



Traffic Membrane Troubleshooting Manual

Technical Manual
May 2019 Edition

Description

Cause

Repair

How to Avoid

BUILDING TRUST



INTRODUCTION: HORIZONTAL TRAFFIC-BEARING, WATERPROOFING MEMBRANES

There are many options when it comes to selecting suitable materials for the horizontal waterproofing of concrete. The focus of this troubleshooting manual is on traffic-bearing, vehicular and pedestrian systems; more specifically, 1 and 2 component polyurethane systems. These systems are commonly used on parking garages, balconies, stadiums, plaza's, walkways, tank lids and a variety of other structures. The benefits of waterproofing concrete include increasing its durability by preventing the ingress of water, chlorides, carbon dioxide and other aggressive chemicals; thus, reducing the risk of damage caused by erosion, freeze/thaw and corrosion of embedded reinforcing steel. Aesthetic benefits of these materials include improved color uniformity, stain resistance and ability to clean.

It is not difficult to successfully apply these materials and achieve long term performance. The best contractors make it look easy; however, there are many things to consider and proper planning is critical. Experienced contractors understand the importance and know how to verify proper surface preparation that results in a clean, dry, sound, open-pore, appropriately roughened surface. They also understand the importance of mixing and applying the material with the proper tools and equipment to the proper thickness and monitoring weather conditions to ensure the ambient and substrate conditions are suitable from application through cure. They have experience with the products they are using and follow the recommendations of the manufacturer.



Concrete is often referred to as a 'hard sponge'. Concrete is a porous material that contains a pore structure; there is always moisture and air within the pore structure. Before applying these materials it is important to know not only what the moisture content of the concrete is but to consider other key factors such as dew point, substrate temperature, climatic conditions of temperature and humidity, whether temperatures are rising or falling, if the area to be coated is in the sun or shade and knowing the forecasted weather conditions during the curing period. Understanding these conditions and respecting the manufacturer's recommendations will go a long way toward ensuring a successful project.

Despite these many challenges, over a hundred million square feet of these materials are installed every year with a great degree of success. If problems do arise, a visual inspection along with the use of this guide can aid owners, consultants, contactors and manufacturers to determine the likely cause of the problem, the proper repair procedure and the steps to avoid future occurrences. As always, Sika stands ready to assist the team to obtain long-lasting, durable waterproofing solutions!



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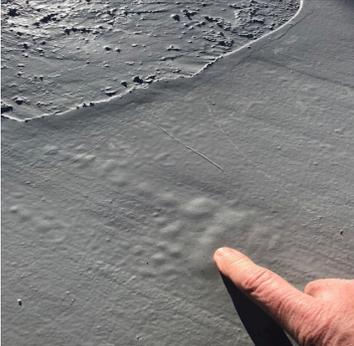
Photo	Title	Description	Page #
	<p>Bubbling Due to Encapsulated moisture in the substrate</p>	<p>Bubbles in the coating surface which have not popped. When the bubble is cut water comes out or the surface underneath the bubble is wet</p>	<p>3-4</p>
	<p>Blistering Due to Thick Coating</p>	<p>These blistering feel spongy and the coating is usually very thick and soft. When the blister is cut the coating is excessively thick and may be as much as 60-120 mils (DFT) thick and looks like a sponge with unbroken or circular blisters. It happens mostly to top coats especially single component top coats. The affected coating wears very quickly and aggregate usually settles completely into the coating leaving a smooth surface.</p>	<p>5-6</p>
	<p>Pinholing/Bubbling</p>	<p>Pinholing is a result of outgassing when air escapes from porous concrete and becomes trapped in the coating. As the air escapes through the coating, the first sign is generally small bubbles that appear shortly after the application of the coating. When the bubbles pop they leave behind small craters in the coating. The pinhole can usually be seen at the bottom of these craters.</p>	<p>7-8</p>
	<p>Water Damage</p>	<p>Water damage occurs as a result of deterioration of the membrane before the material has fully cured. This occurs when there is poor membrane adhesion due to the presence of water or dampness during the application.</p>	<p>9-10</p>
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BUBBLING DUE TO ENCAPSULATED MOISTURE IN THE SUBSTRATE

Description:

Bubbles in the coating surface which have not popped. When the bubble is cut water comes out or the surface underneath the bubble is wet.

Causes:

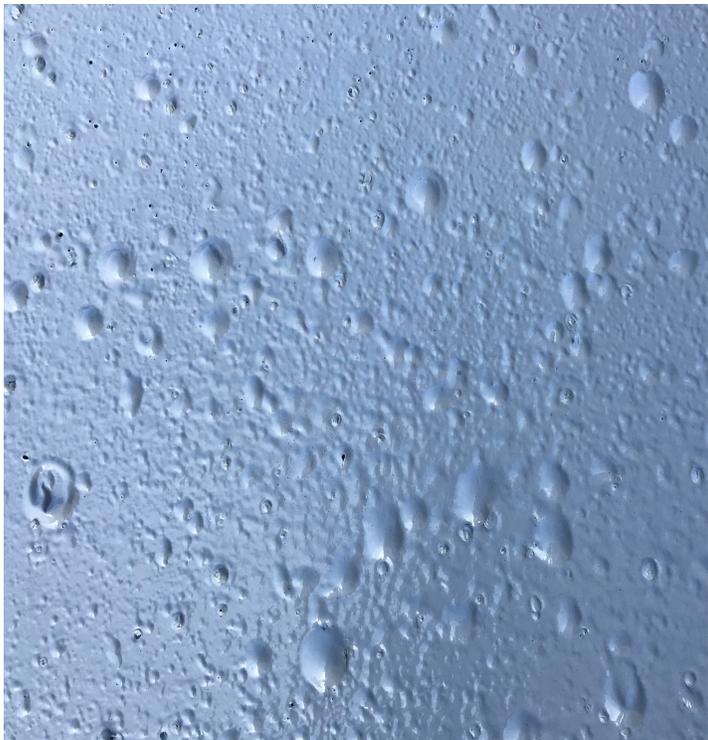
- High surface moisture content prior to application of membrane
- Trapped moisture in insulated split slab construction
- Trapped moisture in metal pan deck construction
- Application during winter months – problem may not appear until the following summer when temperatures rise drawing moisture in the slab to the surface
- Water contamination prior to application of the coating (rain)
- Application above 4% moisture content without using a special moisture barrier

Repair:

- Completely remove affected area down to the concrete substrate
- Let the surface dry
- Re-apply the system paying special attention to avoid the causes listed above

How to avoid:

- Check the substrate moisture content and follow the guidelines if the moisture is higher than 4% by Tramex. One more testing method to check vapor moisture drive strongly is recommended (plastic sheet test)
- Determine if the structure is a split slab or metal pen deck
- Check the dew point and ensure you are a minimum of 5F above the dew point
- Avoid outside application during late fall or winter (what about our winter grade?)
- Minimum temperature and humidity should be within the range specified in PDS
- If ambient conditions are critical apply the product during falling temperatures



BLISTERING DUE TO THICK COATING

Description:

These blisters feel spongy and the coating is usually very thick and soft. When the blister is cut the coating is excessively thick and may be as much as 60-120 mils (DFT) thick and looks like a sponge with unbroken or circular blistering. It happens mostly to top coats especially single component top coats. The affected coating wears very quickly and aggregate usually settles completely into the coating leaving a smooth surface.

Causes:

- Wet film application is too thick
- Wrong tools (squeegee size)
- Wrong detail work
- Uneven surface – low spots
- Very rough concrete surface profile (more than CSP 4)
- Insufficient mixing of single component product

Repair:

- Remove affected area down to sound substrate
- Re-apply the coating

How to avoid:

- Check the wet film thickness during application
- Detailing - Fill up low spot areas of the substrate prior to application
- Detailing - Check CSP (CSP 3-4 required)
- During application backroll to move the material from low spot areas
- Check your tools – use the recommended size squeegee
- Use a booster or accelerator with single component products



PINHOLING / BUBBLING

Description:

Pinholing is a result of outgassing when air escapes from porous concrete and becomes trapped in the coating. As the air escapes through the coating, the first sign is generally small bubbles that appear shortly after the application of the coating. When the bubbles pop they leave behind small craters in the coating. The pinhole can usually be seen at the bottom of these craters.

Causes:

- Porous concrete surface
- Insufficient primer application
- Aggressive surface preparation
- Moisture (damp substrate)
- High ambient temperature (rapid curing)
- Freshly applied coating exposed to direct sunlight
- High substrate temperature at 90°F and above

Repair:

- Lightly grind or sand affected areas to a flat finish
- Apply 100% solid epoxy primer and seed it lightly (10lbs/100sf) with 20/40 dry silica sand
- Clean to remove excess sand
- Re-apply base coat or the whole system

How to avoid:

- Prime substrate precisely following required coverage rate
- If substrate is very porous or rough, 2 coats of primer are strongly recommended
- Avoid aggressive surface preparation
- Consider application in afternoons or evenings as temperatures are falling in order to avoid rapid temperature increase during application
- Prevent direct sunlight exposure during initial cure
- Temperature and humidity should be within the range specified in PDS
- At the first appearance of bubbles a spike roller can be used to pop the bubbles
- Check substrate moisture and follow the guidelines if the moisture is higher than 4% by Tramex.



WATER DAMAGE

Description:

Water damage occurs as a result of deterioration of the membrane before the material has fully cured. This occurs when there is poor membrane adhesion due to the presence of water or dampness during the application.

Causes:

- Inclement weather during application (Rain , Snow)
- Accidental water leak (floors above, sprinklers)
- Human sweat
- Contamination by machinery liquids

Repair:

- Completely remove affected area down to concrete substrate
- Re-apply the system

How to avoid:

- Avoid application during or shortly before anticipated inclement weather
- Protect the area from any potential accidental water leak from the floors above
- If possible, sequence the project from top levels to lower ones
- Workers should wear hats or head bands
- Deactivate sprinkler system prior to application



CRACKS / JOINTS

Description:

Substrate fractures which telegraph thorough the membrane caused by excessive movement. Cracks may compromise the waterproofing system causing leaks affecting water tightness of the system if not properly treated.

Causes:

- Structural problem - movement in the joint exceeds elongation of membrane
- Failure to route , caulk and detail every crack greater than 1/16”
- Failure to detail every crack which is less 1/16”
- Uncured sealant in routed and caulked crack
- Coating over joints greater than 1”
- Cracks in the concrete occur; especially in new construction, after the basecoat was applied

Repair:

- Route existing cracks and seal with a polyurethane sealant
- Apply detail coat
- If excessive movement is expected reinforce detail coat with Sika Flexitape heavy or run the sealed joint through the traffic membrane

How to avoid:

- Properly detail cracks
- The correct crack treatment will depend on crack width and expected movement
- Honor joints greater than 1” thorough the system
- The strip of detail coat 23 DFT should be always applied
- Use only PU sealant under PU waterproofing membrane
- Use reinforcement if movement creates crack up to 1/16 inch
- Rout and seal if movement creates crack between 1/16 inch to 1 inch



DELAMINATION / PEELING

Description:

The coating peels off the substrate (concrete) or previous coat (inter coat adhesion).

Causes:

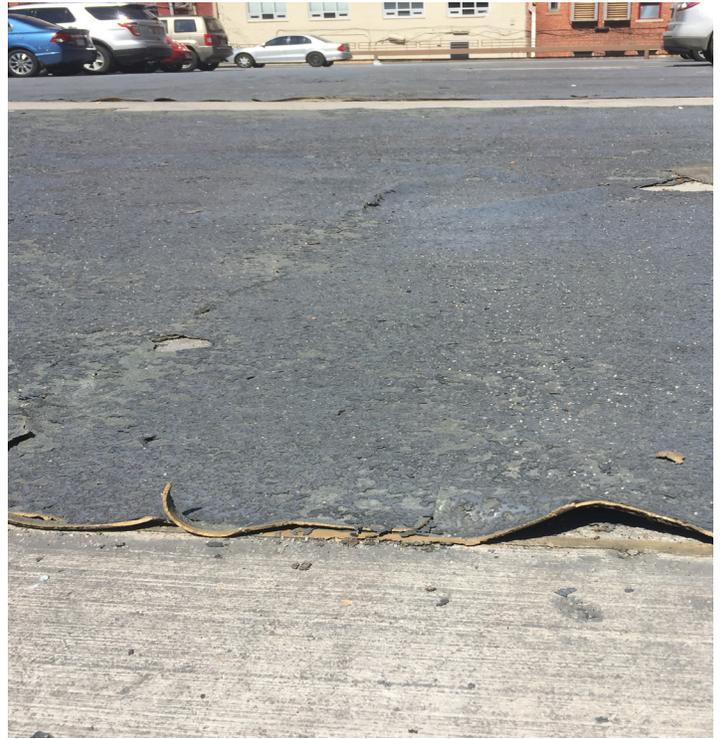
- Insufficient concrete surface preparation (suitable CSP)
- Existing coating preparation (grinding, roughening, recoat window, cleaning, primer)
- Surface contamination (dirt, dust, oil)
- Moisture (damp substrate, dew point , sweat)
- Insufficient thickness (min. DFT)
- Not properly maintained (snow plows, aggressive cleaning agents, chemical impact – car liquid leaks)

Repair:

- Remove loose delaminated coating
- Abrade and clean surface
- Remove all residual contamination (chemically or mechanically)
- Reapply the whole system or top coat using appropriate primers

How to avoid:

- Follow PDS recommendations
- Surface preparation : Abrade or shot blast the substrate to achieve a CSP 3-4 per ICRI guidelines
- Surface contamination : Entirely clean substrate prior to application of primer or primerless base coat
- Remove all residual contamination on existing coating (chemically or mechanically)
- Remove all loose areas of existing coating
- Follow required maximum recoat window of new coating
- Follow required minimum coverage rates of each coat
- Check substrate moisture and follow the guidelines if the moisture is higher than 4% by Tramex
- Verify the substrate temperatures are minimally 5F above the dew point



MECHANICAL DAMAGE

Description:

Finished waterproofing system damaged by reckless use and insufficient maintenance .

Causes:

- Reckless behavior
- Vandalism
- Snow plows
- Studded tires
- Skid marks – burned tires

Repair:

- Completely remove the affected area down to the concrete substrate
- Re-apply the system

How to avoid:

- The system should be periodically maintained
- Installation of speed bumps
- Snow removal equipment should be equipped with adjustable , rubber, snow-plow blades
- Heavy duty systems should be installed on the top deck levels where snow plowing is expected
- Do not use wire brush to clean the membrane
- Use solvent free and acid free cleaners



SKID RESISTANCE / INCONSISTANT TEXTURE

Description:

The surface of the finished membrane is slippery and/or there are 'bald' spots. Inconsistently seeded aggregate create bold and shiny spots on the membrane . Wear resistance and aesthetics features are also compromised.

Causes:

- Inconsistent aggregate distribution
- Insufficient amount of aggregate applied per sf
- Wrong tools (roller) used
- Wrong aggregate size
- Difficult seeding of the areas with bad access
- Seed and back roll may be more prone to inconsistent appearance vs seed and lock

Repair:

- Abrade the surface
- Clean and apply recoat primer
- Apply 2 coats of wear/top coat and broadcast depending on the type of seeding

How to avoid:

- Broadcast sufficient amount of aggregate
- Use the right method based on the traffic and specific project need (seed & lock or seed & backroll)
- Use more coarse aggregate and adequate amount of resin to enhance slip resistance
- Use the right size aggregate according to manufacturer's PDS
- Use a pretextured topcoat
- Apply two top coats if using pretextured top coat



COLOR VARIATIONS

Description:

The coating appears to be different shades.

Causes:

- Product from different batches can have slight variations in color
- The older coating of the same color has had more UV exposure and has weathered
- No sufficient mixing
- Shaded areas of deck can get less UV exposure and can appear darker

Repair:

- Clean the whole affected area apply recoat primer Use only one batch of the product for this additional coat.
- Apply additional top coat
- Use only one batch of the product for this additional coat

How to avoid:

- Check the batches
- Prior to application ensure that you have enough product from the same batch
- Apply the whole top coat in single application
- Mix product thoroughly 3 minutes
- Scrap the sides of the pail during mixing
- Use aliphatic top coat only for UV exposed areas



AGGREGATE ROLLING OUT

Description:

The top coat loses significant aggregate after a short period of service.

Causes:

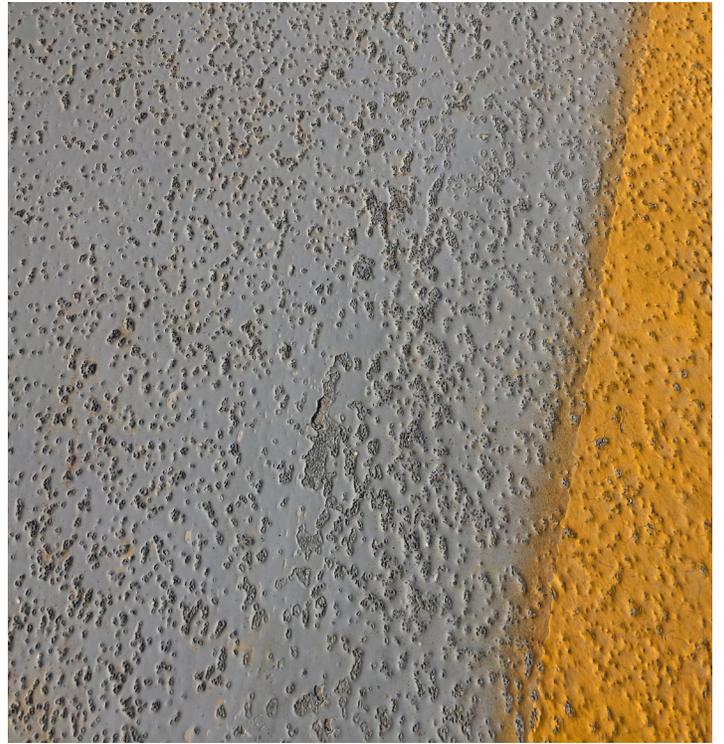
- Wrong aggregate selection
- Wrong thickness of the top coat - insufficient encapsulation
- Wet or contaminated aggregate

Repair:

- Clean the whole affected area from all loose aggregate and solvent wipe
- Apply recoat primer
- Apply 2 additional top coats seeded with right aggregate

How to avoid:

- Check the source of aggregate and make sure that the aggregate is totally dry
- Aggregate can get wet if packed in plastic bags
- The aggregate should be washed silica sand
- Gradation of aggregate should be between 16 - 40 mesh
- Stock aggregate before application indoors or covered to protect from rain
- Follow the minimum and maximum thickness of the top coat
- Use textured products to avoid an issue with aggregate selection and aggregate condition



STAINS

Description:

The coating has different discoloration stains.

Causes:

- UV stability of top coat
- Staining due to auto liquids leak
- Metallic content in the aggregate – rusting
- Skid tire marks
- Tire marks due to longer contact with a new high performance tires (car dealerships)
- Insufficient maintenance and cleaning
- Insufficient mixing of component products

Repair:

- Abrade affected area to remove the whole stain mechanically
- Clean and solvent wipe the whole affected area
- Apply recoat primer
- Apply additional top coat

How to avoid:

- Check aggregate for metallic impurities (less than 0.05%)
- Clean the area after shotblasting
- Maintain and clean the deck periodically
- Clean car liquid spill within 24 hours period after first exposure
- Use protection pads under new performance tires when the car stays on one place for more than one week (car dealerships)
- Use aliphatic top coat only for UV exposed areas
- Use Sikalastic 748 Polypl



GASSING UNDER REINFORCEMENT FABRIC

Description:

Big bubbles occur under fabric after the resin has been cured. When the fabric is cut the big air bubbles occur below. It happens mostly to reinforced detail coat especially when the coating was applied too thick prior to saturation of the fabric. The bubbles occur after 2-8 hours after the fabric was saturated in the resin.

Causes:

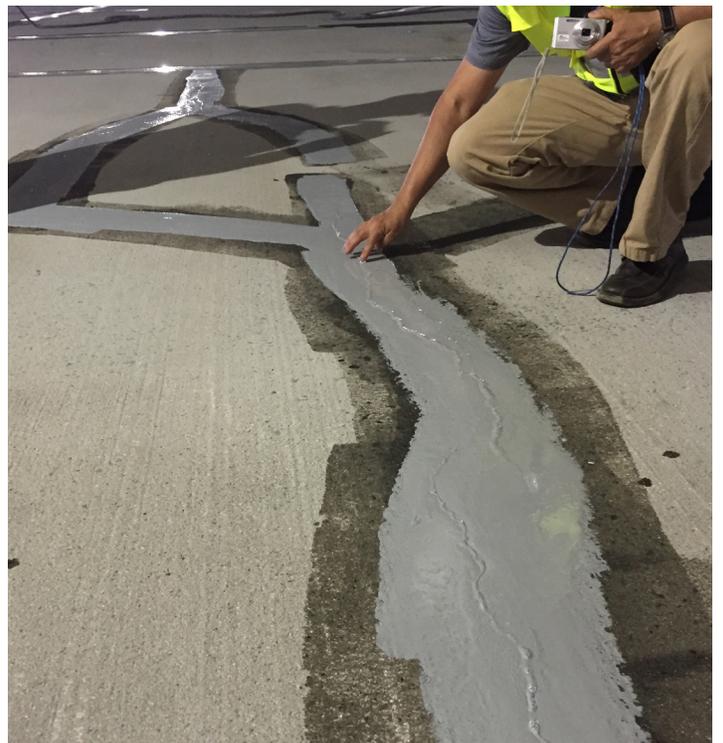
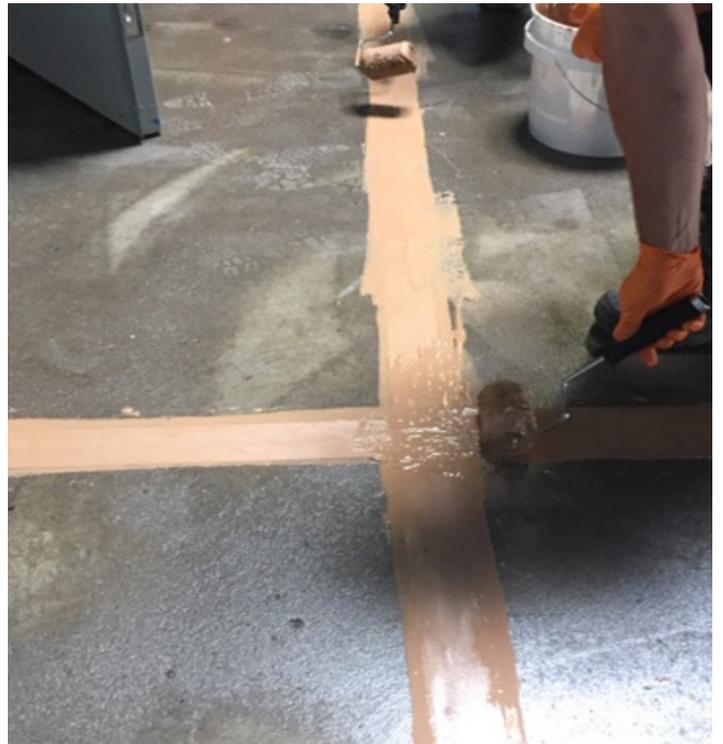
- Wet film application is too thick
- Wrong tools
- Wrong detail work
- Uneven surface – low spots
- Very rough concrete surface profile (more than CSP 4)

Repair:

- Completely remove affected area down to concrete substrate
- Re-apply the system with new reinforcement

How to avoid:

- Check the wet film thickness during application
- Fill up and let cure low spot areas of the substrate before placing the fabric
- Check CSP (CSP 2-4 required)
- The first coat to saturate the fabric should be thinner (10WFT max.) and then the fabric should be saturated with an extra resin from the top
- Check your tools
- Use a booster or accelerator with single component products



TOOLS AND EQUIPMENT CHECKLIST

- Notched and flat squeegees, holders and handles (see System Guides for wet mil application rates)

SQUEEGEE	COATING MIL RANGE (Estimated) *Assume applied to a smooth surface unless otherwise stated
Flat	0 – 5 mils
1/8" wide by 1/8" deep V notch	5 – 15 mils
3/16" wide by 3/16" deep V notch	15 – 25 mils
1/4" wide by 1/4" deep V notch	25 – 35 mils
5/32" wide by 5/32" deep V notch	30 – 40 mils
3/8" wide by 3/8" deep V notch	35 – 45 mils
1/2" wide by 1/2" deep V notch	45 + mils
1/2"-3/16" deep V notch	16 mils for textured top coats

- Wet film thickness gauges
- Phenolic resin/solvent resistant roller covers (3/8 or 1/2 inch nap), assemblies and handles – 4 inch for detailing, and 9 or 18 inch for base and top coats
- Spiked (rounded) shoes
- Blower or spreader for aggregate
- Xylene or mineral spirits for cleaning
- Rags or towels
- Mixing pails
- Measuring containers
- Duct tape or blue tape for masking
- Polyethylene sheeting
- Mixing drill and Jiffy paddles
- Drum opener and agitators with collapsible shafts
- Sikaflex joint sealant, caulking gun and coving/finishing tools
- SikaRepair, SikaTop, or SikaQuick cementitious repair mortars
- Sikadur crack and surface profile repair resins
- Backer rod and bond breaker tape
- Saw for routing cracks
- Grinder, hammer, chisel, tape measure and floor sander
- Shot blaster or scarifier
- Broom, shovel, blower and vacuum
- Moisture meter or moisture test materials
- Work lights and extension cords
- Hand truck for moving materials
- Coveralls and rubber boots
- Rubber and leather gloves
- Goggles or appropriate eye protection
- NIOSH approved respirators (as required)

APPLICATION CHECKLIST

■ Project Overview

- Starting location and sequence
 - Top to bottom or other
 - Full or partial floor access
- Sequence detailing, base coat, intermediate coat, top coat, seal coat

■ Check Product

- Type (primer, base coat, top coat, single or multi component)
- Amount (coverage rate)
- Expiration date
- Record batch numbers and location used (floor/column lines)
- Complete components if multi component
- Temperature (needs warm or cold preconditioning)
- Aggregate (right blend, dry without impurities)
- Compatibility (intercoat, line striping product etc.)
- Right tools to work with each product (Refer to tool checklist)
- Topcoat color

■ Check Ambient Conditions

- Temperature
- Humidity
- Dew Point (ensure substrate temperature is a minimum 5F above dew point)
- Record weather (sunny, cloudy, partly sunny, etc)

■ Check Substrate

- CSP (Concrete surface profile-ICRI)
- Moisture content
- Temperature

■ Mock Up Strongly Recommended to Verify

- Surface preparation and profile
- Sequence (detailing through top coat)
- Adhesion
- Compatibility
- Aesthetics
- Durability
- Complete surface preparation
- Install system noting coverage rates, working times, open times and cure times of each step in the system (primer – detail coat – base coat – top coat(s))
- Select and Area 50 ft x 50 ft in Appropriate Location
 - Near entrance
 - Ramp
 - Turning radius
 - Drive lane
 - Parking stall
 - Top deck

APPLICATION CHECKLIST (CONTINUED)

■ Fill out Field Report Form

■ Application Crew Size

- Additional surface preparation & Cleaning
- Mixing
- Mixed product transportation'
- Product spreading
- Backrolling

■ Safety Precautions

- Wear all personal protection
- Ventilate if confined space
- No smoking or any open fire
- Check your tools and equipment

Protect all surrounding spots which should not receive coating

Setup mixing station and protect the area from spills

Setup area for empty pails and waist

Check pot life of each product if it is two component

Segregate top coat product by batch number

Check wet mill thickness after backrolling

Protect all surrounding spots which should not receive coating

Setup mixing station and protect the area from spills

Setup area for empty pails and waist

Check pot life of each product if it is two component

Segregate top coat product by batch number

Check wet mill thickness after backrolling

Dew Point is the temperature at which moisture will condense on a surface. In relation to dew point, surface temperature is especially important. Below are some common rules to follow when applying a Sikalastic coating.

- If the surface temperature is at or below the dew point, the surface will be noticeably wet/damp and generally should not be coated. Problems can occur when the surface temperature is near, but not quite at the dew point.
- If the coating is applied when the surface temperature is near the dew point, the evaporation of the solvent can depress the temperature below the dew point and allow moisture to condense on the fresh coating. There is a slight temperature depression when liquid evaporates. This may cause problems between the adhesion of the coating to the substrate.
- **No coatings should be applied unless the surface temperature is a minimum of 5°F above this point. This temperature must be maintained during curing as well.**

Below the chart illustrates how to determine your dew point based on the Ambient air temperature and Relative Humidity.

Ambient Air Temperature

	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F
90%	18°F	28°F	37°F	47°F	57°F	67°F	77°F	87°F	97°F	107°F	117°F
85%	17°F	26°F	36°F	45°F	55°F	65°F	75°F	84°F	95°F	104°F	113°F
80%	16°F	25°F	34°F	44°F	54°F	63°F	73°F	82°F	93°F	102°F	110°F
75%	15°F	24°F	33°F	42°F	52°F	62°F	71°F	80°F	91°F	100°F	106°F
70%	13°F	22°F	31°F	40°F	50°F	60°F	68°F	78°F	88°F	96°F	105°F
65%	12°F	20°F	29°F	36°F	47°F	57°F	66°F	76°F	85°F	93°F	103°F
60%	11°F	19°F	27°F	36°F	45°F	55°F	64°F	73°F	83°F	92°F	101°F
55%	9°F	17°F	25°F	34°F	43°F	53°F	61°F	70°F	80°F	89°F	96°F
50%	6°F	15°F	23°F	31°F	40°F	50°F	59°F	67°F	77°F	86°F	94°F
45%	4°F	13°F	21°F	29°F	37°F	47°F	58°F	64°F	73°F	82°F	91°F
40%	1°F	11°F	18°F	26°F	35°F	43°F	52°F	61°F	69°F	78°F	87°F
35%	-2°F	8°F	16°F	23°F	31°F	40°F	48°F	57°F	65°F	74°F	83°F
30%	-6°F	4°F	13°F	20°F	28°F	36°F	44°F	52°F	61°F	69°F	77°F

Example: If the ambient temperature is 70°F and the Relative humidity (RH) is 65%, the dew point will be 57°F. No coatings should be applied in these climates unless the surface temperature is at a minimum of 62°F (57°F+5°F=62°F).

WE ARE SIKA

Sika is a specialty chemicals company with a leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing and protecting in the building sector and the motor vehicle industry. Sika's product lines feature concrete admixtures, mortars, sealants and adhesives, structural strengthening systems, industrial flooring as well as roofing and waterproofing systems.

Our most current General Sales Conditions shall apply. Please consult the Product Data Sheets prior to any use and processing.

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