



Custom Test Report

Custom Test Report: 80244970

Date: April 23, 2025

CLIENT: Martin Solar
6719 State Route 4
Mascoutah, Illinois 62258
United States

Attention: Preston Nelson

Issued by: Michael Hoffnagle

SUBJECT: Mechanical Load testing only for Hidden-Fastener Solar Mount component per UL 2703.

APPLICABLE REQUIREMENTS:

ANSI/UL 2703: 2015 - First Edition- Including revisions through July 11, 2024

ASSESSMENT:

Please supply a copy of this information when filing an application for CSA Certification related to the SUBJECT, as it may aid the investigation.

Evaluation and Testing:

THIS REPORT DOES NOT AUTHORIZE THE USE OF THE CSA MARK ON THE SUBJECT PRODUCTS.

The completion of this form does not imply certification or approval of the "SUBJECT" product nor any features or components thereof.

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Mechanical Load Testing Summary

Product: Hidden-Fastener Solar Mount (HFSM-655)

Standard: UL 2703, Section 21 – Mechanical Load Testing

Test Components: Unirac rails and clamps

Purpose: Evaluate mechanical load capacity and performance to failure

Overview

The HFSM-655 was tested to assess its mechanical load capacity when integrated with a railed racking system. Testing was conducted using Unirac rails and clamps, in accordance with UL 2703 Section 21.

Certification Testing

- **Minimum Load Testing:** Conducted per UL 2703 requirements to meet baseline certification.
- **Three Test Directions:** All directions required by the standard (downward, upward, and lateral) were tested.
- **Results:** The mount passed in all three directions at **3x the minimum required loads**, satisfying UL 2703 performance criteria.
-

Extended Load Testing

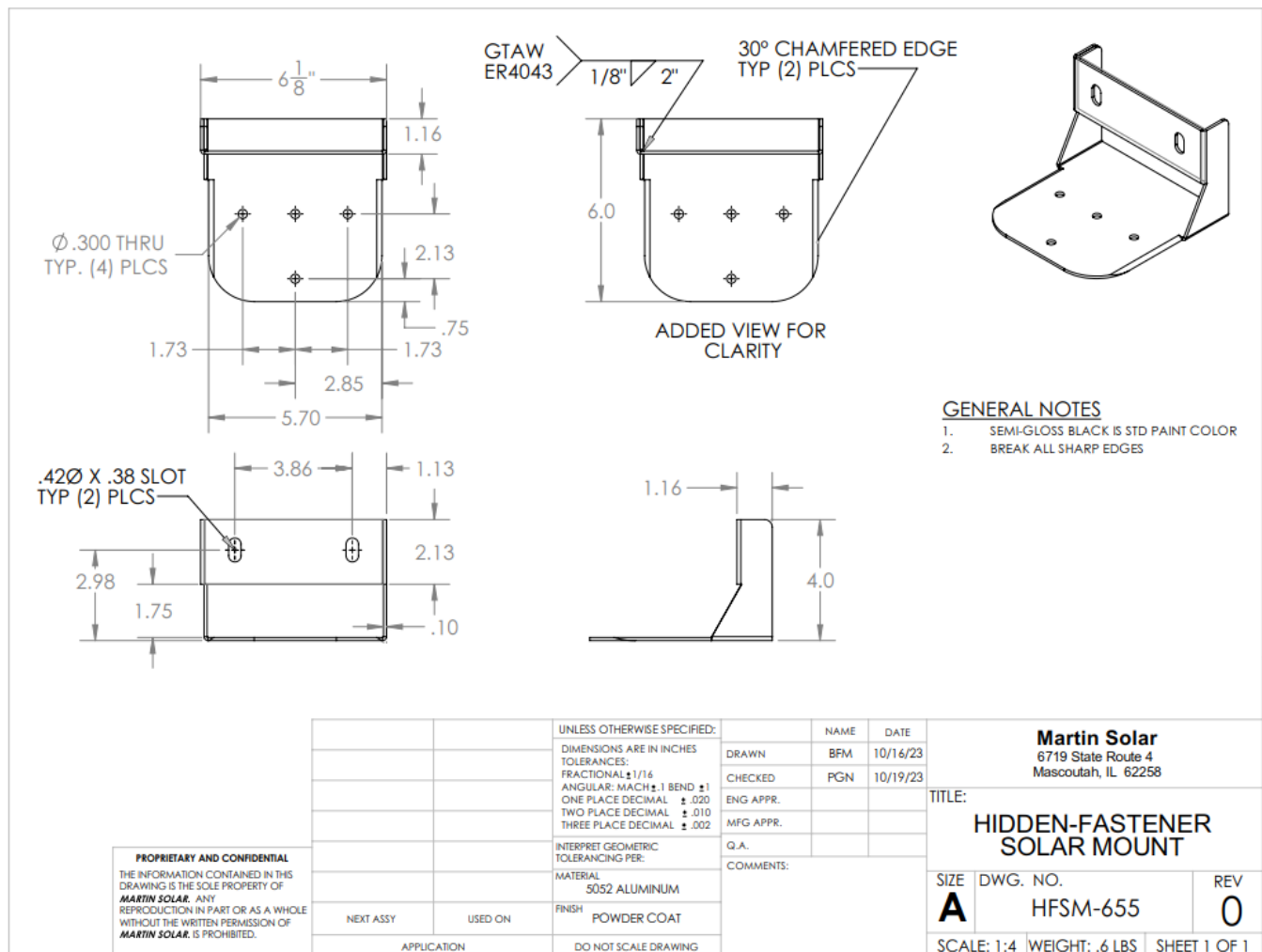
After achieving certification thresholds, additional testing focused solely on **upward (uplift) loading** to determine the component's maximum capacity and failure mode.

- **Increased Load Performance:** The HFSM-655 maintained integrity up to **6x the UL 2703 minimum load** in the upward direction.
- **Failure Point:** Beyond 6x loads, the mount exhibited **permanent deformation**, which constitutes failure per UL 2703.
 - Testing continued post-deformation to observe ultimate failure.
 - **System Collapse:** A module became dislodged at one of the end clamps, resulting in localized structural collapse.

Conclusion

The HFSM-655 demonstrated robust mechanical performance, exceeding UL 2703 requirements with a maximum achieved uplift rating of **6x the standard load** before permanent deformation. Testing to failure provided insight into the system's structural limits and failure mode.

Note: For precise load values and testing data, please refer to the attached detailed test results



Hidden-Fastener Solar Mount, component being tested

Final Results:

Certification loads:

Panel area: 27.84 ft2

Test Weight is per module

UL 2703 Loading			
Test	Design Load	Test Load	Test Weight
Downward Pressure	30.0 lbs/ft2	45.00 lbs/ft2	1253.0 lbs
Upward Pressure	30.0 lbs/ft2	45.00 lbs/ft2	1253.0 lbs
Sloped Load	15.0 lbs/ft2	22.50 lbs/ft2	626.5 lbs

Downward Pressure	3x minimum load rating
Upward Pressure	6x minimum load rating
Sloped Load	3x minimum load rating

Here is what the minimums are per UL 2703:

Test	Design Load	Test Load
Downward Pressure	10.0 lbs/ft2	15.00 lbs/ft2
Upward Pressure	5.0 lbs/ft2	7.50 lbs/ft2
Sloped Load	5.0 lbs/ft2	7.50 lbs/ft2

Test to fail loads:

Pane areal: 27.84 ft2

Test Weight is per module

Considered a failure by bracket bending with permanent deformation

Test	Design Load	Test Load	Test Weight	1336.5 per module	2673 total on system
Upward Pressure	32.0 lbs/ft2	48.00 lbs/ft2	1336.5 lbs		

System failure when module dislodged from clamp

Test	Design Load	Test Load	Test Weight	1750 per module	3500 total on system
Upward Pressure	42.0 lbs/ft2	63.00 lbs/ft2	1754.2 lbs		

All testing done with PV module from Hyperion Solar, HY-DH144N8-575, Type 29, 27.84 ft2

TEST REPORT/Data Sheet

1) General

Test Methods Applied:	UL 2703
Additions to, deviations from, or exclusions from Test Method:	n/a
Description of the Product(s) tested:	Hidden-Fastener Solar Mount with Unirac rails and clamps
Description of the sampling process:	Production
Date of receipt of test samples:	03-31-2025
Test sample conditions:	new
Dates of Testing:	04-03-2025 to 04-09-2025

Testing Performed/ Prepared By:	Name (Printed):	Mike Hoffnagle	Signature:
	Title:	Certifier III	
	Date:	04-17-2025	

2) Equipment:

The following key pieces of equipment were used to perform the tests documented in this report.			
Asset #	General Description:	Date of Calibration:	Calibration Due Date:
Z00017326	Stopwatch	2024-10-21	2025-10-21
Z00020314	Environmental meter	2024-06-04	2025-06-04
Z00020335	Torque Wrench	2024-06-18	2025-06-18
E062	Scale	2025-01-08	2026-01-08
Z00023466	Tape measure	2024-03-14	2025-03-14
Z00017379	Digital Protractor	2025-01-20	2026-01-20

3) Test Results:

21 Mechanical Loading Test

Certified Results:

Clause 21 and TIL No. A-40	Mechanical Loading Test		
Test Date (mm/dd/yy)	04-03-2025 to 04-09-2025	Results (P/F)	P
Downward Design Load (lb/ft ²)	30.0	1.5 x Downward Design Load (lb/ft ²)	45.0
Upward Design Load (lb/ft ²)	30.0	1.5 x Upward Design Load (lb/ft ²)	45.0
Down-Slope Load (lb/ft ² or Pa)	15.0	1.5 x Down-Slope Design Load (lb/ft ²)	22.5
Mounting Condition per Manufacturer	Downward (P/F)	Upward (P/F)	Down-Slope (P/F)
	P	P	P
Comments: Tested with PV module from Hyperion Solar, HY-DH144N8-575, Type 29, 27.84 ft ²			
Test By	Mike Hoffnagle	Test Date	04-03-2025 to 04-09-2025

Test to failure results, bracket

Clause 21 and TIL No. A-40	Mechanical Loading Test		
Test Date (mm/dd/yy)	04-03-2025 to 04-09-2025	Results (P/F)	P
Downward Design Load (lb/ft ²)	NA	1.5 x Downward Design Load (lb/ft ²)	NA
Upward Design Load (lb/ft ²)	32.0	1.5 x Upward Design Load (lb/ft ²)	48.0
Down-Slope Load (lb/ft ² or Pa)	NA	1.5 x Down-Slope Design Load (lb/ft ²)	NA
Mounting Condition per Manufacturer	Downward (P/F)	Upward (P/F)	Down-Slope (P/F)
	P	P	P
Comments: Tested with PV module from Hyperion Solar, HY-DH144N8-575, Type 29, 27.84 ft ²			
Test By	Mike Hoffnagle	Test Date	04-03-2025 to 04-09-2025

Test to failure results, system

Clause 21 and TIL No. A-40	Mechanical Loading Test		
Test Date (mm/dd/yy)	04-03-2025 to 04-09-2025	Results (P/F)	P
Downward Design Load (lb/ft ²)	NA	1.5 x Downward Design Load (lb/ft ²)	NA
Upward Design Load (lb/ft ²)	42.0	1.5 x Upward Design Load (lb/ft ²)	63.0
Down-Slope Load (lb/ft ² or Pa)	NA	1.5 x Down-Slope Design Load (lb/ft ²)	NA
Mounting Condition per Manufacturer	Downward (P/F)	Upward (P/F)	Down-Slope (P/F)
	P	P	P
Comments: Tested with PV module from Hyperion Solar, HY-DH144N8-575, Type 29, 27.84 ft ²			
Test By	Mike Hoffnagle	Test Date	04-03-2025 to 04-09-2025