FTI Façade Testing Institute

FTI provides third party performance testing for façade elements and construction materials, including product classification, professional engineering and validity evaluation services.
We test and evaluate structural physics and design criteria befitting international standards. These criteria are then compared to the relevant standards (Air, Water, Wind, Sound, Heat, Seismic, Impact, Corrosion). We also test performance requirements of new or existing projects and compare the performances of façade and structural elements.

### Products

- Structural Façade Materials
- Façade Systems
- Window / Door Systems
- System Accessories

### Test Methods

- Test Stands of 1/1 Scale
- Structural Physics Specifications
- International Test Standards
Tests

**Laboratory Tests**

**Façades, Skylights, Windows / Doors**

- Air Permeability Test
- Water Penetration Test
- Wind Resistance Test
- Water Penetration Test under Dynamic Pressure
- Skylight - Water Penetration Test
- Impact Resistance Test
- Building Movements - Seismic Test
- Measurement of Airborne Sound Insulation Value
- Flanking Noise Measurement
- Component Cycling Testing

**Balustrades**

- Balustrade Performance

**Specific Tests**

- Buckling Test
- Structural Silicon Aging Test
- Mechanical Durability of Silicon Elements Test

**On-Site Tests**

**Façade, Windows / Doors**

- Water Penetration and Wind Resistance Test
- Thermal Performance of Structures - Air Permeability Test
- Measurement of Air-Permeated Noise Insulation Value
- Water Penetration Test

---

**Structural Silicon Aging Test**

**ETAG 002**

*Program*

1. Cycle: 23°C … %50 humidity .... 7 days
2. Cycle: 37.8°C ....%80 humidity …. 7 days
3. Cycle: 23°C .... %50 humidity .... 7 days

With these processes, silicon samples can be aged 10 years.

---

**Mechanical Durability of Silicon Samples Test**

**ETAG 002**

Appliable Force Range: 0 - 170 kg
Dynamic Performance Tests

These tests simulate weather conditions such as rain and wind, evaluates the water permeability and wind load resistance of façade systems.
ENV 13050 Laboratory Test Under Dynamic Air Pressure and Water Spray

Our test stand not only allows samples up to 4650 x 9850 mm size to be tested, but has the capability to resist test pressures up to 12000 Pa. Special spraying nozzles are capable of spraying 2 to 500 litres of water per minute, and this water is then thrown on to the test sample via wind from a special fan - pipe couple at speeds of 108 km / h. The mock - up is observed from the inside during the test to discover if the water penetrates, and the exact locations where it does.

### ENV 13050

- Max. Sample Size: 4650 x 9850 mm
- If Needed: 9300 x 9850 mm
- Max. Test Pressure: (P) 12000 x (V) 12000 Pascal
- Water Spray Rate: 2 - 500 lt / mn
- Average Wind Speed: 108 km / h
AAMA 501-1 Water Penetration Test of Façade and Window / Door Systems Under Dynamic Pressure

For this test, maximum mock-up size can reach values of 12000 X 12000 mm. A ROTAX airplane engine equipped with a 1.85 m diameter propeller generates wind velocities up to 45 m/sec, which throws spray water coming from a specially designed system onto the sample. As the result, the locations of water penetration (if any) are recorded and added to the report.

AAMA.501.1

Max. Sample Size : 12000 x 12000 mm
Max. Wind Speed : 150 km / h
Water Spray Rate : 2 - 50 lt / mn
Displacement Range : 0 - 400 mm
Impact Resistance Tests
EN 12600, EN 14019, EN 13049

These tests can be classified as “hard - body” and “soft - body” tests and can be applied on façade, window / door, skylight and balustrade systems. Respectively for each test, either a mass of 50 kg consisting of two rubber wheels around a steel bore, or a sack full of glass marbles weighing 50 kg is swung to the test sample via standard pendulum movement.

Respectively for each test, either a mass of 50 kg consisting of two rubber wheels around a steel bore, or a sack full of glass marbles weighing 50 kg is swung to the test sample via standard pendulum movement.
The applied energy is the potential energy gained by letting go of the bag and allowing it to impact on the glass. This is expressed in Joule ( J ) units. Up to 1200 J can be applied on the sample as part of this process.
The impact test can be performed on the inner or the outer surface of the test sample, and the testable samples can reach sizes of 3800 x 5000 mm. For the test to be successful, there should be no permanent deformation nor any residual debris on any part of the test sample.
Static Performance Tests

EN 12153, EN 1026 Air Permeability Tests

In air permeability tests, the air infiltration of curtain walls and doors / windows is measured for both fixed and openable elements according to EN 12153 and EN 1026. During the tests, the sample is subjected to both positive and negative pressures reaching up to 10000 Pa in façade samples and 5000 Pa in window / door samples.

<table>
<thead>
<tr>
<th>EN 12153</th>
<th>EN 1026</th>
<th>Max. Sample Size</th>
<th>Max. Test Pressure</th>
<th>Flow Rate Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Façade Systems</td>
<td>For Window / Door Systems</td>
<td>4650 x 9850 mm</td>
<td>12000 / 12000 Pascal</td>
<td>0 - 2000 m³ / h</td>
</tr>
</tbody>
</table>
Air penetration intensity is expressed as m³ / hour. The results of the tests are defined as air permeability per unit area and air permeability per unit length of sealing as m³ / h.m² and m³ / h.m respectively.

**EN 12155, EN 1027 Water Penetration Tests**

In water penetration tests, water penetration in curtain walls and doors / windows is measured for both fixed and openable elements in compliance to EN 12155 and EN 1027.

**EN 12155** | For Façade Systems
---|---
**EN 1027** | For Window / Door Systems
Max. Sample Size | 4650 x 9850 mm
If Needed | 9300 x 9850 mm
Max. Test Pressure | (P) 12000 / (V) 12000 Pascal
Standard Test Pressure | (P) 600 Pascal
Water Spray System | 2 lt / min. per nozzle at 2~3 bar pressure
During tests, the sample is subjected to positive test pressure applied at fixed intervals and with increased pressure, so that a certain amount of water is applied to the surface to form a continuous layer. The test supervisor observes whether there is any water leakage. The water layer is adjusted by spraying 2 lt / min through special nozzles. During the spray, the inner surface of the test sample is checked continuously for leakage.
EN 12179, EN 12211 Wind Resistance Test

In wind load tests, resistance of curtain walls and doors/windows against wind load is determined under positive and negative wind pressures for both fixed and openable elements according to EN 12179 and EN 12211. During this test, a series of positive and negative test pressures reaching 10000 Pa in specified intervals are applied to the test sample. For each test pressure, measurements are made to evaluate resistance to damage from wind loads and to assess perpendicular deflection on the surface. The deflection should be less than L/200 or 15 mm.

EN 12179 : For Façade Systems
EN 12211 : For Window / Door Systems

Max. Sample Size : 4650 x 9850 mm
If Needed : 9300 x 9850 mm
Max. Test Pressure : (P) 12000 x (V) 12000 Pascal
Displacement Range : 0 - 400 mm
The seismic behaviors of façade systems are tested with three-dimensional pneumatical seismic test units in accordance to AAMA 501.4 and AAMA 501.6.
In our facilities, samples as small as 1000 mm x 1000 mm and as large as 3500 mm x 4800 mm can be tested as part of the seismic test. Displacements up to 150 mm can be reached, and in dynamic tests, frequencies of 0.4 and 0.8 Hertz can be applied onto the samples. As a result, any risks of falling glass and permanent deformations are looked for, and if found, recorded to the report.
On-Site Tests
EN 13051, AAMA 501.2 - 03 Water Penetration of Façade Systems

According to the EN 13051 norm, with this on site test, a fixed volume of constantly flowing water is sprayed onto the outer surface of the newly installed curtain wall, and a continuous water flow is maintained.

EN 13051
AAMA 501.2 - 03
EN 13051 Nozzle : 2 lt / min. at 2~3 bar pressure
AAMA 501.2 Nozzle : 20 lt/min. at 30-35 PSI pressure
Water is applied from the outside.
Water penetration is observed from the inside.
This test measures the air permeability of the whole or some part of a building according to the EN 13829 standard. 50 Pascals of pressure difference is applied on the system to be tested with a special fan, and if the resulting air exchange value exceeds 3 m³ / hr, the test is considered a failure.
ISO 140 - 5 On - Site Testing of Airborne Sound Insulation Value

With this test, the sound reduction value of a façade element is measured. Sources distanced 5 metres from the façade create a stable field of sound between 50 and 5000 Hz, and after the receptors measure the echoes, a final average sound absorption value is calculated.

<table>
<thead>
<tr>
<th>ISO 140 - 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
</tr>
<tr>
<td>Magnitude</td>
</tr>
<tr>
<td>Sound Pressure Level</td>
</tr>
<tr>
<td>Sound Reduction Index</td>
</tr>
<tr>
<td>Relative Sound Reduction Index</td>
</tr>
</tbody>
</table>
Acoustic Performance Tests
ISO 10140 - 2, ISO 10848 - 2

Sound insulation of structural materials are tested in our two special test chambers according to ISO 10140-2 and ISO 10848-2 standards. While the former is a wider standard and states the sound reduction of wall, door, window, façade systems and façade elements, the latter standard describes the methods of measuring the “flanking” sound reduction performances of one or more structural elements.

ISO 10140 - 2 Airborne Sound Insulation of Building Elements

ISO 10140 - 2 Airborne Sound Insulation of Building Elements
Max. Sample Size : 3910 x 2590 mm
Standard Door Sample Size : 1250 x 2200 mm
Standard Window Sample Size : 1250 x 1500 mm
Range : 50 x 5000 hz
Magnitude : 60 db
This facility consists of two adjacent rooms with an opening in between for the sample to be installed. This adjustable opening allows window elements of 1250x1500 mm, door elements of 1250x2200 and other larger test samples of 3910x2590 to be quickly installed and tested. After the sample is checked thoroughly for leakage, the noise level of the rooms with the source and receiver are measured and the difference is found. All measurements are done at the third octave and 50-5000 Hz frequencies according to ISO 10140-2, and as a result, a final value describing the general acoustic performance is found.

Airborne Sound Insulation of Building Elements  ISO 10140 - 2

ISO 10848 - 2 Sound Insulation Measurements - Flanking Transmission

The facility consists of four adjacent rooms which allow the horizontal, vertical, and diagonal sound transmission to be measured.
ISO 10848 - 2  Sound Insulation Measurements - Flanking Transmission

Max. Sample Size : 6300 x 6840 mm
Range : 15 - 5000 hz
Magnitude : 60 db
Component Cycling Test
EN 947, EN 948, EN 12046 - 2, EN 1191

This test looks for mechanical resistance and permanent deformation of window / door systems after a specific amount of opening and closing cycles.
EN 947: Determination of the resistance to vertical load
EN 948: Determination of the resistance to static torsion
EN 12046 - 2: Operating forces
EN 1191: Resistance to repeated opening and closing

Max. Sample Size: 3000 x 3000 mm
Min. Sample Size: 1000 x 1000 mm
We are preferred by them.....

Consultants

System Companies

Execution Companies
Head Office
FTI Fasad Teknoloji Merkezi
Rüzgarlı Bahçe Mah. Toyota K Plaza Kat/5
34805 Kavacık / İstanbul
Tel : +90 216 425 52 22
Fax: +90 216 425 52 21

Laboratory
FTI Fasad Teknoloji Merkezi
Çakıl Köyü Bağlar Mevkii PK.39
34540 Çatalca / İstanbul
Tel: +90 212 776 42 25