



TEST REPORT

5001 East Philadelphia Street
Ontario, California – USA 91761-2816

Ph: 909.472.4100 | Fax: 909.472.4243
<http://www.iapmortl.org>

Report Number: 2841-20001-002

Project No.: 32925

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Client: Solar Roof Jack
PO Box 1194
El Dorado, CA 95623

Contact: Chistopher

Source of Samples: The samples were shipped to IAPMO R&T Lab from Solar Roof Jack, and received in good condition on May 30, 2019.

Date of Testing: October 02, 2019 to May 12, 2020.

Sample Description: Diverting Roof Vent Terminal; model: SRJ 1530.

Scope of Testing: The purpose of the testing is to determine if the samples tested of the Diverting Roof Vent Terminal meets all applicable requirements of IAPMO IGC339-2016e1, entitled, "Diverting Roof Vent Terminals".

Conclusion: the samples tested of the Diverting Roof Vent Terminal, model noted above, from Solar Roof Jack, **COMPLIES** with all applicable requirements of IAPMO IGC339-2016e1.

Tested by,

Reviewed by,

Hanks Ninh, Project Engineer

Sean Vuu, P.E., Manager, Specialty Projects

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Primary Standard: IAPMO IGC 339-2016e1, clauses tested / evaluated:

- 4 General Requirements
- 5 Testing Requirements
- 6 Markings & Installation Instructions.

Test Results: all tests and evaluations were conducted per the written procedures specified in the standard.

IAPMO IGC339-2016e1:

4 General Requirements

4.1 General - FOLLOWED

Diverting roof vent terminals typically consist of a

- (a) Flanged (Aluminum) diverting vent fitting with elastomeric gasket and corrosion resistant screws
- (b) Roof flange (ABS)
- (c) Connection DWV fittings to redirect vent outlet (Rubber).

4.2 Compatibility and Dimensions

4.2.1 Compatibility with Pipe and Tubing - FOLLOWED

Diverting roof vent terminals shall be compatible with the piping materials for which they are designed. All piping material(s) with which the diverting roof vent terminals are designed to connect shall be identified in the installation instructions (see Section 6.3).

4.2.2 Dimensions and Tolerances - COMPLIED

Dimensions and tolerances of diverting roof vent terminals shall:

- (a) Be determined in accordance with ASTM D2122;
- (b) Comply with the geometries and laying lengths specified in ASTM D3311;
- (c) Comply with the dimensions specified in ASTM D2661 for ABS fittings; and,

Finding: ASTM D3311, Table 1:

Model	Bend Angle	G Required (in)	Measured (in)	Result
2" elbow	¼ (90 deg)	2-5/16	2-5/16	passed

ASTM D2661, Table A1.1:

Dimension	Required (in)	Measured (in)	Result
Socket Entrance Dia. A	2.380 – 2.395	2.386	Passed
Out of roundness	0.024 (max)	0.018	Passed
Socket Bottom Dia. B	2.363 – 2.375	2.371	Passed
Out of roundness	0.024 (max)	0.008	Passed
Socket Depth C	0.750 (min)	0.761	Passed
Wall thickness E	0.156 (min)	0.160	Passed
Wall thickness after core shift	0.140 (min)	0.156	Passed

4.3 Components and Connections

4.3.1 Roof Flashing and Elastomeric Gasket - COMPLIED

The roof flashing and elastomeric gasket for the diverting roof vent terminals complies with IAPMO PS 64 (see IAPMO PS64 report).

4.3.2 Plastic Material – COMPLIED (refer to document provided by the manufacturer).

Plastic material used to manufacture diverting roof vent terminals shall be:

- (a) ABS compounds that comply with or exceed the properties of cell classification 42222 as specified in ASTM D3965;

Finding: ABS cell class is 4-2-2-2-2 (LG HI100).

4.3.3 Workmanship - COMPLIED

Diverting vent terminal is free from visible cracks, gouges, foreign inclusions, blisters, unintended holes and voids, or other injurious defects visible to normal or corrected-to-normal vision that would impair their performance in service or their integrity. In addition, the chemical composition of polymeric material, used to manufacture any roof flashing, is be homogeneous throughout.

4.3.4 Solvent Cement & Primer – NOT APPLICABLE (no cement/primer).

- (a) Solvent cement shall meet the requirements of ASTM D2235 for joining ABS pipe and fittings,
- (b) Primer shall meet the requirements of ASTM F656 and solvent cement shall meet the requirements of ASTM D2564 for joining PVC pipe and fittings.

4.4 Air Flow – COMPLIED (see section 5.2).

The diverting roof vent terminal allowS air flow as specified in Table 1 for the given vent pipe size with a pressure loss in the piping system not exceeding 1 inch of a water column.

5 Testing Requirements

5.1 Testing and Test Specimens - FOLLOWED

Diverting roof vent terminals test specimens shall be assembled in accordance with the manufacturer's installation instructions using appropriately sized piping made of the material(s) with which the diverting roof vent terminal is intended to connect.

5.2 Air Flow Test - COMPLIED

5.2.1 Test Methods - FOLLOWED

The air flow test shall be conducted as follows:

- (a) Install the diverting roof vent terminal in accordance with the manufacturer's installation instructions as shown in Figure 1;
- (b) Fill the trap seal and note the trap seal depth;
- (c) Operate the fan for 10 minutes at the flow rates listed in Table 1 for the given vent pipe size;
- (d) Turn the fan off;
- (e) Measure any loss in the column of water making up the trap seal;
- (f) Refill the trap seal;
- (g) Reverse the direction of the fan;
- (h) Operate the fan for 10 minutes at the flow rates listed in Table 1 for the given vent pipe size;
- (i) Turn the fan off; and,

(j) Measure any loss in the column of water making up the trap seal.

5.2.2 Performance Requirements - COMPLIED

There shall be no loss of the trap seal and the trap seal depth shall be reduced no greater than 12.7 mm (0.5 in) on either side of the trap.

Finding: the trap seal loss was 1/4".

5.3 Frost Closure Test - COMPLIED

The frost closure test is not applicable to diverting roof vent terminals intended for use with NPS1-1/2 vent pipe.

Note: Minimum NPS-2 or greater diverting vent terminals must be used where frost or snow closure is likely to occur.

5.3.1 Test Procedure - FOLLOWED

Install the diverting roof vent terminal in a freeze box capable of maintaining temperatures between -23 and -29 °C (-10 and -20°F). The freeze box shall be a minimum of 457 mm (18 in) by 457 mm (18 in) by 305 mm (12 in) high. Extend the vent pipe downward, outside the freezer box as shown in Figure 2. Have a vent opening to the freezer box with a minimum area of 6450 mm² (10 in²). Close the vent to the freezer box and lower the temperature to between -23 and -29 °C (-10 and -20°F). Cycle as follows:

- (a) Supply water at a temperature of 60 ± 3 °C (140 ± 5°F).
- (b) Open the water supply to the trap at a flow rate of 3.8 L/min (1 gpm) for 15 s.
- (c) Repeat the item (b), the water flow every 15 min.
- (d) Continue cycling through items (b) and (c) for 48 h.
- (e) Open the vent to the freezer box and turn on the fan.
- (f) Operate the fan connected to the vent pipe at the air flow rates listed in Table 1 for the given vent pipe size.
- (g) After 10 min, turn off the fan and measure the loss of the trap seal.

5.3.2 Performance Requirements - COMPLIED

There shall be no loss of the trap seal and the trap seal depth shall be reduced no greater than 12.7 mm (0.5 in) on either side of the trap.

Finding: the trap seal loss was 3/8".

6 Markings and Installation Instructions – COMPLIED (per drawing)

6.1 General

- 6.1.1 Diverting roof vent terminals complying with this Standard shall be marked with the manufacturer's name or trademark "Solar Roof Jack".
- 6.1.2 Markings shall be permanent, legible, and visible after installation.

6.2 Installation Instructions

Diverting vent terminals shall be accompanied by instructions for their installation, specifying at least the piping material(s) with which they are designed to connect.

- 6.2.1 Installation instructions shall specify use and installation of certified DWV components not packaged with product.

IAPMO PS 64-2012ae1:

4 General Requirements

4.1 General

4.1.1 – COMPLIED

Roof pipe flashing is designed to accommodate a wide range of pitches, in accordance with the manufacturer's installation instructions.

4.1.2 – COMPLIED

The roof pipe flashing is designed to seal the joint between the pipes and the roof area at the roof penetration.

4.1.3 – COMPLIED

The roof pipe flashing is free from visible cracks, holes, and other defects that could adversely affect their performance.

4.2 Dimensions

4.2.1 Opening for elastomeric roof pipe flashings shall have diameters that do not exceed 90% of the outside diameters of the pipes which they are designed to accommodate.

Findings: NOT APPLICABLE (not a cone flashing).

4.2.2 The minimum heights of the cones and skirts were more than 6.4 mm (0.25 in).

Finding: NOT APPLICABLE (not a cone flashing).

4.2.3 Flanges – Refer to section 5.4.

4.3 Materials – COMPLIED

4.3.1 Materials used for the manufacture of roof pipe flashings (Aluminum, ABS, rubber) are suitable for long-term outside use. Acceptable materials are specified in Sections 4.3.2 to 4.3.8.

4.3.4 Aluminum – COMPLIED (refer to document provided by the manufacturer).

a) complies with ASTM B209 (with tensile strength of 34 ksi; yield strength of 26.3 ksi and elongation of 11.3%); and

b) has a minimum thickness of 0.02" (found 0.05").

4.3.8 Elastomer – COMPLIED (refer to ARDL report no.: 152579)

Elastomer complies with the requirements in Table 1 below.

Table 1
Physical Properties for Elastomers
(See Section 4.3.3)

Property	ASTM Test Method	Conditions	Requirements
Brittleness	D2137 Method A	3 min at -40 °C (-40°F)	No brittleness
Elongation*	D412 Method C		Minimum 210%
Ozone resistance	D1149 and D1171	After 72 h at 40 °C (104°F)	No visible deterioration other than minor fading
Tear strength	D624 Method C		0.25 kN/m (1.4 lbf/in) 0.18 kN/m (1.0 lbf/in) for silicone rubber
UV resistance	G154 with UVB-313 lamps	UV: One 4-h cycle at 60 °C (140°F) Condensation: 2,000 h at 50 °C (122°F)	Maximum 50% loss in tensile strength and ultimate elongation
Water absorption	D471	After 48 h in water at 70 °C (158°F)	Maximum 5% change in volume

**For ridged thermoplastic materials used for roof pipe flashing skirts (bases), a tensile strength at yield of at least 15 MPa (2,175 psi) when tested in accordance with ASTM D638 may be substituted for the elongation requirement.*

Findings:

- Brittleness: No crack.
- Elongation: 459%.
- Ozone Resistance: No crack.
- Tear Strength: 193 lbf/in.
- UV Resistance: -0.9% (Tensile Strength); - 32.5% (Elongation).
- Water Absorption: +0.2%.

5. Additional Requirements – FOR REFERENCE ONLY.

Since the roof pipe flashings can be used on different roof materials (per manufacturer), so these dimensions are for references only: its minimum width is 4”.

6. Testing Requirements

6.1 Rain Test – COMPLIED

Rain test was performed on representative samples of all types of flashing construction by the method prescribed in section 25 of ANSI/UL 441, Standard for Gas Vents.

Finding: rainfall per hour (R): 16.25 inches/hour.

Maximum allowable collected water:

- Cross section (A): 4.41 sq-in → $Q(\text{allowable}) = 0.02RA = 1.43 \text{ cu-in/hr}$

While, the actual maximum water collected in all roof flashings: 0 cu-in/hr.

6.2 Temperature Test – COMPLIED

Temperature test was performed according to section 19 of ANSI/UL 441 for Type B Vents:

Finding: room temperatures: 79.7°F, the maximum temperature attained on the surface of the roof flashing was 128.7°F, which was less than 90°F above the room temperature when a roof flashing was tested as decribed in 19.1.3-19.1.8.

The maximum temperature on surfaces of the roof flashing was not more than 90°F above the room temperature during the period ending 1-1/2 hours after the start of the test, and not more than 117°F above room temperature for any subsequent period.

6.3 Horizontal Burning Test – COMPLIED

The horizontal burning test was conducted in accordance with Section 7 of UL94 for Type B vents. For thickness of less then 3 mm, the burning rate shall be less than 75 mm/min.

Finding: the burning rate were: 46, 51 and 48 mm/min. for 3 samples.

6.4 Corrosion Resistance Test - COMPLIED

When tested to section 6.4.1, metallic part (Aluminum) did not exhibit any corrosion spot at all.

