Genius Quest Global Limited
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No. 10 Fenggang Science Technology Road
Fenggang Town, Dongguan City Zip-523696

Test Report

Applicant: ArcticAnchor USA 800 N Rainbow Blvd, Unit 208, Las Vegas, NV 89107

Number: RAIL-BLK032625
Date: March 26, 2025

Sample Description:

Submitted Sample Test:	Force/Temperature
Item Name:	TitanCore Snow Rail Black
Test Sample Quantity:	10 Pieces
Date Sample Received:	January 15, 2025
Date Sample Tested:	January 18, 2025
Testing Standards	Mechanical: Internal method (fixture-based), applicable standards, and engineering practice.

Product Image:

Detailed report continued on attached pages.

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I. INTRODUCTION

I.A Purpose of Test

The purpose of this evaluation was to determine the static mechanical load-to-failure capacity of the TitanCore Snow Rail Black (ArcticAnchor system) and to document the observed structural response under quasi-static loading. Testing was performed using a universal testing machine and a custom fixture intended to represent a controlled loading condition relevant to snow retention rail applications. Results are intended to support engineering assessment of the rail's strength and durability for internal product approval and design validation under the boundary conditions described in this report.

I.B Laboratory

Testing was performed at the Genius Quest Global in-house testing facility. Unless otherwise stated, testing was conducted under controlled laboratory conditions. Equipment identification, capacity, and calibration status are documented on the associated equipment pages and, where available, in supporting records.

I.C Description of Unit

The test article is the TitanCore Snow Rail Black, a polymer snow retention rail intended for use as part of a roof-mounted snow retention system. The rail is designed to be installed along the roofline and used in conjunction with compatible system hardware (e.g., stands/clamps or equivalent mounting interfaces) as applicable to the roof type and project requirements. The rail evaluated in this report is a finished production-intent component. Representative photographs of the rail and test setup are provided in this document.

II. SUMMARY

II.A Pretest Information

The samples were received as finished parts. Sample quantity and conditioning groups are listed in the test results tables. Where receipt dates, lot/batch traceability, and drawing revision are not provided in the test package, placeholders are included and should be completed prior to issuance as a controlled report.

II.B Information Log

Static mechanical load-to-failure testing was performed using a universal testing machine with custom fixtures. The mechanical loading was performed using a custom fixture and is not claimed to be a direct execution of an ASTM/ISO standardized mechanical test method.

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II.C Summary of Test Results

Ultimate load-to-failure results are summarized below for ambient (22 °C) and cold (−30 °C) testing. Descriptive statistics are calculated from the listed specimen force values. Raw data exports (load versus displacement) are retained and available upon request.

Metric	22 °C	−30 °C	Change
Mean ultimate load (N)	15,619.07	14,887.31	-4.7%
Minimum listed load (N)	15,082.25	14,133.22	—
Sample Count	10	10	—

Notes:

1. The values above correspond to the reported Break Point at each temperature condition in the results sections.
2. Where the underlying machine output is recorded in newtons, unit conversions are maintained internally for traceability.

Rapid Thermal Cycling and Post-Aging Mechanical Verification

Rapid thermal cycling was performed prior to mechanical verification testing to evaluate durability under repeated temperature switching. Specimens were cycled between −30 °C and +55 °C, with the chamber switching setpoints every 8 hours (8 hours at −30 °C followed by 8 hours at +55 °C, repeated) for up to 30 days. Upon completion of the thermal cycling exposure, mechanical performance was verified using the same load-to-failure procedure described in this report. Mechanical results are reported herein as ambient (22 °C) load-to-failure and cold (−30 °C) load-to-failure, with cold tests executed within a defined short handling window after removal from the chamber. Detailed chamber cycle logs (temperature time history, ramp/dwell performance, interruptions) are retained internally and available upon request.

III. TEST SET-UP AND PROCEDURE

III.A Intended Field Installation (System Context)

In intended field installation, the TitanCore Snow Rail Black is installed as part of a roof-mounted snow retention assembly. The rail is supported and restrained by compatible system hardware (e.g., clamps, brackets, stands, or equivalent attachment interfaces) selected for the roof type and project design loads. The final layout, rail run length, attachment spacing, and hardware selection are determined by roof geometry, local design snow load, and project-specific engineering requirements. This report documents component-level rail testing under controlled laboratory conditions and does not, by itself, represent a complete roof-system evaluation.

III.B As-Tested Mounting and Boundary Conditions

For mechanical evaluation, rail specimens were tested using a rigid fixture arrangement that applied a controlled load to a defined rail span under repeatable boundary conditions. The rail was constrained at the fixture clamp location and loaded

quasi-statically until failure. Because the laboratory fixture configuration and boundary conditions may differ from the field load distribution through a complete roof system assembly, the measured ultimate loads represent rail performance under the stated laboratory boundary conditions and should not be interpreted as allowable roof design loads without system-level verification.

III.C Test Equipment (Summary)

Mechanical load-to-failure testing was performed using a universal testing machine. Machine capacity, measurement accuracy, displacement resolution, and key specifications are provided in the Testing Equipment section of this report. The test temperature conditions reported in this document were achieved by conditioning specimens to the target test temperature prior to mechanical loading (ambient: 22 °C, cold: −30 °C) as indicated on the results pages.

III.D Test Procedure

Each specimen was installed into the fixture and aligned to ensure consistent load application. The load was applied quasi-statically under machine control until failure. Failure was defined as catastrophic fracture, loss of load-carrying capacity, or another clearly observable structural collapse consistent with the purpose of the test. The maximum load reached prior to failure was recorded as the ultimate load. After testing, specimens were photographed, and the observed failure condition was documented.

Rapid Thermal Cycling (Durability Conditioning)

Durability conditioning was conducted in a programmable environmental chamber by alternating specimens between a cold setpoint of −30 °C and a hot setpoint of +55 °C. The chamber was programmed to switch between setpoints every 8 hours, such that specimens were exposed to repeated temperature transitions throughout the aging period. Exposure durations of 10, 20, and 30 days were evaluated in accordance with the test plan. Specimens were placed to avoid contact with chamber walls and to maintain airflow around all surfaces. Upon completion of each exposure duration, specimens were removed for inspection and mechanical verification testing. Chamber program details and time-history logs are retained internally and are available upon request.

III.E Cold Mechanical Testing Window (−30 °C)

To evaluate mechanical performance at cold temperature, specimens were conditioned at −30 °C in the environmental chamber and transferred directly to the universal testing machine for load-to-failure testing. Testing commenced within a 2-minute window following removal from the chamber to minimize specimen warm-up and ensure the test condition represents near-chamber-temperature performance. The reported cold-temperature mechanical results (Section VII) correspond to this cold-conditioned, rapid-transfer test method.

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IV. SNOW RAIL TEST METHODS

Mechanical Load-to-Failure, Rapid Thermal Cycling, and UV Accelerated Weathering

IV.A Purpose
This section provides a clear, technically precise description of the test procedures used to evaluate the TitanCore Snow Rail Black. It is intended to be read alongside the corresponding test results pages, which contain the measured data, equipment identification, and photographic records. Together, the methods description and results pages form the complete test record supporting the engineering review.

IV.B Scope
The procedures described herein cover three categories of testing: (i) mechanical destructive load-to-failure testing to determine ultimate capacity and characterize failure response under quasi-static loading; (ii) rapid thermal cycling to evaluate durability under repeated temperature switching, followed by mechanical re-testing to quantify retention of performance; and (iii) xenon-arc UV accelerated weathering to evaluate susceptibility to sunlight-driven degradation, with documented inspections at defined exposure intervals.

IV.C Specimens, Identification, and Handling
All specimens shall be uniquely identified prior to testing using a traceable specimen ID scheme. Specimen IDs shall be linked to the part number and drawing revision, the material designation, the lot/batch (where applicable), and the assigned test condition (baseline, thermal-cycled duration, or UV exposure). Prior to each test phase, specimens shall be visually inspected and photographed to document initial conditions. Following environmental exposures, specimens should be handled to avoid unintended damage and conditioned at standard laboratory conditions prior to mechanical testing, when such conditioning is required for consistency.

IV.D Mechanical Load-to-Failure Test Method
Mechanical destructive testing was performed to determine the rail's ultimate load capacity and to document observed failure response under controlled, quasi-static loading. The applied loading configuration uses a controlled fixture and a defined span to generate repeatable loading of the rail until failure. The source test report may refer to this activity as tensile testing; however, the loading condition represents a fixture-driven structural loading mode applied to a rail span. Testing is performed using a universal testing machine (UTM). The machine capacity, measurement accuracy, displacement resolution, and calibration status are documented on the Testing Equipment page(s). Load is measured by the UTM load cell. Displacement is recorded using the machine crosshead and/or an equivalent displacement-measurement system, as documented on the results pages.

During testing, the load is increased continuously and quasi-statically until failure. Failure is defined as the onset of catastrophic fracture, loss of load-carrying capacity, or other clearly observable structural collapse consistent with the test objective. After failure, specimens are photographed, and the failure condition is recorded.
Because the rail is tested in a controlled fixture configuration, the measured ultimate loads represent rail performance under the stated laboratory boundary conditions. These results should not be interpreted as allowable loads for an as-installed roof system without separate verification of roof panel capacity, attachment hardware performance, and system-level load distribution.

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IV.E Rapid Thermal Cycling and Post-Aging Mechanical Testing

Rapid thermal cycling is performed to evaluate the rail's durability under repeated temperature switching that may be experienced in service. Specimens are exposed in a programmable environmental chamber that alternates between defined cold and hot setpoints, with switching every 8 hours. This protocol is intended to induce repeated thermal strain and to reveal susceptibility to cracking, embrittlement, warpage, and other thermally driven damage mechanisms. The thermal cycling program is executed for multiple exposure durations (e.g., 10, 20, and 30 days) as defined in the test plan. At the completion of each exposure duration, specimens are removed, visually inspected, and evaluated by mechanical load-to-failure testing using the same fixture configuration and procedure used for baseline mechanical testing, unless otherwise specified.

Specimens are placed within the chamber so that airflow is not obstructed, and they do not contact the chamber walls or each other in a manner that would create significant thermal gradients. Chamber identification and equipment performance specifications are documented on the chamber equipment page(s). Raw time-history logs and detailed cycle parameters are retained internally and are available upon request.

IV.F UV Accelerated Weathering (Xenon-Arc) and Inspection

UV accelerated weathering is performed to evaluate the rail's resistance to sunlight-driven degradation using a xenon-arc weathering chamber. Xenon-arc devices are selected because they provide a full-spectrum light source, including ultraviolet components relevant to outdoor exposure. The exposure method is conducted in accordance with ISO 4892-2 xenon-arc practices, using an applicable exposure cycle as defined in the chamber program.
Specimens are mounted on the chamber sample rack such that the intended exposed surface faces the light source and mounting does not create shadowing or non-uniform exposure. When the chamber includes a rotating specimen holder, rotation improves exposure uniformity. Chamber identification and equipment capability specifications are documented on the UV equipment page(s). Inspection intervals and acceptance criteria (e.g., gray-scale color change rating) are recorded on the UV results page(s).

IV.G Records, Data Retention, and Limitations

All test records, including specimen identification logs, inspection photographs, chamber program records, temperature or exposure logs, mechanical raw data files, and summary calculations, shall be retained as controlled quality records. This method section describes the intended procedures; the authoritative record of as-run equipment identification, calibration status, and as-run parameters is provided on the associated testing results pages.
Accelerated laboratory exposures are simulations and may not reproduce all field variables, including site-specific UV dose, pollutants, installation stresses, moisture ingress, or complex roof-system interactions. Engineering conclusions should be limited to the documented test conditions and measured performance results.

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V. TESTING EQUIPMENT

2-ton microcomputer double-column tensile testing machine.

Machine Specifications:

Maximum test force:	2000KG
Accuracy level:	Level 1N
Test force range:	0.4%～100%FS
Power resolution:	1/200000
Strength accuracy:	within ±1%
Test stroke:	1000mm including fixture
Displacement indication error:	within ±1% of indication
Displacement resolution:	0.1mm

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VI. TEST RESULTS 22 CELCIUS

Test Results: Tensile Testing Summary of Results:

Sample No.	Length (inches)	Effective Span (inches)	Breaking Load (N)	Failure Description
1	22	18	15,081.86	Fracture at Clamp
2	22	18	15,966.36	Fracture at Clamp
3	22	18	15,838.28	Fracture at Clamp
4	22	18	16,260.52	Fracture at Clamp
5	22	18	15,232.09	Fracture at Clamp
6	22	18	15,233.56	Fracture at Clamp
7	22	18	15,346.15	Fracture at Clamp
8	22	18	15,551.61	Fracture at Clamp
9	22	18	15,465.13	Fracture at Clamp
10	22	18	16,215.18	Fracture at Clamp
Average Break Point in (N)	22	18	**15,619.07 (N)**	

Before:

After:

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VII. TEST RESULTS -30 CELCIUS

Test Results: Tensile Testing Summary of Results:

Sample No.	Length (inches)	Effective Span (inches)	Breaking Load (N)	Failure Description
1	22	18	14,775.24	Fracture at Clamp
2	22	18	15,289.90	Fracture at Clamp
3	22	18	15,094.53	Fracture at Clamp
4	22	18	14,975.43	Fracture at Clamp
5	22	18	14,580.03	Fracture at Clamp
6	22	18	14,492.57	Fracture at Clamp
7	22	18	15,214.39	Fracture at Clamp
8	22	18	14,580.05	Fracture at Clamp
9	22	18	14,977.62	Fracture at Clamp
10	22	18	14,893.29	Fracture at Clamp
Average Break Point (N)	22	18	**14,887.31 (N)**	

Before:

After:

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VIII. UV TESTING EQUIPMENT

225 Xenon Lamp Weathering Test Machine: Methods of exposure to plastic laboratory light sources - Part 2: Xenon arc lamps" and other international standards.Test method/standard: ISO 4892-2 Cycle 1 *or equivalent xenon-arc exposure program* as configured on the chamber; full parameters available upon request. Where a wavelength-banded irradiance basis (e.g., 300–400 nm or 340 nm) is required by a specific standard, the applicable radiometer basis and calibration details are retained internally and available upon request.

Machine Test Specifications:

Test method/standard	ISO 4892-2 (Xenon-Arc), Method A (Daylight filter), Cycle 1.
Irradiance (control basis)	850 W/m²
Spectral wavelength (lamp capability)	290-800nm;
Cycle definition (Cycle 1)	102 min light (dry) + 18 min light with water spray, repeating (120-min cycle)
Chamber air temperature (setpoint)	38 °C (typical control setpoint)
Black panel / black standard temperature (setpoint)	65 °C (typical control setpoint)
Relative humidity (during light/dry period)	65% RH (programmed setpoint: retained internally, available upon request
Water spray	Enabled during the 18-min segment of each cycle (Cycle 1 spray interval).

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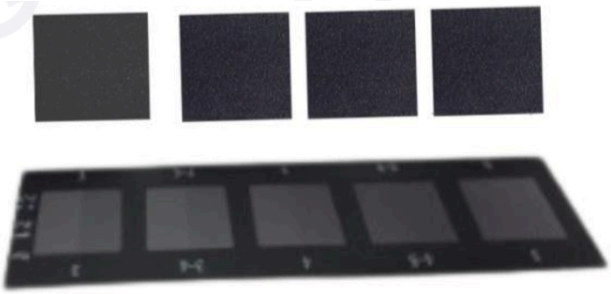
IX. UV Accelerated Weathering Results.

Test Results UV Testing Summary of Results:

No.	Test Item	Test Method	Result	Conclusion
1	Light Ageing Test-Xenon-arc Exposure	ISO 4892-2:2013/Amd.1:2021 Cycle 1	Gray scale: 4.3 1000h	PASS
2	Stress Test	IEC 60068-2-1:2007 & IEC 60068-2-2:2007 and the client's requirement	See images result below	PASS
Note	Pass: Meets the requirements; Fail: Does not meet the requirement; /: Not apply to the judgment.			



Gray Scale Level 4.3 1000h

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X. Thermal Cycling Equipment

80L constant-temperature and humidity test chamber used for programmed temperature cycling per the internal test plan (−30 °C ↔ +55 °C, switching every 8 hours). Humidity cycling was not used unless explicitly stated.

Equipment Performance:

Analysis accuracy:	Temperature ±0.01°C; Humidity: ±0.1% R.H
Temperature range:	-40°C ~ +150°C
Temperature fluctuation:	±2°C
Temperature uniformity:	±2°C
Humidity range:	20% to 98% R.H
Humidity uniformity:	±3%
Heating rate:	2°C - 4°C/min *(from room temperature to maximum temperature, non-linear no-load)*
Cooling rate:	0.7°C - 1°C/min *(from room temperature to the lowest temperature, non-linear no-load)*

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XI. Authorization - Limitations and Disclaimer

Genius Quest Global Limited Testing Signed by:

Sam Kwan

Sam Kwan
General Manager Testing Department
Consumer Products/Shenzhen Testing Facility

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In-house test report. Testing was performed by GeniusQuest Global as an internal laboratory for product development and internal approval purposes. The test equipment used is of the appropriate type and capacity to conduct the procedures described; however, this laboratory is not an accredited or registered third-party testing or certification body. Unless explicitly stated otherwise, the test methods described are internal methods and/or methods based on applicable standards and good engineering practice. Results apply only to the specific samples tested under the stated conditions and are not intended to represent third-party certification. This report shall not be interpreted as a certification, listing, or approval by an independent laboratory or certification body.

End of report.