ICC-ES Evaluation Report

ESR-1463

Reissued October 1, 2010

This report is subject to re-examination in two years.

Underwriters Laboratories ICC-ES/UL Dual Report

Click on the logo to access UL Certification

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 INCORPORATED
PO BOX 7000
CARLISLE, PENNSYLVANIA 17013
(717) 245-7000
www.carlisle-syntec.com

EVALUATION SUBJECT:

CARLISLE EPDM, PVC AND TPO SINGLE-PLY ROOFING MEMBRANES

ADDITIONAL LISTEES:

VERSICO INCORPORATED
POST OFFICE BOX 1289
CARLISLE, PA 17013

MULE-HIDE PRODUCTS COMPANY, INC.
1195 PRINCE HALL DRIVE
BELOIT, WISCONSIN 53511

WEATHERBOND
P.O. BOX 251
PLAINFIELD, PENNSYLVANIA 17081

KELLY COMPANY/2001 INC.
325 THOMASTON AVENUE
WATERBURY, CONNECTICUT 06702

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)
- Other Codes (see Section 8.0)

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 Incorporated and Kelly Company/2001 Inc., the additional listees.

3.2 EPDM Membranes:

3.2.1 Sure-Seal: Sure-Seal is a black, nonreinforced EPDM membrane available in 45-, 60- and 90-mil (1.14, 1.52, and 2.29 mm) thicknesses.

3.2.2 Sure-Seal FR: Sure-Seal FR is a black, nonreinforced EPDM membrane with fire retardants, available in 45-, 60- and 90-mil (1.14, 1.52, and 2.29 mm) thicknesses.

3.2.3 Sure-White: Sure-White is a white, nonreinforced EPDM membrane available in a 60- and 90-mil (1.52 and 2.29 mm) thickness.

3.2.4 Sure-Tough: Sure-Tough is a black, reinforced membrane consisting of a polyester reinforcement encapsulated between two EPDM membrane plies. It is available in 45- to 75-mil (1.14 to 1.90 mm) thicknesses.

3.2.5 Sure-Tough FR: Sure-Tough FR is a black, reinforced membrane consisting of a polyester reinforcement encapsulated between two EPDM membrane plies with fire retardants. It is available in 45 to 60-mil (1.14 to 1.52 mm) thickness.

3.2.6 Sure-Seal FleeceBACK: Sure-Seal FleeceBACK is a 45-, 60- or 90 -mil (1.14, 1.52 or 2.29 mm) non-reinforced EPDM bonded to a 5.5-ounce-per-square-yard (0.18 kg/m^2) polyester fleece.

3.2.7 Sure-White FleeceBACK: Sure-White FleeceBACK is a 60- or 90-mil (1.52 or 2.29 mm) nonreinforced white EPDM bonded to a 5.5-ounce-per- square-yard (0.18 kg/m^2) polyester fleece.

3.2.8 Sure-Seal AFX: Sure-Seal AFX is a 45-, 60- or 90-mil (1.14, 1.52 or 2.29 mm) non-reinforced EPDM bonded to a 7.5-ounce-per-square-yard (0.25 kg/m^2) polyester fleece.

3.2.9 Sure-Seal AFX PLUS: Sure-Seal AFX PLUS is a 60-mil (1.52 mm) non-reinforced EPDM bonded to a 7.5-ounce-per-square-yard (0.25 kg/m^2) polyester fleece.

3.3 PVC Membranes:

3.3.1 Sure-Flex and Sure-Flex Elvaloy: Sure-Flex and Sure-Flex Elvaloy are 50-, 60-, or 80-mil (1.27, 1.52, or 2.03 mm) membranes consisting of a polyester reinforcement encapsulated between two plies of PVC. The membrane is available in white, gray or custom colors.

3.3.2 Sure-Flex FRS and Sure-Flex Elvaloy FRS: Sure-Flex FRS and Sure-Flex Elvaloy FRS are 50-, 60-, or 80-mil (1.27, 1.52, or 2.03 mm) membranes consisting of a fiberglass reinforcement encapsulated between two plies of PVC. The membrane is available in white, gray or custom colors.

3.3.3 Sure-Flex FRS FleeceBACK and Sure-Flex Elvaloy FRS FleeceBACK: Sure-Flex FRS FleeceBACK and Sure-Flex Elvaloy FRS FleeceBACK are the Sure-Flex FRS membrane and the Sure-Flex Elvaloy FRS membrane, described in Section 3.3.2, with a laminated 5.5-ounce-per-square-yard (0.18 kg/m^2) polyester fleece backing.

3.4 TPO Membranes:

3.4.1 Sure-Weld: Sure-Weld is a 45- or 60-mil (1.14 or 1.52 mm) membrane consisting of a polyester reinforcement encapsulated between two plies of TPO. The membrane is available in white, gray, tan or custom colors.

3.4.2 Sure-Weld HS: Sure-Weld HS is the Sure-Weld membrane formulated with an additional flame retardant for fire resistance at higher slopes. It is manufactured in 45- and 60-mil (1.14 or 1.52 mm) thicknesses, and is available in white, gray, tan or custom colors.

3.4.3 SAT-TPO: SAT-TPO is a self-adhered version of Sure-Weld HS membrane with adhesive.

3.4.4 Sure-Weld EXTRA: Sure-Weld EXTRA is the same formulation as the Sure-Weld membrane but comes in 72- and 80-mil (1.83 and 2.03 mm) thicknesses.

3.4.5 Sure-Weld HS EXTRA: Sure-Weld HS EXTRA is the same formulation as the Sure-Weld HS membrane but comes in 72- and 80-mil (1.83 and 2.03 mm) thicknesses.

3.4.6 Sure-Weld FleeceBACK: Sure-Weld FleeceBACK is the Sure-Weld HS membrane, 45 or 60 mils (1.14 or 1.52 mm) thick, with a laminated 5.5-ounce-per-square-yard (0.18 kg/m^2) polyester fleece backing.

3.4.7 Sure-Weld AFX: Sure-Weld AFX is the 45-mil (1.14 mm) Sure-Weld HS membrane with a laminated 10-ounce-per-square-yard (0.34 kg/m^2) polyester fleece backing.

3.4.8 Sure-Weld AFX PLUS: Sure-Weld AFX PLUS is the 60-mil (1.52 mm) Sure-Weld HS membrane with a laminated 10-ounce-per-square-yard (0.34 kg/m^2) polyester fleece backing.

3.4.9 Spectro-Weld: Spectro-Weld is the Sure-Weld membrane, described in Section 3.4.1, and Sure-Weld EXTRA membrane, described in Section 3.4.4, formulated with a brighter white color. It is manufactured in 45-, 60-, 72- or 80-mil (1.14-, 1.52-, 1.83- or 2.03-mm) thicknesses.

3.4.10 Spectro-Weld FleeceBACK: Spectro-Weld FleeceBACK is the Spectro-Weld membrane with a laminated 5.5-ounce-per-square-yard (0.18 kg/m^2) polyester fleece backing.

3.5 Insulation:

See Tables 2 through 4 for insulations for use with specific roofing systems. 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 E 84.

3.6 Barrier Board:

Barrier board, where used, must be either minimum $^1/_4$-inch-thick (6.4 mm) G-P Gypsum Corporation "DensDeck," minimum $^1/_4$-inch-thick (6.4 mm) Owens Corning "Strataguard", minimum $^1/_4$-inch-thick (6.4 mm) USG "Securock," or minimum $^1/_2$-inch-thick (12.7 mm) gypsum board. Barrier board must be UL- listed 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," Elk "VersaShield Underlayment," Elk "VersaShield FB-1S or FB-2S, or Atlas FR 10 or FR 50."

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 for spacing of fasteners.

3.9.1 Sure-Seal 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 Sure-Seal 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 $^3/_4$ inch (19.1 mm.)

3.9.3 Sure-Seal 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).

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

3.9.5 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 prepunched holes 6 inches (150 mm) on center.

3.9.6 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 $^3/_4$ inch (19.1 mm), and into the wood deck a minimum of 1 inch (25.4 mm).

3.9.7 Piranha Fastening Plate: This is a $2^3/_8$-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.

3.9.8 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 $^3/_4$ inch (19.1 mm) and into the wood deck a minimum of 1 inch (25.4 mm).

3.9.9 Piranha XTRA Fastening Plate: This is a $2^3/_8$-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.

3.9.10 OMG Inc. 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 Adhesives:

3.10.1 Sure-Seal 90-8-30A: Sure-Seal 90-8-30A 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^2/L). The adhesive is supplied in 5-gallon (18.9 L) containers and has a shelf life of one year.

3.10.2 Sure-Seal Aqua Base 120: Sure-Seal Aqua Base 120 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^2/L). The adhesive is supplied in 5-gallon (18.9 L) containers and has a shelf life of one year.

3.10.3 Sure-Flex PVC Bonding Adhesives: Sure-Flex PVC and Sure-Flex Low VOC PVC Bonding Adhesives are 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^2/L). The adhesives are supplied in 5-gallon (18.9 L) containers with a shelf life of one year.

3.10.4 Sure-Weld Bonding Adhesive: Sure-Weld 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^2/L). 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 membranes to an insulation or substrate. It has a coverage rate of approximately 60 square feet per gallon (1.5 m^2/ L). The adhesive is supplied in 5-gallon (18.9 L) containers with a shelf life of one year.

3.10.6 FAST Adhesives: FAST 100, FAST 100LV, FAST Adhesive Dual Cartridge, FAST Adhesive Box Sets, Flexible FAST and FAST Bag-in-a-Box 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^2/L). The adhesives are supplied in 15-gallon (56.7 L) and 50-gallon (189 L) drums, cartridge tubes or cylinders, and have a shelf life of one year.

3.11 Impact Resistance:

The EPDM, PVC, and TPO roofing membranes described in this report meet requirements for impact resistance in IBC Section 1504.7, based on testing in accordance with 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 contaminates 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 E 108 and 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:

4.3.1 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 for roofing systems must be designed in accordance with ANSI/SPRI ES-1, complying with IBC Section 1504.5. The edge securement for mechanically attached membranes was tested in accordance with ANSI/SPRI ES-1 Test RE-1, using Carlisle SecurEdge 300 [0.050-inch (1.27 mm) 3003 aluminum] and Carlisle SecurEdge 3000 [0.040-inch (1.02 mm) 3003 aluminum] fascia systems. The maximum allowable load for Carlisle SecurEdge 300 is 234 plf (348 kg/m). The maximum allowable load for Carlisle SecurEdge 3000 is 200 plf (298 kg/m).

4.3.2 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, reroofing with adhered systems 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 R314.4, 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 E 84, 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 Table 4.

5.6 The allowable wind uplift pressures listed in Table 4 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 The roofing membranes are manufactured at Carlisle, Pennsylvania; Greenville, Illinois; Tooele, Utah; and Senatobia, Mississippi, under a quality control program with inspections by Underwriters Laboratories Inc. (AA-668).

5.9 For buildings under the IBC, above-deck thermal insulation board must comply with the applicable standards listed in Table 1508.2 of the IBC.

6.0 EVIDENCE SUBMITTED

Data in accordance with ICC-ES Acceptance Criteria for Membrane Roof Covering Systems (AC75), dated April 2007, (corrected December 2008).

7.0 IDENTIFICATION

Each roll of the roofing membrane must bear a label noting the product name, the manufacturer's name (Carlisle SynTec Incorporated) or the name of the additional listee, the manufacturer's address or plant code, the ICC-ES evaluation report number (ESR-1463), and the name or label of the inspection agency (Underwriters Laboratories Inc.).

8.0 OTHER CODES

In addition to the codes referenced in Section 1.0, the products in this report were evaluated for compliance with the requirements of the following codes:

- BOCA® *National Building Code*/1999 (BNBC)
- 1999 *Standard Building Code*© (SBC)
- 1997 *Uniform Building Code*™ (UBC)

For compliance under the above codes, see Sections 2 through 7 of this report, except revise the following sections to read as follows:

3.8 Flashing:

Flashing must be provided in accordance with SBC Section 1503.2, BNBC Section 1508.1 and UBC Section 1509, 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.

3.11 Impact Resistance:

The EPDM, PVC, and TPO roofing membranes described in this report meet requirements for impact resistance in BNBC Section 1505.4.2, and SBC Section 1504.6, based on testing in accordance with FM 4470.

4.3.1 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.

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 8.0 of this report, subject to the following conditions:

See Sections 5.1 through 5.8, except revise Section 5.3 to read as follows:

5.3 Foam plastic insulation must be separated from the interior of the building by an approved thermal barrier in accordance with BNBC Section 2603.4.1.5, SBC Section 2603.5.1.5, and UBC Sections 2602.4 and 2602.5.3, as applicable.

Option 1

Membrane for Roofing Systems
as to External Fire Exposure
See UL Directory of Products Certified for Canada
and UL Roofing Materials and Systems Directory
60P6

Option 2

Membrane for Roofing Systems
as to External Fire Exposure
See UL Directory of Products Certified for Canada
and UL Roofing Materials and Systems Directory
60P6

FIGURE 1—INSPECTION AGENCY LABEL

TABLE 1—PRODUCT NAMES

CARLISLE PRODUCT NAME	MULE-HIDE PRODUCT NAME	WEATHERBOND PRODUCT NAME	VERSICO PRODUCT NAME	KELLY CO./ 2001 INC. PRODUCT NAME
Sure-Seal	Mule-Hide Standard EPDM	WeatherBond RBR EPDM Membrane	Versigard	-
Sure-Seal FR	Mule-Hide FR EPDM	WeatherBond RBR FR EPDM Membrane	Versigard Nonreinforced EPDM	C-EPDM-C
Sure-Tough Reinforced	Mule-Hide Standard Reinforced EPDM	WeatherBond RBR Standard Reinforced EPDM Membrane	Versigard Reinforced	C-EPDM-CR
Sure-Tough FR Reinforced	Mule-Hide FR Reinforced EPDM	-	VersigardFR Reinforced	C-EPDM-CR Type 1
Sure-White	Mule-Hide White-on-Black EPDM	WeatherBond RBR White EPDM Membrane	Versigard Nonreinforced EPDM -White	EPDM RF - White
Sure-Weld	Mule-Hide TPO-c	WeatherBond PRO TPO Membrane	Versiweld	Reinforced TPO / White TPO
Sure-Weld HS	Mule-Hide TPO-c (FR)	-	Versiweld ES	-
SAT-TPO	Mule-Hide SA-TPO	WeatherBond PRO PAS TPO	Versiweld QA TPO	-
Sure-Weld EXTRA	Mule-Hide TPO-c Extra	WeatherBond PRO TPO Membrane	Versiweld PLUS	-
Sure-Weld HS EXTRA	Mule-Hide TPO-c Extra (FR)	-	Versiweld ES PLUS	-
Sure-Weld FleeceBACK	Mule-Hide TPO-c Fleece Back	-	Versiweld VersiFleece	-
Sure-Flex	Mule-Hide PVC Membrane	WeatherBond PRO PVC	VersiFlex Reinforced PVC Membrane	-
Sure-Flex FRS	Mule-Hide FRS PVC Membrane	-	VersiFlex FRS Reinforced PVC Membrane	-
Sure-Seal 90-8-30A Bonding Adhesive	Mule-Hide Bonding Adhesive	WeatherBond RBR LC-60 Bonding Adhesive	G200SA Yellow Substrate Adhesive	2001 Inc. Bonding Adhesive
Sure-Seal Aqua Base 120 Bonding Adhesive	Mule-Hide Water-Based Bonding Adhesive	Aqua Base 120 Bonding Adhesive	Aqua Base 120 Bonding Adhesive	-
Sure-Weld Bonding Adhesive	Mule-Hide TPO-c Bonding Adhesive	WeatherBond PRO TPO Bonding Adhesive	Versiweld Bonding Adhesive	-
Sure-Weld Low VOC Bonding Adhesive	Mule-Hide TPO-c Low VOC Bonding Adhesive	-	Versiweld LOW VOC Bonding Adhesive	-
Sure-Flex PVC Bonding Adhesive	Mule-Hide PVC Bonding Adhesive	WeatherBond PRO PVC Bonding Adhesive	VersiFlex PVC Bonding Adhesive	-
Sure-Flex Low VOC PVC Bonding Adhesive	Mule-Hide Low VOC PVC Bonding Adhesive	-	VersiFlex Low VOC PVC Bonding Adhesive	-
FAST 100 Adhesive	Mule-Hide SP-100 Adhesive	-	FAST 100 Adhesive	-
FAST 100 LV Adhesive	Mule-Hide SP-100-LT Adhesive	-	FAST 100 LV Adhesive	-

TABLE 2—FIRE CLASSIFICATION ASSEMBLIES—ADHERED ROOFING SYSTEMS[2,5]

SYSTEM NO.	ROOF CLASS	DECK	BARRIER BOARD OR SLIP SHEET	INSULATION[1]	MEMBRANE/MAX. ROOF SLOPE
1	A	Noncombustible	–	Any of the following insulations, 1-inch min. to 6-inch max. thickness: Carlisle "SecurShield Polyiso", "Polyiso HP-H", Hunter Panels "H-Shield" or "H-Shield-CG"	Sure-Weld, Spectro-Weld - 1/4:12 Sure-Seal, Sure-Tough, Sure-White, Sure-Seal FleeceBACK, Sure-Weld HS, SAT-TPO, Sure-Weld FleeceBACK, Spectro-Weld FleeceBACK - 1/2:12 Sure-White FleeceBACK, Sure-Flex, Sure-Flex FRS - 3/4:12
2	A	Noncombustible	—	1/2-inch-thick fiberboard[4], 1/2-inch-thick fiberboard[4] or barrier board (see Section 3.6) over 5-inch max Insulfoam EPS[3], 1/2-inch-thick fiberboard or barrier board (see Section 3.6) over System No. 1 insulations	Sure-White FleeceBACK-3/4:12 Sure-Seal, Sure-Tough - 1:12 Sure-White, Sure-Seal FleeceBACK, Sure-Weld, Spectro-Weld, Sure-Weld HS, SAT-TPO, Sure-Weld FleeceBACK, Spectro-Weld FleeceBACK, Sure-Flex, Sure-Flex FRS - 1 1/2:12
3	A	Noncombustible or Combustible - min. 15/32-inch-thick plywood or min. 7/16-inch-thick OSB.	Barrier board (see Section 3.6)	—	Sure-White FleeceBACK-3/4:12 Sure-White, Sure-Seal FleeceBACK - 1 1/2:12 Sure-Tough, Sure-Weld, Spectro-Weld, Sure-Weld FleeceBACK, Spectro-Weld FleeceBACK - 3:12 Sure-Weld HS, SAT-TPO - 4:12 Sure-Seal FR, Sure-Flex, Sure-Flex FRS – unlimited slope
4	A	Combustible - min. 15/32-inch-thick plywood or min. 7/16-inch-thick OSB.	Barrier board (see Section 3.6) or Slip sheet: 2 layers (see Section 3.7)	Any of the following insulations, 1-inch min. to 6-inch max. thickness: Carlisle "SecurShield Polyiso", Polyiso HP-H", Hunter Panels "H-Shield" or "H-Shield-CG"	Sure-Weld, Spectro-Weld - 1/4:12 Sure-Seal, Sure-Tough, Sure-White, Sure-Seal FleeceBACK, Sure-Weld HS, SAT-TPO, Sure-Weld FleeceBACK, Spectro-Weld FleeceBACK - 1/2:12 Sure-White FleeceBACK, Sure-Flex, Sure-Flex FRS - 3/4:12
5	C	Combustible - min. 15/32-inch-thick plywood or min. 7/16-inch-thick OSB.	—	Any of the following insulations, 2-inch min. to 6-inch max. thickness: Carlisle "Polyiso HP-H" or Hunter Panels "H-Shield"	Sure-Weld, Spectro-Weld, Sure-Weld HS, SAT-TPO, Sure-Flex, Sure-Flex FRS – unlimited slope
6	A	Combustible	—	Single layer of minimum 3.0" or double layer of minimum 1.5" Carlisle "SecurShield Polyiso" or Hunter Panels "H-Shield-CG"	EPDM, PVC, and TPO Membranes - 1/2:12
7	B	Combustible	—	Single layer of minimum 1.9" Carlisle "SecurShield Polyiso" or Hunter Panels "H-Shield-CG"	EPDM, PVC, and TPO Membranes - 1/2:12

For **SI:** 1 inch = 25.4 mm.

[1] 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.
[2]See Section 3.10 for adhesive application rate.
[3]UL Classified EPS may be installed below min. 1-inch-thick Carlisle or Hunter Panels polyisocyanurate insulations (max slope1:12) or below min. 1/2-inch-thick Carlisle SecurShield HD or Hunter Panels H-Shield HD (max slope 2:12) on noncombustible decks.
[4]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.
[5]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 IBC Section 1510, IRC Section R907, BNBC Section 1512, SBC Section 1510 or UBC Appendix to Chapter 15, as applicable.

TABLE 3—FIRE CLASSIFICATION ASSEMBLIES—MECHANICALLY FASTENED ROOFING SYSTEMS[4]

SYSTEM NO.	ROOF CLASS	DECK	BARRIER BOARD OR SLIP SHEET	INSULATION[1]	MEMBRANE/MAX. ROOF SLOPE
1	A	Noncombustible	—	Any of the following insulations, 1-inch min. to 6-inch max. thickness: Carlisle "SecurShield Polyiso" or "Polyiso HP-H", Hunter Panels "H-Shield" or "H-Shield-CG"	Sure-Tough, Sure-Weld, Spectro-Weld, Sure-Flex, Sure-Flex FRS - $^1/_2$:12 Sure-Weld HS - 1$^1/_2$:12 Sure-Tough FR - 2:12
2	A	Noncombustible	—	$^1/_2$-inch-thick fiberboard[3], $^1/_2$-inch-thick fiberboard[4] or barrier board (see Section 3.6) over 5-inch max Insulfoam EPS[2], $^1/_2$-inch-thick fiberboard or barrier board (see Section 3.6) over System No. 1 insulations	Sure-Tough, Sure-Weld HS, Sure-Flex, Sure-Flex FRS - 1:12 Sure-Weld, Spectro-Weld - 1$^1/_2$:12 Sure-Tough FR - 3$^1/_2$:12
3	A	Noncombustible	—	To 5-inch max: Insulfoam SP	Sure-Weld, Spectro-Weld, Sure-Weld HS, Sure-Flex, Sure-Flex FRS - $^1/_2$:12
4	A	Noncombustible or Combustible - min. $^{15}/_{32}$-inch-thick plywood or min. $^7/_{16}$-inch-thick OSB.	Barrier board (see Section 3.6)	—	Sure-Tough, Sure-Weld, Spectro-Weld - 3:12 Sure-Tough FR - 3$^1/_2$:12 Sure-Weld HS, Sure-Flex, Sure-Flex FRS - unlimited
5	A	Combustible - min. $^{15}/_{32}$-inch-thick plywood or min. $^7/_{16}$-inch-thick OSB.	Barrier board (see Section 3.6) or Slip sheet: 2 layers, (see Section 3.7)	Any of the following insulations, 1-inch min. to 6-inch max. thickness: Carlisle "SecurShield Polyiso" or "Polyiso HP-H", Hunter Panels "H-Shield" or "H-Shield-CG"	Sure-Tough, Sure-Weld, Spectro-Weld, Sure-Flex, Sure-Flex FRS - $^1/_2$:12 Sure-Weld HS, 1$^1/_2$:12 Sure-Tough FR - 2:12
6	A	Combustible - min. $^{15}/_{32}$-inch-thick plywood or min. $^7/_{16}$-inch-thick OSB.	Slip sheet, 2 layers (see Section 3.7)	—	Sure-Tough - 1:12 Sure-Tough FR, Sure Weld, Spectro-Weld, Sure-Weld HS, Sure-Flex, Sure-Flex FRS - 1$^1/_2$:12
7	B	Combustible - min. $^{15}/_{32}$-inch-thick plywood or min. $^7/_{16}$-inch-thick OSB.	Slip sheet, 1 layer (see Section 3.7)	—	Sure-Tough, Sure-Tough FR, Sure-Weld, Spectro-Weld, Sure-Weld HS, Sure-Flex, Sure-Flex FRS - 1$^1/_2$:12
8	C	Combustible - min. $^{15}/_{32}$-inch-thick plywood or min. $^7/_{16}$-inch-thick OSB.	—	Any of the following insulations, 2-inch min. to 6-inch max. thickness: Carlisle "SecurShield Polyiso" or "Polyiso HP-H", Hunter Panels "H-Shield" or H-Shield CG"	Sure-Weld, Spectro-Weld, Sure-Weld HS, Sure-Flex, Sure-Flex FRS - unlimited
9	A	Combustible	—	Single layer of minimum 3-inch or double layer of minimum 1.5-inch Carlisle "SecurShield Polyiso" or Hunter Panels "H-Shield-CG"	EPDM, PVC, and TPO Membranes - $^1/_2$:12
10	B	Combustible	—	Single layer of minimum 1.9-inch Carlisle "SecurShield Polyiso" or Hunter Panels "H-Shield-CG" or single layer of an inverted G3 cap sheet.	EPDM, PVC, and TPO Membranes - $^1/_2$:12

For **SI:** 1 inch = 25.4 mm.

[1] 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.
[2]UL Classified EPS may be installed below min. 1-inch-thick Carlisle or Hunter Panels polyisocyanurate insulations (max slope1:12) or below min. $^1/_2$-inch-thick Carlisle SecurShield HD or Hunter Panels H-Shield HD (max slope 2:12) on noncombustible decks.
[3]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.
[4]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 IBC Section 1510, IRC Section R907, BNBC Section 1512, SBC Section 1510 or UBC Appendix to Chapter 15, as applicable.

TABLE 4—WIND RESISTANCE - MECHANICALLY FASTENED ASSEMBLIES[4,7]

SYSTEM NO.	MAXIMUM ALLOWABLE WIND UPLIFT (psf)	DECK[3]	INSULATION [5]	MEMBRANE	MEMBRANE FASTENING	MAXIMUM FASTENER SPACING (inches)	MAXIMUM FASTENER ROW SPACING[8]
1	45	Noncombustible	Foam plastic insulation[1,2], 1/2-inch-thick fiberboard[6] 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, Sure-Weld EXTRA, 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, Sure-Weld EXTRA, 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, Sure-Weld EXTRA, 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, Sure-Weld EXTRA, 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, Sure-Weld EXTRA, 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, Sure-Weld EXTRA, 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	HP-X Fasteners with Piranha Plates	6	6 ft 4 inches
14	83	Noncombustible	Same as System No. 1	Sure-Flex	HP-X Fasteners with Piranha Plates	6	2 ft 11 inches
15	30	Noncombustible	Same as System No. 1	Sure-Flex	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	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	HP-X Fasteners with Piranha Plates	12	2 ft 11 inches
18	45	Noncombustible	Same as System No. 1	Sure-Weld	HP-X Fasteners with OMG RhinoBond Plates	1 per 5.3 ft^2	N/A
19	60	Noncombustible	Same as System No. 1	Sure-Weld	HP-X Fasteners with OMG RhinoBond Plates	1 per 4 ft^2	N/A

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

[1]Foam plastic insulation must be any of the following (1-inch min. to 6-inch max. thickness): Carlisle “SecurShield Polyiso”,“Polyiso HP-H” Hunter Panels “H-Shield” or Hunter Panels “H-Shield- CG”.
[2]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.
[3]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'_c) of 2500 psi. See Section 5.6 of this report.
[4]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.
[5]UL Classified EPS may be installed below min. 1-inch-thick Carlisle or Hunter Panels polyisocyanurate insulations (max slope1:12) or below min. 1/2-inch-thick Carlisle SecurShield HD or Hunter Panels H-Shield HD (max slope 2:12) on noncombustible decks.
[6]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.

Table 4 footnotes cont'd

[7] 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 IBC Section 1510, IRC Section R907, BNBC Section 1512, SBC Section 1510 or UBC Appendix to Chapter 15, as applicable.
[8] Fastener row spaces shown are for field of roof only. See Section 4.3 for recognized fascia systems for mechanically fastened roof assemblies. The maximum allowable load for Carlisle SecurEdge 300 is 234 plf (348 kg/m). The maximum allowable load for Carlisle SecurEdge 3000 is 200 plf (298 kg/m). Distance between the edge of the roof and the first row of fasteners must be determined accordingly.

TABLE 5—WIND RESISTANCE – ADHERED ASSEMBLIES[5]

SYSTEM NO.	ALLOWABLE WIND UPLIFT (FIELD) (psf)	DECK[2]	INSULATION / MIN. THICKNESS[1,3]	INSULATION FASTENING RATE	MEMBRANE TYPE
1	45	Combustible or Noncombustible	1/2 inch fiberboard[4], 15/32 inch OSB, or barrier board (See Section 3.6)	1 per 2 ft^2	EPDM, PVC and TPO Membranes
2	45	Combustible or Noncombustible	Carlisle "Polyiso HP-H" 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^2	EPDM, PVC and TPO Membranes
3	45	Combustible or Noncombustible	Carlisle "Polyiso HP-H" 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^2	EPDM, PVC and TPO Membranes
4	68	Combustible or Noncombustible	Carlisle "Polyiso HP-H" or "SecurShield Polyiso"; Hunter Panels "H-Shield" or "H-Shield-CG" / 1.0 inch	FAST Adhesive	FleeceBACK Membranes
5	75	Combustible or Noncombustible	Carlisle "Polyiso HP-H" 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^2	EPDM, PVC and TPO Membranes
6	120	Combustible or Noncombustible	Carlisle "Polyiso HP-H" or "SecurShield Polyiso"; Hunter Panels "H-Shield" or "H-Shield-CG" / 2.0 inch	1 per 1 ft^2	TPO Membranes; EPDM membranes (with noncombustible deck only)
7	128	Combustible or Noncombustible	Carlisle "Polyiso HP-H" 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^2	EPDM and TPO Membranes
8	135	Combustible or Noncombustible	Carlisle "Polyiso HP-H" 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^2	FleeceBACK Membranes
9	143	Combustible or Noncombustible	1/2 inch DensDeck Prime	1 per 1 ft^2	FleeceBACK Membranes

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

[1] 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.
[2] 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'_c) of 2500 psi. See Section 5.6 of this report.
[3] UL Classified EPS may be installed below min. 1-inch-thick Carlisle or Hunter Panels polyisocyanurate insulations (max slope1:12) or below min. 1/2-inch-thick Carlisle SecurShield HD or Hunter Panels H-Shield HD (max slope 2:12) on noncombustible decks.
[4] 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.
[5] 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. For reroofing or recovering, installation must be in accordance with IBC Section 1510, IRC Section R907, BNBC Section 1512, SBC Section 1510 or UBC Appendix to Chapter 15, as applicable.