



ENVIRONMENTAL TESTING



CONTENT

ENVIRONMENTAL TESTING

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.

OUR SERVICES

- Consulting and selection of test methods
- Practice oriented test planning
- Conducting of the tests
- Conducting of acceptance tests
- Long-term and life cycle tests
- Reports and certificates

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 our staff and technical equipment is assured in the complete product life cycle from engineering to maintenance.



ACCREDITATION



Our staff has many years of know-how as an independent, ISO 9001 certified testing center and are EN ISO/IEC 17025 accredited.



HEAT - COLD - CLIMATE	5
THERMAL SHOCK	7
LOW PRESSURE	9
SHOCK - VIBRATION	11
MECHANICAL LOAD	12
ICE - SNOW - WEATHERING	13
CORROSIVE ATMOSPHERES	15
IP PROTECTION CLASS - WATER	17
IP-PROTECTION CLASS - DUST	19
SOLAR RADIATION	21
SUPPLEMENT	
OVERVIEW	22
TESTING EQUIPMENT	23

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HEAT - COLD - CLIMATE



Climate Chamber

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 to vehicles and overhead line construction

OUR SERVICES

- High temperature tests up to +250 °C
- Low temperature tests up to -75 °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
- Temperature change and rapid temperature change: changing speed up to 15 °C / min

TESTING EQUIPMENT

- Temperature Chambers: -70 °C up to +250 °C
- Climate Chambers: -70 °C up to +180 °C
- Heat/Cold/Climate Test Chambers: -75 °C up to +200 °C
- Corrosion Gas Chamber

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
- EN60068-2-60
- EN60068-2-42
- EN60068-2-43

DRIVE-IN CLIMATE CELL



THERMAL SHOCK

Temperature-shock Test Chamber

APPLICATIONS

- Materials testing
- Electronic and electrical components and devices

TESTING EQUIPMENT

THERMAL SHOCK WITH TWO TEST CHAMBERS:

- High Temperature Chamber up to +220 °C
- Low Temperature Chamber down to -80 °C
- Capacity of the chambers: 47 x 65 x 41 cm
- Max. weight of sample: 20 kg
- Transfer time: < 10 sec
- Automatic sample transport
- Freely programmable sample exposure time
- Unlimited number of test cycles

OUR SERVICES

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

STANDARDS

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



LOW PRESSURE



Vacuum Chamber

APPLICATIONS

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

OUR SERVICES

- Low pressure (flight test, alpine test, etc.)

TESTING EQUIPEMENT

LOW PRESSURE CHAMBER (WALK-IN)

- Size of chamber: 1,2 m x 1,2 m x 2,3 m
- Pressure: 1 mbar up to 1300 mbar

STANDARDS

- IEC 60068-2-13: Environmental Testing: Test M: low air pressure
- IEC 60749: Semiconductor Devices - Mechanical and climatic test methods
- MIL-STD-810F: Test Method Standard for Environmental Engineering Considerations and Laboratory Tests



SHOCK - VIBRATION



Electrodynamic Shaker

APPLICATIONS

Shock and vibration testing of specimens like:

- Electronic and electrical components, machines and devices
- Mechanical constructions and structures
- Vehicle components (road, rail, aviation and spacecraft)
- Transport simulation

OUR SERVICES

- **Vibration: Sine and broadband random vibration with and without climate test chamber**
- **Mechanical shock: Single und repeated shock with and without climate test chamber**
- Selection of test methods
- Design and performance of application-oriented test sequences
- Performance of approval tests
- Support of product development
- Endurance testing
- Accredited test reports

STANDARDS

- EN 60068-2-27: Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock (IEC 60068- 2-27:2008)
- EN 60068-2-31: Environmental testing – Part 2-31: Tests – Test Ec: Rough handling shocks, primarily for equipment-type specimens (IEC 60068-2-31:2008)
- EN 60068-2-6: Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal) (IEC 60068-2-6:2007)
- EN 60068-2-64: Environmental testing – Part 2-64: Tests – Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64:2008)

TESTING EQUIPMENT

ELECTRODYNAMIC SHAKER 1

Type: RMS SW9112-80-LS3 / RMS600-1

- Horizontal slip table
- Maximum force 80 kN (sine/random)
- Maximum force 160 kN (shock)
- Maximum displacement 50,8 mm for sine/random (2 inches peak - peak)
- Maximum displacement 76,2 mm for shock (3 inches peak - peak)
- Frequency range 5 - 2500 Hz
- Maximum acceleration 100 g (mass of specimen and equipment < 45 kg)
- Tests in 3 axes xyz possible
- Specimen mass typically up to 300 kg, nominally up to 500kg

ELECTRODYNAMIC SHAKER 2

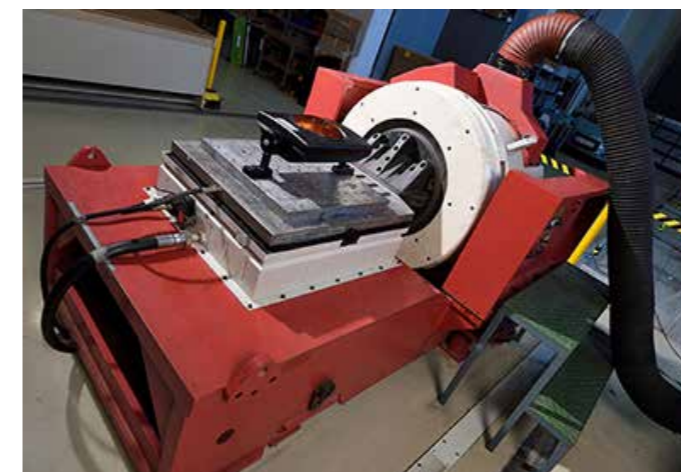
Type: LDS V864HT-440 / HBT 600 Combo

- Horizontal slip table
- Maximum force 35 kN
- Maximum displacement 50,8 mm (2 inch peak - peak)
- Frequency range 5 - 2500 Hz
- Maximum acceleration vertically 100 g (dependent on specimen mass)
- Tests in 3 axes xyz possible
- Specimen mass typically up to 300 kg, nominally up to 500kg

CLIMATE TEST CHAMBER

Type: Vötsch climate test chamber VCV 7100-5/S with air cooling

- Temperature range: -70 to +180 °C
- Maximum rate of temperature change: +7°C/min and -5°C/min
- Relative humidity: 10% - 95% RH
- Maximum specimen dimensions: ca. 500 x 500 x 800 mm³





MECHANICAL LOAD TEST

MECHANICAL LOAD

APPLICATIONS

Simulation of wind and snow loads

- PV modules, solar panels
- Building integrated PV elements
- facade elements
- Construction parts, superstructures, vehicle parts

OUR SERVICES

- Static tensile and pressure load
- Dynamic tensile and pressure load
- Test pressure up to 10,000 Pa (N / m²)
- Up to 3 cycles / min

TESTING EQUIPMENT

- Pneumatic test stand with 30 push / pull punches
- Measurement of deflection by laser distance sensors
- Vacuum suction cups
- Test room dimensions: 1,8 m x 2,4 m

STANDARDS

- MQT16 IEC 61215-2: Static mechanical load test
- MST34 IEC 61730-2: Mechanical load test
- IEC TS 62782: Cyclic (dynamic) mechanical load testing

ICE - SNOW - WEATHERING

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 facade elements
- Vehicle parts and vehicles (automobiles, rail vehicles, aircraft and spacecraft)
- Normative / supplementary testing of photovoltaic modules

OUR SERVICES

- Analysis of samples under extreme weather conditions:
 - Rain
 - Snow
 - Hail
 - Freezing
 - Wind
- Expert reports and certificates

TESTING EQUIPMENT

- Water test (indoor/outdoor)
- Ice/Snow/Climate Chamber
- Hail test stand 25mm and 55 mm diameter

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



RAIN / ICE / SNOW CHAMBER



HAIL TEST



CORROSIVE ATMOSPHERES



Salt Spray Chamber

APPLICATIONS

- Materials testing
- Electronic and electrical components, machines and devices
- Mechanical constructions and structures
- Vehicle parts (automobiles, aircrafts and spacecrafts)
- Normative / supplementary tests of photovoltaic modules

OUR SERVICES

- Salt spray test
- corrosive gas test

TESTING EQUIPMENT

SALT CHAMBER

- Test space: l=165 cm, w=120 cm, d=57 cm
- Temperature range: room temperature up to +55 °C
- Also suitable for condensation water test

MIXED FLOWING GAS CLIMATE CHAMBER

- Size of chamber: l=60 cm, w=60 cm, d=55 cm
- Temperature range: +15 °C up to +60 °C
- Humidity range: 10 % r.h. up to 80 % r.h., depending on the temperature
- Harmful gases: SO₂, H₂S, NO₂, CL₂
- Also suitable for mixed corrosion gas tests

STANDARDS

SALT SPRAY

- 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

CORROSIVE GAS

- IEC 60068-2-42: Environmental Testing: Test Kc: sulphur dioxide test
- IEC 60068-2-43: Environmental Testing: Test Kd: hydrogen sulfide test
- IEC 60068-2-60: Environmental Testing: Test Ke: Flowing mixed gas corrosion test

CLIMATE CHAMBER WITH HARMFUL GAS CELL



IP-PROTECTION CLASS - WATER



Spray Water Test

APPLICATIONS

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

OUR SERVICES

- IP classification
- Testing and assessment for all enclosure protection levels

TESTING EQUIPMENT

WATER PROTECTION TESTS

- Spray water, dripping water, water jet propulsion, steam jet propulsion

STANDARDS

in connection with the applicable product standard:

- IEC 60529: Degrees of protection provided by enclosures (IP Code)
- EN 60529: Degrees of protection provided by enclosures (IP Code)
- ÖVE-A/EN 60529: Schutzarten durch Gehäuse (IP-Code)
- DIN 40050 - Teil 9: Schutzarten durch Gehäuse (IP-Code)
- ISO 20653: Schutzarten durch Gehäuse (IP-Code)

DRIPPING WATER TEST



IP-PROTECTION CLASS - DUST



Dust Chamber ISO 20653

APPLICATIONS

- Electronic and electrical components, machines and devices
- Machines and technical facilities
- Mechanical constructions, drives and superstructures
- Vehicle parts (automobiles, aircrafts and spacecrafts)
- Sand storm tests of photovoltaic modules

OUR SERVICES

- IP classification
- Testing and assessment for all enclosure protection levels

TESTING EQUIPMENT

- Dust: Talcum and Arizona
- Access and object probes

STANDARDS

in connection with the applicable product standard:

- IEC 60529: Degrees of protection provided by enclosures (IP Code)
- EN 60529: Degrees of protection provided by enclosures (IP Code)
- ÖVE-A/EN 60529: Schutzarten durch Gehäuse (IP-Code)
- DIN 40050 - Teil 9: Schutzarten durch Gehäuse (IP-Code)
- ISO 20653: Schutzarten durch Gehäuse (IP-Code)

DUST CHAMBER EN 60529



SOLAR RADIATION



Stationary Solar Simulator

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
- Model structures also scale 1: 1, doors, windows and facade elements
- Vehicle parts
- Vehicles (automobiles, rail vehicles, aircraft and spacecraft)
- Characterization of photovoltaic modules and cells for accelerated aging of materials

OUR SERVICES

- Standard tests on PV modules
- Simulation of solar radiation on the earth's surface
- Simulation of UV radiation
- UV irradiation (UVA and UVB)
- Determination of the spectral sensitivity of photovoltaic modules and
- Power measurement of photovoltaic modules

TESTING EQUIPMENT

STATIONARY SOLAR SIMULATOR

- Class BBB (IEC 060904-9)
- 9 m² test area
- 0-1100 W / m²

PULSED SOLAR SIMULATOR (FLASHER)

- Class A + A + A + (IEC 060904-9)
- 3 m x 3 m test area
- Homogeneity <+/- 0.3%

PHOTOVOLTAIC CELLS SOLAR SIMULATOR

- Class AAA (IEC 060904-9)
- 20 cm x 20 cm

UV SUN SIMULATION

- UVA & UVB; 0-250 W / m²; 2,3 m x 2 m

MEASUREMENT-SPECTRAL SENSITIVITY

- for photovoltaic cells and modules

STANDARDS

- IEC 60904-1: Messen der photovoltaischen Strom-/Spannungskennlinien
- 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
- IEC 61215: Crystalline Silicon terrestrial photovoltaic (PV) modules - design qualification and type approval
- IEC 61730: Photovoltaic (PV) module safety qualification
- IEC 60904-8: Spectral response measurement

PULSED SOLAR SIMULATOR („FLASHER“)



UV SUN SIMULATION



SUPPLEMENT

Overview

- DIN 40050 - Teil 9: Schutzarten durch Gehäuse (IP-Code)
- EN 60068-2-27: Umgebungseinflüsse - Teil 2-27: Prüfverfahren - Prüfung Ea und Leitfadern: Schocken (IEC 60068-2-27:2008)
- EN 60068-2-31: Umgebungseinflüsse - Teil 2-31: Prüfverfahren - Prüfung Ec: Schocks durch raue Handhabung, vornehmlich für Geräte (IEC 60068-2-31:2008)
- EN 60068-2-6: Umgebungseinflüsse - Teil 2-6: Prüfverfahren - Prüfung Fc: Schwingen (sinusförmig) (IEC 60068-2-6:2007)
- EN 60068-2-64: Umgebungseinflüsse - Teil 2-64: Prüfverfahren - Prüfung Fh: Schwingen, Breitbandrauschen (digital geregelt) und Leitfadern (IEC 60068-2-64:2008)
- EN 60529: Degrees of protection provided by enclosures (IP Code)
- EN60068-2-43
- EN60068-2-60
- EN60068-2-42
- IEC 60068-2-1: Environmental Testing: Test A: cold
- IEC 60068-2-11: Environmental Testing: Test Ka: salt mist
- IEC 60068-2-13: Environmental Testing: Test M: low air pressure
- IEC 60068-2-13: Environmental Testing: Test M: low air pressure
- IEC 60068-2-14: Environmental Testing: Test N: Change of temperature
- IEC 60068-2-2: Environmental Testing: Test B: dry heat
- 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 60068-2-42: Environmental Testing: Test Kc: sulphur dioxide test
- IEC 60068-2-43: Environmental Testing: Test Kd: hydrogen sulfide test
- IEC 60068-2-5: Environmental Testing: Test Sa: simulated solar radiation at ground level
- IEC 60068-2-52: Environmental Testing: Test Kb: salt mist, cyclic
- IEC 60068-2-60: Environmental Testing: Test Ke: Korrosionsprüfung mit strömendem Mischgas
- IEC 60068-2-61: Environmental Testing: Test Z/ABDM: climatic sequence
- IEC 60068-2-78: Environmental Testing: Test Cab: damp heat, steady state
- IEC 60529: Degrees of protection provided by enclosures (IP Code)
- IEC 60749: Semiconductor devices - Mechanical and climatic test methods
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- IEC 60904-1: Messen der photovoltaischen Strom-/Spannungskennlinien
- IEC 60904-8: Spectral response measurement
- IEC 61215: Crystalline Silicon terrestrial photovoltaic (PV) modules - design qualification and type approval
- IEC 61730: Photovoltaic (PV) module safety qualification
- IEC TS 62782: Cyclic (dynamic) mechanical load testing
- ISO 20653: Schutzarten durch Gehäuse (IP-Code)
- ISO 9227: Corrosion tests in artificial atmospheres - salt spray tests
- MIL-STD-810E: Test Method Standard for Environmental Engineering Considerations and Laboratory Tests
- MIL-STD-810F: Test Method Standard for Environmental Engineering Considerations and Laboratory Tests
- MIL-STD-810F: Test Method Standard for Environmental Engineering Considerations and Laboratory Tests
- MIL-STD-883E: Test Method Standard, Microcircuits
- MQT16 IEC 61215-2: Static mechanical load test
- MST34 IEC 61730-2: Mechanical load test
- ÖVE-A/EN 60529: Schutzarten durch Gehäuse (IP-Code)

SUPPLEMENT

Testing Equipment

Test equipment	Temperature range	Humidity range	Size (L x W x D)
Temperature chamber	-70 °C up to +180 °C	-	58 x 62 x 75 cm
Temperature chamber	-70 °C up to +180 °C	-	80 x 65 x 95 cm
Temperature chamber	+20 °C up to +180 °C	-	58 x 38 x 48 cm
heat cabinet	RT up to +250 °C	-	58 x 38 x 48 cm
heat cabinet	RT to +250 °C	-	80 x 50 x 60 cm
Climatic chamber	-70 °C up to +180 °C	10 % r.F. up to 98 % r.F.	80 x 65 x 95 cm
Climatic chamber	-70 °C up to +180 °C	10 % r.F. up to 98 % r.F.	80 x 80 x 95 cm
Climatic chamber	-70 °C up to +180 °C	10 % r.F. up to 98 % r.F.	58 x 62 x 75 cm
Climatic chamber	-70 °C up to +180 °C	10% r.F. up to 98 % r.F.	80 x 65 x 95 cm
climate cell	-70 °C up to +180 °C	15 % r.F. up to 95 % r.F.	100 x 150 x 200 cm
climate cell	-20 °C up to +80 °C	-	240 x 240 x 240 cm
climate cell	-75 °C up to +120 °C	15 % r.F. up to 95 % r.F.	200 x 130 x 260 cm
climate cell	-40 °C up to +80 °C	15 % r.F. up to 95 % r.F.	410 x 530 x 310 cm
climate cell	-70 °C up to +120 °C	5 % r.F. up to 95 % r.F.	280 x 210 x 260 cm
UV cell	-	-	230 x 200 x 10 cm
Shock temperature chamber	-80 °C up to +220 °C	-	47 x 65 x 41 cm
Gas climate chamber	-70 °C up to +180 °C	12 % r.F. up to 98 % r.F.	82 x 80 x 85 cm
Salt spray chamber	RT up to +55 °C	50 % r.F. up to 100 % r.F.	120 x 165 x 57 cm
Low pressure chamber	-	-	120 x 120 x 230 cm
Dust chamber	-	-	100 x 170 x 150 cm
Dust chamber	-	-	80 x 100 x 200 cm
Spray water test equipment IPX3, IPX4	-	-	400 x 250 x 300 cm
Vibration and mechanical shock test equipment	-70 °C up to +180 °C	10 % r.F. up to 95 % r.F.	100 x 100 x 100 cm
Solar collector test equipment	-	-	9 m ²
hail test	-	-	180 x 240 cm
Mechanical load test	-	-	180 x 240 cm



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