

RF81

Finish Defects

**Uniform
Procedures For
Collision Repair
UPCR**

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v.4.0



1. Description

This procedure describes methods for correcting finish defects. Inspection and evaluation requirements are also included.



2. Purpose

The purpose of this procedure is to provide industry-accepted requirements for performing high-quality correction of finish defects. This procedure is intended for use by professionals who are qualified through training and experience.



3. Referenced Documents

The following documents are considered part of this procedure by reference.

3.1 Procedures

- HM01 Hazardous Materials
- PS01 Personnel Safety
- RF01P Surface Preparation
- RF01S Surface Preparation
- RF11 Masking
- RF21 Finish Removal
- RF41 Finish Application

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3. Referenced Documents (cont'd)

3.2 Other Information

- Equipment-specific information
- Product-specific information
- Vehicle paint code information
- Vehicle-specific repair information



4. Equipment And Material Requirements

4.1 Equipment

The use of this equipment is included in this procedure:

- rotary buffer
- vacuum sanding system
- dual-action (DA) sander
- paint thickness gauge
- magnifying glass or low power microscope

4.2 Materials

The use of these materials is included in this procedure:

- clay products
- dry and wet sandpaper
- plastic razor blades
- backing pads for sanding
- sanding blocks and nib files
- oxalic and phosphoric/sulfuric acid solutions
- compounds
- polishes
- buffing pads
- wax and grease remover
- baking soda



5. Damage Analysis

5.1 Finish Defects

Clean the vehicle with a pH-neutral soap and water. Rinse and wipe dry. Then inspect the finish for defects. Determine if the defect can be removed without refinishing.

5.2 Excess Film Thickness

Check the paint film thickness on several areas of the vehicle with a paint thickness gauge. If the average thickness exceeds 250 microns (10 mils), the excess finish must be removed. If too much clearcoat is removed, it must be refinished.

Conventional film thickness gauges do not work on plastic parts. Because plastic parts are sensitive to excessive film build, determine if the part has been previously refinished. If the part has been refinished plan to remove all coatings or replace the part.



6. Personnel Safety

6.1 General Safety

General safety information is in **PS01**.

6.2 Safety With Finishing Materials

To prevent injury when working with finishing materials:

- Wear the proper respirator. A properly fitted, positive-pressure, fresh air-supplied respirator is required when working with materials that contain isocyanates.
- Wear solvent-resistant gloves and a paint suit to avoid skin contact with solvents or vapors.
- Wear eye protection when mixing or applying paint materials.
- Refer to the MSDS sheet and container label for all products used. Make sure the MSDS is readily available for emergency situations.
- Clean up spills promptly. Refer to the MSDS for the proper cleanup procedures.
- Do not eat, drink, or smoke in the work area.
- Do not store flammable materials near heat or ignition sources.
- Do not use thinner, gasoline, or other solvents to clean hands, etc.
- Wear neoprene, or acid-resistant, gloves, coveralls, and eye protection when using acid-based materials.
- Work in a well-ventilated area.

Follow the paint maker's recommendations when cleaning and wiping plastics, to avoid the build-up of static electricity.

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6. Personnel Safety (cont'd)

6.3 Safety When Machine Sanding

To prevent injury when machine sanding:

- Wear protective clothing, goggles, gloves, and a NIOSH-approved particle respirator or dust mask.
- Work in a well-ventilated and well-lighted area.
- Direct the dust away from the face and toward the floor.
- Be aware of the air hose or electrical cord location at all times.
- Do not stand in water.
- Do not use compressed air to blow dust off the vehicle.
- Use a vacuum sanding system, when available.

6.4 Safety When Buffing

To prevent injury when buffing a finish:

- Wear protective clothing, goggles, gloves, and a NIOSH-approved particle respirator or dust mask.
- Work in a well-ventilated and well-lighted area.
- Be aware of the air hose or electrical cord location at all times.
- Do not stand in water.



7. Environmental Safety

7.1 Hazardous Materials

Hazardous material safety information is in **HM01**.

7.2 Finishing Materials

These finishing materials may be considered hazardous waste and should be disposed of following environmental regulations:

- masking containing buffing or sanding residue
- cleaning solvents
- any cloths that contain finishing materials or chemicals



8. Vehicle Protection

8.1 Adjacent Areas

Protect adjacent areas while correcting finish defects. See **RF11**.

8.2 Buffing

To protect finishes when buffing:

- Use only clean buffing pads.
- Do not remove more than 13 microns (.5 mil) of paint film.
- Control the buffer by lifting the pad only about 5° to change direction.
- Avoid creating excessive heat, unless specified by the product maker.
- Do not buff rail dust or other hard particles imbedded in the finish.
- Prevent jewelry, watches, belt buckles, etc. from scratching the vehicle.
- Protect panel edges by masking.
- Ground the vehicle.

8.3 Machine Sanding

To protect the vehicle when machine sanding:

- Keep the sander moving on the surface.
- Remove dirt caught between the finish and the sandpaper.
- Do not machine sand too close to trim and moldings.
- Do not machine sand body style lines or panel edges.
- Protect or remove trim, decals, glass, and emblems. See **RF11**.
- Do not remove body filler.
- Avoid removing any zinc coating.
- Do not use compressed air to blow dust off the vehicle.
- Use vacuum sanding equipment, when available.
- Immediately protect bare metal parts from flash corrosion. See **RF01S**.



9. Repair Procedure

Determine the type of defects to be corrected. Use the following index to find the appropriate procedures:

- Acid rain, **9.9**.
- Blistering, **9.6**.
- Industrial fallout, **9.11**.
- Organic Damage, **9.10**.
- Overspray, **9.7**.
- Oxidation, **9.15**.
- Poor adhesion problems and paint cracking, **9.5**.
- Rail dust, **9.12**.
- Rust spots, **9.14**.
- Surface stains, **9.13**.
- Water spots, **9.8**.

9.1 Removing Minor Paint Defects

To remove minor paint defects:

- 1. Refer to the paint maker's time window for the recommended time limits for correcting the defects.
- 2. Use a paint thickness gauge to measure the film thickness at several locations in the affected area. Record the film thicknesses.
- 3. If there is sufficient film thickness, determine the least aggressive method that can be used for removing the paint defect. Prepare to sand if the defect requires leveling the surface. For wet sanding, see **9.2**. For dry sanding, see **9.3**. For buffing, see **9.4**.

9.2 Wet Sanding

To remove minor paint defects by wet sanding:

- 1. Select the sandpaper or sanding nib blocks for the size and type of repair. Use the least aggressive grit first.
- 2. Soak the wet sandpaper or nib blocks in a pH-neutral soap and water before use. Some products do not require soaking. Follow the product maker's recommendations.
- 3. Prepare to keep the surface wet with clean water.
- 4. Sand, using short strokes to keep the repair area as small as possible. If using sanding nib blocks, use a small circular motion. If using sandpaper, use a sponge backing pad and sand in only one direction.
- 5. Check progress often by rinsing and removing the sludge and water with a rubber squeegee.
- 6. Use a more aggressive grit if the defect is not being removed after several rinses.
- 7. Remove sandscratches with progressively finer grits.

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9. Repair Procedure (cont'd)

- 8. Recheck film thickness and perform a visual inspection to ensure sufficient film thickness remains.
- 9. Remove sandscratches by buffing with a compound or polish. See **9.4**.

9.3 Dry Sanding

To remove minor paint defects by dry sanding:

- 1. Select a fine-grit sandpaper and method for the size and type of repair. Use the least aggressive grit first.
- 2. Sand the defect.
- 3. Sand, keeping the repair area as small as possible. If hand sanding, use a backing pad or block.
- 4. Check progress often.
- 5. Use a more aggressive grit if the defect is not being removed.
- 6. Remove sandscratches with progressively finer grits.
- 7. Recheck the film thickness and perform a visual inspection to ensure sufficient film thickness remains.
- 8. Remove sandscratches by buffing with a compound or polish.

9.4 Buffing

To remove minor paint defects by buffing:

- 1. Remove all sanding dust or residue, if necessary.
- 2. Wash the vehicle with a pH-neutral soap and water. Rinse and wipe dry.
- 3. Ground the vehicle.
- 4. Clean with the recommended wax and grease remover and wipe dry.
- 5. Remove or protect adjacent areas or parts as necessary.
- 6. Protect panel edges by masking.
- 7. Select the least aggressive compound or polish that will remove the defect.
- 8. Use the type of buffing pad recommended by the product maker. Make sure the buffing pad is clean.
- 9. Apply the compound or polish to the pad. Prime the pad by spreading the material around on the surface.
- 10. Buff, following the line of sight. Use a continuous motion. Do not shut off the machine on the surface. Buff using speeds up to 2000 rpm, depending on the product maker's recommendation.
- 11. Remove swirl marks using a less-aggressive pad and product.
- 12. Check the finish thickness and compare with the readings recorded in **9.1**. If more than 13 microns (.5 mil) of film thickness was removed, refinishing may be necessary.
- 13. Hand polish the surface using a suitable polishing cloth.

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9. Repair Procedure (cont'd)

9.5 Poor Adhesion, Cracking, Or Checking

To correct a finish with poor adhesion, cracking, or checking:

- 1. Wash the vehicle with a pH-neutral soap and water. Rinse and wipe dry.
- 2. Clean the affected area with wax and grease remover and wipe dry.
- 3. Remove the defective finish down to a sound substrate. On steel surfaces, avoid removing any zinc coating.
- 4. Protect bare metal surfaces. Follow the paint and vehicle makers' recommendations.
- 5. Prepare the surface for refinishing.

9.6 Blistering

To correct blistering in the finish:

- 1. Wash the vehicle with a pH-neutral soap and water. Rinse and wipe dry.
- 2. Clean the affected area with wax and grease remover and wipe dry.
- 3. Sand the finish to remove the blister.
- 4. Prepare the surface for refinishing.

9.7 Overspray

To remove overspray:

- 1. Wash the affected area with a pH-neutral soap and water. Rinse and wipe dry.
- 2. Clean the affected area with wax and grease remover and wipe dry.
- 3. Remove any remaining overspray using a clay product, or by sanding or buffing. Use the least aggressive method first. Switch to a more aggressive product if necessary.
- 4. Buff with a mild polish to restore the gloss.

9.8 Water Spots

To correct water spotting:

- 1. Wash the vehicle with a pH-neutral soap and water. Rinse and wipe dry.
- 2. If spots remain, use a paint thickness gauge to measure the film thickness at several locations in the affected area. Record the film thicknesses.
- 3. If there is sufficient film thickness, buff with a mild compound or polish. Use the least aggressive method first. Switch to a more aggressive product if necessary.
- 4. Remove or protect adjacent areas or parts as necessary.
- 5. Buff with a mild polish to restore the gloss. See **9.4**.
- 6. Check the finish thickness and compare with the readings in step 2. If more than 13 microns (.5 mil) of film thickness was removed, refinishing may be necessary. Follow the paint and vehicle makers' recommendations.

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9. Repair Procedure (cont'd)

9.9 Acid Rain

To correct acid rain damage:

- 1. Wash the vehicle with a pH-neutral soap and water. Rinse and wipe dry.
- 2. If spots remain, neutralize the surface following the vehicle or paint makers' recommendations.
- 3. Rinse with clear water and wipe dry.
- 4. Use a paint thickness gauge to measure the film thickness at several locations in the affected area. Record the film thicknesses.
- 5. If severe damage exists, the repair process may be sped up by sanding the affected area with 1500–2000 grit wet/dry sandpaper that has soaked in a pH-neutral soap and water for a minimum of 1 hour.
- 6. Remove or protect adjacent areas or parts as necessary.
- 7. If there is sufficient film thickness, buff with a mild compound or polish. Use the least aggressive method first. Switch to a more aggressive product if necessary.
- 8. Buff with a mild polish to restore the gloss. See 9.4.
- 9. Check the finish thickness and compare with the readings in step 4. If more than 13 microns (.5 mil) of film thickness was removed, refinishing may be necessary.

9.10 Organic Damage

To correct organic damage, such as bird droppings, tree sap, etc.:

- 1. Wash the vehicle with a pH-neutral soap and hot water. Rinse and wipe dry.
- 2. If there are particles on the surface, remove them with a non-aggressive tool or product. Carefully follow the product maker's recommendations.
- 3. If defects remain, use a paint thickness gauge to measure the film thickness at several locations in the affected area. Record the film thicknesses.
- 4. Remove or protect adjacent areas or parts as necessary.
- 5. If there is sufficient film thickness, buff with a mild compound or polish. Use the least aggressive method first. Switch to a more aggressive product if necessary.
- 6. Buff with a mild polish to restore the gloss. See 9.4.
- 7. Check the finish thickness and compare with the readings in step 3. If more than 13 microns (.5 mil) of film thickness was removed, refinishing may be necessary.

9.11 Industrial Fallout

To correct industrial fallout stains:

- 1. Wash the vehicle with a pH-neutral soap and hot water. Rinse and wipe dry.
- 2. Clean the affected area with wax and grease remover and wipe dry.
- 3. If there are particles on the surface, remove them using overspray clay or other non-aggressive products. Carefully follow the product maker's recommendations.

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9. Repair Procedure (cont'd)

- 4. If there are spots, or residue on the finish, use a paint thickness gauge to measure the film thickness at several locations in the affected area. Record the film thicknesses.
- 5. Remove or protect adjacent areas or parts as necessary.
- 6. If there is sufficient film thickness, buff with a mild compound or polish. Use the least aggressive method first. Switch to a more aggressive product if necessary.
- 7. Buff with a mild polish to restore the gloss. See 9.4.
- 8. Check the finish thickness and compare with the readings in step 4. If more than 13 microns (.5 mil) of film thickness was removed, refinishing may be necessary.

9.12 Rail Dust

To remove rail dust, or iron particles imbedded in the finish:

- 1. Wash the vehicle with a pH-neutral soap and hot water. Rinse and wipe dry.
- 2. Clean the affected area with wax and grease remover and wipe dry.
- 3. Apply a properly diluted solution of oxalic acid or phosphoric/sulfuric acid. Carefully follow the product and vehicle makers' recommendations for applying and neutralizing the acid.
- 4. If spots remain, use a paint thickness gauge to measure the film thickness at several locations in the affected area. Record the film thicknesses. Determine if there is sufficient film thickness to allow buffing.
- 5. Remove or protect adjacent areas or parts as necessary.
- 6. Buff with a mild compound or polish. Use the least aggressive method first. Switch to a more aggressive product if necessary.
- 7. Buff with a mild polish to restore the gloss. See 9.4.
- 8. Check the finish thickness and compare with the readings in step 4. If more than 13 microns (.5 mil) of film thickness was removed, refinishing may be necessary.

9.13 Surface Stains

If the surface stain was caused by battery acid or brake fluid, the finish may have to be completely removed.

To remove surface stains in the finish:

- 1. Wash the vehicle with a pH-neutral soap and water. Rinse and wipe dry.
- 2. Clean the affected area with wax and grease remover and wipe dry.
- 3. If stains remain, neutralize the surface following the paint or vehicle maker's recommendations. If a baking soda and water solution is recommended, use 16 milliliters of baking soda per liter of water (one tablespoon per quart).
- 4. Rinse with clear water and wipe dry.
- 5. If stains remain, use a paint thickness gauge to measure the film thickness at several locations in the affected area. Record the film thicknesses.

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9. Repair Procedure (cont'd)

- 6. If there is sufficient film thickness, buff with a mild compound or polish. Use the least aggressive method first. Switch to a more aggressive product if necessary.
- 7. Buff with a mild polish to restore the gloss. See **9.4**.
- 8. Check the finish thickness and compare with the readings in step 5. If more than 13 microns (.5 mil) of film thickness was removed, refinishing may be necessary.

9.14 Rust Spots

To correct rust spots on a steel substrate:

- 1. Wash the vehicle with a pH-neutral soap and water. Rinse and wipe dry.
- 2. Clean the affected area with wax and grease remover and wipe dry.
- 3. Remove the finish and all corrosion down to bare metal in the affected area.
- 4. Protect the bare metal surfaces. Follow the paint or vehicle maker's recommendations.
- 5. Prepare the surface for refinishing.

9.15 Oxidation

To correct paint film oxidation:

- 1. Wash the vehicle with a pH-neutral soap and hot water. Rinse and wipe dry.
- 2. Clean the affected area with wax and grease remover and wipe dry.
- 3. Use a paint thickness gauge to measure the film thickness at several locations in the affected area. Record the film thicknesses.
- 4. If there is sufficient film thickness, buff with a mild compound or polish. Use the least aggressive method first. Switch to a more aggressive product if necessary.
- 5. Buff with a mild polish to restore the gloss. See **9.4**.
- 6. Check the finish thickness and compare with the readings in step 3. If more than 13 microns (.5 mil) of film thickness was removed, refinishing may be necessary.



10. Use Of Recycled (Salvage) Parts

Does not apply.



11. Inspection And Testing

11.1 Corrected Finish

Inspect the corrected finish for these conditions:

- defect completely removed
- no sandscratches
- no swirl marks
- consistent gloss
- consistent paint texture
- proper film thickness

Correct any defects.