CHROME SUBSTITUTE WITH BERLAC® REFLEXION: THE ECO-FRIENDLY ALTERNATIVE FROM SIMPLE LACQUER COATING.

www.berlac.ch
REACH: CHROMIUM(VI)-COMPOUNDS.

- **Registration**
  - Introduction REACH
  - List of substances included in Annex XIV

- **Evaluation**
  - 01.06.2007
  - 15.12.2010

- **Autorisation**
  - 01.03.2013
  - 21.03.2016
  - 21.09.2017

- **Chemicals**
  - 18 months
  - 35 months

Inclusion of Substances of Very High Concern in the Candidate List (svhc)

Deadline for Applications for Authorisation (AfA)
BERLAC® REFLEXION: APPLICATION.

<table>
<thead>
<tr>
<th>Coating system</th>
<th>Drying parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>2comp. PUR primer, black/grey, high gloss</td>
<td>30 min. / 80° C</td>
</tr>
<tr>
<td>2comp. base coat Reflexion, glossy</td>
<td>30 min. / 80° C</td>
</tr>
<tr>
<td>2comp. PUR top coat colourless, high gloss, semi-glossy, matt</td>
<td>30 min. / 80° C</td>
</tr>
</tbody>
</table>
BERLAC® REFLEXION: APPLICATION.

Standard solution

- Top coat
  30 - 35 my

- Base coat
  12 - 16 my

- Primer
  coloured
  20 - 25 my

Substrate
BERLAC® REFLEXION: APPLICATION.

Berlac® Reflexion

- Plastic substrate
- Base coat 12 - 16 my
- Primer black/grey high gloss 15 my
- Berlac® Reflexion (special pigment)
- Top coat 21 my

Standard solution

- Plastic substrate
- Primer coloured 20 - 25 my
- Base coat 12 - 16 my
- Top coat 30 - 35 my
Conventional silver pigment

Heterogeneous surface
- less intensive flop
- reduced reflection
PIGMENTS - KEY FACTOR AFFECTING REFLECTANCE.

Conventional silver pigment

Reflexion pigment

Heterogeneous surface
- less intensive flop
- reduced reflection

Homogeneous surface
- more intensive flop
- enhanced reflection
Advantages

• REACH-compliant, eco-friendly technology with a future
Berlac® Reflexion

- Top coat 21 µm
- Base coat Reflexion
  - Primer black/grey
  - High gloss
  - 15 µm

- No use of Cr$^6$ in the manufacturing process
- REACh-compliant both in production and disposal
BERLAC® REFLEXION: ECO-FRIENDLY.

Berlac® Reflexion

**Top coat 21 my**

**Base coat Reflexion**

- Primer black/grey
  - high gloss
  - 15 my

Conventional chromium plating

- Causing cancer and genetic mutations

- No use of Cr$^6$ in the manufacturing process
- REACh-compliant both in production and disposal
CHROME SUBSTITUTE WITH 3-LAYER COATING SYSTEM: BERLAC® REFLEXION.

Advantages

- REACH-compliant, eco-friendly technology with a future
- Broader colour palette for designers
BERLAC® REFLEXION: BROADER COLOUR PALETTE.

Berlac® Reflexion

- Additional colour shade for designers in the realm of spray paints
BERLAC® REFLEXION: BROADER COLOUR PALETTE.

Berlac® Reflexion

- Additional colour shade for designers in the realm of spray paints
- For the time being two additional colour shades (Dusk & Dark) besides Reflexion Standard available
BERLAC® REFLEXION: BROADER COLOUR PALETTE.

Berlac® Reflexion

- Additional colour shade for designers in the realm of spray paints
- For the time being two additional colour shades (Dusk & Dark) besides Reflexion Standard available
- Top coat minimally adjustable
BERLAC® REFLEXION: BROADER COLOUR PALETTE.

Berlac® Reflexion

- Additional colour shade for designers in the realm of spray paints
- For the time being two additional colour shades (Dusk & Dark) besides Reflexion
- Standard available
- Top coat minimally adjustable
- Level of gloss customizable
- Faster change in colours than with chromium plating
BERLAC® REFLEXION: COLOUR VERSIONS.

- **Reflexion Standard**
  - glossy, semi-glossy
  - Original colour shade referring to real chrome look 3Q7 and Silvershadow

- **Reflexion Dark**
  - glossy, semi-glossy
  - Technically seeming dark chrome version

- **Reflexion Dusk**
  - glossy, semi-glossy
  - Slightly more pallid and yellowish colour version
Advantages

• REACHE-compliant, eco-friendly technology with a future
• Broader colour palette for designers
• Colour stable application
BERLAC® REFLEXION: COLOUR STABLE APPLICATION.

Berlac® Reflexion

• Colour stable application by means of automated coating processes

Conventional chromium plating

• Frequent colour matching problems during serial process
Advantages

• REACh-compliant, eco-friendly technology with a future
• Broader colour palette for designers
• Colour stable application
• Broad applicational spectrum
BERLAC® REFLEXION: BROAD APPLICATIONAL SPECTRUM.

Berlac® Reflexion

- Wide range of plastic substrates
- Suitable for all component sizes and 3D shapes
- Non-brittle coating solution for filigree and thin-walled components thanks to ultra-thin, elastic coats
- Increased design flexibility
BERLAC® REFLEXION: BROAD APPLICATIONAL SPECTRUM.

Berlac® Reflexion

- Wide range of plastic substrates
- Suitable for all component sizes and 3D shapes
- Non-brittle coating solution for filigree and thin-walled components thanks to ultra-thin, elastic coats
- Increased design flexibility

Conventional chromium plating

- No options regarding polymer materials
- Unsuitable for complex 3-D components
- Risk of paint chipping when used on flexible substrates
BERLAC® REFLEXION: APPLICATIONAL SPECTRUM EXTERIOR.
BERLAC® REFLEXION: APPLICATIONAL SPECTRUM INTERIOR.
Advantages

- REACH-compliant, eco-friendly technology with a future
- Broader colour palette for designers
- Colour stable application
- Broad applicational spectrum
- **Highly resistant coating solution**

CHROME SUBSTITUTE WITH 3-LAYER COATING SYSTEM: BERLAC® REFLEXION.
BERLAC® REFLEXION: HIGHLY RESISTANT COATING SOLUTION.

Berlac® Reflexion

Russian Mud Test  OK

- In compliance with German automotive specifications
- Tested in compliance with TL 226 / TL 211 / DBL 7384
- Highly resistant to loose chipping and corrosion including aggressive road salts, also in areas strongly exposed
BERLAC® REFLEXION: HIGHLY RESISTANT COATING SOLUTION.

Berlac® Reflexion

- In compliance with German automotive specifications
- Tested in compliance with TL 226 / TL 211 / DBL 7384
- Highly resistant to loose chipping and corrosion including aggressive road salts, also in areas strongly exposed

Conventional chromium plating

- Russian Mud Test: failures

Russian Mud Test: OK
Advantages

- REACH-compliant, eco-friendly technology with a future
- Broader colour palette for designers
- Colour stable application
- Broad applicational spectrum
- Highly resistant coating solution
- **Laser-engravable for day/night design applications**
BERLAC® REFLEXION: SUITABLE FOR DAY/NIGHT DESIGN.

Top coat

Reflexion base coat

Primer black/grey, grau high gloss
Light-thightly formulated

Translucent plastic

Laser controlled coating removals in form of symbols, icons, characters, etc.
Advantages

- REACH-compliant, eco-friendly technology with a future
- Broader colour palette for designers
- Colour reliable application
- Broad applicational spectrum
- Highly resistant coating solution
- Laser-engravable for day/night design applications
- **Translucent**
BERLAC® REFLEXION: TRANSLUCENCE.

Chrome look at day

<table>
<thead>
<tr>
<th>Protecting top coat</th>
<th>PC transparent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primer transparent</td>
<td></td>
</tr>
<tr>
<td>Reflexion base coat</td>
<td></td>
</tr>
<tr>
<td>Top coat colourless or coloured</td>
<td></td>
</tr>
</tbody>
</table>
BERLAC® REFLEXION: TRANSLUCENCE.

Chrome look at day

Lighting at night

- Light aspect controllable via LED or top coat
BERLAC® REFLEXION: TRANSLUCENCE.

Berlac® Reflexion

- Lighting at night
- Conventional chromium plating

- Protecting top coat
- PC transparent
- Primer transparent
- Reflexion base coat
- Top coat coloured

- Protecting top coat
- PC transparent
- Primer transparent
- Reflexion base coat
- Top coat colourless
BERLAC® REFLEXION: TRANSLUCENT.
Advantages

- REACh-compliant, eco-friendly technology with a future
- Broader colour palette for designers
- Colour reliable application
- Broad applicational spectrum
- Highly resistant coating solution
- Laser-engravable for day/night design applications
- Translucent
- **Printable**
BERLAC® REFLEXION: PRINTABLE WITH BERLAPRINT® PAD PRINTING INK.

- 4th layer on top of top coat
- Berlac internally tested in compliance with TL 226 / DBL 7384
- OEM tests ongoing
BERLAC® REFLEXION: INDUSTRIAL COATING CONCEPTS.

- Applicable in case of high volume production
- Coating concept to be chosen according to component geometry

**Flatbed coating line**
for 2-D components such as trims, air outlets, tacho bezels, etc.

**Robotic / spindle coating line**
for 3-D components such as rear-view mirror caps, steering wheel trims, etc.
• Mirror-like polished surfaces are necessary, as sink and gate marks cannot be concealed
• Dosing pumps must be tailored to paints with low viscosity and low dosage
• Nozzle: 0.8 mm
• Hose diameters must be tailored to low flow rate
• 3comp. or 2comp. spray coating lines
• Base coat must be continuously stirred by means of a blade stirrer in the pressure tank
• Relative humidity must be controllable, ideally in between 50% and 60%
• Air circulating oven ensuring a constant component temperature of at least 30 min./80° C
BERLAC® REFLEXION: APPROVALS.

<table>
<thead>
<tr>
<th>Company</th>
<th>Approval Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daimler</td>
<td>Interior / DBL 7384</td>
</tr>
<tr>
<td>Audi</td>
<td>Interior and exterior / TL 226 + 211</td>
</tr>
<tr>
<td>VW</td>
<td>Interior and exterior / TL 226 + 211</td>
</tr>
<tr>
<td>JLC</td>
<td>Interior</td>
</tr>
<tr>
<td>Lotus</td>
<td>Interior</td>
</tr>
<tr>
<td>Porsche</td>
<td>Interior</td>
</tr>
</tbody>
</table>

Several job coaters have been qualified in a selective process conducted in accordance with OEMs.

**Industrialization or serial feasibility respectively is certified.**
BERLAC® REFLEXION: SERIAL APPLICATIONS EXTERIOR.

- **Audi**: Door trims SQ7

- **VW**: Decorative trim in front lamps Golf VII

- **Porsche**: Diffuser in front fender Panamera
• **Daimler:**
  Translucent touch control ring in steering wheel, E-class

• **Daimler:**
  Air diffusers in dashboard
  E-class Convertible 2017 (SOP)
BERLAC® REFLEXION: SERIAL APPLICATIONS INTERIOR.

- **Daimler:**
  - Center console frame
  - C-Class BR 205
  - E-Class BR 213
BERLAC® REFLEXION: PERSPECTIVES.

- Individualisation with additional colour shades is aimed at
- UV-curing systems
- 2-coat systems
- Qualification of additional job coaters
THANK YOU FOR YOUR ATTENTION.