Coating Green or High MVER Concrete Technical Bulletin

MANUFACTURER

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DESCRIPTION

Traditionally, it is recommend to cure new concrete for 28 days prior to the application of polymer coatings. This period of time allows for the proper hydration of the concrete which is directly related to the development of physical strength properties. Standard concrete achieves 100% strength development within 28 days. While the 28 day rule of thumb is well accepted there are methods and materials available which can reduce the required cure time of concrete allowing for more timely installation of coatings. These recommendations and procedures should also be employed for applications to any above grade and/or new concrete that may be susceptible to moisture vapor transmission, exposure to sunlight/thermal cycles or otherwise likely to have outgassing pinhole issues.

First and foremost, the concrete mix design should be examined and, where possible, include specific properties that promote strength development and coating "friendliness". There are several facets of the concrete mix that can be optimized for quick and effective top coating. These include: water to cement ratio less than .45, use of well graded aggregate to reduce cement paste/water content, aggregate of proper type to reduce water absorption, minimum compressive strength of 5000 psi at 7 days, elimination of CaCl2 and NaCl, density of at least 140 lbs./ft3, less than 4" slump and no more than 6.5% air entrainment. These suggested mix variables can reduce the excess water in the mix that is not required for hydration and provide a suitable concrete substrate for polymer coating application. Additional considerations also include proper compaction and consolidation, a light steel trowel finish, proper design and placement of sub base and vapor barriers, and proper curing. Liquid membrane curing compounds should not be employed. If used, all curing compounds must be removed by mechanical means. Achievement of at least 80% of the design strength should be attained prior to removal of wet cure systems and commencement of preparation.

Proper surface preparation is required to remove any weak surface layers and to also provide a suitable profile for coating adhesion. Concrete should be prepared using a method which achieves a clean, uncontaminated surface having adequate profile and porosity to promote coating penetration and adhesion. Concrete surface preparation methods are discussed in industry standards such as SSPC TU-10 and ICRI Guideline No. 03732. Acceptable methods may include high-pressure water cleaning, dry or wet abrasive blast, shot blasting or combinations of these and other methods. The selected surface preparation methods should remove all contaminates, remove weak surface layers and efflorescence, open honeycombs/bug holes and create a profile comparable to ICRI CSP 3 or greater. Surface prep methods should be performed in a manner that provides a uniform, sound, clean and neutralized surface that is not excessively damaged. The substrate should also be allowed to thoroughly dry of any water introduced during surface preparation operations. It is strongly recommended that all slabs/floors be tested for moisture vapor emission rate (or MVER) according to ASTM F1869-04; Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

Applications of primers to the substrate are made to prior to the application of the topcoat material to promote adhesion and reduce the detrimental effects of moisture vapor emissions. For concrete having a high moisture water emission rate (>3 lbs.) it is recommended to apply multiple coats of primers. For concrete less than 28 days old or having MVER greater than 3 lbs./1000SF/24hrs, Raven recommends the application of two coats Min. of Raven 155 at a coverage rate of 8 mils WFT, followed by an optional (for MVER>8 lbs.) coat of Raven 171 or 171FS 100% solids primer at 8 mils WFT. Additionally, all surface defects such as voids, bug holes and honeycombs, should be repaired prior to primer application. Other standard precautions to avoid outgassing pinholes should also be followed, such as coating during falling substrate temperatures and the avoidance of direct sunlight. It is recommended to chart the temperature cycles of the substrate for at least two days to determine the appropriate time to apply coating materials.

The application of test areas and subsequent adhesion testing is recommended prior to full scale coating operations. The results of such testing may indicate the need to modify procedures and/or materials. Standard good coating practices and adherence to material handling and applications should always be observed.

Recommended Procedure for Coating Application on New Concrete Substrates or Concrete Substrates having High MVT

SURFACE PREPARATION

All concrete substrates shall be prepared according to accepted industry standards as described in SSPC TU-10, NACE No. 6, NACE RPO-892 and ICRI Guideline No. 03732. Recommended details shall include:

· Inspection for and removal of all contaminates, curing compounds, form releases, etc. according to SSPC SP-1

· Cleaning of all surfaces via High Pressure Water Cleaning (5000 psi min), dry or wet abrasive blast to achieve adequate profile (Min. ICRI CSP 4) and porosity, to remove laitance, dirt, loose materials, dust, etc. and exposure of subsurface voids as necessary,

· Repair of all surface defects (honeycombs, voids, projections, sharp corners, etc.) using a back filling method with the coating being utilized, an approved high early strength repair mortar and mechanical means such as grinders, chipping hammers, etc. as necessary,

· Following adequate cure of applied repair mortar; profiling of all surfaces via High Pressure Water Cleaning (5000 psi min) dry or wet abrasive blast to achieve adequate profile (ICRI CSP 3-5) and porosity,

· Cleaning of all surfaces of blast media and remaining debris via vacuum, clean air blast or water cleaning is necessary,

· All prepared surfaces to be coated shall be ventilated and allowed to dry prior to primer/coating application (preferably for at least 12 hours to allow water introduced during cleaning to dissipate)

RECOMMENDED COATING SCHEDULE

· Coating applications should be made during periods when substrate temperature decline and exposure to direct sunlight or other thermal sources can be mitigated,

· A minimum of (2) coats Raven 155 Primer applied via spray, brush or roller; at a minimum coverage rate equal to 200 S.F./gal (8 mils WFT). An optional application of (1) coat of Raven 171 or 171FS Primer at 8 mils WFT may be applied if conditions warranted (i.e. MVER>8 lbs., high porosity or aggressive profile),

· Each coat of Raven 155 (and 171 or 171FS if utilized) shall be allowed to cure to a set to touch state (no transfer of material to finger when lightly touched) prior to application of additional materials. Attention needs to be given to the amount of time between coats to make sure the primers recoat window is not exceeded. Refer to the TDS of the primer utilized for recoat window. Ventilation shall remain in place during cure of the Raven 155 to promote water evaporation,

· Following application and cure of the primers; Raven or Aquatapoxy topcoats shall be applied in a minimum of two applications totaling the specified WFT,

· In cases where outgassing may be is an issue it is recommended that a light coat of 10-20 mils be applied and allowed to become tack free prior to application of thicker coats. Trowelling in between coats may also aid in the displacement of air in porous substrates

· All coating defects (holidays) shall be repaired prior to application of the final coat. Final coating shall be inspected for holidays according to NACE RPO-188/ASTM D-4587. All holidays shall be repaired by abrading and cleaning the coating at the repair area followed by application of properly proportioned and mixed topcoat to seal the holiday only within the area previously prepared.