

EMACO® R310 CI

One-component flowable repair mortar
with integral corrosion inhibitor

PRODUCT DATA

3 03930

**Concrete
Rehabilitation**

Description

Emaco® R310 CI repair mortar is a polymer-modified cement-based mortar with an integral corrosion inhibitor. It is used for patching or resurfacing distressed horizontal concrete surfaces. Emaco® R310 CI repair mortar is designed for both interior and exterior use.

Yield

Approximately 0.45 ft³ (0.013 m³) of mortar, which will cover approximately 5.4 ft² (0.50 m²) at a 1" (25 mm) depth without waste.

An extension of 45% SSD 3/8" pea gravel (25 lb [11 kg] per 55 lb [25 kg] bag) will yield approximately 0.63 ft³ (0.018 m³).

Packaging

55 lb (25 kg) multi-wall bags

Shelf Life

9 months when properly stored

Storage

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

Features

- Low permeability
- One component
- Low modulus of elasticity
- Contains an integral corrosion inhibitor
- Abrasion resistant
- Early strength gain
- Shrinkage compensated
- Polymer modified

Benefits

- Resists moisture and chloride intrusion
- Easy mixing and handling; components not damaged by freezing
- Improved compatibility for surface renovation
- Prevents corrosion from a wide range of sources and environments
- Excellent protection from vehicular traffic
- Ready for pedestrian traffic in 4 hours, vehicular traffic in 1 day
- Reduces stress at the bondline
- Improved bond to surrounding concrete

Where to Use

APPLICATION

- Horizontal and formed vertical repair of concrete
- Resurfacing rough floors and work areas
- Bridges
- Parking garages
- Walkways, sidewalks, and steps
- Balconies

How to Apply

Surface Preparation

CONCRETE

1. Perform surface preparation in compliance with ICRI Technical Guideline No. 03730 "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays."
2. Square cut or undercut the perimeter of the area being patched to a minimum depth of 1/4" (6 mm) to prevent featheredges. Do not cut reinforcement.

3. Chip unsound or delaminated concrete within the patch area to a depth of 1/4" (6 mm) or to whatever additional depth is necessary to reach sound concrete.
4. Remove concrete that has been saturated with oil or grease.
5. After concrete removal, thoroughly abrade the roughened surface and exposed reinforcement to remove all bond-inhibiting materials, such as rust, dirt, loose chips, dust, oil, and grease. 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.
6. Form vertical surfaces, as required.
7. Saturate the repair area thoroughly with water for several hours before placing Emaco® R310 CI.
8. Immediately before mixing, blow off or remove all excess water from repair area. Substrate should be saturated surface-dry (SSD) during placement.



Technical Data

Composition

Emaco® R310 CI is a blend of cement, graded aggregates, dry polymer, and set-control additives with an integral corrosion inhibitor.

Typical Properties

PROPERTY	VALUE
Unit weight , lb/ft ³ (kg/m ³)	135 (2,160)
Working time , min	30
Set times , hr:min (ASTM C 266)	
Initial set	1:30
Final set	2:00

Test Data

PROPERTY	RESULTS			
	6 Hours psi (MPa)	1 Day psi (MPa)	7 Days psi (MPa)	28 Days psi (MPa)
Compressive Strength (ASTM C 109)	350 (2.4)	2,500 (17.2)	5,500 (37.9)	7,500 (51.7)
Direct tensile bond strength (ACI 503R, Appendix A)	–	150 (1.0)	175 (1.2)	200 (1.4)
Direct shear bond strength (Michigan DOT)	–	150 (1.0)	250 (1.7)	300 (2.1)
Slant shear bond strength (ASTM C 882, Modified ¹)	–	980 (6.8)	1,750 (12.1)	2,100 (15.2)
Splitting tensile strength (ASTM C 496)	–	375 (2.6)	450 (3.1)	600 (4.1)
Flexural strength (ASTM C 348)	–	800 (5.5)	1,000 (6.9)	1,500 (10.3)
Drying shrinkage , %, at 28 days (ASTM C 157, Modified ²)				0.09
Modulus of elasticity , at 28 days (ASTM C 469), psi (GPa)				2.9 x 10 ⁶ (20.0)
Rapid chloride permeability , coulombs, at 28 days (ASTM C 1202 / AASHTO T 277)				850

PROPERTY	RESULTS	TEST METHODS
Freeze/thaw resistance , % RDM, at 300 cycles	92.0	ASTM C 666, Procedure A
Salt scaling resistance , 50 cycles	None	ASTM C 672
Abrasion resistance , depth of wear, in (mm)		ASTM C 779A
30 min	0.008 (0.21)	
60 min	0.033 (0.84)	

¹No epoxy-bonding agent used; air cured according to ASTM C 1042.

²ICRI Guideline No. 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.

STEEL

1. Remove 3/4" (19 mm) of concrete behind corroded reinforcing steel to provide adequate space for preparation and material placement.
2. Sandblast or shotblast corroded reinforcing steel after chipping to remove oxidation and scale in compliance with ICRI Technical Guideline No. 03730 "Guide for Surface Preparation for Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion." For additional protection from future corrosion, coat the prepared reinforcing steel with Emaco® P22 or Emaco® P24 rebar coatings.

Mixing

1. Add 0.75 – 0.90 gallons (2.8 – 3.4 L) of potable water per 55 lb (25 kg) bag of Emaco® R310 CI repair mortar.
2. Use a slow-speed drill (400 – 600 rpm) with a Jiffy-type paddle or an appropriately sized mortar mixer. Pour approximately 90% of the mix water into the mixing container, then slowly charge the mixer with the bagged material.
3. For applications greater than 1" (25 mm) in thickness, add up to 25 lbs (11 kg) of SSD 3/8" (10 mm) pea gravel per 55 lb (25 kg) bag of Emaco® R310 CI. Add the remaining mix water as required to obtain desired consistency. Mix for a total of 3 – 5 minutes to achieve a homogeneous consistency. Do not mix longer than 5 minutes.

Application

HORIZONTAL APPLICATIONS

1. Scrub a thin layer of Emaco® R310 CI into the properly prepared saturated surface-dry (SSD) substrate with a stiff-bristle broom or brush. Do not apply more of the bond coat than can be covered with Emaco® R310 CI before the bond coat starts to set. Do not dilute the bond coat with water. Do not retemper the bond coat. A long open-time bonding agent such as Concreative® Liquid LPL or Emaco® P24 bonding adhesive may be used in place of a bond coat.
2. Minimum application thickness is 1/4" (6 mm); maximum application thickness is 1" (25 mm). For applications greater than 1" (25 mm) in thickness, extend with 25 lbs (45%) of rounded 3/8" pea gravel per 55 lb bag (10 mm per 25 kg) of Emaco® R310 CI.
3. Finish Emaco® R310 CI by hand only. Level as needed to match the original concrete elevation.
4. Where rapid surface evaporation may occur (e.g., hot, dry, or windy conditions), use Confilm® evaporation reducer. Refer to the Confilm® product data sheet for more information. Finish the final surface as required.

FORMED APPLICATIONS

1. Apply form-release agent.
2. Place air-relief vents at high points in the repair to prevent voids from entrapped air.
3. Apply caulk or tape to make form edges watertight. Check formed sections to ensure they are watertight before installing Emaco® R310 CI.
4. Immediately before placement, drain presoaking water from the form, leaving a saturated substrate with no excess water remaining.
5. A long open time bonding agent such as Concreative® Liquid LPL or Emaco® P24 bonding adhesive may be used in place of a saturated substrate. In this case, place the Emaco® R310 CI before the bonding agent becomes tack free.
6. Apply material with sufficient pressure to ensure intimate contact with the substrate surface.
7. Remove forms on the following day when sufficient strength has developed. For further information, consult ACI 347R "Guide to Formwork for Concrete."

Curing

1. Proper curing is extremely important and should be conducted in accordance with ACI 308 "Standard Practice for Curing Concrete."
2. Apply a water-based curing compound that complies with the moisture-retention requirements of ASTM C 309 or ASTM C 1315 or moist cure for 2 – 3 days. Do not use solvent-based curing compounds.

For Best Performance

- Precondition these materials to approximately 70° F (21° C) for 24 hours before using.
- Protect repairs from direct sunlight, wind, and other conditions that could cause rapid drying of material.
- Do not use in applications where product will be exposed to wet or moist conditions.
- Minimum application thickness is 1/4" (6 mm). For applications greater than 1" (25 mm) in thickness, the product must be extended with aggregate.
- Do not mix partial bags.
- Minimum ambient and surface temperatures should be 45° F (7° C) and rising at the time of application.
- Do not use in sulfate-exposed environments.
- Do not use solvent-based curing compounds.
- Do not mix longer than 5 minutes.

- 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 Degussa personnel are for the purpose of making technical recommendations only and not for supervising or providing quality control on the jobsite.

Health and Safety

EMACO® R310 CI

Caution

Risks

Eye irritant. Skin irritant. Causes burns. Lung irritant. May cause delayed lung injury.

Precautions

KEEP OUT OF THE REACH OF CHILDREN. Avoid contact with eyes. Wear suitable protective eyewear. Avoid prolonged or repeated contact with skin. Wear suitable gloves. Wear suitable protective clothing. Do not breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment. Wash soiled clothing before reuse.

First Aid

Wash exposed skin with soap and water. Flush eyes with large quantities of water. If breathing is difficult, move person to fresh air.

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 materials listed by the state of California as known to cause cancer, birth defects, or reproductive harm.

VOC Content

0 lbs/gal or 0 g/L.

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

Degussa Building Systems

889 Valley Park Drive
Shakopee, MN, 55379

www.degussabuildingsystems.com

Customer Service 800-433-9517
Technical Service 800-243-6739

LIMITED WARRANTY NOTICE Every reasonable effort is made to apply Degussa exacting standards both in the manufacture of our products and in the information which we issue concerning these products and their use. We warrant our products to be of good quality and will replace or, at our election, refund the purchase price of any products proved defective. Satisfactory results depend not only upon quality products, but also upon many factors beyond our control. Therefore, except for such replacement or refund, Degussa **MAKES NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, RESPECTING ITS PRODUCTS**, and Degussa shall have no other liability with respect thereto. Any claim regarding product defect must be received in writing within one (1) year from the date of shipment. No claim will be considered without such written notice or after the specified time interval. User shall determine the suitability of the products for the intended use and assume all risks and liability in connection therewith. Any authorized change in the printed recommendations concerning the use of our products must bear the signature of the Degussa Technical Manager.

This information and all further technical advice are based on Degussa's present knowledge and experience. However, Degussa assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights. In particular, Degussa disclaims all **WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY. DEGUSSA SHALL NOT BE RESPONSIBLE FOR CONSEQUENTIAL, INDIRECT OR INCIDENTAL DAMAGES (INCLUDING LOSS OF PROFITS) OF ANY KIND.** Degussa reserves the right to make any changes according to technological progress or further developments. It is the customer's responsibility and obligation to carefully inspect and test any incoming goods. Performance of the product(s) described herein should be verified by testing and carried out only by qualified experts. It is the sole responsibility of the customer to carry out and arrange for any such testing. Reference to trade names used by other companies is neither a recommendation, nor an endorsement of any product and does not imply that similar products could not be used.

For professional use only. Not for sale to or use by the general public.

Form No. 1019941 9/03 (Replaces 1/02)
Printed on recycled paper including 10% post-consumer fiber.

© 2003 Degussa
Printed in U.S.A.