

Submitted for recognition as an American National Standard

**(R) OEM PLASTIC PARTS REPAIR**

1. **Scope**—This SAE Recommended Practice is for providing an overview of the type of information that is needed by insurance and the collision repair industry on plastic repairs. The format herein should be considered as that required for plastic repairs in general. The specific information contained applies to the repair and refinishing of most flexible, semi-flexible, and rigid exterior plastic body parts. When a new type of plastic is being introduced to the market through a new vehicle program, the specific repair and refinishing procedures should follow the same format as this document.
  - 1.1 **Background**—The use of plastics in cars has increased to over 12% by weight, with several types being used for structural and mechanical applications. Interior and exterior plastic body parts have become an integral part of the automotive design reducing overall weight to aid in increasing fuel efficiency. The use of plastic compounds for these parts has expanded to include polyurethanes, polycarbonate blends, modified polypropylenes, polyethylenes, nylons, sheet-molding compound, and fiber-reinforced plastic. Damage to exterior plastic body parts made of these materials can be repaired using 2-part (2K) repair adhesives, plastic welding, and other reinforcing materials available from body shop suppliers.
2. **References**
  - 2.1 **Applicable Publication**—The following publication forms a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.
    - 2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1344—Marking of Plastic Parts
3. **Repairability**—Determine the severity of damage to each part (can the part be repaired?). Next determine the cost of the part (is it worth repairing?). Plastic body parts are either repaired or replaced with new OEM, Aftermarket, or Recycled Parts (turn in old for a repaired part).
  - 3.1 **Plastic Identification**—To identify the type of plastic part being repaired you can consult manufacturer's literature; locate mold markings for plastic type on the back of the part (requires removal); use the burn test (not accurate with blends) or the grinding technique. Consult SAE J1344 for additional information.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-8512 FAX: (724) 776-0243  
TO PLACE A DOCUMENT ORDER; (724) 776-4970 FAX: (724) 776-0790  
SAE WEB ADDRESS <http://www.sae.org>

**3.2 Grinding Technique**—Clean the damaged area of all dirt, grease, wax, and tar. Grind the damaged area with a grade 36 grinding disc using a high-speed sander and observe the sanding characteristics. If the plastic sands smoothly and cleanly, it is typical of most flexible and semi-flexible plastics and can be repaired using conventional 2-part (2K) plastic repair materials. If the grinding causes the plastic to smear or melt, an adhesion promoter will be required. Be sure and follow the manufacturer's instructions of the repair material and for best results stay with one system of products throughout the repair.

**4. Repair Procedures**

**4.1 Preparation**—Cosmetic damage to plastic parts like bumper covers is very common. The puncture in Figure 1 has penetrated the cover causing several deep scratches and gouges. The following are general repair procedures that should be used for cosmetic or nonstructural damage.

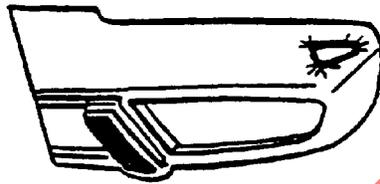


FIGURE 1—PLASTIC BUMPER COVER DAMAGE

**4.2 Surface Preparation**—After cleaning the damaged area with soap and water, grease and wax remover or suitable plastic cleaner, the surface is made ready for the application of a 2-part (2K) repair adhesive or plastic welding. This is accomplished by grinding the damaged areas with a grade 36 grinding disc followed by grade 80 to remove the grade 36 scratches. It is important to vee out the area along a tear, around a puncture or gouge to expose more surface area for adhesive bonding or plastic welding. The paint is then featheredged back using a grade 180 disc on a random orbital (R/O) sander (Figure 2).

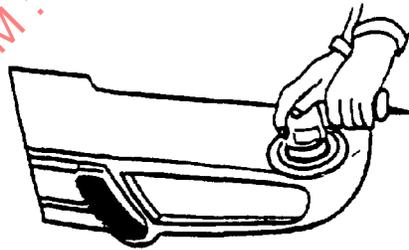


FIGURE 2—SANDING DAMAGED AREA WITH A R/O SANDER

**4.3 Structural Reinforcement**—If structural reinforcement is required, the use of fiberglass cloth saturated with 2-part (2K) repair adhesive applied to the backside of the repair is recommended. Clean the backside of the plastic component using soap and water and a plastic cleaner. Next grind 2 in beyond the back edge of the damaged area with a grade 36 disc. Apply 2-part (2K) adhesive to a piece of fiberglass cloth and apply it to the backside of the repair. Apply additional coats of the 2-part (2K) repair adhesive to the glass cloth and surrounding surface and allow to cure. (Figure 3)

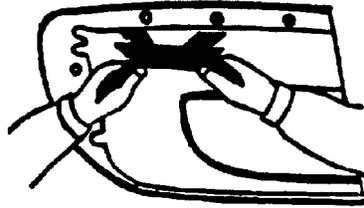


FIGURE 3—APPLICATION OF FIBERGLASS CLOTH TO BACKSIDE OF COVER

**4.4 Repair**—Mix and apply the 2-part (2K) repair material to the outer surface to fill all voids and restore the surface to a level slightly higher than the original contour and allow to cure. (Follow repair material manufacturer's instructions.) (Figure 4)

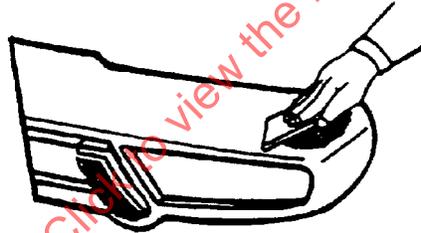


FIGURE 4—APPLICATION OF REPAIR ADHESIVE

After the repair material has cured, it should be sanded with a random orbital (R/O) sander using grade 80 and 180 discs (Figure 5) to restore the original contour. Sand with grade 320 to remove the 180 scratches and restore the original contour. Vacuum sanding is recommended to reduce the amount of airborne dust. Sanding dust from hand sanding should be wiped off with a tack cloth and the surface cleaned with a plastic cleaner. (Figure 6)

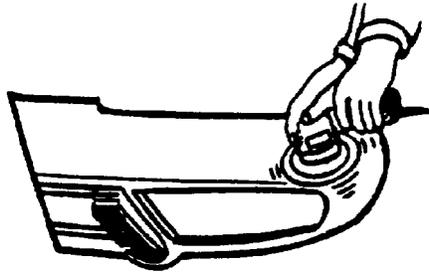


FIGURE 5—SANDING THE REPAIR MATERIAL

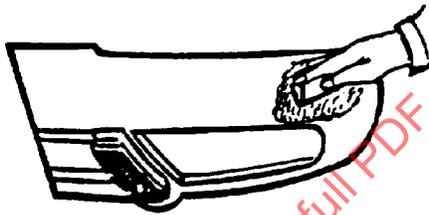


FIGURE 6—REMOVAL OF SANDING DUST

When repairing polyolefin type plastics like TPO, PP, ELP, and EPDM (which smear when sanded), it is necessary to use an adhesion promoter to obtain adequate adhesion of the 2-part (2K) repair material. Adhesion promoters should be applied prior to the application of the repair material and again after sanding (following manufacturer's instructions for adhesion promoters).

Plastic welding can also be used to make repairs on flexible and semi-flexible plastic parts. Matching the type of plastic welding rod to the plastic part being repaired is very important. For structural repairs, welding should be done from both sides. To restore the contour and surface use a 2-part (2K) repair material. If the plastic is a polyolefin type, an adhesion promoter is needed in order to obtain adequate adhesion between the 2-part (2K) repair material and the plastic substrate.

- 4.5 Refinishing**—The refinishing procedures for flexible components requires the use of elastomeric primers or additives in the primer and topcoats. The only glazing putties recommended are those specifically designed for flexible repair. Block sand the primer with grade 240 followed by grade 320. For wet sanding, use grade 360 followed by grade 400.

Follow paint manufacturer's instructions when refinishing plastics.

**5. Repairing Rigid Car Parts**—(SMC & FRP) Sheet-molding compound and fiber-reinforced plastics.

**5.1 Full Rigid Panel Replacement**—(Panels bonded on with adhesive) Remove damaged panels according to manufacturer's recommendations, and remove any remaining adhesive from the body structure with a grade 36 disc. Prime any bare exposed metal with 2-part (2K) primer. Use a cut-off wheel for cutting new replacement panels to size. Clean all the surfaces to be bonded on the replacement panels with soap and water followed by a plastic cleaner. Scuff sand with grade 80 discs and clean with a plastic cleaner. Apply a .95 to 1.27 cm (3/8 to 1/2 in) bead of panel adhesive compound to the body structure and install the replacement panels following manufacturer's instructions for the use of clamps and mill and drill bolts to hold the panels in place. Cure for 2 h at a minimum of 60 °F.

**5.2 Partial Panel Replacement**—Use a cut-off wheel to cut out the damaged parts of panels (according to OE manufacturer recommendations). Cut and fit a new partial panel to replace the damaged section. Use parts of the old section to make bonding strips to provide structural support for the replacement panels. The bonding strips should conform to the original contour and overlap the seam between new and old panels by 2 in. Clean all areas to be bonded (see Step 3). Scuff sand the surfaces of all areas to be bonded using grade 80 discs. Clean off the repair area with a clean, dry rag and air hose then clean with a plastic cleaner. Apply a SMC panel adhesive compound to the backside of the panel and bonding strips to be bonded. Assemble and position the bonding strips, clamping where necessary. (Figure 7)

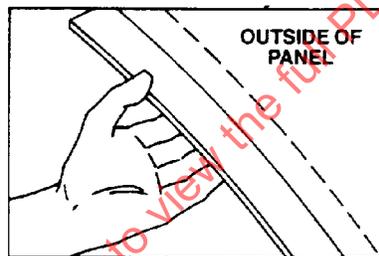


FIGURE 7—ASSEMBLE AND POSITION BONDING STRIPS

Remove any adhesive which may have squeezed out onto the panel or exposed portion of the bonding strips allowing adhesive to cure for a minimum of 30 min at 60 °F before continuing with the structural repair. Next apply SMC panel adhesive compound to the scuffed area of the bonding strips and the body structure, install replacement panels, and clamp as necessary allowing the adhesive to cure (for a minimum of 2 h at 60 °F) before continuing with the cosmetic exterior repairs.

**5.3 Cosmetic Repairs**—To avoid bond lines (where panels meet) clean the repair area with soap and water followed by grease and wax remover or a suitable plastic cleaner and grind sectioned areas with a 3 in grade 36 disc, tapering the area on each side of the bonding strip toward the center. The tapered area should extend 1-1/2 in beyond the edge of the bonding strip.

**IMPORTANT**—Remove all cliff edges in tapered areas (Figure 8). Featheredge the paint back 1/2 in from the recessed area using a grade 180 disc on a random orbital (R/O) sander and clean using compressed air and a clean rag. (Do not use lacquer thinner.) It is important to round all edges prior to applying filler material.

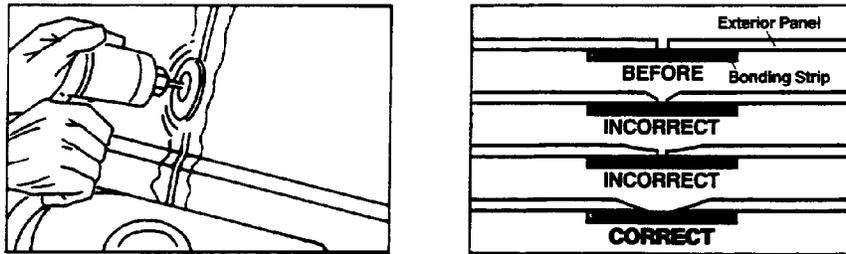


FIGURE 8—TAPERING BOND LINE AREAS

Mix and apply the 2-part (2K) adhesive for rigid parts repairs (following manufacturer's instructions) building up thickness to above original contour and cure for 30 min at 60 to 80 °F. (Do not use conventional plastic filler for making rigid plastic repairs.) Figure 9.

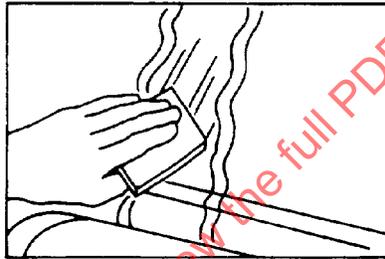


FIGURE 9—APPLYING REPAIR MATERIAL

**5.4 Sanding Repair Material**—Shape sand repair material with grade 80 discs using a random orbital (R/O) sander to original contour. Fill pin holes with a suitable 2-part (2K) glazing putty. (Do not use a flexible putty.) Sand glazing putty with grade 180 discs, clean, and apply a 2-part (2K) urethane primer (according to manufacturer's instructions). Figure 10. After drying, finish sanding with grade 240 to 320 (following paint company's recommendations) and apply color coats.

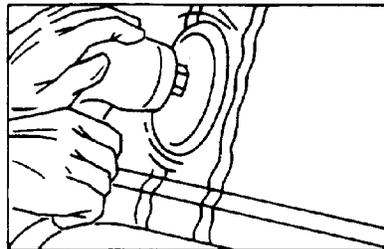


FIGURE 10—SHAPE SANDING REPAIR