

Environmental- Simulations

**Reliability under
extreme Conditions for
long-lasting Products**



Environmental Simulation Tests

Standardized Procedures and Customer-specific Test Strategies

Technical components and systems are exposed to numerous environmental stresses during use – from extreme temperatures, humidity, and UV radiation to mechanical vibrations. Targeted environmental simulation tests are essential for detecting material weaknesses at an early stage and ensuring product reliability.

These tests support the development, certification, and market launch of durable, robust products. Our accredited testing laboratory combines state-of-the-art testing infrastructure with comprehensive application of standards and customized testing strategies – for the highest quality and safety in industries such as automotive, medical technology, aviation, and more.

The test procedures described below represent an excerpt from our extensive test portfolio. The peak values mentioned here always depend on the geometry and mass of the test specimen.

If you have any questions, please do not hesitate to contact us; we are here to assist you.



We have various climate chambers with variable volumes and wide temperature and humidity ranges available for our environmental simulation tests.



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Software	StdMin	24:00



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Mechanical Environmental Testing

Realistic Tests to ensure structural integrity under dynamic operating conditions

Mechanical Vibration and Shock

Our laboratory is equipped with several electrodynamic vibration testing systems with different performance levels. Here, we simulate transport conditions for various freight routes, the effects of engine speeds on the end product, earthquake scenarios, and more.

Audits According to the following Standards

- DIN EN IEC 60068-2-6
- DIN EN IEC 60068-2-27
- DIN EN IEC 60068-2-29
- DIN EN IEC 60068-2-47
- DIN EN IEC 60068-2-57
- DIN EN IEC 60068-2-64
- DIN EN IEC 60068-2-80
- DIN EN IEC 61373
- DIN ISO 16750-3
- ISO 19453-3

Vibration

- Swing path / max. deflection up to 3 inches
- Sine wave up to 220 g (peak value)*
- Random up to 180 grms (effective)*

Vibration profiles

- Sine wave
- Broadband noise
- Sine wave over broadband noise (SoR)
- Broadband noise over broadband noise (RoR)
- Resonance frequency analysis
- Dwell test at discrete frequencies
- Real-time profiles

Shock Profiles

- Sawtooth
- Triangle
- Trapezoid
- Rectangle
- Shock response spectrum
- Max. shock acceleration: 500 g*

All of the test scenarios mentioned are also available with climate or temperature superimposition if required.

Mechanical Crash Test Rig

Our crash test rig is located in a fire-protected area and is used for mechanical shock tests with long pulse durations on test specimens with increased risk potential, e.g., battery systems for electric vehicles and airbags. There, test specimens with a mass of up to 600 kg* and speeds of up to 65 km/h* and a maximum of 60 times* the acceleration due to gravity can be tested. In doing so, we comply with the regulations of ECE R 100, taking into account the following parameters:

- Vmax: 65 km/h
- Test specimen mass: max. 600 kg
- Dimensions of clamping surface for test specimen: 1200 x 1200 mm, extension possible
- Drive force: 900 kN
- Acceleration: 60 g
- Stroke: 1100 mm
- Impact block: 8 t

*Peak values depending on geometry and mass



Electronic components, devices, and systems are tested under realistic environmental conditions using various standardized and customized test procedures.

Climate & Climate shock test

We offer customized temperature and climate testing according to various standards.

- DIN EN IEC 60068-2-1
- DIN EN IEC 60068-2-2
- DIN EN IEC 60068-2-14
- DIN EN IEC 60068-2-30
- DIN EN IEC 60068-2-38
- DIN EN IEC 60068-2-41
- DIN EN IEC 60068-2-48
- DIN EN IEC 60068-2-78
- DIN ISO 16750-4
- ISO 19453-4
- individual Customer Requirements

Our temperature and climate test chambers can accommodate test specimens of various sizes and masses.

- Test chamber sizes from 50 liters to 13.5 m³ test chamber volume, also explosion-proof with inert gas purging
- Temperature range from -80 °C to +300 °C with a temperature change rate of up to 5 K/min under normal conditions and more than 10 K/min under thermal shock conditions
- Humidity range from 10 % to 95 % RH, adjustable

Ice Water Shock Tests

This test, primarily used in the automotive sector, simulates thermal shock caused by ice water on components installed in splash zones on vehicles. The aim of this test is to investigate the resistance to stress cracks in the material, but also seal failure caused by different thermal expansion coefficients under thermal stress.

Scope of testing

- Ice water spray tests with preheated test specimen
- Ice water immersion test with preheated test specimen

Testing Device

- Test specimens up to a size of 240 x 260 x 380 mm
- Water temperature range: -2 °C to RT
- Pre-conditioning of test specimen: 0 °C to 110 °C
- Transfer time: < 30 s
- Splash water up to 60 l/min flow rate

Testing according to

- ISO 16750-4
- individual customer requirements

Immersion Tests

We use an immersion tank to perform immersion tests, e.g. for batteries attached to the underbody of vehicles. This allows immersion tests in accordance with IPX7 to be performed on particularly large test specimens (dimensions up to 2.2 m x 1.5 m).



Environmental Simulation Tests

Our Environmental Simulation Laboratory is accredited according to DIN EN / IEC 17025.

Altitude simulation / Negative pressure tests

Our vacuum chamber enables altitude simulations at reduced air pressure.

- Vacuum up to 100 mbar (absolute)
- Test specimen sizes up to 2000 x 1500 x 500 mm
- Test specimen weight up to 500 kg
- Temperature up to 200 °C

Altitude simulation Tests and negative Pressure Tests according to

- DIN EN IEC 60068-2-13
- DIN EN IEC 60068-2-41

IP Protection Class Tests

As part of its IP protection class testing, [cetecom advanced](#) tests all types of parts and components for access to dangerous parts, solid foreign objects, and water.

IP code Tests according to

- DIN EN 60529
- IEC 60529
- ISO 20653

IPX1 bis IPX8, IPX6K und IPX9K

- Available space in the IP test chamber: 2500 x 6000 mm
- Test specimen weight: up to 300 kg
- Turntable diameter: 1500 mm
- Testing of protection against access to hazardous parts and against dust with different types of dust according to IP1X-6X

Talcum Powder

- Arizona dust (fine or coarse)
- Test chamber dimensions: max. 2500 x 3500 x 1900 mm
- Test specimen weight: up to 5000 kg

Chemical resistance testing

The chemical resistance test is used to determine the resistance of components, devices, or their material components to test liquids..

Scope of Testing

Application methods:

- Spraying
- Brushing
- Wiping
- Pouring
- Immersion
- Submersion
- Chemicals according to standard specifications or customer specifications

Tests

- DIN EN 60068-2-74
- DIN ISO 16750-5
- VW 80000
- ISO 19453-5



Corrosion Tests

In the walk-in salt spray chamber and in our cyclic corrosion test chamber with air conditioning, the corrosion behavior caused by the effects of salt spray or salt shower can be simulated in fast motion in combination with adjustable climatic conditions.

Testing Device

- Exposure area: max. 3000 x 2000 mm
- Floor load: max. 1000 kg/m²

Corrosion Tests in accordance with

- DIN EN ISO 9227
- DIN EN IEC 60068-2-11/-52
- ASTM B 117
- Condensation water atmospheres according to ISO 6270-2

Sun simulation / Artificial weathering

Almost all parts and components are exposed to the sun and the resulting thermal stresses during their service life and must be able to withstand the effects of radiation. Sun simulation is used, among other things, to determine the aging behavior of materials under different types of radiation.

Testing Device

- Outdoor testing (global radiation) and indoor testing (behind window glass)
- Temperature range: -40 °C to 100 °C
- Load capacity: 100 kg
- Relative humidity up to 90%
- Front & back spray

Artificial weathering can be carried out in accordance with the following standards

- DIN EN IEC 60068-2-5
- DIN 75220
- ISO 4892-1/-2/-3
- VW PV 3929
- VW PV 3930
- SAE J2412
- SAE J2527
- ASTM G155

High-speed Photography

We record forces acting on the test specimen during crash, shock, or vibration tests, whose movements cannot be detected by the human eye, using a high-speed camera with the following parameters:

- 2500 fps (frames per second) in Full HD (1920 x 1080)
- 5300 fps in HD Ready (1280 x 720)
- 10000 fps in 640 x 480

Measurement values recorded on the test object can be captured at a sampling rate of up to 100 kSa/s, recorded simultaneously, and displayed in synchronization with the image.

Customized Requirements

In addition to the tests already described in accordance with specified standards, further tests are offered individually at the customer's request:

- Customized test profiles based on DIN EN 60068-1
- Consulting on life cycle tests, functional tests, etc.
- Development of individual test plans and specifications according to customer requirements



Further information is available at
<https://cetecomadvanced.com/en/testing/environmental-simulation/>

300 kN Shaker - electrodynamic vibration testing system

Testing of Components from the Automotive, Mechanical Engineering, and eMobility sectors

Facts & Figures

- Maximum displacement up to 3 inches
- Sinusoidal acceleration
up to 70 g at 195 kg or 11.2 g at 1,500 kg*
- Shock tests with high payloads
up to e.g. 1,500 kg in half-sinusoidal shock
- Test specimen size up to approx. 2.5 x 2.5 m*
- Mass of test specimens up to approx. 2 t*

Special features in the design

- Sound insulation from the environment through
a special soundproof cabin (approx. 600 m3)
- Installation of the shaker (approx. 50 t) in a pit
- Vibration decoupling from the foundation through
air-supported solid steel plate
- Base on micropiles

*Peak values depending on geometry and mass



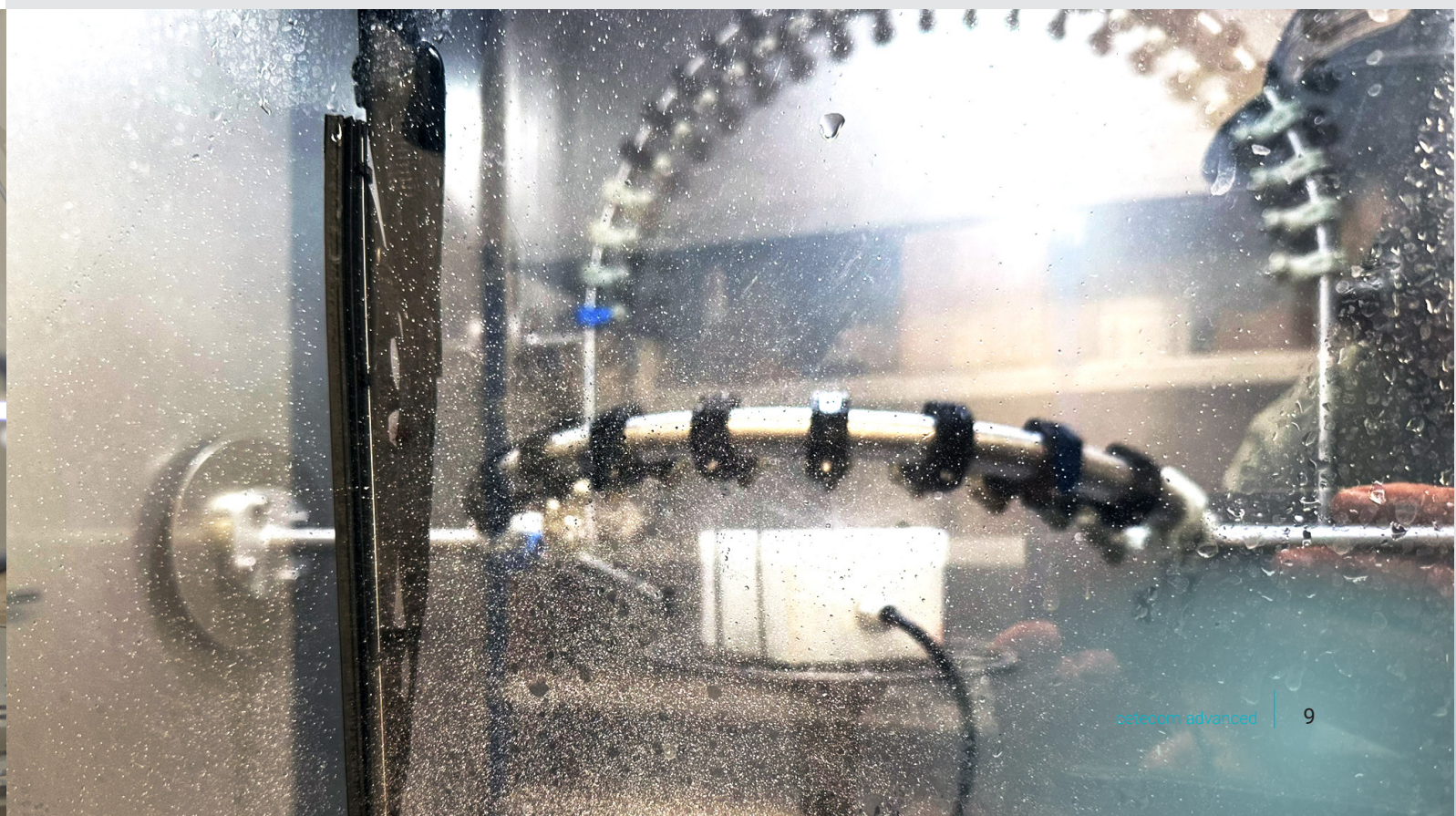
Environmental Simulation Tests

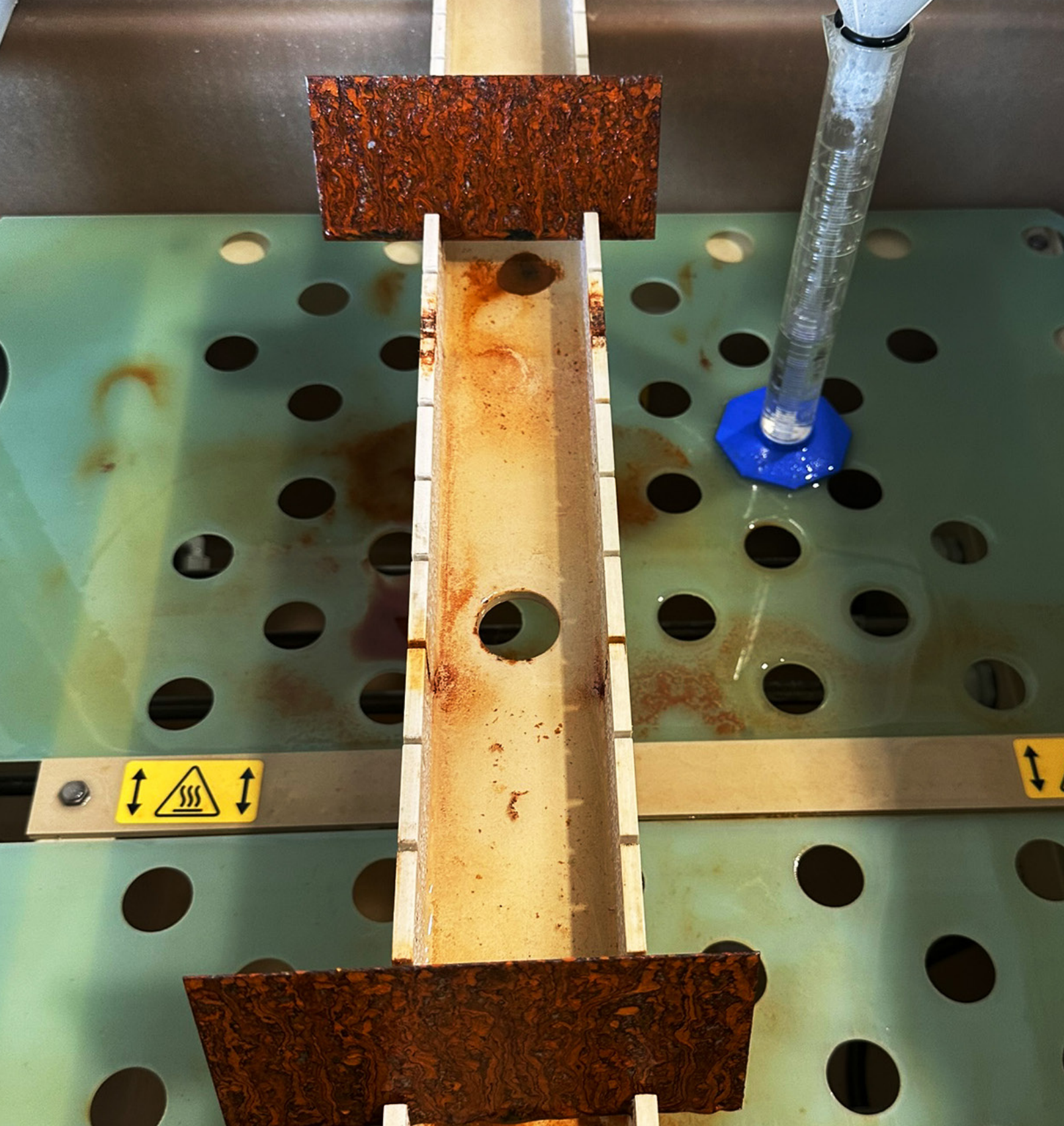
Reliability begins in the testing laboratory –
Environmental Simulations in accordance with International Standards

Environmental simulation tests are key to ensuring technical perfection—in development, production, and application. With internationally recognized standards, state-of-the-art testing equipment, and in-depth industry expertise, we help minimize risks and maximize the reliability of your products. Whether standardized testing or customized test sequences—we offer comprehensive solutions that meet your requirements. Work with us to shape the future of your product development – sustainably, safely, and certified.



If you cannot find the standard you require here, please contact us. Together, we are sure to find the right test case for your product.





We have a wide range of accreditations for environmental and service life testing and offer a broad spectrum of test content.

Please feel free to contact us:

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