

## BUBBLING

Air bubbles can appear in the film from very small defects to "honeycomb" clusters. In all cases, they are caused by air entrapment in the film.

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Outgassing of Air from the Concrete Slab</b></p> <p>Air pockets in porous concrete escaping during the coating process, trapped in the film, creating small bubbles in urethanes and craters or honeycomb bubbles in epoxy.</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens removing all bubbles, vacuum up dust, tack rag, and apply another coat.</li> <li>2. Epoxy: Burst the honeycomb and crater bubbles and fill with 100% epoxy. A grinding wheel on a drill can smooth the surface surrounding the craters. Small bubbles can be screened with 60 grit screens, vacuum up dust, tack rag, and apply another coat.</li> </ol>	<ol style="list-style-type: none"> <li>1. Urethanes: Use a water based epoxy primer to seal off trapped air in the concrete.</li> <li>2. 100% epoxy: Use a water based primer to seal off trapped air in the concrete. 30 minutes to 1 hour after applying 100% epoxies re-roll the area with a porcupine roller to help release the trapped air.</li> </ol>
<p><b>Roller Covers</b></p> <p>Too short or too long a nap roller can generate air on application. Overworking with rollers can trap air in the coating.</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens removing all bubbles, vacuum up dust, tack rag, and apply another coat.</li> <li>2. Epoxy: Burst the honeycomb and crater bubbles and fill with 100% epoxy. A grinding wheel on a drill can smooth the surface surrounding the craters. Small bubbles can be screened with 60 grit screens, vacuum up dust, tack rag, and apply another coat.</li> </ol>	<ol style="list-style-type: none"> <li>1. Urethanes: Use 3/8" solvent resistant rollers. Apply from an applicator tray. If product is too viscous to roll easily, thin with urethane thinner to avoid overworking.</li> <li>2. 100% epoxy: Use only 3/8" solvent resistant roller after spreading with squeegee. Apply epoxy immediately after mixing to avoid having the product gather viscosity in the container.</li> </ol>
<p><b>Air Movement</b></p> <p>Excessive air movement can flash dry the film surface before bubbles can burst, trapping air in the film</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens removing all bubbles, vacuum up dust, tack rag, and apply another coat.</li> <li>2. Epoxy: Burst the honeycomb and crater bubbles and fill with 100% epoxy. A grinding wheel on a drill can smooth the surface surrounding the craters. Small bubbles can be screened with 60 grit screens, vacuum up dust, tack rag, and apply another coat.</li> </ol>	<ol style="list-style-type: none"> <li>1. Urethanes: Use exhaust fans for ventilation, sucking air out of the areas vs. blowing air across the coating. Avoid fast air movement from cross ventilation, i.e. open doors across from each other.</li> </ol>

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Temperature Extremes</b></p> <p>Too hot or humid conditions will create too rapid a drying condition</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens removing all bubbles, vacuum up dust, tack rag, and apply another coat.</li> <li>2. Epoxy: Burst the honeycomb and crater bubbles and fill with 100% epoxy. A grinding wheel on a drill can smooth the surface surrounding the craters. Small bubbles can be screened with 60 grit screens, vacuum up dust, tack rag, and apply another coat.</li> </ol>	<ol style="list-style-type: none"> <li>1. Urethanes: Wait until it cools down. Apply during early morning or late evening hours.</li> <li>2. Epoxy: Same as urethane.</li> </ol>
<p><b>Sunlight</b></p> <p>Sunlight on a floor area increases the temperature considerably, causing a rapid drying condition.</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens removing all bubbles, vacuum up dust, tack rag, and apply another coat.</li> <li>2. Epoxy: Burst the honeycomb and crater bubbles and fill with 100% epoxy. A grinding wheel on a drill can smooth the surface surrounding the craters. Small bubbles can be screened with 60 grit screens, vacuum up dust, tack rag, and apply another coat.</li> </ol>	<ol style="list-style-type: none"> <li>1. Urethanes: Close the doors where sunlight hits the floor area. Coat areas exposed to sunlight before sun hits the area. Coat in the evening.</li> <li>2. Epoxy: Same as urethane.</li> </ol>
<p><b>Sunlight</b></p> <p>Sunlight on a floor area increases the temperature considerably, causing a rapid drying condition.</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens removing all bubbles, vacuum up dust, tack rag, and apply another coat.</li> <li>2. Epoxy: Burst the honeycomb and crater bubbles and fill with 100% epoxy. A grinding wheel on a drill can smooth the surface surrounding the craters. Small bubbles can be screened with 60 grit screens, vacuum up dust, tack rag, and apply another coat.</li> </ol>	<ol style="list-style-type: none"> <li>1. Urethanes: Close the doors where sunlight hits the floor area. Coat areas exposed to sunlight before sun hits the area. Coat in the evening.</li> <li>2. Epoxy: Same as urethane.</li> </ol>
<p><b>Lambs Wool Applicator</b></p> <p>The "stop" marks created from applying with lambs wool tend to generate foam; consequently, bubbles will occur.</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens removing all bubbles, vacuum up dust, tack rag, and apply another coat.</li> <li>2. Epoxy: Burst the honeycomb and crater bubbles and fill with 100% epoxy. A grinding wheel on a drill can smooth the surface surrounding the craters. Small bubbles can be screened with 60 grit screens, vacuum up dust, tack rag, and apply another coat.</li> </ol>	<ol style="list-style-type: none"> <li>1. Urethanes: Applying urethanes with lambs wool applicators requires working in two man teams. One "butters" on the coat, while the other pulls it out, generating less foam and bubbles. Roller application is less apt to create bubbles.</li> <li>2. Epoxy: not applicable.</li> </ol>
<p><b>Spray Application</b></p> <p>Airless spraying can be used to apply urethanes. It cannot be used to apply 100% epoxies.</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens removing all bubbles, vacuum up dust, tack rag, and apply another coat.</li> <li>2. Epoxy: Burst the honeycomb and crater bubbles and fill with 100% epoxy. A grinding wheel on a drill can smooth the surface surrounding the craters. Small bubbles can be screened with 60 grit screens, vacuum up dust, tack rag, and apply another coat.</li> </ol>	<p>Contact representative with manufacture of spray equipment. Adjustments must be made in regards to pressure and tip. Change to roller application until corrections can be made to sprayer.</p>
<p><b>Mixing Procedure</b></p> <p>Drawing air into the product while mixing can trap air in the product before applying. This is especially true of 100% solids epoxies and higher solids urethanes.</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens removing all bubbles, vacuum up dust, tack rag, and apply another coat.</li> <li>2. Epoxy: Burst the honeycomb and crater bubbles and fill with 100% epoxy. A grinding wheel on a drill can smooth the surface surrounding the craters. Small bubbles can be screened with 60 grit screens, vacuum up dust, tack rag, and apply another coat.</li> </ol>	<ol style="list-style-type: none"> <li>1. Urethanes: Read directions for proper mixing speed. Always use a Jiffy mixer designed to keep out air in the mixing process. If air is drawn into the mixture, allow to stand until the bubbles are released.</li> <li>2. Epoxy: same as urethane.</li> </ol>

## COLOR SHADING

Uniform color but different shades of color.

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Batch Variations</b></p> <p>Like wallpaper, every batch of pigment will vary slightly from another.</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens, vacuum and tack rag, apply another coat.</li> <li>2. Epoxy: Screen with 60 grit screens, vacuum and tack rag, apply another coat.</li> </ol>	<p>Check batches of pigmented products before applying separate batches for designated floor areas. "Box" batches together to get a uniform color.</p>
<p><b>Exposure to Sunlight or Settling of Product.</b></p> <p>Same batch is applied to the floor area and one section turns lighter or darker than another.</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens, vacuum and tack rag, apply another coat.</li> <li>2. Epoxy: Screen with 60 grit screens, vacuum and tack rag, apply another coat.</li> </ol>	<p>Can be a mixing problem; especially with material over 6 months old. Settling occurs and must be scrapped out to shade the product evenly. Sunlight will discolor many products. Check to see if the product is subjected to sunlight in one area vs. another. Gas vapor and florescent lighting can also discolor a product. Switch to a UV resistant coating to avoid discoloration.</p>
<p><b>Wrong Product Selection</b></p> <p>Clear products subject to sunlight can yellow if not UV resistant. Only aliphatic type products will not discolor.</p>	<p>Screen with 60 grit screens. Vacuum, tack rag, and apply an aliphatic product, preferably a pigmented product to hide the discoloration.</p>	<p>Make sure the product is not going to be exposed to sunlight if aromatic. Be safe and use only aliphatic products if exposure is to sunlight and gas vapor lighting.</p>
<p><b>Spotty Discoloration</b></p> <p>Usually caused by chemical attack of the film.</p>	<p>Screen, vacuum, and tack rag. Apply a new coat of product.</p>	<p>Check before selling and applying any products as to which chemicals will come into contact with the coating. Check chemical resistance charts for the best product to use. Detail a maintenance program to remove chemical spills before they can attack the coating. Some chemicals can cause damage to any known coatings. The customer should be aware of any potential problems at the time of the sale.</p>

## COLOR FLOODING

Dark or light streaks in the film, usually noticeable on application.

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Improper Mixing</b></p> <p>Thorough mixing is required to disperse the pigment evenly in the product</p>	<ol style="list-style-type: none"> <li>1. Urethanes: Screen with 60 grit screens, vacuum and tack rag, apply another coat.</li> <li>2. Epoxy: Screen with 60 grit screens, vacuum and tack rag, apply another coat.</li> </ol>	<ol style="list-style-type: none"> <li>1. Urethanes: Always use a Jiffy mixer blade vs. conventional type paint mixers. Always mix until product is uniform in color. Check the bottom of the container for settlement of pigment. Time the mixing process to make sure it is mixed according to directions.</li> <li>2. Epoxies: same as urethane.</li> </ol>

## WRINKLING OF FILM

Imperfections in coating film, appearance of wrinkles

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Recoat Too Soon</b></p> <p>If the first coat has not dried sufficiently, the second coat will bite in too much and cause the first coat to wrinkle.</p>	<p>If not too severe, screening can remove slight wrinkles. Excessive wrinkles will have to be sanded to smooth and recoat.</p>	<p>Test floor with thumbprint. Do not overcoat until the first coat can be walked on without a sticky feel underfoot.</p>
<p><b>Too Heavy a Coat</b></p> <p>Urethanes are designed to be applied within a specified square foot rate per gallon. Too heavy a film can wrinkle.</p>	<p>If not too severe, screening can remove slight wrinkles. Excessive wrinkles will have to be sanded to smooth and recoat.</p>	<p>Check rate of coverage. Do not try to build mils by applying heavy coats.</p>
<p><b>Solvent Attack</b></p> <p>This occurs when trying to overcoat an existing product that can be partially dissolved by the urethane solvent.</p>	<p>If not too severe, screening can remove slight wrinkles. Excessive wrinkles will have to be sanded to smooth and recoat.</p>	<p>Check compatibility of existing product on the floor. Test with a urethane solvent covered with visqueen overnight to see if the old product is softened or dissolved.</p>

## PEELING

Delamination of the film from the floor

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Excessive Moisture in Concrete Slab</b></p> <p>Pressure created by moisture in concrete will "push" the coating off the floor.</p>	<p>Chemically strip or shotblast coating and redo.</p>	<p>Run a moisture test with a moisture meter or calcium chloride test on both old and new concrete in various spots on the floor. The meter reading must be below 20 to accept urethane and 100% epoxy coatings.</p>
<p><b>Inadequate Etch or Lack of Etch</b></p> <p>The concrete surface must have a medium grade sandpaper feel.</p>	<p>Chemically strip or shotblast coating and redo.</p>	<p>Do not coat smooth floors. Repeat etch process until medium grade texture is achieved.</p>
<p><b>No Primer Used</b></p> <p>Primers solve many adhesion problems and are always recommended.</p>	<p>Chemically strip or shotblast coating and redo.</p>	<p>Always use a water based primer under every urethane and epoxy job.</p>
<p><b>Inadequate Cleaning</b></p> <p>Coatings will not adhere to oil, grease, or common soils.</p>	<p>Chemically strip or shotblast coating and redo.</p>	<p>Re-clean area if necessary. Do not rush preparation process.</p>
<p><b>Delamination of One Coat from Another</b></p> <p>Most common on an overcoat touch-up, months or years after initial installation.</p>	<p>Chemically strip or shotblast coating and redo.</p>	<p><b>Re-coat of old film:</b> Inadequate screening process and cleaning process. When screening, all gloss must be removed. Urethanes require 60 grit screens to adequately dull and provide tack for subsequent coats.  <b>New installation:</b> Re-coat time too long. Urethanes and most coatings must be overcoated within 18 to 24 hours, maximum. Screen coat first if 18 hour time span is exceeded.</p>

## DISCOLORATION

Clear or pigment coatings have a color shading change

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Wrong Product Selection</b></p> <p>Urethanes are either aliphatic or aromatic. Aliphatic urethanes are UV resistant and will not discolor in sunlight. Aromatic will discolor in sunlight, gas vapor lighting, or fluorescent lighting.</p>	<p>Once yellowing occurs, the only solution is to screen, vacuum, tack rag, and overcoat with an aliphatic pigmented urethane to hide the yellowing.</p>	<p>Check exposure to sunlight, gas lighting, or fluorescent lighting and recommend only aliphatic urethanes for the installation.</p>
<p><b>Solvent or Acid Attack</b></p> <p>Spotty discoloration of clear or pigmented urethane from exposure to harsh chemicals.</p>	<p>Screen, vacuum, tack rag, and overcoat with a chemical resistant urethane, upgrade maintenance procedure to clean up as soon as possible the chemical that is causing the problem.</p>	<p>Run a test patch where suspect chemicals will come into contact with the product before applying to identify the effect on the coating.</p>

## WHITE SPOTS

Below surface film, appearance like bubbles or thread strands

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Moisture</b></p> <p>Depressions in the floor retain moisture. The moisture will cause delamination and white spots.</p>	<p>Chemically remove or shotblast area and redo.</p>	<p>Always use a water-based primer that is insensitive to water. Do not coat unprimed floors for at least 24 hours and air blow dry cracks and depressions before coating.</p>
<p><b>Laitance</b></p> <p>Alkaline salts on the surface of new concrete floors.</p>	<p>Usually, adhesion is lacking. Chemically remove or shotblast area and redo.</p>	<p>Check the floor after etching. If a fine talc powder residue remains, re-etch and flush rinse thoroughly before priming and coating.</p>
<p><b>Trapped Solvent</b></p> <p>Fine lint like threads that appear below the surface.</p>	<p>Has little effect on surface film. If unsightly, screen, vacuum, tack rag, and recoat with a pigmented coat.</p>	<p>Provide ventilation to the area so solvents can escape as soon as tack free.</p>

## STREAKS

Visible film separation or pass marks

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Application Method</b></p> <p>Usually caused by lambs wool applicators. Too slow to keep a "wet edge", causing lap marking</p>	Screen, vacuum, tack rag, and recoat.	Switch to rollers vs. lambs wool. Thin the product out if application is tacky. If hot and humid, wait until evening or early morning hours to apply.
<p><b>Inadequate Preparation</b></p> <p>Oil and grease residue can cause separation or streaks.</p>	If peeling, chemically remove or shotblast area and redo. If adhering, screen, vacuum, tack rag, and recoat.	Make sure that the floor is properly prepared and thoroughly cleaned.

## FISH EYES

Circular spots that separate from the film resembling "fish eyes"

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Silicone Residue</b></p> <p>Silicone from welding rods or aerosols deposited on the floor will cause "fish eyes".</p>	Screen, vacuum, tack rag, and recoat. Complete removal of the fish eyes is impossible, only a partial repair through screening. A complete removal and recoat is necessary to correct the problem entirely. A silicone additive "FEE 10", by DuPont, can be added to the urethane to help bridge the separations.	Switch to rollers vs. lambs wool. Thin the product out if application is tacky. If hot and humid, wait until evening or early morning hours to apply.
<p><b>Oil and Grease Residue</b></p> <p>Oil and grease residue will cause product separation, i.e. fish eyes.</p>	Usually, peeling also occurs. In most cases, the coating has to be stripped and redone to completely solve the problem.	With any installation where oil and grease are present, the emulsifiable solvent cleaner should be used. After cleaning to determine whether the dark spots are water or oil, place an electrician's or mechanical light next to the spot and check for wicking of oil or drying, if water spots.

## DULL FINISH

Low gloss, flat finish

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Recoated Too Fast</b></p> <p>Hastening the application of a second coat of product.</p>	Screen, vacuum, tack rag, and recoat.	Make sure the initial coat of the product has been allowed to dry. Test the coating by pressing your thumb into the film. If a thumb print remains, let coatings dry until a thumbprint cannot be pressed into the coating,
<p><b>Little or no Ventilation</b></p> <p>If the solvent portion of a coating cannot evaporate, it becomes trapped in the surface and dulls the gloss.</p>	Screen, vacuum, tack rag, and recoat.	As soon as the product becomes tack free, provide air movement and exhaust ventilation to remove the solvent from the area.

## EXCESSIVE WEAR

Traffic and soil on the surface can abrade a coating and prematurely show wear patterns.

CAUSES	REPAIR PROCEDURES	WAYS TO AVOID PROBLEMS
<p><b>Maintenance Program</b></p> <p>Improper maintenance procedures or lack of proper maintenance to remove sand, soil, and grit that will create excessive abrasion.</p>	<p>Screen, vacuum, tack rag, and apply additional coats of product.</p>	<p>Set up a proper maintenance program with equipment and chemicals to adequately maintain coated area.</p>
<p><b>Wrong Product Selection</b></p> <p>Spalled or pitted concrete requires adequate product to provide a smooth surface. Usually, 100% epoxy is required to fill the depressions even though urethane may be used as a final coat.</p>	<p>Screen, vacuum, tack rag, and apply additional coats of product</p>	<p>Recommend a 100% epoxy product to fill the pitted areas or resurface the entire area.</p>
<p><b>Substandard Concrete</b></p> <p>Porous or "soft" concrete requires more product than standard or dense concrete.</p>	<p>Screen, vacuum, tack rag, and apply additional coats of product</p>	<p>Check the softness or density of the concrete prior to product recommendation. Scratch the surface of the concrete with a nail or knife if the concrete is white and powdery vs. black and hard. Usually, an additional coat of product is necessary.</p>

**General:** Every reasonable effort is made to insure the technical information and recommendations on these data pages are true and accurate to the best of our knowledge at the date of issuance and are subject to change without notice. Products and information are intended for use by qualified applicators that have the required background, technical knowledge, and equipment to perform said tasks in a satisfactory manner.

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