

# ICC-ES Evaluation Report

**ESR-1463**

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This report also contains:

- CBC Supplement

- LABC Supplement

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<p><b>DIVISION: 07 00 00 — THERMAL MOISTURE AND PROTECTION</b></p> <p><b>Section: 07 53 23 — Ethylene-Propylene-Diene-Monomer Roofing</b></p> <p><b>Section: 07 54 19 – Polyvinyl- Chloride Roofing</b></p> <p><b>Section: 07 54 23 — Thermoplastic-Polyolefin Roofing</b></p>	<p><b>REPORT HOLDER:</b>  <b>CARLISLE SYNTEC SYSTEMS, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC</b></p> <p><b>ADDITIONAL LISTEE:</b>  <b>MULE-HIDE PRODUCTS COMPANY, INC.</b></p> <p><b>VERSICO, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC</b></p> <p><b>WEATHERBOND, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC.</b></p> <p><b>ROOFING PRODUCTS INTERNATIONAL, INC.</b></p>	<p><b>EVALUATION SUBJECT:</b>  <b>CARLISLE EPDM, PVC AND TPO SINGLE-PLY ROOFING MEMBRANES</b></p>	
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## 1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015, 2012 and 2009 [International Building Code® \(IBC\)](#)
- 2021, 2018, 2015, 2012 and 2009 [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.

For evaluation for compliance with codes adopted by the [Los Angeles Department of Building and Safety \(LADBS\)](#), see [ESR-1463 LABC and LARC Supplement](#).

**Properties evaluated:**

- Weather resistance
- Roof covering fire classification
- Wind uplift resistance
- Impact resistance

## 2.0 USES

Carlisle ethylene propylene diene monomer (EPDM), polyvinyl chloride (PVC) and thermoplastic polyolefin (TPO) single-ply roofing membranes are used as roof coverings in adhered and mechanically fastened membrane roofing systems.

## 3.0 DESCRIPTION

### 3.1 General:

The EPDM, PVC and TPO Membrane Roofing Systems described in this report consist of single-ply roofing membranes, insulation where used, barrier board or slip sheet where used, flashing, mechanical fasteners and adhesives that are installed on a combustible or noncombustible deck. See [Table 1](#) for Carlisle product trade names and corresponding product names for Mule-Hide Products Company, Inc., WeatherBond, Versico, and Roofing Products International, Inc., the additional listees.

### 3.2 EPDM Membranes:

**3.2.1 Sure-Seal EPDM Membrane:** Sure-Seal EPDM Membrane is a black, nonreinforced EPDM membrane, 45 mils thick [0.045 inch (1.14 mm)].

**3.2.2 Sure-Seal FR EPDM Membrane:** Sure-Seal FR EPDM Membrane is a black, nonreinforced EPDM membrane with fire retardants. Available thicknesses range from 45 mils (0.045 inch [1.14 mm]) to 90 mils (0.090 inch [2.29 mm]).

**3.2.3 Sure-White EPDM Membrane:** Sure-White EPDM Membrane is a white, nonreinforced EPDM membrane. Available in thicknesses of 60 mils [0.060 inch (1.52 mm)] and 90 mils [0.090 inch (2.29 mm)].

**3.2.4 Sure-White Reinforced EPDM Membrane:** Sure-White Reinforced EPDM Membrane is a white, reinforced EPDM membrane. Available in a thickness of 60 mils [0.60 inch (1.52 mm)].

**3.2.5 Sure-Tough EPDM Membrane:** Sure-Tough EPDM Membrane is a black, reinforced membrane consisting of a polyester reinforcement encapsulated between two EPDM membrane plies. Available in thicknesses ranging from 45 mils [0.045 inch (1.14 mm)] to 75 mils [0.075 inch (1.90 mm)].

**3.2.6 Sure-Seal FleeceBACK EPDM Membrane:** Sure-Seal FleeceBACK EPDM Membrane is a 45-mil to 90-mil [0.045 inch to 0.090 inch (1.14 mm to 2.29 mm)] non-reinforced EPDM bonded to a polyester fleece. Available product thicknesses range from 100 mils [0.100 inch (2.55 mm)] to 145 mils [0.145 inch (3.68 mm)].

**3.2.7 Sure-White FleeceBACK EPDM Membrane:** Sure-White FleeceBACK EPDM Membrane is a 45-, 60- or 90-mil [0.045, 0.060 or 0.090 inch (1.14, 1.52 or 2.29 mm)] nonreinforced white EPDM bonded to a polyester fleece. Available product thicknesses are 100, 115 and 145 mils [0.100, 0.115 or 0.145 inch (2.54, 2.92 or 3.68 mm)].

**3.2.8 Sure-Seal AFX EPDM Membrane:** Sure-Seal AFX EPDM Membrane is a 45-mil [0.045 inch (1.14 mm)] or 60-mil [0.060 inch (1.52 mm)] non-reinforced EPDM bonded to a polyester fleece. Available thicknesses are 90 mils [0.090 inch (2.29 mm)] and 105 mils [0.105 inch (2.67 mm)].

### 3.3 PVC Membranes:

**3.3.1 Sure-Flex PVC Membrane:** Sure-Flex PVC Membrane is a heat-weldable PVC thermoplastic membrane consisting of a weft-inserted polyester fabric that is encapsulated by PVC based top and bottom plies. Available thicknesses range from 50 mils [0.050 inch (1.27 mm)] to 80 mils [0.080 inch (2.03 mm)].

**3.3.2 Sure-Flex KEE HP Membrane:** Sure-Flex KEE HP Membrane is a heat-weldable thermoplastic membrane that consists of a polyester fabric that is encapsulated by KEE HP based top and bottom plies. Available thicknesses range from 50 mils [0.50 inch (1.27 mm)] to 80 mils [0.80 inch (2.03 mm)].

**3.3.3 Sure-Flex PVC FRS Membrane:** Sure-Flex PVC FRS Membrane is a heat-weldable thermoplastic membrane that consists of a fiberglass reinforcement encapsulated with PVC based top and bottom plies. Available thicknesses range from 60 mils [0.60 inch (1.52 mm)] to 80 mils [0.80 inch (2.03 mm)].

**3.3.4 Sure-Flex PVC FleeceBACK Membrane:** Sure-Flex PVC FleeceBACK Membrane consists of polyester reinforcing scrim and polyester fleece backing. Available thicknesses range from 115 mils [0.115 inch (2.92 mm)] to 135 mils [0.135 inch (3.43 mm)].

**3.3.5 Sure-Flex KEE HP FleeceBACK Membrane:** Sure-Flex KEE HP FleeceBACK Membrane consists of a polyester reinforcing scrim, polyester fleece backing, and DuPont<sup>®</sup> Elvaloy<sup>®</sup> KEE HP copolymer. Available thicknesses range from 105 mils [0.105 inch (2.67 mm)] to 135 mils [0.135 inch (3.43 mm)].

**3.3.6 Sure-Flex PVC FRS FleeceBACK Membrane:** Sure-Flex PVC FRS FleeceBACK Membrane consists of a high-strength fiberglass scrim and polyester fleece backing. Available thicknesses range from 115 mils [0.115 inch (2.92 mm)] to 135 mils [0.135 inch (3.43 mm)].

**3.3.7 Sure-Flex KEE HP FRS FleeceBACK Membrane:** Sure-Flex KEE HP FRS FleeceBACK Membrane consists of a fiberglass reinforcing scrim, polyester fleece backing, and DuPont<sup>®</sup> Elvaloy<sup>®</sup> KEE HP copolymer. Available thicknesses range from 105 mils [0.105 inch (2.67 mm)] to 135 mils [0.135 inch (3.43 mm)].

### 3.4 TPO Membranes:

**3.4.1 Sure-Weld TPO Membrane:** Sure-Weld TPO Membrane consists of a polyester reinforcement encapsulated between two plies of TPO. The membrane is available in white, gray, tan and custom colors. Available thicknesses range from 45 mils [0.045 inch (1.14 mm)] to 60 mils [0.060 inch (1.52 mm)].

**3.4.2 Sure-Weld EXTRA TPO Membrane:** Sure-Weld EXTRA TPO Membrane is a thicker version of the Sure-Weld TPO Membrane specified in Section 3.4.1 for increased strength and weatherability. The membrane is available in white, gray, tan and custom colors. Available in a thickness of 80 mils (0.080 inch [2.03 mm]).

**3.4.3 Sure-Weld HS TPO Membrane:** Sure-Weld HS TPO Membrane is the Sure-Weld membrane formulated with an additional flame retardant for fire resistance at higher slopes. The membrane is available in white, gray, tan and custom colors. Available thicknesses are 45 mils (0.045 inch [1.14 mm]) and 60 mils (0.060 inch [1.52 mm]).

**3.4.4 Sure-Weld SAT-TPO Membrane:** Sure-Weld SAT-TPO Membrane is a self-adhered version of the Sure-Weld HS TPO membrane with adhesive.

**3.4.5 Sure-Weld FleeceBACK TPO Membrane:** Sure-Weld FleeceBACK TPO Membrane is the Sure-Weld HS TPO Membrane, 45 mils [0.045 inch (1.14 mm)], 60 mils [0.60 inch (1.52 mm)] and 80 mils [0.60 inch (2.03 mm)] thick, with a laminated polyester fleece backing. Available thicknesses are 100 mils [0.100 inch (2.54 mm)], 115 mils [0.115 inch (2.92 mm)] and 135 mils [0.135 inch (3.43 mm)].

**3.4.6 Sure-Weld AFX TPO Membrane:** Sure-Weld AFX TPO Membrane is the Sure-Weld HS TPO Membrane with a laminated polyester fleece backing. Available thicknesses range from 120 mils [0.120 inch (3.05 mm)] to 155 mils [0.155 inch (3.94 mm)].

**3.4.7 Spectro-Weld TPO Membrane:** Spectro-Weld TPO Membrane is the Sure-Weld membrane, described in Section 3.4.1, formulated with a brighter white color. Available thicknesses are 60 mils [0.060 inch (1.52 mm)] and 80 mils [0.080 inch (2.03 mm)].

**3.4.8 Spectro-Weld FleeceBACK TPO Membrane:** Spectro-Weld FleeceBACK TPO Membrane is the Spectro-Weld membrane with a laminated 5.5-ounce-per-square-yard (0.18 kg/m<sup>2</sup>) polyester fleece backing. Available in a thickness of 115 mils [0.115 inch (2.92 mm)].

### 3.5 Insulation:

See [Tables 2](#) through [5](#) for insulations for use with specific roofing systems. Insulation must comply with IBC Section 1508.2 or IRC Section R906.2, as applicable. Foam plastic insulation, where used, must have a flame-spread index of not more than 75 when tested at the maximum thickness intended for use in accordance with ASTM E84 or UL 723.

### 3.6 Barrier Board:

Barrier board, where used, must be either minimum 1/4-inch-thick (6.4 mm) Georgia-Pacific Gypsum LLC “DensDeck® Roofboard” or “DensDeck Prime® Roofboard,” minimum 1/4-inch-thick (6.4 mm) Owens Corning “StrataGuard,” minimum 1/4-inch-thick (6.4 mm) USG Corporation “SECUROCK® Gypsum-Fiber Roof Board” or “SECUROCK® Glass-Mat Roof Board,” or minimum 1/2-inch-thick (12.7 mm) gypsum board. Barrier board must be UL-classified for roofing applications or UL-classified gypsum board.

### 3.7 Slip Sheet:

The slip sheet, where used, must include Carlisle “FR Base Sheet 1S or 2S,” GAF “VersaShield® Fire-Resistant Roof Deck Protection ([ESR-2053](#))” or Atlas “FR 10 or FR 50.” Slip sheets must be UL-classified for roofing applications.

### 3.8 Flashing:

Flashing must be provided in accordance with IBC Section 1503.2 or IRC Section R903.2, as applicable. Where flashing is of metal, the metal must be corrosion-resistant, minimum No. 26 gage [0.019 inch (0.483 mm)] galvanized steel.

### 3.9 Fasteners:

Fasteners, used to mechanically attach insulation and membranes to the roof deck, must be corrosion-resistant, and must be Carlisle fasteners, plates or fastening bars, unless otherwise noted in this report. Refer to [Table 4](#) and [5](#) for spacing of fasteners.

**3.9.1 HP Fastener:** This is an epoxy-coated steel screw used in combination with Carlisle’s fastening plates or bars to mechanically attach roofing insulation and membranes to steel or wood substrate. Fastener length must be selected to penetrate through the steel deck a minimum of 3/4 inch (19.1 mm), and into the wood deck a minimum of 1 inch (25.4 mm).

**3.9.2 InsulFast Insulation Fastener:** This is an epoxy-coated steel screw used in combination with Carlisle's insulation plates to mechanically attach roofing insulation to steel or wood substrates. Fastener length must be selected to penetrate through the steel deck a minimum of  $\frac{3}{4}$  inch (19.1 mm), or into the wood deck a minimum of 1 inch (25.4 mm).

**3.9.3 HP Purlin Fastener:** This is an epoxy-coated steel screw used in combination with Carlisle's fastening plates or bars to mechanically attach roofing insulation and membranes to structural steel members. Fastener length must be selected to penetrate through the steel member a minimum of  $\frac{3}{4}$  inch (19.1 mm.)

**3.9.4 HD 14-10 Fastener:** This is a heavy-duty, epoxy-coated steel screw used in combination with Carlisle's fastening plates or bars to mechanically attach roofing insulation and membranes to concrete roof deck. Fastener length must be selected to penetrate into the concrete deck a minimum of 1 inch (25.4 mm).

**3.9.5 CD-10 Fastener:** The CD-10 is an epoxy-coated, hammer-driven, nonthreaded fastener specifically designed to be used with insulation and seam fastening plates to secure membrane and insulation to structural concrete. Fastener length must be selected to penetrate into the concrete deck a minimum of 1 inch (25.4 mm).

**3.9.6 Lite-Deck Fastener:** The Lite-Deck Fastener is used in conjunction with a specially designed 3-inch (76.2 mm) Lite-Deck Metal Plate for insulation attachment to gypsum, cementitious wood fiber (Tectum [\[ESR-1112\]](#)), and lightweight concrete decks. Fastener length must be selected to penetrate into the deck a minimum of 2 inches (50.8 mm).

**3.9.7 GypTec Fastener:** The GypTec Fastener is a glass-filled nylon auger fastener designed for securing mechanically attached membranes and insulation to gypsum and cementitious wood fiber (Tectum [\[ESR-1112\]](#)) decks. Fastener length must be selected to penetrate into the deck a minimum of 1.5 inches (38.1 mm).

**3.9.8 HP Polymer Seam Plate:** This is a 2-inch-diameter (50 mm) polymer plate designed to be used with HP and HD 14-10 fasteners to mechanically attach roofing membranes to the roof deck.

**3.9.9 Sure-Tite Fastener and ST Fastening Bar:** This is a heavy-duty, epoxy-coated steel screw and bar used to secure reinforced EPDM membranes to steel or wood deck. The bar is 1-inch-wide-by-0.040-inch-thick-by-10-foot-long (25.4 mm by 1.1 mm by 3.1 m) galvalume-coated steel with pre-punched holes 6 inches (150 mm) on center.

**3.9.10 HP-X Fastener:** This is an epoxy-coated carbon steel screw used in combination with the Piranha Fastening Plate to mechanically attach TPO membranes to steel or wood substrate. Fastener length must be selected to penetrate through the steel deck a minimum of  $\frac{3}{4}$  inch (19.1 mm), and into the wood deck a minimum of 1 inch (25.4 mm).

**3.9.11 Piranha Fastening Plate:** This is a  $2\frac{3}{8}$ -inch-diameter galvalume-coated steel plate designed to be used with HP-X fasteners to mechanically attach PVC and TPO membranes to the roof deck.

**3.9.12 HP-XTRA Fastener:** This is an epoxy-coated carbon steel screw used in combination with the Piranha XTRA Fastening Plate to mechanically attach PVC and TPO membranes to steel or wood substrate. Fastener length must be selected to penetrate through the steel deck a minimum of  $\frac{3}{4}$  inch (19.1 mm) and into the wood deck a minimum of 1 inch (25.4 mm).

**3.9.13 Piranha XTRA Fastening Plate:** This is a  $2\frac{3}{8}$ -inch-diameter galvalume-coated steel plate designed to be used with HP-XTRA fasteners to mechanically attach PVC and TPO membranes to the roof deck.

**3.9.14 PVC Oval Barbed Plate:** This is a  $1\frac{1}{2}$ -inch-by- $2\frac{3}{4}$ -inch (35 mm by 69.85 mm) Oval Barbed Plate designed to be used with HP-X Fasteners to mechanically attach PVC membranes to the roof deck.

**3.9.15 OMG Roofing Products RhinoBond Plate:** The RhinoBond Plate is a 3-inch-diameter (76.2 mm), 0.028-inch-thick (0.7 mm) galvalume-coated steel plate, coated with a proprietary adhesive and used with the HP-X fastener to mechanically attach PVC and TPO membranes to the roof deck. The adhesive bonds the plate to the underside of the membrane.

**3.10 Carlisle SynTec Adhesives:** See [Tables 2](#) and [5](#) for adhered roofing systems.

**3.10.1 90-8-30A Bonding Adhesive:** 90-8-30A Bonding Adhesive is a high-strength, solvent-based contact adhesive used to adhere EPDM membranes to the insulation or substrate. It has a coverage rate of approximately 60 square feet per gallon (1.5 m<sup>2</sup>/L) when applied to the finished surface area. The adhesive is supplied in 5-gallon (18.9 L) containers and has a shelf life of one year.

**3.10.2 Aqua Base 120 Bonding Adhesive:** Aqua Base 120 Bonding Adhesive is a high-strength, water-based contact adhesive used to adhere EPDM and TPO membranes to the insulation or substrate. It has a coverage rate of approximately 120 square feet per gallon (3 m<sup>2</sup>/L) when applied to the finished surface area. The adhesive is supplied in 5-gallon (18.9 L) containers and has a shelf life of one year.

**3.10.3 Low-VOC PVC Bonding Adhesives:** Low VOC PVC Bonding Adhesives is high-strength, solvent-based contact adhesives used to adhere PVC membranes to an insulation or substrate. They have a coverage rate of approximately 60 square feet per gallon (1.5 m<sup>2</sup>/L) when applied to the finished surface area. The adhesive is supplied in 5-gallon (18.9 L) containers with a shelf life of one year.

**3.10.4 Sure-Weld TPO Bonding Adhesive:** Sure-Weld TPO Bonding Adhesive is a high-strength, solvent-based contact adhesive used to adhere TPO membranes to an insulation or substrate. It has a coverage rate of approximately 60 square feet per gallon (1.5 m<sup>2</sup>/L) when applied to the finished surface area. The adhesive is supplied in 5-gallon (18.9 L) containers with a shelf life of one year.

**3.10.5 Low VOC Bonding Adhesive:** Low VOC Bonding Adhesive is a high-strength, solvent-based contact adhesive used to adhere EPDM and TPO membranes to an insulation or substrate. It has a coverage rate of approximately 60 square feet per gallon (1.5 m<sup>2</sup>/L) when applied to the finished surface area. The adhesive is supplied in 5-gallon (18.9 L) containers with a shelf life of one year.

**3.10.6 HydroBond Water-Based Bonding Adhesive:** HydroBond Water-Based Bonding Adhesive is a water-based, wet lay-in, one-sided adhesive to be used to adhere Sure-Flex PVC, Sure-Flex PVC FRS and FleeceBACK membranes to an insulation or substrate. It has a coverage rate of 100 square feet per gallon (2.5 m<sup>2</sup>/L). The adhesive is supplied in 5-gallon (18.9 L) containers with a shelf life of one year.

**3.10.7 Low VOC Bonding Adhesive 1168:** Low VOC Bonding Adhesive 1168 is high-strength, solvent-based contact adhesive used to adhere EPDM and TPO membranes to an insulation or substrate. It has a coverage rate of approximately 60 square feet per gallon (1.58 m<sup>2</sup>/L) when applied to the finished surface area. The adhesive is supplied in 5-gallon (18.9 L) containers with a shelf life of one year.

**3.10.8 Cold Applied Adhesive:** Cold Applied Adhesive is a solvent-free, asphalt-modified polyether adhesive. This adhesive can be used with all Sure-Seal or Sure-Weld AFX membranes as a one-sided, wet lay-in adhesive. It has a coverage rate of 67 square feet per gallon (1.6 m<sup>2</sup>/L). The adhesive is supplied in 5-gallon (18.9 L) containers with a shelf life of one year.

**3.10.9 Flexible FAST Adhesives:** Flexible FAST Adhesives are two-component polyurethane adhesives used to adhere FleeceBACK membranes and insulations to various substrates. The adhesives have a coverage rate of approximately 100 square feet per gallon (2.5 m<sup>2</sup>/L). The adhesives are supplied in 5-gallon (18.9 L) jugs, 15-gallon (56.7 L) and 50-gallon (189 L) drums, box sets, cartridge tubes, dual tanks, and/or cylinders, and have a shelf life of one year.

**3.10.10 OlyBond 500 Adhesive:** OMG Roofing Products OlyBond 500 Spot Shot and OlyBond 500 BA are two-component polyurethane adhesives used to adhere insulations to various substrates. The adhesives have a coverage rate of approximately 100 square feet per gallon (2.5 m<sup>2</sup>/L). The adhesives are supplied in cartridge tubes and box sets, and have a shelf life of one year.

**3.10.11 EPDM X-23 Low-VOC Bonding Adhesive:** EPDM X-23 Low-VOC Bonding Adhesive is a high strength, solvent-based contact adhesive used to adhere EPDM membranes to an insulation or substrate. It has a coverage rate of approximately 60 square feet per gallon (1.5 m<sup>2</sup>/L) when applied to the finished surface area. The adhesive is supplied in 5-gallon (18.9 L) containers with a shelf life of one year.

**3.10.12 CAV-GRIP III Low-VOC Adhesive/Primer:** CAV-GRIP III Low-VOC Adhesive/Primer is a contact adhesive used to adhere EPDM and TPO membranes to various substrates. It has a coverage rate of 1000 ft<sup>2</sup> per cylinder when applied to the finished surface area. The adhesive is supplied in No. 40 cylinders with a shelf life of one year (unopened).

### 3.11 Impact Resistance:

The EPDM, PVC, and TPO roofing membranes described in this report meet requirements for impact resistance in 2021 IBC Section 1504.8 [2018, 2015, 2012 and 2009 IBC Section 1504.7], based on testing in accordance with Section 4.6 of FM 4470.

## 4.0 INSTALLATION

### 4.1 General:

Installation of the EPDM, PVC, and TPO roofing membranes described in this report must comply with the applicable code, the manufacturer's published installation instructions and this report. The manufacturer's published installation instructions must be available at all times on the jobsite during installation.

The substrate to which the membrane is to be applied must be clean, dry, and free of frost, loose fasteners, and other protrusions or contaminants that will interfere with the adhesion or attachment of the membrane or that will puncture the membrane. All materials must be protected against contact with incompatible materials. Where gypsum board is used as barrier board in the roofing assembly, weather protection must be provided to prevent damage to the gypsum board prior to application of the roofing membrane.

The slope of the roof on which the single-ply membranes are installed must not be more than the maximum slope indicated for the particular assembly as listed in [Tables 2](#) and [3](#).

Penetrations and terminations of the roof covering must be flashed and made weather tight in accordance with the requirements of the membrane manufacturer and the applicable code.

#### 4.2 Fire Classification:

**4.2.1 New Construction:** The adhered and mechanically fastened EPDM, PVC, and TPO single-ply membrane roofing systems, when installed in accordance with this report, are Class A, B or C roof covering systems in accordance with ASTM E108 or UL 790, as noted in [Tables 2](#) and [3](#).

**4.2.2 Reroofing:** The existing deck must be inspected to verify that the structure to be reroofed is structurally sound and adequate to support and secure the roofing membrane. Prior to installation of new roof coverings, inspection by and written approval from the code official having jurisdiction must be required.

Class A, B or C roof covering systems may be installed over existing classified roof covering systems under the following conditions without additional roof classification tests, provided the resulting classification is the lower of the new or existing roofing classification:

- New uninsulated systems installed only over existing uninsulated assemblies.
- New insulated systems installed over existing uninsulated systems only.

#### 4.3 Wind Resistance:

**4.2.3 New Construction:** The allowable wind uplift pressures for the EPDM, PVC, and TPO roofing membranes as parts of roof assemblies are noted in [Tables 4](#) and [5](#).

Metal edge securement systems must be listed in accordance with the 2017 edition of ANSI/SPRI/FM4435 ES-1 and designed and installed for wind loads in accordance with 2021 IBC Section 1504.6 [2018, 2015, 2012 and 2009 IBC Section 1504.5] and IBC Chapter 16.

**4.2.4 Reroofing:** Mechanically anchored systems may be accepted based on the adequacy of anchors penetrating through existing roof coverings into structural substrates. Since the composition and/or condition of any particular existing underlying material may vary widely, roof recovery, or installing the adhered systems over an existing roof covering, without removing the existing roof covering, is outside the scope of this report.

## 5.0 CONDITIONS OF USE:

The single-ply EPDM, PVC, and TPO roofing membranes described in this report comply with, or are 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 must comply with the applicable code, the manufacturer's published installation instructions and this report. The instructions within this report must govern if there are any conflicts between the manufacturer's installation instructions and this report.
- 5.2 The adhered and mechanically fastened single-ply membrane roofing systems must be installed by professional roofing contractors who are trained and approved by the manufacturer.
- 5.3 Foam plastic insulation must be separated from the interior of the building by an approved thermal barrier in accordance with IBC Section 2603.4.1.5 or IRC Section R316.4, as applicable.
- 5.4 Foam plastic insulation, where used, must bear the label of an approved agency indicating that the foam plastic has a flame-spread index of not more than 75 when tested at the maximum thickness intended for use in accordance with ASTM E84 or UL 723, subject to the approval of the code official.
- 5.5 Design wind uplift pressure on any roof area, including edge and corner zones, must not exceed the allowable wind uplift pressure for the system installed in that particular area. Refer to allowable wind uplift pressures for systems as listed in [Tables 4](#) and [5](#).
- 5.6 The allowable wind uplift pressures listed in [Tables 4](#) and [5](#) are for the roof covering system only. The deck and framing to which the system is attached must be designed for the applicable components and cladding wind loads in accordance with the applicable code.
- 5.7 When application is over existing roofs, documentation of the wind-uplift resistance of the composite roof construction must be submitted to the code official for approval at the time of permit application.
- 5.8 For buildings under the IBC, above deck thermal insulation board must comply with the applicable standards listed in IBC Table 1508.2 or IRC Table R906.2, as applicable.
- 5.9 The roofing membranes are manufactured at Carlisle, Pennsylvania; Greenville, Illinois; Tooele, Utah; and Senatobia, Mississippi, under a quality control program with inspections by ICC-ES.

## 6.0 EVIDENCE SUBMITTED

Data in accordance with [ICC-ES Acceptance Criteria for Membrane Roof-covering Systems \(AC75\)](#), dated July 2010 (editorially revised April 2021).

## 7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-1463) along with the name, registered trademark, or registered logo of the report holder or listee must be included in the product label. [Electronic labeling is the ICC-ES web address ([www.icc-es.org](http://www.icc-es.org)); specific URL related to the report; or the ICC-ES machine-readable code placed on the aforementioned items.]
- 7.2 In, addition, each roll of the roofing membrane must bear a label noting the product name, the manufacturer's name (Carlisle SynTec Systems) or the name of the additional listee, the manufacturer's address or plant code and the ICC-ES evaluation report number (ESR-1463).
- 7.3 The report holder's contact information is the following:

**CARLISLE SYNTEC SYSTEMS, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC**  
POST OFFICE BOX 7000  
CARLISLE, PENNSYLVANIA 17013  
(717) 245-7000  
[www.carlisesyntec.com](http://www.carlisesyntec.com)

- 7.4 The Additional Listees' contact information is the following:

**MULE-HIDE PRODUCTS COMPANY, INC.**  
1195 PRINCE HALL DRIVE  
BELOIT, WISCONSIN 53511  
(800) 786-1492

**VERSICO, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC**  
POST OFFICE BOX 1289  
CARLISLE, PENNSYLVANIA 17013  
(800) 992-7663

**WEATHERBOND, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC**  
POST OFFICE BOX 251  
PLAINFIELD, PENNSYLVANIA 17081  
(866) 471-5125

**ROOFING PRODUCTS INTERNATIONAL, INC.**  
57460 DEWITT STREET  
ELKHART, INDIANA 46517  
(800) 628-2957

TABLE 1—PRODUCT NAMES

CARLISLE PRODUCT NAME	MULE-HIDE PRODUCT NAME	VERSICO PRODUCT NAME	WEATHERBOND PRODUCT NAME	ROOFING PRODUCTS INTERNATIONAL PRODUCT NAME
Sure-Seal EPDM	Mule-Hide Standard Black EPDM	VersiGard Non-reinforced EPDM	WeatherBond EPDM Non-Reinforced Membrane	Royal Edge Non-Reinforced EPDM
Sure-Seal FR EPDM	Mule-Hide FR EPDM	VersiGard FR Non-Reinforced EPDM	WeatherBond EPDM FR Non-Reinforced Membrane	Royal Edge Non-Reinforced FR EPDM
Sure-Seal FleeceBACK EPDM	-	VersiFleece EPDM	WeatherBond Fleece EPDM Membrane	Royal Edge EPDM FleeceBACK
Sure-Seal AFX EPDM	-	VersiFleece AC EPDM	WeatherBond EPDM AC Fleece Membrane	-
Sure-Tough EPDM	Mule-Hide Standard Reinforced EPDM	VersiGard Reinforced EPDM	WeatherBond EPDM Reinforced Membrane	Royal Edge Reinforced EPDM
Sure-White EPDM	Mule-Hide White-on-Black EPDM	VersiGard –White Standard	WeatherBond EPDM White Membrane	Re-Flex White EPDM
Sure-White Reinforced EPDM	Mule-Hide White on Black Reinforced EPDM	VersiGard White Reinforced EPDM	WeatherBond EPDM White Reinforced Membrane	-
Sure-White FleeceBACK	-	-	-	Re-Flex White EPDM FleeceBACK
Sure-Weld TPO	Mule-Hide TPO-c	VersiWeld Reinforced TPO Membrane	WeatherBond TPO Membrane	Re-Flex TPO
Sure-Weld HS TPO	Mule-Hide TPO-c (FR)	VersiWeld HS	WeatherBond TPO High Slope Membrane	Re-Flex TPO HS
Sure-Weld SAT-TPO	Mule-Hide SA-TPO	VersiWeld QA TPO Membrane	WeatherBond TPO PAS Membrane	Re-Flex TPO SAT
Sure-Weld TPO FleeceBACK	Mule-Hide TPO-c Fleece Back	VersiFleece TPO	WeatherBond FleeceTPO Membrane	Re-Flex TPO FleeceBACK
Sure-Weld TPO AFX	Mule-Hide TPO-c Fleece Back Plus	VersiFleece AC TPO	WeatherBond TPO AC Fleece Membrane	-
Spectro-Weld TPO	-	-	-	-
Spectro-Weld FleeceBACK TPO	-	-	-	-
Sure-Flex PVC	Mule-Hide PVC Membrane	VersiFlex PVC	WeatherBond PVC Membrane	Re-Flex PVC
Sure-Flex KEE HP	Mule-Hide PVC KEE HP Membrane	VersiFlex KEE HP	WeatherBond KEE HP Membrane	Re-Flex KEE HP
Sure-Flex PVC FRS	Mule-Hide PVC FRS Membrane	VersiFlex FRS PVC	WeatherBond PVC FRS Membrane	Re-Flex FRS PVC
Sure-Flex PVC FleeceBACK	Mule-Hide PVC FleeceBack Membrane	VersiFleece PVC	WeatherBond PVC Fleece Membrane	-
Sure-Flex KEE HP FleeceBACK	Mule-Hide PVC KEE HP Fleece Back Membrane	VersiFleece KEE HP	WeatherBond KEE HP Fleece Membrane	-
Sure-Flex PVC FRS FleeceBACK	-	VersiFleece FRS PVC	WeatherBond PVC FRS Fleece Membrane	Re-Flex FRS PVC FleeceBACK
Sure-Flex KEE HP FRS FleeceBACK	-	VersiFleece FRS KEE HP	WeatherBond KEE HP FRS Fleece Membrane	-
90-8-30A Bonding Adhesive	Mule-Hide Bonding Adhesive	G200SA Yellow Substrate Adhesive	LC-60 Bonding Adhesive	Royal Edge Bonding Adhesive
EPDM X-23 Low- VOC Bonding Adhesive	EPDM X-23 Low VOC Bonding Adhesive	EPDM X-23 Low VOC Bonding Adhesive	EPDM X-23 Low VOC Bonding Adhesive	-
Aqua Base 120 Bonding Adhesive	Aqua Base 120 Bonding Adhesive	Aqua Base 120 Bonding Adhesive	Aqua Base 120 Bonding Adhesive	Royal Edge Water Based Bonding Adhesive
Sure-Weld TPO Bonding Adhesive	Mule-Hide TPO-c Bonding Adhesive	VersiWeld TPO Bonding Adhesive	TPO Bonding Adhesive	Royal Edge EPDM/TPO Bonding Adhesive
Low VOC Bonding Adhesive	Low VOC Bonding Adhesive	LOW VOC Bonding Adhesive	Low VOC Bonding Adhesive	Royal Edge Low VOC Bonding Adhesive
Low VOC Bonding Adhesive 1168	Low VOC Bonding Adhesive 1168	Low VOC Bonding Adhesive 1168	Low VOC Bonding Adhesive 1168	--
Low VOC PVC Bonding Adhesive	Low -VOC PVC Bonding Adhesive	Low-VOC PVC Bonding Adhesive	Low-VOC PVC Bonding Adhesive	Re-Flex PVC Low VOC Bonding Adhesive
HydroBond Water-Based Bonding Adhesive	HydroBond Water-Based Bonding Adhesive-	HydroBond Water-Based Bonding Adhesive	HydroBond Water-Based Bonding Adhesive	=
CAV-GRIP III Low VOC Adhesive/Primer	AeroWeb Adhesive	Cav-Grip 3V Low VOC Adhesive/Primer	Cav-Grip III Low VOC Adhesive/Primer	-



TABLE 1—PRODUCT NAMES (continued)

CARLISLE PRODUCT NAME	MULE-HIDE PRODUCT NAME	VERSICO PRODUCT NAME	WEATHERBOND PRODUCT NAME	ROOFING PRODUCTS INTERNATIONAL PRODUCT NAME
Cold Applied Adhesive	Cold Applied Adhesive	Cold Applied Adhesive	Cold Applied Adhesive	RPI Cold Applied Adhesive
Flexible FAST Adhesive	Helix <sup>®</sup> Max Low-Rise Adhesive	Flexible DASH Adhesive	Flexible DASH Adhesive	FastBond Flex Adhesive
OlyBond 500 Adhesive	-	OlyBond 500 Adhesive	OlyBond 500 Adhesive	OlyBond 500 Adhesive

TABLE 2—FIRE CLASSIFICATION ASSEMBLIES—ADHERED ROOFING SYSTEMS<sup>2,5</sup>

SYSTEM NO.	ROOF CLASS	DECK	MAX SLOPE	BARRIER BOARD OR SLIP SHEET	INSULATION <sup>1</sup>	MEMBRANE
1	A	Noncombustible	1/4:12	—	Any of the following insulations: Carlisle “SecurShield Polyiso”, “InsulBase”, Hunter Panels “H-Shield” or “H-Shield-CG”, any thickness	Sure-Weld, Spectro-Weld
2			3/4:12			Sure-Flex KEE HP FRS FleeceBACK
3			3/8:12			Sure-White Reinforced
4			1/2:12			Sure-Seal FR, Sure-Tough, Sure-White, Sure-Seal FleeceBACK, Sure-Weld HS, Sure-Weld SAT-TPO, Sure-Weld FleeceBACK, Spectro-Weld FleeceBACK, Sure-White FleeceBACK
5			2 1/2:12			Sure-Flex PVC FleeceBACK, Sure-Flex PVC FRS FleeceBACK
6			1 1/2 :12			Sure-Flex PVC, Sure-Flex PVC FRS, Sure-Flex KEE HP, Sure-Flex KEE HP FleeceBACK
7	A	Noncombustible	1/2:12	—	1/2-inch-thick fiberboard <sup>4</sup> or 1/2-inch-thick fiberboard <sup>4</sup> over 5-inch max Insulfoam EPS <sup>3</sup> , or 1/2-inch-thick fiberboard over System No. 1 insulations	Sure-White FleeceBACK
8			1:12			Sure-Seal FR, Sure-Tough, Sure-White Reinforced, Sure-Seal FleeceBACK
9			1 1/2:12			Sure-White, Sure-Weld, Spectro-Weld, Sure-Weld HS, Sure-Weld SAT-TPO, Sure-Weld FleeceBACK, Spectro-Weld FleeceBACK, Sure-Flex PVC, Sure-Flex PVC FRS, Sure-Flex KEE HP, Sure-Flex PVC FleeceBACK, Sure-Flex KEE HP FleeceBACK, Sure-Flex PVC FRS FleeceBACK, Sure-Flex KEE HP FRS FleeceBACK
10			3/4:12			Sure-White FleeceBACK
11			1 1/2:12			Sure-White, Sure-Seal FleeceBACK
12	A	Noncombustible	3:12	1/4-inch thick “DensDeck Prime” or 1/4-inch thick “SECUROCK Gypsum Fiber Roof Board”	(Optional) 5-inch max InsulFoam EPS <sup>3</sup> or System No.1 insulation may be used below the barrier board	Sure-Tough, Sure-Weld, Spectro-Weld, Sure-Weld FleeceBACK, Spectro-Weld FleeceBACK
13			4:12			Sure-Weld HS, Sure-Weld SAT-TPO
14			Unlimited			Sure-Seal FR, Sure-Flex PVC, Sure-Flex PVC FRS, Sure-Flex KEE HP
15			3:12			Sure-Flex PVC FleeceBACK, Sure-Flex KEE HP FleeceBACK, Sure-Flex PVC FRS FleeceBACK, Sure-Flex KEE HP FRS FleeceBack

TABLE 2—FIRE CLASSIFICATION ASSEMBLIES—ADHERED ROOFING SYSTEMS<sup>2,5</sup> (continued)

SYSTEM NO.	ROOF CLASS	DECK	MAX SLOPE	BARRIER BOARD OR SLIP SHEET	INSULATION <sup>1</sup>	MEMBRANE
16	A	Combustible	3/4:12	1/4-inch thick "DensDeck Prime" or 1/2-inch thick "SECUROCK Gypsum Fiber Roof Board"	(Optional) 5-inch max InsulFoam EPS <sup>3</sup> or System No.1 insulation may be used below the barrier board	Sure-White FleeceBACK
17			1 1/2:12			Sure-White, Sure-Seal FleeceBACK, Sure-White Reinforced
18			3:12			Sure-Tough, Sure-Weld, Spectro-Weld, Sure-Weld FleeceBACK, Spectro-Weld FleeceBACK, Sure-Flex PVC FleeceBACK, Sure-Flex KEE HP FleeceBACK, Sure-Flex PVC FRS FleeceBACK, Sure-Flex KEE HP FRS FleeceBACK
19			4:12			Sure-Weld HS, Sure-Weld SAT-TPO Sure-Seal FR, Sure-Flex PVC, Sure-Flex PVC FRS, Sure-Flex KEE HP
20	A	Combustible	1/4:12	Barrier board (see Section 3.6) or Slip sheet: 2 layers (see Section 3.7)	Carlisle "InsulBase" or Hunter Panels "H-Shield", any thickness	Sure-Weld, Spectro-Weld
21			3/4:12			Sure-Flex KEE HP FRS FleeceBACK
22			3/8:12			Sure-White Reinforced
23			1/2:12			Sure-Seal FR, Sure-Tough, Sure-White, Sure-Seal FleeceBACK, Sure-Weld HS, Sure-Weld SAT-TPO, Sure-Weld FleeceBACK, Spectro-Weld FleeceBACK, Sure-White FleeceBACK
24			2:12			Sure-Flex PVC FleeceBACK, Sure-Flex PVC FRS FleeceBACK
25			1 1/2:12			Sure-Flex PVC, Sure-Flex PVC FRS, Sure-Flex KEE HP, Sure-Flex KEE HP FleeceBACK
26	C	Noncombustible or Combustible	Unlimited	—	Carlisle "InsulBase" or Hunter Panels "H-Shield" any thickness	Any EPDM, PVC or TPO Membrane specified in this report
27	A	Combustible	Up to 1/2:12 <sup>6</sup>	—	Minimum 1-inch Carlisle "SecurShield Polyiso or Hunter Panels "H-Shield-CG"	Any EPDM, PVC or TPO Membrane specified in this report
28	A	Combustible	Up to 1:12 <sup>6</sup>	—	1/2-inch Carlisle "SecurShield HD", "SecurShield HD Plus", or Hunter Panels H-Shield HD, H-Shield HD90	Any EPDM, PVC or TPO Membrane specified in this report

For SI: 1 inch = 25.4 mm.

<sup>1</sup>All foam plastic insulation must be UL-classified foamed plastic for roofing systems, and must be limited to the maximum thickness in accordance with Section 5.4 of this report or the maximum thickness in accordance with this table, whichever is less.

<sup>2</sup>See Section 3.10 for adhesive application rate.

<sup>3</sup>UL Classified EPS may be installed below min. 1-inch-thick Carlisle or Hunter Panels polyisocyanurate insulations (max slope 1:12) or below min. 1/2-inch-thick Carlisle SecurShield HD or Hunter Panels H-Shield HD (max slope 2:12) on noncombustible decks.

<sup>4</sup>Carlisle SecurShield HD or Hunter Panels H-Shield HD may replace fiberboard and may be used as a coverboard over any insulation. When these two boards are used directly below the Sure-Weld membrane, the slope is limited to max. 1/2:12.

<sup>5</sup>When these systems are used for reroofing or recovering, installation must be in accordance with Sections 4.2.2 and 5.7 of this report, and 2021 IBC Section 1512, 2018 and 2015 IBC Section 1511 [2012 and 2009 IBC Section 1510], 2021, 2018 and 2015 IRC Section R908 [2012 and 2009 IRC Section R907], as applicable.

<sup>6</sup>Max slope determined by the classification of the membrane assembly.

TABLE 3—FIRE CLASSIFICATION ASSEMBLIES—MECHANICALLY FASTENED ROOFING SYSTEMS<sup>4</sup>

SYSTEM NO.	ROOF CLASS	DECK	MAX. SLOPE	BARRIER BOARD OR SLIP SHEET	INSULATION <sup>1</sup>	MEMBRANE/MAX. ROOF SLOPE
1	A	Noncombustible	1/2:12	—	Any of the following insulations: Carlisle “SecurShield Polyiso” or “InsulBase”, Hunter Panels “H-Shield” or “H-Shield-CG”, any thickness	Sure-Tough, Sure-Weld, Spectro-Weld, Sure-White Reinforced
2			1 1/2:12			Sure-Weld HS
3			2 1/2:12			Sure-Flex PVC, Sure-Flex KEE HP
4	A	Noncombustible	1:12	—	1/2-inch-thick fiberboard <sup>3</sup> or 1/2-inch-thick fiberboard <sup>4</sup> over 5-inch max Insulfoam EPS <sup>2</sup> , or 1/2-inch-thick fiberboard over System No. 1 insulations	Sure-Tough, Sure-Flex
5			1 1/2:12			Sure-Weld, Spectro-Weld, Sure-Weld HS
6	A	Noncombustible	1/2:12	—	Insulfoam SP, 5-inch max thickness	Sure-Weld, Spectro-Weld, Sure-Weld HS, Sure-Flex, Sure-Flex KEE HP
7	A	Noncombustible	1:12	—	“Insulfoam SP” or min. 1/2-inch-thick Insulfoam EPS covered with “Insulfoam SP”	Sure-Weld, Spectro-Weld, Sure-Weld HS, Sure-Tough
8	A	Noncombustible	2:12	1/4-inch thick “DensDeck” or 1/4-inch thick “SECUROCK Gypsum Fiber Roof Board	(Optional) 5-inch max InsulFoam EPS <sup>3</sup> or System No.1 insulation may be used below the barrier board	Sure White Reinforced
9			3:12			Sure-Tough, Sure-Weld, Spectro-Weld
10			Unlimited			Sure-Weld HS, Sure-Flex PVC, Sure-Flex KEE HP
11	A	Combustible	2:12	1/4-inch thick “DensDeck” or 1/2-inch thick “SECUROCK Gypsum Fiber Roof Board	(Optional) 5-inch max InsulFoam EPS <sup>3</sup> or System No.1 insulation may be used below the barrier board	Sure White Reinforced
12			3:12			Sure-Tough, Sure-Weld, Spectro-Weld
13			4:12			Sure-Weld HS, Sure-Flex PVC, Sure-Flex KEE HP
14	A	Combustible	1/2:12	Barrier board (see Section 3.6) or Slip sheet: 2 layers, (see Section 3.7)	Carlisle “InsulBase”, or Hunter Panels “H-Shield”, any thickness	Sure-Tough, Sure-Weld, Spectro-Weld
15			1 1/2:12			Sure-Weld HS
16			2 1/2:12			Sure-Flex PVC, Sure-Flex KEE HP
17	A	Combustible	1:12	Slip sheet, 2 layers (see Section 3.7)	—	Sure-Tough
18			1 1/2:12			Sure Weld, Spectro-Weld, Sure-Weld HS, Sure-Flex, Sure-Flex KEE HP
19	B	Combustible	1 1/2:12	Slip sheet, 1 layer (see Section 3.7)	—	Sure-Tough, Sure-Weld, Spectro-Weld, Sure-Weld HS, Sure-Flex, Sure-Flex KEE HP
20	C	Noncombustible or Combustible	Unlimited	—	Any of the following insulations: Carlisle “SecurShield Polyiso”, “InsulBase”, Hunter Panels “H-Shield” or “H-Shield-CG”, any thickness	Any EPDM, PVC or TPO Membrane specified in this report
21	A	Combustible	1/2:12 <sup>5</sup>	—	Minimum 1-inch Carlisle “SecurShield Polyiso” or Hunter Panels “H-Shield-CG”	Any EPDM, PVC or TPO Membrane specified in this report
22	A	Combustible	1:12 <sup>5</sup>	—	1/2-inch Carlisle “SecurShield HD”, “SecurShield HD Plus”, or Hunter Panels H-Shield HD, H-Shield HD90	Any EPDM, PVC or TPO Membrane specified in this report

For SI: 1 inch = 25.4 mm.

<sup>1</sup>All foam plastic insulation must be UL-classified foamed plastic for roofing systems, and must be limited to the maximum thickness in accordance with Section 5.4 of this report or the maximum thickness in accordance with this table, whichever is less.

<sup>2</sup>UL Classified EPS may be installed below min. 1-inch-thick Carlisle or Hunter Panels polyisocyanurate insulations (max slope 1:12) or below min. 1/2-inch-thick Carlisle SecurShield HD or Hunter Panels H-Shield HD (max slope 2:12) on noncombustible decks.

<sup>3</sup>Carlisle SecurShield HD or Hunter Panels H-Shield HD may replace fiberboard and may be used as a coverboard over any insulation. When these two boards are used directly below the Sure-Weld membrane, the slope is limited to 1/2:12.

<sup>4</sup>When these systems are used for reroofing or recovering, installation must be in accordance with Sections 4.2.2 and 5.7 of this report, and 2021 IBC Section 1512, 2018 and 2015 IBC Section 1511 [2012 and 2009 IBC Section 1510], 2021, 2018 and 2015 IRC Section R908 [2012 and 2009 IRC Section R907], as applicable.

<sup>5</sup>Max slope determined by the classification of the membrane assembly.

TABLE 4—WIND RESISTANCE—ADHERED ASSEMBLIES<sup>5,6</sup>

SYSTEM NO.	ALLOWABLE WIND UPLIFT (FIELD) (psf)	DECK <sup>2</sup>	INSULATION / MIN. THICKNESS <sup>1,3</sup>	INSULATION FASTENING RATE	MEMBRANE TYPE
1	45	Combustible or Noncombustible	1/2-inch fiberboard <sup>4</sup> , 15/32-inch OSB, or 1/4-inch thick "DensDeck Prime" or 1/4-inch thick "SECUROCK Gypsum Fiber Roof Board"	1 per 2 ft <sup>2</sup>	EPDM, PVC and TPO Membranes
2	45	Combustible or Noncombustible	Carlisle "InsulBase" or "SecurShield Polyiso"; Hunter Panels "H-Shield" or "H-Shield-CG" / 1.4 inch with 1/2-inch SECUROCK coverboard (optional)	1 per 3.2 ft <sup>2</sup>	EPDM, PVC and TPO Membranes
3	45	Combustible or Noncombustible	Carlisle "InsulBase" or "SecurShield Polyiso"; Hunter Panels "H-Shield" or "H-Shield-CG" / 2.0 inch with 5/8-inch SECUROCK coverboard (optional)	1 per 4 ft <sup>2</sup>	EPDM, PVC and TPO Membranes
4	68	Combustible or Noncombustible	Carlisle "InsulBase" or "SecurShield Polyiso"; Hunter Panels "H-Shield" or "H-Shield-CG" / 1.0 inch	FAST Adhesive	FleeceBACK Membranes
5	75	Combustible or Noncombustible	Carlisle "InsulBase" or "SecurShield Polyiso"; Hunter Panels "H-Shield" or "H-Shield-CG" / 2.0 inch with 1/2-inch SECUROCK coverboard (optional)	1 per 1.6 ft <sup>2</sup>	EPDM, PVC and TPO Membranes
6	113	Combustible or Noncombustible	Carlisle "SecurShield" or "H-Shield CG" / 2.0 inch	1 per 1ft <sup>2</sup>	PVC Membranes
7	120	Combustible or Noncombustible	Carlisle "InsulBase" or "SecurShield Polyiso"; Hunter Panels "H-Shield" or "H-Shield-CG" / 2.0 inch	1 per 1 ft <sup>2</sup>	TPO Membranes EPDM membranes (with noncombustible deck only)
8	128	Combustible or Noncombustible	Carlisle "InsulBase" or "SecurShield Polyiso"; Hunter Panels "H-Shield" or "H-Shield-CG" / 2.0 inch with 1/2-inch SECUROCK coverboard (optional)	1 per 1 ft <sup>2</sup>	EPDM and TPO Membranes
9	135	Combustible or Noncombustible	Carlisle "InsulBase" or "SecurShield Polyiso"; Hunter Panels "H-Shield" or "H-Shield-CG" / 2.0 inch with 1/2-inch SECUROCK coverboard (optional)	1 per 1 ft <sup>2</sup>	FleeceBACK Membranes
10	143	Combustible or Noncombustible	1/2-inch DensDeck Prime	1 per 1 ft <sup>2</sup>	FleeceBACK Membranes

For SI: 1 inch = 25.4 mm; 1 ft = 0.305 m; 1 psf = 47.88 Pa

<sup>1</sup>All foam plastic insulation must be UL-classified foamed plastic for roofing systems, and must be limited to the maximum thickness in accordance with Section 5.4 of this report or the maximum thickness in accordance with this table, whichever is less.

<sup>2</sup>Steel deck must be minimum No. 22 gage galvanized steel [base-metal thickness 0.030 inch (0.76 mm)]. Concrete must have a minimum compressive strength (f<sub>c</sub>) of 2500 psi. See Section 5.6 of this report.

<sup>3</sup>UL Classified EPS may be installed below min. 1-inch-thick Carlisle or Hunter Panels polyisocyanurate insulations (max slope 1:12) or below min. 1/2-inch-thick Carlisle SecurShield HD or Hunter Panels H-Shield HD (max slope 2:12) on noncombustible decks.

<sup>4</sup>Carlisle SecurShield HD or Hunter Panels H-Shield HD may replace fiberboard and may be used as a coverboard over any insulation. When these two boards are used directly below the Sure-Weld membrane, the slope is limited to 1/2:12.

<sup>5</sup>When application is over existing roofs, documentation of the wind-uplift resistance of the composite roof construction must be submitted to the code official for approval at the time of permit application. Since the composition and/or condition of any particular existing underlying material may vary widely, reroofing with fully adhered System No. 4 is outside the scope of this report. For reroofing or recovering, installation must be in accordance with 2021 IBC Section 1512, 2018 and 2015 IBC Section 1511 [2012 and 2009 IBC Section 1510], 2021, 2018 and 2015 IRC Section R908 [2012 and 2009 IRC Section R907], as applicable.

<sup>6</sup>See Section 3.10 for adhesive application rate.

TABLE 5—WIND RESISTANCE—MECHANICALLY FASTENED ASSEMBLIES<sup>4,7</sup>

SYSTEM NO.	MAXIMUM ALLOWABLE WIND UPLIFT (psf)	DECK <sup>3</sup>	INSULATION <sup>5</sup>	MEMBRANE	MEMBRANE FASTENING	MAXIMUM FASTENER SPACING (inches)	MAXIMUM FASTENER ROW SPACING <sup>8</sup>
1	45	Noncombustible	Foam plastic insulation <sup>1,2</sup> , 1/2-inch-thick fiberboard <sup>6</sup> or barrier board (See Sect. 3.6)	Sure-Tough	HP-X Fastener & Metal Fastening Bar	12	6 ft 6 inches
2	75	Noncombustible	Same as System No. 1	Sure-Tough	HP-X Fastener & Metal Fastening Bar	6	6 ft 6 inches
3	52	Noncombustible	Same as System No. 1	Sure-Tough	HP Fastener & Polymer Seam Plate	6	9 ft 6 inches
4	45	Noncombustible	Same as System No. 1	Sure-Tough	Sure-Tite Fastener & ST Fastening Bar	12	9 ft 6 inches
5	30	Noncombustible	Same as System No. 1	Sure-Tough (75 mil)	HP Fastener & Polymer Seam Plate	12	9 ft 6 inches
6	60	Noncombustible	Same as System No. 1	Sure-Tough (75 mil)	HP Fastener & Polymer Seam Plate	6	9 ft 6 inches
7	45	Noncombustible	Same as System No. 1	Sure-Weld or Spectro-Weld	HP-X or HP-Xtra Fasteners with Piranha or Piranha Xtra Plates	12	7 ft 6 inches
8	45	Noncombustible	Same as System No. 1	Sure-Weld or Spectro-Weld	HP-Xtra Fasteners with Piranha Xtra Plates	12	9 ft 6 inches
9	60	Noncombustible	Same as System No. 1	Sure-Weld or Spectro-Weld	HP-X or HP-Xtra Fasteners with Piranha or Piranha Xtra Plates	6	9 ft 6 inches
10	67	Noncombustible	Same as System No. 1	Sure-Weld or Spectro-Weld	HP-X or HP-Xtra Fasteners with Piranha or Piranha Xtra Plates	6	7 ft 6 inches
11	30	Noncombustible	Same as System No. 1	Sure-Weld or Spectro-Weld	HP-X or HP-Xtra Fasteners with Piranha or Piranha Xtra Plates	12	11 ft 6 inches
12	60	Noncombustible	Same as System No. 1	Sure-Weld or Spectro-Weld	HP-X or HP-Xtra Fasteners with Piranha or Piranha Xtra Plates	6	11 ft 6 inches
13	53	Noncombustible	Same as System No. 1	Sure-Flex PVC or Sure-Flex KEE HP	HP-X Fasteners with Piranha Plates	6	6 ft 4 inches
14	83	Noncombustible	Same as System No. 1	Sure-Flex PVC or Sure-Flex KEE HP	HP-X Fasteners with Piranha Plates	6	2 ft 11 inches
15	30	Noncombustible	Same as System No. 1	Sure-Flex PVC or Sure-Flex KEE HP	HP-X or HP-Xtra Fasteners with Piranha or Piranha Xtra Plates	18	6 ft 4 inches
16	45	Noncombustible	Same as System No. 1	Sure-Flex PVC or Sure-Flex KEE HP	HP-X or HP-Xtra Fasteners with Piranha or Piranha Xtra Plates	12	6 ft 4 inches
17	53	Noncombustible	Same as System No. 1	Sure-Flex PVC or Sure-Flex KEE HP	HP-X Fasteners with Piranha Plates	12	2 ft 11 inches
18	60	Noncombustible	Same as System No. 1	Sure-Flex PVC or Sure-Flex KEE HP	HP-X or HP-Xtra Fasteners with Piranha Plates	6	9 ft 7 inches
19	45	Noncombustible	Same as System No. 1	Sure-Weld	HP-X Fasteners with OMG RhinoBond Plates	1 per 5.3 ft <sup>2</sup>	N/A
20	60	Noncombustible	Same as System No. 1	Sure-Weld	HP-X Fasteners with OMG RhinoBond Plates	1 per 4 ft <sup>2</sup>	N/A

For SI: 1 inch = 25.4 mm; 1 ft = 0.305 m; 1 psf = 47.88 Pa.

<sup>1</sup>Foam plastic insulation must be any of the following (1-inch min. to 6-inch max. thickness): Carlisle "SecurShield Polyiso", "InsulBase" Hunter Panels "H-Shield" or Hunter Panels "H-Shield- CG".

<sup>2</sup>All foam plastic insulation must be UL-classified foamed plastic for roofing systems, and must be limited to the maximum thickness in accordance with Section 5.4 of this report or the maximum thickness in accordance with this table, whichever is less.

<sup>3</sup>Steel deck must be minimum No. 22 gage galvanized steel [base-metal thickness 0.030 inch (0.76 mm)]. Concrete must have a minimum compressive strength (*f'<sub>c</sub>*) of 2500 psi. See Section 5.6 of this report.

<sup>4</sup>For existing metal roofing, the assemblies listed must be installed by fastening through the roofing and into structural members (purlins, angle iron, beams, etc.) capable of resisting all expected loads. The maximum allowable wind uplift (field) pressures are shown in Column 2.

<sup>5</sup>UL Classified EPS may be installed below min. 1-inch-thick Carlisle or Hunter Panels polyisocyanurate insulations (max slope 1:12) or below min. 1/2-inch-thick Carlisle SecurShield HD or Hunter Panels H-Shield HD (max slope 2:12) on noncombustible decks.

<sup>6</sup>Carlisle SecurShield HD or Hunter Panels H-Shield HD may replace fiberboard and may be used as a coverboard over any insulation. When these two boards are used directly below the Sure-Weld membrane, the slope is limited to 1/2:12.

<sup>7</sup>When these systems are used for reroofing or recovering, installation must be in accordance with Sections 4.2.2 and 5.7 of this report, and 2021 IBC Section 1512, 2018 and 2015 IBC Section 1511 [2012 and 2009 IBC Section 1510], 2021, 2018 and 2015 IRC Section R908 [2012 and 2009 IRC Section R907], as applicable.

<sup>8</sup>Fastener row spaces shown are for field of roof only. See Section 4.3 for recognized fascia systems for mechanically fastened roof assemblies. Distance between the edge of the roof and the first row of fasteners must be determined accordingly.

**DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION**  
**Section: 07 53 23—Ethylene-Propylene-Diene-Monomer Roofing**  
**Section: 07 54 19—Polyvinyl-Chloride Roofing**  
**Section: 07 54 23—Thermoplastic-Polyolefin Roofing**

**REPORT HOLDER:**

CARLISLE SYNTEC SYSTEMS, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC

**EVALUATION SUBJECT:**

CARLISLE EPDM, PVC AND TPO SINGLE-PLY ROOFING MEMBRANES

**1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that Carlisle EPDM, PVC and TPO Single-ply Roofing Membranes, described in ICC-ES evaluation report ESR-1463, have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

**Applicable code editions:**

- 2023 *City of Los Angeles Building Code* (LABC)
- 2023 *City of Los Angeles Residential Code* (LARC)

**2.0 CONCLUSIONS**

The Carlisle EPDM, PVC and TPO Single-ply Roofing Membranes, described in Sections 2.0 through 7.0 of the evaluation report [ESR-1463](#), comply with the LABC Chapters 7A and 15, the LARC Section R337 and LARC Chapter 9, and are subjected to the conditions of use described in this supplement.

**3.0 CONDITIONS OF USE**

The Carlisle EPDM, PVC and TPO Single-ply Roofing Membranes, described in this evaluation report must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-1463](#).
- The design, installation, conditions of use and identification are in accordance with the 2021 *International Building Code*® (IBC) and 2021 *International Residential Code*® (IRC) provisions noted in the evaluation report [ESR-1463](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, or LARC Chapter 3, as applicable.
- The Carlisle EPDM, PVC and TPO Single-ply Roofing Membranes must not be installed over existing wood shakes or wood shingles in accordance with LABC Section 1512.
- The installation of the Carlisle EPDM, PVC and TPO Single-ply Roofing Membranes must comply with City of Los Angeles Information Bulletin P/BC 2020-16, "Dwellings in High Wind Velocity Areas (HWA)".
- Reroofing applications must comply with Sections 4.2.2, 4.3.2 and 5.7 of the evaluation report [ESR-1463](#) and LABC Section 1512 or LARC Section R908, as applicable. Where spaced sheathing exists, a minimum of <sup>15</sup>/<sub>32</sub>-inch-thick (11.9 mm) plywood shall be installed prior to roofing installations.
- Where moderate or heavy foot traffic occurs for maintenance of equipment, the roof covering shall be adequately protected.
- The Building Inspector shall be notified 24 hours in advance prior to installation of the roof membranes.

- The Carlisle EPDM, PVC and TPO Single-ply Roofing Membranes may be used in the construction of new buildings located in any Fire Hazard Severity Zone within a State Responsibility Areas or any Wildland-Urban Interface Fire Area, provided installation is in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of Sections 701A.3 and 705A of the LABC.
- The Carlisle EPDM, PVC and TPO Single-ply Roofing Membranes may be used in the construction of new buildings located in any Fire Hazard Severity Zone within a State Responsibility Areas or any Wildland-Urban Interface Fire Area, provided installation is in accordance with the 2018 *International Residential Code*® (IRC) provisions noted in the evaluation report and the additional requirements of Sections R337.1.3 and R337.5 of the LARC.

This supplement expires concurrently with the evaluation report, reissued October 2023 and revised January 18, 2024.

**DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION**  
**Section: 07 53 23—Ethylene-Propylene-Diene-Monomer Roofing**  
**Section: 07 54 19—Polyvinyl-Chloride Roofing**  
**Section: 07 54 23—Thermoplastic-Polyolefin Roofing**

## REPORT HOLDER:

CARLISLE SYNTEC SYSTEMS, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC

## EVALUATION SUBJECT:

CARLISLE EPDM, PVC AND TPO SINGLE-PLY ROOFING MEMBRANES

## 1.0 REPORT PURPOSE AND SCOPE

### Purpose:

The purpose of this evaluation report supplement is to indicate that the Carlisle EPDM, PVC and TPO single-ply roofing membranes, described in ICC-ES evaluation report ESR-1463, have also been evaluated for compliance with the codes noted below.

### Applicable code editions:

- 2022 California Building Code (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2022 California Residential Code (CRC)

## 2.0 CONCLUSIONS

### 2.1 CBC:

The Carlisle EPDM, PVC and TPO single-ply roofing membranes, described in Sections 2.0 through 7.0 of the evaluation report ESR-1463, comply with CBC Chapter 15, provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapter 15, as applicable.

The Carlisle EPDM, PVC and TPO Single-ply Roofing Membranes may be used in the construction of new buildings located in any Fire Hazard Severity Zone within a State Responsibility Areas or any Wildland-Urban Interface Fire Area, provided installation is in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of Sections 701A.3 and 705A of the CBC.

**2.1.1 OSHPD:** The applicable OSHPD Sections of the CBC are beyond the scope of this supplement.

**2.1.2 DSA:** The applicable DSA Sections of the CBC are beyond the scope of this supplement.

### 2.2 CRC:

The Carlisle EPDM, PVC and TPO single-ply roofing membranes, described in Sections 2.0 through 7.0 of the evaluation report ESR-1463, comply with CRC Chapter 95, provided the design and installation are in accordance with the 2021 *International Residential Code*® (IRC) provisions noted in the evaluation report and the additional requirements of CRC Chapter 9, as applicable.

The Carlisle EPDM, PVC and TPO Single-ply Roofing Membranes may be used in the construction of new buildings located in any Fire Hazard Severity Zone within a State Responsibility Areas or any Wildland-Urban Interface Fire Area, provided installation is in accordance with the 2021 *International Residential Code*® (IRC) provisions noted in the evaluation report and the additional requirements of Sections R337.1.3 and R337.5 of the CRC.

This supplement expires concurrently with the evaluation report, reissued October 2023 and revised January 18, 2024.