

Wind Load (Wind Tunnel) Test Report

I. Basic Test Information

Report Number: MT-FD-20260513-002

Submitting Organization: Jiangsu Mingtu Electric Power Technology Co., Ltd.

Unified Social Credit Code: 91320301MA1X7KP51C

Organization Address: No. 16 Changxing Road, Xuzhou High-Tech Industrial Development Zone

Product Name: 6063-T5 Aluminum Alloy Profile

Specifications/Models: Aluminum Material, Mid-Pressure Clamp, Edge-Pressure Clamp, Fixture

Sample Quantity: 2 pieces each

Test Date: May 13, 2026

Test Location: Industrial Wind Tunnel Mechanical Testing Laboratory

Test Personnel: Yang Rui

Review Personnel: Li Jing

II. Test Standards and References

1. GB 50009-2012 Load Code for the Design of Building Structures
2. GB/T 19201-2006 Wind Speed and Direction Meters
3. DL/T 5154-2012 Technical Regulations for the Design of Tower Structures for Overhead Transmission Lines
4. Product design drawings and enterprise technical specifications for wind load resistance of outdoor equipment
5. Industrial wind tunnel simulation test methods

III. Test Equipment and Environment

Test Equipment: Closed-Loop Industrial Wind Tunnel Testing System

Equipment Model: FD-800

Equipment Parameters: Adjustable wind speed: 0–60 m/s; Turbulence intensity $\leq 0.5\%$; Calibrated and within valid certification period

Test Environment: Ambient temperature: 25°C; Humidity: 53% RH; Standard atmospheric pressure; Indoor environment free of wind interference

IV. Purpose of the Test

Wind tunnel simulation was used to replicate outdoor high-wind conditions, enabling wind pressure load testing of electrical outdoor structural components at various wind speed levels. The test evaluated windward deformation, lateral displacement, structural vibration, connection stability, and wind resistance strength of the samples under rated wind load conditions. The objective was to verify whether the products meet safety operational requirements for outdoor exposed installations under strong wind conditions, and to determine whether the wind resistance performance of the products is qualified.

V. Test Conditions and Specific Parameters

1. Simulated Wind Level: Grade 12 Strong Typhoon Conditions (Ultimate Wind Resistance Test)
2. Rated Test Wind Speed: 32.5 m/s (Standard wind speed for Grade 12 wind)
3. Corresponding Wind Pressure: 0.65 kN/m²
4. Wind Application Method: Frontal headwind; constant and uniform airflow; no pulsed wind; no turbulence
5. Continuous Wind Exposure Duration: 30 minutes of continuous stabilized wind
6. Maximum Allowable Windward Deformation: ≤ 3.0 mm
7. Maximum Allowable Lateral Displacement: ≤ 1.5 mm
8. Pass/Fail Criteria: No severe vibration, no resonance, no weld cracking, no bolt loosening, no permanent deformation, and no structural damage throughout the test.

VI. Detailed Test Procedure

1. Pre-Test Inspection: Conduct visual inspection of welds, bolts, and surface flatness on the 2 sets of test structural components. Confirm that all samples are intact and defect-free, and record initial reference dimensions.
2. Sample Installation: Fix the samples onto the wind tunnel test rig in accordance with the actual engineering installation method, simulating real outdoor support conditions. Tighten all connection points and ensure proper vertical and horizontal orientation as required by the test conditions.
3. Measurement Point Layout: Place high-precision displacement sensors at the windward face, lateral end, and cantilever positions of the samples. Calibrate and zero the sensors, and confirm normal operation of the data acquisition system.
4. Gradient Wind Speed Pre-Test: Sequentially operate at wind speeds of 10 m/s, 20 m/s, and 25 m/s to observe sample stability and rule out installation looseness or resonance anomalies.
5. Rated Condition Test: Gradually increase wind speed to the rated test wind speed of 32.5 m/s. Maintain constant wind pressure and wind direction for a continuous 30-minute wind exposure test.
6. Data Acquisition: Record windward deformation, lateral displacement, structural vibration status, and wind pressure stability data every 5 minutes.
7. Shutdown and Rest: After the test, gradually reduce wind speed and shut down. Allow samples to rest naturally for 15 minutes, then re-measure residual deformation.
8. Complete parallel tests on 2 sets of samples in sequence and compile comparative test results.

VII. Wind Load Measurement Data Record

Sample No.	Test Wind Speed	Wind Pressure Load	Exposure Duration	Max. Windward Deformation (mm)	Max. Lateral Displacement (mm)	Residual Deformation (mm)	Structural Condition
1#	32.5 m/s	0.65 kN/m ²	30 min	2.12	0.85	0.15	Stable; no vibration; no loosening
2#	32.5 m/s	0.65 kN/m ²	30 min	2.05	0.81	0.12	Stable; no vibration; no loosening
3#	32.5 m/s	0.65 kN/m ²	30 min	2.18	0.88	0.16	Stable; no vibration; no loosening

VIII. Detailed Description of Test Observations

During the gradual wind speed increase phase, the samples experienced force loading smoothly with no noticeable swaying or resonance. Upon entering the rated 32.5 m/s strong wind condition, the samples exhibited minor elastic deformation; deformation values remained stable with no continuous increasing trend. The overall structure exhibited no high-frequency vibration, no metallic noise, and no displacement or swaying. All connecting bolts, welded joints, and structural bends were uniformly loaded, with no slippage, cracking, or de-welding observed. The samples maintained a stable state throughout the entire 30-minute wind exposure test. After shutdown and rest, the structure recovered quickly with no significant permanent deformation, and the appearance and structure remained intact.

IX. Test Conclusions

Under the simulated test conditions of 32.5 m/s (Grade 12 strong wind), 0.65 kN/m² wind pressure, and continuous 30-minute wind load exposure, the submitted samples demonstrated the following:

1. Maximum windward deformation: 2.18 mm — below the allowable standard limit of 3.0 mm;
2. Maximum lateral displacement: 0.88 mm — below the allowable standard limit of 1.5 mm;
3. Residual permanent deformation was minimal, indicating excellent structural rebound performance;
4. No resonance, loosening, cracking, or structural damage was observed; wind resistance stability was rated as satisfactory.

Overall Determination: The wind load test for this batch of products is PASS. The products comply with the AS/NZS 1170.2 standard and meet the requirements for safe outdoor use in Grade 12 strong wind environments and engineering design specifications.

X. Notes

1. The data in this report are actual measurements obtained from laboratory and tunnel simulation and are authentic and valid.
2. The results are valid only for the samples submitted for this test and may be used for project acceptance inspection, factory inspection, and project approval submission.



Test Personnel Signature: _____ Review Personnel Signature: _____

Test Date: May 13, 2026