

## PRODUCT DATA

3 03 37 13 Shotcrete

# SHOTPATCH® 21F

Fiber-reinforced, silica-fume-enhanced structural wet- or dry-process shotcrete

## Description

Shotpatch® 21F is a one-component prepackaged, fiber-reinforced repair mortar that contains an integral corrosion inhibitor. It exhibits high bond strengths, low permeability, and excellent resistance to freeze/thaw cycling and salt scaling. Shotpatch® 21F can be applied by either the wet or dry shotcrete process.

## Yield

Approximately 0.48 ft<sup>3</sup> (0.013 m<sup>3</sup>), which will cover approximately 5.8 ft<sup>2</sup> (0.54 m<sup>2</sup>) at a 1" (25 mm) depth excluding rebound and waste.

## Packaging

55 lb (25 kg) multi-wall bags  
3,300 lb (1,500 kg) bulk bags

## Shelf Life

1 year when properly stored

## Storage

Store in unopened containers in a clean, dry area between 45 and 90° F (7 and 32° C).

## Features

- Fiber reinforced
- Versatile
- Low permeability
- Contains an integral corrosion inhibitor
- Workable
- Prepackaged quality

## Benefits

- For plastic shrinkage control and reduced rebound
- Designed for use with the dry or wet shotcrete process
- Resists water and chloride ion penetration
- Prevents corrosion from a wide range of sources and environments
- Easy to cut and finish
- Bag-to-bag uniformity

## Where to Use

### APPLICATION

- Structural repair and retrofit of
  - Bridges, tunnels, and parking garages
  - Piers, docks, and dams
  - Reservoirs and tanks
  - Treatment facilities
  - Canals and aqueducts

### LOCATION

- Horizontal, vertical, and overhead surfaces
- Interior or exterior

## How to Apply

### Surface Preparation

#### CONCRETE

1. Perform surface preparation in compliance with ICRI Technical Guideline No. 03730 "Guideline for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion" and ACI 506.2 "Specification for Materials, Proportioning, and Application of Shotcrete."
2. Remove all unsound or delaminated concrete, providing a minimum 1/4" (6 mm) substrate-profile amplitude and 3/4" (19 mm) clearance behind corroded reinforcing steel.
3. Sawcut the area being repaired to a minimum depth of 1/4" (6 mm).
4. After removing concrete, mechanically abrade the surface to remove all bond-inhibiting materials and provide additional mechanical bond. Do not use a method of surface preparation that will fracture the concrete. Verify the absence of microcracking or bruising in accordance with ICRI Guideline No. 03732.
5. Presoak the prepared concrete surface to provide a saturated surface-dry (SSD) condition.

## Technical Data

### Composition

Shotpatch® 21F is a one-component silica-fume-enhanced fiber-reinforced mortar containing an integral corrosion inhibitor.

### Compliances

- Cement meets ASTM C 150 standards
- Sand gradation meets ASTM C 33 and ACI 506 standards

### Typical Properties

PROPERTY	VALUE
<b>Unit weight</b> , lb/ft <sup>3</sup> (kg/m <sup>3</sup> )	129 (2,067)
<b>Set time</b> , hrs:min at 70° F (21° C) (ASTM C 266)	
Initial set	2:45
Final set	6:00

### Test Data

PROPERTY	RESULTS			TEST METHODS
	<b>1 day Psi (MPa)</b>	<b>7 day Psi (MPa)</b>	<b>28 day Psi (MPa)</b>	
<b>Compressive strength</b>	2,500 (17.2)	6,000 (41.4)	7,000 (48.3)	ASTM C 109
<b>Splitting tensile strength</b>	200 (1.4)	300 (2.1)	400 (2.8)	ASTM C 496
<b>Flexural strength</b>	600 (4.1)	1,200 (8.3)	1,800 (12.4)	ASTM C 348)
<b>Direct tensile bond strength</b>	50 (0.3)	130 (0.9)	180 (1.2)	ACI 503R, Appendix A
<b>Slant shear bond strength</b>	1,200 (8.3)	2,500 (17.2)	3,000 (20.7)	ASTM C 882, modified <sup>1</sup>
<b>Compressive strength</b>				ASTM C 42
	<b>3 day psi (MPa)</b>	<b>28 day psi (MPa)</b>		
Dry process	6,000 (41.4)	10,000 (69.0)		
Wet process	5,500 (38.0)	9,500 (66.0)		
<b>Drying shrinkage</b> , %, at 28 days		0.08		ASTM C 157, modified <sup>2</sup>
<b>Modulus of elasticity</b> , psi (GPa), at 28 days		4.6 x 10 <sup>6</sup> (31.7)		ASTM C 469
<b>Rapid chloride permeability</b> , coulombs, at 28 days		685		ASTM C 1202 / AASHTO T-277
<b>Freeze/thaw resistance</b> , % RDM, at 300 cycles		95		ASTM C 666, Procedure A
<b>Abrasion resistance</b>				ASTM C 779A
	<b>Duration, min</b>	<b>Depth of wear, in (mm)</b>		
	30	0.021 (0.53)		
	60	0.036 (0.91)		

<sup>1</sup>No epoxy bonding agent used.

<sup>2</sup>CRI Guideline #03733, 1 by 1 by 10" (25 by 25 by 250 mm) prism, air cured.

Results were obtained when material was mixed with 0.8 gallons (3.0 L) of water per bag and cured at 70° F (21° C). Expect reasonable variations, depending upon application methods, test methods, and curing conditions.

#### CORRODED REINFORCING STEEL

1. Remove all oxidation and scale from the exposed reinforcing steel in accordance with ICRI Technical Guideline No. 03730 "Guideline for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion."
2. For additional protection from future corrosion, coat the prepared reinforcing steel with Emaco® P24 rebar coating or install Emaco® Corr-Stops® CM galvanic anodes.

#### Mixing

##### WET PROCESS

1. Add 0.7 – 0.9 gallons (2.7 – 3.4 L) of potable water per 55 lb (25 kg) bag of Shotpatch® 21F mortar.
2. Mechanically mix using an appropriately sized mortar mixer. Pour approximately 90% of the water into the mixing container, then charge the mixer with the bagged material. Add the remaining mix water as required.
3. Mix for 3 – 5 minutes to reach a homogeneous consistency.

#### Application

1. Apply Shotpatch® 21F in accordance with ACI 506R "Guide to Shotcrete."
2. Apply Shotpatch® 21F while taking proper consideration for rebound and compaction around reinforcing steel. The successful application of Shotpatch® 21F depends primarily on the skill of the nozzleman.
3. When applying multiple lifts, scratch the preliminary lift before initial set. Apply the succeeding lift after the preliminary lift has reached final set. If the succeeding lift will not be immediately placed, keep the surface continually moist.
4. Cut off or level the application as required, matching the original concrete elevation.
5. In rapid-drying conditions (e.g., hot, dry, and windy weather) use Confilm® evaporation reducer.

6. Finish the final surface as required.

#### Curing

1. Proper curing is extremely important and should be conducted in accordance with ACI 308 "Standard Practice for Curing Concrete."
2. Apply a curing compound that complies with the moisture-retention requirements of ASTM C 309 or ASTM C 1315 or else moist cure for a minimum of 7 days.

#### For Best Performance

- Precondition these materials to approximately 70° F (21° C) for 24 hours before using.
- This product comes in premeasured kits; do not add extra water.
- Water content should not exceed 0.9 gallons per 55 lb bag during application.
- Minimum application thickness is 3/8" (10 mm). Maximum application thickness is 6" (152 mm) per lift.
- Do not mix partial bags.
- Minimum ambient and surface temperatures should be 45° F (7° C) and rising at the time of application.
- Make certain the most current versions of product data sheet and MSDS are being used; call Customer Service (1-800-433-9517) to verify the most current versions.
- Proper application is the responsibility of the user. Field visits by BASF personnel are for the purpose of making technical recommendations only and for supervising or providing quality control on the jobsite.

#### Health and Safety

SHOTPATCH® 21F

#### WARNING!

Contains silica, crystalline quartz, Portland cement.

#### Risks

Product is alkaline on contact with water and may cause injury to skin or eyes. Ingestion or inhalation of dust may cause irritation. Contains small amount of free respirable quartz which has been listed as a suspected human carcinogen by NTP and IARC. Repeated or prolonged overexposure to free respirable quartz may cause silicosis or other serious and delayed lung injury.

#### Precautions

Avoid contact with skin, eyes and clothing. Prevent inhalation of dust. Wash thoroughly after handling. Keep container closed when not in use. DO NOT take internally. Use only with adequate ventilation. Use impervious gloves, eye protection and if the TLV is exceeded or used in a poorly ventilated area, use NIOSH/MSHA approved respiratory protection in accordance with applicable Federal, state and local regulations.

#### First Aid

In case of eye contact, flush thoroughly with water for at least 15 minutes. In case of skin contact, wash affected areas with soap and water. If irritation persists, SEEK MEDICAL ATTENTION. Remove and wash contaminated clothing. If inhalation causes physical discomfort, remove to fresh air. If discomfort persists or any breathing difficulty occurs or if swallowed, SEEK IMMEDIATE MEDICAL ATTENTION.

#### Waste Disposal Method

This product when discarded or disposed of is not listed as a hazardous waste in federal regulations. Dispose of in a landfill in accordance with local regulations.

For additional information on personal protective equipment, first aid, and emergency procedures, refer to the product Material Safety Data Sheet (MSDS) on the job site or contact the company at the address or phone numbers given below.

#### Proposition 65

This product contains material listed by the State of California as known to cause cancer, birth defects or other reproductive harm.

#### VOC Content

0 g/L or 0 lbs/gal less water and exempt solvents.

**For medical emergencies only,  
call ChemTrec (1-800-424-9300).**

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Form No. 1019338 8/07  
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