

Material Characterisation and Performance Testing

Summary report covering composition, ageing, salt spray, distributed load, and slip resistance testing for FRP grating.

SAMPLE NAME

FRP GRATING

PRODUCT SPECIFICATION

19×19 / 38×38

OVERALL HEIGHT

30 mm

REPORT OVERVIEW

This report consolidates the submitted test information for FRP grating, including chemical composition analysis, composition analysis, FTIR spectra, ultraviolet ageing exposure, neutral salt spray exposure, distributed load testing, and slip resistance assessment. Results apply only to the tested sample and the methods stated in this report.

TEST SUMMARY

Test item	Method / basis	Key Outcome
Chemical composition analysis	GB/T 20123 / GB/T 20124 / SN/T 2718	Cr 17.07%, Ni 10.19%, Mo 2.19%
Composition analysis	FTIR / PGC-MS / EDX / TGA	UP 33%, aluminium hydroxide 34%, glass fiber 32%
Light ageing test – UV exposure	ASTM G154-16 Cycle 1	Grade 4; no visible color change, no cracking
Neutral salt spray test	ASTM B117-16	No visible color change
Distributed load test	Client offered method	Maximum deflection 5.82 mm; fail against ≤ 5 mm
Slip resistance	DIN 51130:2014-02	Critical angle 35.2°; classification R13

TEST MATRIX

1. Chemical Composition Analysis
2. Composition Analysis and FTIR Spectrum Review
3. Light Ageing Test – UV Exposure
4. Neutral Salt Spray Test
5. Distributed Load Test
6. Slip Resistance (Oil-Wet Ramp Test)

Chemical and Composition Analysis

Material chemistry and constituent breakdown of the submitted FRP grating sample.

CHEMICAL COMPOSITION ANALYSIS

Element	C	Si	Mn	P	S	Cr	Ni	Mo	N
Result, %	0.019	0.50	1.41	0.032	0.002	17.07	10.19	2.19	0.013

Test Method: C, S: GB/T 20123-2006 (Method A) C/S Analyzer;
N: GB/T 20124-2006 O/N Analyzer;
Others: SN/T 2718-2010 ICP-OES.



Sample photo

COMPOSITION ANALYSIS

Sample description: Gray sample
Test methods used:
Fourier Transform Infrared Spectrometer (FTIR)
Pyrolysis-Gas Chromatography Mass Spectrometry (PGC-MS)
Energy Dispersive X-ray Fluorescence Spectrometer (EDX)
Thermogravimetric Analyzer (TGA)

No.	Composition	Content, Wt%
1	Unsaturated polyester (UP)	33
2	Amide lubricant	1
3	Pigment	—
4	Aluminum hydroxide powder	34
5	Glass fiber	32

Report Note

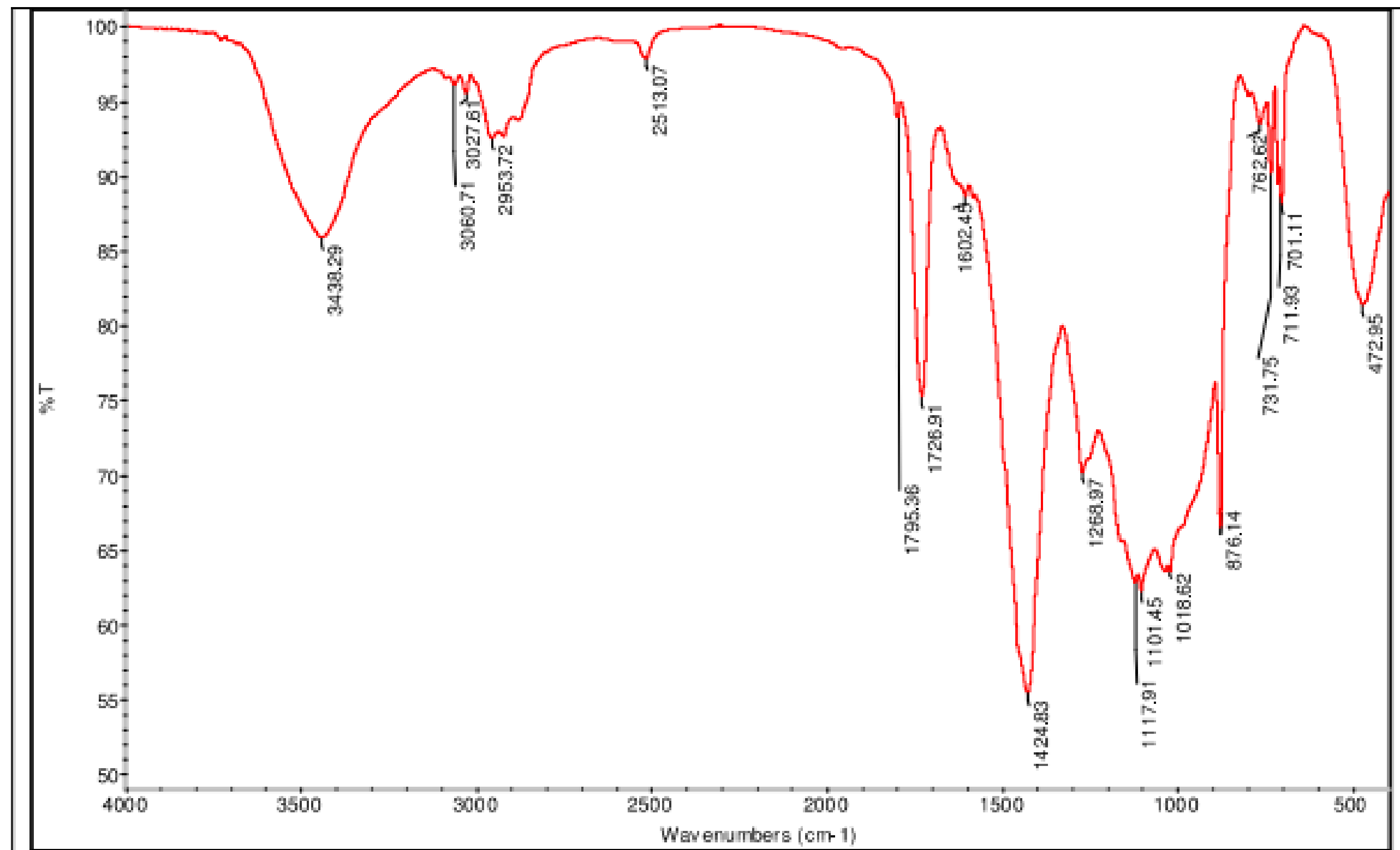
Wt% denotes weight percent.
PGC-MS testing was carried out by an external laboratory assessed as competent.
Quantitative composition data is provided for reference to describe the tested sample.

FTIR Spectrum Review

Spectral plots for the original sample and calcination residue, plus a representative sample photograph.

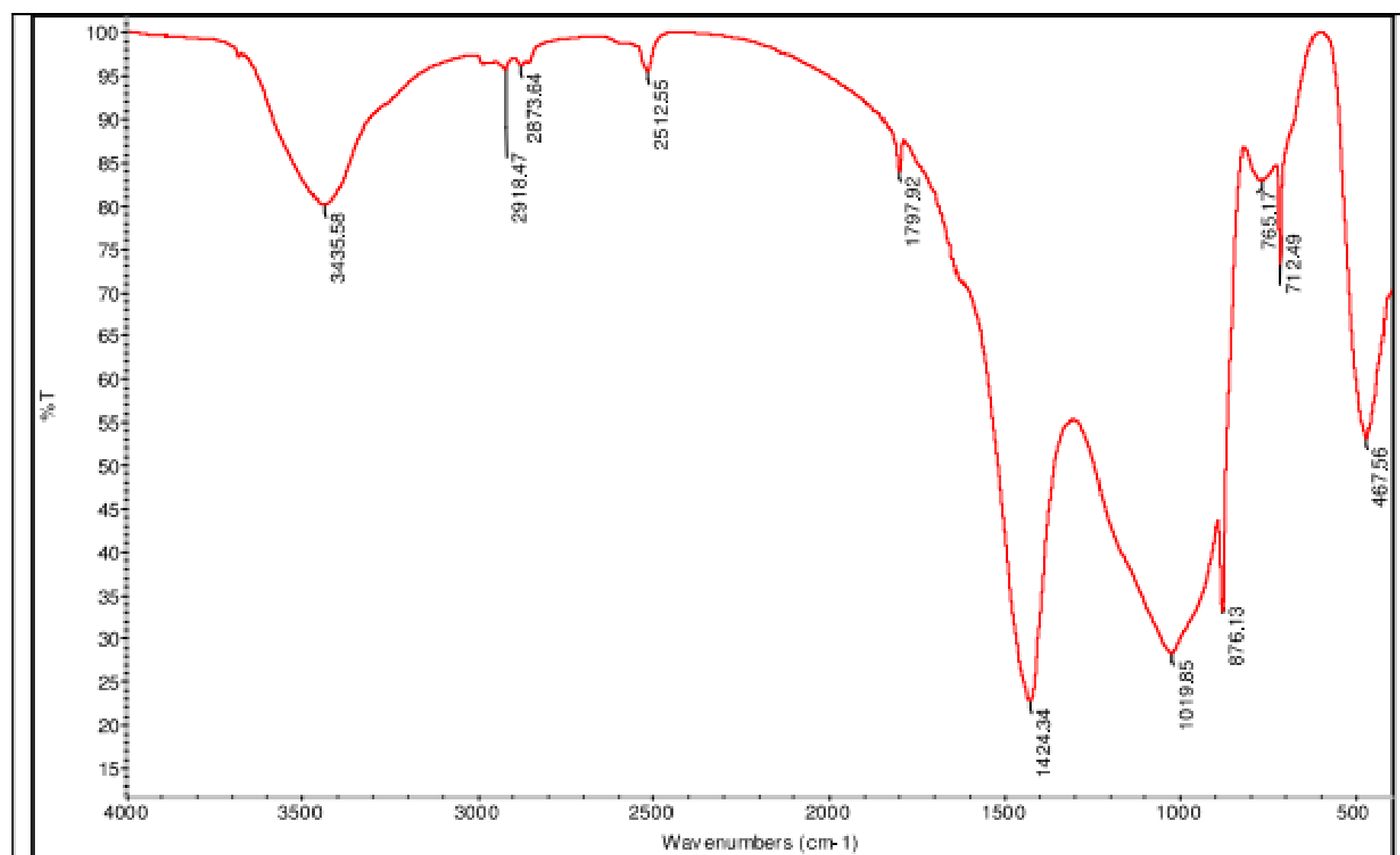
SPECTRAL RESULTS

Fig.1: FTIR spectrum of original sample

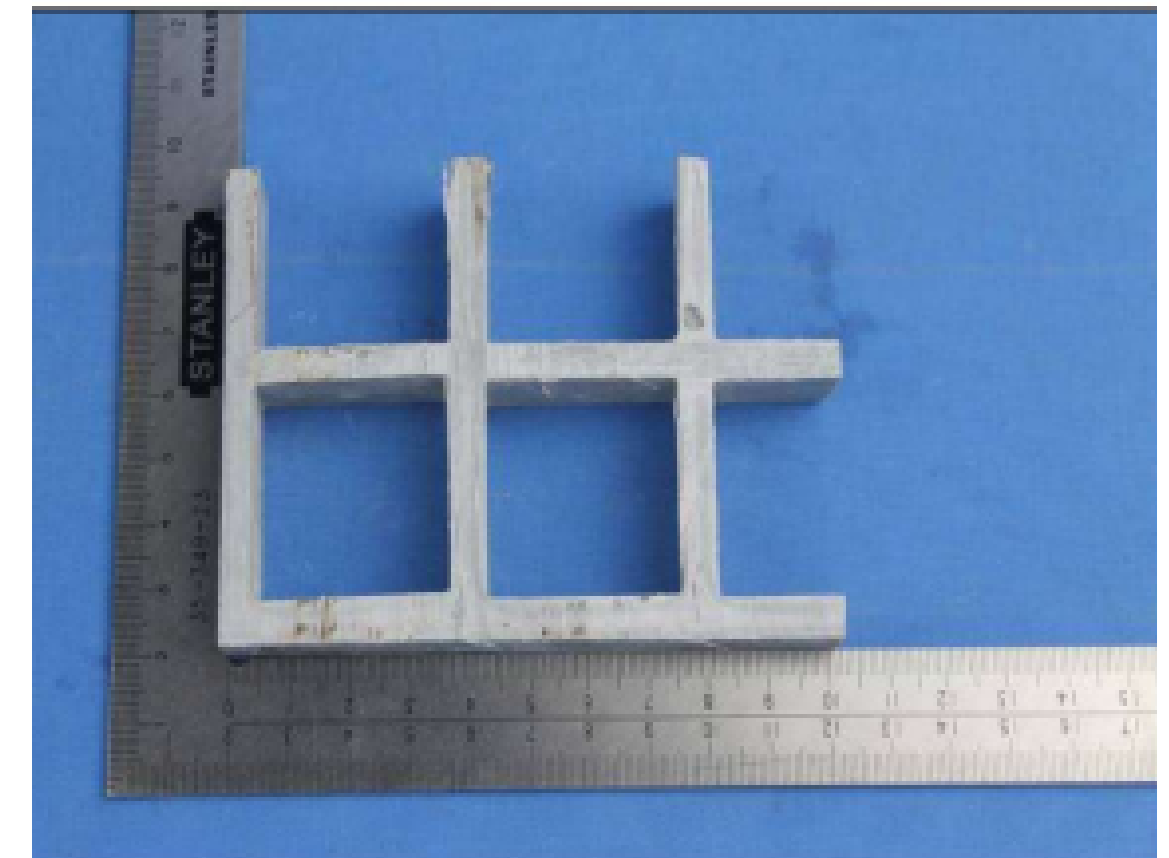


FTIR spectrum of original sample

Fig.2: FTIR spectrum of calcination residue



FTIR spectrum of calcination residue



Sample photo

Report Note

The FTIR spectra indicate the infrared absorption profile of the tested FRP material in its original state and after calcination. These plots are included as supporting analytical evidence for the material composition review.

Light Ageing Test – UV Exposure

Ultraviolet weathering performance of the gray FRP sample under ASTM G154-16 Cycle 1.

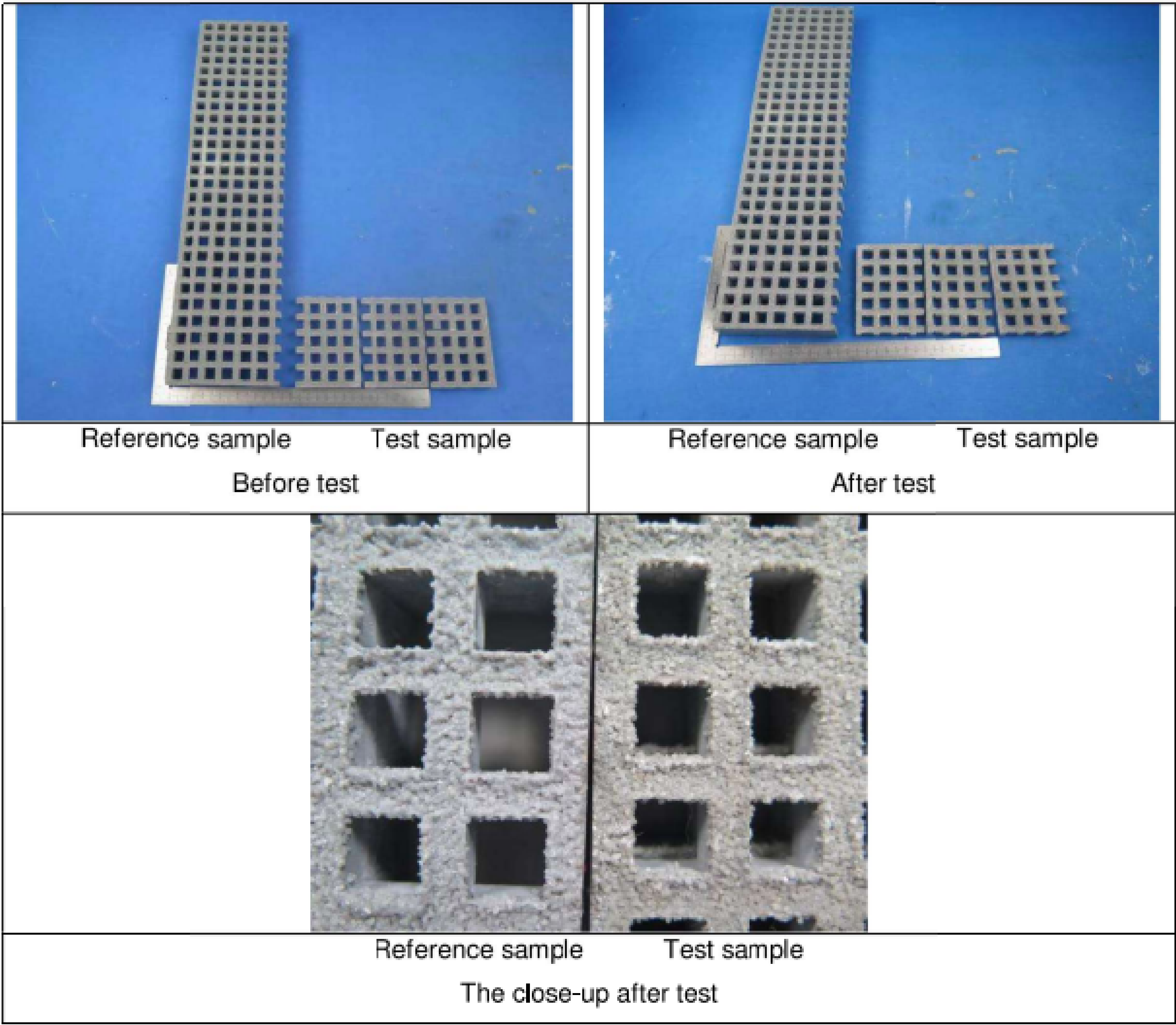
TEST CONDITIONS AND RESULT

Sample description: Gray sample
Test method: ASTM G154-16 Cycle 1
Exposure cycle:
ASTM G154-16 cycle 1
Lamp type: UVA-340
8 h UV at (60±3)°C BPT, 0.89 W/(m²·nm) @ 340 nm
4 h condensation at (50±3)°C BPT
Exposure duration: 96 h

Sample	Grey scale	Appearance
1	Grade 4	No visible color change. No cracking. No warping or deformation. No delamination.

According to ISO 105-A02, the tested sample achieved Grade 4 after exposure.

TEST PHOTOS



Reference sample and test sample before and after UV exposure

Neutral Salt Spray Test

Salt spray performance of the gray FRP sample under ASTM B117-16 exposure.

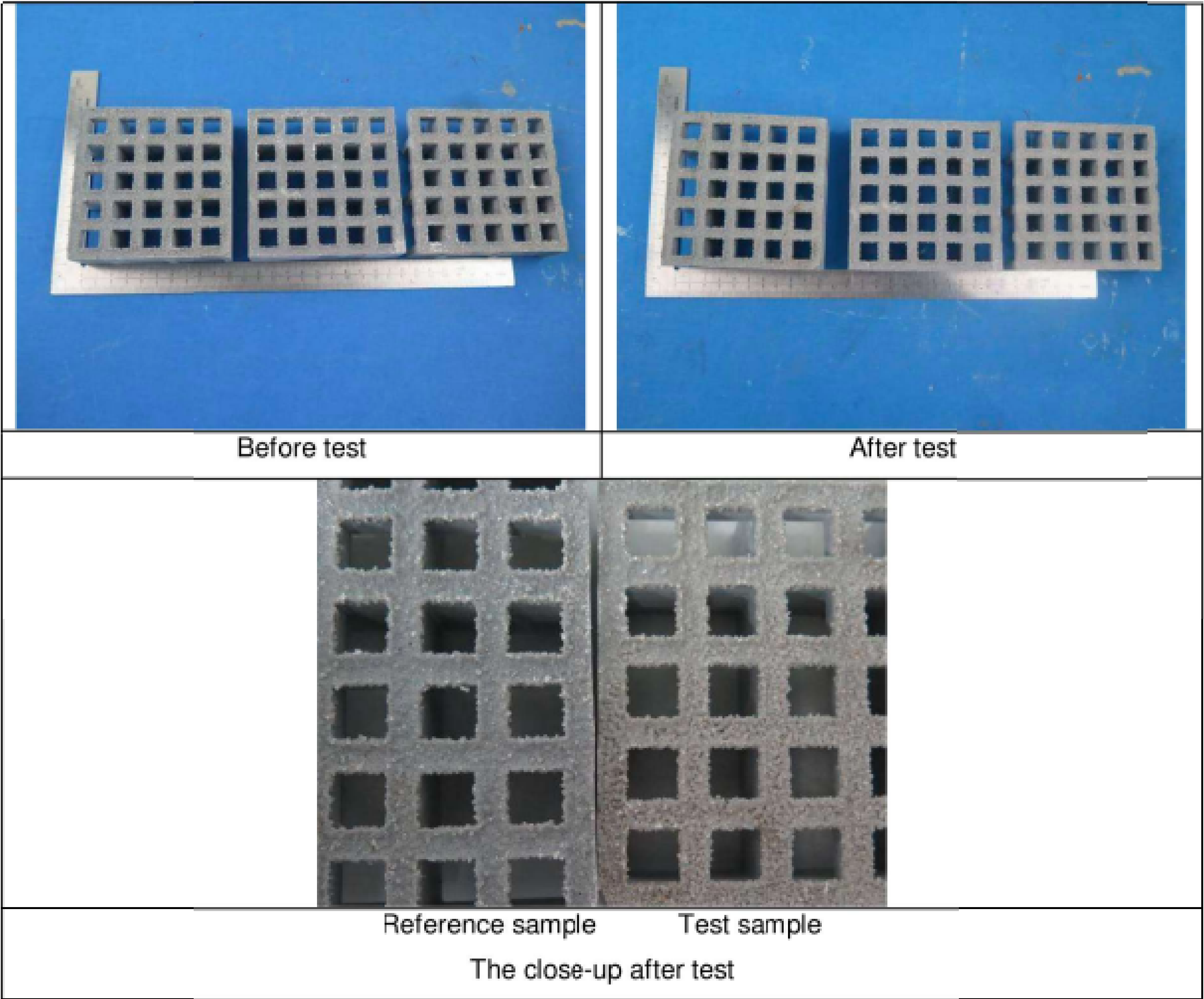
TEST CONDITIONS AND RESULT

Sample description: Gray sample
Test method: ASTM B117-16
Concentration of solution collected: (5±1) % NaCl (m/m)
Chamber temperature: (35±2) °C
Volume of salt solution collected: (1.0–2.0) mL/(80 cm²·h)
pH of collected solution at (23±3)°C: 6.5–7.2
Exposure period: 96 h

Sample	Appearance
1	No visible color change.

The tested sample showed no visible color change after 96 hours of neutral salt spray exposure.

TEST PHOTOS



Reference sample and test sample before and after salt spray exposure

Distributed Load Test

Load and deflection assessment of an FRP grating panel under a distributed load condition.

TEST METHOD AND RESULT

Sample dimensions: 1004 mm × 500 mm × 30 mm

Test method: Offered by client

Procedure:

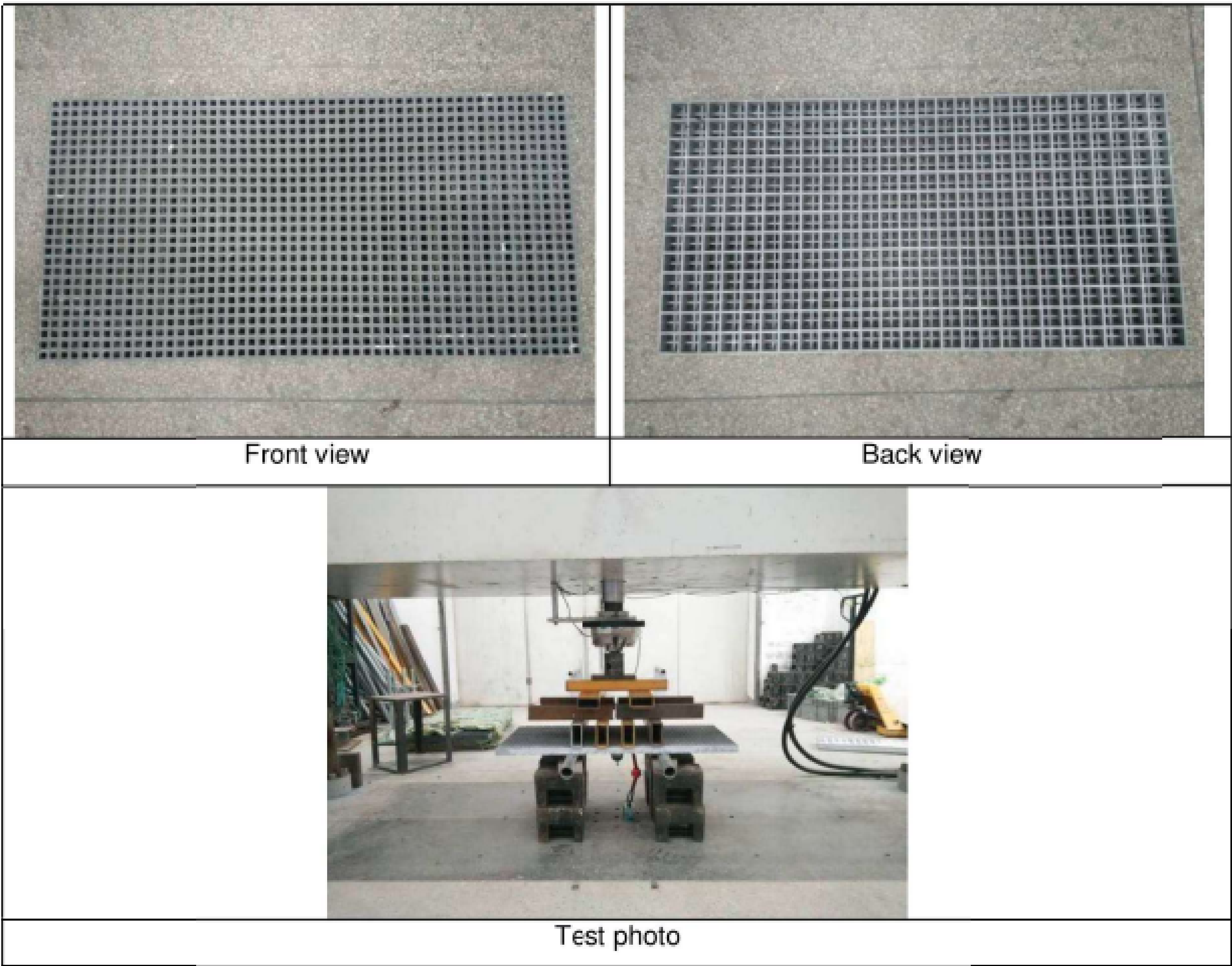
Place the sample horizontally on two steel tubes along the whole width of sample; support span 400 mm; tube diameter 48.3 mm; set the deflection measurement point at the center of sample.

Apply a distributed load of 500 kN/m² on the sample within the span and maintain it for 30 seconds, then record the maximum deflection at the center point.

Test item	Test load	Client requirement	Test result
Distributed load test	500 kN/m ² (100 kN)	Maximum deflection shall not exceed 5 mm	Maximum deflection = 5.82 mm

Conclusion: Fail
The measured maximum deflection exceeded the stated client requirement of 5 mm under the applied distributed load.

TEST PHOTOS



Front view, back view, and load test set-up

Slip Resistance Test

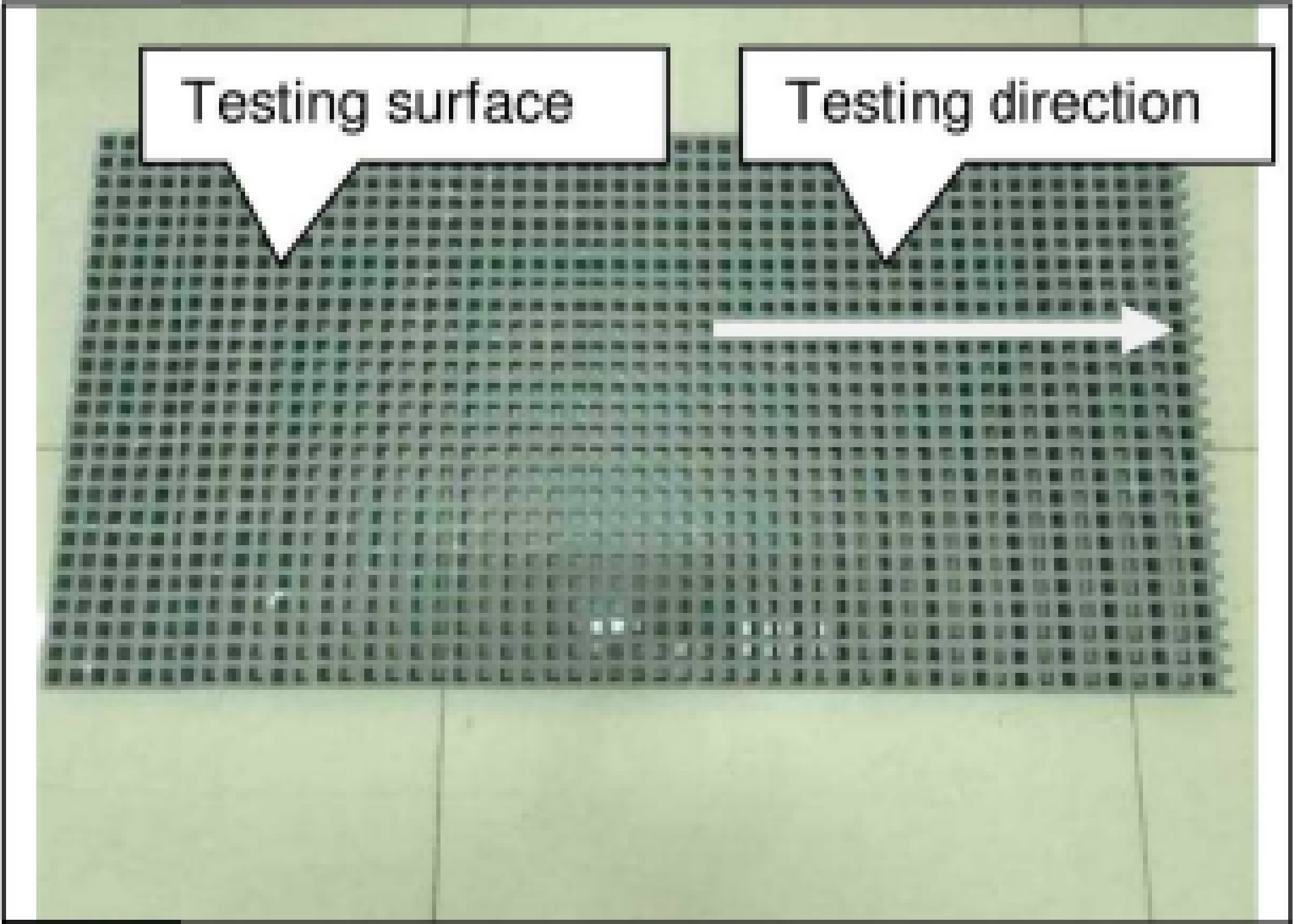
Oil-wet ramp test results for the submitted FRP grating sample.

TEST METHOD AND RESULT

Sample description: 1000 mm × 500 mm × 30 mm, 1 piece
Test method: DIN 51130:2014-02 Testing of floor coverings – determination of the anti-slip property – workrooms and fields of activities with slip danger, walking method – ramp test.

Test item	Test result	Classification
Slip resistance (oil-wet ramp test)	Critical angle of inclination: 35.2°	R13

Classification	Angle (degrees)
R9	$6^{\circ} \leq X \leq 10^{\circ}$
R10	$10^{\circ} < X \leq 19^{\circ}$
R11	$19^{\circ} < X \leq 27^{\circ}$
R12	$27^{\circ} < X \leq 35^{\circ}$
R13	$> 35^{\circ}$



Report Note
The tested sample achieved a critical angle of inclination of 35.2°, corresponding to slip resistance classification R13 under DIN 51130.