

## **Concrete Inspection and Preparation for Acceptance of Coatings** **(NACE No. 6/SSPC-SP 13)**

NACE No. 6/SSPC-SP 13 provides a standard for contractors and manufacturers, to aid in the inspection and preparation of concrete substrates for the acceptance of coatings. While not all methods of surface preparation are appropriate for Zirconia systems, we have outlined steps to inspect, qualify, prepare, and clean concrete substrates for acceptance of Zirconia systems per the compatible methodologies described in NACE No. 6.

### **Section 1: Concrete Inspection Prior to Surface Preparation**

#### **1.1 Visual Inspection**

1.1.1 Concrete should be thoroughly inspected for visual indications of cracking, defects, contamination, excessive moisture, and general deterioration.

1.1.2 While cracking is typically apparent, mechanical surface preparation often reveals cracks to be larger or more significant with the removal of material. Cracks must be excavated and repaired prior to application of Zirconia products, using compatible materials.

1.1.3 Defects in concrete include spalling and honeycombing and may occur simultaneously with other forms of concrete degradation (e.g., contamination) and contain unsound concrete at the surface. Defects must be repaired with compatible material, after the removal of unsound concrete, prior to application of Zirconia products.

1.1.4 Contamination in concrete may be due to chemical intrusion, biological contamination, previous coatings/repair materials, or even products intended to clean/prepare the surface. All contamination must be removed prior to application of Zirconia products. This may involve using sterilizing, disinfecting, or neutralizing agents which must be completely washed away.

1.1.5 Excessive moisture must be identified and allowed to dry prior to the application of Zirconia products. If moisture is being introduced by a continuous source, then this must be fixed prior to any coating activities and may inhibit proper repairs.

1.1.6 Any other forms of concrete deterioration not mentioned above must be identified and managed, so that only sound concrete or sound cementitious repair materials are left when coating is applied.

#### **1.2 Inspecting for Surface Soundness**

1.2.1 Physical soundness of the concrete should be tested, such that Zirconia products are only applied over good, intact substrates, which are free of chalking, flaking, or loose materials, and the concrete is known to be of appropriate strength. NACE No. 6, paragraph 1.4.3:

*“A screwdriver, file, or pocket knife is lightly scratched across the concrete surface. If the metal object rides over the surface without loosening any particles and leaves no more than a shiny mark, the surface is sound. If this process gouges the surface, the surface is not sound.*”

*The concrete surface is lightly struck with the edge of a hammer head. If the hammer rebounds sharply with no more than a small fracture at the impact area, the surface is sound. If it lands with a dull thud and leaves powdered dusts in the indentation, the surface is not sound.*

*A chain is dragged across horizontal concrete surfaces. Differences in sound indicate unsound concrete and holes or pockets within the concrete.”*

If such qualitative testing proves inconclusive, then other agreed upon testing, such as ASTM D4541 (pull-off testing), can be performed with agreed upon metrics for acceptable results.

1.2.2 Chemical soundness of concrete can be tested in a variety of ways, however visual inspection is typically sufficient. If unsure of the presence of chemical contaminants, Zirconia recommends surface grinding, high pressure washing, and use of Zirconia PoreBlocker™ colloidal silicate to push out and encapsulate chemical contaminants.

1.2.3 Contamination of concrete is typically revealed by visual inspection. Biological intrusion appears dark or off color, when compared to sound concrete. Contamination from previous coatings or repair products may be difficult to distinguish at times, and misting with water may reveal these products when contrasted with wet concrete. A water drop test may also be used to test for hydrophobic contaminants.

1.2.4 Excessive moisture can be identified by visual inspection, but using a moisture meter may be necessary in some cases.

## **Section 2: Concrete Repair**

To the extent possible, all concrete repairs should be performed prior to surface preparations. Any repair performed should only be done after the removal of all unsound or contaminated concrete, and the management of moisture levels or other circumstances outside of the application specifications of the repair material. Only approved, compatible products should be used for repair.

## **Section 3: Surface Preparation**

### **3.1 Objectives**

3.1.1 Surface preparation should achieve the desired final surface profile prior to the application of any Zirconia products. Zirconia engineers thin build coating systems which ultimately mimic the surface profile of the substrate.

3.1.2 Surface preparation should achieve a substrate condition of only sound concrete, or sound compatible cementitious materials when required for patching and repair.

3.1.3 All identified cracks, defects, contaminants, or other forms of unsound substrate must be managed prior to application of any Zirconia products.

## **3.2 Mechanical Preparation**

3.2.1 Surface Grinding is the preferred method of substrate preparation, as it can achieve the desired surface profile and remove unsound concrete simultaneously. In most cases, a single proper grind is sufficient to prepare concrete for coating.

3.2.2 High pressure washing can be used in scenarios such as vertical applications, where grinding isn't feasible or an available option.

3.2.3 Use of manual or power tools for removal of material, such as roto hammers, wire brushes, or other impact or abrasive tools, which aid in achieving a sound surface to coat, may be used as appropriate. Care must be taken with the use of tools or methods which may produce an undesired surface profile.

## **3.3 Chemical Preparation**

3.3.1 Chemical agents such as bleach or oil lifting detergents may be used where mechanical methods were unable to remove contaminants. If used, any remaining chemical agents must be neutralized and all foreign (not sound concrete) materials completely removed, prior to coating with Zirconia products.

## **3.4 Surface Cleaning**

3.4.1 Vacuuming should be performed following all grinding activities, even in the case of vacuum grinding. Thorough vacuuming is necessary to ensure the removal of loose particles, debris, and contaminants which may inhibit bonding or cause coatings to bond non integral/unsound concrete.

3.4.2 Auto scrubbing is the preferred method of cleaning horizontal surfaces, after grinding and vacuuming have taken place. Auto scrubbing helps to ensure that loose particles, debris, and contaminants from grinding and the environment are removed, and residual water is controlled. Additionally, the scrubbing action is often more effective at dislodging foreign or unsound materials, relative to other cleaning methods.

3.4.3 High pressure washing of surfaces is appropriate when other methods are not available, or a vertical surface is being prepared for coating.

3.4.4 Wet mopping, dry mopping, or sweeping may be appropriate in circumstances where thorough cleaning has already been conducted, and loose environmental debris must be removed. For example, removal of wind-blown leaves or incidental detritus from foot traffic.

## **Section 4: Post Surface Preparation Inspection**

### **4.1 Final Visual Inspection**

4.1.1 After the conclusion of necessary surface preparation, a final visual inspection should be conducted to identify any remaining areas of concern, and to ensure that preparation and cleaning did not reveal previously unknown defects or contaminants.

4.1.2 Visual inspection of the prepared surface should verify that no defects, contamination, or other forms of unsound substrate remain.

4.1.3 Visual inspection of the prepared surface should verify that no areas of excessive moisture are present, which may inhibit or interfere with bonding.

4.1.4 Visual inspection of all repair work should verify that repair material is integral with substrate and in sound condition.

4.1.5 Visual inspection of the prepared surface should verify that the appropriate surface profile was achieved, and no areas require further grinding or scarification.

4.1.6 Visual inspection of the prepared surface should verify that the substrate was properly and thoroughly cleaned, with no remaining loose particles, debris, foreign or unsound materials.

#### **4.2 Physical Inspection**

4.2.1 During the course of visual inspection, the prepared surface should be touched and felt for signs of debris, residues, and foreign or unsound materials.

4.2.2 During the course of visual inspection, the prepared surface should be touched and felt for signs inconsistent or undesired surface profile. This may include small spalls, grinding marks, burs, protruding aggregate, or other undesired surface topography.

4.2.3 In areas where known contaminants were removed or neutralized, appropriate follow up testing should be conducted to verify that the surface is now sound and appropriate for coating.

4.2.4 In areas where repair or patch work was conducted, repair or patch material should be touched, felt, or prodded to ensure that repairs and patches are sound and ready to accept coating.

#### **4.3 Inspection of Substrate and Ambient Conditions**

4.3.1 Using a temperature gun, several data points for substrate temperature should be collected, to ensure that conditions are appropriate for coating.

4.3.2 Using a temperature and humidity data logging monitor, ambient conditions should be captured and monitored, to ensure that conditions are appropriate for coating.