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ESR-1714

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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
SECTION: 07 18 13—PEDESTRIAN TRAFFIC COATINGS

REPORT HOLDER:

CROSSFIELD PRODUCTS CORP. - MIRACOTE DIVISION

**3000 EAST HARCOURT STREET
RANCHO DOMINGUEZ, CALIFORNIA 90221**

EVALUATION SUBJECT:

**MIRACOTE MIRAFLEX II DECKING SYSTEMS—WALKING DECK
AND ROOF COVERING**



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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

Section: 07 18 13—Pedestrian Traffic Coatings

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EVALUATION SUBJECT:

**MIRACOTE MIRAFLEX II DECKING SYSTEMS—
WALKING DECK AND ROOF COVERING**

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2012, 2009 and 2006 *International Building Code*® (IBC)
- 2012, 2009 and 2006 *International Residential Code*® (IRC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)[†]

[†]The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Properties evaluated:

- Durability
- Wind resistance
- Fire classification
- Fire-resistance-rated construction

2.0 USES

The Miracote Miraflex II Decking Systems are walking deck and Class A roof covering systems for use directly over concrete or plywood substrates. The systems may also be used as a component of a one-hour fire-resistance-rated roof assembly as described in Section 4.9 of this report.

3.0 DESCRIPTION

3.1 General:

Miracote Miraflex II Decking Systems are polymer-modified, cementitious walking deck and roof covering systems that consist of expanded metal lath; polymer-modified cementitious mortar base coat; a polymeric waterproofing layer; reinforcing fabric; a protection coat; and either a topcoat or a sealer coat. See Section 4.0 and Tables 1 and 2 for recognized Miraflex II

system configurations and corresponding component requirements.

3.2 Materials:

3.2.1 General: Miracote Miraflex II Decking Systems powder and liquid components have a shelf life of one year when stored indoors at temperatures between 40°F and 100°F (4.4°C and 37.8°C). Liquid components must be kept from freezing.

3.2.2 Base Coat Components

3.2.2.1 MiraPatch RM 1 (Repair Mortar) Powder: A proprietary dry mixture of portland cement and graded aggregates supplied in 50-pound (22.7 kg) bags.

3.2.2.2 MiraPatch RM 3 (Repair Mortar) Powder: A proprietary dry mixture of portland cement and graded aggregates supplied in 36-pound (16.4 kg) bags.

3.2.2.3 MiraPatch LM Powder (Lath Mortar): A proprietary dry mixture of cement and graded aggregates supplied in 50-pound (22.7 kg) bags.

3.2.2.4 MiraPatch RM 1 Liquid, MiraPatch RM 3 Liquid and MiraPatch LM Liquid: Liquid polymers designed to be mixed with their respective MiraPatch RM (Repair Mortars) or MiraPatch LM Powders, supplied in 5-gallon (18.9 L) containers.

3.2.3 Waterproofing Layer Component:

3.2.3.1 MiraFlex Membrane A: A liquid polymer waterproofing latex supplied in 5-gallon (18.9 L) containers.

3.2.3.2 Miracote Poly Fabric: A polypropylene woven-mesh reinforcing fabric available in 40-inch-wide-by-300-foot-long (1.02 by 91.4 m) rolls, weighing 0.45 ounces per square foot (136 g/m²).

3.2.4 Protection Layer Components:

3.2.4.1 Miracote Protective Powder: A dry blend of portland cement and graded aggregates packaged in 55-pound (25.0 kg) bags.

3.2.4.2 Miracote MPC Liquid Catalyst: A liquid polymer designed to be used with Miracote Protective Powder dry mix, supplied in 5-gallon (18.9 L) containers.

3.2.4.3 Mirastamp Powder: A dry blend of portland cement and graded aggregates, packaged in 45-pound (20.5 kg) bags.

3.2.4.4 Mirastamp Liquid: A liquid polymer designed to be used with Mirastamp Powder, supplied in 5-gallon (18.9 L) containers.

3.2.5 Topcoat Component

3.2.5.1 Miracote MiraGard Color Bond XL: A waterborne, pigmented, acrylic topcoat supplied in 5-gallon (18.9 L) containers.

3.2.6 Sealer Coat Components:

3.2.6.1 Miracote MiraGard HD 100 Sealer: A solvent-borne, clear, acrylic sealer supplied in 5-gallon (18.9 L) containers.

3.2.6.2 Miracote MiraGard HD 400 Sealer: A solvent-borne, clear, acrylic sealer supplied in 5-gallon (18.9 L) containers.

3.2.6.3 Miracote MiraGard HDWB: A waterborne, clear, acrylic sealer supplied in 5-gallon (18.9 L) containers.

3.2.6.4 Miracote MiraGard Color Bond (XL): A waterborne, pigmented sealer supplied in 5-gallon (18.9 L) containers.

3.2.7 Metal Flashing: Metal flashing must be minimum 0.019-inch-thick [0.48 mm (26 gage)], corrosion-resistant metal. Flashings must be rigid enough to avoid excessive deflection and ponding, or must be solidly backed by the concrete or plywood substrate.

3.2.8 Substrates:

3.2.8.1 Plywood: Plywood must be minimum $\frac{5}{8}$ -inch-thick (15.9 mm) exterior-grade plywood complying with U.S. DOC PS-1 or PS-2.

3.2.8.2 Concrete: Concrete decks must comply with the applicable requirements of the applicable code and must have a minimum compressive strength (f_c) of 2500 psi (17.2 MPa).

3.2.9 Metal Lath: Metal lath must be minimum 1.8-pound-per-square-yard (1.0 kg/m²), galvanized, expanded metal lath complying with ASTM C847.

3.2.10 Staples: Staples must be corrosion-resistant, minimum No. 16 gage staples with minimum 1-inch-wide (25.4 mm) crowns and $\frac{1}{2}$ -inch-long (12.7 mm) legs, complying with ASTM F1667.

4.0 INSTALLATION

4.1 General:

Installation of the Miracote Miraflex II Decking system must be in accordance with the manufacturer's published installation instructions, the applicable code and this report. The manufacturer's installation instructions must be available on the jobsite during application. Installation must only be performed when the weather is dry and the ambient air temperature is between 60°F and 95°F (15.6°C and 35.0°C). Materials must not be applied if precipitation is occurring or expected.

Substrates must be structurally sound, clean and dry, and must be sloped a minimum of $\frac{1}{4}$ inch per foot (2% slope).

4.2 Preparation of Substrates:

4.2.1 Plywood: Plywood must be applied to framing in accordance with the requirements of the applicable code. All edges must be blocked. All penetrations through and terminations of the sheathing must be protected with metal flashing in accordance with the requirements of the applicable code and the manufacturer's published installation instructions.

4.2.2 Concrete: Surfaces must be clean and free of standing water. All holes, joints and cracks must be pointed flush with portland cement mortar and all high

spots cut or ground off to provide a smooth, even surface. Any foreign material such as paint, grease or oil must be removed by mechanical means. New concrete must be mechanically scarified prior to application of the system.

4.3 Systems A, B and C (Installation over Plywood – See Table 1):

4.3.1 Metal Lath: Metal lath, as described in Section 3.2.9 of this report, with staples described in Section 3.2.10, must be fastened to the plywood deck with 22 to 28 staples per square foot (0.09 m²), uniformly distributed. Where the lath is butt-jointed, the staple spacing at the joint must be no greater than 2 inches (51 mm) on center. Butt joints of metal lath must not occur over plywood joints. Where plywood joints occur, lath shall be stapled across all plywood joints at 4 inches (102 mm) on center.

4.3.2 Base Coat: The base coat must be one of the following:

- Two one-gallon (3.8 L) containers of MiraPatch RM 1 Repair Mortar Liquid mixed with three 50-pound (34.0 kg) bags of MiraPatch RM 1 Powder. Coverage must be approximately 84 square feet (7.8 m²) per batch at a minimum thickness of $\frac{3}{16}$ inch (4.8 mm).
- One and a quarter gallons (4.75 L) of MiraPatch 3 Liquid mixed with one 50-pound bag of MiraPatch LM Powder. Coverage must be approximately 43 square feet (3.99 m²) per batch at a minimum thickness of $\frac{3}{16}$ inch (4.8 mm).
- One gallon (3.8 L) of MiraPatch Repair Mortar 3 Liquid mixed with one 36-pound (16.4 kg) bag of MiraPatch RM 3 Powder. Coverage must be approximately 23 square feet (2.1 m²) per batch at a minimum thickness of $\frac{3}{16}$ inch (4.8 mm).

The base coat must be trowel-applied to completely fill and cover the metal lath to a minimum total thickness of $\frac{3}{16}$ inch (4.8 mm). The base coat must be allowed to cure a minimum of eight hours before application of the waterproofing layer.

4.3.3 Waterproofing Layer: MiraFlex Membrane A must be mixed with water at a ratio of 1:1 by volume, and the first coat must be roller-applied over the base coat at a rate of 1 gallon per 400 square feet (1 L/9.8 m²). Two additional coats of Membrane A (undiluted) must be applied with a $\frac{1}{8}$ -inch (3.2 mm) V-notched trowel, at a rate of 1 gallon per 64 square feet (1 L/1.6 m²), for a minimum total dry-film thickness of 0.025 inch [25 mils (0.64 mm)] for each coat. Each coat must be allowed to dry to the touch before the next coat is applied [approximately one hour at 70° F (21.0° C)]. Reinforcing fabric poly propylene "Poly Fabric" must be embedded in the final coat and be allowed to cure for a minimum of four hours before application of the protection coat.

4.3.4 Protection Coat: Five gallons (18.9 L) of Miracote Liquid Catalyst must be mixed with two 55-pound (25.0 kg) bags of Miracote Protective Coating. Two coats of the protection coat must be applied over the waterproofing layer by trowel or texturing hopper gun at a rate of 1 gallon per 41 square feet (1 L/1.0 m²), for a minimum wet-film thickness of 0.039 inch [39 mils (0.99 mm)] for each coat. The first coat must be allowed to dry for four to six hours before the application of the second coat. The second coat must be allowed to cure for a minimum of eight hours before application of the topcoat.

4.3.5 Topcoat (Required for Systems A and B): Two coats of Miracote MiraGard Color Bond (XL) must be roller-applied over the protection coat at a rate of 1 gallon per

300 square feet (1 L/7.4 m²), for a minimum wet-film thickness of 0.011 inch [11 mils (0.28 mm)] for each coat. The first coat must be allowed to dry for approximately one hour before application of the second coat. The second coat must be allowed to cure for a minimum of eight hours before application of the sealer.

4.3.6 Sealer (Required for Systems B and C): The sealer must be one of the following:

- Two coats of Miracote MiraGard HD100 Sealer, or two coats of MiraGard 400 sealer roller-applied over the top coat at a rate of 1 gallon per 400 square feet (1 L/9.8 m²), for a minimum wet-film thickness of 0.0053 inch [5.3 mils (0.13 mm)] for each coat. The first coat must be allowed to dry for a minimum of 30 minutes before application of the second coat.
- Two coats of Miracote MiraGard HDWB sealer, roller-applied over the protection coat at a rate of 1 gallon per 400 square feet (1 L/9.8 m²), for a minimum wet-film thickness of 0.011 inch [11 mils (0.28 mm)] for each coat. The first coat must be allowed to dry for a minimum of 30 minutes before application of the second coat.
- As an additional option for System C, two coats of Miracote MiraGard Color Bond (XL) must be roller-applied over the protection coat at a rate of 1 gallon per 300 square feet (1 L/7.4 m²), for a minimum wet-film thickness of 0.011 inch [11 mils (0.28 mm)] for each coat. The first coat must be allowed to dry for approximately one hour before application of the second coat.

For all sealers, after application of the second coat, the coating must be allowed to dry for 12 to 24 hours before traffic is allowed on the coating.

4.4 Systems D, E and F (Installation over Concrete – See Table 2): Application of the waterproofing layer and protection coat, must be as described in Sections 4.3.3 and 4.3.4, respectively.

For Systems D and E application of the topcoat must be as described in Section 4.3.5.

For Systems D and F application of the sealer must be as described in Section 4.3.6.

4.5 System G (Installation over Concrete – See Table 2):

Application of the waterproofing layer and sealer must be as described in Sections 4.3.3 and 4.3.6, respectively.

For application of the protection coat, one gallon (3.8 L) of Mirastamp Liquid must be mixed with a 45-pound (20.5 kg) bag of Mirastamp Powder and applied with a spreader rake and closed with a float trowel over the waterproofing layer at a rate per batch of 18 square feet (1.7 m²) for the minimum 1/4-inch (6.4 mm) thickness, 13.5 square feet (1.3 m²) for the 3/8-inch (9.5 mm) thickness, or 9 square feet (0.83 m²) for a thickness of 1/2 inch (12.7 mm). The coating is processed and stamped and allowed to cure for a minimum of 12 hours.

4.6 Method of Repair:

The damaged area must be removed and replaced as required for a new installation, as described in Section 4.3,

4.4, or 4.5. When substrate damage occurs, the retention of the fire-resistance rating and strength properties must be investigated and the results submitted to the code official.

4.7 Wind Resistance:

Installation must be limited to areas where the maximum basic wind speed, building height and exposure comply with Tables 3 and 4 of this report, as applicable.

4.8 Class A Roof Covering Construction:

When Miraflex II Decking systems are applied over concrete or 5/8-inch-thick (15.9 mm) exterior-grade plywood substrates with all edges blocked, the systems have a Class A roof classification, provided the maximum slope does not exceed 1/2 inch per foot (4% slope).

4.9 One-hour Fire-resistance-rated Construction:

The deck system described in Section 4.3 of this report, when applied over 5/8-inch-thick (15.9 mm) exterior-grade plywood, with nominally 2-by-10 (51 by 254 mm) joists spaced at 16 inches (406 mm) on center, and all plywood joints blocked, can be recognized as a substitute for the double wood floor described in Assembly 13 of Table 721.1(3) of the 2012 IBC (Table 720.1(3) of the 2009 and 2006 IBC).

5.0 CONDITIONS OF USE

The Miracote Miraflex I walking deck and roof covering system described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1** Installation must comply with this report, the manufacturer's published installation instructions and the applicable code. If there is a conflict between the installation instructions and this report, this report must govern.
- 5.2** Installation must be limited to use in areas where the wind speed does not exceed what is specified in Table 3 of this report.
- 5.3** The products are manufactured at the Crossfield Products Corporation facility in Rancho Dominguez, California, under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

- 6.1** Data in accordance with the ICC-ES Acceptance Criteria for Walking Decks (AC39), dated April 2011 (editorially revised August 2013).
- 6.2** Report of wind resistance testing in accordance with FM Standard 1-52.

7.0 IDENTIFICATION

Each container or bag of the Miracote Miraflex II Decking System Walking Deck and Roof Covering components described in this report must be identified by a label bearing the Crossfield Products Corporation—Miracote Division name and address, product designation, batch number keyed to date of manufacture, product expiration date, and the evaluation report number (ESR-1714).

TABLE 1—MIRACOTE MIRAFLEX I SYSTEM APPLIED OVER PLYWOOD DECKS

COMPONENT	SYSTEM III A	SYSTEM B	SYSTEM C
Lath fastener	Staples	Staples	Staples
Expanded lath	1.8 lb/yd ²	1.8 lb/yd ²	1.8 lb/yd ²
Base coat	MiraPatch LM or MiraPatch RM 3	MiraPatch LM or MiraPatch RM 3	MiraPatch LM or MiraPatch RM 3
Waterproofing	Miraflex Membrane A	Miraflex Membrane A	Miraflex Membrane A
Reinforcing fabric	Miracote Poly fabric	Miracote Poly fabric	Miracote Poly fabric
Protection coat	Miracote MPC Protective Coating	Miracote MPC Protective Coating	Miracote MPC Protective Coating
Topcoat	Miracote MiraGard Colorbond (XL)	Miracote MiraGard Colorbond (XL)	NA
Sealer	NA	Miracote Miragard HDWB, Miracote MiraGard HD 100 or Miracote MiraGard HD 400	Miracote MiraGard Colorbond (XL), Miracote MiraGard HDWB, Miracote MiraGard HD 100 or Miracote MiraGard HD 400

For SI: 1 lb/yd² = 0.537 kg/m².

NA: Not applicable

RM: Repair Mortar

TABLE 2—MIRACOTE MIRAFLEX II SYSTEM APPLIED OVER CONCRETE DECKS

COMPONENT	SYSTEM D	SYSTEM E	SYSTEM F	SYSTEM G
Waterproofing	MiraFlex Membrane A	MiraFlex Membrane A	MiraFlex Membrane A	MiraFlex Membrane A
Protection coat	Miracote MPC Protective Coating	Miracote MPC Protective Coating	Miracote MPC Protective Coating	Mirastamp Coating
Topcoat	Miracote MiraGard Colorbond (XL)	Miracote MiraGuard Colorbond (XL)	NA	NA
Sealer	Miracote MiraGard HD 100, Miracote MiraGard HD 400, or Miracote MiraGard HDWB	NA	Miracote MiraGard HD 100, Miracote MiraGard HD 400 or Miracote MiraGard HDWB	Miracote MiraGard HD 100, Miracote MiraGard 400 or Miracote MiraGard HDWB

NA: Not applicable.

TABLE 3—MAXIMUM ULTIMATE DESIGN WIND SPEED FOR MIRACOTE MIRAFLEX II SYSTEMS (2012 IBC (miles per hour))^{1,2,3,4}

Height, ft	Zone 1			Zone 2			Zone 3		
	Exp B	Exp C	Exp D	Exp B	Exp C	Exp D	Exp B	Exp C	Exp D
0-15	160	150	140	130	120	110	110	-	-
20	160	150	140	130	115	110	110	-	-
25	160	140	130	130	115	-	110	-	-
30	160	140	130	130	110	-	110	-	-
40	160	140	130	130	110	-	-	-	-
50	150	140	130	120	110	-	-	-	-
60	150	130	130	120	-	-	-	-	-

For SI: 1 ft = 304.8 mm 1 mph = 1.6 kph.

¹The values are based on roofs with slopes not exceeding 7 degrees from horizontal, and the following conditions:

G_{Cp} = 2.8 for Zone 3

G_{cp} = 1.8 for Zone 2

G_{cp} = 1.0 for Zone 1

G_{cpi} = +/0.18

²Applicable for Risk Category II buildings, for a given location, the tabulated values must exceed that shown in the 2012 IBC Figure 1609A.

³Zones 1, 2 and 3 are defined in IBC, IRC, and ASCE 7-10.

⁴For a given location, the tabulated values multiplied by a factor of $\sqrt{0.6}$ must not exceed that shown in the 2012 IRC wind speed map.

**TABLE 4—MAXIMUM ALLOWABLE BASIC WIND SPEED FOR MIRACOTE MIRAFLEX II SYSTEMS
(2009 and 2006 IBC, 3-sec gust (miles per hour)^{1,2,3}**

Height, ft	Zone 1			Zone 2			Zone 3		
	Exp B	Exp C	Exp D	Exp B	Exp C	Exp D	Exp B	Exp C	Exp D
0-15	130	120	110	105	95	85	85	-	-
20	130	120	110	105	90	85	85	-	-
25	130	110	100	105	90	-	85	-	-
30	130	110	100	105	85	-	85	-	-
40	130	110	100	100	85	-	-	-	-
50	120	110	100	95	85	-	-	-	-
60	120	100	100	95	-	-	-	-	-

For **SI**: 1 ft = 304.8 mm 1 mph = 1.6 kph.

¹The values are based on roofs with slopes not exceeding 7 degrees from horizontal, and the following conditions:

- I = 1.0
- G_{Cp} = 2.8 for Zone 3
- G_{Cp} = 1.8 for Zone 2
- G_{cp} = 1.0 for Zone 1
- G_{cpj} = ±/0.18

²For a given location, the tabulated values must exceed that shown in the 2009 and 2006 IBC/IRC wind speed maps.

³Zones 1, 2 and 3 are defined in IBC, IRC, and ASCE 7-05.