ICC-ES Evaluation Report

ESR-3252

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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION Section: 07 54 00—Thermoplastic Membrane Roofing Section: 07 54 19—Polyvinyl-Chloride Roofing	REPORT HOLDER: CANADIAN GENERAL-TOWER LTD.	EVALUATION SUBJECT: TOWER PVC ROOFING MEMBRANES	

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015, 2012, 2009 and 2006 *International Building Code®* (IBC)
- 2021, 2018, 2015, 2012, 2009 and 2006 *International Residential Code®* (IRC)

Properties evaluated:

- Physical properties
- Fire classification
- Wind uplift resistance
- Impact resistance

2.0 USES

Tower polyvinyl chloride (PVC) roofing membranes are single-ply membranes used as roof covering in mechanically fastened Class A roof assemblies installed on noncombustible decks.

3.0 DESCRIPTION

3.1 General:

Tower PVC Membrane Roofing Systems consist of a single-ply PVC membrane, insulation, flashing, and mechanical fasteners.

3.2 Tower PVC Membranes:

Tower PVC membranes are polyester-fabric-reinforced PVC membranes, complying with ASTM D4434, Type III, manufactured in nominally 50-, 60- and 80-mil [0.05, 0.06 and 0.08 inch (1.27, 1.52 and 2.03 mm)] thicknesses.

3.3 Insulation:

See Tables 1 and 2 for insulations used with specific roofing systems. Foam plastic insulation, when used, must have a flame-spread index of not more than 75 when tested, at the maximum thickness intended for use,

in accordance with ASTM E84 or UL 723. Polyisocyanurate foam plastic insulation boards must comply with ASTM C1289. EPS foam plastic insulation boards must comply with ASTM C578.

3.4 Fasteners:

Fasteners used to mechanically fasten insulation and membranes to the roof deck must be corrosion-resistant and must be one of the fasteners described below or noted in Table 2.

3.4.1 Dekfast #15 HS Fastener: A No. 15 carbon steel screw, having double-edged self-drilling points, a $^{7}/_{16}$-inch-diameter (11.1 mm) truss head, a major thread diameter of 0.257 inch (6.53 mm), a minor thread diameter of 0.167 inch (4 .24 mm) and a black proprietary coating.

3.4.2 Dekfast 2$^{1}/_{2}$-inch HS Membrane Plate: A 2$^{1}/_{2}$-inch-diameter (64 mm), 0.038-inch-thick (0.96 mm) steel disc having an AZ50 galvalume coating, a 0.261-inch-diameter (6.63 mm) center hole and six pointed barbs projecting $^{1}/_{8}$ inch (3.2 mm) downward from the underside between two raised circular stampings.

3.4.3 OMG XHD Roofing Fastener: A carbon steel screw having a buttress thread design, double-edged self-drilling points, a $^{7}/_{16}$-inch-diameter (11.1 mm) truss head, a major thread diameter of 0.265 inch (6.73 mm), a minor thread diameter of 0.158 inch (4.01 mm) and a black proprietary coating.

3.4.4 OMG XHD (Extra Heavy Duty) Seam Plate: A 2$^{3}/_{8}$-inch-diameter (60 mm), 0.040-inch-thick (1.02 mm) steel disc, having an AZ55 galvalume coating, a 0.230-inch-diameter (5.84 mm) center hole and six pointed barbs projecting $^{1}/_{8}$ inch (3.2 mm) downward.

3.5 Impact Resistance:

The Tower PVC Roofing Membranes described in this report meet the requirements for impact resistance in 2021 Section 1504.8 (2018, 2015, 2012, 2009 and 2006 IBC Section 1504.7), based on testing in accordance with Section 4.6 of FM 4470.

4.0 INSTALLATION

4.1 General:

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

The slope of the roof on which the 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 Table 1.

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 roof covering system described in Table 1, when installed in accordance with this report, is classified as a Class A roof covering system in accordance with ASTM E108 or UL 790.

4.2.2 Reroofing: The existing noncombustible 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, there must be inspection of the deck by the code official having jurisdiction, and written approval by that code official.

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

- New uninsulated systems installed only over existing uninsulated systems
- 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 Tower PVC membrane roof covering systems described in the report are noted in Table 2. Metal edge securement systems must be listed in accordance with the 2011 edition of ANSI/SPRI/FM4435 ES-1, and designed and installed in accordance with the 2021 IBC Section 1504.6 (2018 and 2015 IBC Section 1504.5) and IBC Chapter 16 (or the 2003 edition of ANSI/SPRI/FM4435 ES-1, and designed and installed for wind loads in accordance with the 2012, 2009 and 2006 IBC Section 1504.5 and IBC Chapter 16).

As an alternative, for mechanically fastened roofing systems, under the 2012, 2009 and 2006 IBC the edge securement may be the IB 3-inch Drip Edge PVC Clad Metal System or the IB 3 3/4-inch Gravel Stop PVC Clad Metal System. When tested in accordance with Test RE-1 of the 2003 edition of ANSI/SPRI/FM4435 ES-1, the maximum allowable loads at the roof edge are 329 plf (490 kg/m) for the 3-inch Drip Edge System and 356 plf (530 kg/m) for the 3 3/4-inch Gravel Stop System.

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 Tower PVC 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 of the membranes must comply with the applicable code, the manufacturer's published installation instructions and this report. If there are any conflicts between the manufacturer's installation instructions and this report, this report governs.

5.2 The membranes must be installed by authorized applicators approved by Canadian General-Tower Ltd.

5.3 Foam plastic must be separated from the interior of the building by an approved thermal barrier in accordance with IBC Section 2603.4.1.5, 2021, 2018, 2015, 2012 and 2009 IRC Section R316.4, (2006 IRC Section R314.5.2), as applicable, except when specifically listed in an ICC-ES evaluation report as outlined in Footnote 6 of Table 1.

5.4 Foam plastic insulation, when 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. Total thickness of the foam plastic insulation must be limited to the lesser of the maximum thickness allowed in Tables 1 and 2 or the maximum thickness that limits the flame spread index to not more than 75 when tested in accordance with ASTM E84 or UL 723.

5.5 Above-deck thermal insulation board must comply with the applicable standard listed in IBC Table 1508.2 or IRC Table R906.2, as applicable.

5.6 Design wind uplift pressure on any roof area, including edge and corner zones, must not exceed the allowable wind pressure for the roof covering installed in that particular area. Refer to Table 2.

5.7 The allowable wind uplift pressures listed in Table 2 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 applicable code.

5.8 Calculations demonstrating that the required wind resistance is less than the allowable wind resistance must be submitted to the code official for approval.

5.9 When application is over an existing roof, documentation of the wind uplift resistance of the composite roof construction must be submitted to the code official.

5.10 The membranes are manufactured in Cambridge, Ontario, Canada, under a quality control 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 April 2021).

7.0 IDENTIFICATION

7.1 Each roll of roofing membranes has a label bearing the Canadian General-Tower Ltd. Name and address, the product name and the evaluation report number (ESR-3252).

Fasteners are identified by the company name and by the size.

7.2 The report holder's contact information is the following:

CANADIAN GENERAL-TOWER LTD.
52 MIDDLETON STREET
CAMBRIDGE, ONTARIO N1R 5T6
CANADA
(519) 623-1630
www.cgtower.com

TABLE 1—FIRE CLASSIFICATION—MECHANICALLY FASTENED ROOFING SYSTEM

SYSTEM NO.	ROOF CLASS	SUBSTRATE[2]	MAX. ROOF SLOPE	INSULATION[1,3,5,6]	MEMBRANE TYPE[4]
1	A	Noncombustible	3:12	Min. 1-inch-thick to max. 4-inch thick, any UL-classified polyisocyanurate insulation, mechanically fastened to deck.	Tower PVC

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

[1]All foam plastic insulation must be UL-classified foam plastic for roofing systems, and must be limited to the maximum thickness noted in Section 5.4 of this report.
[2]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.
[3]Polyisocyanurate insulation must comply with ASTM C1289.
[4]Membranes must be UL-classified for roofing systems.
[5]Foam plastic insulation thickness is limited to the lesser of the maximum thickness specified in this table or the maximum thickness stated on the label, that limits the flame spread index to not more than 75 when tested in accordance with ASTM E84 or UL 723.
[6]Foam plastic insulation may be installed over a steel deck without a thermal barrier when installed in accordance with an ICC-ES evaluation report recognizing direct application of a specific foam plastic insulation. Reference: IBC Section 2603.4.1.5 and IRC Section R906.1.

TABLE 2—WIND RESISTANCE—MECHANICALLY FASTENED ROOFING SYSTEMS

SYSTEM NO.	DECK[3]	INSULATION		MEMBRANE[14]		ALLOWABLE WIND UPLIFT PRESSURE (psf)
		TYPE[1,2,4]	ATTACHMENT[1]	TYPE	ATTACHMENT[1]	
S-1	Min. No. 22 gage, Grade 33 steel deck	Min. 1 1/2-inch-thick to max. 4-inch-thick, Atlas Roofing "ACFoam II" or "ACFoam III" or Johns-Manville "E'NRG'Y 3" on loose-laid vapor retarder (min. 0.004-inch-thick polyethylene sheet)	Dekfast #15 HS Fastener with Dekfast 2 1/2-inch HS Membrane Plate at 1 fastener per 2 ft^2	Tower PVC	Dekfast #15 HS Fasteners with Dekfast 2 1/2-inch HS Membrane Plates or Olympic XHD Fasteners with Olympic XHD Seam Plates, 12 inches o.c. along min. 5-inch side laps, in rows 5 feet 7 inches o.c.	30
S-2	Min. No. 22 gage, Grade 33 steel deck	Min. 1 1/2-inch-thick to max. 4-inch-thick, Atlas Roofing "ACFoam II" or "ACFoam III" or Johns-Manville "E'NRG'Y 3" on loose-laid vapor retarder (min. 0.004-inch-thick polyethylene sheet)	Dekfast #15 HS Fastener with Dekfast 2 1/2-inch HS Membrane Plate at 1 fastener per 2 ft^2	Tower PVC	Dekfast #15 HS Fasteners with Dekfast 2 1/2-inch HS Membrane Plates or Olympic XHD Fasteners with Olympic XHD Seam Plates, 12 inches o.c. along min. 5-inch side laps, in rows 5 feet 7 inches o.c.	45
S-3	Min. No. 22 gage, Grade 80 steel deck	Min. 1-inch-thick to max. 4-inch-thick, Atlas Roofing "ACFoam II" or "ACFoam III" or Johns-Manville "E'NRG'Y 3"	Dekfast #15 HS Fastener with Dekfast 2 1/2-inch HS Membrane Plate at 1 fastener per 8 ft^2	Tower PVC	Dekfast #15 HS Fasteners with Dekfast 2 1/2-inch HS Membrane Plates or Olympic XHD Fasteners with Olympic XHD Seam Plates, 12 inches o.c. along min. 5-inch side laps, in rows 5 feet 7 inches o.c.	45
S-4	Min. No. 22 gage, Grade 80 steel deck	Min. 1-inch-thick to max. 4-inch-thick, Atlas Roofing "ACFoam II" or "ACFoam III" or Johns-Manville "E'NRG'Y 3"	Dekfast #15 HS Fastener with Dekfast 2 1/2-inch HS Membrane Plate at 1 fastener per 8 ft^2	Tower PVC	Dekfast #15 HS Fasteners with Dekfast 2 1/2-inch HS Membrane Plates or Olympic XHD Fasteners with Olympic XHD Seam Plates, 12 inches o.c. along min. 5-inch side laps, in rows 5 feet 7 inches o.c.	60

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

[1]Insulation, vapor retarder, membrane and fasteners must be FM-approved.
[2]All foam plastic insulation must be UL-classified foam plastic for roofing systems, and must be limited to the lesser of the maximum thickness specified in this table or the maximum thickness stated on the label, that limits the flame spread index to not more than 75 when tested in accordance with ASTM E84 or UL 723..
[3]Steel deck must be minimum No. 22 gage galvanized steel [0.030 inch (0.76 mm)].
[4]Polyisocyanurate insulation must comply with ASTM C1289. EPS insulation boards must comply with ASTM C578.