



Anti-Corrosion Principles of Protective Solar Paint Layers

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Presenter

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Metal Corrosion – a Question of Time



- Von André Karwath aka Aka - Eigenes Werk, CC BY-SA 2.5, <https://commons.wikimedia.org/w/index.php?curid=70833>

Every coating has a limited service life

Even precious metal silver mirrors corrodes



- Von Claus Ableiter - Eigenes Werk, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=9524050>



A question of time?
Yes, but not only...

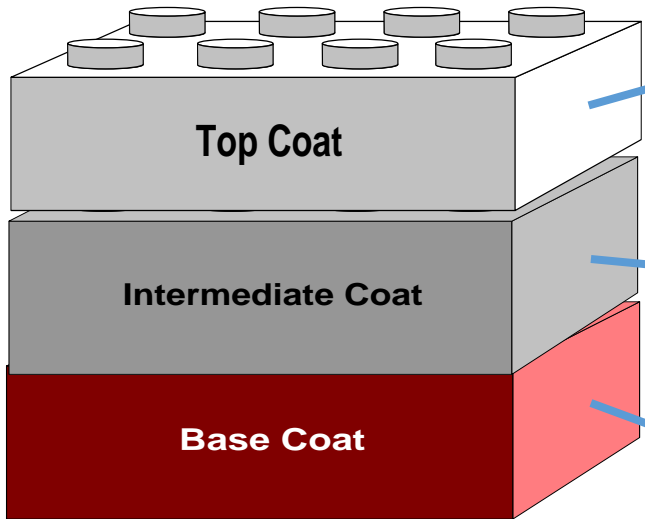
Proven track record of long term durability



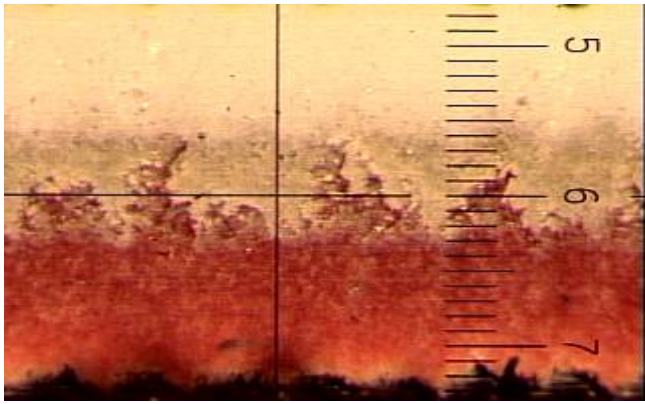
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because of protective solar paint systems

Solar Paint System and Function

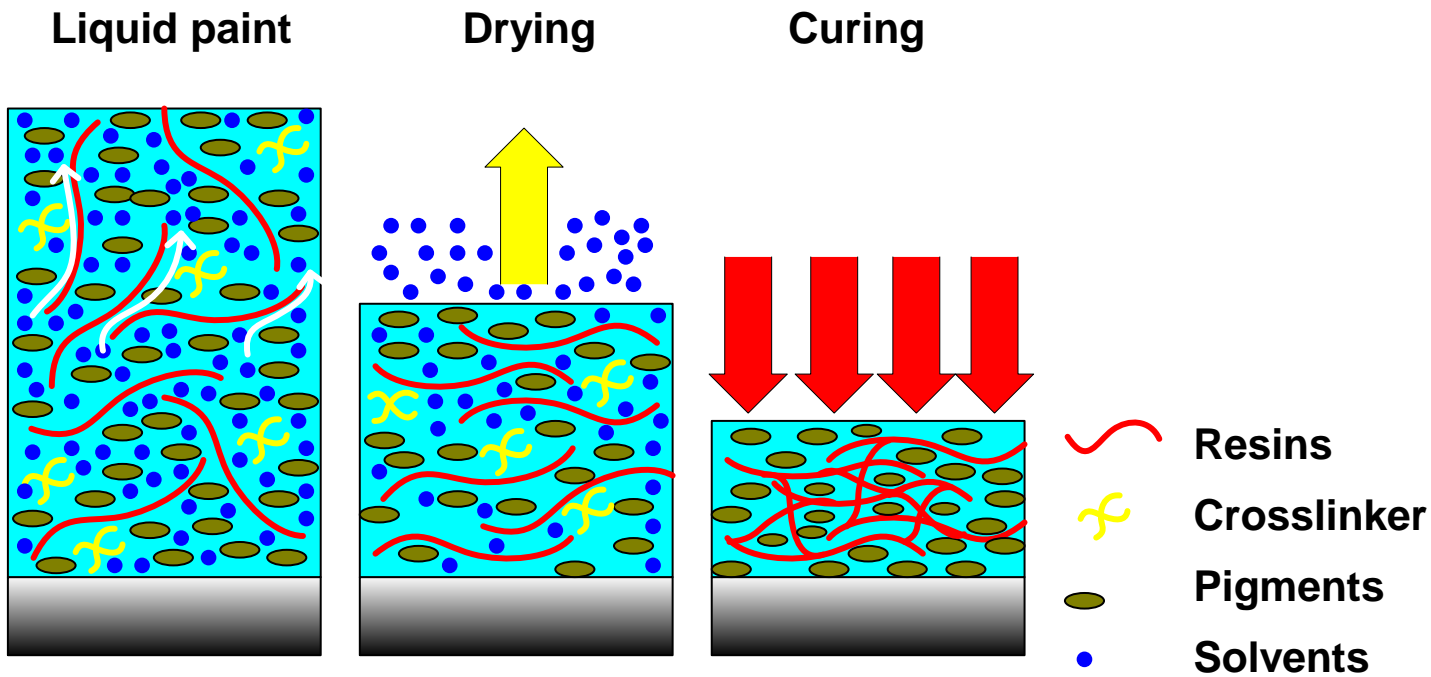


- Provides UV light resistance and UV block
- A barrier to water, oxygen and atmospheric pollution
- Protects from abrasion and physical damage
- Additional barrier to water, oxygen, etc.
- More film build leads to more physical protection
- Anti-corrosion properties and adhesion to metal



- Three organic paint layers of 100 μm total thickness need to cover multiple requirements to protect two metal layers of about 0,3 μm
- A single sheet of paper is as thick as the entire solar paint system - approx. 0,1 mm

General Solar Paint Composition



- A robust three-dimensional polymer matrix encloses pigments and provides excellent inter-coat adhesion

Common Paint Raw Materials



Resins:

Polyester, alkyd, acrylic, melamine



Film build, pigment wetting, diffusion barrier, adhesion, hardness, flexibility

Anti-corrosion pigments:

Lead, zinc phosphate, zinc oxide



Neutralize chemical attack caused by chloride, sulfide, sulfate, etc.

Barrier and color pigments:

Carbonate, silicate, sulfate, TiO₂, iron oxide



Filler and barrier effect, UV-block, color

Solvents:

Aromatic/aliphatic HC, acetate, alcohol



Provides application properties, film formation, leveling

Additives:

Multi-function agents



Wetting, levelling, defoaming, anti-settle, UV-block, etc.

Exceptional Position of Lead Pigments

Current Situation:

Lead use is common practice in the mirror industry. Interior and exterior applications

Properties:

Lead pigment provides outstanding anti-corrosion performance. It is stable against oxidation and reacts with most acids to insoluble salts

Regulations:

All common lead pigments are listed as SVHC (Substance of Very High Concern). It is only a question of time that we face a raw material shortage and a final lead ban



GHS08 Health hazard

Technology Change Drivers

Lead replacement:

- Classified as SVHC under REACH, phase out in Europe has started
- Non-lead anti-corrosion technologies needed

VOC (volatile organic compounds) reduction:

- Global regulations enforce VOC control. For instance waterborne technology
- Public pressure for green technologies

Thank you!

