



# **Formula 1 for Quality direct from the Factory**

**Environmental Simulation Technology for Functional Testing  
and Safety in the Automotive Industry**



# The Key to Quality and Safety

## Communication

The good reputation of a make of car is the culmination of a multitude of advantageous features and – verifiable – marks of quality.

Throughout the world, the motorist places high demands on driving performance, comfort and safety.

And because vehicles more than any other mass-produced product are exposed to changing environmental influences, reliability, service life and operational reliability play an extremely important role because a vehicle packed full with electronics, essential mechanical components and efficient technology is susceptible to just as many risks of failure.

We at Weiss possess the environmental simulation technology for all that concerns the automobile: Standard testing and special testing systems for corrosion and weathering, for testing electrical, electronic and mechanical components and systems of all sizes and design capacities for motors and emission tests.

If it is a question of ensuring that only tested quality is produced in series, then contact Weiss Umwelttechnik.

We will give you extensive consultation, undertake project planning and install testing systems which give you the reliability and safety you require: Individual special solutions based on well-tried components according to national and international guidelines and laws for environmental simulation technology in the manufacturing of automobiles.

Environmental simulation technology which has been a fixed constituent of quality management of many renowned manufacturers for many years.

## Environmental Simulation Technology for Professionals.

Radio, board computer, mobile radio telephone, control and information systems . . .



## Comfort

Heating, air conditioning, doorlock control, cruise control . . .



## Durability

Lacquer, metals, plastics, rims . . .



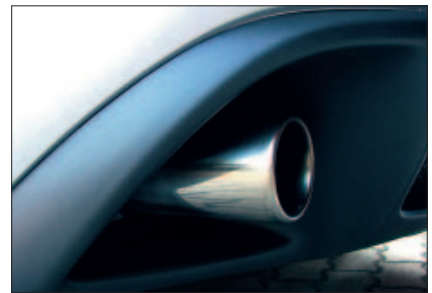
## Safety

ABS, electronic stability programme (ESP), steering mechanism, airbag, belt tensioning, light system . . .



## Drive Technology

Engine and electronics, speed and exhaust control, gear and gear control, chassis . . .





# Engine and Emission Tests

## Weiss SHED Chambers ...

In addition to exhaust emissions caused by traffic, hydrocarbon vapours are also emitted when refuelling tank systems and by the vehicle itself.

Due to the globalisation of the automobile industry, the strict regulations of the American Environmental Protection Authorities EPA and CARB have found world-wide recognition in the specifications defining the requirements of environmental simulation technology.

The SHED chambers of Weiss Umwelttechnik which can be temperature conditioned comply with these requirements.

Many leading automobile manufacturers and renowned suppliers repeatedly choose Weiss environmental simulation technology for very good reasons.

Not least because Weiss Umwelttechnik is one of the leading manufacturers of testing systems world-wide.



## RL SHED Chamber

The RL SHED chamber for determining the emission of fuel evaporation during driving. The system consists of driver instructor unit with ceiling mounted monitor, a dynamometer, volume compensation with Tedlar foil or movable ceiling, analyser, software and special airtight door.

Test chamber volume: 95 m<sup>3</sup>  
Temperature range: +15 ... +45 °C  
Temperature constancy: ± 1 K



# ...Special Testing Systems



## ORVR SHED Chamber

These chambers are used for **O**nboard **R**efuelling **V**apour **R**ecovery testing (ORVR). A vehicle located in the chamber is refuelled from the outside via hermetic port holes in the chamber wall. The HC emissions generated in the process are determined and assessed. The fuel required is provided by a fuel conditioning system at the temperature and volume flow rate required.

Test space volume: approx. 60 m<sup>3</sup>  
Test temperature: +27 °C



## VT SHED Chamber

VT SHED chambers for evaporative determination on motor vehicles in accordance with EPA, CARB and EU regulations. A main feature is volume compensation with tedlar bag or movable ceiling enabling temperature profiles to be performed with an hermetically sealed chamber without a differential pressure to ambient.

Test space volume: approx. 60 m<sup>3</sup>  
Temperature range: +15 ... +45 °C



# Special Testing Systems...

## Climate Test Chamber with Dynamometer

These chambers are used for emission testing in accordance with European and American regulations.

Test space volume: approx. 579 m<sup>3</sup>  
Temperature range: -20...+35 °C  
Climate range: +10...+35 °C  
Humidity range:  
5.5...12 gH<sub>2</sub>O/kg dry air



## Climate Test Chamber with 4-wheel-drive Dynamometer and Sunlight Simulation

These chambers are used for emission testing in accordance with European and American regulations.

Besides the sunlight simulation system for SFTP tests these chambers are additionally equipped with an air make-up unit, a wind speed fan and fuel tank heating by hot air blowing onto the tank surface.

Test space volume: approx. 502 m<sup>3</sup>  
Temperature range: -20...+50 °C  
Climate range: +10...+35 °C  
Humidity range:  
5.5...15.5 gH<sub>2</sub>O/kg dry air, max. 75% r.h.



# ...Special Testing Systems



## Altitude Simulation Chamber

The Altitude Simulation Chamber is used for measurement of performance, exhaust emission and fuel consumption of combustion engines at different altitudes.

Test space volume: approx. 138 m<sup>3</sup>  
Temperature range: -40 ... +50 °C  
Pressure range: 715 ... 1100 mbar  
Altitude range: up to 3000 m above sea level



## Fuel Conditioning System

Fuel conditioning systems are used to carry out ORVR refuelling in vehicles in compliance with legal regulations and to test vehicle tanks.

In addition to the supply tank the main components comprise various gasoline nozzles, active and passive gas vapour recovery, pre-pay function, etc.

Tank volume: up to 200 l  
Temperature range: +5 ... +45 °C  
Volume flow: up to 80 l/min.



## VT Mini SHED Chamber

VT Mini SHED Chambers are used for permeation tests in fuel tanks or for HC emission tests in vehicle components carrying fuel.

In addition to the explosion-proof test space, the equipment comprises a volume compensation device, an analyser, lighting, a window, a refuelling port as well as purging and safety equipment.

Test space volume: 2.6 m<sup>3</sup>  
Temperature range: +15 ... +80 °C  
Temperature constancy: ± 1 K



# Corrosion Testing

## Extreme Environmental Influences on Motor Vehicles...

Damp, cold, heat, de-icing salt, noxious gases and global radiation: Everywhere and in all seasons, motor vehicles are subject to environmental influences. The effectiveness of corrosion preventive measures is a quality feature which plays a decisive role in the automobile industry today when a vehicle is purchased.

The very combination of numerous environmental influences means that virtually all exposed vehicle components are subject to high amounts of pollution. On the other hand, the demands on durability and for longer periods of warranty are increasing. The continuous inspection and optimisation of protective measures is thus imperative for assuring quality and competitive advantages.

Weiss Umwelttechnik has an extensive range of systems and processes for implementing short-term weathering and corrosion tests, alternating climate and noxious gas tests in accordance with generally valid standards or customer-specific test specifications.

## Walk-in Salt Spray Test Chambers

Walk-in salt spray test chambers for performing corrosion tests as per e.g. DIN 50 021 and DIN 50 017. Also suitable for long-term tests.

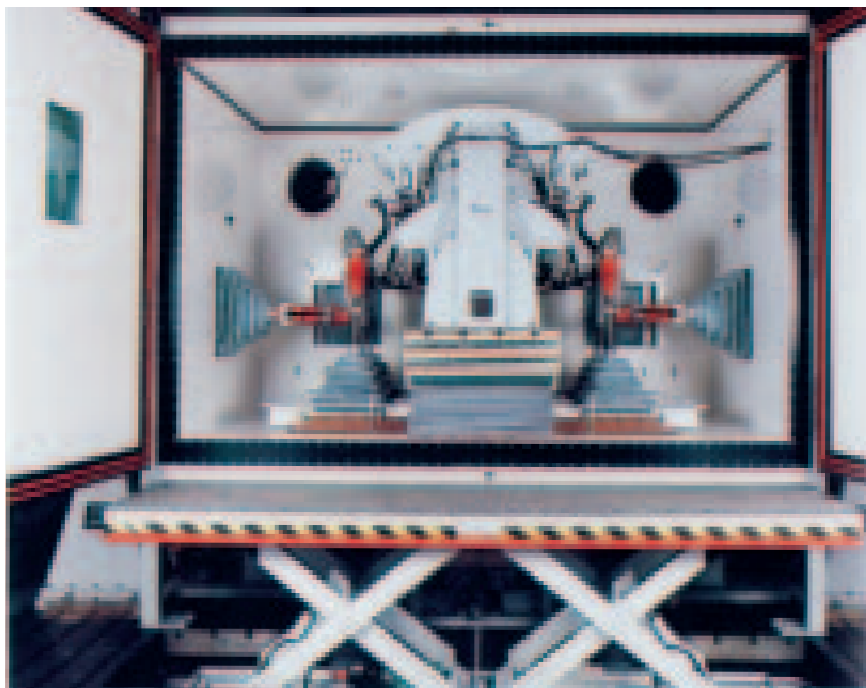
Test space volume: 7.5 m<sup>3</sup>  
Temperature range: AT... +50 °C  
Temperature constancy: ±2 K



## Combined Corrosion Testing System

For vibration, climate and corrosion testing of axles, half axles and parts of axles. The operating reliability test bench enables the combination of the test parameters – temperature, humidity, corrosion with NaCl, CaCl and MgCl solutions with simultaneous vibration in the x, y and z axes.

Temperature range: -40... +130 °C  
Climate range: +15... +90 °C  
Humidity range: 10... 80 % r.h.  
Amplitude of the vibration system:  
max. ±150 mm  
Test space volume: 13.6 m<sup>3</sup>





# ... Standard Testing Systems

## Salt Spray/ Alternating Climate Testing Chamber

For performing corrosion tests and testing the anti-corrosive resistance of motor vehicle lacquers under exposure to cyclically alternating conditions.

The salt spray chambers of the series SC/KWT are an outstanding example for profitability, wide application range and trendsetting environmental simulation technology.

They enable reproducible corrosion tests as per DIN, ISO, ASTM, DEF, MIL-STD and can be upgraded, if required, to an alternating climate testing system with individually programmable long-term cycles.

Well devised details such as the program editor for up to 100 testing programs, the fully automatic recording and display of the rainfall rate or the sturdy construction of absolutely corrosion-resistant polyethylene are evidence of the above-average standard of Weiss Umwelttechnik testing systems. An air conditioning unit – available as option – allows test cycles with controlled air humidity, automatically alternating cycles with salt mist and condensation.

## Global UV Testing System (Type BAM)

For the reproducible weathering test of polymer materials e.g. plastics, coatings or car lacquers in the entire natural temperature and humidity range.

The simultaneous effect of UV radiation, temperature, humidity, (acid) rain and their diurnal variations are decisive factors for the premature ageing of polymer materials. The global UV testing system, Type UV<sup>200</sup> was developed in cooperation with the Federal Agency for Materials Testing and enables real-life simulation of weathering effects in a working range of  $-20 \dots +80 \text{ }^\circ\text{C}$  and up to 95% relative humidity.

Radiation is in accordance with the relevant regulations in the wavelength range of 290 nm to 450 nm so that the reaction to sensitive materials can be tested.

The unit has a program memory for 100 programs plus an integrated monitoring system which provides information on operating faults and records the machine operating times and number of which actuations of individual components.

Appropriate interfaces and configuration modules are available for documenting and for integrating in host testing systems.



# Endurance Strength Testing

## Cold-Heat Climate Test Chamber with Road Simulator and Sunlight Simulation

For multiple component testing of complete vehicle bodies under realistic operational stress in combination with the environmental influences of temperature, humidity and solar radiation.

Test space volume: 480 m<sup>3</sup>  
Temperature range: -40...+90 °C  
Climate range: +10...+80 °C  
Dewpoint temperature range: +5...+59 °C\*

\*limited by sunlight simulation



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## Endurance Strength Test Stand

The Endurance Strength Test is performed by fixing specimens onto a 2 x 2 m test bench in the temperature test chamber. This is dynamically stressed under temperature influences via hydraulic servo actuators. Conditioned air is supplied into the test chamber through ducts from a remote conditioning system.

Test space: 15 m<sup>3</sup>  
Temperature range: -40...+150 °C



# ...Special Testing Systems



## Cold-Heat Climate Test Chamber with Multiaxis Vibration Table

For temperature and climate conditioning of specimens fixed on a multiaxis vibration table which provides translative and rotary motion in three axes.

To compensate for the table motion and the associated volumetric change of the test space and also to isolate the vibration from the conditioning system special flexible insulating walls are used.

Test space volume: 14 m<sup>3</sup>

Temperature range: -30...+90 °C

Climate range: +20...+60 °C\*

Dewpoint temperature range:  
+10...+55 °C\*



## Cold-Heat Climate Test Chamber with a 4 Poster System and Sunlight Simulation

These chambers are used for combined tests with road conditions and environmental influences such as temperature, humidity and sunlight (Squeak and Rattle Tests).

Test space volume: 304 m<sup>3</sup>

Temperature range: -40...+80 °C

Climate range: +5...+80 °C\*

Humidity range: 20...80 % r.h.

\*limited by sunlight simulation



# Electronics Testing

## Testing Electrical and Electronic Components

Today electronics dominate almost all sectors of automobile manufacture: Safety equipment, comfort features, motor function – from exhaust control to ignition, everything is electronically controlled.

Whether ABS, ESP or antiskid device, mobile radio telephone, board computer, air conditioning system or doorlock control: sensors, microcomputers and other electronic components ensure safety, reduce environmental pollution and increase driving comfort.

The automobile as a high-tech device equipped with components from the electronics industry, some of which are highly sensitive can only function as reliably as its electrical and electronic components.

Not only dust, spray and splash water but also extreme temperature fluctuations have a lasting effect on the operational reliability and service life of these components.

The wide product range of Weiss Umwelttechnik with its standard or tailor-made testing systems contains all relevant parameters and their real-to-life combination of same:

From a system for IP protection testing to a drive-in cold chamber for performing cold start test.



# ... Standard Testing Systems

## Temperature Shock Test Chamber TS 130

For producing thermal stresses on electronic components, units and systems for environmental stress screening and performance tests according to national and international standards.

The turn-key temperature shock test chamber TS 130 offers high performance temperature changing (sufficient for 10 kg integrated circuits as specified in MIL-STD) at a working range of  $-80\text{ }^{\circ}\text{C} \dots +220\text{ }^{\circ}\text{C}$ . At a transfer time of approx. 10 sec., test specimens of 20 kg (optional 50 kg) can be subject to temperature change in time-optimised operation.

The TS 130 can be operated either as a self-sufficient simulation device or integrated in automated testing and production systems.

## Temperature and Climate Test Chambers Series WT/WK

For temperature tests of  $-70\text{ }^{\circ}\text{C} \dots +180\text{ }^{\circ}\text{C}$  and climate tests of  $+10\text{ }^{\circ}\text{C} \dots +95\text{ }^{\circ}\text{C}$  and a relative humidity of 10...98% in accordance with relevant testing standards, e.g. DIN, ISO, MIL, IEC, DEF, EN or ASTM.

The test chambers of the WT/WK series with graphics-compatible touch panel and 32 bit processor have undergone completely new development as regards comfortable handling and reliable functioning even under extreme conditions. Outstanding features are the powerful, even temperature conditioning, input via touch panel or notebook, service-friendly modular construction, documentation and evaluation per graphics plus the compatibility with all Weiss software products.

Standard test space volumes from 190 l to 1540 l with and without panorama window are available.



# Special Testing Systems ...

## Spray and Splash Water Testing Equipment SWT

For performing reproducible tests for testing of the protection of housings/enclosures against ingress of water during development and quality control. The spray and splash water test equipment is manufactured as a turn-key version for protection system tests (IP code). In conjunction with a timer, the test cycle can be automated with a settable test time of 3 sec. to 30 h. Thanks to the integrated circulation equipment, water consumption can be reduced to a minimum.



## Dust Testing Equipment and Systems

For protection code testing (IP-code) in a dust-laden atmosphere according to IEC and DIN regulations.

The systems can be equipped with an underpressure device so that the dust not only settles on the entire specimen but can also ingress into the specimen.

Test space volume: 1 m<sup>3</sup>





# ...Special Testing Systems



## Cold-Heat Test Tunnel

Cold-Heat Test Tunnels are used for production-integrated testing of components for e.g. automotive electronics (such as airbag systems, engine management systems and transmission control).

Test Tunnels for temperature tests are equipped with a conveyor belt and test heads.

Main components are:

cold zone:

temperature range down to  $-45\text{ }^{\circ}\text{C}$

hot zone:

temperature range  $+95\text{ }^{\circ}\text{C}$  ...  $+145\text{ }^{\circ}\text{C}$

cooling zone

loading, transport

and unloading system

test heads



## Cold-Heat Test Chamber

With rotating device and contacting system for fully automatic temperature testing and performance testing of electronic control units.

Test space volume: 1000 l

Working range:  $-40\text{ }^{\circ}\text{C}$  ...  $+150\text{ }^{\circ}\text{C}$

Temperature constancy:  $\pm 1\text{ K}$

# Combined Testing Processes

## There's no such thing as "it can't be done"...

... is the motto of Weiss.

Test specifications which distinguish the brand quality by defining their own standards repeatedly present a challenge to the engineers at Weiss Umwelttechnik.

Combined environmental testing processes on parts and complete systems come closest to real-life field tests. Whether mechanical vibration loads, thermal or chemical stress factors, during manufacture, for quality monitoring or when driving: mechanical components in such highly sensitive safety systems as the airbag demand a high degree of care when undergoing a performance test.

Especially for testing systems for the automotive industry.



# ... Standard Testing Systems

## Quick Temperature Change by means of Stress Screening Systems

Environmental stress screening systems series WT/WK can improve the reliability of technical products. Fault sources are detected and can be eliminated at the earliest stage of development.

Test space volume: 180 ... 1300 l  
Temperature range:  $-70 \dots +180 \text{ }^\circ\text{C}$   
Climate range:  $+10 \dots +95 \text{ }^\circ\text{C}$   
Humidity range: 10 ... 98% r.h.  
Temperature change rates:  
5/10/15  $^\circ\text{C}/\text{min}$ .

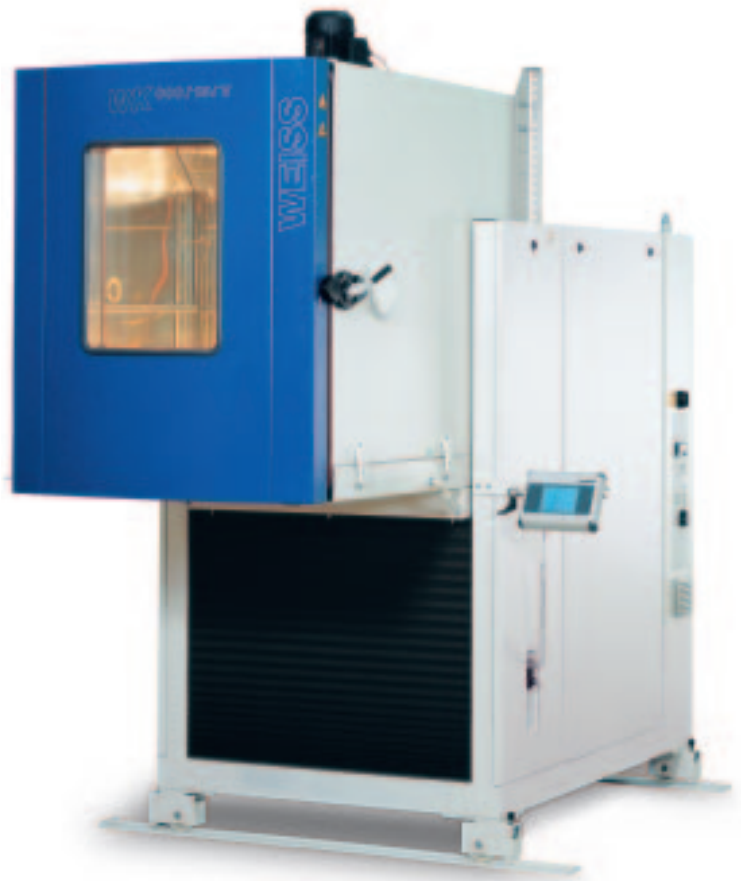
## Cold-Heat and Climate Test Chambers with Vibration System WT/V and WK/V

These chambers are used for testing of e.g. components used in the engine compartment of a vehicle under the influence of a combination of various parameters such as vibration, temperature or temperature changes and humidity.

With the blank floor element (no vibrator port) these chambers can be used as temperature and climate test chambers and also as stress screening systems.

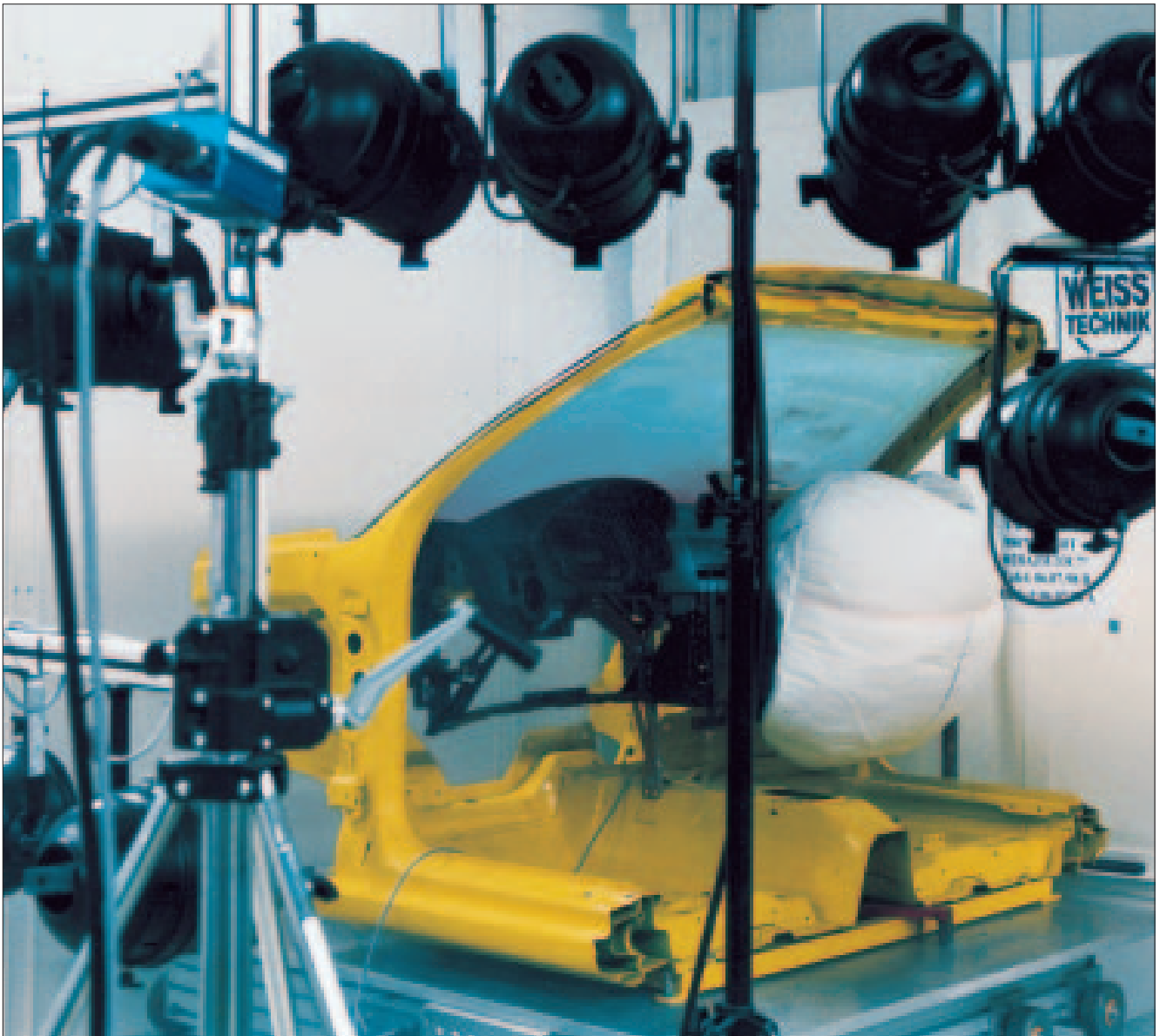
Temperature range:  $-40 \dots +180 \text{ }^\circ\text{C}$   
Climate range:  $+10 \dots +95 \text{ }^\circ\text{C}$   
Humidity range: 10 ... 95% r.h. <sup>(1)</sup>

<sup>(1)</sup> with the blank floor element  
(no vibrator port)





# Special Testing Systems ...



## **Airbag Testing System for Research and Quality Assurance**

The system comprises the temperature conditioning chamber, a sliding test frame with runners, automatically closing gate and switch cabinet with control system. The testing system is for testing the performance of airbags at extreme temperatures.

Test space volume: 25 m<sup>3</sup>  
Temperature range: - 40 ... +120 °C  
Temperature constancy: ± 1 K

# ...Special Testing Systems



## Ozone Climate Test Chamber

For testing organic materials and rubber elasticised materials.

Ozone causes such materials to become prematurely brittle, hair cracks appear on the surface. The components age prematurely and/or are destroyed.

Temperature range: 10 ... + 40 °C

Humidity range: ... 65 % r.h.

Ozone concentration:

According to standards DIN, JIS, ISO, ASTM



## Climate Test Chamber with Noxious Gas Equipment Type BSB

For the systematic testing of the corrosive effect of noxious gases in the atmosphere. The test chamber is equipped with a climate test space and a removable interior chamber for noxious gas testing (air/jacket temperature conditioning). The users have a climate test chamber of high value at their disposal which can also be used for performing tests without noxious gas.

Temperature range: + 15 ... + 80 °C

Humidity range: 40 ... 75 % r.h.

Exposure to noxious gas with:

SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>2</sub>, Cl<sub>2</sub>, O<sub>3</sub>



## Cooling Cycle Test Stand

For testing and measuring the performance of complete vehicle air conditioning systems (CO<sub>2</sub> and R134a). Due to the transcritical working conditions, the CO<sub>2</sub> is cooled in a coaxial heat exchanger. It is also possible to measure the torque at the compressor and the refrigerant mass flow.

Test space volume: 2 x 500 l

Temperature range in the compressor test space: AT ... + 150 °C

Temperature range in the evaporator test space: AT ... + 50 °C

Temperature constancy: ± 1 K

# Test Technology for Professionals. Test the Best...



A complete line of standard systems is available offering test space volumes ranging from approx. 60 l to 1,500 l, a working range from  $-75 \dots +180$  °C and relative humidity values ranging from 10 ... 98 % r.h.

We also offer an extensive line of field-proven test systems specially for simulating exposure to weather, temperature shock, corrosion and long-time tests for application in research, development, quality control and production.

Of course, Weiss – as one of the leading producers of environmental simulation systems world-wide – offers the entire spectrum of high-tech test systems starting from a series of cost-effective test systems up to customised walk-in chambers and in-line systems.

If it's know-how, service and reliability that you are looking for – contact Weiss Umwelttechnik.