

# Paint damage, paint defects and environmental effects.



Spies Hecker – simply closer.





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# Paint damage, paint defects and environmental effects.

The examples and suggestions in this booklet are intended to help you prevent paint defects, identify environmental effects and produce nothing but immaculate paint finishes.

We wish you continued success!



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# Identifying and remedying paint defects and environmental effects.

Despite careful preparation, advanced application methods and the use of high-grade paint systems, flaws in a vehicle refinish can never be entirely excluded. However, a quality paintshop today cannot afford to produce flawed paintwork.

Eliminating a defect is often troublesome and time-consuming. What are the causes? What mistakes have been made? How can such mistakes be avoided in future?

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Spies Hecker hopes that this collection of the most frequent paint defects will serve the practitioner as a handy reference source in his daily work.

Only by correctly assessing defects is it possible to eliminate the causes and effectively remedy the damage to the painted surface. In addition, paintwork may also be damaged by a whole range of environmental effects, which have to be identified and remedied.

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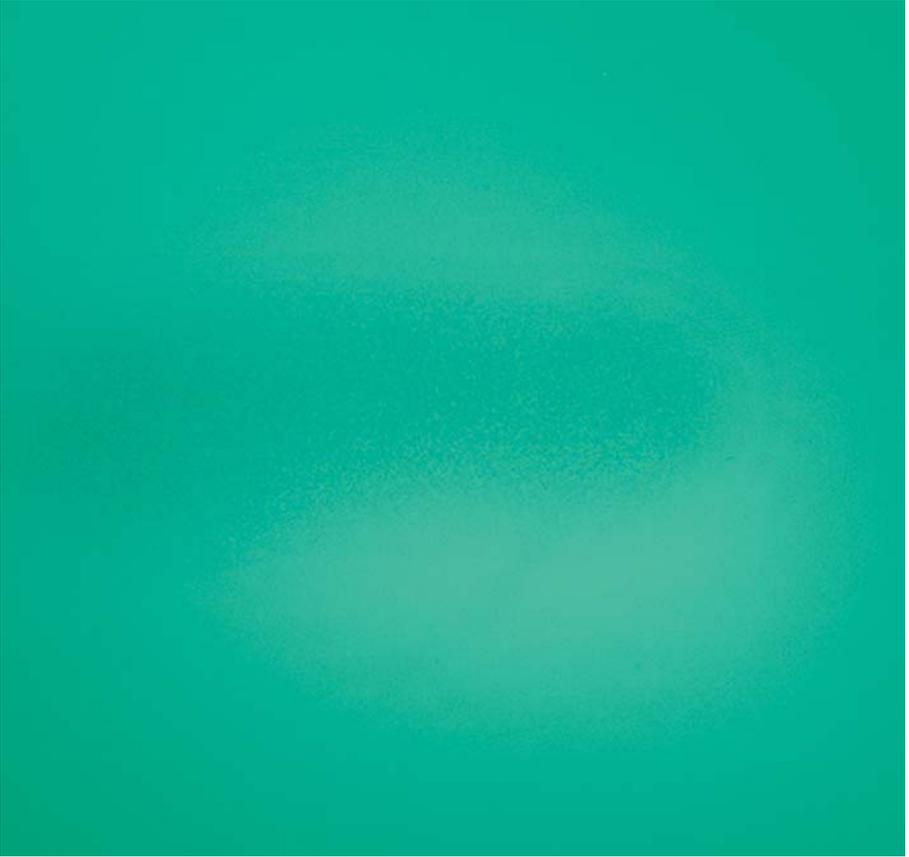
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Paint defects.



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# Poor opacity.



## Definition

- Uneven coloration.
- Substrate visible through top coat.

## Cause

- Insufficient top coat applied.
- Incorrectly produced, uneven substrate (effect finishes).

## Prevention

- Keep to the film thicknesses specified on the Technical Data Sheets.
- For low-opacity colors, use the specified surfacer.
- Spray a neutral-colored substrate.

## Remedy

- Sand the surface and respray.

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## Dirt inclusions.



### Definition

- Particles projecting through the top coat.

## Cause

- Surface not carefully cleaned.
- Faulty ceiling filters.
- Pressure in the spray booth too low.
- Unsuitable work clothes.
- Dirty spray booth.

## Prevention

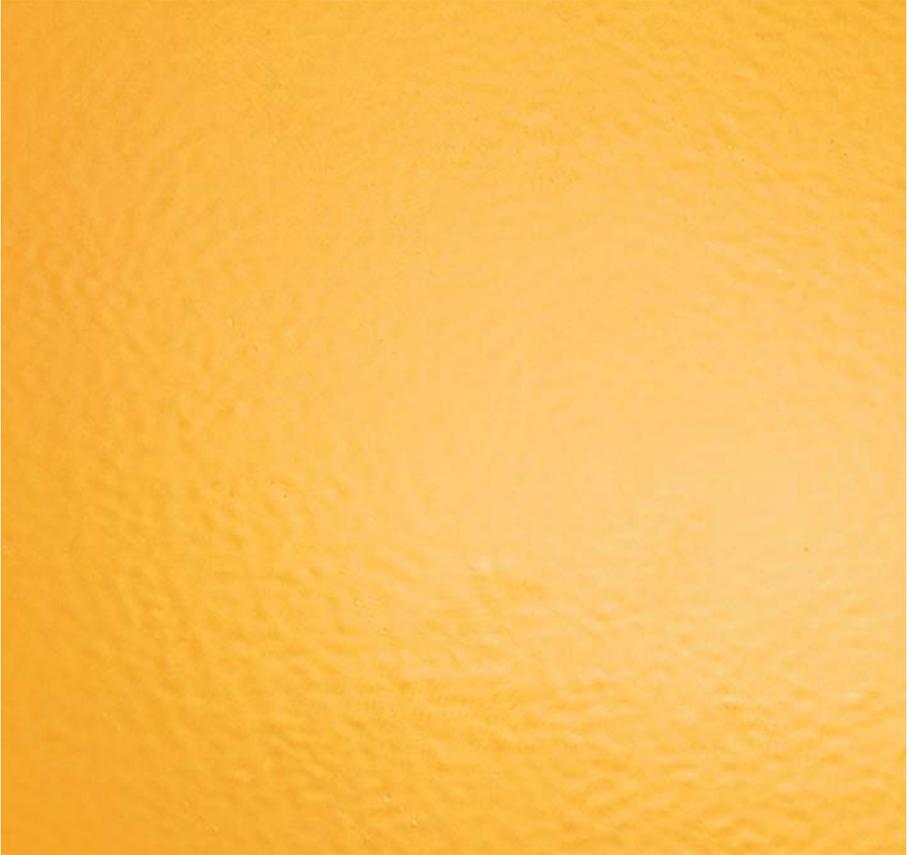
- Carefully blow off the surface, clean it and then wipe with a tack cloth.
- Check filters regularly.
- Wear lint-free overalls.
- Maintain spray booth regularly.

## Remedy

- Sand defect lightly and polish.
- Sand and respray large surfaces.

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## Orange peel / poor flow.



### Definition

- Surface texture resembling orange peel.

## Cause

- Paint viscosity too high.
- Fast, highly volatile reducers.
- Incorrect nozzle size.
- Spray gun too far from object; not enough paint applied.

## Prevention

- Set the right spray booth temperature.
- Adapt the paint system to the repair job and spray booth temperature.
- Set the right paint viscosity with a DIN viscosity cup.
- Check and maintain spraying distance (follow spray gun manufacturer's recommendations).

## Remedy

- On small surfaces, sanding and polishing are possible.
- On large surfaces, sand down the texture and respray.

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# Holograms.



## Definition

- 3D effect on dark paint surfaces on which a paint defect has been remedied.
- Mostly elliptical or circular clouding; greyish iridescence like that of an oil film.

## Cause

- Remedying of defects and dust nibs on mostly dark top coats or clear coats.

## Prevention

- Use products specified by polish manufacturer.
- Use suitable sanding materials.
- Keep to the drying times for the paint systems employed. Follow instructions on the Technical Data Sheets.

## Remedy

- Treat surface again with suitable polishes.

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## Color separation on sealant.



### Definition

- Sealant visible through top coat.

## Cause

- Sealant overpainted too soon.
- Insufficient wetting of top coat on sealant.

## Prevention

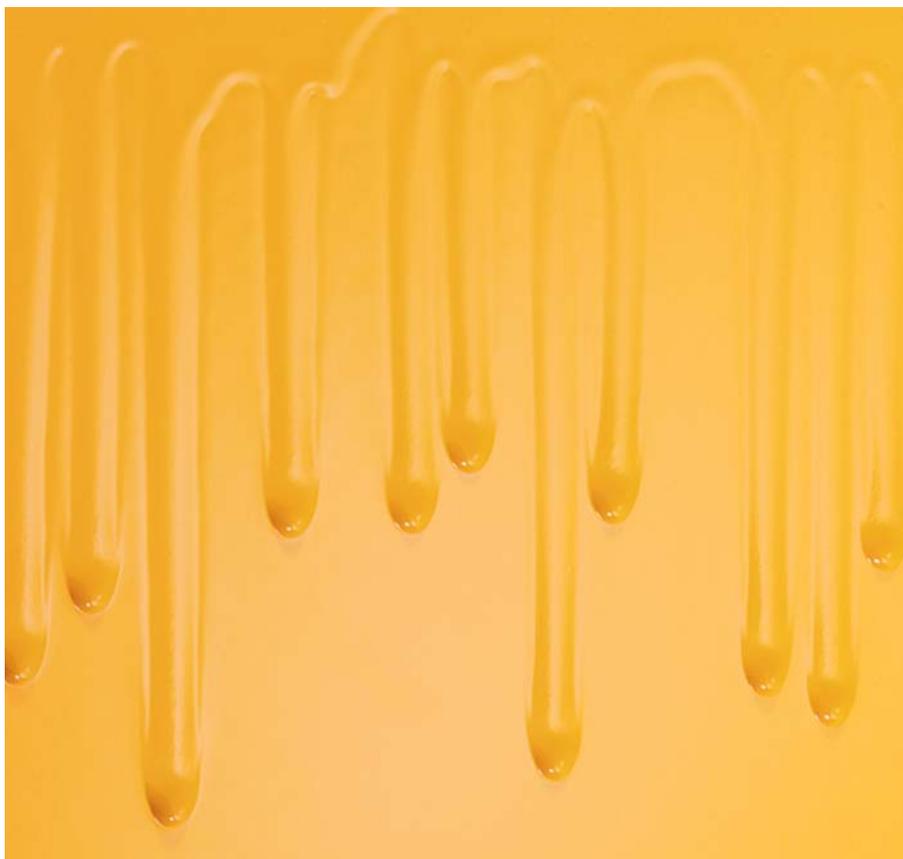
- Allow enough time for sealant to dry.
- Apply a thin initial coat of base / top coat over seals.

## Remedy

- Respray.

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# Runs.



## Definition

- Paint runs on vertical body parts.

## Cause

- Uneven paint application.
- Specified spray viscosity not observed.
- Unsuitable reducers.
- Material or spray booth temperature too low.
- Film thicknesses too high.
- Faulty spray gun (nozzle).
- Flash-off between coats too short.

## Prevention

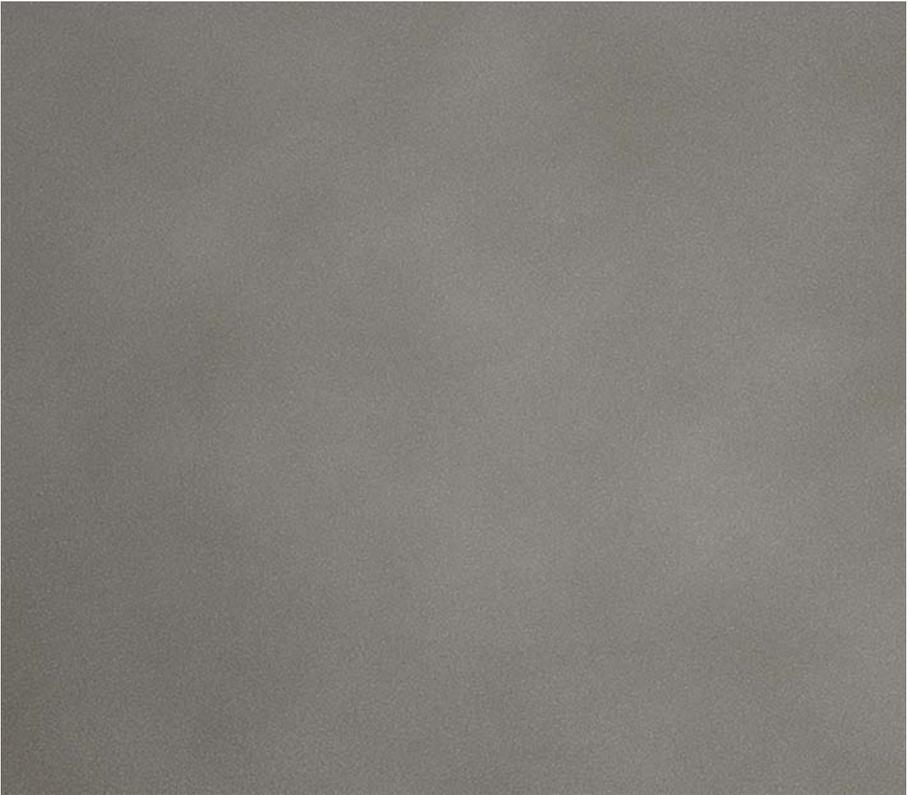
- Comply with instructions on object, paint and spray booth temperature.
- Check spraying equipment regularly.
- Mix and apply paint in accordance with the instructions on the Technical Data Sheets.

## Remedy

- After the specified drying time, flat any runs.  
If necessary, use an infrared heater for further drying and then polish.
- If the runs have been sanded right through, respray.

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# Clouding or mottling in metallic finishes.



## Definition

- Uneven color / effect.

## Cause

- Faulty spray gun (nozzle).
- Incorrect air pressure, unsuitable reducer, unsuitable spraying technique, unsuitable spray viscosity.

## Prevention

- Use mixing stick or DIN viscosity cup to obtain spray viscosity.
- Maintain spray guns regularly.
- Hold spray gun parallel to object while spraying (observe correct distance).  
Follow the spray gun manufacturer's instructions.
- Follow the application recommendations on the Technical Data Sheets.

## Remedy

- Allow clear coat to dry thoroughly, then sand the surface and respray.

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# Solvent popping.



## Definition

- Small bubbles in the top coat, some of them burst.

## Cause

- Excessive film thickness.
- Top coat not allowed to flash off long enough before forced drying.
- Specified spray viscosity not observed.
- Unsuitable hardener or reducer.

## Prevention

- Apply paint in normal film thicknesses.
- Keep to specified flash-off times.
- Follow the instructions on spray viscosity, hardeners and reducers on the Technical Data Sheets.

## Remedy

- Sand the affected areas lightly with a sanding pad and respray within 24 hours.  
Do not sand pop marks open.
- Where there are large bubbles / pop marks, sand down the surface completely and reapply the paint system.

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## Edge mapping.



### Definition

- Edges showing through in the top coat.

## Cause

- Old paintwork not sanded down smoothly at the edges.
- Putty and surfacer applied on top of elastic factory finish.
- Surfacer sanded and recoated before it had fully dried.
- Substrate not completely dry.
- Priming material applied in excessive film thickness and not allowed to dry properly.

## Prevention

- Carry out a solvent test on the substrate (elastic / hard).
- Apply putty to bare metal only.
- On elastic substrates apply surfacer to complete panels.

## Remedy

- After the top coat has fully dried, fine-sand and polish.
- Sand, isolate with a surfacer and spray again.

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# Polyester bleeding.



## Definition

- Discolored patches in metallic finishes.

## Cause

- Too much hardener in the polyester putty.

## Prevention

- Isolate areas of putty with suitable materials.
- If necessary, use putty dispenser.
- Avoid using excessive hardener in the putty.

## Remedy

- If too much hardener was used in polyester putty, sand off polyester putty and repeat application using correct putty / hardener ratio.

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# Water spotting.



## Definition

- Marks and raised edges of water droplets on fresh finishes.

## Cause

- Warm, not fully hardened top coat spotted with water droplets, usually immediately after oven drying.

## Prevention

- Observe drying time.
- Allow object to cool after oven drying.

## Remedy

- Lightly sand and polish.
- Sand damaged area and respray.

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# Sanding marks.



## Definition

- Sanding marks with swollen edges.

## Cause

- Excessively coarse sanding materials for substrate preparation.

## Prevention

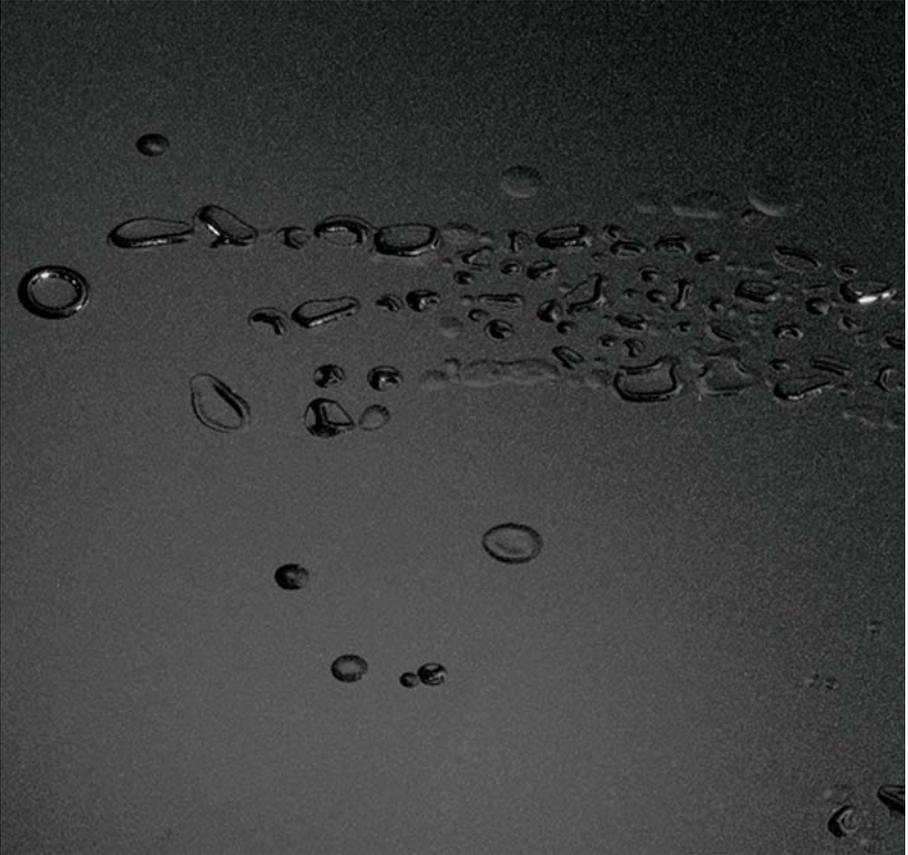
- Sand putty with P 120-180 (initial sanding) and P 240-320 (final sanding).
- Surfacers: dry P 400-500, wet P 800-1200.
- Follow instructions for substrate preparation on the Technical Data Sheets.

## Remedy

- When the top coat has fully dried, fine-sand and polish the paint surface.
- To eliminate serious damage, sand paint surface and respray.

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# Moisture blistering.



## Definition

- Small raised pimples appearing in the paint film.

## Cause

- Moisture absorbed by the substrate.
- Insufficient substrate drying after wet sanding (particularly a problem with polyester products).
- Condensation due to temperature fluctuations.
- Polyester products not isolated.
- Damp compressed air.

## Prevention

- Dry-sand and isolate polyester products.
- Ensure that the supplied compressed air is clean.

## Remedy

- Sand down the affected area completely, matt-sand the unaffected remaining surface, clean with silicone remover, apply surfacer and then respray.

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## Lifting / wrinkling.



### Definition

- Lifting / wrinkling of the paint surface.

## Cause

- Substrate solvent-sensitive or not fully cured.
- Areas where clear coat was sanded through to base coat either not isolated or isolated with an unsuitable surfacer.
- Unsuitable substrate (e.g. aerosol-can finish with TPA or nitrocellulose paints).
- Unsuitable priming materials, top coats or reducers.

## Prevention

- Carry out a solvent test on problem substrates.
- Apply several thin coats of a 2K surfacer to problem substrates and allow longer flash-off.

## Remedy

- Completely remove the fully dried area of wrinkled top coat together with the affected substrate and apply the paint system again.
- Before applying the top coat, lightly sand the entire area.

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# Pinholes.



## Definition

- Small, pinhole-like depressions.

## Cause

- Air trapped in putty.
- Excessive putty film thickness.
- Incorrect spray viscosity for surfacer materials.
- Excessive surfacer film thickness.
- Insufficient flash-off between coats.

## Prevention

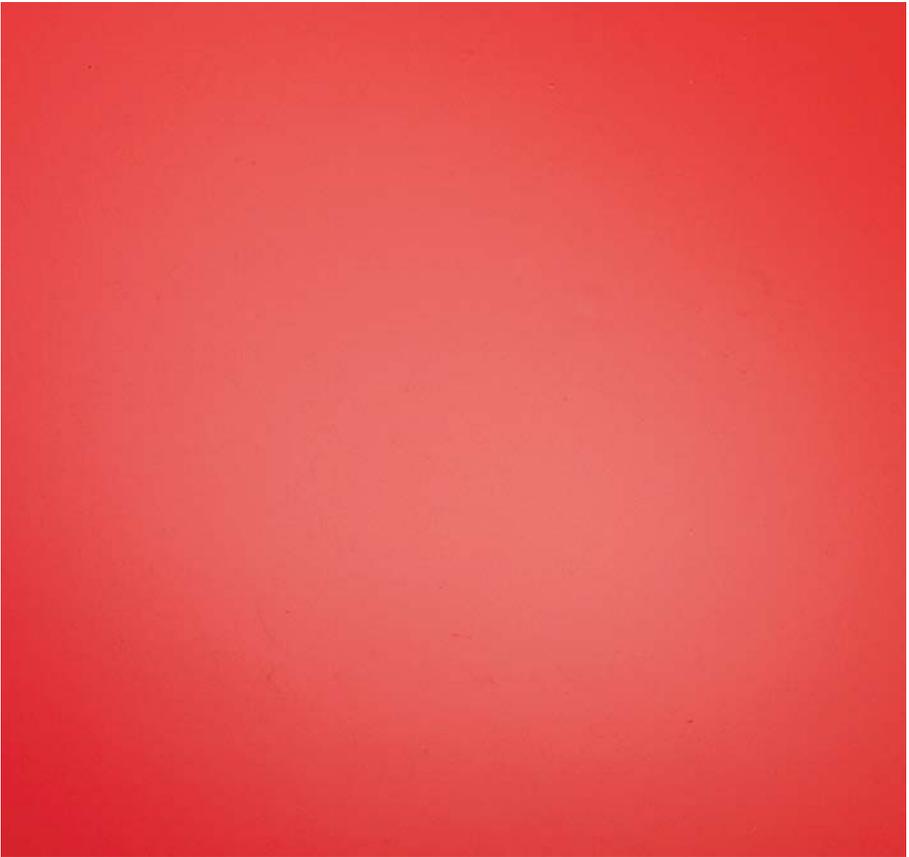
- Follow the application recommendations on the Technical Data Sheets.
- Choose the right hardener for the temperature.
- Observe flash-off times.

## Remedy

- Sand down pinholes, apply surfacer if necessary and reapply paint system.

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# Matting.



## Definition

- Loss of top coat gloss.

## Cause

- Surfacers not allowed to dry properly.
- Unsuitable reducers or hardeners.
- Hardener had already reacted with moisture.
- Poor air circulation in drying oven.
- Extraordinary climatic conditions.
- Film thickness too high or low.

## Prevention

- Keep to the
  - drying times and
  - film thicknessesspecified on the Technical Data Sheets.
- Use only the recommended reducers.
- Close hardener cans immediately after use.
- Check air circulation in drying oven.

## Remedy

- After drying, polish the affected area to a full gloss or, alternatively, lightly sand the whole surface, clean with silicone remover and respray.

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# Salt and pepper effect.



## Definition

- Black and white stippling / impurities in the base coat.

## Cause

- Material insufficiently filtered.
- Incorrect storage temperature (waterborne base coat).
- Material past end of shelf life.
- Insufficiently stirred base coat.

## Prevention

- Use a suitable strainer.
- Observe storage temperature (as given on the Technical Data Sheets).
- Stir the tinters in the mixing machine regularly.

## Remedy

- Sand and respray with uncontaminated material.

---

## Dirt and dust in the base coat.



### Definition

- Dirt particles projecting from the base coat.

## Cause

- Base coat not filtered.
- Incorrect cleaning of the surface (dirt from rebates, etc.).
- Dirt from clothing (refinisher).
- Unsuitable tack cloth / dirty spray booth and filters (ceiling, floor).

## Prevention

- Filter base coat.
- Clean surface correctly (including rebates, etc.).
- Wear clean overalls.
- Use suitable tack cloth.
- Maintain the spray booth regularly.

## Remedy

- Clean with silicone remover, tack cloth (sand if necessary) and reapply base coat.

---

## Dirt and dust in the clear coat.



### Definition

- Dirt particles projecting from the clear coat.

## Cause

- Clear coat not adequately filtered.
- Incorrect cleaning of the surface (dirt from rebates, etc.).
- Dirt from clothing (refinisher).
- Dirty spray booth and filters.

## Prevention

- Filter clear coat well.
- Clean surface correctly (including rebates, etc.).
- Wear clean overalls.
- Maintain the spray booth regularly.

## Remedy

- Sand (P 1500) and polish.
- If exceptionally contaminated, sand and then respray base coat and clear coat.

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## Poor adhesion.



### Definition

- Loss of putty adhesion on bare metal (steel, zinc or aluminum).

## Cause

- Unsuitable substrate.
- Putty overheating during IR drying.
- Insufficient substrate preparation.

## Prevention

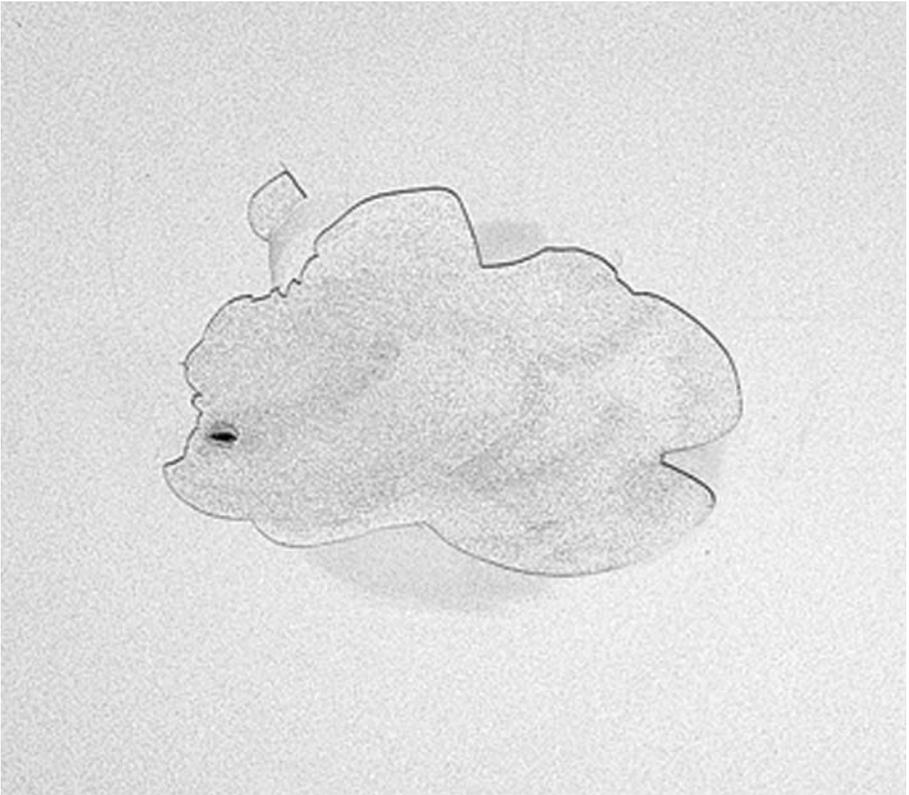
- Choose suitable putty for the substrate.
- Observe distance from heater.
- Choose correct preparation.

## Remedy

- Sand down and start again.

---

# Adhesion problems between base coat and clear coat.



## Definition

- Poor adhesion between base coat and clear coat.
- Clear coat peels off.

## Cause

- Insufficient flash-off before clear coat application.
- Base coat film too thick.

## Prevention

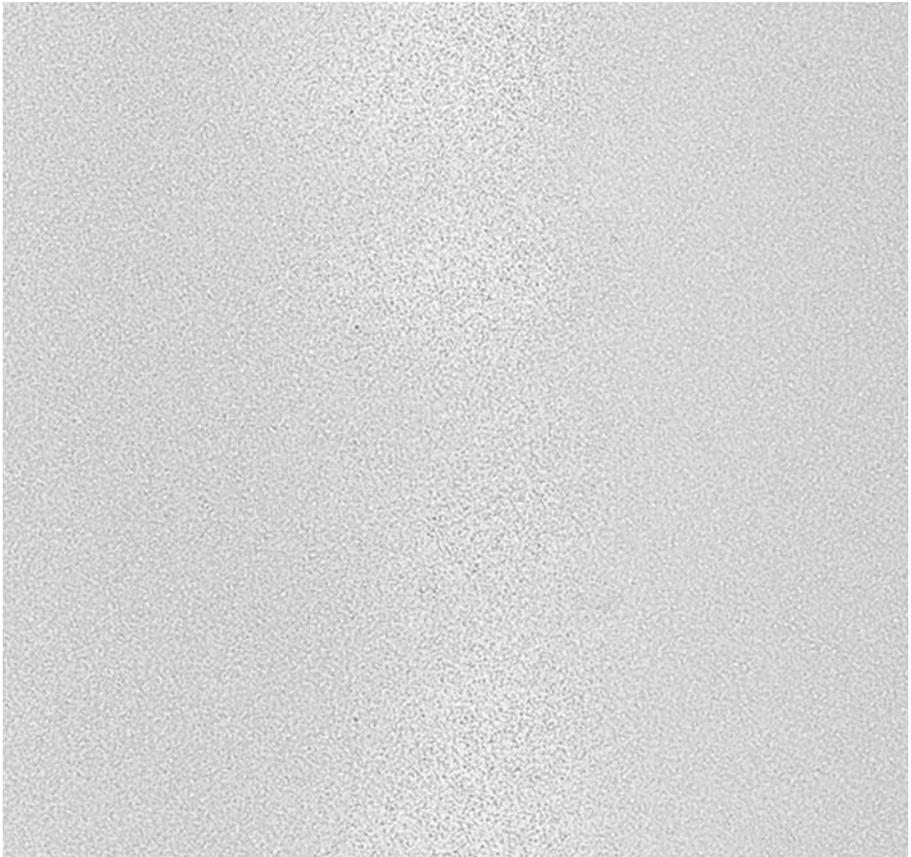
- Observe flash-off times  
(follow instructions on the Technical Data Sheets).
- Observe film thicknesses  
(follow instructions on the Technical Data Sheets).

## Remedy

- Sand and respray.

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## Halo effect in blending areas.



### Definition

- Visible edge when blending in from the base coat.

## Cause

- Edge zone sprayed too dry / wet.
- Incorrect spraying technique.
- Spraying pressure too high.
- Spray booth temperature too high.
- No blend-in additive used.

## Prevention

- Check spray booth temperature.
- Use blend-in additive in accordance with instructions on the Technical Data Sheets.

## Remedy

- Sand clear coat, and respray base coat and clear coat.

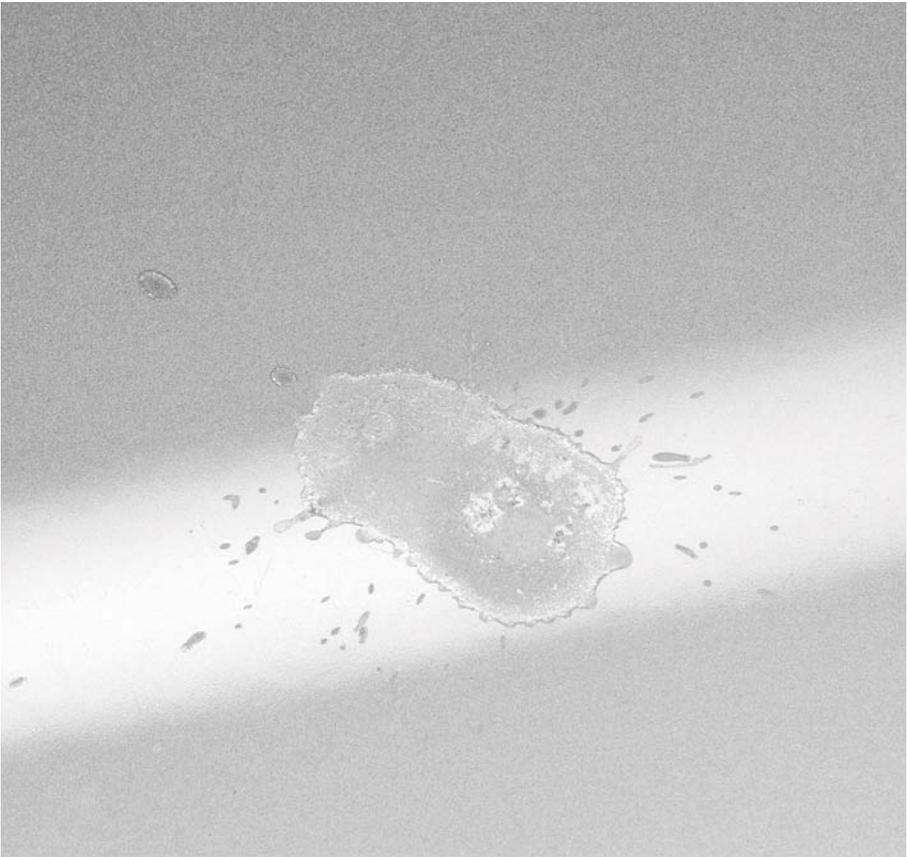


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Environmental effects.

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# Bird droppings.



## Definition

- The damage can range from paint discoloration to the film dissolving completely.
- Bubbling, swelling and etching are typical phenomena.

## Cause

- The different types of food ingested by birds affect the composition and quantity of droppings.
- Chemical aggression on the paint surface may be caused by strong organic acids acting for an extended period and exposed to high temperatures.

## Remedy

- Depending on the type of damage, the remedy ranges from polishing to a complete respray.

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# Acid rain.



## Definition

- Droplet-like spots with sunken edges or edge zones.

## Cause

- Etching of the paint surface by acid rain.
- Destruction of the paint film by the sulphurous acid or even sulphuric acid contained in acid rain.

## Remedy

- Repair paint surface by polishing.
- In the event of severe damage, a respray may be necessary.

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# Stone chipping.



## Definition

- Dot-like, angular or crater-like damage to the paint.
- Tiny impact holes in the paint surface.

## Cause

- Serious mechanical stressing of the paint surface, particularly at the front of the vehicle.
- Small stones or chippings thrown up at the paintwork by other vehicles.

## Remedy

- Local repair is possible with a brush.
- If stone chipping is widespread, sand and replace paint system.

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# Tree sap.



## Definition

- Thread or droplet-like deposits then can etch deep into the paintwork.

## Cause

- Chemical aggression from tree sap and blossom resin.

## Remedy

- Remove tree sap carefully, so as not to damage the top coat.
- Allow cloths soaked in silicone remover to act for some time, then carefully scrape off the tree sap with a plastic spatula.
- Polish (if necessary sand and polish).
- Respray if damage is serious.

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# Bug marks.



## Definition

- Etching of the top coat.
- Damage can range from loss of gloss to the complete dissolving of the top coat down to the surfacer.

## Cause

- Insect secretions reacting on exposure to moisture and heat.
- Substances allowed to act for a long time.

## Remedy

- Clean with water or silicone or tar remover.
- Polish (if necessary sand and polish).
- If the damage cannot be remedied by polishing, respray.

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# Tar.



## Definition

- Dark or yellow dot-like marks surrounded by a halo of discoloration.

## Cause

- Spots of tar diffusing into the paint film.
- Made worse by lack of care.

## Remedy

- Immediately remove with tar remover or silicone remover and then polish.
- If allowed to act for too long, respraying is the only remedy.

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# Industrial fallout.



## Definition

- Particles of rust locally visible on the top coat.

## Cause

- Chemical destruction of the paint film by the corrosion of individual rust particles on the paint film.

## Remedy

- Depending on the extent of the chemical reaction, polish (or sand and polish).
- Chemical remedy possible (please contact our Technical Service).
- Respray in the event of serious damage.

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## Splashes of lime or cement.



### Definition

- Matted surfaces with bright, whitish marks.
- Etched areas on the paint surface.

## Cause

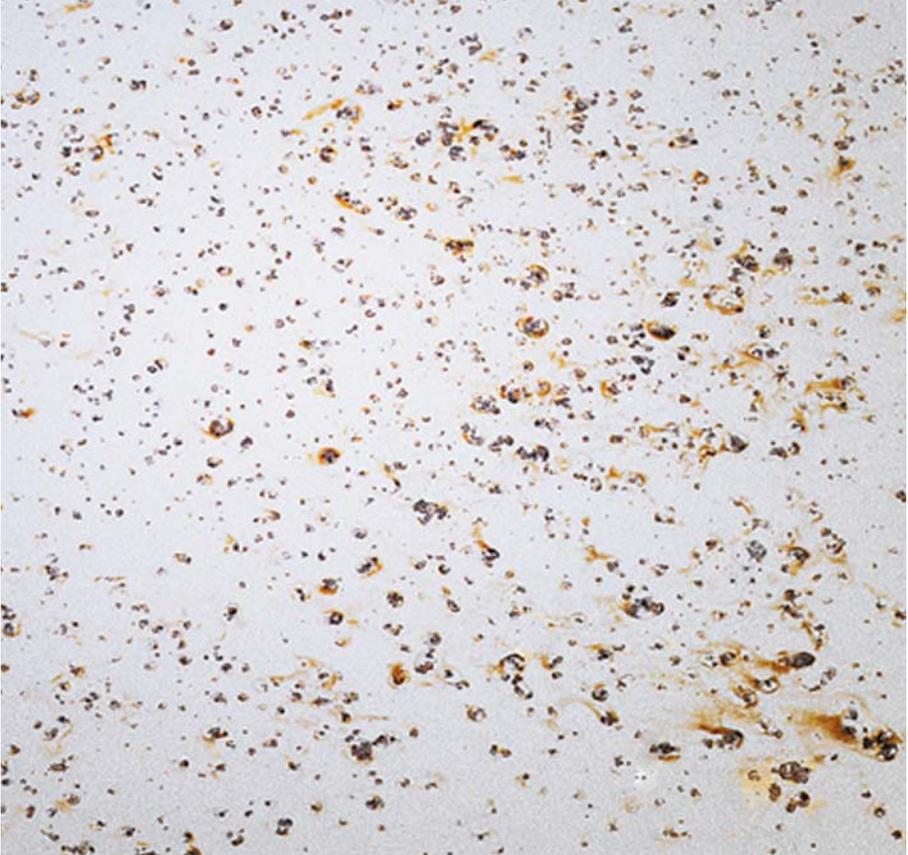
- Chemical destruction of the paint film by splashes of lime or cement.

## Remedy

- Depending on the extent of the damage, polish (or sand and polish).
- Respray if polishing does not help.

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# Corrosion.



## Definition

- Mechanical damage with rust beneath the paint film.

## Cause

- Stone chipping in conjunction with de-icing salt and moisture.
- Penetration of moisture into the damaged paint film.
- Bare metal exposed to moisture before priming.
- Inadequate vehicle care.

## Prevention

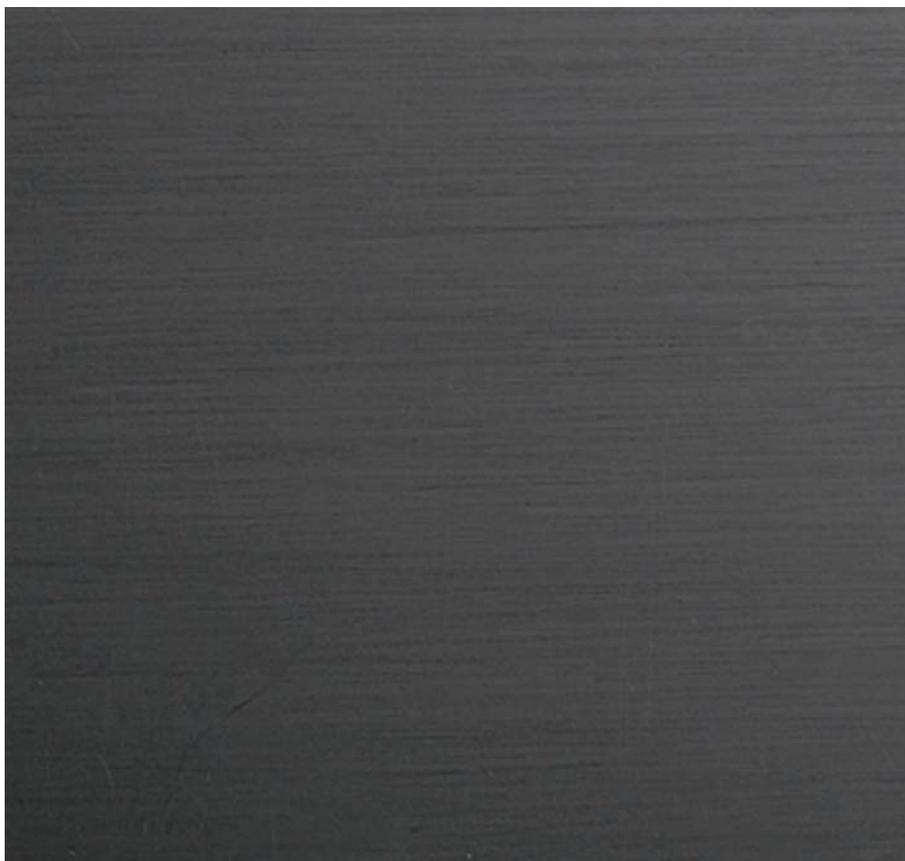
- Before priming, thoroughly clean and degrease the bare metal.

## Remedy

- Remove rust from areas of corrosion by sand-blasting, with wire brushes or with CSD cleaning discs.
- If the rust is serious, part replacement may be advisable.
- Complete new respray.

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## Car wash scratches.



### Definition

- Uniform and almost parallel scuff and scratch marks of varying depth.
- Dull paint surfaces.

## Cause

- No or insufficient prewash.
- Washing with too little water.
- Wash brushes worn or dirty.

## Remedy

- Mechanical polishing.
- Sealing the paint surface with hard wax.
- Proper car care.

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## Color fade / change.



### Definition

- White, light-colored, pale surfaces, mostly horizontal.
- Staining with discolored spots.

## Cause

- Destruction of the paint pigment by UV radiation and weathering.

## Remedy

- Respray.
- Recommended is a solid-color 2-coat system.



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Miscellaneous.



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## Plastic film marks.



### Definition

- Plastic film contact marks are clearly visible.
- Remains of film adhesive.

## Cause

- Plastic film placed too soon over paintwork that was not completely dry.

## Prevention

- Vapor-diffusing film should be used.
- Follow the instructions of the plastic film manufacturer.

## Remedy

- Remove remains of adhesive with silicone remover or other mild cleaners.
- Then polish.
- If necessary, sand surfaces and respray.

---

# Transport damage.



## Definition

- Scratch marks of varying depth.

## Cause

- Insufficient protection of factory finish during improper transport.

## Prevention

- Covering the original paintwork (plastic film or protective paint).

## Remedy

- Sand shallow scratches and polish.
- Deeper scratches require a refinish.





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