Benjamin Moore®

COROTECH®

HIGH PERFORMANCE

Commercial and Industrial Flooring Systems

PREP, APPLICATION & TROUBLESHOOTING GUIDE

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Benjamin Moore® Corotech® High-Performance Flooring Systems are designed for application by professionals in commercial and industrial environments, as well as select residential spaces. These products provide enhanced appearance and lasting protection for cleaner, safer, brighter and more productive environments.

This ***Prep, Application & Troubleshooting Guide*** will help you diagnose the condition of the floor, prepare it properly, and correctly apply a Corotech floor coating. Your Benjamin Moore Corotech retailer or Benjamin Moore specialty coatings representative can assist you further or guide you through unique project considerations, including the most important part of the process: Thorough and effective preparation.

To learn more about the right Corotech product to choose for a particular flooring need, talk to your Benjamin Moore Corotech retailer or read the ***Corotech Flooring Systems Product Guide***. The entire portfolio of Corotech high-performance primers, enamels, epoxies, urethanes and more can be found at corotechcoatings.com.

CONTENTS:

DIAGNOSTICS

Thorough and effective preparation is the key to a successful floor job, and the first step in preparation is testing and diagnosing the condition of the current floor and the project environment:

- Ensure the concrete itself is in sound condition and fully cured – make repairs if necessary.
- Analyze for the presence of sealers, curing compounds, oils, grease and other contaminants.
- Measure the moisture content of the concrete.
- Test the level of alkalinity or pH of the concrete.
- Observe environmental conditions impacting application.

TEST FOR SEALERS AND CURING COMPOUNDS

Clear sealers based on alkyd, epoxy, urethane, silicone and acrylic resins are used to control laitance and dusting on concrete. Curing compounds based on waxes, epoxies, and acrylics are incorporated into the wet concrete when poured to control the rate of moisture loss during initial curing. The type of sealer or curing compound present will influence the mode of preparation. Test sample areas of the floor by placing a few drops of diluted muriatic acid on the concrete. If the acid bubbles, the concrete is free of sealers or curing compounds. If it does not bubble, a sealer or curing compound is present and must be removed before application of a coating.

TEST FOR OIL AND GREASE

Contamination from oil and grease prevents strong penetration and bonding of the coating system to the concrete. To test for the presence of oil/grease, sprinkle water on the concrete surface in several locations, including areas of activity and traffic patterns. If the water beads, these contaminants are present and must be removed. If the water spreads out and is absorbed, they are not present.

TEST FOR MOISTURE IN THE CONCRETE

All concrete contains some moisture. Excess amounts of moisture often signal that a coating applied to that concrete will fail over time. Testing for moisture allows the flooring applicator to proceed with confidence or to recommend to the facility manager or owner that the moisture be mitigated before a coating is applied.

There are three common tests. Using all three will ensure the best possible estimate of moisture content; the bare minimum should be the plastic sheet test.

Plastic Sheet: Tape to the concrete an 18 x18-inch sheet of clear polyethylene plastic, approximately 4 mils thick, and allow it to remain in place for at least 16 hours. Be sure to seal all edges (ASTM D4263-83). If moisture collects under the plastic in any amount, then the Calcium Chloride test below should be performed, which will give a measurable result, before a coating is applied.

Calcium Chloride: To measure the rate of moisture-vapor emission from the concrete, place a measured amount of anhydrous calcium chloride in a dish inside a transparent plastic cover that is sealed to the floor. Pre-measured kits with instructions for the test are often sold by Benjamin Moore® Corotech® retailers and big box home improvement retailers. After 60 to 72 hours, weigh the calcium chloride and perform calculations to determine the amount of water absorbed (ASTM F1869-11).

The moisture-vapor emission rate is calculated in pounds of water per 1,000 square feet per a 24-hour period. Rates below 3-5 pounds are generally recommended to avoid possible coating failure due to moisture. Flooring applicators should be sure to advise facility manager/owner of moisture-vapor emission test results.

Moisture Meter: Use a moisture meter to determine a percent reading of moisture present in the concrete. Less than 3-5% is generally recommended before proceeding with application of a coating. Moisture is often present from the preparation of the concrete or from water used later to clean or wash off various residues.

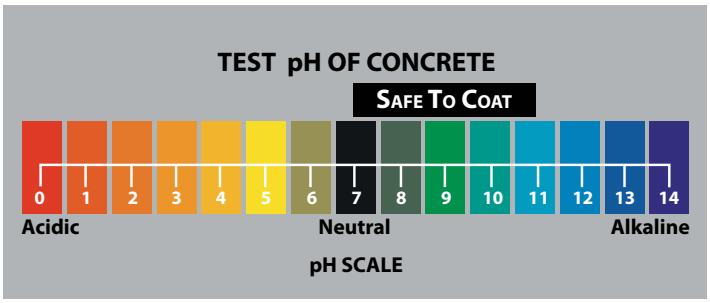
TEST pH OF THE CONCRETE

The pH level of the concrete should be evaluated on a pH scale. Concrete is usually alkaline (also called basic). High pH levels can cause saponification (a chemical reaction that creates a soap-like substance when the concrete is coated), which will lead to delamination of the coating. Cured concrete has a pH level between 8 and 10 and can be tested with pH paper strips.

Environmental Conditions

Air and surface temperature, direct heat/sunlight, relative humidity and dew point are important factors to take into consideration before applying a coating to concrete.

- High humidity slows down the drying process. Note: Warm air holds more moisture. For example, air at a temperature of 90° F and 50% relative humidity holds significantly more moisture than air at 70° F and 50% relative humidity.
- The dew point should be monitored. This is the temperature at which moisture vapor will condense on a surface. During the application of the system, dew formation can cause curing and appearance problems and should be avoided.
- Direct sunlight and high air flow (convection) can affect curing.



SURFACE PREPARATION

Once the condition of the floor and environment are properly diagnosed and any mitigation steps taken, the next step is surface preparation. The surface of a concrete floor is prepared to increase the porosity, profile and surface area so that the new coating can penetrate, bond and effectively adhere to the concrete. Achieving a rough sandpaper-like profile is ideal. Surface preparation is always best accomplished with these three elements:

- Cleaning and degreasing.
- Creating a profile through acid etching or mechanical methods.
- Patching and repairing.

CLEANING AND DEGREASING

All traces of oil and grease and other contaminants must be removed from a concrete floor before acid etching, grinding or shot blasting. Grinding and shot blasting without cleaning will only push contamination deeper into the porous concrete surface, which will affect proper bonding of the coating system. Use Corotech V600 Oil and Grease emulsifier to clean the floor thoroughly. Stubborn or heavy residue areas may require repeated applications.

CREATING A PROFILE

Concrete profile standards have been established by the ICRI (International Concrete Repair Institute) and range from CSP 1 to CSP 9 (concrete surface profile). Regular floor coatings including epoxies require a surface profile of CSP 2 or 3; pictorial or model standards are available and can be achieved with various mechanical methods. Acid etching can also be used as a secondary option.

Acid Etching

After thorough cleaning, acid etching can be performed to open the pores of the concrete and increase the profile of the surface. Bare unsealed concrete floors can be effectively etched using Corotech V620 Concrete & Masonry Etcher. After etching, the acid must be neutralized and the floor must be rinsed thoroughly and allowed to dry. Check local environmental restrictions before proceeding with chemical preparation methods. Acid etching will not work on surfaces that have been treated with sealers and will not remove oil, grease, existing coatings, or other contamination.

Mechanical Preparation

Methods such as Shot Blasting, Scarifying, Diamond Grinding, Grinding/Sanding, Key Cuts and Water Jetting are examples of effective means of mechanical surface preparation.

Shot Blasting

The preferred method of mechanical preparation that strips thin existing coatings, cleans and profiles simultaneously. It is suitable for large and small areas; delivers high production rates; is dust free, dry and cost-effective. Excess shot must be swept-up after blasting.

Scarifying

Method uses metal or carbide disks that rotate at high speeds. Levels uneven floors and edges of concrete. Removes adhesives and thick film coatings. Dusty and labor intensive. Leaves very rough profile only fit for high-build coatings.

Diamond Grinding

Diamond bits are used to grind the surface. Leaves a very smooth profile; ideal for thin film system applications. Low dust levels. Removes existing epoxies and urethanes. Slower than other methods.

Grinding/Sanding

Prepares, cleans and abrades existing coatings for recoat and helps smooth aggregate floors. A labor-intensive method.

Water Jetting

Water sprayed at extremely high pressure (5,000-40,000 psi) with enough force to profile concrete, remove laitance, contamination and unsound concrete. No dust is generated, tight spaces can be prepared and different profiles can be achieved. Eliminates the need for harsh chemicals. A sufficient water source must be available, with time required for a thorough dry.

Key Cuts

Key cuts are masonry saw cuts/small grooves (approx.1/4-inch deep) made around drains, doors and transitions in the floor. Although not used to prepare an entire floor, these key cuts can serve as anchor points for an epoxy system, limit sections of failure, and reduce undercutting by chemicals.

Patching and Repairing

Settling cracks should be repaired after preparation of the entire floor and after the primer/sealer is applied, but before finish coating. Expansion joints should be repaired and filled after the entire coating system is in place. When patching, apply the sealer to the crevice to be repaired before applying epoxy patch. This will enhance the bond strength of the patch. Apply epoxy/aggregate mixture immediately after mixing, spread with trowel, grind off excess.

APPLYING A HIGH-PERFORMANCE COATING OVER AN EXISTING COATING

Applying a Corotech high-performance coating over an existing floor coating is not optimal and should be approached with care. There are two areas of concerns: (1) lifting or wrinkling of the existing coating and (2) improper bonding of the new high-performance coating to the actual concrete or to the existing coating. If the existing coating is determined to be sound, not peeling, properly bonded to the concrete, and not subject to wrinkling or lifting by the new product, then a thorough cleaning and mechanical abrasion should be specified to ensure proper adhesion of the refinish coat to this existing coat. If the existing coating is not sound, then it must be removed by mechanical preparation method such as blasting or grinding.

An expert should be consulted before attempting to coat over an existing coating.

APPLICATION

High-performance floor coatings are specialized products that require technically accurate preparation and handling. They are often applied by trained professional flooring applicators with specialized equipment, application tools and techniques. Application tools and techniques vary depending on the type of flooring system and are typically categorized as:

- Thin-Film Systems - A two-coat system consisting of a penetrating sealer/ primer and finish coat.

- Thick-Film or High-Build Systems - A three-coat system consisting of a penetrating sealer, an intermediate coat, and a finish coat or a two-coat system that builds to more than 8 mils dry.

PREPARATION AND HANDLING

Many high-performance products are two-component catalyzed or unique curing systems that demand strict adherence to all technical data and guidelines. Below is a routine checklist of sound practices and procedures.

- Before beginning, review all project specifications closely and read all product technical data thoroughly.
- Stage all materials before starting and double check that all the proper products, components and quantities are on hand.
- Carefully follow all mixing instructions and observe all mixing ratios, rates and order of addition (example: component B is added to component A).
- Provide efficient and thorough mixing of all products and allow for proper "sweat-in" or induction time.
- Only mix enough material to be applied within the recommended working time or pot-life of the product.
- Measure temperatures and make sure they are within allowable application ranges and note where cold or hot temperatures can slow or accelerate performance/ application parameters.
- If using thinners, only use recommended thinning agents.
- Once the coatings are prepared make sure that the application tools to be used are high quality, clean and in good working condition.

APPLYING FLOOR COATING SYSTEMS

Flooring systems can be broadly grouped into two types: thin film (5-8 mils) and thick film (13-20 mils) systems. Thin film applications are usually 2-coat systems and lend themselves to brush, roll (3/8" nap max) and spray. Thick film applications can be 2- or 3-coat systems; tool requirements include brushes, squeegees and a variety of rollers (lambskin, phenolic core and porcupine).

Always refer to product technical data sheets for application recommendations for specific products and systems, or ask your Benjamin Moore® Corotech® retailer or Benjamin Moore & Co. specialty coatings representative.

First Coat – Penetrating Primer/Sealer

All new or bare properly prepared concrete floors should receive Corotech V155 100% Solids Epoxy Pre-Primer or V156 Moisture Tolerant Quick Set to provide a foundation for the coating system that forms a strong bond with the concrete, while also satisfying the thirst and porosity of the substrate. The reaction of an epoxy sealer with the bare concrete prevents "outgassing" with the subsequent topcoats. Outgassing is a phenomenon where a liquid coating/topcoat reacts with unsealed concrete and gas is generated, causing bubbles to form that become trapped in the finished film. V155 may be sprayed, brushed or rolled; V156 can be applied with a brush, roller or squeegee with back roll.

Intermediate and Finish Coats

Pour ribbons of the mixed coatings onto the floor then spread with squeegee, roller lamb's wool applicator, or phenolic core roller as appropriate. For squeegee application, lightly back roll with a lint-free phenolic core roller perpendicular to the original squeegee orientation. Avoid over-rolling as it may cause appearance uniformity problems. Since many flooring systems are multi-layer coats on large expansive areas, spiked shoes are routinely used by applicators so that they can walk into freshly coated areas to re-roll, even-out, lap, blend-in or broadcast aggregate or other materials into the finish while wet.

Porcupine rollers are used to smooth the surface coat and release entrapped air in the finish. Notched squeegees and rakes are used to apply high solids/high build finishes at evenly controlled wet film thicknesses. For more information on specialized application and finishing tools, one web site to visit is www.midwestrake.com.

Slip-Resistant Surfaces

Hand broadcast aggregate in the intermediate and/or the finish coat followed by back rolling. The amount required will be determined by the size of the aggregate and desired anti-slip properties. Keep in mind the more aggregate you use, the harder it will be to keep the finish clean.

TROUBLESHOOTING

PROBLEM:
Lint or Fibers in Coating

Possible Causes:
Improper roller quality.
Prevention / Remedy:
Use high-quality roller cover with composition appropriate for product type.

PROBLEM:
Dirt, Lumps or Trash in Finish

Possible Causes:
Dust, dirt or shot not effectively removed during prep steps.
Prevention / Remedy:
Be thorough with floor clean-up before beginning application.
Possible Causes:
Improper mixing of dry additives such as anti-slip aggregate.
Prevention / Remedy:
Be sure to thoroughly incorporate dry additives.
Possible Causes:
Dirty equipment or containers.
Prevention / Remedy:
Be sure to properly clean all equipment and containers.

PROBLEM:
Bubbles in Cured Finish

Possible Causes:
Outgassing. Bubbles may occur after the epoxy coating is applied to a porous concrete surface. As the coating begins to cure it releases heat (exotherms), which causes air that expands, tries to escape and gets caught in the film.
Prevention / Remedy:
Apply V155 Corotech100% solids penetrating epoxy sealer as first coat.
Possible Causes:
High air flow. Excessive air flow originating from external sources and equipment causing rapid surface dry of the coating, which entraps air.
Prevention / Remedy:
Remove or re-direct sources of air convection during drying.
Possible Causes:
Roller covers of poor quality or incorrect nap and/or composition.
Prevention / Remedy:
Adhere closely to recommendations on data sheets for tools and techniques.
Possible Causes:
Improper mixing. Mixing technique whips air into coating.
Prevention / Remedy:
Use 300-500 RPM mixing drill with blade that delivers smooth incorporation.
Possible Causes:
Air, surface or material temperature exceeding 90° F will cause a 100% solids epoxy floor coating to cure too quickly, preventing air in the coating from escaping.
Prevention / Remedy:
Avoid high-temperature conditions during application when possible. Cool material before application.
Possible Causes:
Direct sunlight will cause coating to cure too quickly.
Prevention / Remedy:
Note excessive temperature and attempt to shade areas from direct sunlight during application.
Repair:
Bubbles in finish. Thoroughly abrade the affected areas with scrubber or grinder. Always feather the edges of all imperfections. Thoroughly vacuum debris and follow with tack rag and/or strong solvent wipe. Recoat at a rate of coverage called for on data sheet.

PROBLEM:
Coverage Variations

Possible Causes:
Temperature, application tool quality and technique.
Prevention / Remedy:
Coverage recommendations are based upon well established performance criteria. When significant coverage variations occur, consult data sheet information and adhere closely to specifications.
Problem:
Gummy or Tacky Spots in 2-Component Coating After 24-Hour Cure
Possible Causes:
No catalyst or part B used, insufficient mixing of components or improper ratio of components to be mixed.
Prevention / Remedy:
Be certain all components are used at proper ratios and mixed well per data sheet guidelines.
Repair:
If coating is gummy because part B catalyst was not added, scrape away all soft material, follow with a strong solvent wipe-up and remove all residue. If finish is tacky or sticky in spots, treat localized areas by scraping or grinding and recoat. If surface is uniformly partially cured, allow additional time to cure.

PROBLEM:
Poor Wetting of Coating, Crawling, Fish Eyes, and Cratering

Possible Causes:
Contamination on floor from residual materials like silicones, oils, lubricants, waxes, animal fats, vegetable oils and food products.
Prevention / Remedy:
Before application, perform multiple sample areas and check inventory of the types of products and potential contaminants that may be encountered at the project site. Use solvent or chemical agents identified as dissolvers for materials like silicones that may be encountered and degreasers for oil/grease contaminants in sample areas to determine most effective preparation specification.
Repair:
Thoroughly sand or grind affected areas. Remove all residue. Tack rag and solvent wipe. Re-apply and monitor to determine if condition is remedied.

PROBLEM:
Lack of Color Uniformity

Possible Causes:
During application, insufficient mixing/pigment settling. Multiple batches at project site. Product settling. Improper blending of components. Inconsistent application techniques.
Prevention / Remedy:
Mix properly and thoroughly prior to and during application. Always segregate lots when practical and box material where appropriate. Find break points (like expansion joints) when changing lots. Use consistent finish application techniques particularly in back rolling to minimize variations.
Possible Causes:
In service, prolonged exposure to sunlight and chemical exposure.
Prevention / Remedy:
If the problem can be predicted, select colors that are more colorfast and/or topcoat with aliphatic urethane. Make sure that coating system is well designed to be resistant to the types of chemicals and exposures that will be most prevalent.

PROBLEM:
Wrinkling of Film

Possible Causes:
Solvent is added to the coating and the coating is applied thickly. Finish coating attacks and softens unknown previous coating, causing it to lift and wrinkling the surface film. Surface temperature of concrete is too cold (below 50° F).
Prevention / Remedy:
Avoid adding solvent and exceeding film thickness recommendations. Always perform sample test areas to insure compatibility before proceeding.
Repair:
Thoroughly sand and/or grind the floor to a smooth substrate. Clean thoroughly, tack rag and solvent wipe. Recoat floor.

PROBLEM:
Delamination, Flaking, Peeling

Possible Causes:
Insufficient cleaning/preparation, inadequate etching, excessive moisture in and/or on concrete, intercoat adhesion failures.
Prevention / Remedy:
The testing and evaluation phase of the project is intended to determine the best possible cleaning and preparation specifications. These steps combined with multiple sample areas are the most tried and true approaches to achieving successful results with your high-performance flooring system. We strongly recommend not compromising these aspects of the process.
Repair:
Shot blast entire floor to bare concrete when extensive delamination, peeling or flaking is encountered. Repeat original specification. For isolated areas, key the affected area with a sharp knife or 1/16" portable saw and repeat specification in isolated area only.

PROBLEM:
Dull or Low Gloss
After 24-Hours Cure

Possible Causes:
Poor ventilation, excessive humidity, cold temperatures.
Prevention / Remedy:
Avoid these conditions if possible or alter air flows, dehumidify or artificially elevate temperatures during application.
Repair:
If a "blush" occurs over surface (greasy film) after curing, scrub with strong pH neutral detergent or wipe with strong aromatic solvent like xylene. If recoat time has elapsed, sand or grind floor, clean thoroughly before recoating.

TIPS FOR CARE AND MAINTENANCE

Once your high-performance Floor System has been installed, here are some basic tips that are useful to achieve an optimum service life.

- Keep the floors clean with frequent sweeping and vacuuming.
- Wash the floors on a regular basis to remove dirt, grease, grime and other residue. This prevents the embedding of these contaminants into the coating that can occur with extensive wear and constant traffic.
- Always remove spills as soon as they occur. Even though your high-performance flooring system is highly resistant to many chemicals, leaving them unattended for prolonged periods is not safe and may discolor and/or soften the finish.
- Acid and caustic spills should be cleaned and neutralized immediately. Always follow-up with a thorough rinse.

To learn about the entire portfolio of Corotech® high-performance primers, enamels, epoxies, urethanes and more, visit corotechcoatings.com or talk to your Benjamin Moore® Corotech retailer.

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