AUSTRIAN INSTITUTE OF TECHNOLOGY
TOMORROW TODAY

ENVIRONMENTAL TESTING

Mobility Department

Foreword & Introduction

Tests


Ing. Robert Meier

Reliability, Quality, Safety and Compatibility

If these or similar slogans apply to your products we can and would like to support you in your work.

The AIT Mobility Department and its staff have many years of know-how as an independent, ISO 9001 certified testing center. We are accredited to EN 45001 and EN 45004. Experienced experts of our team are active in both Austrian and international standards boards, forming a link between standards theory and testing practice.

The competitive edge provided by your staff and our technical equipment is assured in the complete product life cycle from engineering to maintenance.

Best regards

Ing. Robert Meier
Environmental Simulation

We support you in

- Selection of test methods
- Practice oriented test planning

We offer you

- Conducting of the tests
- Conducting of acceptance tests
- Long-term and life cycle tests
- Reports and certificates

I would be pleased if you would place your trust in us.

Accredited Testing Laboratory/Inspection Body by decree of the Austrian Minister of Economics and Labour

Heat - Cold - Climate

Applications

- Materials testing
- Electronic and electrical components, machines and devices
- Display models also in 1:1 scale, doors, windows and fascade elements
- Vehicle parts and vehicles, e.g. electric scooters, automobiles and rail vehicles

Scope of Service

- High temperature tests up to +250 °C
- Low temperature tests up to -70 °C
- Dew point tests from -3°C to 94°C
- Climate tests: 10 % r.F up to 95 % r.F (Temperature range 10 °C up to 90 °C)
- Rate of temperature: up to 11°C/min.

Testing Equipment

- Temperature Chambers
  -40 °C up to +250 °C
- Climate Chambers
  -70 °C up to +180 °C
- Heat/Cold/Climate Test Cells (walk-in)
  -35 °C up to +90 °C
- Heat/Cold/Climate Test Cells (drive-in)
  -50 °C up to +60 °C
- Heat/Cold/Climate Test Chambers (drive-in)
  -50 °C up to +50 °C

Standards

IEC 60068-2-1	Environmental Testing: Test A: Cold
IEC 60068-2-2	Environmental Testing: Test B: Dry heat
IEC 60068-2-14	Environmental Testing: Test N: Change of temp.
IEC 60068-2-30	Environmental Testing: Test Db: Damp heat, cyclic
IEC 60068-2-38	Environmental Testing: Test Z/AD:Composite temperature/humidity cyclic test
IEC 60068-2-61	Environmental Testing: Test Z/ABDM: Climatic sequence
IEC 60068-2-78	Environmental Testing: Test Cab: Damp heat, steady state
IEC 60749	Semiconductor devices - Mechanical and climatic test methods
MIL-STD-810E	Test Method Standard for Environmental Engineering Considerations and Laboratory Tests


Drive-in climate cell 1


Climate chamber

Thermal Shock

Applications
- Materials testing
- Electronic and electrical components and devices

Scope of Service
- Rapid change between 2 temperatures (thermal shock) in air

Testing Equipment
- Freely programmable sample exposure time.
- Unlimited number of test cycles.
- Two test chambers:
  High Temperature Chamber up to +180 °C
  Low Temperature Chamber down to -70 °C
- Automatic sample transport
- Transfer time:< 10 sec.
- Capacity of the chambers:
  47 x 65 x 41 cm
- Max. weight of sample: 20 kg

Standards
- IEC 60068-2-14 Environmental Testing: Test N: Change of temperature
- IEC 60749 Semiconductor Devices – Mechanical and climatic test methods


Thermal Shock

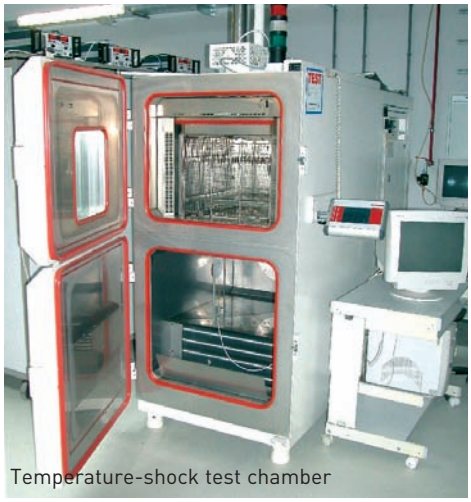
Low Pressure - High Pressure

Applications
- Materials testing
- Electronic and electrical components, machines and devices
- Mechanical constructions and structures
- Vehicle parts (automobiles, aircraft and spacecraft)

Scope of Service
- Low pressure (flight test, alpine test, etc.)

Testing Equipment
Low Pressure Chamber (walk-in)
- Size of chamber: 1.2 m x 1.2 m x 2.3 m
- Temperature range: -40 °C up to +80 °C
- Pressure: 1 mbar up to 1300 mbar

Standards
- IEC 60068-2-13 Environmental Testing: Test M: Low air pressure
  IEC 60068-2-40 Environmental Testing: Test Z/AM: Combined cold/low air pressure tests
  IEC 60068-2-41 Environmental Testing: Test Z/BM: Combined dry heat/low air pressure tests
- IEC 60749 Semiconductor Devices - Mechanical and climatic test methods
- MIL-STD-810F Test Method Standard for Environmental Engineering Considerations and Laboratory Tests


Temperature-shock test chamber


Vacuum chamber

Vibration

Applications

- Electronic and electrical components, machines and devices
- Mechanical constructions and structures
- Vehicle parts (automobiles, aircrafts and spacecrafts)

Scope of Service

Sinus Vibration

- Range of frequency: 5 Hz up to 3 kHz
- Control of distance, speed and acceleration
- Max. distance: 2 inches (peak-peak)
- Max. speed: 1.8 m/s
- Max. acceleration: depending on the mass of the sample incl. table 110 g (without mass) up to 40 g (with appr. 60 kg payload)

Random Vibration

- Range of frequency: 10 Hz up to 2 kHz
- Max. acceleration: 75 g (without mass) up to 10 g (with appr. 330 kg payload)

Testing Equipment

Electrodynamic Shaker

- Sway-direction vertical or horizontal on coupled horizontal table.
- Force: 35585 N

Climate Equipment

- Temperature range -70 °C up to +180 °C, Change of temperature: 5 K/min.
- Climate: 10 % r.h. up to 95 % humidity in a temperature range from 10 °C up to 90 °C.

Prüfnormen

- EN 22247 Packaging - Complete, filled transport packages -Vibration test at fixed low frequency
- EN 28318 Packaging - Complete, filled transport packages -Vibration test using a sinusoidal variable frequency
- IEC 60068-2-6 Environmental Testing: Test Fc: Vibration
- IEC 60068-2-50 Environmental Testing: Test Z/AFc: Combined cold/vibration tests
- IEC 60068-2-51 Environmental Testing: Test Z/BFc: Combined dry heat/vibration tests
- IEC 60068-2-64 Environmental Testing: Test Fh: Vibration broad-band random
- MIL-STD-810E Test Method Standard for Environmental Engineering Considerations and Laboratory Tests
- MIL-STD-883E Test Method Standard, Microcircuits

Electrodynamic shaker with adapted climate chamber

Mechanical Shock

Applications

- Electronic and electrical components, machines and devices
- Mechanical constructions and structures
- Vehicle parts (automobiles, aircrafts and spacecrafts)

Scope of Service

Single and Steady Shock

Mass of sample depends on the acceleration and duration of the shock.

Test duration, e.g.:

6 ms:	11 ms:
232 kg at 30 g	223 kg at 30 g
126 kg at 50 g	64 kg at 50 g
6 kg at 100 g	7 kg at 60 g

Testing Equipment

Electrodynamic Shaker

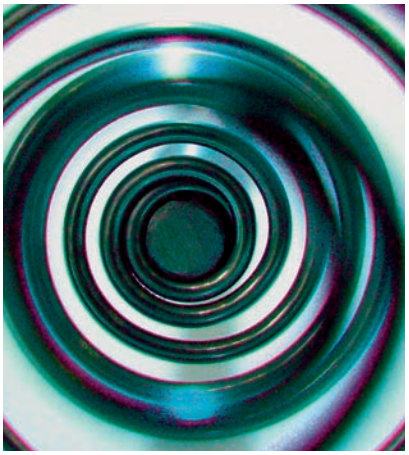
- Sway-direction vertical or horizontal on coupled horizontal table
- Force: 35585 N

Climate Equipment

- Temperature range -70 °C up to +180 °C, Change of temperature: 5 K/min.
- Climate: 10 % RH up to 95 % humidity in a temperature range of 10 °C up to 90 °C

Standards

- IEC 60068-2-27 Environmental Testing: Test Ea: Shock
  IEC 60068-2-29 Environmental Testing: Test Eb: Bump
  IEC 60068-2-31 Environmental Testing: Test Ec: Drop and topple
  IEC 60068-2-32 Environmental Testing: Test Ed: Free fall
  IEC 60068-2-55 Environmental Testing: Test Ee: Bounce
  IEC 60068-2-75 Environmental Testing: Test Eh: Hammer test
- MIL-STD-810E Test Method Standard for Environmental Engineering Considerations and Laboratory Tests



Electrodynamic shaker with adapted climate chamber

Corrosive Atmospheres

Applications

- Materials testing
- Electronic and electrical components, machines and devices
- Mechanical constructions and structures
- Vehicle parts (automobiles, aircrafts and spacecrafts)

Scope of Service

- Salt Spray (Fog) Test chamber with condensation water test
- Sulphur Dioxide SO_2 and Hydrogen Sulfide H_2S test

Testing Equipment

Salt Chamber

- Size of chamber: L=165 cm H=120 cm D=57 cm
- Temperature range: Ambient temperature up to +55 °C
- Also suitable for condensation water test

Sulphur and Hydrogen Climate Chamber

- Size of chamber: L=60 cm H=60 cm D=55 cm
- Temperature range: +15 °C up to +60 °C
- Humidity range: 10 % r.h. up to 80 % r.h.,
- Gas concentration: 0.1 ppm up to 25 ppm SO_2 and H_2S
- Also suitable for mixed corrosion gas tests

Standards

Salt mist test with condensation water test

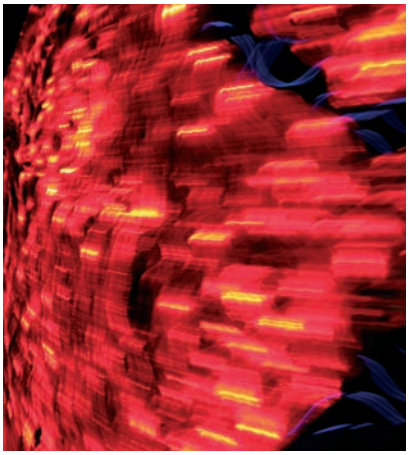
- ASTM B117 — Standard Method of Salt Spray (Fog) Testing
- IEC 60068-2-11 — Environmental Testing: Test Ka: Salt mist
- IEC 60068-2-52 — Environmental Testing: Test Kb: Salt mist, cyclic
- ISO 9227 — Corrosion tests in artificial atmospheres - Salt spray tests
- MIL-STD-883E — Test Method Standard, Microcircuits

Gas tests

- IEC 60068-2-42 — Environmental Testing: Test Kc: Sulphur dioxide test
- IEC 60068-2-43 — Environmental Testing: Test Kd: Hydrogen sulfide test


Salt spray test chamber with condensation water test


Climate chamber with sulphur hydrogen cell



Rain - Dust - IP Enclosure

Applications
- Electronic and electrical components, machines and devices
- Machines and technical facilities
- Mechanical constructions and structures
- Vehicle parts (automobiles, aircrafts- and spacecrafts)

Scope of Service
- IP classification
- Testing and classification of all degrees of protection for enclosures (against access to dangerous parts, solid particles, water)

Testing Equipment
- Water Protection Tests: Spray water, dripping water, water jet propulsion, steam jet propulsion
- Dust Chamber
  Dust: Talcum
- Several test probes

Standards
Depending on the Standard applicable

IEC 60529	Degrees of protection provided by enclosures (IP Code)
EN 60529	Degrees of protection provided by enclosures (IP Code)
ÖVE-A/EN 60529	Degrees of protection provided by enclosures (IP Code)


Water protection test equipment

Ice - Snow

Applications
- Electronic and electrical components, machines and devices
- Mechanical constructions and structures
- Electric, pneumatic, hydraulic and mechanical drives
- Display models also in 1:1 scale, doors, windows and fascade elements
- Vehicle parts
- Vehicles (automobiles, rail vehicles, aircraft and spacecraft)

Scope of Service
Analysis of samples under extreme weather conditions:
- Rain
- Snow
- Freezing
- Wind

Expert reports and certificates

Testing Equipment
- Water test (indoor/outdoor)
- Ice/Snow/Climate Chamber

Standards
Depending on the applicable product standard (examples):
- IEC 62271-102 High-voltage switchgear and controlgear - Part 102: High-voltage alternating current disconnectors and earthing switches


Device under weathering

Solar Radiation

Applications

- Materials testing
- Building climate
- Solar collectors and photovoltaic elements
- Electronic and electrical components, machines and devices
- Mechanical constructions and structures
- Electric, pneumatic, hydraulic and mechanical drives
- Scale models of doors, windows and facade elements
- Vehicles (automobiles, rail vehicles, aircraft and spacecraft)

Scope of Service

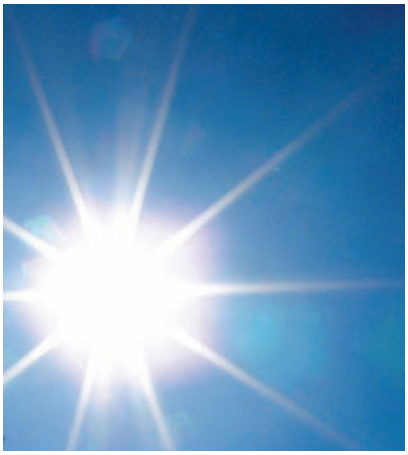
- Solar collector tests according to the standards
- Simulation of solar radiation on the earth`s surface
- Simulation of UV radiation UV radiation range from 0.28 µm up to 0.40 µm

Testing Equipment

- Solar collector test stand with automatic data logging
- Solar Simulator up to 1000 W/m^2 also in combination with cold-heat climate chambers (walk-in and drive-in)
- UV chamber 2380 x 2380 x 1650 mm
- Temperatures from -40°C up to + 80°C

Standards

- EN 12975-2 Termal solar systems and components - Solar collectors Part 2: Test methods
- IEC 60068-2-5 Environmental Testing: Test Sa: Simulated solar radiation at ground level
- MIL-STD-810E Test Method Standard for Environmental Engineering Considerations and Laboratory Tests




Solar collector test stand


Solar simulator

SUPPLEMENT

Standards

ASTM B117	Standard Method of Salt Spray (Fog) Testing
EN 12975-2	Thermal Solar Systems and Components - Solar Collectors Part 2: Test Methods
EN 22247	Packaging - Complete, filled transport packages - Vibration test at fixed low frequency
EN 28318	Packaging - Complete, filled transport packages - Vibration test using a sinusoidal variable frequency
IEC 60068-2-1	Environmental Testing: Test A: Cold
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IEC 60068-2-5	Environmental Testing: Test Sa: Simulated solar radiation at ground level
IEC 60068-2-6	Environmental Testing: Test Fc: Vibration
IEC 60068-2-11	Environmental Testing: Test Ka: Salt mist
IEC 60068-2-13	Environmental Testing: Test M: Low air pressure
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IEC 60068-2-75	Environmental Testing: Test Eh: Hammer test
IEC 60068-2-78	Environmental Testing: Test Cab: Damp heat, steady state
IEC 60749	Semiconductor devices - Mechanical and climatic test methods
ISO 9227	Corrosion tests in artificial atmospheres - Salt spray tests
MIL-STD-810F	Test Method Standard for Environmental Engineering Considerations and Laboratory Tests

SUPPLEMENT

Test Equipment

Test equipment	Temperature range	Humidity range	Size (L x W x D)
Temperature chamber	-70 °C to +180 °C	-	58 x 62 x 75 cm
Temperature chamber	-70 °C to +180 °C	-	80 x 65 x 95 cm
Temperature chamber	-70 °C to +180 °C	-	58 x 62 x 75 cm
Temperature chamber	20 °C to +250 °C	-	40 x 40 x 40 cm
Temperature chamber	20 °C to +180 °C	-	58 x 38 x 48 cm
Temperature chamber	20 °C to +180 °C	-	58 x 38 x 48 cm
Temperature chamber	20 °C to +180 °C	-	58 x 38 x 48 cm
Climatic chamber	-70 °C to +180 °C	15 % r.h. to 98 % r.h.	80 x 65 x 92cm
Climatic chamber	-10 °C to +180 °C	11 % r.h. to 98 % r.h.	52 x 47 x 48 cm
Climatic chamber	-30 °C to +180 °C	12 % r.h. to 98 % r.h. at +10 °C to +90 °C	55 x 54 x 64 cm
Climatic chamber	-45 °C to +60 °C	-	6,0 x 3,2 x 3,0 m
Climatic chamber	-40 °C to +90 °C	15 % r.h. to 95 % r.h.	3.2 x 2.0 x 2.0 m
Climatic chamber (UV cell)	-40 °C to +80 °C	-	2.3 x 2.3 x 1.6 m
Climatic chamber	-75 °C to +120 °C	15 % r.h. to 95 % r.h.	2.0 x 1.3 x 2.6 m
Climatic chamber	-40 °C to +80 °C	15 % r.h. to 95 % r.h.	4.1 x 5.3 x 3.1 m
Shock temperature chamber	-80 °C to +220 °C	-	47 x 65 x 41 cm
Gas climate chamber	-70 °C to +180 °C	12 % r.h. to 98 % r.h.	82 x 80 x 85 cm
Salt spray chamber	RT to +55 °C	50 % r.h. to 100 % r.h.	120 x 165 x 57 cm
Low pressure chamber	-40 °C to +80 °C	-	1.2 x 1.2 x 2.3 m
Dust chamber	-	-	1.0 x 1.7 x 1.5 m
Spray water test equipment	-	-	4.0 x 2.5 x 3.0 m
Vibration and mechanical shock test equipment	-70 °C to +180 °C	10 % r.h. to 95 % r.h.	100 x 100 x 100 cm
Solar collector test equipment	-	-	-
Solar simulator	-	-	Modular up to 20 m^2

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