



UL Solutions Evaluation Report

UL ER346702-04

Issued: 2016-10-12

Revised: 2024-09-06

Visit the UL Solutions [Product iQ® database](#) for current status of report.

UL Category Code: ULFD – Roof and Wall Specialties and Accessories

CSI MasterFormat®

DIVISION: 07 00 00 - Thermal and Moisture Protection

Sub-level: 07 72 00 - Roof Accessories

DIVISION: 26 00 00 - Electrical

Sub-level 26 31 00 - Photovoltaic Collectors

COMPANY:

Tesla Inc.

3500 Deer Park Road

Palo Alto, CA 94304

Phone: (650) 391-7144

www.tesla.com

1. Subject

ZS COMP

2. Scope of Evaluation

- 2024, 2021, and 2018 *International Building Code*® (IBC)
- 2024, 2021, and 2018 *International Residential Code*® (IRC)
- 2024, 2021 and 2018 *International Fire Code*® (IFC)
- 2023, 2020, and 2017 *NFPA 70 National Electrical Code*® (NEC)
- 2023 and 2020 Florida Building Code (FBC)
- 2022 and 2019 California Building Code (CBC)

The products were evaluated for the following properties:

- Electrical grounding and bonding to UL 2703
- Fire classification to UL 2703 (Class A)
- Mechanical loading to UL 2703
- Water penetration to UL 2582 - Wind Driven Rain
- Wind driven rain resistance to TAS No. 100

3. Reference Documents

- ANSI/UL1703, Standard for Flat-Plate Photovoltaic Modules and Panels
- ANSI/UL2703, Standard for Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels
- ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures
- ASTM D7147 - Standard Specification for Testing and Establishing Allowable Loads of Joist Hangers
- ICC-ES Acceptance Criteria for Joist Hangers and Similar Devices, AC13
- IEC 61730-1 Photovoltaic (PV) Module safety qualification – Part 1: Requirements for construction
- IEC 61730-2 Photovoltaic (PV) Module safety qualification – Part 2: Requirements for testing
- National Design Specification for Wood Construction
- TAS No. 100: Test Procedure for Wind and Wind Driven Rain Resistance – modified (110 mph @ 8.8 in/h water spray)
- UL 2582, Outline for Ridge Vents

4. Uses

The ZS Comp mounting system is designed specifically for mounting of Zep-compatible photovoltaic modules on composition shingle roofs. The ZS Comp assembly is a system comprising a mounting block combined with a levelling foot and waterproofing flashing insert used to attach specific photovoltaic mounting hardware to the wood framing supporting the roof decks for asphalt shingle roof coverings while maintaining roof watertightness.

The ZS Comp mounting system is suitable for use in high wind areas such as Florida, including High Velocity Hurricane Zones (HVHZ). See section 6 of this report for structural design requirements.

5. Product Description

ZS Comp is composed of three components/subassemblies consisting of the Leveling Foot (P/N 850-1603), Mounting Block (P/N 850-1633), and Flashing Insert Assembly (P/N 850-1628), see Figure 1: ZS Comp Assembly.

The Leveling Foot mounting bolt and serrated locking nut are 300-series stainless steel in accordance with ANSI/ASME B 18.2.1.

The mounting block is constructed of cast aluminum alloy, A360 or A380 with a matte black-e-coating.

The flashing insert assembly consists of a puck insert constructed of a UL Recognized Component resin suitable for outdoor exposure and puck foam with pressure sensitive adhesive.

The lag screw is 300-series stainless steel in accordance with ANSI/ASME B18.2.1 and is 5/16 in. diameter with min. of 2.5" embedment into structural members with captured washers. The washer for the lag screw is 300-series stainless steel and is a 5/16 in. Type B washer.

6. Design

A structural designer or other qualified person acceptable to the Authority Having Jurisdiction must calculate the applicable design forces and relevant load combinations for the system from the applicable code and compare against the load ratings for the attachment as listed in this report. The designer must analyze the wood framing members for the applicable design forces and load combinations from the applicable code and then compare connection capacity in accordance with the National Design Specification for Wood Construction (NDS).

Ultimate uplift, and downforce load values for the system were determined from test data. Values reported in Table 1 are tabulated for use with Allowable Strength Design (ASD) provisions. Attachment patterns or spacings for the ZS Comp mounting system shall be determined based on site-specific parameters including solar module and PV array geometry, building and roof geometry and siting, and any applicable design loads (e.g., dead, wind, and snow loading).

For HVHZ regions, this includes the following as prescribed by the FBC.

- Wind loads calculated per ASCE 7 Chapter 29
- Minimum Exposure Category C; Exposure Category D (as applicable)
- Miami-Dade County Wind Speeds Broward County Wind Speeds

Risk Category 1 = 165 mph	Risk Category 1 = 156 mph
Risk Category 2 = 175 mph	Risk Category 2 = 170 mph
Risk Category 3 = 186 mph	Risk Category 3 = 180 mph
Risk Category 4 = 195 mph	Risk Category 4 = 185 mph

7. Installation

Installation of the ZS Comp assembly shall comply with this report and the manufacturer's published installation instructions. The installation instructions are to be available at the jobsite during installation.

Installation of the ZS Comp assembly as described in this report is limited to roofs having a minimum slope of 2:12 to a maximum slope of 12:12.

The installation of the ZS Comp is limited to the mounting hardware as specified in the installation instructions.

8. Condition of Use

The ZS Comp assembly described in this report complies with those codes listed in Section 2 of this report, subject to the following conditions:

- 8.1** Materials and methods of installation shall comply with this report and the manufacturer's published installation instructions. In the event of a conflict between the installation instructions and this report, this report governs.
- 8.2** A registered design professional's report demonstrating compliance with the applicable code, as referenced in Section 6, shall be provided where required by the authority having jurisdiction.
- 8.3** Manufacturer's installation instructions shall be provided to the code official upon request for inspection purposes.

8.4 The ZS Comp assembly shall be installed only by professional personnel trained and approved by the manufacturer.

8.5 Photovoltaic modules supported by the modular mounting system shall be listed and labeled in accordance with UL 1703 or both UL 61730-1 and UL 61730-2. Rooftop mounted photovoltaic panel systems must comply with the following Code editions as applicable.

Code Version	Code Section
IBC – 2018, 2021 and 2024	1505.9, 3111.3
IRC - 2018, 2021 and 2024	R324
FBC - 2020	1505.8,1620, 3111.3
FBC - 2023	1505.9,1620, 3111.3
CBC- 2019 and 2022	1505.9, 3111.3

8.6 Installation of photovoltaic modules must comply with following Code editions as applicable.

Code Version	Code Section
IFC - 2018	1204
IFC – 2021 and 2024	1205
NEC - 2017, 2020 and 2023	690

8.7 Modified silane sealant shall be injected through filler port.

8.8 See UL Online Certification Directory for Mounting Systems, Mounting Devices, Clamping Devices and Ground Lugs for Use with Photovoltaic Modules and Panels - (QIMS).

8.9 The ZS Comp assembly consisting of Mounting Block (P/N 850-1633), Leveling Foot (P/N 850-1603), and Flashing Insert (P/N 850-1628) is manufactured under the UL LLC Listing and Follow-Up Service Program, which includes regular audits.

8.10 Wood framing members shall be predrilled for installation of lag screws in conformance with the applicable sections of the National Design Specification for Wood Construction (NDS) and the manufacturer's installation instructions (7/32 inch pilot hole). Edge and end distances of the lag screw in the wood framing member shall be sufficient to prevent unusual splitting and not less than the requirements of the applicable Tables of the National Design Specification for Wood Construction (NDS).

9. Supporting Evidence

9.1 Manufacturer's descriptive product literature, including installation instructions.

9.2 Resistance to water infiltration data utilizing the Wind-Driven Rain Test in UL Subject 2582.

9.3 Resistance to water infiltration data utilizing TAS No. 100: Test Procedure for Wind and Wind Driven

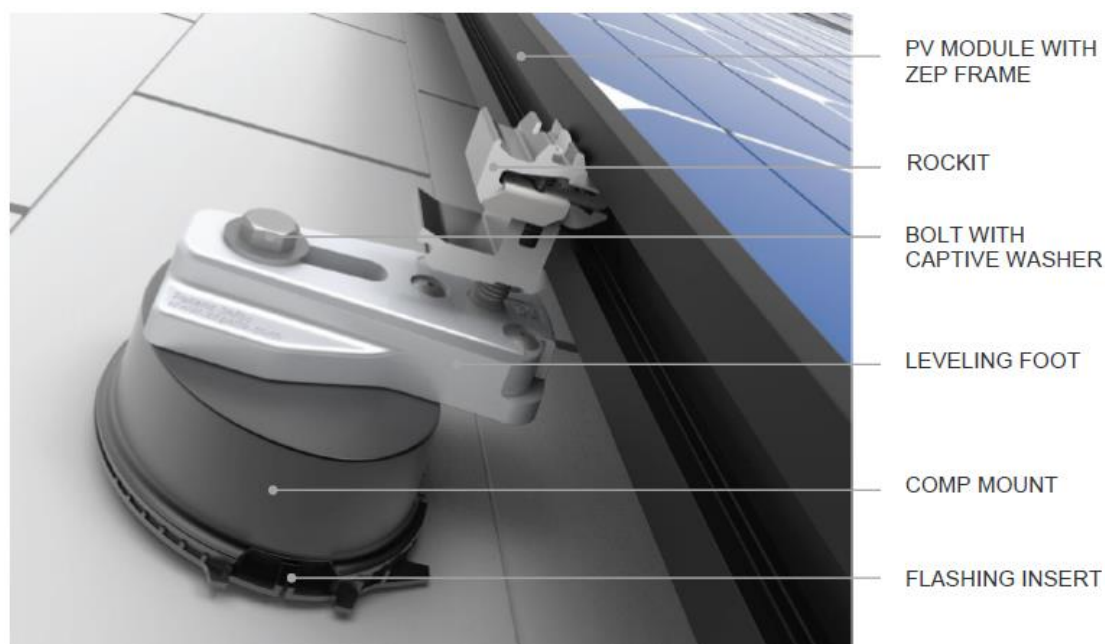
9.4 UL test reports and Listing, UL File E346702, in accordance with ANSI/UL 2703 for grounding and bonding, fire performance and mechanical loading. See UL Product Certification Category for Mounting Systems, Mounting Devices, Clamping Devices and Ground Lugs for Use with Photovoltaic Modules and Panels – UL Product iQ ([QIMS](#)).

10. Identification

The ZS COMP described in this evaluation report are identified by markings bearing the report holder's name (Tesla Inc.), the plant identification, if applicable, the UL Listing Mark, and the evaluation report number UL ER346702-04. The validity of the evaluation report is contingent upon this identification appearing on the product or on the smallest unit container in which the product is packaged.

11. Use of UL Evaluation Report

- 11.1** The approval of building products, materials or systems is under the responsibility of the applicable authorities having jurisdiction.
- 11.2** UL Evaluation Reports shall not be used in any manner that implies an endorsement of the product, material or system by UL.
- 11.3** The current status of this report, as well as a complete directory of UL Evaluation Reports may be found at UL.com via our On-Line Certifications Directory.
- 11.4** Comprehensive guidance for design and installation of solar photovoltaic systems and associated equipment is beyond the scope of this document. For support on these topics, refer to a contractor, system designer, building official or registered design professional, as appropriate, or where required by the Authority Having Jurisdiction. Evaluation of existing structures for structural sufficiency and code compliance is beyond the scope of this report. It shall be the responsibility of the installer to investigate and comply with all local building code requirements and criteria as may be applicable to the installation of ZS Comp to an existing structure.

Figure 1: ZS Comp Assembly**Table 1:** Maximum System Load Rating per ANSI/UL 2703 Mechanical Listing on ZS COMP, consisting of Mounting Block, Leveling Foot, and Flashing Insert

Attachment Type	Max. System Design Load Rating (lbs/sqft)	
	Rear	Front
ZS Comp (Modules in Landscape)	72* ¹	100* ³
	72* ¹	50* ²
ZS Comp (Modules in Portrait)	72* ¹	50* ²
	37.5* ⁴	31.3* ⁵

Note *1: Listed PV modules shown on E346702 - UL Product IQ ([QIMS](#)) tested with ZS Comp have been tested for 72 psf.

Note *2: Refer to manufacturer's installation instructions for Listed PV modules shown on E346702 - UL Product IQ ([QIMS](#)) have been tested for 50 psf.

Note *3: Listed PV modules shown on E346702 - UL Product IQ ([QIMS](#)) tested with ZS Comp have been tested for 100 psf.

Note *4: Listed PV modules shown on E346702 - UL Product IQ ([QIMS](#)) tested with ZS Comp have been tested for 37.5 psf.

Note *5: Listed PV modules shown on E346702 - UL Product IQ ([QIMS](#)) tested with ZS Comp have been tested for 31.3 psf.

The mechanical securement is based upon Listed PV module assessed for use with the ZS Comp system.

UL Solutions Evaluation Reports

© 2024 UL LLC

This UL Solutions Evaluation Report is not an endorsement or recommendation for use of the subject and/or product described herein. This Report is not the UL Solutions Listing or UL Solutions Classification Report that covers the subject product. The subject product's UL Solutions Listing or UL Solutions Classification is covered under a separate UL Solutions Report. UL Solutions disclaims all representations and warranties whether express or implied, with respect to this Report and the subject or product described herein. Contents of this Report may be based on data that has been generated by laboratories other than UL Solutions that are accredited as complying with ISO/IEC Standard 17025 by the International Accreditation Service (IAS) or by any other accreditation body that is a signatory to the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). The scope of the laboratory's accreditation shall include the specific type of testing covered in the test Report. As the accuracy of any non-UL Solutions data is the responsibility of the accredited laboratory, UL Solutions does not accept responsibility for the accuracy of this data.

UL Solutions Headquarters
333 Pfingsten Road
Northbrook, IL 60062-2096 USA
T: 847.272.8800
[UL.com/Solutions](https://www.ul.com/Solutions)