder to a common 120 volt AC outlet. A three-prong grounded plug is supplied with each unit and MUST be used.
5. Allow the welder to warm up at the recommended STARTING pressure according to the temperature chart on

the following page. It is essential that either air or inert gas flows through the welder at all times, (from warming up to cooling off), to prevent burn-out of the heating element and/or further damage to the gun. **AT NO TIME SHOULD THE ELECTRICITY BE CONNECTED WITHOUT AIR FLOWING THROUGH THE GUN.**

6. Select the proper welding tip and install it into the threaded outer barrel with pliers to avoid touching the tip and barrel while they are hot. After the tip has been installed, the temperature will increase slightly due to back pressure. Allow two to three minutes for the tip or outer barrel to reach the required operating temperature.
7. If you find the temperature is too high to weld the material you are working with, increase the air pressure slightly until the temperature decreases. If the temperature is too low for your application, decrease the air pressure slightly until the temperature rises. When increasing or decreasing the air pressure, allow at least two or three minutes for the temperature to stabilize at the new setting. Damage to the welder or heating element will not occur from too much air pressure; however, the element can become overheated by too little air pressure. When decreasing the air pressure from the recommended starting pressure, never allow the spanner nut to become too hot to the touch. This is an indication of overheating. Maximum operating temperature with the minimum air pressure is obtained when the spanner nut is only slightly warm to the touch. A partial clogging of the dirt screen in the regulator or a fluctuation in the line voltage can also cause over or under heating.

KAMWELD WelderModel

	Cartridge Type Element Watts	Starting Air Pressure (Approx.)	Warm-Up Time (Approx.)	Operating Pressure (Minimum)	Maximum Air Temp. Without Tip Installed (Approx.)
41-HT	350 w	2.5 lbs.	6 min.	2 lbs.	600 °F (316 °C)
	450 w	3.5 lbs.	6 min.	2.5 lbs.	675 °F (357 °C)
43-HS	600 w	3 lbs.	6 min.	2.5 lbs.	725 °F (385 °C)
	750 w	3.55 lbs.	6 min.	3 lbs.	850 °F (454 °C)
	900 w	4 lbs.	7 min.	3 lbs.	900 °F (482 °C)
44-AW	LOW 300 w	3 lbs.	6 min.	2.5 lbs.	575 °F (301 °C)
	MED 400 w	4 lbs.	6 min.	2.5 lbs.	650 °F (343 °C)
	HIGH 700 w	4.5 lbs.	6 min.	3 lbs.	825 °F (441 °C)
46-RW	350 w	Pre-Set	5 min.	High Setting	650 °F (343 °C)
47-RW	600 w	Pre-Set	5 min.	High Setting	800 °F (426 °C)

8. If the threads at the end of the barrel become tight, clean them with a 9/16"-18 tap. Occasional application of high temperature grease on the threads (both at the outlet end of the barrel and on the spanner nut) will prevent seizing and keep threads free.

HOW TO DISCONNECT THE WELDER:

When welding is completed, disconnect the electricity and allow the air to flow through the welder for about four to five minutes or until the barrel becomes cool enough to touch.

HOW TO CHANGE HEATING ELEMENTS:

Push the end of the barrel against a solid object (such as the side of a bench). Hold the handle tightly and push inward. The pressure on the barrel compresses the element spring. Use the spanner wrench to loosen the spanner nut. Keep the pressure on the handle and back off the nut all the way by hand. Hold the barrel and place the complete welder on a flat surface. Remove the barrel and gently pull the element

out of the handle. Grasp the socket at the end of the wire tightly and jiggle or rock the element while pulling until the element is completely dislodged from the socket. To reinstall the element, reverse the above procedure. Turn the element clockwise (about 1 ½ turns) while pushing the wire gently back into the handle. This prevents kinking of the wire during reinstallation. To reinstall the barrel, reverse the above procedure.

HOW TO DISASSEMBLE THE HANDLE:

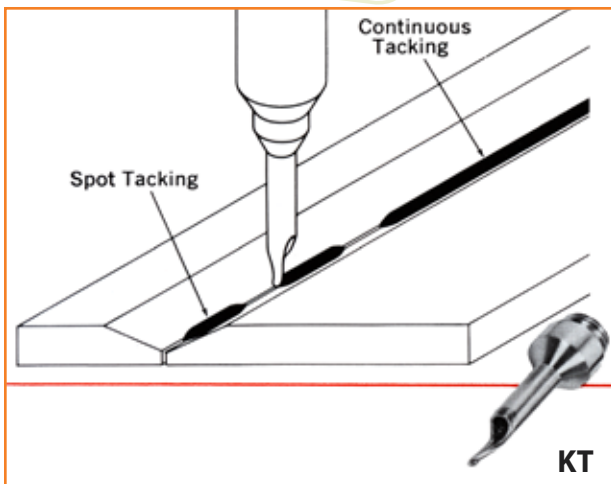
To remove the plastic grip from the handle, remove the screw at the end of the grip. Slide the grip back over the hose. Hold the handle firmly and grasp the tail piece and hose. Use a slight twisting motion while pulling back until it becomes free. Then the wire and socket can be completely removed. To reassemble, reverse the above procedure, making sure to line up the screw holes in the tail piece and the handle.

WELDING OPERATIONS:

There are three basic types of plastics welding with hot-air: Tack Welding, Hand Welding and High-Speed Welding.

TACK WELDING

Tack welding is a shallow fusion of the mating surfaces of the material. It possesses little tensile strength. It holds the pieces together until the regular bead is welded. Tack welding eliminates the need for clamps, jigs and additional manpower.



For practice welding, prepare the material as follows:

1. Take two pieces of 1/8" thick PVC sheets, each about 2" wide by 6" long. Bevel one of the long edges of each piece to about 30° for a total included angle of 60°. Do not bevel to a feathered edge.
2. Remove all dust and chips. Do not use a solvent. This will soften the material and result in a poor weld.

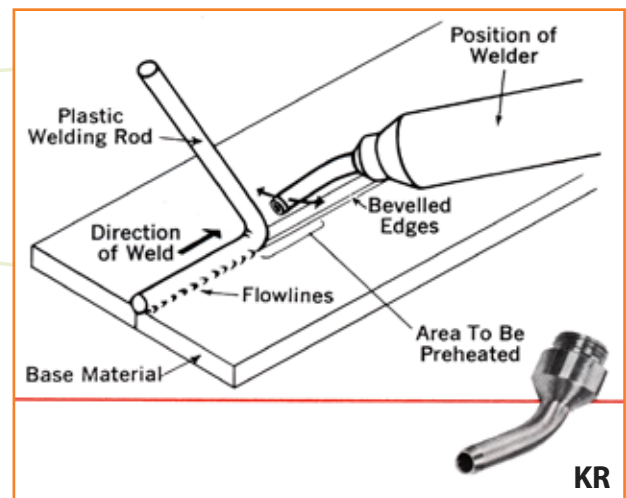
3. Clamp one of the beveled pieces flat on a work bench with the bevel pointed upward. Place the other pieces so that the beveled edges face each other. Install the tacker tip. Hold the welder upright at an angle of about 80° perpendicular to the surface of the material.

4. Hold the loose PVC piece firmly against the clamped piece. Touch the point of the tacker tip quickly but firmly along the mating surfaces, making short (1/2" to 3/4") tacks at intervals of about 1 1/2 to 2" along the joint.

5. Then draw the point of the tacker tip along the entire joint, fusing the edges together. This operation must be performed quickly. Hesitation at any point can result in charred spots that must be removed before further welding. The two pieces are now fused together with sufficient strength for handling.

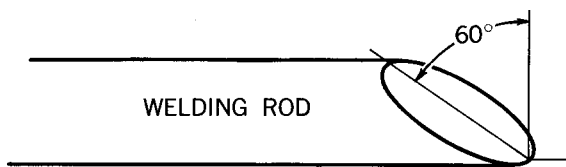
HAND WELDING

Hand welding can provide very high tensile strength, if properly accomplished. It is recommended for welding



corners, short runs and small radii. It also provides the beginner with a chance to determine the correct balance of heat and pressure required to produce a good weld.

1. Install the round tip and allow for warm-up time. Hold the welder in one hand and weld rod in the other hand.
2. Preheat the base material at the start of the weld by fanning the heat about 1/2" from the material's surface.
3. Hold the rod, which has been precut at a 60° angle, perpendicular to the joint of the material, and slightly above the preheated point, with the face of the 60° cut toward the direction of the weld.



4. Direct the heat to the beveled surface of the material and the bottom and front surfaces of the rod. Continue the fanning motion of the tip. Make sure that the air stream is directed straight to the joint of the rod and beveled area. When the rod and the base material become shiny and "tacky", touch the rod material. They will stick together.
5. Now lean the rod forward in the direction of the weld. Push the rod down so that the first part will adhere and not "skid". Maintain enough pressure on the rod so that the softened end of the rod presses into the softened surface of the material.

Flow lines (see Figure 3a) will appear on sides of the rod. A small wave of softened material, consisting of fused rod and base material, will flow in the bevel in front of the rod, if the pressure is being evenly and constantly applied.

6. Now lean the rod back at a slight angle, away from the direction of the weld, causing the rod to bend just above the point where it is flowing into the bevel. Maintain the fanning motion with the welder tip and enough pressure on the rod while proceeding with the weld.

Generally speaking, the base material will take more heat than the rod, although the distribution of the heat necessary can be determined by observation. If the tip is not kept in motion or if it is held too close, browning or charring will occur, resulting in an unsatisfactory weld. If the tip is held too far away or at an incorrect angle, an uneven weld will occur. If the rod is pushed too hard into the base material, it will stretch, resulting in a flat, highly stressed weld, which will break if an additional weld is laid over or abutting it or if it is subjected to routine environmental stress.

Figure 3a. Good and Bad Flow Lines

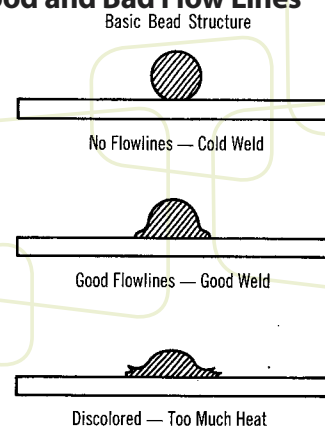


Figure 3b. Good and Bad Welds

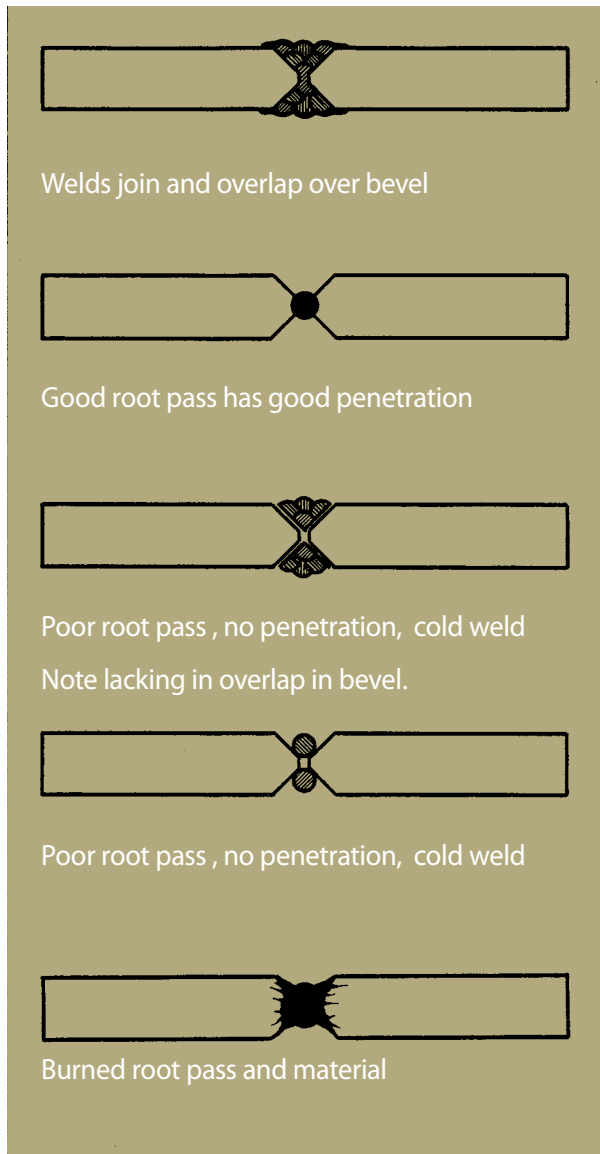
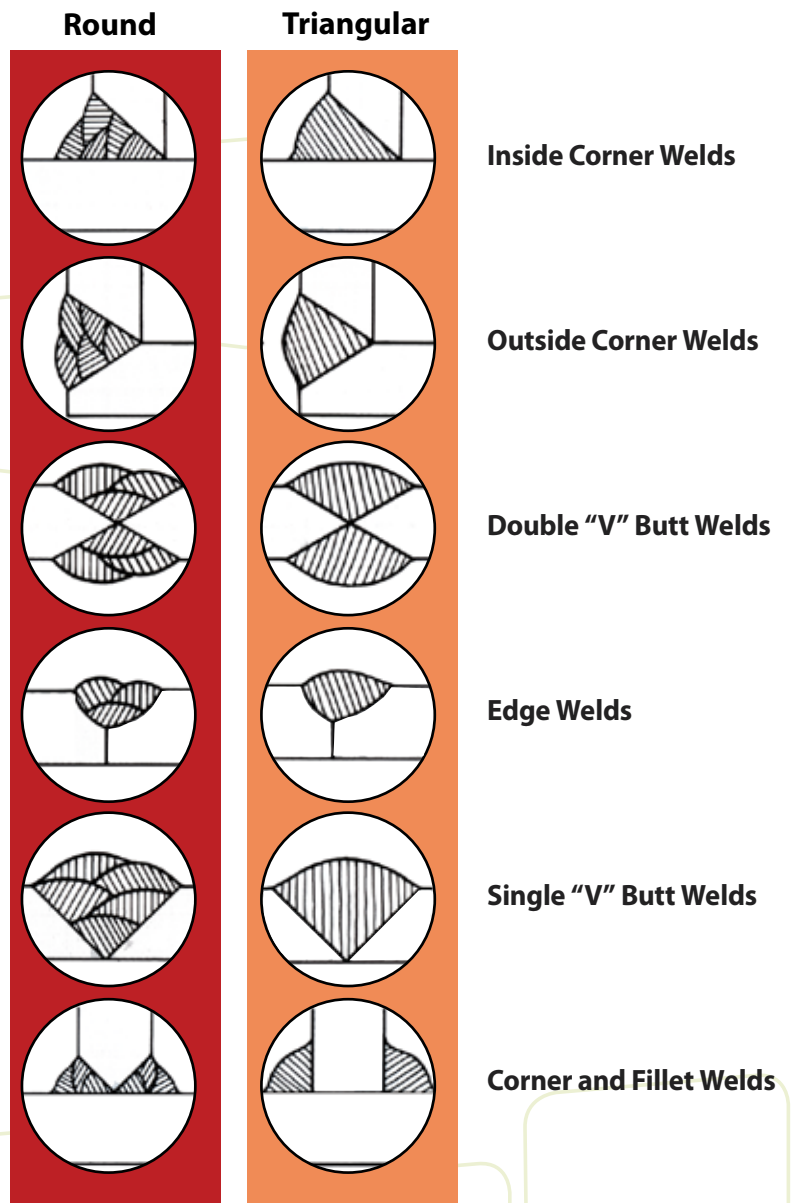


Figure 4. Types of Welds



7. The weld can be stopped at any time by merely removing the heat from the weld area. The weld may be continued from that point with the same rod, or an entirely new start can be made, using the procedure above.

8. When the weld is completed, cut the rod off close to the base material with a knife or a pair of cutting pliers.

HIGH-SPEED WELDING

The principle of high-speed welding incorporates the basic methods utilized in hand welding with specially designed and patented tools. Here too, the requirements for constant heat and pressure must be fulfilled. The accelerated rate of speed in high-speed welding is possible because both the rod and the base material are preheated before they reach the fusion point. A round or triangular rod is preheated in a tube, while the base material is preheated by the hot air stream from a vent in the underside of the welding tip.

The necessary pressure is no longer provided by holding the rod in the hand. Instead, a shoe on the end of the tool furnishes the necessary pressure and, at the same time, smooths out the rod for uniform appearance and higher tensile strength. Gentle pressure on the rod results in better control of the weld.

The conventional hand welding method now becomes a faster and more uniform operation. Once started, the rod is fed automatically into the preheating tube by the motion of the welder being pulled along the joint. The Kamweld high-speed tools automatically give constant balance of heat and pressure.

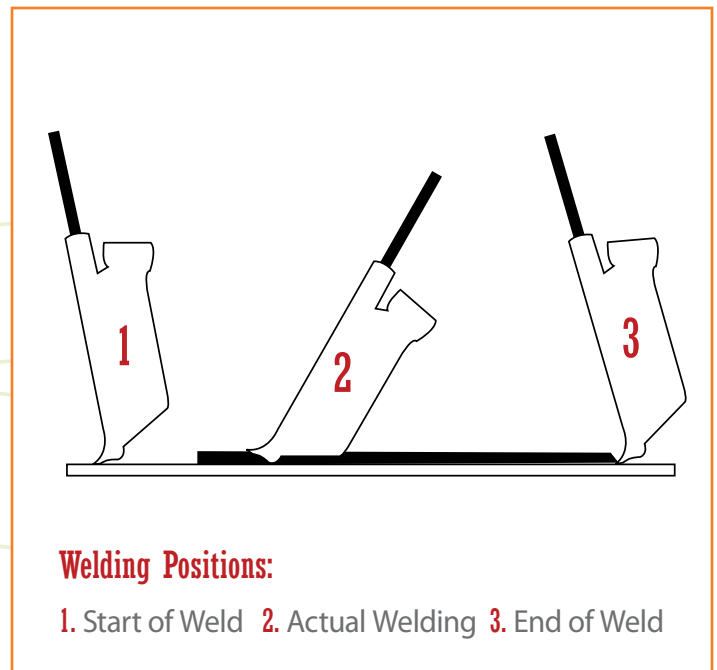


Figure 5. High-Speed Welding with round or triangular rod.

1. Select and install the proper size high-speed tip for the appropriate size welding rod. Allow for warm-up time.
2. Grasp the welder firmly and hold it in an upright position, with the point of the high-speed tip approximately $\frac{1}{2}$ " above base material, directly over the starting point of the weld. Insert the rod into the welding tube and hold it there until the base material turns shiny and starts to soften.
3. Push the rod down until it sticks to the base material.
4. Continue exerting downward pressure on the rod, which will then bend and lower the shoe to the rod. The shoe of the tip will rest on top of the exposed part of the rod (see Figure 5, illustration 1).

5. While continuing to exert moderate pressure with the shoe, lean the welder to about 60° toward the operator and start pulling the welder in the same direction of the weld, at the same time helping the rod into the preheating tube with light hand pressure (see Figure 5, illustration 2).

This technique requires practice. If the weld progresses too slowly, discoloration and charring will occur, and the rod will buckle in the feed tube. If it progresses too quickly, a cold weld will occur.

6. Continuously observe the condition of the welding rod as it appears under the shoe as the weld progresses. Uniform flow lines should be visible along both sides of the rod, without discoloration or charring.

7. After completion of the weld, the rod can be cut off in two ways:

a) Withdraw the welder completely so that any remaining welding rod will slide out of the tube. The rod can then be cut with a knife or cutting pliers as close as possible to the end of the weld. DO NOT allow the rod to lift at the end of the weld.

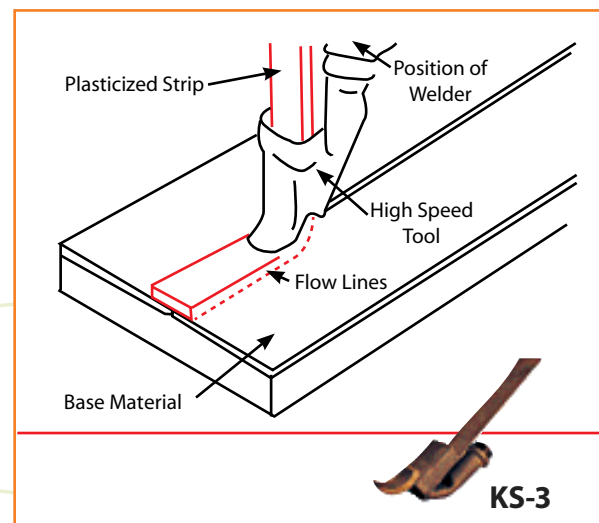
b) Bring the welder quickly to an upright position and push down hard with the point of the shoe. This action cuts the rod at the end of the weld. The remaining rod is pulled out of the tube by hand (see Figure 5, illustration 3).

HIGH-SPEED WELDING FOR PLASTICIZED STRIPS (CORNER OR FLAT STRIPS)

Follow the same procedure as for round or triangular rod high-speed welding as previously described, except:

1. Precut the strips to required length to complete the weld.
2. Start the weld by tamping the shoe section of the strip in the direction of the weld. Do not drag for the first inch of the weld until the strip appears firm. Then continue welding with proper downward pressure and speed, showing slight flow lines along both sides of the strip. If performed properly, slight flow lines along both sides of the strip will appear

Figure 6. High-Speed Welding with Plasticized Strips



NOTE: If the weld progresses too slowly, the strip will soften excessively and the shoe will stretch the strip. A quick recovery can be made by immediate motion, such as in the start of a weld, proceeding in the direction of weld at the same time.



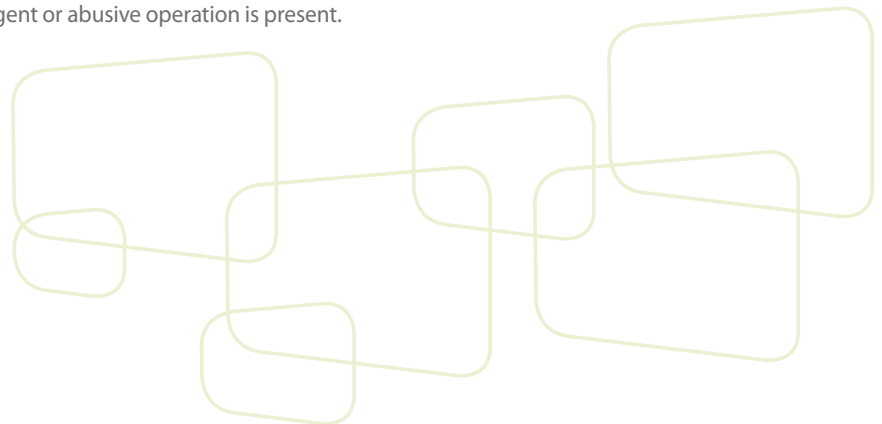
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WARRANTY

Kamweld Technologies, Inc. (the “manufacturer” or “Kamweld”) warrants its products and repair services to be free from defects in materials and workmanship under limitations of normal operation by the purchaser, as prescribed in the instructions furnished to the purchaser, for a period of 90 days from the date of purchase. Except as set forth herein, Kamweld makes no warranty respecting the merchantability of its products or their suitability or fitness for a particular purpose or use.

Kamweld shall not be held liable for any damage to person or property resulting from any breach of this warranty, nor be responsible for any work done or repairs made by others, unless authorized in writing by the manufacturer. In no event shall Kamweld be held liable for incidental, special, or consequential damages. This warranty is limited to the replacement of the product for the period set forth above.

This warranty shall become void if the purchaser modifies the product, uses the product in a manner that in the manufacturer’s judgment exceeds its design capability, or if evidence of negligent or abusive operation is present.



Kamweld
STAINLESS STEEL
Tools & Tips

KS-1-8

For Type I and II PVC, 1/8" round rod



KS-1-8-A

For polypropylene, 1/8" round rod



KS-1

For Type I and II PVC, 5/32" round rod



KS-1-OLD

Longer version of KS-1



KS-1B

For low-density polyethylene, 5/32" round rod



KS-1C

For polypropylene, high-density polyethylene and other high-temperature thermoplastics, 5/32" round rod



KS-2

For Type I and II PVC, 3/16" round rod



KS-2B

For low-density polyethylene, 3/16" round rod



KS-2C

For polypropylene, high-density polyethylene and other high-temperature thermoplastics, 3/16" round rod



KS-3

Flat and corner strip for tank lining, 5/8" to 3/4", plasticized PVC



KS-4A

Flat and corner strip for tank lining, 1", plasticized PVC



KS-6

For Type I and II PVC, 1/4" round rod



KST-6C

For polypropylene, high-density polyethylene and other high-temperature thermoplastics, 1/4" round rod



KST-1

For triangular PVC rod, equivalent to 1/8"



KST-1A

For triangular polypropylene rod, equivalent to 1/8"



KST-2

For triangular PVC rod, equivalent to 3/16"



KST-2C

For triangular polypropylene rod, equivalent to 3/16"



KST-3

For triangular PVC rod, equivalent to 1/4"



KST-3C

For triangular polypropylene rod, equivalent to 1/4"



KR

Round Tip for hand welding



KT

Tacker Tip for hand welding



KF-1

Flat Tip, 5/8" to 3/4" wide for hand welding



KF-2

Flat Tip, 1" wide for hand welding



KV-1

Also known as the "V" Tip, 5/8" to 3/4" wide for hand welding



KV-2

"V" Tip, 1" wide for hand welding



KRL

Round Tip, extra long for hard-to-reach areas for hand welding





Kamweld
STAINLESS STEEL
Welding Products



44-AWC

300 and 400, or 700 watt combination for model 44-AW



HSC

600, 750, and 900 watt for model 43-HS



RWC

350 watt for model 46-RW and 600 watt for model 47-RW



HTC & HSC

350 and 450 watt for model 41-HT and model 42-TM

Kamweld Technologies, Inc.

Kamweld Technologies, Inc. is a leading provider of plastic welding products, industrial hot air guns, plastic sheet bending devices and accessories. For nearly 50 years, the Kamweld name has stood for superior products, rugged durability and highly competitive prices. All of our products are developed, manufactured, tested and packaged within the USA, resulting in consistent quality and rapid turnaround time.



KHAG

The KAMWELD Hot Air Gun is supplied complete with an air regulator and pressure gauge, a 2" long, 5/8" diameter stainless steel flanged round tip with check-nut and 5' of insulated cable. A stainless steel wrap-around mounting bracket permits permanent mounting to existing equipment, and the gun may be grounded through the mounting bracket. Two models available. Both models are designed for use with 115 volts AC, but they can be supplied for a 230 volt system.



KHD

The KAMWELD Heating Device is used for bending plastic sheets of different widths and lengths. This bending device heats thermoplastic sheets in order to make straight-line bends that are necessary when fabricating items such as hoods, ducts, tanks, displays, signs and many other items. KHD consists of two rectangular aluminum heating bars, two control switches for adjusting the temperature and two aluminum base units. Each heating bar contains an electric heating element that provides uniform heat. Four sizes are available: 28", 54", 96" & 144".