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for the world at your feet

INDUSTRIAL FLOORING INSTALLATION...

The Problems, Causes and Solutions

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Industrial flooring is subject to daily abuse including the use of heavy plant machinery, dropped tools and equipment, foot or fork lift traffic, chemical spillages and much more...

While all of these can cause damage to the floor finish, there are a host of other reasons why flooring in industrial facilities can fail.

Here, Flowcrete India explores the pitfalls of flooring installation for industrial environments, highlights the causes and discusses the methods of prevention.

PROBLEM 1

Outgassing

WHAT IS OUTGASSING?

Air pockets in pourus concrete can escape during the curing process. These air bubbles can then become trapped in the film, creating bubbles in the surface of the floor.

These bubbles typically have a pinhole that penetrates directly to the substrate.

WHAT CAUSES OUTGASSING?

- ✓ Excessive air in the concrete substrate.
- ✓ Moisture vapour escaping from the concrete slab.
- ✓ Changes in temperature and barometric pressure, causing air to pass through the concrete.
- ✓ Insufficiently cured, soft concrete.

HOW TO AVOID OUTGASSING

Check the temperature and humidity conditions of the substrate as well as the surrounding air.

If the temperature is rising do not apply the coating materials. Instead, wait until the temperature is falling.

Try using a water based/moisture insensitive epoxy primer to seal off trapped air in the concrete, perhaps applying two coats.

PROBLEM 2

Poor Intercoat Adhesion

WHAT IS POOR INTERCOAT ADHESION?

Poor intercoat adhesion occurs when one layer of the coating material does not adhere correctly or sufficiently to the previous cured coat.

WHAT CAUSES POOR INTERCOAT ADHESION AND HOW CAN IT BE AVOIDED?

CAUSE: Improper preparation of the previous coating.

SOLUTION: Prior to applying materials, the previous coating must be properly prepared and free from contaminants, including dust, dirt and water.

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WHAT CAUSES POOR INTERCOAT ADHESION AND HOW CAN IT BE AVOIDED?

CAUSE: Recoating outside of recoat window without the required additional preparation.

SOLUTION: Check the manufacturer's product data sheet for the recoat window and ensure that this is not exceeded. If the window has been exceeded, consult the manufacturer's recommended recoat procedure.

WHAT CAUSES POOR INTERCOAT ADHESION AND HOW CAN IT BE AVOIDED?

CAUSE: Surface moisture caused by installing coatings less than 50°F above dew point.

SOLUTION: Avoid surface moisture by ensuring that the substrate temperature is at least 50°F above dew point, and that the humidity of the substrate and surrounding air is suitable for application.

PROBLEM 3

Bond Failure at the Substrate

WHAT IS BOND FAILURE AT THE SUBSTRATE?

Bond failure at the substrate occurs when the coating or flooring system delaminates at the bond line.

WHAT CAUSES BOND FAILURE AT THE SUBSTRATE?

Inadequate surface preparation, preventing a good mechanical bond or leaving a surface contaminant, which acts as a bond breaker.

HOW TO AVOID BOND FAILURE AT THE SUBSTRATE

The foundation of any flooring system is the surface preparation, removing all contaminants and creating a surface profile that promotes adhesion.

Debonding from the substrate at the termination or at transitions is related to the installation detail. Traffic edges require a keyed termination.

PROBLEM 4

Poor Hardness or Tackiness

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WHAT IS POOR HARDNESS OR TACKINESS?

After the recommended curing time – (outlined on the manufacturer's data sheet), the material has not developed proper hardness or may appear tacky on the surface.

WHAT CAUSES POOR HARDNESS OR TACKINESS?

Poor hardness or tackiness is usually caused either by improper mixing or inadequate blending of floor coating components. The coating is likely to remain tacky after the recommended cure time and will never be fully cured.

HOW TO AVOID POOR HARDNESS OR TACKINESS

Ensure that materials are applied within the temperature range recommended by the manufacturer. Applying coatings outside of this range is likely to result in a soft or tacky flooring finish.

PROBLEM 5

Amine Blush or Greasy Film

WHAT IS AMINE BLUSH OR GREASY FILM?

Amine blush is a normal chemical reaction between amine-curing agents and carbon dioxide that forms a carbonate, appearing as a greasy film. This is especially true at low temperatures and high humidity.

WHAT CAUSES AMINE BLUSH OR GREASY FILM?

The main contributing factors are…

- ✓ High humidity
- ✓ Presence of excess carbon dioxide in the atmosphere
- ✓ Low curing temperatures

HOW TO AVOID AMINE BLUSH OR GREASY FILM

Check the environmental conditions and only apply the materials when the temperature is a minimum of 50°F above dew point and rising. Do not use propane heat in closed environments because they emit CO_2.

PROBLEM 6

Blistering

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WHAT IS BLISTERING?

Debonding in the form of blistering occurs when a bump or series of bumps form in the flooring material.

WHAT CAUSES BLISTERING?

Moisture in the pores of concrete can migrate toward the warm dry air, causing loss of adhesion and blistering. Near-surface alkali reaction (NASAR) gel has also been reported as the cause of debonding and blistering of epoxy coatings.

HOW TO AVOID BLISTERING?

A damp proof membrane (DPM) can be installed over the concrete substrate – prior to the installation of the final floor coating – to prevent moisture vapour transmission causing blistering.

PROBLEM 7

Colour Shading

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WHAT IS COLOUR SHADING?

Colour shading occurs when the cured floor finish appears to contain different shades or tones, sometimes dark or light streaks.

WHAT CAUSES COLOUR SHADING AND HOW CAN IT BE AVOIDED?

CAUSE: Retouching pigmented epoxies after 15 minutes or longer can cause colour floating, potentially resulting in different shades in the floor.

SOLUTION: If the flooring material needs to be rolled or re-touched for any reason, it should be done within 10 minutes of the initial application.

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WHAT CAUSES COLOUR SHADING AND HOW CAN IT BE AVOIDED?

CAUSE: Pigments can vary slightly from batch to batch, so using different batches on the same project may result in colour variation.

SOLUTION: Always check to ensure matching batch numbers on the pigmented side of the product prior to adding the activator.

PROBLEM 8

Bubbling

WHAT IS BUBBLING?

Air bubbles may appear throughout the entire coating or in clusters, and can vary in size – from a pinhead to much larger.

WHAT CAUSES BUBBLING?

- ✓ Air trapped during the mixing process
- ✓ Improper casting and moulding techniques
- ✓ Excessive heat during the curing process
- ✓ Direct sunlight during the curing process

HOW TO AVOID BUBBLING

- ✓ Use the manufacture's recommended equipment for mixing and application
- ✓ Try to avoid elevated temperatures
- ✓ Cover windows and doors to prevent direct sunlight exposure during the curing process

PROBLEM 9

Imperfections and Fish Eyes

WHAT ARE IMPERFECTIONS AND FISH EYES?

Fish eyes are imperfections in the floor surface that resemble fish eyes.

WHAT CAUSES IMPERFECTIONS AND FISH EYES?

- ✓ Contaminants on the surface of the floor such as silicone blush, oils, animal fats or grease.
- ✓ Applying epoxy coating materials over epoxy primer that has not properly cured.
- ✓ The use of mineral sprit either for cleaning the floor or as a thinner.

HOW TO AVOID IMPERFECTIONS AND FISH EYES?

Remove all petroleum based contaminants with an oil & grease emulsifier, followed by a thorough chemical cleaning with caustic soda, acid and detergent.

PROBLEM 10

Cloudiness

WHAT IS CLOUDINESS?

Cloudiness refers to the white or cloudy appearance of an epoxy coating immediately after installation.

WHAT CAUSES CLOUDINESS?

Cloudiness is caused by exposing the installed materials to water prior to complete cure, either due to moisture from the concrete / substrate or environmental conditions, or from placing the coating into wet service prior to complete cure.

HOW TO AVOID CLOUDINESS

Ensure that the installed floor coating has been allowed to cure for the time recommended by the manufacturer before trafficking the floor or prior to the installation of subsequent coatings (e.g. seal coat).

PROBLEM 11

Lumps and Bumps

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WHAT ARE LUMPS AND BUMPS?

Lumps and bumps in the surface of the floor that are made up of 100% solid epoxy material.

WHAT CAUSES LUMPS AND BUMPS?

- ✓ Inadequate mixing of the coating materials or by using dirty equipment during mixing or application.
- ✓ Lint from the roller sleeve used.
- ✓ Cold conditions causing epoxy component A to freeze.

HOW TO AVOID LUMPS AND BUMPS?

- ✓ Always use a lint-free 6mm roller.
- ✓ If epoxy component A is frozen, make sure that it is completely thawed, then blended thoroughly before use.

PROBLEM 12

A Dull Finish

WHAT IS A DULL FINISH?

A dull finish occurs when a normally glossy flooring material has cured without its usual sheen.

WHAT CAUSES A DULL FINISH?

- ✓ Humidity above 60%.
- ✓ A dull finish after more than 24 hours can be due to condensation during the cure.
- ✓ Improper mixing.
- ✓ Applying the coating in low temperatures or onto a cold substrate.

HOW TO AVOID A DULL FINISH?

- ✓ Do not apply epoxy coating during periods of high humidity.
- ✓ Ensure that application is performed according to the air and substrate temperatures recommended by the manufacturer.

PROBLEM 13

Yellowing

WHAT IS YELLOWING?

Clear or light coloured pigmented epoxy coatings can become yellow, either across the entire surface of the floor or in patches.

WHAT CAUSES YELLOWING?

Yellowing in lighter coloured epoxies is caused by over-exposure to ultra violet (UV) light.

HOW TO AVOID YELLOWING

- ✓ Select colours that are dark or contain a lot of yellow (such as green).
- ✓ Add an aliphatic (non-yellowing) seal coat.

For more information on avoiding floor failure in industrial environments, contact the flooring experts…

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