

ICC-ES Evaluation Report

ESR-2831

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A Subsidiary of the International Code Council®

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

Section: 07 54 00—Thermoplastic Membrane Roofing

Section: 07 54 23—Thermoplastic-Polyolefin Roofing

REPORT HOLDER:

FIRESTONE BUILDING PRODUCTS COMPANY, LLC

ADDITIONAL LISTEE:

**GENFLEX ROOFING SYSTEMS, A DIVISION OF
FIRESTONE BUILDING PRODUCTS COMPANY, LLC**

EVALUATION SUBJECT:

**FIRESTONE ULTRAPLY™ TPO, ULTRAPLY™ TPO XR,
ULTRAPLY™ TPO SA AND ULTRAPLY™ TPO FLEX
ADHERED SINGLE-PLY ROOFING MEMBRANES**

**ADDITIONAL LISTEE PRODUCT NAMES: GENFLEX EZ
TPO, EZ FLEECE BACKED TPO AND EZ TPO PEEL
AND STICK HW SINGLE-PLY ROOFING MEMBRANES**

1.0 EVALUATION SCOPE

Compliance with the following codes:

2018, 2015, 2012, 2009 and 2006 *International Building Code*® (IBC)

For evaluation for compliance with codes adopted by Los Angeles Department of Building and Safety (LADBS), see [ESR-2831 LABC Supplement](#).

Properties evaluated:

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

2.0 USES

Firestone UltraPly™ TPO (thermoplastic polyolefin), UltraPly™ TPO SA, UltraPly™ TPO XR and UltraPly™ TPO Flex Adhered single-ply roofing membranes are used as roof coverings in adhered and mechanically fastened membrane roofing systems.

3.0 DESCRIPTION

3.1 General:

The UltraPly™ TPO, UltraPly™ TPO SA, UltraPly™ TPO XR and UltraPly™ TPO Flex Adhered Membrane Roofing Systems described in this report consist of single-ply roofing

membranes complying with ASTM D6878, insulation where used, barrier board or slip sheet where used, flashing, mechanical fasteners and adhesives that are installed on a combustible or noncombustible deck. The corresponding names for GenFlex Roofing Systems products are specified in Table 1 of this report.

3.2 Membranes:

3.2.1 UltraPly™ TPO: A flexible thermoplastic polyolefin roofing membrane that is produced with a polyester weft inserted reinforcement. The membrane is available in white (tan or gray on special orders) and in 45-mil (1.1 mm), 60-mil (1.5 mm) and 80-mil (2 mm) thicknesses.

3.2.2 UltraPly™ TPO XR: A flexible thermoplastic polyolefin roofing membrane that is produced with a polyester weft inserted reinforcement and an 8-ounce, polyester backing. The membrane is available in white and in 45-mil (1.1 mm), 60-mil (1.5 mm) and 80-mil (2 mm) thicknesses.

3.2.3 UltraPly™ TPO SA: A flexible thermoplastic polyolefin membrane that is produced with a polyester weft inserted reinforcing and a factory applied pressure sensitive adhesive. The membrane is available in white, tan or gray and in 45-mil (1.1 mm) and 60-mil (1.5 mm) thicknesses.

3.2.4 UltraPly™ TPO Flex Adhered: A flexible thermoplastic polyolefin membrane that is produced with a polyester weft inserted reinforcement. The membrane is available in white and in 60-mil (1.5 mm) thickness.

3.3 Insulation:

Foam plastic insulation, where used, must have a flame-spread index of not more than 75 when tested in accordance with ASTM E84 or UL 723 at the maximum thickness intended for use. Polyisocyanurate and polystyrene rigid-cellular foam plastic thermal insulation specified in Tables 2 through 5 must comply, respectively, with ASTM C1289 or ASTM C578. Wood fiberboard insulation must comply with ASTM C208. See Tables 2 through 6 for insulations used with specific roof covering systems.

3.4 Barrier or Cover Board:

Barrier or cover board, where used, may be minimum 1/4-inch-thick (6.4 mm) G-P Gypsum Corporation “DensDeck® Roofboard” or “DensDeck Prime® Roofboard,” minimum 1/4-inch (6.4 mm) SECUROCK Gypsum-Fiber Roof Board, minimum 1/2-inch-thick (12.7 mm) gypsum board, minimum 1/2-inch-thick (12.7 mm) Firestone ISOGARD HD, or Firestone V-Force Vapor Barrier.

3.5 Fasteners, Plates, Bars:

Fasteners and stress plates used to attach barrier or cover board layer materials, insulation boards and the roof

covering membrane must be corrosion-resistant. Fasteners may be any of the insulation and membrane fasteners and plates summarized in this section (Section 3.5) or shown in Tables 4 through 6.

3.5.1 Firestone All-Purpose Fastener: An epoxy-coated steel screw used in combination with the Firestone Insulation Fastening Plate to attach roofing insulation and base sheets to steel and wood substrates. Fastener length must be sufficient to penetrate through the steel deck a minimum of $\frac{3}{4}$ inch (19 mm), and into the wood deck a minimum of 1 inch (25.4 mm).

3.5.2 Firestone Heavy-Duty: An epoxy-coated steel screw used in combination with the Firestone Insulation Fastening Plate to attach roofing insulation and base sheets to steel, wood and concrete decks. Fastener length must be sufficient to penetrate through the steel deck a minimum of $\frac{3}{4}$ inch (19 mm), and into the wood or concrete deck a minimum of 1 inch (25.4 mm).

3.5.3 Firestone Heavy Duty Plus: An epoxy-coated steel screw used in combination with the Firestone HD Plus Seam Plate to attach roofing insulation and base sheets to steel decks. Fastener length must be sufficient to penetrate through the steel deck a minimum of 1 inch (25.4 mm).

3.5.4 Firestone Concrete Drive Fastener: A nonthreaded hammer-in fastener, epoxy-coated, used with Firestone Insulation Plates to attach roofing insulation, base sheets and other accessories to structural concrete substrates. Fastener length must be sufficient to penetrate into the concrete deck a minimum of $1\frac{1}{4}$ inches (32 mm).

3.5.5 Firestone HD HailGard Fastener: An epoxy-coated steel screw used in roofing applications where HailGard insulation or an OSB or plywood overlay is used and fastened into steel, concrete or wood deck. Fastener length must be sufficient to penetrate through the steel deck a minimum of $\frac{3}{4}$ inch (19 mm), and into the wood or concrete deck a minimum of 1 inch (25.4 mm).

3.5.6 Firestone Insulation Fastening Plate: A 3-inch-diameter (76 mm) galvalume plate used in combination with fasteners, acceptable to Firestone, to secure insulation and base sheets to the roof deck.

3.5.7 Firestone HD Seam Plate: A $2\frac{3}{8}$ -inch-diameter (60 mm) galvalume plate used in combination with Firestone Heavy-Duty Fasteners to secure TPO membranes to the roof deck.

3.5.8 Firestone HD Plus Seam Plate: A $2\frac{3}{4}$ -inch-diameter (70 mm) galvalume plate used in combination with Firestone Heavy Duty Plus Fasteners to secure TPO membranes to the roof deck.

3.5.9 Firestone UltraPly™ TPO InvisiWeld Plate: A 3-inch diameter adhesive coated galvalume plate securing underlying insulation layer(s) to the roof deck with Firestone Heavy-Duty Fasteners, which uses a RF frequency bonding tool to bond the UltraPly™ TPO membrane to the plate.

3.5.10 Firestone Coiled Metal Batten Strip: A 1-inch wide (25.4 mm) by 220-ft long (67.06 m), galvalume AZ 55, batten strip used in combination with fasteners, acceptable to Firestone (see manufacturer's published product sheet).

3.5.11 Firestone UltraPly™ TPO InvisiWeld-S Plate: A 3-inch (76.2 mm) diameter adhesive coated galvalume plate securing underlying insulation layer(s) to the roof deck with Firestone Heavy-Duty Fasteners, which use an RF frequency bonding tool to bond the UltraPly™ TPO membrane to the plate.

3.6 Adhesives:

3.6.1 Firestone UltraPly™ Bonding Adhesive: A solvent-based contact adhesive designed for bonding Firestone UltraPly™ TPO membranes to approved insulations, wood, metal, masonry and other acceptable substrates. Unless specified differently in Table 4, the adhesive is applied to both the substrate and the underside of the membrane with coverage of approximately 45 to 60 square feet (4.18 to 5.58 m²) per gallon (3.78 L), total, for both the substrate and the membrane.

3.6.2 Firestone Single-Ply LVOC Bonding Adhesive 1168: A bonding adhesive designed for bonding UltraPly™ TPO roofing membrane and flashing to insulation, wood, metal, masonry and other substrates. Unless specified differently in Table 4, the adhesive is applied to both the substrate and the underside of the membrane with coverage of approximately 45 to 60 square feet (4.18 to 5.58 m²) per gallon (3.78 L), total, for both the substrate and the membrane.

3.6.3 Firestone Single-Ply LVOC Bonding Adhesive: A bonding adhesive designed for bonding UltraPly™ TPO roofing membrane and flashing to wood, metal, masonry and other substrates. Unless specified differently in Table 4, the adhesive is applied to both the substrate and the underside of the membrane with coverage of approximately 45 to 60 square feet (4.18 to 5.58 m²) per gallon (3.78 L), total, for both the substrate and the membrane.

3.6.4 Firestone XR Bonding Adhesive: A contact adhesive designed for bonding Firestone UltraPly™ TPO XR membranes to approved insulations, wood, metal, masonry and other acceptable substrates. Unless specified differently in Table 4, the adhesive is applied to the substrate only, at a nominal rate of 70 to 90 square feet (6.51 to 8.37 m²) per gallon (3.78 L).

3.6.5 Firestone I.S.O. Stick Insulation Adhesive: A two-component, low-rise, polyurethane insulation adhesive applied in beads designed for bonding roof insulations to allowable deck types in accordance with the application rates specified in Table 4.

3.6.6 Firestone I.S.O. Twin-Pack Insulation Adhesive: A two-component, low-rise, polyurethane insulation adhesive designed for bonding roof insulations, in accordance with Table 4.

3.6.7 Firestone I.S.O. Fix II Insulation Adhesive: A single component, moisture cured, polyurethane adhesive designed to attach approved roof insulation to approved substrates, in accordance with the application rates specified in Table 4.

3.6.8 Firestone Water Based Bonding Adhesive-P: A bonding adhesive designed for bonding UltraPly™ TPO roofing membrane and flashing to wood, metal, masonry and other substrates. Unless specified differently in Table 4, the adhesive is applied to both the substrate and the underside of the membrane with coverage of approximately 100 to 120 square feet (4.18 to 5.58 m²) per gallon (3.78 L), total, for both the substrate and the membrane.

3.6.9 Firestone I.S.O. Spray R: A two-component low rise polyurethane adhesive engineered to anchor approved roof insulation to approved substrates, adhere multiple layers of insulation, or adhere fleece backed UltraPly™ TPO XR membrane to approved substrates, in accordance with the application rates specified in Table 4.

3.6.10 Firestone XR Stick: A two-component low rise polyurethane adhesive designed to adhere fleece backed UltraPly™ TPO XR membrane to approved substrates, in accordance with the application rates specified in Table 4.

3.6.11 Firestone Twin Jet: A two-component, low-rise polyurethane adhesive designed for bonding of roof insulations or adhered fleece backed UltraPly™ TPO XR membrane to approved substrates, in accordance with the application rates specified in Table 4.

3.7 Seam Accessories and Primers:

3.7.1 Firestone UltraPly™ QuickSeam R.M.A. Strips: A 10-inch-wide (254 mm) TPO membrane with two 3-inch-wide (76.2 mm) strips of QuickSeam Tape laminated to it along its length. Used in mechanically fastened assemblies as additional reinforcement.

3.7.2 Firestone Single-Ply QuickPrime Primer: A solvent-based primer designed for cleaning and priming membranes prior to the application of QuickSeam accessories. The primer is applied at a rate of 200 to 250 square feet per gallon (5 to 6 square meters per liter) for a one-sided application.

3.7.3 Firestone Single-Ply LVOC Primer: A solvent-based primer designed for cleaning and priming membranes prior to the application of QuickSeam accessories. The primer is applied at a rate of 200 to 250 square feet per gallon (5 to 6 square meters per liter) for a one-sided application.

3.7.4 Firestone SA-Solvent Based (SB) Primer: A solvent-based primer designed for cleaning and preparing substrate prior to the application of V-Force vapor barrier membrane. Application rate is dependent on substrate type (see manufacturer's published instruction guide). The primer is available in 5 gallon pails and has a shelf-life of 2 years when stored in unopened containers between 50°F – 80°F (10°C – 27°C).

3.8 Impact Resistance:

The Firestone UltraPly™ TPO, UltraPly™ TPO SA, UltraPly™ TPO XR and UltraPly™ TPO Flex Adhered Membrane Roofing Systems described in this report comply with requirements for impact resistance in accordance with Section 4.6 of FM 4470.

4.0 INSTALLATION

4.1 General:

Installation of the UltraPly™ TPO, UltraPly™ TPO SA, UltraPly™ TPO XR and UltraPly™ TPO Flex Adhered 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 on the jobsite at all times during installation.

The slope of the roof on which the single-ply membranes are installed must be a minimum of 1/4:12 (2 percent slope) and 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 weathertight in accordance with the requirements of the membrane manufacturer and IBC Section 1503.2.

4.2 Fire Classification:

4.2.1 New Construction: Roof covering systems described in Tables 2 and 3, when installed in accordance with this report, are classified as Class A or B roof covering systems in accordance with ASTM E108 or UL 790.

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 and existing roofing classification:

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

4.3 Wind Uplift Resistance:

4.3.1 New Construction: The allowable wind uplift pressures for the single-ply roof covering systems described in this report are noted in Tables 4 through 6. Metal edge securement systems must be listed in accordance with the 2011 edition of ANSI/SPRI/FM4435 ES-1, and designed and installed for wind loads in accordance with 2018 and 2015 IBC Section 1504.5 and IBC Chapter 16 [2003 edition of ANSI/SPRI ES-1, and designed and installed in accordance with 2012, 2009 and 2006 IBC Section 1504.5 and 2012, 2009 and 2006 IBC Chapter 16].

4.3.2 Reroofing: Roof covering systems employing mechanical fasteners must be qualified, to the satisfaction of the code official, as to the adequacy of fasteners penetrating through existing roof coverings into structural substrates. Since the composition and/or condition of any particular underlying existing roofing material may vary widely, reroofing with adhered systems is outside the scope of this report.

5.0 CONDITIONS OF USE

The single-ply roofing membranes described in this report comply with, or are suitable alternatives to what is specified in, those codes indicated in Section 1.0 of this report, subject to the following conditions:

- 5.1** Installation of the roofing systems must comply with the IBC, the manufacturer's published installation instructions and this report. The instructions within this report govern if there are any conflicts between the manufacturer's published installation instructions and this report.
- 5.2** The single-ply roof covering systems must be installed only by applicators approved by Firestone Building Products Company, LLC.
- 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.
- 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** Above-deck thermal insulation board must comply with the applicable standards listed in Table 1508.2 of the IBC.
- 5.6** Design wind uplift pressure on any roof area, including edge and corner zones, must not exceed the allowable wind pressure for the system installed in that particular area. Refer to the allowable wind uplift pressure for roof coverings as listed in Tables 4 through 6.
- 5.7** The allowable wind uplift pressures listed in Tables 4 through 6 are for the roof covering only. The deck and framing to which the roof covering is attached must be designed for the applicable components and cladding wind loads in accordance with the IBC.

- 5.8 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.
- 5.9 Calculations demonstrating that the required wind resistance is less than the allowable wind resistance must be submitted to the code official.
- 5.10 UltraPly™ TPO roofing membranes are manufactured in Tuscumbia, Alabama and Wellford, South Carolina under a quality control program with inspections by ICC-ES.
- 5.11 UltraPly™ TPO XR roofing membranes are manufactured in Tuscumbia, Alabama, under a quality program with inspections by ICC-ES.
- 5.12 UltraPly™ TPO SA roofing membranes are manufactured in Tuscumbia, Alabama, under a quality program with inspections by ICC-ES.
- 5.13 UltraPly™ TPO Flex Adhered roofing membranes are manufactured in Tuscumbia, Alabama, under a quality program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Membrane Roof-covering Systems (AC75), dated July 2010 (Editorially revised March 2018).

7.0 IDENTIFICATION

- 7.1 The roof covering membranes (UltraPly™ TPO, UltraPly™ TPO XR, UltraPly™ TPO SA and UltraPly™ TPO Flex Adhered) are identified with a label indicating the company name (Firestone Building Products Company, LLC, or GenFlex Roofing Systems, A Division of Firestone Building Products Company, LLC), the product name, and the evaluation report number (ESR-2831).
- 7.2 The report holder's contact information is the following:
FIRESTONE BUILDING PRODUCTS COMPANY, LLC
200 4th AVENUE SOUTH
NASHVILLE, TENNESSEE 37201
(317) 845-3875
www.firestonebpco.com
- 7.3 The Additional Listees' contact information is the following:
GENFLEX ROOFING SYSTEMS, A DIVISION OF FIRESTONE BUILDING PRODUCTS COMPANY, LLC
200 4th AVENUE SOUTH
NASHVILLE, TENNESSEE 37201
(800) 428-4442
www.genflex.com

TABLE 1—PRODUCT TRADE NAMES

FIRESTONE BUILDING PRODUCTS COMPANY, LLC	GENFLEX ROOFING SYSTEMS A DIV. OF FIRESTONE BUILDING PRODUCTS COMPANY, LLC
MEMBRANES	
UltraPly™ TPO	EZ TPO
UltraPly™ TPO XR	EZ Fleece Backed TPO
UltraPly™ TPO SA	EZ TPO Peel and Stick HW
UltraPly™ TPO Flex Adhered	-
INSULATION BOARDS	
ISO 95+ GL	GenFlex ISO Insulation
ISO 95+ GL Tapered	GenFlex ISO Insulation Tapered
ISOGARD HD	GenFlex HD ISO
ISOGARD HD Composite	GenFlex HD Composite ISO
RESISTA	Coated Glass Facer (flat)
RESISTA Tapered	Coated Glass Facer (tapered)
FASTENING COMPONENTS	
UltraPly Bonding Adhesive	EZ TPO Bonding Adhesive
Single-Ply LVOC Bonding Adhesive 1168	EZ TPO Bonding Adhesive LVOC 1168
Single-Ply LVOC Bonding Adhesive	EZ TPO Bonding Adhesive LVOC
Firestone XR Bonding Adhesive	GenFlex Fleece Backed Bonding Adhesive
Firestone I.S.O. Twin-Pack Insulation Adhesive	GenFlex One Step Insulation Adhesive
Firestone I.S.O. Stick™ Insulation Adhesive	GenFlex I.S.O. Bond Insulation Adhesive
Firestone Twin Jet	GenFlex Quick Dual
Firestone All-Purpose Fastener	GenFast AP Fastener
Firestone Heavy-Duty	GenFlex Heavy Duty
Firestone Heavy-Duty Plus	GenFlex Heavy Duty Plus
Firestone Concrete Drive Fastener	GenFast Concrete Drive
Firestone HD HailGard Fastener	GenFast HailGard Fastener
Firestone Insulation Fastening Plate	GenFast 3" Round Insulation Plate
Firestone HD Seam Plate	GenFlex HD Seam Plate
Firestone HD Plus Seam Plate	GenFlex HD Plus Seam Plate
OTHER	
Firestone QuickSeam R.M.A. Strips	GenFlex TPO Peel & Stick RMA
Firestone Single-Ply QuickPrime Primer	GenFlex Clear Primer
Firestone Single-Ply LVOC Primer	GenFlex All-Purpose LVOC Primer

TABLE 2—FIRE CLASSIFICATION ASSEMBLIES —ADHERED ROOF COVERING SYSTEMS⁴

SYSTEM NO.	ROOF CLASS	DECK ²	MAX. ROOF SLOPE	INSULATION ¹	BARRIER OR COVER BD./ BASE/PLY SHEET	MEMBRANE
1	A	Noncombustible	1/4:12	(Optional) UL-classified polyisocyanurate, any thickness	1/2-inch thick "ISOGARD HD"	UltraPly™ TPO
2	A	Noncombustible	1/4:12	(Optional) Min. 1-inch to max. 4-inch-thick Firestone "ISO 95 + GL"	---	UltraPly™ TPO
3	A	Combustible	2 1/2:12	(Optional) Min. 1 1/2-inch thick Firestone "ISO 95+ GL"	1/2-inch thick "DensDeck"	UltraPly™ TPO
4	A	Noncombustible	1:12	---	---	UltraPly™ TPO XR ³
5	A	Combustible	1:12	(Optional) UL-classified foam plastic insulation, any thickness	Min. 1/4-inch thick "DensDeck", "DensDeck Prime" or "DensDeck DuraGuard"	UltraPly™ TPO XR
6	B	Combustible	1/4:12	(Optional) Min. 1-inch-thick Firestone "ISO 95 + GL"	1/2-inch thick "ISOGARD HD"	UltraPly™ TPO
7	B	Noncombustible	1:12	UL-classified foam plastic insulation, any thickness	Min. 7/16-inch thick APA-rated OSB	UltraPly™ TPO XR
8	B	Noncombustible	1:12	Min. 1-inch-thick Firestone "ISO 95 + GL"	Two plies, Type G2 "MB Base Sheet", 1 ply "APP 170", 1 ply "APP 180FR"	UltraPly™ TPO XR
9	Existing Class A, B or C system to retain existing classification.	Combustible	1/2:12	Existing Class A, B or C uninsulated BUR system (mineral surfaced cap sheet)	---	UltraPly™ TPO XR
10	A	Combustible	1/4:12	(Optional) Firestone "ISO 95+ GL", any thickness	Min. 1-inch-thick ISOGARD HD (offset 6 inches from joints in deck) or min. 1-inch- thick RESISTA	UltraPly™ TPO

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

¹All foam plastic insulation must be UL classified and 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.

²Wood deck must be minimum 5/32-inch-thick (11.9 mm) plywood. Steel deck must be minimum No. 22 gage galvanized steel [0.030 inch (0.76 mm)]. Concrete must have a minimum compressive strength (f_c) of 2500 psi.

³Membrane to be adhered directly to structural concrete with hot asphalt.

⁴Adhesive and adhesive application rate to be as specified in Section 3.6.

TABLE 3—FIRE CLASSIFICATION ASSEMBLIES—MECHANICALLY FASTENED ROOF COVERING SYSTEMS

SYSTEM NO.	ROOF CLASS	DECK ²	MAX. ROOF SLOPE	INSULATION ¹	BARRIER OR COVER BD./ BASE/PLY SHEET	MEMBRANE
1	A	Combustible	4:12	(Optional) Firestone "ISO 95 + GL", any thickness	Min. 1/4-inch thick "DensDeck"	UltraPly™ TPO
2	A	Noncombustible	1/2:12	Min. 1-inch-thick "ISO 95+GL"	(Optional) 1/2-inch-thick ISOGARD HD	UltraPly™ TPO
3	A	Noncombustible	3/4:12	(Optional) UL-classified foam plastic insulation, any thickness.	1/2-inch thick "ISOGARD HD"	UltraPly™ TPO
4	B	Combustible	1/2:12	(Optional) Min. 1-inch-thick Firestone "ISO 95 + GL"	1/2-inch thick "ISOGARD HD"	UltraPly™ TPO
5	A	Combustible	1/2:12		1/2-inch-thick "ISOGARD HD"	UltraPly™ TPO
6	A	Combustible	1/4:12	(Optional) Firestone "ISO 95+ GL", any thickness	Min. 1-inch-thick RESISTA	UltraPly™ TPO

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

¹All foam plastic insulation must be UL classified and 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.

²Wood deck must be minimum 15/32-inch-thick (11.9 mm) plywood. Steel deck must be minimum No. 22 gage galvanized steel [0.030 inch (0.76 mm)]. Concrete must have a minimum compressive strength (f_c) of 2500 psi.

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS

SYSTEM NO.	DECK ³	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
W-1	Wood	(a) Min. 1.2-inch to max. 4-inch-thick Firestone "ISO 95 + GL" or (b) min. 2-inch to max. 4-inch-thick Firestone HailGard	(a) Loose-laid or (b) HD HailGard fastener @ 2.6 ft ² per fastener	⁷ / ₁₆ -inch-thick OSB (Omit for HailGard insulation)	HD HailGard fastener @ 2.6 ft ² per fastener	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive or Single-Ply LVOC Bonding Adhesive 1168	45
W-2	Wood	---	---	Min. ¹ / ₄ -inch thick DensDeck Prime or min. ¹ / ₄ -inch thick SECUROCK Gypsum Fiber-Roof Board Min. ¹ / ₄ -inch-thick to max. ⁵ / ₈ -inch thick DensDeck Prime Min. ¹ / ₄ -inch thick SECUROCK Gypsum Fiber-Roof Board	Heavy-duty Fastener & Insulation Fastening Plate @ 1 per 1.33 ft ²	UltraPly™ TPO UltraPly™ TPO Flex Adhered UltraPly™ TPO XR UltraPly™ TPO SA UltraPly™ TPO XR	UltraPly™ Bonding Adhesive or Single-Ply LVOC Bonding Adhesive, Water Based Bonding Adhesive P, Single-Ply LVOC 1168 UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive or Single-Ply LVOC Bonding Adhesive 1168 XR Stick or I.S.O. Spray R ³ / ₄ -inch to 1-inch ribbons @ 12 inches o.c., XR Bonding Adhesive, PermaMop at 20-25 lbs./100 ft ² , or hot asphalt Self-adhered Twin Jet ³ / ₄ -inch to 1-inch ribbons at 4 inches o.c. or spatter applied at a rate of 0.318 gal./sq. Twin Jet ³ / ₄ -inch to 1-inch ribbons at 12 inches o.c. or spatter applied at a rate of 0.318 gal./sq.	60

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
W-3	Wood	-	-	Min. 1/4-inch-thick DensDeck Prime or min 1/4-inch-thick SECUROCK Gypsum-Fiber Roof Board	I.S.O. Fix II applied in 1.5-inch wide ribbons spaced @ 6 inches o.c. or I.S.O. Spray R applied in 3/4-inch to 1-inch wide ribbons @ 12 inches o.c.	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly Bonding Adhesive, Single-Ply LVOC Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168	53
						UltraPly™ TPO XR	XR Stick or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @ 12 inches o.c., XR Bonding Adhesive @ 70-90 ft ² per gallon, PermaMop at 20-25 lbs/100 ft ² , or hot asphalt	
						UltraPly™ TPO SA	Self-adhered	
				UltraPly™ TPO XR		Twin Jet 3/4-inch to 1-inch ribbons at 12 inches o.c. or spatter applied at a rate of 0.318 gal./sq.		
						Twin Jet 3/4-inch to 1-inch ribbons at 4 inches o.c. or spatter applied at a rate of 0.318 gal./sq.		
W-4	Wood	Min. 1-inch-thick RESISTA, min. or 1.5-inch-thick "ISO 95+ GL"	All-Purpose Fastener and Insulation Fastening Plate @ 1.33 ft ² per fastener	—	—	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168, or Single-Ply LVOC Bonding Adhesive	53
						UltraPly™ TPO XR	XR Stick 3/4-inch to 1-inch ribbons @ 6 inches oc. or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @ 12 inches o.c.	
						UltraPly™ TPO SA	Self-adhered	
		UltraPly™ TPO XR				Twin Jet 3/4-inch to 1-inch ribbons @ 6 inches o.c or spatter applied at a rate of 0.318 gal./sq.		
						Twin Jet 3/4-inch to 1-inch ribbons @ 4 inches o.c. or spatter applied at a rate of 0.318 gal./sq.		
		Min. 1-inch-thick RESISTA						
		Min. 1.5-inch-thick to max 36 inch-thick "ISO 95+ GL"						

SYSTEM NO.	DECK ³	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
W-5	Wood	Min. 1-inch-thick RESISTA or min. 1.5-inch-thick "ISO 95+ GL"	All-Purpose Fastener and Insulation Fastening Plate @ 1.78 ft ² per fastener	—	—	UltraPly™ TPO or UltraPLY™ TPO Flex Adhered	UltraPly Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168, or Single-Ply LVOC Bonding Adhesive	38
						UltraPly™ TPO XR	XR Stick 3/4-inch to 1-inch ribbons @ 6 inches o.c. or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @ 12 inches o.c.	
		UltraPly™ TPO SA				Self-adhered		
		UltraPly™ TPO XR				Twin Jet 3/4-inch to 1-inch ribbons @ 6 inches o.c or spatter applied at a rate of 0.318 gal./sq.		
Twin Jet 3/4-inch to 1-inch ribbons @ 4 inches o.c. or spatter applied at a rate of 0.318 gal./sq.								

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
W-6	Wood	—	—	Min. 1/4-inch-thick DensDeck Prime or min. 1/4-inch-thick SECUROCK Gypsum-Fiber Roof Board	All-Purpose Fastener and Insulation Fastener Plate @ 1.6 ft ² per fastener	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive, or Single-Ply LVOC Bonding Adhesive 1168	45
						UltraPly™ TPO XR	XR Stick 3/4-inch to 1-inch ribbons @ 6 inches o.c. or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @ 12 inches o.c. or XR Bonding Adhesive, Owens Corning PermaMop @ 20-25 lbs/100 ft ² , or hot asphalt	
				UltraPly™ TPO SA		Self-adhered		
				UltraPly™ TPO XR		Twin Jet 3/4-inch to 1-inch ribbons @ 4-inches o.c. or spatter applied at a rate of 0.318 gal./sq.		
Twin Jet 3/4-inch to 1-inch ribbons @ 6 inches o.c. or spatter applied at a rate of 0.318 gal./sq.								
W-7	Wood	—	—	Min. 1/2-inch-thick DensDeck Prime or min. 1/2-inch-thick SECUROCK Gypsum-Fiber Roof Board	All-Purpose Fastener and Insulation Fastener Plate @ 1.78 ft ² per fastener	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168	45
						UltraPly™ TPO XR	XR Stick 3/4-inch to 1-inch ribbons @ 6 inches o.c. or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @ 12 inches o.c. or XR Bonding Adhesive, Owens Corning PermaMop @ 20-25 lbs/100 ft ² , or hot asphalt	
				UltraPly™ TPO SA		Self-adhered		
				UltraPly™ TPO XR		Twin Jet 3/4-inch to 1-inch ribbons @ 4-inches o.c. or spatter applied at a rate of 0.318 gal./sq.		
Twin Jet 3/4-inch to 1-inch ribbons @ 6 inches o.c. or spatter applied at a rate of 0.318 gal./sq.								
				Min. 1/8-inch thick DensDeck Prime				
				Min. 1/4-inch-thick SECUROCK Gypsum-Fiber Roof Board				

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
W-8	Wood	—	—	Min. 1/2-inch-thick SECUROCK Gypsum-Fiber Board	All-Purpose Fastener and Insulation Fastening Plate @ 1.45 ft ² per fastener	UltraPly™ TPO	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168 or Water Based Bonding Adhesive P	60
						UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive or Single-Ply LVOC Bonding Adhesive 1168	
						UltraPly™ TPO XR	XR Stick or Twin Jet 3/4-inch to 1-inch ribbons @ 6 inches o.c. or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @12 inches o.c. or XR Bonding Adhesive, Owens Corning PermaMop @ 20-25 lbs/100 ft ² , or hot asphalt or Twin Jet applied at a rate of 0.318 gal./sq.t	
						UltraPly™ TPO SA	Self-adhered	
W-9	Wood	—	—	Min. 1/4-inch-thick SECUROCK Gypsum-Fiber Board	I.S.O. Spray R, 3/4-inch to 1-inch wide ribbons @ 6 inches o.c.	UltraPly™ TPO	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168 or Water Based Bonding Adhesive	90
						UltraPly TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive or Single-Ply LVOC Bonding Adhesive 1168	
						UltraPly™ TPO XR	I.S.O. Spray R, 3/4-inch to 1-inch ribbons @12 inches o.c. or XR Bonding Adhesive, Owens Corning PermaMop @ 20-25 lbs/100 ft ² , or hot asphalt	
						UltraPly™ TPO SA	Self-adhered	

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
W-10	Wood	Min. 2-inch-thick RESISTA or "ISO 95+ GL"	Heavy Duty Fasteners and Insulation Fastening Plates @ 4 ft ² per fastener	—	—	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168, or Water Based Bonding Adhesive P	45
						UltraPly™ TPO XR	XR Stick or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @12 inches o.c.	
						UltraPly™ TPO SA	Self-adhered	
		UltraPly™ TPO XR				Twin Jet 3/4-inch to 1-inch ribbons @ 12 inches o.c. or spatter applied at a rate of 0.318 gal./sq.		
Twin Jet 3/4-inch to 1-inch ribbons @ 4-inches o.c. or spatter applied at a rate of 0.318 gal.sq.								
W-11	Wood	Min. 1.5-inch-thick ISOGARD HD Composite	All-Purpose Fastener and Insulation Fastening Plate @ 2.67 ft ² per fastener	—	—	UltraPly™ TPO or UltraPLY™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168, or Single-Ply LVOC Bonding Adhesive	45
						UltraPly™ TPO XR	XR Stick or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @12 inches o.c.	
						UltraPly™ TPO SA	Self-adhered	

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
S-1	Steel	Min. 1.5-inch to max. 4-inch-thick ISOGARD HD Composite	All-Purpose Fastener & Insulation Fastening Plate @ 1.33 ft ² per fastener	---	---	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168 or Single-Ply LVOC Bonding Adhesive to substrate and underside of membrane @ 120 ft ² per gallon	90
						UltraPly™ TPO XR	XR Stick or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @ 12 inches o.c.	
						UltraPly™ TPO SA	Self-adhered	
S-2	Steel	Min. 1.5-inch to max 4-inch thick Firestone "ISO 95 +GL,"	All-Purpose Fastener & Insulation Fastening Plate @ 1.33 ft ² per fastener	-	-	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168 or Single-Ply LVOC Bonding Adhesive to substrate and underside of membrane @ 120 ft ² per gallon	90
						UltraPly™ TPO XR	XR Stick or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @ 12 inches o.c. or Twin Jet 3/4-inch to 1-inch ribbons @ 6-inches o.c.	
						UltraPly™ TPO SA	Twin Jet spatter applied at a rate of 0.318 gal./sq. Self-adhered	
S-3	Steel	Min. 1.5-inch to max 4-inch thick Firestone RESISTA	All-Purpose Fastener & Insulation Fastening Plate @ 1.33 ft ² per fastener	-	-	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168 or Single-Ply LVOC Bonding Adhesive to substrate and underside of membrane @ 120 ft ² per gallon	90
						UltraPly™ TPO XR	XR Stick or I.S.O. Spray R, or Twin Jet 3/4-inch to 1-inch ribbons @ 12 inches o.c.	
						UltraPly™ TPO SA	Twin Jet spatter applied at a rate of 0.318 gal./sq. Self-adhered	

SYSTEM NO.	DECK ³	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
S-4	Steel	Min 1.5-inch-thick ISOGARD HD Composite	All-Purpose Fastener & Insulation Fastening Plate @ 1.6 ft ² per fastener	---	---	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168 or Single-Ply LVOC Bonding Adhesive	75
						UltraPly™ TPO XR	XR Stick or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @ 12 inches o.c.	
						UltraPly™ TPO SA	Self-adhered	
S-5	Steel	Min. 2-inch to max. 4-inch-thick Firestone "ISO 95+ GL"	All-Purpose Fastener & Insulation Fastening Plate @ 1.6 ft ² per fastener	-	-	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168 or Single-Ply LVOC Bonding Adhesive	75
						UltraPly™ TPO XR	XR Stick or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @ 12 inches o.c. or Twin Jet 3/4-inch to 1-inch ribbons @ 6-inches o.c	
						UltraPly™ TPO SA	Twin Jet spatter applied at a rate of 0.318 gal/sq. Self-adhered	
S-6	Steel	Min. 2-inch to max. 4-inch-thick Firestone RESISTA,	All-Purpose Fastener & Insulation Fastening Plate @ 1.6 ft ² per fastener	-	-	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168 or Single-Ply LVOC Bonding Adhesive	75
						UltraPly™ TPO XR	XR Stick or I.S.O. Spray R, or Twin Jet 3/4-inch to 1-inch ribbons @ 12 inches o.c	
						UltraPly™ TPO SA	Twin Jet. or spatter applied at a rate of 0.318 gal./sq Self-adhered	

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)	
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹		
S-7	Steel	Min. 1.5-inch to max. 4-inch-thick Firestone "ISO 95+ GL" or RESISTA	All-Purpose Fastener & Insulation Fastening Plate @ 2 ft ² per fastener	Min. 1/4-inch thick or SECUROCK Gypsum-Fiber Roof Board	I.S.O. Twin Pack Insulation Adhesive 1/2- to 3/4-inch beads, or I.S.O. Fix II, I.S.O. Stick, Twin Jet, or I.S.O. Spray R 3/4-inch to 1-inch beads @ 12 inches o.c.	UltraPly™ TPO or UltraPly™ TPO Flex Adhered	UltraPly Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168 or, Water Based Bonding Adhesive P	45	
						UltraPly™ TPO XR	XR Stick, Twin Jet or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @ 12 inches o.c. or XR Bonding Adhesive, Owens Corning PermaMop @ 20-25 lbs/100 ft ² , or hot asphalt, or Twin Jet applied at a rate of 0.318 gal./sq.		
						UltraPly™ TPO SA	Self-adhered		
S-8	Steel	Min. 1/2-inch "ISO 95+ GL" or RESISTA	Loose Laid	Min. 1/2-inch DensDeck Prime or SECUROCK Gypsum-Fiber Roof Board	All-Purpose Fastener or All-Purpose S Fastener & Insulation Fastening Plate @ 2.67 ft ² per fastener	UltraPly™ TPO and UltraPly™ TPO Flex Adhered	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168	45	
						UltraPly™ TPO XR	XR Stick or I.S.O. Spray R, 3/4-inch to 1-inch ribbons @ 12 inches o.c. or XR Bonding Adhesive, Owens Corning PermaMop @ 20-25 lbs/100 ft ² , or hot asphalt		
				UltraPly™ TPO SA		Self-adhered	45?		
				UltraPly™ TPO XR		Twin Jet 3/4-inch to 1-inch ribbons @ 6 inches o.c. or spatter applied at a rate of 0.318 gal./sq.			
				Min. 1/2-inch to max 5/8-inch thick DensDeck Prime				45?	
				Min. 1/2-inch thick SECUROCK Gypsum-Fiber Roof Board					45?

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	VAPOR BARRIER	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
			TYPE ^{1,2}	ATTACHMENT ¹	TYPE ¹	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
C-1	Concrete	Firestone SBS PolyTorch or Glass Torch Base, torch adhered.	One or 2 layers of 1.5-inch-thick Firestone "ISO 95 + GL" or RESISTA	I.S.O. Twin Pack Insulation Adhesive 1/2- to 3/4-inch ribbons at 12 inches o.c.	Min. 1/4-inch-thick DensDeck Prime, or SECUROCK Gypsum-Fiber Roof Board	I.S.O. Twin Pack Insulation Adhesive 1/2 to 3/4-inch, I.S.O. Fix II, Twin Jet or I.S.O. Stick 3/4 to 1-inch ribbons at 12 inches o.c	UltraPly™ TPO	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168, Water Based Bonding Adhesive P or Single-Ply LVOC Bonding Adhesive	232
							UltraPly™ TPO XR	XR Stick 3/4 to 1-inch ribbons @ 6inches o.c. or XR Bonding Adhesive, Owens Corning PermaMop at 20-25 lbs/100 ft ² , or hot asphalt	
							UltraPly™ TPO SA	Self-adhered	
							UltraPly™ TPO XR	Twin Jet 3/4-inch to 1-inch ribbons @ 4 inches o.c. or spatter applied at a rate of 0.318 gal./sq.	
								Twin Jet 3/4-inch to 1-inch ribbons @ 6 inches o.c. or spatter applied at a rate of 0.318 gal./sq.	
C-2	Concrete	---	Min. 1.5-inch to max. 4-inch-thick Firestone "ISO 95 + GL" or RESISTA	I.S.O. Twin Pack Insulation Adhesive 1/2- to 3/4-inch ribbons at 12 inches o.c.	---	---	UltraPly™ TPO	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168 or Single-Ply LVOC Bonding Adhesive	165
							UltraPly™ TPO XR	XR Stick 3/4 to 1-inch ribbons @ 6 inches o.c. or I.S.O. Spray R 3/4 to 1-inch ribbons @ 12 inches o.c.	
			UltraPly™ TPO SA				Self-adhered		
			UltraPLY™ TPO XR				Twin Jet 3/4-inch to 1-inch ribbons @ 4 inches o.c. or spatter applied at a rate of 0.318 gal./sq.		
							Twin Jet 3/4-inch to 1-inch ribbons @ 6 inches o.c. or spatter applied at a rate of 0.318 gal./sq.		
			Min. 1.5-inch to max. 4-inch-thick Firestone "ISO 95 + GL"						
			Min. 1.5-inch to max. 4-inch-thick RESISTA						

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
C-3	Concrete	Min. 1.5-inch to max. 4-inch-thick Firestone "ISO 95 + GL" or RESISTA	Hot asphalt, full mopping	Min. 1/4-inch-thick DensDeck Prime, or SECUROCK Gypsum-Fiber Roof Board	Hot asphalt, full mopping	UltraPly™ TPO	UltraPly™ Bonding Adhesive or Single-Ply LVOC Bonding Adhesive 1168	195
						UltraPly™ TPO XR	XR Stick 3/4 to 1-inch ribbons @ 6 inches o.c. or XR Bonding Adhesive, PermaMop at 20-25 lbs/100 ft ² , or hot asphalt	
						UltraPly™ TPO SA	Self-adhered	
						UltraPly™ TPO XR	Twin Jet 3/4-inch to 1-inch ribbons @ 4 inches o.c. or spatter applied at a rate of 0.318 gal./sq.	
Twin Jet 3/4-inch to 1-inch ribbons @ 6 inches o.c. or spatter applied at a rate of 0.318 gal./sq.								
C-4	Concrete	Min. 1.5-inch to max. 4-inch-thick Firestone "ISO 95 + GL" or RESISTA	Hot asphalt, full mopping	---	---	UltraPly™ TPO	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive 1168 or Single-Ply LVOC Bonding Adhesive	180
						UltraPly™ TPO XR	XR Stick 3/4 to 1-inch ribbons @ 6 inches o.c. or I.S.O. Spray R 3/4 to 1-inch ribbons @ 12 inches o.c.	
	UltraPly™ TPO SA	Self-adhered						
	UltraPly™ TPO XR	Twin Jet 3/4-inch to 1-inch ribbons @ 6 inches o.c. or spatter applied at a rate of 0.318 gal./sq.						
	Concrete	Min. 1.5-inch to max. 4-inch-thick RESISTA						

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	VAPOR BARRIER	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)	
			TYPE ^{1,2}	ATTACHMENT ¹	TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹		
C-5	Primed concrete	Firestone V-Force, self-adhered over deck primed with SA-Solvent Based (SB) Primer	Min. 1 1/2-inch-thick "ISO 95+ GL" or RESISTA	I.S.O. Stick or Twin Jet in continuous 3/4-1-inch-wide ribbons at 12 inches o.c. or Firestone I.S.O. TwinPack Adhesive in continuous 1/2 to 3/4-inch-wide ribbons at 12 inches o.c.	(Optional) Min. 1-or 1 1/2-inch-thick "ISO 95+ GL" or RESISTA	(For optional cover board) I.S.O. Stick, or Twin Jet in continuous 3/4 to 1-inch-wide ribbons at 12 inches o.c.	UltraPly™ TPO XR	XR Bonding Adhesive or XR Stick 3/4 to 1-inch ribbons @ 6 inches o.c.	113	
							UltraPly™ TPO SA	Self-adhered		
					(Optional) Min. 1-or 1 1/2-inch-thick "ISO 95+ GL"		UltraPly™ TPO XR	Twin Jet 3/4-inch to 1-inch ribbons @ 4 inches o.c. or spatter applied at a rate of 0.318 gal./sq.		
					(Optional) Min. 1-or 1 1/2-inch-thick RESISTA		UltraPly™ TPO XR	Twin Jet 3/4-inch to 1-inch ribbons @ 6 inches o.c. or spatter applied at a rate of 0.318 gal./sq.		
C-6	Primed concrete	Firestone V-Force, self-adhered over deck primed with SA-Solvent Based (SB) Primer	Min. 1 1/2-inch-thick "ISO 95+ GL" or RESISTA	I.S.O. Stick or Twin Jet in continuous 3/4-1-inch-wide ribbons at 12 inches o.c. or Firestone I.S.O. TwinPack Adhesive in continuous 1/2 to 3/4-inch-wide ribbons at 12 inches o.c.	I.S.O. Stick or Twin Jet in continuous 3/4-1-inch-wide ribbons at 12 inches o.c. or Firestone I.S.O. TwinPack Adhesive in continuous 1/2-3/4-inch-wide ribbons at 12 inches o.c.	(Optional) Min. 1-or 1 1/2-inch-thick "ISO 95+ GL" or RESISTA	(For optional cover board) I.S.O. Stick or Twin Jet in continuous 3/4 to 1-inch-wide ribbons at 12 inches o.c.	UltraPly™ TPO	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive or Single-Ply LVOC Bonding Adhesive 1168	278
								UltraPly™ TPO XR	I.S.O. Spray R 3/4 to 1-inch ribbons @ 12 inches o.c.	
								UltraPly™ TPO SA	Self-adhered	

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	VAPOR BARRIER	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
			TYPE ^{1,2}	ATTACHMENT ¹	TYPE ¹	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
C-7	Concrete	---	---	---	---	---	UltraPly™ TPO XR	Hot asphalt at 20 to 40 lbs per sq.	500
C-8	Concrete	---	---	---	---	---	UltraPly™ TPO XR	XR Bonding Adhesive	470
C-9	Primed Concrete	V-Force, self-adhered over deck primed with SA-Solvent Based (SB) Primer or 1 to 2 ply of Ply IV or VI in hot asphalt or APP 80 Glass Torch Base, SBS Glass FR Torch, or SBS Poly Torch Base torch adhered	Min 1.5-inch to max. 4-inch "ISO 95+ GL" or RESISTA followed by (Optional) Tapered "ISO GL+ 95" or Tapered RESISTA	I.S.O. Stick (with V-Force only) or Twin Jet (with V-Force only) I.S.O. Spray R in continuous 3/4 to 1-inch wide ribbons or I.S.O. Twin Pack Insulation Adhesive (not with V-Force) in 1/2 to 3/4-inch wide ribbons at 12 inches o.c	(Optional) Min. 1/4-inch DensDeck Prime or SECUROCK Gypsum-Fiber Roof Board	(For optional cover board) I.S.O. Stick, Twin Jet or I.S.O. Spray R in continuous 3/4 to 1-inch ribbons or I.S.O. Twin Pack Insulation Adhesive in 1/2 to 3/4-inch wide ribbons @ 12 inches o.c	UltraPly™ TPO	UltraPly™ Bonding Adhesive, Single-Ply LVOC Bonding Adhesive, Water Based Bonding Adhesive P or Single-Ply LVOC Bonding Adhesive 1168	263
							UltraPly™ TPO XR	XR Bonding Adhesive at 70-90 ft ² per gallon or Owens Corning PermaMop or hot asphalt as 20-25 lbs/100 ft ²	
							UltraPly™ TPO SA	Self-adhered	
C-10	Concrete	-	Min 1 inch thick "ISO 95+ GL", RESISTA or min. 1/2-inch to max 1-inch thick ISOGARD HD	I.S.O. Twin Pack Insulation Adhesive 3/4-inch to 1-inch ribbons spaced 6 inches o.c.	-	-	UltraPly™ TPO XR	Twin Jet 3/4-inch to 1-inch ribbons @ 4 inches o.c. or spatter applied at a rate of 0.318 gal./sq.	413

TABLE 4—WIND RESISTANCE—ADHERED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	SUPPLEMENTAL LIGHTWEIGHT CONCRETE ATTACHMENT ¹	INSULATION		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
			TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
LC-1	Cellular lightweight concrete, 200 psi, on structural concrete.	---	---	---	UltraPly™ TPO XR	XR Bonding Adhesive	467
LC-2	Cellular lightweight concrete, 300 psi, on steel deck.	Heavy-Duty Fasteners with Insulation Fastening Plates at 2 ft ² per fastener	---	---	UltraPly™ TPO XR	XR Bonding Adhesive	75
LC-3	Celcore lightweight concrete, 300 psi, on steel deck.	Heavy-Duty Fasteners with Insulation Fastening Plates at 2 ft ² per fastener	---	---	UltraPly™ TPO XR	XR Bonding Adhesive	90
LC-4	Celcore lightweight concrete, 300 psi, on steel deck.	---	---	---	UltraPly™ TPO XR	XR Bonding Adhesive	45

For **SI**: 1 inch = 25.4 mm; 1 ft = 0.305 m; 1 psf = 47.88 Pa; 1 gal = 3.785 L.

¹Insulation, adhesive, fasteners, vapor barriers, ply sheets and basesheets must be FM-approved.

²All foam plastic insulation 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.

³Wood deck must be minimum 1⁵/₃₂-inch-thick (11.9 mm) plywood. Steel deck must be minimum No. 22 gage galvanized steel [0.030 inch (0.76 mm)]. Concrete must have a minimum compressive strength (f_c) of 2500 psi, unless otherwise noted. See Section 5.9 of this report.

TABLE 5—WIND RESISTANCE—WELDED ROOF COVERING SYSTEMS

SYSTEM NO.	DECK ³	VAPOR BARRIER	INSULATION		COVER BOARD		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
			TYPE ^{1,2}	ATTACHMENT ¹	TYPE ¹	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
WW-1	Wood	(Optional) Min. 1/4-inch-thick DensDeck or DensDeck Prime	Min. 1.5-inch-thick ISO 95+GL or RESISTA	Loose-laid	Min. 1/2-inch-thick ISOGARD HD or min. 1/4-inch-thick DensDeck or DensDeck Prime or Min. 1/2-inch thick SECUROCK Gypsum-Fiber Roof Board	InvisiWeld or InvisiWeld S Plates and Heavy Duty Fasteners at 5.3 ft ² per fastener	UltraPly™ TPO	Bonded to InvisiWeld or InvisiWeld S Plates	45
WSC-1	Steel or concrete	(Optional) Min. 1/4-inch-thick DensDeck or DensDeck Prime	(Optional) (Min. 1 1/2-inch-thick "ISO 95+ GL" or RESISTA	Loose-laid	Min. 1/2-inch-thick ISOGARD HD or min. 1/4-inch-thick DensDeck or DensDeck Prime or Min. 1/2-inch thick SECUROCK Gypsum-Fiber Roof Board	InvisiWeld or InvisiWeld S Plates and Heavy Duty Fasteners (through steel) or Concrete Drive Fasteners (through concrete) at 5.3 ft ² per fastener	UltraPly™ TPO	Bonded to InvisiWeld or InvisiWeld S Plates	45
WSC-2	Steel or concrete	---	(Optional) Min. 1.5-inch-thick "ISO 95+ GL" or RESISTA	Loose-laid	Min. 1/2-inch-thick ISOGARD HD or min. 1/4-inch-thick DensDeck or DensDeck or Min. 1/2-inch thick SECUROCK Gypsum-Fiber Roof Board Prime	InvisiWeld or InvisiWeld S Plates and Heavy-Duty Fasteners (through steel) or Concrete Drive Fasteners (through concrete) at 4 ft ² per fastener	UltraPly™ TPO	Bonded to InvisiWeld or InvisiWeld S Plates	60
WSC-3	Steel or concrete	---	(Optional) Min. 1.5-inch-thick "ISO 95+ GL" or RESISTA	Loose-laid	Min. 1/2-inch-thick ISOGARD HD or min. 1/4-inch-thick DensDeck or DensDeck Prime or Min. 1/2-inch thick SECUROCK Gypsum-Fiber Roof Board	InvisiWeld or InvisiWeld S Plates and Heavy-Duty Fasteners (through steel) or Concrete Drive Fasteners (through concrete) at 2.7 ft ² per fastener	UltraPly™ TPO	Bonded to InvisiWeld or InvisiWeld S Plates	75
WSC-4	Steel or concrete	---	(Optional) Min. 1.5-inch-thick "ISO 95+ GL" or RESISTA	Loose-laid	Min. 1/2-inch-thick ISOGARD HD or min. 1/4-inch-thick DensDeck or DensDeck Prime or Min. 1/2-inch thick SECUROCK Gypsum-Fiber Roof Board	InvisiWeld or InvisiWeld S Plates and Heavy-Duty Fasteners (through steel) or Concrete Drive Fasteners (through concrete) at 2 ft ² per fastener	UltraPly™ TPO	Bonded to InvisiWeld or InvisiWeld S Plates	105

For SI: 1 inch = 25.4 mm; 1 ft = 0.305 m; 1 psf = 47.88 Pa; 1 gal = 3.785 L.

¹Insulation, adhesive and fasteners must be FM-approved.

²All foam plastic insulation 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.

³Wood deck must be minimum 15/32-inch-thick (11.9 mm) plywood. Steel deck must be minimum No. 22 gage galvanized steel [0.030 inch (0.76 mm)]. Concrete must have a minimum compressive strength (*f_c*) of 2500 psi, unless otherwise noted. See Section 5.9 of this report.

TABLE 6—WIND RESISTANCE—MECHANICALLY FASTENED ROOF COVERING SYSTEMS

SYSTEM NO.	DECK ³	INSULATION		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
SC-1	Steel or concrete	Min. 1.5-inch to max. 4-inch-thick Firestone "ISO 95 + GL"	Preliminarily attached	UltraPly™ TPO	Heavy-Duty Plus Fasteners with HD Plus Seam Plates (steel) or Concrete Drive Fasteners with HD Seam Plates (concrete), fastener rows at 142 inches o.c., 12 inches o.c. along side laps	30
SC-2	Steel or concrete	Min. 1.5-inch to max. 4-inch-thick Firestone "ISO 95 + GL"	Preliminarily attached	UltraPly™ TPO	Heavy-Duty Plus Fasteners with HD Plus Seam Plates (steel) or Concrete Drive Fasteners with HD Seam Plates (concrete), fastener rows at 142 inches o.c., 6 inches o.c. along side laps	60
SC-3	Steel or concrete	Min. 1.5-inch to max. 4-inch-thick Firestone "ISO 95 + GL"	Preliminarily attached	UltraPly™ TPO	Heavy-Duty Plus Fasteners with HD Plus Seam Plates (steel) or Concrete Drive Fasteners with HD Seam Plates (concrete), fastener rows at 114 inches o.c., 6 inches o.c. along side laps	68
SC-4	Steel or concrete	Min. 1.5-inch to max. 4-inch-thick Firestone "ISO 95 + GL"	Preliminarily attached	UltraPly™ TPO	Heavy-Duty Fasteners with HD Seam Plates, fastener rows at 142 inches o.c., 6 inches o.c. along side laps	52
SC-5	Steel or concrete	Min. 1.5-inch thick "ISO 95+ GL"	Preliminarily attached	UltraPly™ TPO	Heavy-Duty Fasteners with 2 ³ / ₈ HD Seam Plates, fastener rows at 6 ft o.c., 18 inches o.c. along side laps	30

TABLE 6—WIND RESISTANCE—MECHANICALLY FASTENED ROOF COVERING SYSTEMS (Continued)

SYSTEM NO.	DECK ³	INSULATION		MEMBRANE		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE ^{1,2}	ATTACHMENT ¹	TYPE	ATTACHMENT ¹	
SC-6	Steel or concrete	Min. 1.4-inch to max. 4-inch-thick Firestone "ISO 95 + GL"	Preliminarily attached	UltraPly™ TPO	Heavy-Duty Fasteners with 2 ³ / ₈ HD Seam Plates, fastener rows at 9 ft-6 inches o.c., 6 inches o.c. along side laps	38
SC-7	Steel or concrete	Min. 1.5-inch thick "ISO 95+ GL"	Preliminarily attached	UltraPly™ TPO	Heavy-Duty Plus Fasteners with HD Seam Plates, fastener rows at 7 ft-6 inches o.c., 12 inches o.c. along side laps	45
MS-1	Steel	Min. 1.5-inch to max. 4-inch-thick, any FM-approved foam plastic insulation	Preliminarily attached	UltraPly™ TPO	Heavy-Duty Plus Fasteners with HD Plus Seam Plates, fastener rows at 9 ft-6 inches o.c., 12 inches o.c. along side laps	45
MS-2	Steel	Min. 1.5-inch to max. 4-inch-thick Firestone "ISO 95 + GL"	Preliminarily attached	UltraPly™ TPO	QuickSeam R.M.A. Strips @ 10 ft o.c. with Coiled Metal Batten Strips and Heavy-Duty Fasteners along strips @ 6 inches o.c.; Single-Ply Quick Prime or Single-Ply LVOC Primer to underside of membrane at strip locations	45

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

¹Insulation and fasteners must be FM-approved.

²All foam plastic insulation 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.

³Wood deck must be minimum 1⁵/₃₂-inch-thick (11.9 mm) plywood. Steel deck must be minimum No. 22 gage galvanized steel [0.030 inch (0.76 mm)]. Concrete must have a minimum compressive strength (*f_c*) of 2500 psi, unless otherwise noted. See Section 5.9 of this report.

ICC-ES Evaluation Report

ESR-2831 LABC Supplement

Reissued August 2019

This report is subject to renewal August 2021.

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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

Section: 07 54 00—Thermoplastic Membrane Roofing

Section: 07 54 23—Thermoplastic-Polyolefin Roofing

REPORT HOLDER:

FIRESTONE BUILDING PRODUCTS COMPANY, LLC

ADDITIONAL LISTEE:

GENFLEX ROOFING SYSTEMS, A DIVISION OF FIRESTONE BUILDING PRODUCTS COMPANY, LLC

EVALUATION SUBJECT:

FIRESTONE ULTRAPLY™ TPO, ULTRAPLY™ TPO XR, ULTRAPLY™ TPO SA, AND ULTRAPLY™ TPO FLEX ADHERED SINGLE-PLY ROOFING MEMBRANES

ADDITIONAL LISTEE PRODUCT NAMES: GENFLEX EZ TPO, GENFLEX EZ FLEECE BACKED TPO AND GENFLEX EZ TPO PEEL AND STICK HW SINGLE-PLY ROOFING MEMBRANES

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Firestone UltraPly™ TPO, UltraPly™ TPO XR, UltraPly™ TPO SA and UltraPly™ TPO Flex Adhered Single-ply Roofing Membranes, described in ICC-ES master evaluation report [ESR-2831](#), 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:

- 2017 *City of Los Angeles Building Code* (LABC)

2.0 CONCLUSIONS

The Firestone UltraPly™ TPO, UltraPly™ TPO XR, UltraPly™ TPO SA and UltraPly™ TPO Flex Adhered Single-ply Roofing Membranes, described in Sections 2.0 through 7.0 of the master evaluation report [ESR-2831](#), comply with the LABC Chapters 7A and 15, and are subjected to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Firestone UltraPly™ TPO, UltraPly™ TPO XR, UltraPly™ TPO SA, UltraPly™ TPO Flex Adhered Single-ply Roofing Membranes, described in this evaluation report must comply with all of the following conditions:

- All applicable sections in the master evaluation report [ESR-2831](#).
- The design, installation, conditions of use and identification are in accordance with the 2015 *International Building Code*® (2015 IBC) provisions noted in the master evaluation report [ESR-2831](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.
- The Firestone UltraPly™ TPO, UltraPly™ TPO XR, UltraPly™ TPO SA and UltraPly™ TPO Flex Adhered Single-ply Roofing Membranes must not be installed over existing wood shakes or wood shingles in accordance with LABC Section 1511.
- The installation of the Firestone UltraPly™ TPO, UltraPly™ TPO XR, UltraPly™ TPO SA and UltraPly™ TPO Flex Adhered Single-ply Roofing Membranes must comply with City of Los Angeles Information Bulletin P/BC 2017-16, "Dwellings in High Wind Velocity Areas (HWA)".

- Reroofing applications must comply with Sections 4.2.2, 4.3.2 and 5.8 of the master evaluation report [ESR-2831](#) and LABC Section 1511. Where spaced sheathing exists, a minimum of ¹⁵/₃₂-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 Firestone UltraPly™ TPO, UltraPly™ TPO XR, UltraPly™ TPO SA and UltraPly™ TPO Flex Adhered 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 2015 *International Building Code*® (IBC) provisions noted in the master report and the additional requirements of Sections 701A.3 and 705A of the LABC.

This supplement expires concurrently with the master report, reissued August 2019.