

CONCRETE SUBSTRATE PREPARATION FOR STRATASEAL HR APPLICATIONS

Introduction

Typically the cleaning of a new concrete surface will consist of thoroughly sweeping the surface of all dirt and construction debris and then blow-cleaning to provide a surface acceptable of the application of STRATASEAL HR.

There are several instances when the typical simple cleaning is not adequate and additional preparation time and materials are required. This additional surface prep is typically required when one or more of the following conditions are encountered:

- After the tear-off of existing roofing/waterproofing materials
- If laitance exists on the concrete surface.
- When certain liquid membrane curing compounds have been used
- When certain form release agents have been used
- If there has been a spill or leak of oil and/or other surface contaminants

The following information has been adapted from procedures developed by the American Concrete Institute (ACI) and compiled from CETCO's experience with respect to the cleaning, preparation and repair of concrete.

Cleaning

Chemical Cleaning – Chemical cleaning may be necessary as a preliminary step to other methods of cleaning to remove substances such as oil, grease, dirt, and some surface treatments. This method typically requires a vigorous scrubbing with solutions of caustic soda, trisodium phosphate or detergents especially formulated for use on concrete. Flush with water (not solvent) to rinse away all traces of the cleaning material as well as the contaminant. Solvents should not be used in the flushing as they tend to dissolve the contaminant and spread it over the deck.

Acid Etching - Once considered a reliable method for preparing a concrete surface, acid etching is not as dependable as mechanical cleaning methods have become and is now typically only used if no other alternative is possible. If grease or oil residue is part of the contamination, pre-cleaning before acid etching should be done according to the chemical cleaning method described above.

The etching procedure itself is typically performed with a 10/90 or 20/80 dilution ratio of commercial grade hydrochloric (muriatic) acid in water, applied to the concrete at an average rate of one quart per square yard. If chlorines cannot be used (if corrosion of reinforcing steel is a concern) a 15% solution of phosphoric acid may be used.

The acid solution is sprinkled or sprayed onto the concrete's surface and is worked in with stiff brooms or brushes. When the foaming action subsides (typically 3-5 minutes) the surface is flushed with water while scrubbing continues. A second treatment may be required to remove heavily contaminated areas. Test with litmus or pH paper to verify that the water flushing has resulted in a near neutral pH condition. When a near neutral pH condition exists, the surface can be allowed to dry.

Note: Proper precautions and personal protective equipment should be used at all times when working with harmful chemicals. Consult the specific manufacturer for recommendations regarding the safe use of their product.

Blast Cleaning – This is one of the more effective ways of removing dirt, concrete laitance or other weak surface material and some residue of existing roofing/waterproofing materials, regardless of using a high pressure water jet with or without an abrasive like sand or just a dry abrasive like sand. High pressure washing without abrasive may not be adequate for the removal of some of these materials since it removes little surface material as compared to the wet or dry abrasive blast methods.

Oil or grease that has soaked into the concrete should first be removed with a chemical cleaning process before blast cleaning.

A blasting method should be selected (in accordance with local environmental restrictions and codes) which best does the job resulting in the surface of the concrete being abraded to the extent that small aggregate particles are exposed and a SOUND, STRONG SUBSTRATE remains.

The air compressor used in the blasting process must have efficient oil and water traps to make sure that the air it supplies is clean. Clean water must be used in wet blast cleaning.

Wet blast cleaning offers a clean-up advantage over dry methods as dust collection is typically more time consuming and difficult than water removal.

Mechanical Removal Methods

These methods and other mechanical methods are probably the most efficient methods of removing weakened layers of concrete (i.e. laitance) and residues of pre-existing roofing/waterproofing materials such as asphalt, urethanes, adhesives, etc.

Scarifiers – Typically employ a drum that has a series of blades attached. The drum spins at high speeds thus allowing the blades to tear into the surface of the concrete or coating. Scarifiers can be particularly useful on rubber-type and asphaltic material that may “gum” up when other machines are used.

Shotblasters – Much like a sand blasting utilizes metal shot or pellets, of various sizes, that are shot at high speed at the decks surface thus breaking up the concrete or coating. The surface texture required and type of material being removed determines what size shot is used. Shotblasters may not be as effective on rubber-type materials and in some cases asphalt products, as sacrifiers would be, since the shot would tend to simply bounce off the surface. Shotblasters also offer a clean-up advantage in that the shot is recovered into the machine and in some cases the dust and debris can be vacuumed up by the machine or attachments.

Grinding – Machines typically employ a simple wheel that spins a series of blades that cut up or grind a surface. Grinding is usually only appropriate to further prepare concrete surfaces to remove weak areas or to grind down high spots and ridges. Grinders typically cannot do an adequate job on removing existing roofing/waterproofing materials as most would simply “gum” up due to the heat generated by the friction of the grinding wheel.



Materials Requiring Removal

Prior to the application of STRATASEAL HR, one or more of the cleaning techniques covered herein may be used for removal of the following materials that may be present on existing concrete substrates.

Laitance – Laitance must be totally removed. Laitance is a layer of weak, non-durable cement and fine elements of aggregate that has been brought to the surface by overworking or improper finishing of the concrete surface. Usually lighter in color than the rest of the concrete surface, one can easily check the presence of laitance by scraping the surface of the concrete with a putty knife or any other hard metal object. The surface will easily break away from the sound concrete below or grooves will easily be made in the surface.

Existing Roofing/Waterproofing – Every effort should be made to remove all existing solid material from the deck. The use of spud bars and/or scarifiers and/or shotblasters is typically recommended. In no case should any loose, blistered, wet or damaged material be left on the deck. There must be no areas where it is left trapped underneath or within plies of any existing material. If some existing materials remain on the deck after thorough cleaning as described above, they may be acceptable according to the following guidelines. Consult CETCO's Technical Services Department for a review of exact conditions.

Asphalt and Modified Asphalt Built-up Roofing – All insulation and felt or membrane layers must be removed completely, down to the last coating of asphalt directly applied to the deck. Scarifiers and/or shotblasters have proven quite effective in removing the last layer of asphalt.

More consideration can be exercised for leaving some solid membrane material on the deck that is firmly bonded to the concrete since these materials are typically compatible with STRATASEAL HR. All continuous flashing materials must be removed 100%. If new flashings are to be adhered with bonding adhesive, the substrate must be 100% cleaned or a suitable recovery material (i.e., plywood, cement or gypsum board) should be installed.

Coal Tar Built-up Roofing – All insulation and felt or membrane layers must be removed completely, down to the last coating of coal-tar directly applied to the deck. Scarifiers and/or shotblasters have proven quite effective in removing the last layer of coal-tar.

Some solid membrane material may be left on the deck that is tightly bonded to the concrete; however, more care must be exercised as the coal tar pitch may not be compatible with the STRATASEAL HR. Age of the old membrane and any volatiles remaining should be determined. Test patches of new STRATASEAL HR (fabric reinforced) may be required. Consult CETCO.

All continuous flashing materials must be completely removed. If new flashings are to be adhered with bonding adhesive, the substrate must be totally cleaned or a suitable recovery material (i.e. plywood, cement or gypsum board) be installed.

Liquid Applied Membranes or Coatings – All loose, blistered and damaged areas must be removed completely. Any trapped moisture must be located and exposed to facilitate drying. Scarifiers work very well for the thicker (1.5+mm or 60+mils) membranes and some shotblaster manufacturers claim the same for their equipment. Both machines work equally well on the thinner deck coating materials. More consideration can be exercised for leaving solid asphalt material on the deck that is firmly bonded to the concrete since asphalt is compatible with STRATASEAL HR.

Peel and Stick Membranes – All loose, blistered and damaged material must be removed. Any areas where water or moisture is trapped beneath the membrane must be located and removed. If the entire membrane cannot be removed from the deck, at a minimum, a torch must be used to burn off the layer of polyethylene on the existing membrane. STRATASEAL HR should not be installed over polyethylene film of existing peel and stick membrane.

Testing if the Substrate is Properly Prepared

One final check to determine if the concrete has been properly cleaned is to apply test patches of STRATASEAL HR to the concrete surface:

1. Several test patches should be applied to different areas of the deck. The patches should be no less than 300mm (12”) square and be applied at no less than 3.2mm (125 mils) thick.
2. The bond to the substrate can be checked immediately after the membrane cools and then should be checked again the next day.
3. If a sound bond is achieved the application can typically proceed. However, frequent bond checks should be made during the application of the membrane to ensure the integrity of the overall installation.
4. If a sound bond is not achieved, further deck preparation is typically required.

The same test patch procedures, outlined above can be used to determine whether the concrete is dry enough to receive the STRATASEAL HR. Excessive moisture within the concrete can be drawn to the surface during application of the membrane (due to its heat) and even after application by the heat of the sun on the black membrane. Vapor drive caused by the capillary action of the water wanting to escape also aids this process.

The result of excessive moisture on the STRATASEAL HR would be seen in the form of pinholing, blistering and/or loss of adhesion.

If pin-holing and/or blistering are observed, the application must either be delayed until the concrete is shown to be dry enough or the application must be completed with the fabric reinforced membrane assembly. SEE STRATASEAL HR installation guidelines for more information.

If loss of adhesion is observed, the application cannot proceed until the concrete is shown to be dry enough.

In some cases the test patches with STRATASEAL HR are not practical. In these instances, there are other methods that can be employed as aids in making the determination of whether the concrete is dry enough.

ASTM D4263 “Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method”, reports a simple method for determining the presence of moisture in concrete. This standard recommends using a 450mm x 450mm (18” x 18”) square of 0.1 mm (4 mil) polyethylene sheets and 50mm or 75 mm (2” or 3”) wide duct tape. The plastic sheet is taped to the concrete surface tightly, sealing all edges. This should be done when the surface temperature of the concrete and other ambient conditions are the same as those expected during membrane application. In addition, CETCO recommends doing several tests in different areas. The sheet should be protected from heat, direct sunlight and tearing. After at least 16 hours, remove the sheet and look for moisture both on the poly sheet and on the concrete.

The presence of moisture is an indication that more drying time is required or that the fabric reinforced assembly must be installed. If no moisture is present, the application can typically proceed. However, frequent bond checks should be made during the application of the membrane to ensure the integrity of the overall installation

The use of moisture meters on site or the laboratory analysis of core samples taken from the deck are other methods used to determine the presence of moisture within concrete. These methods however, are best left to professionals who specialize in these procedures.

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