

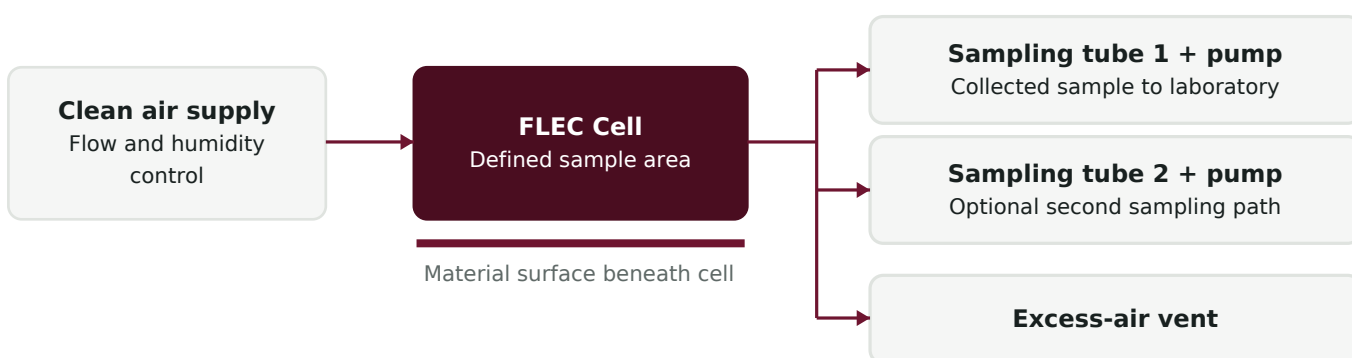
FLEC®

Material emission testing

A practical introduction to the measurement principle, equipment and interpretation of results.

Measure the material surface

The Field and Laboratory Emission Cell collects substances released from a defined material area. A suitable surface forms the lower boundary of the cell. Conditioned air carries emissions to sampling media, which are analysed by a laboratory. FLEC is the emission-sampling part of the system; the analytical method identifies and quantifies the compounds. [1, 3]



Functional air path. One or two sampling paths may be used; unused connections must be configured correctly. The vent carries the remaining inlet flow.

The FL-0001 at a glance

Exposed area	Cell volume	Published inlet-flow range
177 cm ² / 0.0177 m ²	35 cm ³ / 35 mL	100-500 mL/min

These figures describe the standard FL-0001 configuration. A different holder or exposed opening can change the relevant test geometry. Use the actual exposed area when calculating results. Product specifications: [FL-0001 FLEC Cell](#).

Select the setup for your specimen

Use the cell directly on a suitable planar surface. CHEMATEC test plates support carpet, coating and sealant specimens. FL-2001 and FL-2002 Sub-Units provide additional space for other sample geometries. A holder changes the test arrangement and must suit the selected procedure.

Plan the complete measurement

Define the material, target compounds and reporting objective before choosing sampling conditions.

Part of the setup	What to establish
Specimen and holder	Identify the surface, exposed area, sample preparation and conditioning history. Record the time since manufacture, installation or application. [2]
Cell and air supply	Use clean, controlled air. Select the inlet flow and humidity for the method and material. The FL-1000 controls air supplied to the cell from a suitable external supply.
Sampling paths	Choose compatible media and suitable pumps with the analytical laboratory. Set the individual sample flows and verify the complete flow balance.
VOC analysis	ISO 16000-6 describes sampling on sorbent tubes followed by thermal desorption and gas chromatography, with mass-spectrometric detection. Sorbent selection affects the compounds that can be measured. [3]
Carbonyl analysis	ISO 16000-3:2026 covers active air sampling and analysis for formaldehyde and, with suitable method modifications, other carbonyls. [4]

Document conditions, not just a concentration

A useful test record includes sample identification, location and orientation, actual exposed area, preparation and conditioning, temperature, humidity, inlet flow, each sampling flow, sampling duration and elapsed material age. Record deviations so results can be interpreted in their test context. [1, 2]

Checks that support a usable result

Agree background and blank measurements, leak checks, flow verification and recovery checks with the laboratory. Polished contact surfaces help reduce interactions with sampled compounds; recovery still depends on the compound and the complete setup. Keep sampling flow below inlet flow so an excess-air path remains. Use the selected method for acceptance criteria. [5]

From a collected sample to an emission rate

Keep sampled-air volume, total cell airflow and exposed material area separate. They describe different parts of the measurement.

A simple mass-balance illustration

With stable, representative concentrations, appropriate blank correction and negligible unaccounted losses or generation in the system:

$$E = Q \times (C_{\text{out}} - C_{\text{in}}) / A$$

Quantity	Meaning	Units
E	Net emission per area and time	µg/(m ² ·h)
Q	Total airflow through the cell	m ³ /h
C _{out} - C _{in}	Representative outlet concentration minus inlet background	µg/m ³
A	Actual exposed material area	m ²

Worked example - assumed values, not a product test.

Q = 300 mL/min = 0.018 m³/h; A = 0.0177 m²;

C_{out} - C_{in} = 100 µg/m³.

E = 0.018 × 100 / 0.0177 = 101.7 µg/(m²·h).

Use each sampling tube correctly

Where concentration is calculated from collected mass, divide the appropriately corrected mass by the air volume sampled through that tube. Do not substitute total cell airflow for the tube flow. Evaluate separate tubes according to the sampling plan rather than simply adding their measured concentrations.

Compare like with like

Match material age, preparation, climate, airflow, geometry and analysis. During drying, wet coatings can respond differently to airflow than materials controlled mainly by internal diffusion. Heterogeneous products may need several specimens. Cell, chamber and room-air results are not automatically interchangeable. [2, 5]

This is an explanatory steady-state balance. Apply the complete method to measured data, including transient behaviour, blanks, recovery and uncertainty where relevant.

Choose the method for the question

Laboratory characterisation, source investigation in buildings and production comparisons have different reporting needs.

Application	Relevant framework
Laboratory emission cells	ISO 16000-10 and ASTM D7143 address emission-cell testing. NT BUILD 438 describes laboratory testing with FLEC. [1, 5, 6]
Installed surfaces	NT BUILD 484 describes on-site source investigation. It treats the procedure as semiquantitative because conditions in buildings can be difficult to control. [7]
Specimen handling	ISO 16000-11 addresses sample collection, storage and specimen preparation. [2]
Sampling and analysis	ISO 16000-6 covers VOC sampling and analysis; ISO 16000-3:2026 covers active air sampling and carbonyl analysis. [3, 4]

Interpret the result in context

An on-site result describes the selected surface under recorded conditions, rather than occupant exposure or whole-room air quality. ISO 16000-10 and ASTM D7143 acknowledge field use but do not specify the on-site procedure. Production comparisons require a baseline and a consistent test schedule. [1, 5, 7]

References and further information

- [1] [ISO 16000-10:2006 - emission test cells](#)
- [2] [ISO 16000-11:2024 - specimen handling and preparation](#)
- [3] [ISO 16000-6:2021 - sorbent sampling, TD and GC analysis](#)
- [4] [ISO 16000-3:2026 - carbonyl sampling and analysis](#)
- [5] [ASTM D7143-24 - emission-cell practice](#)
- [6] [NT BUILD 438 - laboratory measurements with FLEC](#)
- [7] [NT BUILD 484 - on-site measurements with FLEC](#)

References checked 07 September 2026; ISO 16000-3 updated 09 September 2026. Confirm the applicable edition when planning a test. This guide explains the system; use the complete standards for procedural requirements.

Discuss your material and test objective. [Contact CHEMATEC](#)
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