

Code Compliance Research Report

CCRR-0193

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1.0 Subject

Solatube SkyVault, Model M74 DS

2.0 Research Scope

2.1 Building Codes:

2012 International Building Code (IBC)

2012 International Residential Code (IRC)

2.2 Properties

Structural Performance

Durability

Burning

3.0 Description

3.1 *Solatube SkyVault Series* Model M74 DS consists of three primary assemblies; single or dual glazed skylight assembly, reflective tube assembly, and diffuser assembly. See Figure 1.

3.1.1 Skylight assemblies are comprised of a dome, thermal disc (only for dual glazed skylights), a dome edge protection band, dome clamps, a tube ring, foam plastic insulation with a closed cell foam infiltration seal, and a curb cap with closed cell foam weather strips.

3.1.1.1 The dome is manufactured of Sheffield Plastics' Makrolon-SL as recognized in ICC-ES Evaluation Report, ESR-2728.

3.1.1.2 A thermal disc is utilized in dual glazed skylights, and consists of a 0.040 inch thick PET material, complying with IBC Section 2606.4 with a plastic classification of CC1 or CC2.

3.1.1.3 A dome edge protection band is manufactured from 0.022 inch thick by 7/8 inch wide steel sheet.

3.1.1.4 Dome clamps attach the dome and the dome edge protection band to the curb cap. They are manufactured from 0.064 inch thick steel sheet.

3.1.1.5 Closed cell foam is utilized between the mating surfaces of the dome and curb cap. Closed cell foam is also utilized between the curb cap and wood curb.

3.1.1.6 A tube ring is a 28-1/2 inch diameter, (minimum) 0.018" thick aluminum sheet metal tube formed with rivets through the overlap seam and with a reflective coating on the interior face. It is utilized to connect the top of an extension tube to the curb cap assembly via interlocking joints. A metal belt and torsion spring clamp secure the interlocking joint assembly.

3.1.1.7 The foam plastic insulation is of 1 inch thickness, manufactured in accordance with ESR-1864 or ESR-1659. The foam plastic insulation complies with the code requirements for use in attics and crawl spaces without an ignition barrier and do not require a thermal barrier.

3.1.1.8 The curb cap is manufactured from 0.028 inch steel sheet and is mounted to a roof mounted curb provided by others to form the base of the skylight assembly.

3.1.2 Reflective tube assemblies are comprised of (minimum) 0.018" thick, 28-1/2 inch diameter aluminum tubes with a reflective coating on the interior face of the tube. Tubes have six equally spaced tabs on the ends to enable interlocking with additional tubes, tube rings or diffuser collars. A metal belt and torsion spring clamp are utilized to secure the interlocking joints to secure the assembly.

3.1.3 Diffuser assemblies are comprised of a prismatic panel diffuser, diffuser collar, and closed cell sponge rubber dress ring.

3.1.3.1 The prismatic panel diffuser is a single glazed acrylic diffuser with a plastic classification of CC1 or CC2. The prismatic panel diffuser has twelve evenly spaced holes around its perimeter that fit the tabs of the diffuser collar.

3.1.3.2 A diffuser collar is utilized to connect the bottom of an extension tube to the prismatic panel diffuser. Diffuser collars have six tabs on one end and twelve on the other to enable interlocking with the extension tubes and prismatic panel diffuser, respectively.

3.1.3.3 A closed cell sponge rubber dress ring is snap-fitted around the perimeter of the prismatic panel diffuser.

3.1.3.4 Amplifier diffuser assemblies use a tube manufactured of sheet metal that transitions the diffuser from a 28-1/2 inch diameter to 36 inch diameter.

4.0 Performance Characteristics

4.1 The M74 DS Model identified in this report has been tested for deflection and structural response under uniform loading in both the positive (inward) and negative (outward) directions in accordance with ICC-ES AC16. The maximum allowable positive and negative design loads are indicated in Table 2.

4.2 The prismatic panel diffusers have a flame spread index not exceeding 75 and a smoke development index not exceeding 450 when tested in accordance with ASTM E 84.

4.3 The M74 DS Model identified in this report has met the air infiltration and water penetration acceptance criteria identified in ICC-ES AC16 when tested in accordance with Sections 9.3.2 and 9.3.3 of AAMA/WDMA/CSA 101/I.S.2/A440-11.

5.0 Installation

Installation shall be in accordance with the manufacturer's installation instructions for the Solatube M74 Daylighting System (Part No. 949990 v1.0), the details and drawings included in this report, and IBC Sections 2405 and 2610, and IRC Section R308.6. Where differences occur between this report and the manufacturer's installation instructions, this report shall govern.

5.1 Skylights shall be mounted on a wood, steel, aluminum, or concrete curb that raises the plastic glazing at least 4 inches above the plane of the roof.

5.2 The outside curb dimensions are indicated in Table 1. The design, attachment, flashing and placement of the curb to the roof deck is outside the scope of this report.

5.3 Skylights shall be attached to the curb utilizing fasteners described in this report. See Table 1 for fastener details. A maximum 1/2" shim space is permitted between the curb and the curb cap.

6.0 Supporting Evidence

6.1 Manufacturer's drawings and installation instructions.

6.2 Reports of testing and engineering analysis in accordance with ICC-ES AC16, *Acceptance Criteria for Plastic Glazed Skylights*, approved April 2011.

6.3 Quality control manual in accordance with ICC-ES AC10, *Acceptance Criteria for Quality Documentation*, approved December 2012.

6.4 Reports of testing in accordance with AAMA/WDMA/CSA101/I.S.2/A440-11 "Standard/Specification for Windows, Doors, and Unit Skylights", American Architectural Manufacturers Association, Window and Door Manufacturers Association, and Canadian Standards Association.

7.0 Conditions of Use

The Solatube SkyVault Model M74 DS identified in this report is deemed to comply with the referenced building codes subject to the following conditions:

7.1 Unless the building is equipped throughout with an automatic sprinkler system in accordance with IBC Section 903.3.1.1, the light diffusing system shall not be installed in the following occupancies and locations:

- Group A with an occupant load of 1,000 or more.
- Theaters with a stage and proscenium opening and an occupant load of 700 or more.
- Group I-2
- Group I-3
- Interior exit stairways and ramps and exit passageways.

7.2 The light-transmitting plastic material of the prismatic panel diffuser complies with Section 2606.7.2 of the IBC. The diffuser may be used in all occupancies where it does not exceed 10 percent of the specific ceiling area in which it is attached.

7.3 The wind uplift rating recognized in this report (Table 2) is based on attachment to curbs and corresponding fasteners as described in Table 1.

7.4 The status of this report is contingent on the validity of the ICC-ES reports identified herein. The revocation or expiration of any included ICC-ES reports will invalidate this report.

7.5 Where required by the building official, engineering calculations and details shall be provided. The calculations shall verify that the anchorage complies with the building code for the type of framing and condition of the supporting construction

7.6 The *Solatube SkyVault Series* is manufactured in accordance with the manufacturer's approved quality control system with inspections by Keystone Certifications, Inc. (IAS AA-714).

8.0 Identification

The *Solatube SkyVault Series* produced in accordance with this report shall be identified with permanent labeling that includes the following information:

8.1 The manufacturers name and/or logo, address model number and allowable loads.

8.2 The plastic dome glazing thickness and classification (CC1).

8.3 Safety labeling indicating "Risk of Fall" that complies with Class 1, ANSI Standard Z35.1 specifications for accident prevention signs.

8.4 The name or logo of the independent inspection agency, Keystone Certifications, Inc. (IAS AA-714).

8.5 The Architectural Testing Code Compliance Research Report mark and report number (CCRR-0193).

9.0 Code Compliance Research Report Use

9.1 Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

9.2 Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product or manufacturer by Architectural Testing.

9.3 Reference to the Architectural Testing internet web site address at www.ati-es.com is recommended to ascertain the current version and status of this report.

Table 1 – M74 DS Curb and Fastener Schedule

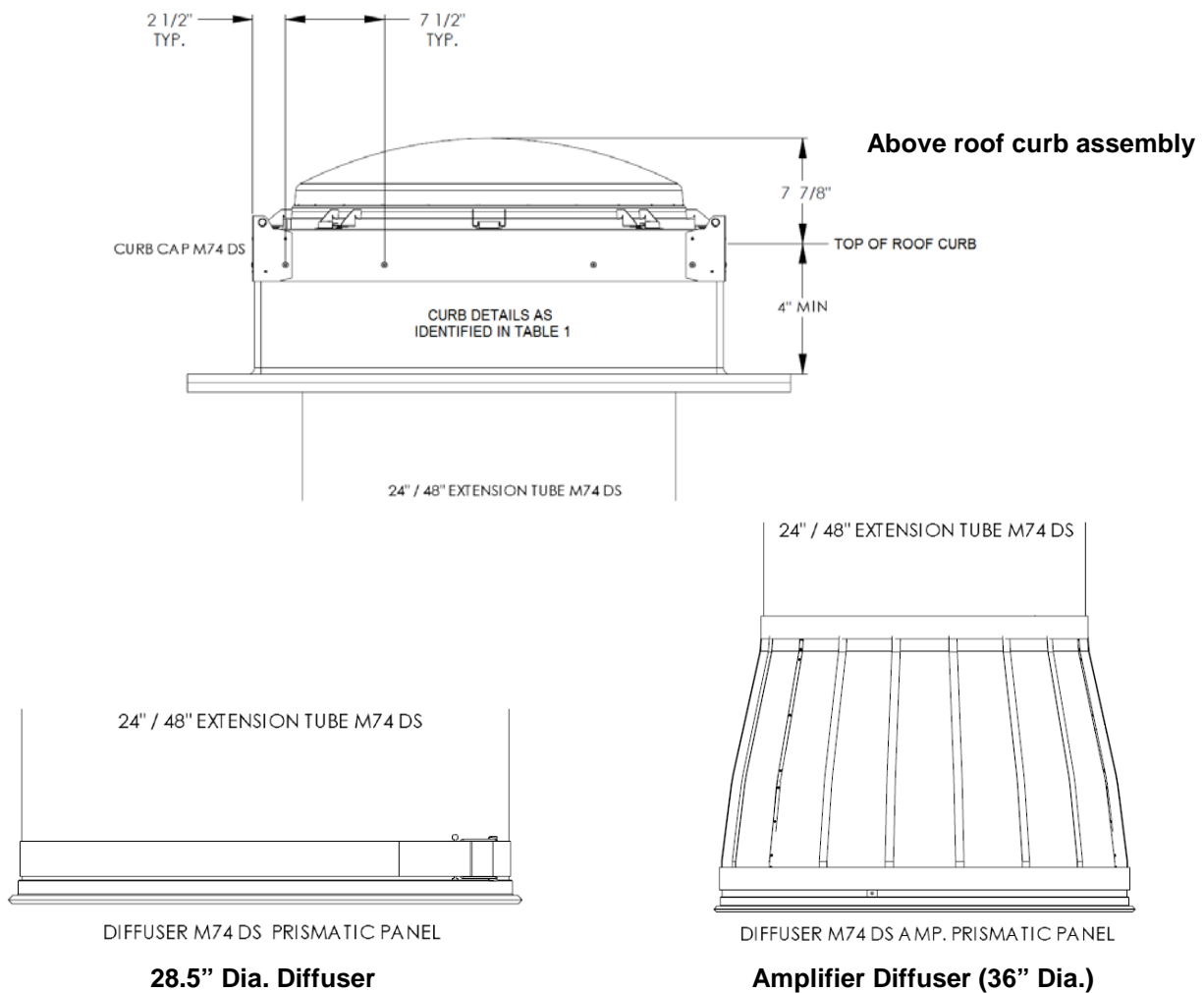
Outside Curb Dimensions	Curb			Fastener (Curb Cap to Curb)		
	Material	Min. Thickness	Properties	Description	Qty.	Spacing
36" x 36"	2x4 Spruce-Pine-Fir	2" Nominal Wood Blocking	Specific Gravity, G=0.42	#8 x 2" Phillips truss head self-pierce sheet metal screw	16	Spaced 2-1/2" and 10" from each corner for a total of four fasteners per side.
				#10 x 2" wood screw		
	33 ksi Steel (ASTM A653)	18 Gauge (0.0451")	F _y = 33 ksi F _u = 45 ksi	#10-16 SAE Grade 5 TEKS screw with minimum 3 threads past the curb substrate	16	Spaced 2-1/2" and 10" from each corner for a total of four fasteners per side.
	3105-H14 Aluminum	0.0508"	F _{tu} = 25 ksi F _{ty} = 22 ksi	#10-24 300 Series stainless steel sheet metal screw with minimum 3 threads past the curb substrate	16	Spaced 2-1/2" and 10" from each corner for a total of four fasteners per side.
	Normal Weight Concrete	4"	f' _c = 2,500 psi	3/16" Tapcon Anchor (ESR-2202) with min. embedment of 1-1/2"	16	Spaced 2-1/2" and 10" from each corner for a total of four fasteners per side.

⁽¹⁾ Installation on a curb substrate with a lesser thickness or lesser mechanical properties may result in a lower wind load rating.

Table 2 – Maximum Allowable Design Loads

Skylight Description			Glazing Description			Wind Loads (psf) ⁽¹⁾
Model Series	Model No.	Dome Rise (inch)	Glazing Material	Glazing Thickness (inch)	Diameter (inch)	
SkyVault	M74 DS	6-7/8	Sheffield Plastics' Makrolon-SL (ESR-2728)	0.118	28-1/2	+71 -80

⁽¹⁾ Positive (+) loads are directed inward; negative (-) are directed outward. All positive design pressures were tested to a safety factor of 3. All negative design pressures were tested to a safety factor of 2.


Figure 1 – M74 DS