



PLASTIC WELDING SCHOOL LLC

590 FISH ROAD
TIVERTON, RI 02878

www.plasticweldingschool.org

Toll Free: 888 807-4030

Local 401 625-5099

Fax: 401 624-3081

Welding thermoplastics using hand held hot gas welding tools



Photographs of students using various thermoplastic hot gas welding tools

Thermoplastics such as PVC, polyethylene, polypropylene, acrylics, polycarbonate, ECB, CSPE, ABS, polyvinylidenefluoride and diverse compound polymers can be welded, shrunk and bent with Hot Air welding tools, The most frequently used methods of hot air welding such as pendulum welding, welding with a variety of speed welding nozzles and appropriate profiled welding rod and mirror welding are described on the following pages.

CAUTION:

Incorrect use of hot air tools can be a fire hazard! Before using the tools read the operating instructions.



PLASTIC WELDING SCHOOL LLC

590 FISH ROAD
TIVERTON, RI 02878

www.plasticweldingschool.org



Small hand held tool with speed welding nozzle for profiled welding rod 5, 7 x 3, 7 mm. The hot air tool weighing just 13 ozs is suitable for welding all thermoplastics. The temperature is steplessly adjustable and electronically controlled from 20° to 600°; the air flow is electronically steplessly adjustable between 10 to 60 l/min. this small handy heat gun is especially suitable for detailed work or repair work on containers, boards and pipes, as well as for overlap welding of foils and for shrinking



This heat gun is shown with speed welding nozzle for 20 mm profiled welding rod (fillet weld) and pressure roller for welding thick section polypropylene sheets with welding rod. This Heat gun can weld all thick Polyethylene and rigid PVC materials reliably without strain.

Welding speed: depending on the material, 20 to 30 cm/min.

Weight: 5 lbs.



Pendulum welding of hard pvc with a 5 mm profile rod

Pendulum welding

A frequently used method, the electronically regulated hot air tools are entirely suitable. Pendulum welding should be mastered perfectly. The working sequence is as follows: The welding rod is held with its end in the carefully prepared welding groove and at an angle of 90° to the groove. With a pendulum movement (from top to bottom, not in a circle) hot air is directed partly at the welding rod and to a greater extent into the groove. At the same time the hand must exert even pressure of about 4 1/2 lbs on the welding rod. Three things are very important: Correct temperature setting (this can be set very reliably on the electronically regulated on these hot air tools; steady welding speed; and even downward pressure on the welding rod. When these three factors are in correct relation to one another a slight foamy wash will be formed along the weld, but this wash must be neither brown nor black. A clean wash is a necessary sign of a good weld.



PLASTIC WELDING SCHOOL LLC

590 FISH ROAD
TIVERTON, RI 02878

www.plasticweldingschool.org



Speed welding with the push-on Speed welding nozzles for round and profile rods.

The head on this heat gun is standardized so that the Various speed nozzles can be simply pushed on.

By using these speed welding nozzles with the appropriate size welding rod profiles and by increasing the volume of hot air on groove and welding rod, the welding process can be considerably speeded up. Profile welding with speed welding nozzles results in welding speeds 10-15 times greater than pendulum welding with several layers of round rod.

Speed welding polypropylene with a 7 mm profile rod. The pressure is not Applied with the tool, but by hand on The welding rod.



Tacking weld on hard PVC pipe. After joining the components with the tacking jet, welding with welding rod can follow.



Heat guns with push Fit welding mirror of 135 mm and 160 mm diameter respectively. Using the mirror welding process all Polypropylene (PP), Polyethylene (PE) and PVC pipes and boards can be butt welded with these tools

MIRROR WELDING

For butt welding pipes and profiles of Polyethylene, polypropylene and PVC, the PTFE-coated welding mirror 135 mm is fitted on the Heat gun. The welding mirror, heated by hot air is electronically controlled on the gun and can reach in a few minutes of adjustment between ambient and 300°C. Another PTFE-coated welding mirror 270 mm can be fitted on the heat gun.

MIRROR WELDING PROCESS

To create bends or junctions in pipes, the Sections should be sawn to give the Required radius and any burring should be removed. The two areas to be joined are then presses one on each side of the heated welding mirror. After about 20-30 seconds the important “wash” is formed on the pipe ends which are against the mirror. When this “wash” has formed, the pipe ends are immediately pressed against each other by hand, the pressure being maintained for about 20 seconds. During this process the “wash” becomes obvious. The welding process is now complete. Mirror welding is not only a quick and simple welding process but ensures great strength, especially on pipe and profile joins.



PLASTIC WELDING SCHOOL LLC

590 FISH ROAD
TIVERTON, RI 02878

www.plasticweldingschool.org

Welding soft PVC boards, pipes, conveyor belts and foils and PVC-coated cables and foam plastics.



Welding soft-PVC is similar to welding hard thermoplastics. This means that the same speed welding nozzles can be used with soft welding profiles but various pressure rollers can also be used to guide the welding cable or tape. Furthermore, soft thermoplastics can be overlap welded without any additional material. In practice this method is frequently used. Suitable welding nozzles are 20 mm and 40 mm wide slot nozzles and wide band feed rollers. Welding Polyethylene foam is done in a similar manner.

Heating up and re-forming thermoplastic pipes and profiles.

For bending thermoplastic pipes, sheets and profiles the electronically regulated electric hot air tool can be used. The many different push-on reflectors in various sizes ensure even application of heat to the bending point. For the purpose of bending, pipes are filled with dry sand to avoid collapsing the pipe in the area of the bend. Creating a pressure of about 1500 mm water gauge (about 59") in the pipe can also prevent the pipe collapsing. For forming profiles a wooden or metal former is often necessary, especially if large complicated forming is required. Sheet material can be heated to bending point with aid of push-on wide slot nozzles. To keep the heating zone as narrow as possible it is delineated with steel rulers. Heating up temperatures vary according to the nature of the material between 300° and 600°C. After bending and cooling is completed, the material will retain its shape. Flaring and making flanges are common jobs on plastic pipes and can be done quickly with a suitable reflector.

Welding PVC-coated lorry tilt with a heat gun
Everything made of PVC, polyethylene
Polypropylene and ABS can be welded or
Repaired with the this type of heat gun.



Tools currently available for shrinking and bending of thermoplastics



TYPICAL THERMOPLASTIC HAND HELD WELDING TOOLS



PLASTIC WELDING SCHOOL LLC

590 FISH ROAD
TIVERTON, RI 02878

www.plasticweldingschool.org

PLASTICS RECOGNITION

So that you can recognize which plastic you are dealing with, the following simple test is recommended:

- 1. A short test weld with the available welding rod. If the welding rod or tape is fixed firmly, the problem is solved.
- 2. Take a small sliver or shaving of the material to be welded and light it with a match, observe the flame and smell the smoke.

| | |
|------------------|--|
| On PVC | blackish smoke and acrid smell |
| On Polyethylene | no smoke, the material drips like a candle and also smells of wax |
| On Polypropylene | no smoke, the material drips like a candle and smells of burnt oil |
| On Polyamide | no smoke, pulls to form thread, smells of burn horn |
| On Polycarbonate | yellowish sooty smoke. Sweetish smell |
| On ABS | blackish smoke, soot flakes, sweetish smell |

The welding rod and tape has the following colors:

Welding temperature in °C

| | | |
|------------------------|-----------------|-----------|
| Hard PVC rod | grey and red | 300°C |
| Soft PVC rod | transparent | 400-500°C |
| Soft PVC tape | grey | 400-500°C |
| Hard Polyethylene rod | black and white | 300°C |
| Hard Polyethylene tape | white | 300°C |
| Soft polyethylene rod | black | 270°C |
| Soft Polyethylene tape | transparent | 270°C |
| Polypropylene rod | grey | 300°C |
| Polypropylene tape | natural | 300°C |
| Polymide rod | black | 400°C |
| Polycarbonate rod | transparent | 350°C |
| Xenoy tape | grey | 350°C |
| ABS rod | white | 350°C |
| ABS tape | white | 350°C |

Because containers, pipes and foils are available in many different colors, it is not possible to judge from the color of an article from which thermoplastic it is made. Since however 50% of goods are made of types of polyethylene this eases your recognition problem. If contrary to expectations you have problems when welding, contact PWS at 590 Fish Road, Tiverton, RI 02878. Toll Free: 888 807-4030.

www.plasticweldingschool.org