SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1573

REV. FEB2003

Issued 1987-02
Revised 2003-02

Superseding J1573 SEP1995

(R) OEM Plastic Parts Repair

1. ***Scope—***This SAE Recommended Practice defines the information required to repair the various types of plastics found on modern light-duty highway vehicles. Information is included for the repair and refinishing of most flexible, semi-flexible, and rigid plastic body parts, both interior and exterior. Repair information is described for all commonly used plastics including polyurethanes, polycarbonate blends, modified polypropylenes, polyethylenes, nylons, sheet-molded compounds (SMC), and fiber-reinforced plastics (FRP). Repairs can be made to these types of plastics using two-part (2K) repair adhesives, plastic welding, and other materials available from body shop suppliers. When a new type of plastic is being introduced to the market through a new vehicle program, specific repair and refinishing procedures should be provided, following the format in this document.

1.1 **Purpose—**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 (SMC), and fiber-reinforced plastic (FRP). This document is intended to guide vehicle manufacturers, material suppliers, and equipment suppliers in providing timely repair information to repairers and insurers. Providing this information prior to vehicle introduction is necessary to allow damaged vehicles to be restored to their pre-accident condition.

2. ***References***

2.1 **Applicable Publications—**The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1344—Marking of Plastic Parts
SAE J2376—New-Vehicle Collision Repair Information

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).

4. ***Publication Requirements—***Requirements should conform to SAE J2376.

TO PLACE A DOCUMENT ORDER:
Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: custsvc@sae.org
SAE WEB ADDRESS: http://www.sae.org

5. Technical Contents

5.1 Regardless of the repair method used, refer to the product supplier's instructions for proper application of the product being used.

5.2 Safety Precautions—Include special warnings and procedures, related to vehicle repair, to avoid personal injury and property damage. It is not necessary to include standard industrial safety practices.

5.2.1 PERSONAL PROTECTION—Include recommended safety equipment and precautions.

5.2.2 HAZARDOUS MATERIALS—Include information on use of Material Safety Data Sheets, handling and disposal.

5.3 Tools and Materials—Include information on recommended tools and materials.

5.4 Plastic Identification—Include methods of and special procedures for material identification. Examples include consulting manufacturer's literature; locating ISO codes for plastic type on the back of the part (requires part removal); conducting a "floater test", or conducting a visual inspection. Consult SAE J1344 for additional information.

5.5 Inspection for Damage—Include information on conducting visual inspections, identifying the type of damage, and determining the appropriate repair procedure (i.e., one-sided versus two-sided repair).

5.6 Pre-Conditioning of Parts—Include information on recommended temperature and humidity conditions parts should be brought to before beginning repairs.

5.7 Cleaning—Include information on recommended cleaning materials and techniques, including the use of adhesion promoters or surface modifiers.

5.8 Removal of Distortion—Include information on recommended equipment and techniques to remove distortions in flexible plastic parts, including hot water, hot-air guns or infrared lamps.

5.9 Grinding/Sanding—Include information on recommended grits, featheredging techniques, size and shape of V-grooves, size of the area to be ground or sanded adjacent to the damaged area, how to stop running cracks in SMC panels, sanding psi and recommended sanding equipment.

5.10 Surface Preparation—Include information on recommended adhesion promoters or surface modifiers and flame treating.

5.11 Alignment and Clamping—Include information on recommended alignment and clamping techniques.

5.12 Structural Reinforcement—Include information on types of materials, application techniques, recommended sizes, and fabrication of backing (pyramid) patches and bridging strips.

5.13 Repair Materials—Include information on recommended types of materials, mixing, application tools and techniques, and recommended curing conditions.

5.14 Sanding—Include information on recommended grits, tools and techniques.

5.15 Bonding—Include information on types of bonding materials, tools, removal of bonded components, surface preparation, and application techniques.

5.16 Plastic Welding—Include information on recommended equipment, welding tips, welding rod material compatibility, conducting a rod adhesion test, types of weld joints, operating temperatures, pre-heating of glass-reinforced thermoplastics, sectioning of damaged parts, application techniques, cooling of the joints, and inspection of weld quality.

5.17 Refinishing—Include information on degreasing/cleaning, surface preparation, application of fillers, primer-surfacers, and adhesion promoters, use of flexible additives, masking, application of basecoat/clearcoat, number of coats, and curing conditions.

6. Notes

6.1 Marginal Indicia—The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE OEM PLASTIC PARTS COMMITTEE OF THE
SAE VEHICLE SERVICE DEVELOPMENT DIVISION

APPENDIX A

A.1 Typical Flexible Thermoplastic Repair Procedure

A.1.1 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 two-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.

A.2 Repair Procedures

A.2.1 Preparation—Cosmetic damage to plastic parts like bumper covers is very common. The puncture in Figure A1 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.

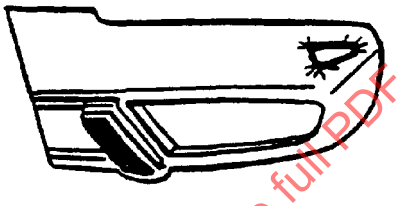

FIGURE A1—PLASTIC BUMPER COVER DAMAGE

A.2.2 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 two-part (2K) repair adhesive or plastic welding. Note that instructions regarding cleaning vary greatly among suppliers. Supplier's instructions should first be followed. 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. However, if there is the potential that the repair will produce read-through, form a tapered, rather than a vee groove. The paint is then featheredged back using a grade 180 disc on a random orbital (R/O) sander (Figure A2).

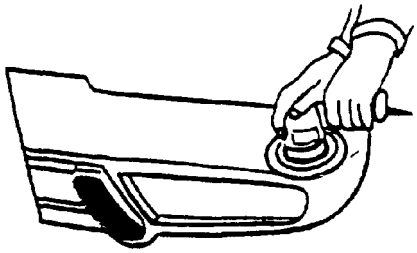

FIGURE A2—SANDING DAMAGED AREA WITH A R/O SANDER

A.2.3 Structural Reinforcement—If structural reinforcement is required, the use of fiberglass cloth reinforcing tape or cloth saturated with two-part (2K) repair adhesive applied to the back of the repair is recommended. Clean the backside of the plastic component using soap and water and a plastic cleaner. Next grind 51 mm (2 in) beyond the back edge of the damaged area with a grade 36 or 80 disc. Apply two-part (2K) adhesive to a piece of fiberglass cloth and apply it to the backside of the repair. Apply additional coats of the two-part (2K) repair adhesive to the glass cloth and surrounding surface and allow to cure (Figure A3).

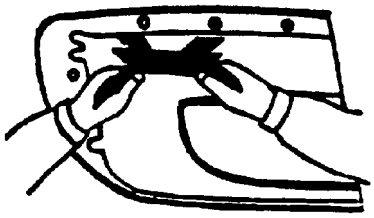

FIGURE A3—APPLICATION OF FIBERGLASS CLOTH TO BACKSIDE OF COVER

A.2.4 Repair—Mix and apply the two-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 A4).

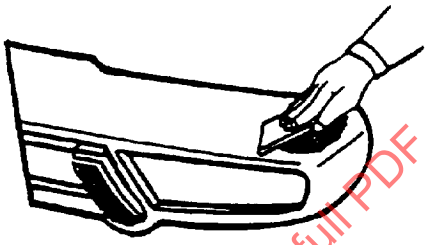

FIGURE A4—APPLICATION OF REPAIR ADHESIVE

After the repair material has cured, it should be sanded with a dual-action random orbital (R/O) sander using grade 80 and 180 discs (Figure A5) 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 should be wiped off with a tack cloth and the surface cleaned with a plastic cleaner. (Figure A6)

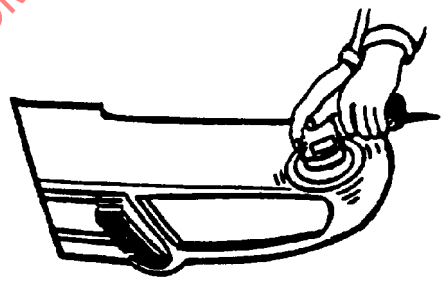

FIGURE A5—SANDING THE REPAIR MATERIAL

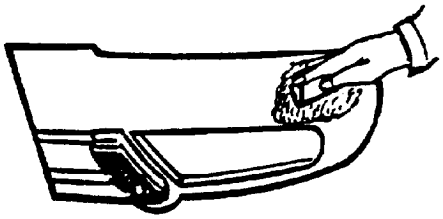

FIGURE A6—REMOVAL OF SANDING DUST

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 two-part (2K) repair material. Be careful to use only adhesion promoters when called for by the adhesive supplier, and one that is designed for the particular repair system. 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 two-part (2K) repair material. If the plastic is a polyolefin type, an adhesion promoter is needed in order to obtain adequate adhesion between the two-part (2K) repair material and the plastic substrate.

A.2.5 Refinishing—The refinishing procedures for flexible components may require 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.

Follow paint manufacturer's instructions when refinishing plastics.

APPENDIX B

B.1 Typical Rigid Plastic Repair Procedure - Sheet-molding compound and fiber-reinforced plastics (SMC and FRP)

B.1.1 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 two-part (2K) primer. Use a cut-off wheel for cutting new replacement panels to size. If reinforcing fibers are showing, do not clean the fiber area with any liquids, soap, water or plastic cleaner. Wipe the surface, or use air to clean. 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 0.95 to 1.27 cm 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. Follow the manufacturer's instructions for open time, work time, clamp time and cure time.

B.1.2 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 5 cm. If reinforcing fibers are showing, do not clean the fiber area with any liquids, soap, water or plastic cleaner. Wipe the surface, or use air to clean. 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 sheet moulding compound (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 B1)

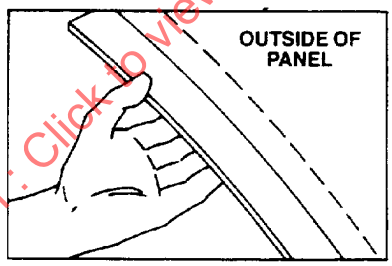

FIGURE B1—ASSEMBLE AND POSITION BONDING STRIPS

Remove any adhesive, which may have squeezed out onto the panel or exposed portion of the bonding strips, allowing adhesive to cure, per the adhesive manufacturer's recommendations, before continuing with the structural repair. Next, apply sheet moulding compound (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 completely cure per the manufacturer's instructions before continuing with the cosmetic exterior repairs.

B.1.3 Cosmetic Repairs—To avoid bond lines (where panels meet), and if no reinforcing fibers are exposed, clean the repair area with soap and water followed by grease and wax remover or a suitable plastic cleaner. Grind sectioned areas with a 7.5 cm grade 36 disc, tapering the area on each side of the bonding strip toward the center. The tapered area should extend 3.8 cm beyond the edge of the bonding strip. If there is doubt about the presence of exposed reinforcing fibers, use only a cleaner that flashes quickly, and do not saturate the area.