BUILDING TRUST

PRODUCT DATA SHEET

SikaRepair®-224

One component, cementitious, structural repair mortar applied by hand trowel or spray methods

PRODUCT DESCRIPTION

SikaRepair®-224 is a one component, cementitious, ready-to-use, silica fume enhanced, fiber reinforced, high strength, shrinkage compensated repair mortar. SikaRepair®-224 is formulated for hand trowel or low-pressure spray application methods. Designed for horizontal (i.e. flat), vertical and overhead installations.

USES

- On grade, above grade, and below grade concrete
- On horizontal surfaces (e.g. for spall repairs on flat work, or as an overlay)
- On vertical and/or overhead surface repairs when either hand trowel or spray applied
- As a structural repair material for water and wastewater treatment plants, manholes, parking facilities, industrial plants, walkways, bridges, tunnels, dams, abutments, balconies, etc.
- As a filler for voids and cavities
- For the repair of substrates such as concrete, mortars and masonry
- SikaRepair®-224 may only be used by experienced professionals.

CHARACTERISTICS / ADVANTAGES

- Ready-to-use, one component material
- Easy to mix, just add clean water
- Can be installed by hand trowel
- Sprayable system
- Superior workability
- Superior abrasion resistance
- Sulfate resistant
- Great adhesion
- Increased resistance to deicing salts
- High early strengths
- Good freeze/thaw resistance
- Silica fume enhanced
- Fiber reinforced

APPROVALS / STANDARDS

NSF/ANSI 61 compliant for potable water contact after cure (reference: UL FDNP.MH17464).

PRODUCT INFORMATION

Packaging	50 lb (22.7 kg) bags; 48 bags per pallet
Appearance / Color	Powder / Dark Gray
Shelf Life	12 months from date of production if stored properly in original, unopened and undamaged, sealed packaging
Storage Conditions	Store in cool, dry, well ventilated conditions, out of direct sunlight at 40 - 95 °F (4 - 35 °C). Protect powder from moisture. If permitted to become damp, discard material.

TECHNICAL INFORMATION

Compressive Strength	1 day	4,500 psi (31.0 MPa)	(ASTM C109) 73 °F (23 °C), 50% R.H.
	7 days	8,000 psi (55.2 MPa)	
	28 days	10,000 psi (69.0 MPa)	
Flexural Strength	28 days	1,100 psi (7.6 MPa)	(ASTM C293) 73 °F (23 °C), 50% R.H.
Splitting tensile strength	28 days	735 psi (5.1 MPa)	(ASTM C496) 73 °F (23 °C), 50% R.H.
Tensile Adhesion Strength	28 days	> 350 psi (2.4 MPa) substrate failure (typical)	(ASTM C1583) 73 °F (23 °C), 50% R.H.
Slant Shear Strength	28 days	> 2,500 psi (17.2 MPa)	(ASTM C882 modified*) 73 °F (23 °C), 50% R.H.
	* Mortar scrubbed into mechanically prepared, saturated surface dry (SSD) substrate.		
Sulfate Resistance	1 year	< 0.06% length change	(ASTM C1012) 73 °F (23 °C), 50% R.H.
Rapid Chloride Permeability	28 days	< 500 Coulombs	(ASTM C1202 / AASHTO T 277) 73 °F (23 °C), 50% R.H.

APPLICATION INFORMATION

Mixing Ratio	6 to 7 pints (2.8 - 3.3 liters) of liquid (e.g. clean water or SikaLatex® R admixture) per 50 lb. (22.7 kg) bag of SikaRepair®-224		
Fresh mortar density	125 lb/ft³ (2.0 kg/m³)		(ASTM C138) 73 °F (23 °C), 50% R.H.
Coverage	0.40 ft³ (0.01 m³) per Neat mix 0.58 ft³ (0.02 m³) per Extended mix, containing 25 lbs (11.4 kg) of 3/8 inch (10 mm) coarse aggregate (Yield figures do not include allowance for surface profile and porosity, or material waste.)		
Layer Thickness		**Minimum**	**Maximum per lift ***
	Vertical	3/8 inch (10 mm)	2 inches (51 mm)
	Overhead	3/8 inch (10 mm)	1-1/2 inches (38 mm)
	Extended	1 inch (25 mm)	4 inches (102 mm)
	* If repair requires multiple lifts, each lift should be applied as soon as the previous lift develops enough initial strength to support it.		
Product Temperature	Condition 65 - 75 °F (18 - 24 °C) before use.		
Ambient Air Temperature	40 °F (4 °C) minimum / 95 °F (35° C) maximum		
Substrate Temperature	40 °F (4 °C) minimum / 95 °F (35° C) maximum		

Set Time	>4 hours (Initial)	(ASTM C266) 73 °F (23 °C), 50% R.H.
Final set time	>5 hours	(ASTM C266) 73 °F (23 °C), 50% R.H.
Application Time	Approximately 30 minutes Temperature will affect the Application Time: Above 73 °F (23 °C) will reduce the Application Time and slump Below 73 °F (23 °C) will extend the Application Time and slump	
Waiting / Recoat Times	Refer to Sika Tech Brief # 18-01 for minimum cure times prior to overcoating.	

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

LIMITATIONS

- Avoid application in direct sunlight, during precipitation and/or when strong winds prevail.
- Use only clean, potable water when polymer modification is not required.
- Do not use solvent-based curing compounds.
- Using SikaLatex® R or similar admixture products in lieu of some or all of the recommended amount of water per bag may result in a change in consistency. Mock-up trial mixes for suitability are strongly recommended.
- Do not use any other types of admixtures (e.g. plasticizers, accelerators, retarders, etc.) or add cement to SikaRepair®-224.
- SikaRepair®-224 does not form a vapor barrier when cured.
- As with all cement-based materials, avoid contact with aluminum to prevent adverse chemical reaction and possible product failure. Insulate potential areas of contact by coating aluminum bars, rails, posts etc. with an appropriate epoxy such as Sikadur®-32 Hi-Mod.
- Elevated temperatures will decrease working time and slump.
- Rate of strength gain will be reduced at colder temperatures. On site testing is recommended.

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

Concrete

- Surfaces must be clean and sound. Remove all deteriorated concrete, dirt, dust, oil, grease, contaminants and other bond-inhibiting materials from the area to be repaired.
- Be sure the repair area is not less than 3/8 inch (10 mm) in depth for placement of a Neat mix. Be sure the repair area is not less than 1 inch (25 mm) in depth for placement of an Extended mix.
- Preparation work should be done by high pressure water blasting, scabbling, or other appropriate mechanical means. Obtain an exposed aggregate surface with a minimum surface profile of ±1/8 inch (3 mm) [per ICRI CSP-6 to -7] on clean, sound concrete.
- To ensure optimum repair results, the effectiveness of decontamination and substrate preparation can be

assessed by a Pull-Off test (i.e. a Tensile Adhesion test per ASTM C1583).
- Saw cutting the perimeter edges of the repair area is recommended, preferably cut at a dovetail angle.
- Substrate should be saturated surface dry (SSD) with clean water prior to application. No standing water should remain during application.

Steel
- Steel surfaces should be thoroughly prepared by mechanical cleaning (e.g. blast cleaning, wire brushing) to remove all traces of rust and scale (reference: SSPC-SP5/NACE 1). Where corrosion has occurred, the steel should be high-pressure washed with clean water after mechanical cleaning.

CORROSION PROTECTION
- For the corrosion protection of reinforcing steel, use Sika® Armatec® corrosion protection products. Please consult the applicable current Product Data Sheets for additional information.

PRIMING
- When required (e.g. for hand trowel application) prime the prepared substrates with a brush or spray applied coat of Sika® Armatec® or Sikadur® bonding agent products. Please consult the applicable current Product Data Sheets for additional information. Steel substrates typically require the installation of a bonding agent.
- Alternately in lieu of a bonding agent, a scrub coat of a Neat mix of SikaRepair®-224 can be applied to the substrate prior to trowel application. While the scrub coat is still wet, place the remaining thickness of SikaRepair®-224 needed to complete the repair.
- Properly prepared, saturated surface dry (SSD) concrete substrates scheduled to receive a wet spray application of SikaRepair®-224 typically do not require priming.
- If a bonding agent or a scrub coat of SikaRepair®-224 are not possible, other suitable means should be employed such as vibration of the material, pumping under pressure or spraying to ensure good intimate contact with the prepared substrate is achieved.

MIXING
- **With water**: Pour 6 pints (2.8 liters) of clean water into a suitably sized mixing container.
- Add the entire bag's contents of SikaRepair®-224 to the container while continuously mixing with a low-speed rotary drill (400 - 600 rpm) and paddle or a concrete mixer.
- Add up to an additional maximum 1 pint (0.5 liter) of water, if needed, for the desired consistency.
- Do not overwater. Excess water may cause segregation.
- Mix to a uniform consistency, maximum 3 minutes. Thorough mixing and proper proportioning are necessary.
- **With SikaLatex® R**: Pour 6 pints (2.8 liters) of SikaLatex® R admixture into the mixing container. Slowly add SikaRepair®-224, mix and adjust as above.
- **With diluted SikaLatex® R**: SikaLatex® R admixture may be diluted up to 5:1 (i.e. clean water : SikaLatex® R) by volume for projects requiring minimal polymer modification. Pour 6 pints (2.8 liters) of the mixture into the mixing container. Slowly add SikaRepair®-224, mix and adjust as above.

EXTENSION WITH AGGREGATES

- For horizontal applications greater than 1" (25 mm) in depth, extend with 3/8" (10 mm) coarse aggregate. If placement is vertical or overhead, support the material with forms as required.
- Pour 6 pints (2.8 liters) of clean water, SikaLatex® R admixture or diluted SikaLatex® R mixture into a suitably sized mixing container or a concrete mixer.
- Add entire bag's contents of SikaRepair®-224 while mixing continuously, then introduce 3/8" (10 mm) coarse aggregate.
- Mix to uniform consistency, maximum 3 minutes. Thorough mixing and proper proportioning of all components is necessary.
- Add up to an additional maximum 1 pint (0.5 liter) of liquid, if needed, for the desired consistency. Do not exceed 7 pints (3.3 liters) of liquid.
- Ideally, the aggregate must be nonreactive (reference: ASTM C1260, ASTM C227 and ASTM C289), clean, well graded, saturated surface dry (SSD), have low absorption, high density, and comply with ASTM C33, size number 8 per Table 2.
- Variances in aggregate quality may result in different strengths and cured performance.
- The typical addition rate is 25 lbs (11.4 kg) of aggregate per mix. This is approximately 2 gallons (7.6 liters) of aggregate by loose volume.

APPLICATION

- Apply SikaRepair®-224 mortar by hand trowel or spray methods for the repair of horizontal, vertical or overhead concrete surfaces.
- At the time of application, the substrate surfaces must be saturated surface dry (SSD) but hold no standing water.

Hand Trowel

- A neat mix of SikaRepair®-224 mortar must initially be scrubbed into the mechanically prepared, SSD substrate. Alternately an appropriate Sika bonding agent product can be used. Be sure to fill all pores and voids.
- Apply SikaRepair®-224 mortar by hand trowel while the scrub coat or bonding agent is still wet and uncured.
- Force material against edges of repair, working toward center. After filling repair area, screed off excess SikaRepair®-224 mortar.
- Allow SikaRepair®-224 to set to the desired stiffness. Finish with broom or with a burlap drag for a rough finish. Finish with a wood float for a granular finish. Finish with a steel trowel or a magnesium float for a smooth finish.
- To assist in the finishing process, use SikaFilm® finishing aid. Please consult the current product data sheet for additional information.
- Mixing, placing and finishing typically should not exceed 2 to 3 hours maximum.

Wet Process Spraying

- Conventional wet process shotcrete spray equipment should be used. Consult directly with the equipment manufacturer for their recommendations.
- Set up wet process spray equipment. Add liquid [i.e. 6 - 7 pints (2.8 - 3.3 liters) per bag] directly into the mixer.
- Start the mixer in motion and add SikaRepair®-224 powder while continuing to mix.
- When spraying, shoot perpendicular (i.e. at a 90° angle) to vertical or overhead surfaces. This minimizes rebound, creates the smoothest pattern (i.e. reduces "bumps") and properly encases rebar. Consult ACI 506R, the "Guide to Shotcrete" for additional information.
- The velocity of the material is sufficient, if at a distance of 18 to 24 inches (46 to 61 cm), the material pattern flattens out on contact with the surface and rebars are encased.
- After applying the material, allow it to stiffen before removing bumpy areas with a trowel.
- Before applying the next layer, allow the material to develop initial strengths. This may take anywhere from 2 - 4 hours, depending on mix consistency, ambient and substrate temperatures, wind conditions and humidity.
- Begin and finish multiple lift repairs on the same day. To assist in the finishing process of the final lift, use SikaFilm® finishing aid. Please consult the current product data sheet for additional information.
- Refer to ACI 305R the "Guide to Hot Weather

Concreting" or ACI 306R the "Guide to Cold Weather Concreting" when there is a need to place this product while either hot or cold temperatures prevail. Thinner placements will be more sensitive to actual temperature conditions.

Natural Gun Finish

- If a gun-finish is too rough, special finishes may be applied.
- After sufficient stiffening and initial strength gain, excess material should be sliced off with a sharp-edged cutting screed. The surface may then be finished to the actual application's requirements:
  - Broom for a rough texture
  - Wood float for a granular texture
  - Steel trowel for a smooth finish
- To assist in the finishing process, use SikaFilm® finishing aid. Please consult the current Product Data Sheet for additional information.

CURING TREATMENT

- As per ACI recommendations for Portland-cement concrete, curing is required.
- Moist curing should commence immediately after finishing.
- Moist cure with wet burlap and/or polyethylene, a fine mist of water or a water-based,* compatible curing compound meeting ASTM C309.
- Curing compounds may adversely affect the adhesion of following layers of mortar, leveling mortars or protective coatings.
- Protect newly applied material from direct sunlight, wind, rain and frost.
- To prevent from freezing, cover with insulating material (e.g. curing blanket).

* Pretesting of curing compound for compatibility is recommended.

OTHER RESTRICTIONS

See Legal Disclaimer.

LEGAL DISCLAIMER

- **KEEP CONTAINER TIGHTLY CLOSED**
- **KEEP OUT OF REACH OF CHILDREN**
- **NOT FOR INTERNAL CONSUMPTION**
- **FOR INDUSTRIAL USE ONLY**
- **FOR PROFESSIONAL USE ONLY**

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates (“SIKA”), the user must always read and follow the warnings and instructions on the product’s most current product label, Product Data Sheet and Safety Data Sheet which are available at usa.sika.com or by calling SIKA’s Technical Service

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