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MERCEDES-BENZ

ADVICE ON PAINT AND PAINTWORK DEFECTS
Advice on Paint and Paintwork Defects

If you need advice ...

This brochure contains information on various types of paintwork damage and paintwork defects, their causes and their remedies. The information should help you to clearly identify the cause of the damage so that you can avoid it, or help you to put it right properly.
**Definition**
Swelling and Lifting of the substrate layers when new paint is applied. Problem may appear during the painting process or on drying.

**Causes**
1. Flash-off time too long when working wet-on-wet with some 2K-Products (recoating during Geli-phase).
2. Recoating solvent-sensitive layers (NC/TPA) with the wrong repair materials or when layers are too thick.
3. Coats used as a sealer are not thick enough (sprayed too thin or when sanded down too far).
4. Substrate layers not thoroughly dried.

**How to avoid**
1. Always keep to the recommended Flash-off times.
2. Carry out a Solvent Test, use the correct repair process and use the correct film thickness.
3. Use the correct Film Thickness as advised in the product technical data.
4. Ensure that the substrate is dry. (Re-bake or use IR lamps).

**Repair**
Sand down the paintwork back to a sound substrate. Rework using suitable Primer and Top Coats. (If necessary be prepared to strip back to a sound substrate).

**Definition**
Very slow evaporation of residual solvent from a freshly painted paint process. This causes widespread swelling or sweating of the paint surface. Problem can lead to a reduction of gloss (hazing) and in small areas, edge zone marking (see chapter on "Edge-Zone Marking").

**Causes**
1. Drying time too short between layers in a complete process and/ or too high a film thickness of the filler coat within the process.
2. Filled areas are too thin or are not sufficiently isolated.
4. Incorrect quantity of hardener in Body-Filler or Filler coats.
5. Incorrect process when finishing over NC or TPA substrates.

**How to avoid**
1. Always keep to recommended film thickness and drying times for each product. Where possible dry with infrared as this dries from the lower layers first.
2. Apply isolating coat in sufficient film thickness (circa 50 µm).
3. Before painting, carry out a solvent test with acrylic or NC Thinners. Sand feathered edges and surfaces finely (Body Filler with P80/ P150, Primer Filler with P240 – refer to technical information sheets). Do not apply Body Filler over old paintwork which is solvent sensitive (better to apply to bare metal). Apply sprayfillers in thin spray coats and allow a good flash-off between coats (to isolate). Use products with mild solvent properties (Waterbased fillers).
4. Only use specified mixing ratios.
5. Apply the paint process suitable for the respective base.

**Repair**
Thoroughly sand back, or remove the affected area. Refinish with the correct primer and/ or Top Coats.
**[Bleeding]**

**Definition**
Bleeding is the staining or seeping through of a soluble dye from the substrate through the top coat colour. Bleeding is normally observed as spots or patches of discoloration in the top coat, (often in red or yellow colours). Excess peroxide hardener in a polyester filler can also cause similar marks due to a chemical reaction with the colour pigments.

**Causes**
1. Soluble pigments or dyes from the old paintwork are dissolved in the solvent of the repair materials, and change in the shade at the surface.
2. Bleeding can also occur when excessive peroxide from a polyester filler reacts with the pigments in the repair materials causing a yellow-brown stain. Blue and green colours are particular vulnerable to this problem.
3. Residues from Bitumen or Tar if not cleaned off thoroughly.

**How to avoid**
1. Carry out a solvent test to check if a soluble dye exists. Soluble dyes have not existed in any Glasurit paintwork or repair paints for many years.
2. Only use the recommended quantity of peroxide hardener when mixing polyester products and mix the hardener in evenly and thoroughly. Never allow the coloured hardener to look streaky in the filler when applied.
3. Before painting ensure all contamination, especially bitumen and tar deposits, are thoroughly removed.

**Repair**
To repair a bleed-through area, the whole area should be isolated with an appropriate sealer e.g. Glasurit Stonechip Primer 1109-1240/6, and Glasurit EP Primer 801-1552. If the bleed through is severe then the paint layers should be removed back to a sound substrate and then refinished with the correct primer and top-coat process.

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**[Blistering]**

**Definition**
In damp weather, a small quantity of water vapour is absorbed into the paint structure and is then evaporated again in dry conditions (osmosis). This process is normal and does not harm a well constructed finishing process. However, poor processing of the primers will leave hydroscopic/water soluble substances (salts) behind as contaminants. These cause a local concentration of a salt water solution which lifts the paint film into water blisters. Blisters can occur in many sizes, patterns and frequency and can form between individual layers or beneath the entire film build. In dry weather most blisters will temporarily recede.

**Causes**
1. The surface to be painted (filler, bare metal etc) was not cleaned thoroughly. Contamination from salt residue, eg dirty sanding water or hand sweat, was left on the surface under or between coats. The blister pattern may indicate the cause (beading = wipe marks, prints = finger or hand prints).
2. Wet sanding operations (particularly with polyester based products) without sufficient time to allow water to evaporate before application of top-coats.

**How to avoid**
1. Thoroughly clean the areas to be painted with clean water. Change sanding and cleaning water regularly, especially in winter when vehicle paintwork in for repair is covered in salt. Consider changing to dry sand operations to avoid water absorption when sanding. Finally (depending on the substrate) clean the area with Glasurit Cleaner 700-1 and Glasurit Wax and Grease Remove 541-5 or Glasurit Panel Cleaner 360-4.
2. Allow sufficient time for water to evaporate when wet sanding (circa 2 hours at 20ºC). Dry sand where possible especially with polyester based products.
3. Ensure booth is dry before painting. In cold damp conditions run the booth on bake before any paint processing operations.

**Repair**
Sand down and remove the paint layers back to a sound substrate. Be prepared to strip the areas back to bare metal where necessary. Refinish with the correct choice of primers fillers and top-coats.
Definition
Substrate showing through the top-coat. Old paintwork, spot primer or areas of filler are visible through the top-coat.

Causes
1. Substrate not coloured to similar even shade.
2. Poor covering shade (e.g. no heavy metal pigment).
3. Top-coat over-thinned.
4. Top-coat not stirred properly before use.
5. Paint coats were applied too thin.

How to avoid
1. A uniform substrate is required, especially when using translucent colours (e.g. when using 3-coat pearl effect systems)
2. For poor covering colours, use Glasurit HS Tinting Filler 285-35 (see example below). Alternatively use primer filler/filler surfacer and mix it to the colour shade most appropriate for the respective topcoat e.g. Glasurit 285-55 HS VOC Primer Filler black mixed with Glasurit 285-65 Universal HS VOC Primer Filler white or, for the wet-on-wet process, use Glasurit 285-39 VOC Non-Sanding Filler dark grey mixed with Glasurit 285-38 VOC Non-Sanding Filler white.
3.-4. Stir base colours thoroughly and always thin as per specification.

Repair
After drying, sand down and repaint.

Example: Two areas of spot primer, on the left using a tinted primer and on the right a beige primer. Both are over painted with 1 coat of top-coat. The area on the left will be coloured with the next coat of top-coat.
**Definition**
Physical attack or discoloration of the paint surface due to various causes; the spots take various shapes, colours and sizes.

### Causes

<table>
<thead>
<tr>
<th>Causes</th>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2] Industrial waste gases, e.g. SO2</td>
<td>2] Large area or spot area gone matt (see Chapter “Loss of Gloss”)</td>
</tr>
<tr>
<td>4] Acid (Battery),</td>
<td>4] Usually destroys the entire paint build down to the metal.</td>
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<tr>
<td>8] Bird-Droppings</td>
<td>8] Appearance can vary depending on the type of bird, weather conditions and duration of contamination.</td>
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### How to avoid

Remove all foreign bodies and matter from the paintwork as soon as possible. Wash off tar and tree sap using Glasurit Cleaner 541-5 or similar. Remove all other contamination with water. Regular paintwork aftercare is required (washing, polishing, wax protection etc see chapter “After Care of Vehicle Paintwork”).

### Repair

Depending on the nature of the damage, where defects manifest themselves in the top coat, first of all try to polish with Glasurit Fine Polishing Paste 562-1602, finishing off with high gloss polish. The next step would be to sand down with P1200, using Fine Polishing Paste 562-1602 and finishing off with a propriety high gloss polish. More extensive defects can be sanded down to sound coats to allow for a new build-up.
**Definition**
Spots of corrosion on top of the paint surface

**Causes**

**Industrial Dust**
Corrosive deposits from chimneys of foundries and ironworks. Rail and road chippings. Iron particles, which mainly occur on top of flat surfaces, oxidise in moisture and humidity and then attack the paint surfaces.

**Spark Damage**
Ash from overheated electricity cables on tramways and railways. Spark damage from welding and grinding operations. The hot and sometimes glowing, particles of iron burn into the paint surface.

**How to avoid**
Immediate removal of the metal particles and regular maintenance by polishing and waxing will help to avoid the problem. Where welding or grinding work is being carried out, ensure that all vehicles adjacent to or near the work are fully covered to protect them.

**Repair**
Use a propriety rust remover and finish off with Glasurit Fine Polishing Paste 562-1602, as required. If metal dust particles are located at a lower level, sand the defective surface with P1200 and then polish using Glasurit Fine Polishing Paste 562-1602, finishing off with a propriety high gloss polish.

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**Definition**
Matt or matted paint surfaces.

**Causes**

1. Paint swelling.
2. Coats too thick.
3. Weathering (results of the action of Sulphur dioxide/nitrous oxide combined with moisture and/or severe UV radiation).
4. Wrong amount of hardener in the mix.
5. Poor or incorrect paint-work aftercare.
   - Incorrect polishing (polish too aggressively, or in direct sunlight).
   - Weathered surfaces due to poor aftercare maintenance.
   - Car wash brushes too coarse or worn.
   - Car shampoo too strong (e.g. using washing up liquid).
6. New repair work weathered too early. Thick coats or fresh paintwork are sensitive to condensation (below dew point).
7. Insufficient air circulation during spraying and/or drying operations.

**How to avoid**

1. See chapter on "Swelling".
2. Ensure that prescribed film thickness is maintained.
   Use Glasurit HS Colour Shade Filler 285-95 VOC where the colour shades (yellow/red) do not cover easily.
3. Ensure regular paintwork aftercare.
4. Always keep to the recommended mixing ratios.
5. See chapter on "Aftercare of Paintwork".
6. Always keep to the recommended coat thickness and drying times.
7. Check air circulation, replace floor and ceiling filters if necessary. If in doubt, consult your spray booth manufacturer.

**Repair**

First attempt polishing with Glasurit Fine Polishing Paste 562-1602. Finish off with a propriety high gloss polish. If any matt areas cannot be repaired in this manner, a fresh coat of paint must be applied.
[Loss Of Adhesion]

Definition
Loss of adhesion can manifest itself in 2 different ways. First – where a total lack of adhesion occurs below the entire paint film. Second – where a lack of adhesion occurs between coats.

Causes
Loss of adhesion can occur when:
1] Substances which can cause adhesion failure are left on the substrate (e.g. silicone, oil, grease, wax, rust, sanding residue, etc.)
2] An unsuitable primer or surfacer was applied to the substrate.
3] Insufficient sanding was carried out to the substrate.
4] Primer or base coats were applied too dry or too thin.
5] Poor drying conditions.

How to avoid
To avoid the result of loss of adhesion to the substrate, always use the correct type of primer and/or surfacer for the substrate (e.g. for aluminium, steel or plastic etc.). Only apply primers as per specification (see Technical Data Sheets or Tech Data on the cans.) Do not apply coats too thick. Thoroughly clean the substrate before application of paint materials.

Repair
Remove all coats with poor adhesion. Thoroughly sand and clean the substrate. Repaint using the correct choice of primer and/or surfacer and/or top-coats.
**Solvent Boil**

**Definition**
Blister-like surface defects due to solvent entrapment in the surface of the paint film.

**Causes**
1. Coats applied too thick.
2. Hardener and/or Thinner too fast.
3. Flash-off time between individual paint coats too short.
4. Flash-off time before baking or Infra-red drying too long.
5. Insufficient distance between IR lamps and object causing too high a temperature.
6. When using a wet-on-wet system, too short a flash off between coats.

**How to avoid**
1. Keep to recommended film builds.
2. Use correct choice of hardener and thinner for the working temperature available (see temperature table).
3. Keep to recommended flash-off times.
4. When using Glasurit products, no flash-off time is required before baking.
5. Keep to recommended distances and intensities when drying with Infra-red.
6. Keep to recommended film builds and flash off times between coats.

**Repair**
For surface defects caused by solvent boiling, the paint coats must be sanded back to a sound substrate. Refinish using the correct choice of primers and top-coats. If the bubbles are not completely removed, pin-holes will appear when the next coats are applied (see chapter on “Pinholes”).

**Pinhole Marks**

**Definition**
Small holes or craters in the new paintwork as a result of solvent boil not removed properly from the substrate (old finish).

**Causes**
1. Solvent Boil or aeration of the old paint finish.

**How to avoid**
1. Either sand out the holes/craters completely or, where possible, fill the holes.

**Repair**
Pinholes or small craters can only be repaired successfully by thorough sanding of the substrate or by filling the areas if practical or desirable.
**Cratering**

**Definition**
Circular recesses with a diameter from 0.5 to 3 mm. The problem may range in appearance from a very flat recess in the top-coat to a deep fault which extends back to the substrate. If incorrectly repaired, the original craters may reappear as a more flat recess.

**Causes**
- **Humans**
  - Marks from clothing, rubber gloves, skin and hair lotions.
- **Spray Booth**
  - Lubricants from moving parts, release agents from plastic parts, hoses and sealants, inadequate oil and water trap bleeding, dirty ceiling and floor filters.
- **Paint Material**
  - Incorrect use of paint additives (anti silicone additive), unsuitable thinner/hardener impurities from poor transportation or storage.
- **Workpiece**
  - Residues from release agents (on plastic parts) slip additives, solder flux, bitumen and oil from insulating mats.
- **Paint processing ancillaries**
  - Release agents from new sponges, unsuitable cleaning agents or abrasives, adhesives from tapes.
- **Environment**
  - Intake of polluted air from other work areas (polishes, oil sprays, release agents, fine dusts etc) sealant and insulation dusts from the building.

**How to avoid**
Points 1 to 6 give the reasons for many of the causes of cratering in paint finishes, from which it is possible to take precautions to avoid the contamination. In principle, we would recommend that only silicone free products are used in the vicinity of the paintshop, and substrates are always cleaned thoroughly.

**Repair**
Thoroughly sand the paint build back to a sound substrate. Repaint using the correct choice of primers and top-coats. If it is necessary to repaint over a paint layer where silicone induced craters are clearly present, we recommend the use of Glasurit Anti-Silicone Additive 580-100 to be applied.
**[Scratches from Car Wash]**

**Definition**
Thread-like scratches which are often in parallel lines, and are particularly visible on darker colours. The surface can lose gloss and appear grey in shade.

**Cau ses**
1. Hand wash brush or car wash brushes which are too coarse, too dirty or very worn.
2. Pre-wash too dry with insufficient water.
3. Exposing fresh new paintwork to a car wash too early.
   The sensitivity to marking of a new paint surface is increased when the paint is not dried for long enough or when too thick a coat is applied or the incorrect hardener is used.

**How to avoid**
1. Use the correct clean brushes.
2. Thoroughly wet the car before brushing with plenty of water.
3. Avoid early exposure to car wash installations. Ensure that recommended coat thicknesses, drying times and hardener ratios are maintained.

**Repair**
Polish using Glasurit Fine Polishing Paste 562-1602 and finish off with a propriety high gloss polish.

**[Chalking]**

**Definition**
Decomposition of the binding agents at the paint surface resulting in the release of the colour pigments. Reds and yellow colours turn whitish and dark blues turn bronze.

**Ca u ses**
1. Choice of wrong hardener or amount.
2. Colour coats applied too thick.
3. Weathering (aggressive environmental pollution such as sulphur dioxide and nitrous oxides in combination with high humidity and exposure to UV radiation).
4. Poor after-care of the paintwork.
5. Poor repair to a previously chalking paint finish.

**How to avoid**
1. Always use recommended hardener and mixing ratio.
2. Ensure that the prescribed film thickness is maintained.
   Use Colour Shade Filler 285-95 VOC as the dominant coloured surfacer paint (as used in the automotive industry) for colour shades difficult to cover (yellow/red).-
3. Regular care of paint finish.
4. Ensure chalked paintwork is removed back to a sound substrate before refinishing. Use base coat + clear lacquer system where possible.

**Repair**
First try polishing using Glasurit Fine Polishing Paste 562-1602, finishing off with a propriety high gloss polish. If the chalked surfaces cannot be repaired in this way, the damaged coat must be sanded down and freshly painted.
### 1. Flaking

**Definition**
Easy removal of the total film build from the plastic substrate.

**Causes**
1. Insufficient cleaning of the plastic substrate.
2. Insufficient sanding of the plastic substrate.
3. Unsuitable cleaner or degreaser used, or wrongly used.
4. Plastic part not tempered before painting.
5. No plastics primer/adhesion-promoter or 2C plastics primer filler used.

**How to avoid**
1. Wash the part thoroughly with a mild detergent solution to remove any water soluble release agents. Thoroughly clean the plastic with Glasurit Universal Cleaner 541-30 to remove solvent soluble release agents. Where plastic is very dirty or textured, clean with the assistance of a sanding pad. Clean the surface before and after sanding.
2. Use recommended sanding grades. Where an irregular shaped part is to be sanded (e.g. radiator grill, bumper etc.) use a sanding pad.
4. "Tempering" means sweating out the release agents by heating (1-2 hours at a maximum).
5. Use Glasurit 934-0 1C Plastics Adhesion Primer or Glasurit 934-10 1C Plastics Primer or Glasurit 934-70 2C Plastics Primer Filler as per Refinishing Systems D5.

**Repair**
Remove paint layers completely and re-paint as per D5 paint procedures. Do not use stripping agents as they may cause damage to synthetic parts.

### 2. Cracking

**Definition**
Break or crack lines in the paint finish after mechanical stress. In severe cases the plastic may also crack. This problem is normally associated with soft flexible parts (e.g. PUR rear spoilers).

**Causes**
1. Insufficient or failure to use a flexible additive to the paint. E.g. Glasurit Soft Face Additive 521-111.
2. Total paint thickness far too high.

**How to avoid**
1. The amount of Glasurit Softface Additive 521-111 added to the paint depends on the degree of flexibility required and whether the plastic is rigid (hard) or soft (flexible). Soft (spongy plastics are usually PUR Foam (e.g. rear spoilers) and can be easily indented with the thumb. All other plastics are rigid (hard). In principle, the filler, solid top coat or clear lacquer coats must be plasticised. Base coats in a two coat system do not require softface additive.
   - **Hard/Rigid Plastics:** Mix the paint 4:1 by volume with 521-111 before adding hardener.
   - **Soft/Flexible Plastics:** Mix the paint 2:1 by volume with 521-111 before adding hardener.

**Note:**
- First add the 522-111 and then add hardener in the recommended mixing ratio.
- Keep to the recommended film thickness.

**Repair**
Where possible, mechanically remove paint layers and re-paint as per D5 paint procedures, otherwise it is irreparable. Do not use stripping agents as they may cause damage to synthetic parts!
3. Pinholes

Definition
Small holes in the paint surface due to pores and bubbles in the plastic. This problem often appears on the soft flexible parts (e.g., PUR rear spoilers) and GRP fibre-glass mouldings.

Causes
1] Expansion faults or foam holes in the plastics from production.

How to avoid
1] Thoroughly check the plastic part for pores before painting. Then fill the pores using Glasurit 839-90 Plastics Body Filler grey.

Repair
Porous paintwork can, in principal, be repaired using the pore filler wiping process. Scuff sand the surface, fill the pores with 839-90 and refinish the area to be painted.

Note:
Too many pores in the plastic will make it very difficult to paint. It is important to check the plastic for pores thoroughly before painting.

[Runs]

Definition
These are beads, droplets, larger globules or “curtain effect” in the paint finish on vertical surfaces.

Causes
1] Paint mixture too slow (hardener, thinner).
2] Viscosity too low (too thin).
3] Paint or object to be painted too cold.
4] Paint applied too thick.
5] Too many layers of paint.
6] Flash-off times too short.
7] Spray-gun held too close to the object.
8] Spray nozzle too large...
9] Irregular spraying action (jerky)

How to avoid
Ensure that you always adapt the mixture of paint with the correct choice of hardener, thinner and viscosity to suit the temperature and size of the area to be painted. Ensure that the spray gun is clean and with the correct size of nozzle and air cap. Spray in an even pattern and do not hesitate with the gun or arc your spray pattern.

Repair
When the paint has completely dried, remove the run with a paint planner, carbon blocks or wet sanding paper. The finer the abrasive paper, the more unlikely there is any damage to the paint, thereby reducing the re-polishing work. Finish off with Glasurit Fine Polishing Paste 562-1602 and a propriety high gloss polish.
**Metamerism**

**Definition**
Metamerism is the effect where a colour that appears the same shade to a second colour under certain conditions, may look totally different under different conditions. The most common existence of this problem is where two colours match in daylight, but appear different under artificial light (especially sodium street lighting).

**Causes**
Apart from the individual nature and the many variations of human colour perception, there are a variety of other reasons for the occurrence of metamerism.

1. The pigment and/or base-colour composition of the repair paint does not correspond to the pigment composition of the original paint.
2. The mixing of an unknown colour shade (where no mixing formula is available) without checking the shade under different light sources before use.
3. By tinting a colour without reference to the base colours used in the colour formulation, i.e. tinting with a base colour which is not part of the original colour formulation.

**How to avoid**
For previous unknown colour shades, metamerism can only be avoided with the use of electronic colour measurement. For known shades (where a mixing formula is available), the shade must be checked under various light sources. Tint only with base colours which form part of the mixing formula and/or as specified in the tinting table.

**Repair**
Slight variations in colour due to metamerism can be overcome by blending the colour into the surrounding panels. For severe metamerism, the colour shade must be re-mixed or reassessed by electronic colour measurement.

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**Orange Peel**

**Definition**
Poor surface texture of the paint similar to the surface texture of an orange skin.

**Causes**
1. Spray gun held too far from object.
2. Spray pressure too low (poor atomisation).
3. Paint film too thin.
4. Viscosity too high (paint too thick).
5. Hardener and/or thinner too fast for the conditions or size of object.
7. Flash-off time too long between coats.

**How to avoid**
1. Keep spray gun within the recommended distance from the object.
2. Ensure spray pressure is as recommended.
3. Always apply wet coats.
4. Adjust paint viscosity as recommended.
5. Choose correct hardener and thinner (see temperature table).
6. See tech data for correct choice of spray nozzle.
7. Allow a long enough flash-off between coats.

**Repair**
For small defects, sand down with P1200, polish, Glasurit Fine Polishing Paste 562-1602 and a propriety high polish. More extensive damage is to be sanded down for re-painting.
**Polishing Marks**

**Definition**
Very fine lines in the paint surface with a low gloss greyish appearance from polishing paste and/or cloth.

**Causes**
1. The sensitivity of the paint surface to polishing marks is greater when: the paint has not been allowed to dry for long enough; the film thickness is too high; the incorrect choice or amount of hardener has been used.
2. Excessive pressure has been exerted on the polishing machine, (polish burnt in).
3. Polishing machine tilted during polishing process.
4. Wrong polishing head.
5. Aggressive/coarse polishing paste.
6. Polishing when the painted surface is too hot from the oven or in direct sunlight.

**How to avoid**
1. Ensure only the correct film thickness, drying times and choice of hardener and thinner are observed. Before polishing, allow the paint layers to dry sufficiently (rebake using Infra Red if necessary).
2+3+4 Do not press too hard or tilt the polishing head and use the correct head for the application being carried out.
5 Do not use too coarse a polishing paste.
6 Ensure that the paint surface is cool and/or not in the sun.

**Repair**

**Edge Marking**

**Definition**
Swelling or sweated edges showing in the top-coat around feather-edge sanded old paintwork.

**Causes**
1. Insufficient drying of filler and/or knifing stopper areas.
2. Swelling layer in the old paint at a feather-edge sanded area where the layer of filler meets the old paint or metal. Or the feathered edge was not fine enough.
3. Swelling of works primer on new/spare parts.
4. Wrong process used over TPA or NC old finishes.
5. Sanded areas not isolated properly before base-coat and clear processing.

**How to avoid**
1. Ensure drying times are observed. Infra Red drying reduces the chances of edge marking by drying the lower layers first.
2+3 Before painting, carry out a solvent test with an Acrylic or NC Thinner to check for solvent sensitivity. When sanding ensure that the feather edge is fine enough on the layer being sanded (P80/P150) on stopper/filler, P240 on primer filler see technical information). Do not apply knifing fillers over sensitive paintwork (apply to bare metal only and leave a metal edge). Apply spray filler in light coats to isolate. Use paint with mild solvent properties (e.g. Glasurit Water Thinnable Filler 76-71.
4 Observe correct mixing ratios.
5 Apply the appropriate paint process to the respective surface.
6 Isolate sanded base with light coats of spray filler.

**Repair**
Sand affected areas smooth and flat. Respray with the correct primer and/or top-coat.
**Definition**

**Textured paint surface with uneven wave type formation that occurs when the paint surface dries faster than the substrate coats. This problem only occurs in the presence of synthetic enamels.**

**Causes**

1. Film build faults on TPA Thermoplastics Acrylic substrates (e.g. the use of polyester filler, wash primer or synthetic enamels directly onto TPA finishes). These will cause shrinkage of the TPA film resulting in cracking.
2. Repair paint layers not cured or hard (too little or no hardener).
3. Film Build Faults:
   - Wash primer coated with polyester materials.
   - Synthetic enamel or nitro-cellulose mixtures repainted too quick.
4. Cracks on plastic parts.
   - see chapter “Faults in Plastic Painting”.
5. Severe stress to the paint surface by UV radiation and/or extreme temperature fluctuations.
6. Film Build Faults:
   - Wash primer coated with polyester materials.
   - Synthetic enamel or nitro-cellulose mixtures repainted too quick.
7. Total film build far too high.

**How to avoid**

1. Apply the appropriate paint process to the respective surface.
2. Ensure correct hardener quantities.
3. Ensure correct system builds and processes.
4. Plasticise materials – see chapter “Faults in Plastic Painting”.
5. No cases are known with any current range Glasurit repair products.
6. Ensure correct flash-off times are observed.

**Repair**

Sand down the paint film build back to a sound substrate. Ensure all traces of cracks are thoroughly removed. Refinish using suitable primers and top-coats.

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**Definition**

**Crazing**

Cracks of various lengths, widths and depths.

**Causes**

1. Synthetic Enamel applied too thick.
2. Little or no drier solution added.
3. Unfavourable drying conditions (e.g. shop temperature too high).

**How to avoid**

1. Keep to recommended number of coats and film build.
2. Ensure drier solution is added as part of the mixing formulation.
3. Ensure correct drying conditions (not too warm).

**Repair**

For minor faults, dry the surface thoroughly, sand back to a hardened layer and then refinish. For severe wrinkling faults, strip the entire paint layers with paint stripper or by mechanical bead blasting and refinish to specification.

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**Definition**

**Wrinkling**

Textured paint surface with uneven wave type formation that occurs when the paint surface dries faster than the substrate coats. This problem only occurs in the presence of synthetic enamels.

**Causes**

1. Film build faults on TPA Thermoplastics Acrylic substrates (e.g. the use of polyester filler, wash primer or synthetic enamels directly onto TPA finishes). These will cause shrinkage of the TPA film resulting in cracking.
2. Repair paint layers not cured or hard (too little or no hardener).
3. Film Build Faults:
   - Wash primer coated with polyester materials.
   - Synthetic enamel or nitro-cellulose mixtures repainted too quick.
4. Cracks on plastic parts.
   - see chapter “Faults in Plastic Painting”.
5. Severe stress to the paint surface by UV radiation and/or extreme temperature fluctuations.
6. Flash off time too short in wet-on-wet systems...
7. Total film build far too high.

**How to avoid**

1. Apply the appropriate paint process to the respective surface.
2. Ensure correct hardener quantities.
3. Ensure correct system builds and processes.
4. Plasticise materials – see chapter “Faults in Plastic Painting”.
5. No cases are known with any current range Glasurit repair products.
6. Ensure correct flash-off times are observed.

**Repair**

For minor faults, dry the surface thoroughly, sand back to a hardened layer and then refinish. For severe wrinkling faults, strip the entire paint layers with paint stripper or by mechanical bead blasting and refinish to specification.
**Sanding Marks**

**Definition**
Sanding swirl marks in the substrate show as lines in the top-coat.

**Causes**
1. The substrate was sanded with an abrasive that was too coarse. The depth of the scratch is too deep for the subsequent products to fill and hide.
2. The correct drying times for the primer or surfacer coats were not observed correctly. The swirl marks from the sanding operation are clearly visible due to the swelling of the primer at the time of painting and the shrinkage on drying.
3. Filler coats were applied too thin to cover the sanding marks in the substrate.
4. Poor sanding technique and/or sanding machine.

**How to avoid**
1. Use specified grade of sanding disc and/or paper (e.g. for stoppers use P80/P150, primer/ filler P240 – refer to relevant tech data sheets).
2. Dry as per specification.
3. Observe specified film builds.
4. Always place sanding machine on surface of paintwork before starting the machine. For dry sanding of primer/ filler coats, the eccentric stroke should not be greater than 5mm.

**Repair**
Sand out the scratches and refinish with correct filler coat and/or top-coats as necessary.

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**Dust Contamination**

**Definition**
Usually small, irregular particles in the paint film caused by foreign matter (e.g. dust/dirt) which can occur in different sizes, shapes, types and patterns.

**Causes**
1. Poor cleaning of substrate prior to painting.
2. Lint containing overalls or clothes.
3. Spray booth dust problem due to dirty filters causing incorrect air supply, extraction and pressure.
4. Intake of contaminated air from outside the spray booth (polishing residues, fine dust etc.).

**How to avoid**
1. Thorough cleaning before application of new paints.
2. Use lint-free overalls and cloth.
3. Ensure regular maintenance and filter changes of the booth.
4. Ensure polishing/finishing areas are away from the paintshop and separated by filtered and ventilated systems.

**Repair**
Polish using Glasurit Fine Polishing Paste 562-1602, finishing off with a propriety high gloss polish. More extensive defects are to be sanded down for re-painting.
**Overspray**

**Definition**
Fine dry atomised spray droplets from the painting process stuck to the surface, or droplets that have not been absorbed by the paint film.

**Causes**
1. Poor spray absorption due to the incorrect hardener and/or thinner for the painting conditions or the size of the object which is being sprayed.
2. Inadequate overlap of spray pattern when spraying...

**How to avoid**
1. Select the correct choice of hardener and thinner to suit the temperature of the workshop and the size of the object/vehicle which is to be painted. (see temperature table).
2. Ensure adequate overlap of previous gun strokes when spraying...

**Repair**
Polish using Glasurit Fine Polishing Paste 562-1602 and a propriety high gloss polish.

**Spraydust – Dust Clusters**

**Definition**
Paint dust particles from the spray environment in the new paint surface.

**Causes**
1. Impurities due to paint residue/encrustation of the spray gun, paint hoses and clothing.
2. Paint clusters (multi-coloured particles) from the spray booth fall into the wet paintwork. These particles often form on the roof of the spray booth if the air changes are poor or the filters are dirty.
3. Paint spray contamination from adjacent paint jobs.

**How to avoid**
1. Regularly clean spray guns, air hoses and clothing.
2. Regular maintenance of the spray booth and filter systems and ensure the booth manufacturers set the airflow correctly.
3. Keep jobs separate and masked from adjacent jobs.

**Repair**
Polish with Glasurit Fine Polishing Paste 562-1602, finishing off with a propriety high gloss polish. More extensive defects are to be sanded down for re-painting.
Remove all paint and corrosion (rust) from the affected areas (by grinding, stripping, sandblasting). Thoroughly clean the area with Glasurit Panel Cleaner 360-4 and Glasurit Wax and Grease Remover 541-5. Prime bare metal as quickly as possible to avoid flash rusting and build up with the recommended primers, surfacers and top-coats.

**Definition**
Mechanical damage to the paint surface and film build due to flying stones (e.g. chippings, stones and debris).

**Causes**
Stones of various weight, shape and size are flung onto the paintwork at varying levels of energy (velocity and size). Depending on the impact force, the top-coats and also the primer/surfacer coats can be damaged down to the substrate (metal, plastic or electrocoat). Moisture may then penetrate the paint film and further flaking can occur.

**How to avoid**
There is no total protection against stone chips. Areas most greatly at risk can be given treatment of additional anti-chip and underbody protection coatings for extra protection to avoid corrosion of the substrate. (e.g. Glasurit Stone Chip Primer 1109-1240/6 and/or the use of Glasurit Soft Face Additive 521-111 in the top-coats or clear lacquer to increase to increase the flexibility). (4 parts by vol paint or clear to 1 part 521-111 before adding the hardener and thinner).

**Repair**
Stone chips should be touched-up immediately. Sand out and build up with the correct primer and/or top-coats.

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**Definition**
Paint damage showing at the paint surface as irregular shaped blisters. If the blisters burst then corrosion spots are clearly visible (e.g. brown rust on steel or white rust on aluminium).

**Causes**
1. Mechanical damage to the paint surface (e.g. stone chips, scratches etc.;) causing penetration of moisture to the underlying coats or metal substrate.
2. Poor preparation of the metal prior to painting. Poor cleaning (see also chapter on “Blistering”). Poor rust removal or removal of metal particles from the metal surface..
3. Flash rust formation on newly stripped or sand blasted metal surfaces...
4. Inadequate or missing cavity sealing. (Rust through from behind).

**How to avoid**
1. Stone chips or scratches should be repaired immediately..
2. Ensure thorough cleaning of all metal surfaces with Glasurit Metal Cleaner 360-4. Remove all rust by sand blasting to produce a bright metal substrate. Treat all welded seams.
3. Sandblasted areas should be primed immediately after blasting to avoid flash rusting
4. Seal and protect all cavities with the recommended products.

**Repair**
Remove all paint and corrosion (rust) from the affected areas (by grinding, stripping, sandblasting). Thoroughly clean the area with Glasurit Panel Cleaner 360-4 and Glasurit Wax and Grease Remover 541-5. Prime bare metal as quickly as possible to avoid flash rusting and build up with the recommended primers, surfacers and top-coats.
**Water Marking**

**Definition**

Water spotting normally appears as light, whitish circular spots on the paint surface caused by the drying of a solution of water combined with mineral salts. The inner areas are normally intact, whilst the outer edge are often slightly raised.

**Causes**

1. Insufficient drying of fresh work prior to being left in the rain.
2. Poor drying of paint due to thick coat application.
3. Incorrect hardener or quantity of hardener...

**How to avoid**

Ensure all fresh paints are applied using correct hardener, correct mixing ratio and the number of coats (film thickness) is correct and not excessive...

**Repair**

First wash with clean water; if this does not work, polish using Glasurit Fine Polishing Paste 562-1602, finishing off with apropriety high gloss polish. More extensive defects are to be sanded down for re-painting.

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**Clouding**

**Definition**

Spots or stripes of light and dark patches, mainly seen in metallic finishes.

**Causes**

1. Uneven spray application.
2. Flash-off between coats or prior to application of clear coat too short.
3. Colour coat applied too heavy or too light.

**How to avoid**

1. Application must be even and correctly overlapped with the previous gun stroke.
2. Ensure correct flash-off times are observed between coats.
3. Apply the basecoat as recommended in the technical information.

**Repair**

If clouding occurs during the application of the basecoat, compensate by spraying over the affected areas using the correct technique. If clouding occurs after the clear lacquer has been applied, allow to dry, sand down, and repaint, using the correct technique.
**The sand through method** is a simple way to diagnose paint damage more accurately on site and therefore determine the best repair method required. The various layers and products used, are carefully sanded through in one bad area back to the bare substrate (metal or plastic etc.) This allows all of the coats and layers to be clearly identified, their individual film thickness assessed and the fault to be highlighted.

The sand through is best carried out by first sanding with P240 back to the substrate. The second stage is to re-sand the same area with as fine a paper as practical (e.g. P600). Finally the area could be polished with a fine polishing paste in order to allow to clear and precise observation of the coats and the problem. The following types of paint damage can be easily assessed using this method.

**Blistering** (see also Chapter “Blistering”). Blisters are easily detected, showing as different coloured spots as the top coat is removed revealing the layer below.

**Crazing** (see also Chapter “Crazing”). The depth of a crack in the paint layers can easily be detected in the sanded through areas. To assist even further, wipe Guide Coat into the cracks and allow to dry before sanding and the contrast will ease the identification.

**Solvent Boil** (see also Chapter “Solvent Boil”). This type of defect is often mistaken for dirt inclusions because of the small size of the defect. By sanding through, the defect can be easily identified as small cavities in the layer concerned.

**Cratering** (see also Chapter “Cratering”). Cratering shows as the flat recess or dimple in old paintwork, or on the surface of new paintwork and can indicate a poor flow characteristic of the paint.

**Pinholing** (see also Chapter “Pinholing”). Pinholes will appear as small dots of a different colour than the top-coat and originate from faults such as bubbles or pores in the substrate.

**Swirl Marks/Swelling**. Swirl marks will appear as colour filled lines in the primer or surfacer in the sanded through layer. The pattern and size of the lines will indicate the method of sanding used (hand or machine) and the grit size of paper used.

**Number of Paint Layers of the Old Paintwork**. The layers of paint, like the rings in a tree trunk, are exposed by sanding. With this method it is possible to say exactly how many coats of paint have been applied to the car and whether the risk of overloading on repainting is possible.

**How to Test:**

After sanding, soak a piece of cloth in a strong thinner (e.g. 352-50 or 352-91) and rub over the sanded area. Watch closely for any signs of a reaction i.e. if one or more of the layers swells, lifts, rivels or goes sticky then it is solvent sensitive.

Having established that the coat is sensitive the correct method of repairing is essential to avoid problems.

When repairing such layers (coats), note the following:

- s仇ing process should be finer and cover a wider area than normal.
- Do not use any polyester filler over the feathered edge, leave bright metal showing between.
- apply filler/surfacer and top-coats only in thin light coats and allow good flash-off times between coats.
- do not use a wet-on-wet surfacer or system.
- carefully dry with IR heaters (not over TPA substrates)
- only use a suitable finishing process
- if paint films demonstrate extreme solvent-sensitivity, these should be stripped to bare metal before repair.

**Solvant Test**

Before starting any repair painting, we recommend that a solvent test is carried out on a sanded area to reveal any layers (coats) which may be solvent sensitive and therefore require special attention or treatment to avoid problems.

**Solvent-sensitive layers may be:**

- TPA (Thermo Plastic Acrylic) Paintwork
- Nitro-Cellulose Paintwork
- Non-cured Synthetic Enamels
- Sensitive/Swelling Works applied Paintwork
Modern conditions place a heavy burden on the life of a paint finish on any road vehicle. The influence of acid rain, traffic grime, road salt, bird-lime (bird dropping) ultra-violet rays from sunlight, dampness and moisture, changes in temperature, industrial gases, tree sap etc. all work to take a toll on the condition of the vehicles paintwork. In addition, the use of detergents when washing cars, and the physical abrasive actions of the washing itself have a detrimental effect on the paint finish. Without regular paintwork aftercare, the gloss will fade and the paintwork’s natural resistance to moisture will be lost. The answer is regular paintwork maintenance with aftercare products such as polishes and waxes.

Before attempting to polish any paint surface it is essential that it is washed thoroughly first. Never use polish or wax in full sunlight as the warm surface is more sensitive and therefore more difficult to protect. Information on the use of Glasurit After Care products is given in Chapters C7 and A12 of the Glasurit “Vehicle Refinishing Manual”.

New, fresh repair paint should be cleaned carefully with clean and clear water only, no additives for the first 4 to 5 weeks. Within this time the new paint film will be achieving full hardness and allowing the escape of the residual solvents. Careful drying should only be carried out using a soft, chamois leather. After the full hardening period then all normal cleaning methods may be used e.g. car washes, high pressure washes etc. We recommend protecting the surface with Glasurit Hard Gloss Polish 577-1506, which should be applied with a polishing cloth in a circular motion and after drying buff to a high gloss with a soft lint-free polishing cloth. The protection from the polish will give the paint film excellent water shedding properties. When water no longer forms into beads or droplets and runs from the surface, the paint finish requires repolishing. Under normal conditions, the paint finish will require a minimum of twice a year.

A slight gloss haze on the paint (e.g. on new cars) can be easily removed with Glasurit High Gloss Polish 560-1506, which should be applied after cleaning the paintwork, and when dry removed with a soft cloth. The high gloss finish can be further protected with Glasurit Hard Gloss 577-1506.

For older or severely weathered paintwork after washing and drying the vehicle, treat first with Glasurit Paint Cleaner 560-1512 which should be applied by soaking a clean soft cloth in it and applying in circular movements to one section at a time. As particles of dirt and traffic grime are removed, the cloth may take on the colour of the paintwork. After a thorough cleaning, protection of the revived surface is essential e.g. with Glasurit Hard Gloss 577-1506. In addition to regular paintwork maintenance and aftercare, we recommend that an annual close check is carried out (especially before winter begins) to check for stone-chips etc. which should be repaired where necessary. In this way, further damage can be avoided.

The paint mixture choice with hardener and thinner should be varied according to the working temperature and the size of the object or area to be painted. The recommendations set out below for the choice of hardener and thinner at the stated temperatures are applicable to a full repaint or large area. For part panel or spot repair painting, the choice of hardener and thinner should be chosen against the next lower temperature quoted. Please refer to the Technical Information!

### Correct choice of hardeners and thinners for 2K Topcoats and Clear lacquers

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Glasurit High-Solid-2K-Cover Paint, Range 22 VOC</th>
<th>Glasurit HS-Clear 923-447 VOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>at 30°C</td>
<td>VOC Hardener 929-34</td>
<td>Clear 923-447 VOC 100 Vol.</td>
</tr>
<tr>
<td></td>
<td>Thinner, slow 352-216</td>
<td>Thinner 923-34</td>
</tr>
<tr>
<td></td>
<td>or extra slow 352-34</td>
<td>or Thinner, slow 352-216</td>
</tr>
<tr>
<td>at 25°C</td>
<td>VOC Hardener 929-34</td>
<td>VOC Hardener 929-34</td>
</tr>
<tr>
<td></td>
<td>Thinner, slow 352-216</td>
<td>Thinner 929-34</td>
</tr>
<tr>
<td></td>
<td>or extra slow 352-34</td>
<td>or Thinner, slow 352-216</td>
</tr>
<tr>
<td>at 20°C</td>
<td>VOC Hardener 929-34</td>
<td>VOC Hardener 929-34</td>
</tr>
<tr>
<td></td>
<td>Thinner, standard 352-91</td>
<td>Thinner, standard 352-91</td>
</tr>
<tr>
<td></td>
<td>or Thinner, slow 352-216</td>
<td>or Thinner, slow 352-216</td>
</tr>
<tr>
<td>at 15°C</td>
<td>VOC Hardener 929-31</td>
<td>VOC Hardener 929-31</td>
</tr>
<tr>
<td></td>
<td>Thinner, standard 352-91</td>
<td>Thinner, standard 352-91</td>
</tr>
<tr>
<td></td>
<td>or Thinner, fast 352-50</td>
<td>or Thinner, fast 352-50</td>
</tr>
</tbody>
</table>

The table above shows the recommended hardeners and thinners for 2K topcoats and clear lacquers at different temperatures. The products are only suitable for professional use.
ADVICE ON PAINT
AND PAINTWORK DEFECTS