SAE International

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1573 DEC2011

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Superseding J1573 OCT2008

OEM Plastic Parts Repair

RATIONALE

J1573 has been updated to reflect more current automotive plastics applications statistics and repair procedure examples which reflect the current state of plastics repair technology.

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 plastic body parts, both interior and exterior. Repair information is described for all commonly used plastics including, but not limited to, polyurethanes, polycarbonate blends, modified polypropylenes, polyethylenes and nylons. 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.

Sheet-molded compounds (SMC), fiber-reinforced plastics (FRP) and carbon fiber reinforced plastics can also be repaired using slightly different procedures and repair materials.

1.1 Purpose

The average composition of plastics and composites in U.S. vehicles has increased from approximately 230 pounds in 1995 to 350 pounds in 2008, 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 many variations of plastics and blends of plastics over the years. 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.

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http://www.sae.org/technical/standards/J1573_201112

2. REFERENCES

2.1 Applicable Documents

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 International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

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.

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

A change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.

PREPARED BY THE COLLISION REPAIR COMMITTEE
OF THE SAE SERVICE DEVELOPMENT STEERING COMMITTEE

APPENDIX A

A.1 TYPICAL PLASTIC PART REPAIR PROCEDURE (NOT FOR COMPOSITE PARTS)

A.1.1 Repairs opposite object detection sensors

Do not perform repairs in any zone that lies in the transmitting zone of an object detection sensor of any kind. A repair in these areas can compromise the performance of these systems.

A.1.2 Grinding Technique

Clean the damaged area of all dirt, grease, wax, and tar, using soap and water followed by solvent wash. Grind the damaged area with a 3", 50 grit disc, operating at 5,000 rpm and observe the sanding characteristics. If the plastic sands smoothly and cleanly, it is thermoset plastic and can be repaired using conventional two-part (2K) plastic repair materials. If the grinding causes the plastic to smear or melt, it is a thermoplastic and 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. Note that many manufacturers of repair materials now recommend using an adhesion promoter on all plastics, with the exception of composites.

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.

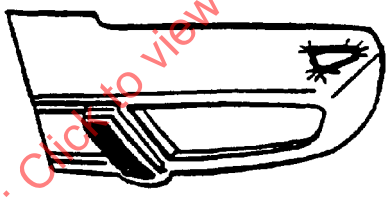

FIGURE A1 - PLASTIC BUMPER COVER DAMAGE

A.2.2 Surface Preparation

If the piece has a distortion caused by the impact, it may be necessary to apply heat using a hot-air gun, while applying pressure to the affected area. 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 plastic welding. However, if making an adhesive repair, form a tapered, or dished out area to accept the repair material, rather than a vee groove. A vee groove will result in ghosting (read through). The paint is then featheredged back using a grade 180 disc on a random orbital (R/O) sander (Figure A2).

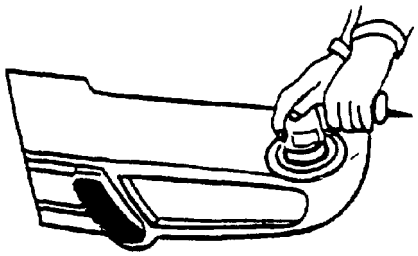

FIGURE A2 - SANDING DAMAGED AREA WITH A R/O SANDER

A.2.3 Reinforcing a Two-Sided Repair

If structural reinforcement is required, the use of fiberglass cloth reinforcing tape or fiberglass cloth/mat, 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 a light coat of adhesion promoter. 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).

There are also commercially available reinforcement patches with pre-applied adhesive.

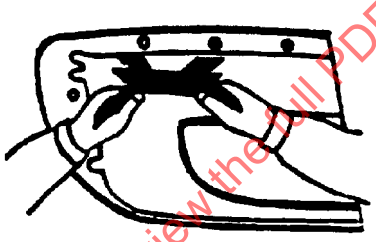

FIGURE A3 - APPLICATION OF FIBERGLASS CLOTH TO BACKSIDE OF COVER

A.2.4 Repair

Sand any repair material that may have oozed through to the front side of the repair area, blow and/or wipe off any dust.. Be sure that the repair area has been properly dished out and any paint feathered back from the repair area. Apply adhesion promoter and allow it to flash off. 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.

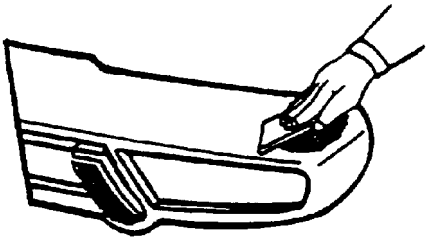

FIGURE A4 - APPLICATION OF REPAIR ADHESIVE

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 blown and/or wiped off with a tack cloth, and the surface cleaned with a plastic cleaner. (Figure A6)

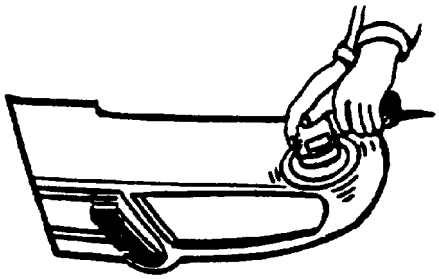

FIGURE A5 - SANDING THE REPAIR MATERIAL

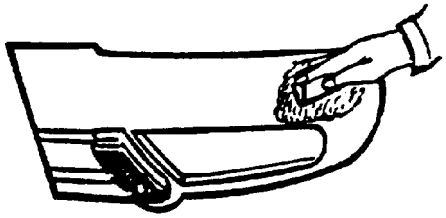

FIGURE A6 - REMOVAL OF SANDING DUST

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 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. Another critical point is the welding temperature. If the temperature is too high, the material will be damaged; however, if the temperature is too low, the welding rod and the piece to repair won't be mixed. To achieve a good repair, it is also important to take into account the pressure applied on the welding rod. To restore the contour and surface apply 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.

A.3 TYPICAL RIGID PLASTIC REPAIR PROCEDURE - SHEET-MOLDING COMPOUND AND FIBER-REINFORCED PLASTICS (SMC AND FRP)

A.3.1 Repairs opposite object detection sensors

Do not perform repairs in any zone that lies in the transmitting zone of an object detection sensor of any kind. A repair in these areas can compromise the performance of these systems.