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## VERGOLA OPERABLE LOUVER ROOF SYSTEM

### CSI Sections:

- 10 73 00 Protective Covers
- 13 34 00 Fabricated Engineered Structures

### 1.0 RECOGNITION

Vergola Operable Louver Roof Systems described in this report have been evaluated for use as patio covers for recreational outdoor living purposes associated with dwelling units, and not as carports, garages, storage rooms, or habitable rooms. The structural properties of the systems were evaluated for compliance with the following codes:

- 2021, 2018, and 2015 International Building Code® (IBC)
- 2021, 2018, and 2015 International Residential Code® (IRC)
- 2022 California Building Code (CBC) – attached Supplement.
- 2022 California Residential Code (CRC) – attached Supplement.
- 2023 City of Los Angeles Building Code (LABC) – attached supplement – attached supplement.
- 2023 City of Los Angeles Residential Code (LARC) – attached supplement.

The Roof Systems comply with Appendix I of the IBC and Appendix H of the IRC.

### 2.0 LIMITATIONS

Use of the Vergola Operable Louver Roof Systems recognized in this report is subject to the following limitations:

- 2.1** The roof systems shall be associated with dwelling units and shall be limited to use as structures regulated under Appendix I of the IBC or Appendix H of the IRC.
- 2.2** The existing structure shall be adequate to support the additional loads imposed by the attached patio cover.
- 2.3** Freestanding and attached roof systems shall have a roof slope of at least 1/4 inch per foot (2.1 percent).

**2.4** The Vergola Operable Louver Roof System shall not be used to cover an enclosed room.

**2.5** Minimum design roof live load shall be 10 psf (479 N/m<sup>2</sup>) for the roof systems.

**2.6** Any roof structure constructed in an area with a flat roof-top snow load greater than 50 psf (2.4 kN/m<sup>2</sup>), or with a wind speed in excess of 140 mph (63 m/s), is outside the scope of this report.

**2.7** The Roof Systems shall be installed a maximum of 15 feet (4.6 m) above grade.

**2.8** The roof systems shall be limited to use in locations associated with IBC Seismic Design Categories A, B, C, or D, and the Response Modification Coefficient R, shall be taken as 1.25. Seismic coefficients S<sub>s</sub> and S<sub>1</sub> shall be limited as described in Drawing GS-2.

**2.9** The Vergola Operable Louver Roof Systems recognized in this report are produced by Vergola USA in Gardena, California.

### 3.0 PRODUCT USE

The Vergola Operable Louver Roof Systems shall be designed and installed in accordance with the applicable codes, the manufacturer’s published installation instructions, this report, and the associated Vergola Opening Roof System details by Anil Desai, Pages GS-1, GS-2, and ORS-1 thru ORS-6, dated January 12, 2024. Where the documents conflict, the more restrictive shall govern.

#### 3.1 Design:

Vergola Operable Louver Roof Systems shall be designed by a registered design professional. Selection of components for the design of freestanding and attached residential roof structures shall be in accordance with the design tables, applicable reductions, and the appropriate structural details for the roof size and structural configuration chosen. The selections shall be based on the site-specific design criteria for the location where the structure will be installed. The project location, corresponding code, and applicable design criteria, as given in 2021 IRC Table R301.2 [2018 and 2015 IRC Table R301.2(1)], including wind speed with exposure category, roof live load, ground snow load, seismic design category, and frost line depth shall be noted on the details. The required louver length and type (PVC or steel inserts), perimeter frame sizes and spans, column sizes and spacing, and footing sizes shall be included, as applicable, in the design documentation. Construction documents including this report and the site-specific structural plans shall be submitted to the building official for approval.

*The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with IBC Section 104.11. This document shall only be reproduced in its entirety.*





Design documents for roof structures subject to snow loading shall demonstrate that the snow loading does not exceed the allowable roof snow loads specified in the Vergola details. The calculations shall address the snow load provisions of IBC Section 1608, including rain-on-snow surcharge, unbalanced snow loading and drifting, and adequate reduction factors shall be applied as required by the accompanying Vergola details.

Freestanding covers, attached covers, and the existing building to which the covers are attached shall comply with the scoping requirements of Chapter 26 of ASCE/SEI 7 for regular geometric shape and response characteristics. Roof structures subject to the topographic effects of abrupt changes such as wind speed-up over hills, ridges, and escarpments in accordance with Section 26.8.1 of ASCE/SEI 7 are outside the scope of this report.

**3.2 Installation:** The Vergola Operable Louver Roof Systems shall be assembled on-site by trained installers that are approved by the manufacturer. The installers shall follow the plans accompanying this report and the job-specific instructions determined by design. Any uncoated aluminum shall be separated from dissimilar materials to prevent corrosion as described in Section M.7 of the ADM1. Each Vergola Operable Louver Roof System includes a list of parts required to assemble the structure according to design. Where the associated details provide for use of equivalent accessories, equivalency shall be substantiated by Vergola, and justification shall be submitted to the building official for approval.

#### 4.0 PRODUCT DESCRIPTION

The Vergola Operable Louver Roof Systems consist of louvers that may be opened to the outside air or closed to increase shade or to provide protection from rain. The louvers are supported by a perimeter steel frame and gutter system, which is either attached to an existing structure or supported by steel columns. The structures are constructed in accordance with the Vergola details accompanying this report.

#### 4.1 Materials

**4.1.1 Louvers:** The louvers are symmetrical airfoil-shaped members roll-formed from 0.0157-inch-thick (0.4 mm) Zinalume G300S coils meeting Australian Standard AS1365. The Zinalume has minimum yield strength,  $F_y$ , of 43,511 psi (300 MPa) and minimum tensile strength,  $F_u$ , of 49,313 psi (340 MPa). The Zinalume is finished with Colorbond, an Australian Standard AS2728 Type 3 coating. Tubes described in Section 4.1.3 of this report are inserted concentrically with the long axis of the louvers to provide additional bending strength. Cast aluminum end caps described in Section 4.1.2 are added to support the foil shape and provide connection and pivot points to allow the louvers to rotate as part of the motorized roof-opening mechanism.

**4.1.2 End Caps:** The end caps are cast from Australian Standard AS1874 DA401 aluminum. The casting specifications are as described in the Vergola Opening Roof System details and Vergola Quality Documentation.

**4.1.3 Inserts:** Two louver types are available with different allowable spans depending on the design loads and the tube insert material. The plastic inserts are made of 1-inch-diameter (25.4 mm) ASTM D4216 PVC Schedule 80 pipe. The roof system with plastic inserts weighs 2.05 pounds per square foot (98 N/m<sup>2</sup>). The metal inserts are made of 1.181 inch (30 mm) Australian Standard AS1365 Zinalume square tubes, 0.063 inch (1.6 mm) thick, having minimum yield strength,  $F_y$ , of 40,610 psi (280 MPa) and minimum tensile strength,  $F_u$ , of 47,862 psi (330 MPa). The steel tubes are galvanized inside and out. The roof system with metal inserts weighs 2.46 pounds per square foot (118 N/m<sup>2</sup>). See the span tables in the Vergola details for allowable spans.

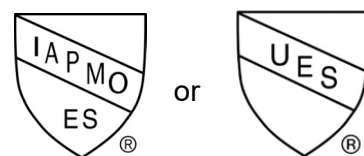
**4.1.4 Steel Structure:** The louver roof is supported by a steel structure fabricated in accordance with the Vergola details. The support columns are 3-inch x 3-inch HSS tubes made of ASTM A500, Grade B steel, minimum. The post thickness varies depending on the loading as shown in the tables in the Vergola details. The supporting beams and gutters are made from 0.102-inch-thick (2.59 mm) ASTM A653 SS, Grade 50, Class 4 steel, minimum. The connection types, fastener spacing, and assembly details shall be selected to correspond to the loads and framing situation encountered in accordance with the Vergola details.

**4.1.5 Fasteners:** Fasteners include aluminum and steel bolts, wood screws, lag screws, post-installed anchors, self-drilling screws, and sheet metal screws as specified in the plans accompanying this report.

**4.1.6 Concrete:** The minimum concrete compressive strength used to form the footings in accordance with the Vergola details shall be a minimum of 4,500 psi (31 MPa). Concrete not exposed to sulfate may have the minimum compressive strength reduced to 2,500 psi (17 MPa).

#### 5.0 IDENTIFICATION

The Roof System covered by this report shall be identified by a permanent decal or identifying tag, installed on the job site once an assembly is completed, that states the name and address of the report holder (Vergola USA). Each installation shall bear the Evaluation Report Number (ER-532). Either IAPMO UES Mark of Conformity may also be used as shown below:



IAPMO UES ER-532



## 6.0 SUBSTANTIATING DATA

6.1 Data in general agreement with the ICC-ES Acceptance Criteria for Patio Enclosures (AC340) approved August 2018 (Editorially Revised August 2021).

6.2 Structural performance testing for the operable louvers in accordance with ASTM E1592, Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference

6.3 Engineering analysis in accordance with the 2021, 2018, and 2015 International Building Code, ASCE/SEI 7-16 Supplement 1, and the Aluminum Design Manual 2020.

6.4 Quality control manual.

6.5 Product drawings dated January 12, 2024, by Anil Desai.

6.6 Test reports are from laboratories in compliance with ISO/IEC 17025.

## 7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on the Vergola Operable Louver Roof System to assess conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product certification. The Vergola Operable Louver Roof Systems are produced at locations noted in Section 2.9 of this report under a quality control program with periodic inspection under the supervision of IAPMO UES.

For additional information about this evaluation report please visit [www.uniform-es.org](http://www.uniform-es.org) or email us at [info@uniform-es.org](mailto:info@uniform-es.org)

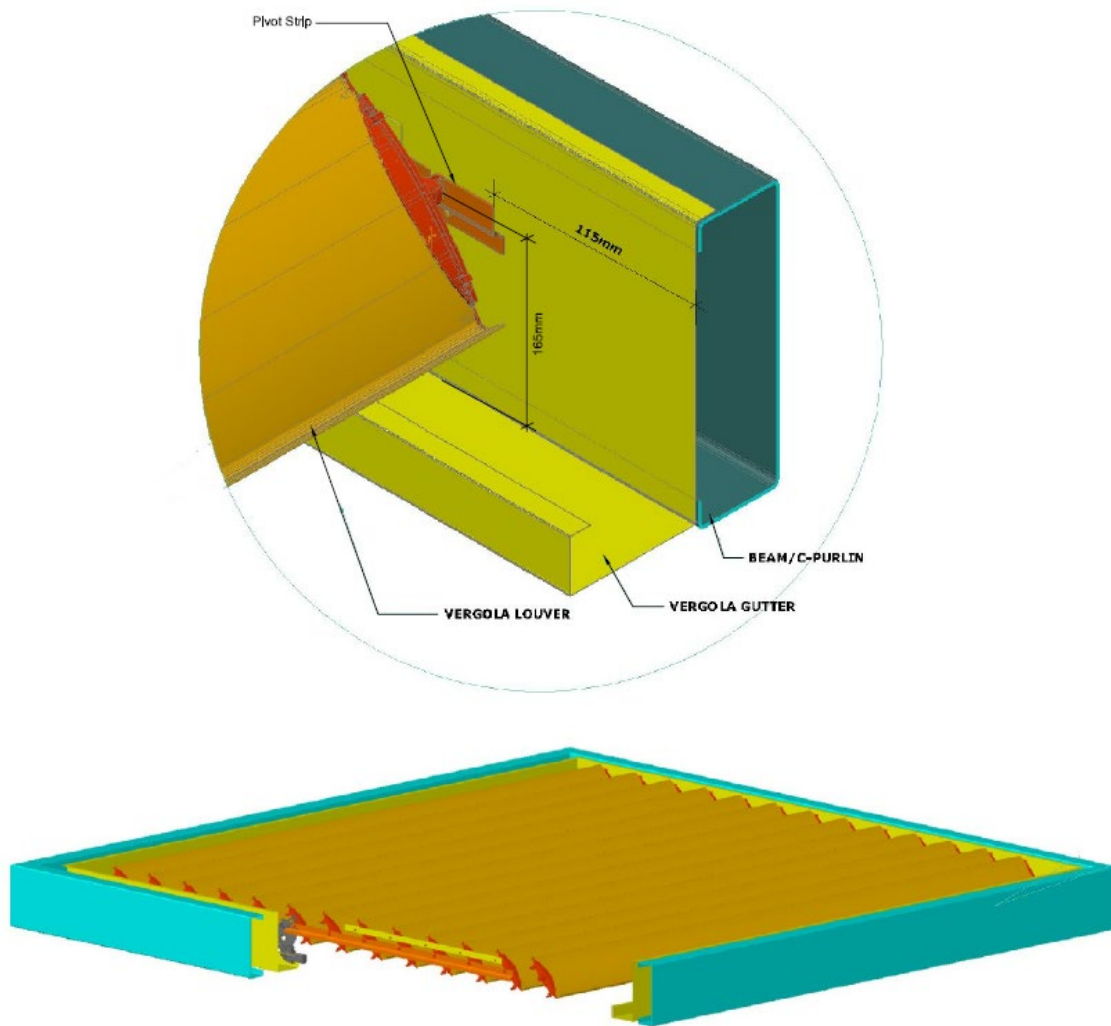


FIGURE 1 – TYPICAL VERGOLA OPERABLE LOUVER ROOF ASSEMBLY



## CALIFORNIA SUPPLEMENT

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- 2022 California Building Code (CBC)
- 2022 California Residential Code (CRC)

The systems are residential self-supporting or attached structures conforming to Appendix I of the CBC, and Appendix H of the CRC. The patio enclosures shall be constructed in accordance with the attached Evaluation Report, ER-532, the drawings accompanying report ER-532 (Vergola Opening Roof System details, by Anil Desai, Pages GS-1, GS-2, and ORS-1 thru ORS-6, dated January 12, 2024), the manufacturer's published installation instructions, and the California Building and Residential Codes.

### 2.0 LIMITATIONS

Use of the Vergola Operable Louver Roof System recognized in this report is subject to the following limitations:

**2.1** Use and installation of the Vergola Operable Louver Roof shall be in accordance with ER-532 and its corresponding drawings, the manufacturer's published installation instructions, and Appendix I of the CBC, or Appendix H of the CRC, as applicable.

**2.2** The site-specific design criteria for live load, wind speed and exposure category, seismic design category, rain load, and ground snow load conditions shall be determined in accordance with Chapter 16 of the CBC or Section R301 of the CRC, as applicable. The appropriate configurations for the Roof System shall be determined in accordance with

Sections 3.1 of ER-532 based on the design loads determined in accordance with the CBC or CRC for the building site.

**2.3** These structures are not intended to comply with the provisions related to hospitals (OSHPD) and public schools in California (DSA).

**2.4** This supplement expires concurrently with ER-532.

For additional information about this evaluation report please visit [www.uniform-es.org](http://www.uniform-es.org) or email us at [info@uniform-es.org](mailto:info@uniform-es.org)



## CITY OF LOS ANGELES SUPPLEMENT

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