Tradeflame

PLASTIC WELDING INSTRUCTION MANUAL

STEP ONE: IDENTIFY THE TYPE OF PLASTIC YOU WISH TO WELD

Plastics are also called synthetic resins and are broadly classified into two categories: thermosetting resins and thermoplastic resins. For the sake of plastic welding we are only concerned with thermoplastic resins.

Identification of the plastic can mean simply looking at the symbol moulded into the plastic as per the below chart, if however there is no symbol then some testing will be required to identify the plastic:

	SYNTHETIC RESIN	SYMBOL	SHORT NAME	PROPERTIES	COMMON USES
THERMOPLASTIC RESIN Thermoplastic resins include PVC, polyethylene (PE), polystyrene (PS) and polypropylene (PP), which can be re-softened by heating.	Polyvinyl chloride		PVC	Strong, tough can be clear can be solvent welded, softens at 80°C	Cosmetic containers, electrical conduit, plumbing pipes and fittings, blister packs, wall cladding, roof sheeting, garden hose, shoe soles, cable sheathing, blood bags and tubing. Certain specific flexible applications, such as flooring, decorative sheets and artificial leather.
	Polyethylene		PE HDPE LDPE	HDPE = Hard to semi-flexible, resistant to chemicals and moisture, waxy surface, opaque, softens at 75°C, easily colored processed and formed. LDPE = Soft, flexible waxy surface, translucent, softens at 70°C, scratches easily.	PE-HD = Shopping bags, freezer bags, milk bottles, ice cream containers, detergent bottles, rigid agriculture pipes and crates PE-LD = Cling wrap, garbage bags, squeeze bottles, irrigation tubing
	Polypropylene		PP	Hard but still flexible, waxy surface, softens at 140°C translucent, withstands solvents, versatile	Microwave dishes, kettles, garden furniture, lunch boxes, packaging tape
	Polystyrene		PS	Clear, glassy, rigid, opaque semi tough, softens at 95°C. Affected by fat, acids and solvents but resistant to alkalis and salt solutions. Low water absorption, when not pigmented is clear, is odor and taste free.	CD cases, plastic cutlery, imitation glassware, low cost brittle toys, foamed polystyrene cups and takeaway clamshells, protective packaging and building and food insulation
	Acrylonitrile-Butadiene-Styrene Resin		ABS	Superior for hardness, impact resistance, gloss and electrical insulation properties. Resistant to aqueous acids, alkalis, hydrochloric and phosphorus acid, animal, vegetable and mineral oils. Softens at 117°C.	Automotive and appliance components, computers, electronics, cooler bottles and packaging.
	Polycarbonate		PC		
	Polyethylene terephthalate		PET	Clear, tough, solvent resistant, barrier to gas and moisture, softens at 80°C	Soft drink and water bottles, biscuit trays and containers
THERMOSETTING RESIN Thermosetting resins include phenolic resin and melamine resin, which are thermally hardened and never become soft again.	Melamine resin			Not within the scope of this discussion as they cannot be plastic welded.	
	Polyamide resin		PA (Nylon)		
	Polyurethane		PU		
	Epoxy resin				
	Silicon resin		SI		

FLOAT TEST

The easiest way to identify between broad groups of plastic is by establishing whether they float or sink. While there are exceptions, generally numbers (Polyolefin). 2, 4 and 5 - HDPE, LDPE and PP float, so as a rule of thumb, if a piece of the plastic floats, it will be one of these, otherwise, it will be something else and may require further tests.

BURN TEST

The polyolefins ignite quite readily - be very careful if you are testing this type of plastic because molten plastic can drip and will leave an ugly burn if you make contact with it.

PVC and ABS will only ignite with moderate enthusiasm and will soften, but not release dripping "firebombs" of plastic; while PET also ignites moderately, but bubbles as it melts.

FLAME TEST

Blue with a yellow tip would be indicative of the polyolefins and nylon. You might think, well how would you separate these two if their flame is the same? Remember from above, the polyolefins would float and nylon (PA) would sink.

A yellow flame with a green tip on contact shows PVC, yellow with dark smoke could be PET or PC and yellow with sooty, dark, smoke could be PS or ABS.

SMELL TEST

If you must, and we advise against it where possible, a small whiff of the smoke will give you further clues as to the plastic identification code under which your suspect can be classified.

After you have applied a flame to the plastic piece to test it, and carefully observe the smoke and ignition potential, you can carefully waft some of the smoke towards your nose.

Each plastic has a different smell, PET smells similar to burnt sugar, PVC has an acrid smell like chlorine - STAY AWAY from the smoke and gas given off by PVC.

LDPE and HDPE smell like candle wax, while PP smells similar to candle wax, but with an element of paraffin to it; ABS and PS both smell like styrene, but the ABS also has a faint rubbery smell to it.

WARNING:

If you have already identified the plastic from other methods and particularly where you suspect the plastic is PVC, do not smell the smoke.

TOUCH AND SOUND TEST

The polyolefins are rather tricky. They generally all float, have the same flame and dripping "firebomb" effect and even smell the same! This makes them rather tricky to tell apart, particularly when they are in the form of film - in other words, when they are packaging like packets or film wrapping.

Plastic packets can be made from LDPE, HDPE or PP. Now your senses of touch and hearing are drafted into play.

LDPE feels soft and smooth, like the bag Mum packs your sandwich into. Additionally, if you rub it together, it will make a soft swishing sound, as opposed to a crinkling, harsher sound.

HDPE feels harder and essentially, more crinkly. Many plastic shopping bags are manufactured from HDPE and the easiest way to distinguish them from LDPE bags, is from the sound the make when you crinkle them in your hands. If the sound is soft and swishing (think of green leaves blowing in the trees), then you have identified LDPE; if the sound is crisper and crinkly (think of dry leaves being squished together), then you have HDPE. The two sounds are quite distinct.

PP: packets made of this plastic sound similar to HDPE and are crinkly. PP is generally used for packaging food, such as chocolate and chips wrappers, or the clear packets you might buy a gentleman's shirt in. It feels much firmer and stiffer, but the most important trick here, is that it does not stretch. It simply rips and tears without stretching at all first.

STEP TWO: PLASTIC WELDING HOW TO

This plastic welding kit is used in conjunction with Tradeflame Butane Torch Part number 211189 or 211212. The instructions for using this torch are not included in this kit. Please read the instructions supplied with the butane torch.

Due to the high costs associated with the replacement of plastic panels (bumpers, inner wings, headlamp bodies, engine covers, motorcycle body work, toys etc) this kit has been developed to repair small to medium sized damage that could render a panel unusable.

Thin plastic parts can be welded due to applied heat being contained in a small area. This kit is supplied with:

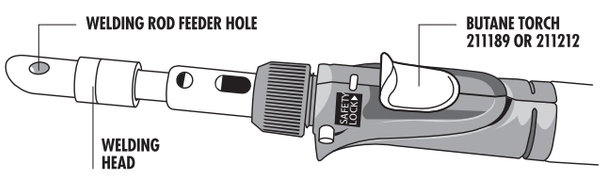
- Plastic welding head 10mm
- Precision screwdriver for attaching welding head to the butane torch
- Wire brush for cleaning area before welding
- Cleaning rod for cleaning the welding head when finished
- Reinforcing mesh (stainless steel) for adding strength to the weld
- Welding rods:

  PP = 17cm (3 white and 3 black) 4mm OD

  ABS = 17cm (3 white and 3 black) 4mm OD

  PS = 17cm (3 white and 3 black) 4mm OD

  PE = 17cm (3 white and 3 black) 4mm OD



Tradeflame Butane Torch 211189 or 211212 is not supplied with this kit.

WELDING FILLER RODS ARE CONSUMABLES AND ARE AVAILABLE SEPARATELY

Part no:	Description
213056	PP plastic welding rods 17cm, 4mm OD (10pcs black and 10pcs white)
213067	PE plastic welding rods 17cm, 4mm OD (10pcs black and 10pcs white)
213078	PS plastic welding rods 17cm, 4mm OD (10pcs black and 10pcs white)
213089	ABS plastic welding rods 17cm, 4mm OD (10pcs black and 10pcs white)
213101	Reinforcing mesh (stainless steel) 3pcs 10 x 6cm

Select the correct type of filler rod for the job, refer STEP 1, how to identify the type of plastic.

Fit welding head and tighten with the screwdriver supplied.

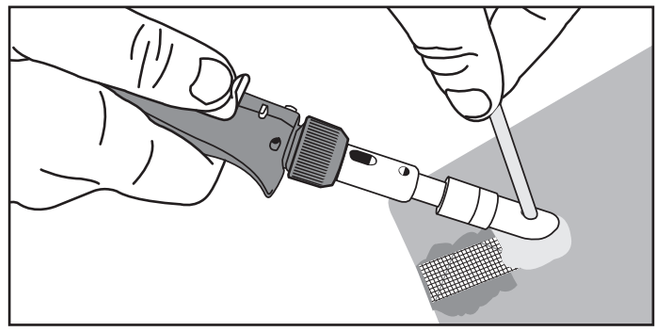
Ignite the torch (see instructions supplied with the torch), move the gas flow control to the desired level to set the heat to the desired level for the weld.

CAUTION:

This torch including the welding head gets very hot. Take care to keep these hot parts away from the body and any flammable objects.

Heat up the adjacent area with the welding head before applying the filler rod. The filler rod is melted and applied to the job by inserting through the hole in the welding head.

Then melt into the adjacent plastic and smooth over using the welding head to achieve the desired shape.



Remember that you can stop and repair and then recommence at any time. This is a heat based process. You are not dependent on any chemical curing so you can stop and start when convenient.

The repair is then sanded down to continue with the preparation and painting. Before you sand or paint make sure that the plastic is allowed to cool

When finished the welding head can be cleaned up using both the included wire brush and the cleaning rod. Let the welding head and torch cool before cleaning.

If the split is large and requires reinforcing use the wire mesh. Cut off an appropriate size using the appropriate tool. When the plastic welder is at the right temperature, tack the mesh into the repair.

The hot plastic welder is used to heat the mesh and soften the plastic of the panel as the mesh is pressed into the plastic. As the melted plastic comes through the mesh it can be smoothed over with the hot welding head.

If the crack or damaged area follows a curve the mesh can be formed also to follow the curve. The intention is to bury the mesh below the surface of the plastic, smoothing off with the hot welding head as you proceed.

If required to bring the level of the surface back up and to add strength you can use the welding filler rods to add materiel. Use the correct type of welding rod for the plastic being repaired.

AN EXAMPLE; USING THE PLASTIC WELDER

With experience many uses can be found for the plastic welding tool. An example of a repair:

Repairing a split or crack in a plastic bumper: using a mini sander or belt sander fitted with 120-180 grit disc, remove paint and primer from the surrounding area and bring the level of the surface down around the are to be repaired.

Prepare the plastic welding tool for use and follow the above instructions.

WARNING:

Failure to use the plastic welder correctly may result in fire, damage and or personal injury. Keep body parts clear to the welding head when operating as it becomes very hot.

DO NOT leave an operating plastic welder unattended.

DO NOT get the plastic welder wet or attempt to cool the welding head with water.

DO NOT inhale any smoke or fumes created.

ALWAYS do this work in a well ventilated area.

FOLLOW THE INSTRUCTIONS FOR THE USING THE TORCH CAREFULLY, INCLUDING THE SAFE USE OF GAS AND REFILLING OF THE TORCH.

TURNING OFF THE TORCH

(see instructions supplied with the torch)

This torch including the welding head gets very hot. Take care to keep these hot parts away from the body and any flammable objects.