Sikafloor® TECHNICAL SERVICES

SURFACE PREPARATION GUIDE

APRIL, 2020

BUILDING TRUST

Scope of Work

This method statement describes guidelines for evaluating concrete surfaces and their preparation prior to installing resinous flooring products. All substrates to receive Sika flooring products must be structurally sound, clean and at a minimum saturated surface dry (SSD). Proper surface preparation is a critical factor in the successful performance of applied resinous floor or wall systems.

Providing an acceptable substrate is the responsibility of the owner, the owner's representative or the concrete contractor, unless specifically stated otherwise. The contractor responsible for the installation of the Sika flooring and wall systems shall be provided a substrate that is clean, durable, flat, pitched to specifications, SSD and free of surface contaminants.

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Substrate Condition Assessment

Determine the general condition, soundness, presence of contaminants and the best method to prepare the surface. The concrete substrate must be sound and possess a minimum compressive strength of 3626 psi (25 N/mm2 or 25 MPa) with a minimum pull off strength of 218 psi (1.5 N/mm2 or 1.5 MPa). The substrate must be clean, dry and free of all contaminants such as dirt, oil, grease, coatings and surface treatments, etc.

Removal and replacement of non-durable concrete must be performed prior to the installation of the flooring system. Weak or deteriorated concrete must be removed to a level of sound concrete. Contact Sika Technical Service for recommendations. Sika offers a complete range of high performance repair mortars and concrete for applications ranging from cosmetic to structural repairs. Sika's repair mortars and underlayments shown below are compatible with Sika resinous floor and wall systems.

Sika Repair Mortars and Underlayments

Sika Level-01 Primer Plus

Sika Level-02 EZ Primer

Sika Level Skim Coat

Sika Level-125

Sika Level-325

SikaQuick 1000

SikaQuick 2500

SikaQuick Smooth Finish

Decontamination of Concrete Surfaces

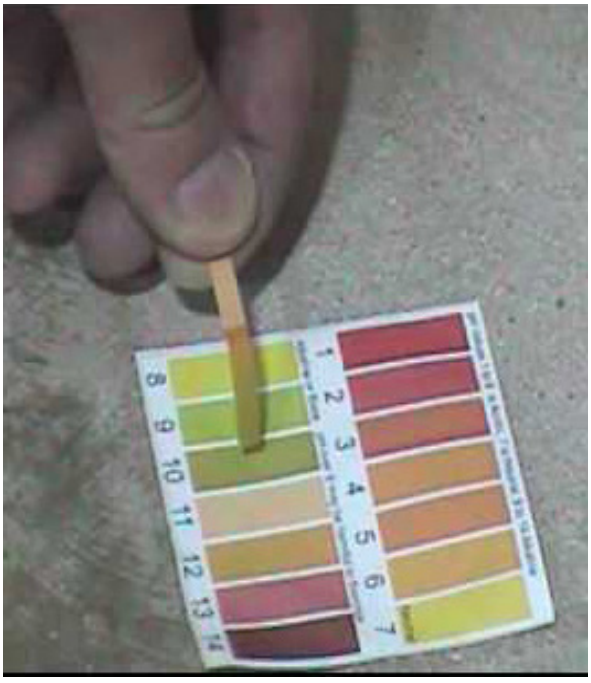
Surface contaminants must be removed prior to creating a surface profile. Contamination of concrete surfaces includes all materials that may affect the adhesion and performance of the coating to be applied. Examples include, but are not limited to, dirt, oil, grease, chemicals, curing compounds etc.

The removal of these contaminants may be accomplished by the use of detergent scrubbing with a heavy duty cleaner/degreaser, low pressure water cleaning (less than 5,000 psi), or steam cleaning. The concrete's porosity and the duration of exposure play an important part in the cleaning/neutralizing of the contaminants.

Testing pH of Concrete

Test the pH of the surface to ensure the contaminants have been removed from the concrete. The chemistry of concrete is alkaline in nature. Normal concrete should be in the range of 11 to 13. After decontaminating, test the floor in multiple locations using distilled water and pH paper. If the pH is 10 or lower, additional decontamination is needed to ensure a good bond. In areas where the contaminants cannot be elimenated, the contaminated concrete must be removed and replaced.

The common method to test pH at the surface of a concrete slab is to use wide range pH paper, its associated pH chart, and distilled or deionized water. Place several drops of water on a clean concrete surface, forming a puddle approximately 1 in. (25 mm) in diameter. Allow the puddle to set for 60 +/-5 seconds then dip the pH paper into the water. Remove immediately and compare to chart to determine pH reading. Other pH testing methods such as pH pencils or pH meters are available and may be used to measure surface pH.



Surface Irregularities

Weak or damaged concrete must be removed and surface defects such as blowholes and voids detailed. Use appropriate Sikafloor® SikaDur® and SikaGard® repair materials for repairing the substrate, such as filling blowholes, voids and surface leveling (see chart 2-1). The concrete or screed substrate must be primed or leveled to an even surface. High spots must be mechanically removed, e.g. grinding.

Creating Surface Profiles

Concrete substrates must be mechanically prepared to remove cement laitance, existing coatings, curing compounds and achieve a profile that is clean, dry and free from dirt, grease, oil and any other surface contamination. Shot blasting, grinding or similar techniques are ideally suited for this work.

Shot Blasting

Shot Blasting is the industry standard for surface preparation of concrete. Shot Blasting means that a machine projects a large number of abrasives towards the surface of the concrete and in this way roughens the surface. A wheel in the machine uses centrifugal force to propel the abrasive against the concrete. The abrasives are then drawn back into the machine to be used again. The dust will be separated by the use of a dust collector.

Grinding

Surface grinders with diamond pads are used to create surface profile, remove high spots on a concrete surface and remove coatings, mastic, urethane, epoxy, paint and other surface contaminants. Grinding with diamond tools creates a lot of dust; therefore, a capable dust collector must be used.

Note: Do not use grinding pads made of hard aggregates such as aluminium oxide (corundum). These pads will only polish the concrete surface and are not suitable to create required profiles.

Scarifying

Scarifying tools are used to plane a floor, prepare a concrete floor for further treatment, or remove old resin-based coating to achieve a profiled open textured surface. A concrete scarifier is equipped with a cutting tool that rotates at very high speeds to tear the surface. Scarifying creates a great amount of dust so a capable vacuum dust collector must be used.

Note: Scarifying can damage and loosen the upper layer of the concrete. Therefore it is mandatory that a scarified surface must be shot blasted afterwards.

Profile Characterization

The International Concrete Repair Institute (ICRI) Guideline No. 310.2 (formerly 03732) has defined nine different guidelines for proper surface preparation, known as Concrete Surface Profile (CSP), and has developed profile replica blocks to give a visual point of reference for the user. The nine profile replicas of the CSP standards can be obtained from ICRI. Each profile carries a CSP number ranging from a base line of 1 (no change to profile/remove loose debris) through 9 (very rough/exposed aggregate).

Sika's Typical Recommendation: Concrete must be prepared to achieve a laitance-free and contaminant-free, open textured surface by shot blasting or equivalent mechanical means (CSP-3 to CSP-5 as per ICRI guidelines). Check the most current Sikafloor Product Data Sheet for detailed recommendations. Sikafloor Product Data Sheets can be

CSP-1, Acid Etched*

CSP-2, Grinding

CSP-3, Light Shot Blast

CSP-4, Light Scarification

CSP-5, Medium Shot Blast

CSP-6, Medium Scarification

CSP-7, Heavy Abrasive Blast

CSP-8, Scabbled

CSP-9, Heavy Scarification

* Sika does not recommend acid etching.

Preparation method	Concrete Surface Profile								
	CSP-1	CSP-2	CPS-3	CSP-4	CSP-5	CSP-6	CSP-7	CSP-8	CSP-9
Low-pressure water cleaning									
Grinding									
Abrasive (sand) blasting									
Steel shot blasting									
Scarifying									
Scabbling									

Moisture Level Test Methods

To assess the moisture content of the substrate and determine if is acceptable to apply a concrete coating use one or several of the following test methods:

Pre-Test Conditioning - The substrate and occupied air space above the floor shall be at temperature and relative humidity expected under normal use conditions for a minimum of 48 hours prior to testing for moisture. If this is not possible, the test should be conducted at 75F +/- 10F and relative humidity of 50 +/- 10%.

Sika Recommended Test Methods

Moisture Meter - ASTM F2659 Standard Guide for Preliminary Evaluation of Comparative Moisture Condition of Concrete, Gypsum Cement and Other Floor Slabs and Screeds Using a Non-Destructive Electronic Moisture Meter. The test can get an instant and precise evaluation of the moisture conditions within 1.0" below the surface of the slab. This is done by using the Tramex® CME/CMExpert that gives a measurement of % moisture content by weight; a moisture map of the entire substrate can be recorded.

Other Test Methods

Relative Humidity: ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-situ Probes. The Relative Humidity (RH) test involves drilling holes into the cured concrete and stabilizing for at least 72 hours prior to placing probes in the concrete and reading the results with a hygrometer.

Relative Humidity: ASTM F2420 – Determining Relative Humidity on the Surface of Concrete Floor Slabs Using Relative Humidity Probe Measurement and Insulated Hood. This test method involves placing a purposely-made, thermally insulated hood onto the surface of a concrete slab thereby creating an entrapped and impervious air pocket.

Calcium Chloride: ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloors Using Anhydrous Calcium Chloride. The Calcium Chloride test involves placing a dish of calcium chloride covered by a plastic dome (adhered to the concrete) on the concrete and allowing the dish to remain in place between 60-72 hours. The calcium chloride absorbs any moisture vapor that transmits through the concrete within the plastic dome. The results of a calcium chloride test measure the amount of moisture absorbed and results are stated in pounds per 1,000 ft^2.

Always consult the Sikafloor Product Data Sheets, Method Statements or contact Sikafloor Technical Services for recommendations and procedures for testing.

Dew Point Chart

One of the most critical environmental conditions of a high quality resinous coating quality is the dew point. Because moisture on a surface can lead to problems such as: flash rust, poor adhesion, delamination of coating layers, poor curing, degradation of a coating's physical properties, corrosion beneath the coating, long term impact on the coating performance and unmet expectations of a promised product feature.

The dew point is associated with temperature and relative humidity. A high relative humidity indicates that the dew point is closer to the current air temperature. Relative humidity of 100% indicates that the dew point is equal to the current temperature (and the air is maximally saturated with water). When the dew point stays constant and temperature increases, relative humidity will decrease.

The dew point is the temperature of an air-water vapor mixture at which condensation of water vapor begins, with the air becoming saturated. To allow a practical safety margin, the substrate temperature must be at least 5°F above the dew point.

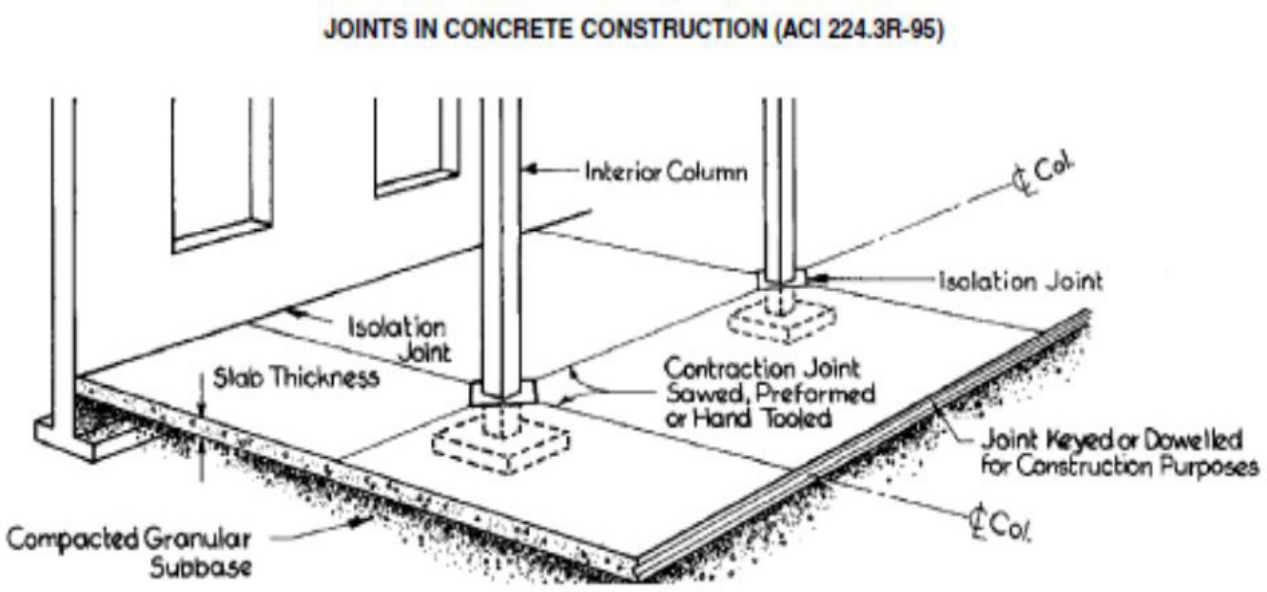
Air Temp °F	% Relative Humidity																		
	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10
110	110	108	106	104	102	100	98	95	93	90	87	84	80	76	72	65	60	51	41
105	105	103	101	99	97	95	93	91	88	85	83	80	76	72	67	62	55	47	37
100	100	99	97	95	93	91	89	86	84	81	78	75	71	67	63	58	52	44	32
95	95	93	92	90	88	86	84	81	79	76	73	70	67	63	59	54	48	40	32
90	90	88	87	85	83	81	79	76	74	71	68	65	62	59	54	49	43	36	32
85	85	83	81	80	78	76	74	72	69	67	64	61	58	54	50	45	38	32	
80	80	78	77	75	73	71	69	67	65	62	59	56	53	50	45	40	35	32	
75	75	73	72	70	68	66	64	62	60	58	55	52	49	45	41	36	32		
70	70	68	67	65	63	61	59	57	55	53	50	47	44	40	37	32			
65	65	63	62	60	59	57	55	53	50	48	45	42	40	36	32				
60	60	58	57	55	53	52	50	48	45	43	41	38	35	32					
55	55	53	52	50	49	47	45	43	40	38	36	33	32						
50	50	48	46	45	44	42	40	38	36	34	32								
45	45	43	42	40	39	37	35	33	32										
40	40	39	37	35	34	32													
35	35	34	32																
32	32																		

To calculate Dew Point, read the air temperature on the left column and the measured relative humidity on the top line. Note the dew point at the intersection of the two values.

Sealants for Concrete Joint Protection

Concrete expands and contracts due to drying shrinkage and temperature changes. To control where this cracking occurs joints are placed in the concrete slab at a predetermined spacing. These joints are either saw cut (control) or preformed (isolation / expansion) to allow for these natural changes in the concrete that are dependent on varying ambient conditions.

While concrete joints offer protection from uncontrolled slab cracking, they need protection themselves. Heavy forklift traffic can quickly damage joint edges causing them to chip, fracture or widen and become unsafe. To prevent joint damage, joints are filled with either an epoxy or polyurea control joint filler and shaved smooth to create a flush profile for forklift and other wheeled traffic. Expansion joints in floors usually can withstand heavy traffic and maintain flexibility for greater joint movement.

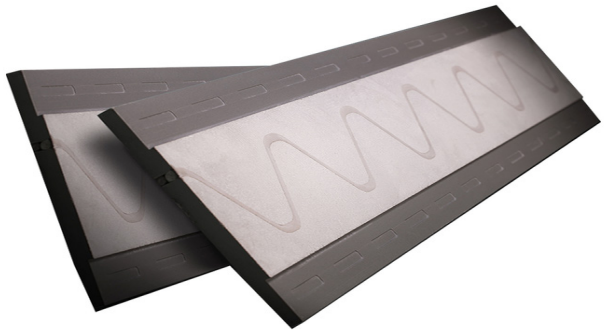


Sika Joint Protection and Repair Products

Sika FloorJoint S

Sika Floor Joint S is a prefabricated, carbon-fiber reinforced polymer composite panel with high resistance to impacts, mechanical wear and other physical vulnerabilities. its unique wave joint design improves weight distribution, avoids point loading and preserves joint integrity.

FloorJoint S is well suited to new construction and renovation projects with medium to heavy duty joint protection requirements, such as factories, warehouses, production areas and hospitals.



Sika Loadflex-524 EZ

- Used for control joints with vehicle traffic
- Shaves smooth in as little as 15 minutes
- Extended shave time window affords contractors the ability to come back the next day and shave
- Better UV resistance compared to typical polyureas
- High moisture tolerance prevents bubbling and foaming

Sikaflex-1cSL

- Used for isolated joints with no traffic
- 1-Component, no mixing required
- Self-Leveling, pourable
- Can be applied to green concrete 24 hours after pour
- Accelerated curing

Sikaflex-2c SL

- Non-sag and self-leveling construction sealants.
- Two-component chemically curing polyurethane with +/- 50% joint movement capability.
- Traffic Grade (TG) component is available for 2c
- NS to achieve higher Shore A hardness
- 35 standard colors with custom colors available

Sikadur-51 NS/SL

- Control joint sealant
- Two component-flexible epoxy
- NS for vertical/non-sagging
- SL for horizontal/self leveling
- Prevents deterioration of joint edges

Static Crack Repair and Patching

Sikafloor 150 is a high strength, epoxy patching gel

- Epoxy Patch Paste
- High solids/low odor
- High-modulus, high-strength
- Patching paste
- Non-sag paste for horizontal and vertical applications

Additional References

AMERICAN CONCRETE INSTITUTE STANDARDS

ACI 201.1R Guide for Making a Condition Survey of Concrete in Service ACI 201.2R Guide to Durable Concrete

ACI 302.1R Guide for Concrete Floor and Slab Construction

ACI 302.2R Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials ACI 318 Building Code Requirements for Structural Concrete

ACI 364.1R Guide for Evaluation of Concrete Structures Prior to Rehabilitation ACI 503R Use of Epoxy Compounds with Concrete

ACI 503.1 Standard Specifications for Producing a Skid Resistant Surface on Concrete by the Use of a Multi Component Epoxy System

ACI 503.4 Standard Specification for Repairing Concrete with Epoxy Mortars ACI 546R Concrete Repair Guide

ASTM INTERNATIONAL

ASTM D4258 Standard Practice for Surface Cleaning Concrete for Coating

ASTM D4260 Standard Practice for Acid Etching Concrete

ASTM D4262 Standard Test Method of pH of Chemically Cleaned or Etched Concrete Surfaces

ASTM D7234 Standard Test Method for Pull-Off Adhesion Strength of Coating on Concrete Using Portable Pull-Off Adhesion Testers

ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

INTERNATIONAL CONCRETE REPAIR INSTITUTE STANDARDS (ICRI)

ICRI Guideline No. 310.1R Guide for Surface Preparation of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion

ICRI Guideline No. 310.2R Selecting and Specifying Concrete Surface Preparation for Sealers Coatings and Polymer Overlays

ICRI Guideline No. 320.1R Guide for Selecting Application Methods for the Repair of Concrete Surfaces

IRCI Guideline No. 320.2R Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces

SOCIETY OF PROTECTIVE COATINGS (SSPC STANDARDS and JOINT STANDARDS)

SSPC-TU 2/NACE 6G197 Design, Installation and Maintenance of Coating Systems for Concrete Used in Secondary Containment

SSPC-SP 13/NACE No. 6 Surface Preparation of Concrete

SSPC-TU 10/PCSI Procedures for Applying Thick Film Coatings and Surfacing's Over Concrete Floors

ORGANIZATION CONTACT INFORMATION:

ACI (American Concrete Institute), P.O Box 9094, Farmington Hills, MI 48331 (http://www.aci-int.org)

American International (formerly American Society for Testing of Materials), 100 Barr Harbor Dr., West Cohshohocken, PA 19428 (http://www.astm.org)

ICRI (International Concrete Repair Institute), 1323 Shepard Drive, Suite D, Sterling, VA 21064 (http://www.icri.org)

NACE International (The Corrosion Society), 1440 South Creek, Houston, TX 77084 (http://www.nace.org)

SSPC (The Society for Protective Coatings), 40 24th St., 6th Floor, Pittsburgh, PA 15222 (http://www.sspc.org)

WHO WE ARE

Sika AG is a globally active specialty chemicals company. Sika supplies the building and construction industry as well as manufacturing industries (automotive, bus, truck, rail, solar and wind power plants, facades). Sika is a leader in processing materials used in sealing, bonding, damping, reinforcing, and protecting loadbearing structures. Sika's product lines feature high quality concrete admixtures, specialty mortars, sealants and adhesives, damping and reinforcing materials, structural strengthening systems, industrial flooring as well as roofing and waterproofing systems.

GREEN GLOBES

BSI ISO 9000:2000

U.S. GREEN BUILDING COUNCIL MEMBER

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