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DIVISION: 07—THERMAL AND MOISTURE PROTECTION
Section: 07180—Traffic Coatings

REPORT HOLDER:

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EVALUATION SUBJECT:

MIRACOTE MIRAFLEX II WALKING DECK AND ROOF COVERING

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)
- 1997 *Uniform Building Code*™ (UBC)

Properties evaluated:

- Durability
- Wind resistance
- Fire classification
- Fire resistance

2.0 USES

The Miracote Miraflex II System is a walking deck and Class A roof covering system for use directly over concrete and plywood substrates. The system is also used as a component of a one-hour fire-resistance-rated roof assembly as described in Section 4.13 of this report.

3.0 DESCRIPTION

3.1 General:

Miracote Miraflex II is a polymer-modified, cementitious walking deck and roof covering system that consists of expanded metal lath; polymer-modified cementitious mortar base coat; a polymeric waterproofing layer; reinforcing fabric; a protection coat; an acrylic topcoat; and a sealer coat. See Section 4.0 and Tables 1 and 2 for recognized Miraflex II configurations and corresponding component requirements.

3.2 Materials:

3.2.1 General: Miracote Miraflex II 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 shall be kept from freezing.

3.2.2 Base Coat Components:

3.2.2.1 Repair Mortar I Powder: A proprietary dry mixture of portland cement and graded aggregates supplied in 75-pound (34.0 kg) bags.

3.2.2.2 Repair Mortar II Powder: A proprietary dry mixture of portland cement and graded aggregates supplied in 40-pound (18.2 kg) bags.

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

3.2.2.4 Repair Mortars I, II and III Liquid: Liquid polymers designed to be mixed with their respective Repair Mortar Powders, supplied in 5-gallon (18.9 L) containers.

3.2.3 Waterproofing Layer Components:

3.2.3.1 Primer Laminating Resin: A waterborne, pigmented, acrylic laminating resin designed to be used with glass fiber mat, supplied in 5-gallon (18.9 L) containers.

3.2.3.2 Glass Fiber Mat: Glass fiber mat shall be a 0.75-ounce-per-square-foot (228 g/m^2) chopped strand glass fiber mat.

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

3.2.4 Protection Layer Components:

3.2.4.1 Miraflex Decking Body Coat II: A liquid polymer with graded aggregates blended in, supplied in 5-gallon (18.9 L) containers.

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

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

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

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

3.2.5 Topcoat Components:

3.2.5.1 Miraflex Decking Sealer III: A waterborne, pigmented, acrylic topcoat supplied in 5-gallon (18.9 L) containers.

3.2.5.2 Miracote Color Bond: A water-borne, pigmented, acrylic topcoat supplied in 5-gallon (18.9 L) containers.

3.2.6 Sealer Coat Components:

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

3.2.6.2 Miracote Miraseal: A waterborne, clear, acrylic sealer supplied in 5-gallon (18.9 L) containers.

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

3.2.8 Substrates:

3.2.8.1 Plywood: Plywood shall be a minimum $^5/_8$-inch-thick (15.9 mm) exterior-grade plywood complying with US DOC PS-1 or PS-2 (UBC Standard 23-2 or 23-3).

3.2.8.2 Concrete: Concrete decks shall comply with the applicable requirements of the applicable code and shall have a minimum compressive strength (f'_c) of 2500 psi (17.2 MPa) for areas adopting the IBC and IRC, or 2000 psi (13.8 MPa) for areas adopting the UBC.

3.2.9 Metal Lath: Metal lath shall be a minimum 1.8-pound-per-square-yard (1.0 kg/m^2), galvanized, expanded metal lath, complying with ASTM C 847.

3.2.10 Staples: Staples shall be corrosion-resistant, minimum No. 16 gage staples with minimum 1-inch-wide (25.4 mm) crowns and $^1/_2$-inch-long (12.7 mm) legs, complying with ASTM F 1667.

4.0 INSTALLATION

4.1 General:

Installation of the Miracote Miraflex II system shall be in accordance with the manufacturer's published installation instructions, the applicable code and this report. The manufacturer's installation instructions shall be available on the jobsite during application. Installation shall 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 shall not be applied if precipitation is occurring or expected.

Substrates shall be structurally sound, clean and dry, and shall be sloped a minimum of $^1/_4$ inch per foot (2% slope).

4.2 Preparation of Substrates:

4.2.1 Plywood: Plywood shall be applied to framing in accordance with the requirements of the applicable code. All edges shall be blocked. All penetrations through and terminations of the sheathing shall 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 shall be clean and free of standing water. All holes, joints and cracks shall 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 shall be removed by mechanical means. New concrete shall be mechanically scarified prior to application of the system.

4.3 System I (Installation over Plywood):

4.3.1 Metal Lath: Metal lath, as described in Section 3.2.3 of this report, shall be fastened to the plywood deck with 22 to 28 staples per square foot (0.09 m^2), uniformly distributed. Where the lath is butt-jointed, the staple spacing at the joint shall be no greater than 2 inches (51 mm) on center. Butt joints of metal lath shall 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: One gallon (3.8 L) of Repair Mortar I Liquid shall be mixed with one 75-pound (34.0 kg) bag of Repair Mortar I Powder. Coverage shall be approximately 30 square feet (2.8 m^2) per batch at a minimum thickness of $^3/_{16}$ inch (4.8 mm). The mixture shall be trowel-applied to completely fill and cover the metal lath to a minimum total thickness of $^3/_{16}$ inch (4.8 mm). Working time of the mixed batch is approximately 30 minutes. The base coat shall be allowed to cure a minimum of eight hours before application of the waterproofing layer.

4.3.3 Waterproofing Layer: Primer Laminating Resin shall be trowel- or roller-applied over the base coat at a rate of 1 gallon per 400 square feet (1 L/9.8 m^2), then the glass fiber mat shall be embedded in the resin. A second coat of resin shall then be applied over the glass fiber mat at a rate of 1 gallon per 50 square feet (1L/1.2 m^2), completely saturating the mat. The coating shall be allowed to cure for a minimum of 8 hours before application of the protection coat.

4.3.4 Protection Coat: Miraflex Decking Body Coat II shall be applied over the waterproofing layer by texturing hopper gun at a rate of one gallon per 75 square feet (1 L/1.8 m^2), to a minimum wet film thickness of 0.021 inch [21 mils (0.53 mm)]. The coating shall be allowed to cure for a minimum of eight hours before application of the topcoat.

4.3.5 Topcoat: Miraflex Decking Sealer III shall be roller-applied over the protection coat at a rate of 1 gallon per 175 square feet (1 L/4.3 m^2), to a minimum wet film thickness of 0.009 inch [9 mils (0.23 mm)]. The coating shall be allowed to cure for a minimum of eight hours before application of the sealer (when used), or 12 to 24 hours before traffic is allowed on the coating.

4.3.6 Sealer (Optional): Two coats of Miracote Miraseal sealer are roller-applied over the topcoat at a rate of 1 gallon per 500 square feet (1 L/12.3 m^2), to a minimum wet film thickness of 0.0064 inch [6.4 mils (0.16 mm)] for each coat. The first coat shall be allowed to dry for a minimum of 30 minutes before application of the second coat. After application of the second coat, the coating shall be allowed to dry for 12 to 24 hours before traffic is allowed on the coating.

4.4 System III and System IV (Installation over Plywood):

4.4.1 Metal Lath: As described in Section 4.3.1 of this report.

4.4.2 Base Coat: One of the following shall be used:

- One gallon (3.8 L) of Repair Mortar I Liquid mixed with one 75-pound (34.0 kg) bag of Repair Mortar I Powder. Coverage shall be approximately 30 square feet (2.8 m^2) per batch at a minimum thickness of $^3/_{16}$ inch (4.8 mm).
- One gallon (3.8 L) of Repair Mortar II Liquid mixed with one 40-pound (18.2 kg) bag of Repair Mortar II Powder. Coverage shall be approximately 25 square feet (2.3 m^2) per batch at a minimum thickness of $^3/_{16}$ inch (4.8 mm).
- One gallon (3.8 L) of Repair Mortar III Liquid mixed with one 36-pound (16.4 kg) bag of Repair Mortar III Powder. Coverage shall be approximately 23 square feet (2.1 m^2) per batch at a minimum thickness of $^3/_{16}$ inch (4.8 mm).

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

4.4.3 Waterproofing Layer: Membrane A shall be mixed with water at a ratio of 1:1 by volume, and the first coat shall be roller-applied over the base coat at a rate of 1 gallon per 400 square feet (1 L/9.8 m^2). Two additional coats of Membrane A (undiluted) shall be applied with a $^1/_8$-inch (3.2 mm) V-notched trowel, at a rate of 1 gallon per 64 square feet (1 L/1.6 m^2), for a minimum total dry-film thickness of 0.025 inch [25 mils (0.64 mm) for each coat. Each coat shall be allowed to dry to the touch before the next coat is applied [approximately one hour at 70°F (21.0°C)]. The final coat shall be allowed to cure for a minimum of four hours before application of the protection coat.

4.4.4 Protection Coat: Five gallons (18.9 L) of Miracote Liquid Catalyst shall be mixed with two 55-pound (25.0 kg) bags of Miracote Protective Coating. Two coats of the protection coat shall 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 m^2), for a minimum wet-film thickness of 0.039 inch [39 mils (0.99 mm)] for each coat. The first coat shall be allowed to dry for four to six hours before the application of the second coat. The second coat shall be allowed to cure for a minimum of eight hours before application of the topcoat.

4.4.5 Topcoat: Two coats of Miracote Color Bond shall be roller-applied over the protection coat at a rate of 1 gallon per 300 square feet (1 L/7.4 m^2), for a minimum wet-film thickness of 0.011 inch [11 mils (0.28 mm)] for each coat. The first coat shall be allowed to dry for approximately one hour before application of the second coat. The second coat shall be allowed to cure for a minimum of eight hours before application of the sealer.

4.4.6 Sealer (Required): One of the following shall be used:

- Two coats of Miracote HD II Sealer, roller-applied over the top coat at a rate of 1 gallon per 600 square feet (1 L/14.7 m^2), for a minimum wet-film thickness of 0.0053 inch [5.3 mils (0.13 mm)] for each coat.
- Two coats of Miracote Miraseal sealer, roller-applied over the top coat at a rate of 1 gallon per 500 square feet (1 L/12.3 m^2), for a minimum wet-film thickness of 0.0064 inch [6.4 mils (0.16 mm)] for each coat.

For both sealers, the first coat shall be allowed to dry for a minimum of 30 minutes before application of the second coat. After application of the second coat, the coating shall be allowed to dry for 12 to 24 hours before traffic is allowed on the coating.

4.5 System V (Installation over Plywood):

4.5.1 Metal Lath: As described in Section 4.3.1 of this report.

4.5.2 Base Coat: As described in Section 4.4.2.

4.5.3 Waterproofing Layer: As described in Section 4.4.3.

4.5.4 Protection Coat: As described in Section 4.4.4.

4.5.5 Sealer: As described in Section 4.4.6.

4.6 System VI (Installation over Plywood):

4.6.1 Metal Lath: As described in Section 4.3.1 of this report.

4.6.2 Base Coat: As described in Section 4.4.2.

4.6.3 Waterproofing Layer: As described in Section 4.4.3.

4.6.4 Protection Coat: One gallon (3.8 L) of Mirastamp Liquid Catalyst shall be mixed with one 45-pound (20.5 kg) bag of Mirastamp Powder, and shall be trowel-applied over the waterproofing layer at a rate of 18 square feet (1.7 m^2) per batch, for a minimum thickness of $^1/_4$ inch (6.4 mm); or at a rate of 13.5 square feet (1.25 m^2) per batch, for a minimum thickness of $^3/_8$ inch (9.5 mm); or at a rate of 9 square feet (0.84 m^2) per batch, for a minimum thickness of $^1/_2$ inch (12.7 mm). The coating shall be allowed to cure for a minimum of 12 hours before application of the sealer.

4.6.5 Sealer: As described in Section 4.4.6.

4.7 System VII and System VIII (Installation over Concrete):

Application of the waterproofing layer, protection coat, topcoat and sealer shall be as described in Sections 4.4.3, 4.4.4, 4.4.5 and 4.4.6, respectively.

4.8 System IX (Installation over Concrete):

Application of the waterproofing layer, protection coat, and sealer shall be as described in Sections 4.4.3, 4.4.4 and 4.4.6, respectively.

4.9 System X (Installation over Concrete):

Application of the waterproofing layer, protection coat, and sealer shall be as described in Sections 4.4.3, 4.6.4 and 4.4.6, respectively.

4.10 Method of Repair:

The damaged area shall be removed and replaced as for new installation, as described in Section 4.3, 4.4, 4.5, 4.6, 4.7, 4.8 or 4.9. When substrate damage occurs, the retention of the fire-resistance rating and strength properties shall be investigated and the results submitted to the code official.

4.11 Wind Resistance:

Installation shall be limited to areas where the maximum basic wind speed, building height and exposure comply with Table 3 of this report.

4.12 Class A Roof Covering Construction:

When Miraflex II 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).

4.13 One-hour Fire-resistance-rated Construction:

The deck systems described in Sections 4.3, 4.4, 4.5 or 4.6 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 720.1(3) of the IBC (Assembly 13 of Table 7-C of the UBC).

5.0 CONDITIONS OF USE

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

5.1 Installation shall 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 shall govern.

5.2 Installation shall 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 R.I. Ogawa & Associates, Inc. (AA-705).

6.0 EVIDENCE SUBMITTED

6.1 Manufacturer's published installation instructions.

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Walking Decks (AC39), dated March 2000 (editorially revised October 2004).

6.3 Report of wind resistance testing in accordance with FM Standard 1-52.

6.4 A quality control manual.

7.0 IDENTIFICATION

Each container or bag of the Miracote Miraflex II Walking Deck and Roof Covering components described in this report shall 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, evaluation report number (ESR-1714) and the name of the inspection agency (RI Ogawa & Associates, Inc.).

TABLE 1—MIRACOTE MIRAFLEX II SYSTEMS APPLIED OVER PLYWOOD DECKS

COMPONENT	SYSTEM I	SYSTEM III	SYSTEM IV	SYSTEM V	SYSTEM VI
Lath fastener	Staples	Staples	Staples	Staples	Staples
Expanded lath	1.75 lb/yd^2	1.75 lb/yd^2	1.75 lb/yd^2	1.75 lb/yd^2	1.75 lb/yd^2
Base coat	RM I	RM I, II or III	RM I, II or III	RM I, II or III	RM I, II or III
Waterproofing	Primer Laminating Resin	Membrane A	Membrane A	Membrane A	Membrane A
Reinforcing fabric	Fiberglass Mat	NA	NA	NA	NA
Protection coat	Body Coat II	Miracote Protective Coating	Miracote Protective Coating	Miracote Protective Coating	Miracote Protective Coating
Topcoat	Decking Sealer III	Miracote Colorbond	Miracote Colorbond	NA	NA
Sealer	Miraseal (optional)	HD II or Miraseal	HD II or Miraseal	HD II or Miraseal	HD II or Miraseal

For **SI:** 1 lb/yd^2 = 0.537 kg/m^2.
NA: Not applicable
RM: Repair Mortar

TABLE 2—MIRACOTE MIRAFLEX II SYSTEMS APPLIED OVER CONCRETE DECKS

COMPONENT	SYSTEM VII	SYSTEM VIII	SYSTEM IX	SYSTEM X
Waterproofing	Membrane A	Membrane A	Membrane A	Membrane A
Protection coat	Miracote Protective Coating	Miracote Protective Coating	Miracote Protective Coating	Mirastamp
Topcoat	Miracote Colorbond	Miracote Colorbond	NA	NA
Sealer	HD II or Miraseal	HD II or Miraseal	HD II or Miraseal	HD II or Miraseal

NA: Not applicable.

TABLE 3—MAXIMUM ALLOWABLE WIND SPEED FOR MIRACOTE MIRAFLEX II SYSTEMS[1]

HEIGHT OF BUILDING (feet)	IBC[2]		UBC[2]	
	Exposure B	Exposure C	Exposure B	Exposure C
	$V_{3\text{-sec}}$	$V_{3\text{-sec}}$	V_{fm}	V_{fm}
0-15	130	120	120	90
20	130	120	120	90
30	130	110	110	90
40	130	110	100	85
60	120	100	100	80

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

[1]The above values are based on roofs with slopes not exceeding 7 degrees, and the following conditions:

I = 1.0
GP_p = 2.8 for Zone 3
G_{cp} = 1.6 for Zone 2
G_{cp} = 1.0 for Zone 1
G_{cpi} = $^+/_-$0.18
$V_{3\text{-sec}}$ = Wind speed, 3-second gust
V_{fm} = Wind speed, fastest mile

[2]Wind speed in miles/hour