



Successful Take-Off. Safe Touch-Down.

Test it. Heat it. Cool it.



www.weiss-technik.info

From the ground to the clouds and into space

Get airborne with weissttechnik.

Whether satellites, aeroplanes or helicopters: modern aircraft are exposed to extreme stress during use. When it comes to the development, quality assurance and production of proven and new technologies, with us, you're playing it safe.

According to estimates, the commercial aircraft market will double in size over the next 10 to 15 years. Satellite-controlled communication is literally already "universal". Fleet renewal and expansion remain an important topic in the military sector.

The key developments are still the same:

- Light and efficient jet engines, which lower kerosene demands or permit greater loads and thus make flying more economical.
- Constantly increasing use of electronics and communications systems, which must function smoothly and independently under all conditions.
- An increasing number of individual parts, which must meet stringent requirements both individually and within the system, with concurrent increases of industrialised production methods that make it necessary to standardise and coordinate processes.

It must be ensured that both proven and new materials meet all norms and legal regulations. This applies to used materials and components themselves as well as to the overall system.



Weiss Technik is one of the most innovative and important developers and producers of systems for environmental simulation, heating, and climate control technology. We have developed solutions specially designed for aerospace technology that meet the most stringent requirements. They are used by renowned aerospace companies around the world.

Test it. Environmental Simulation.

As one of the pioneers in the area of testing technology and environmental simulation, we offer testing solutions tailored to your industry that simulate extreme altitudes, radical temperature fluctuations and intense pressure loads. They can be combined with our standard selection of weathering and corrosion tests, simulated under all climate conditions around the world and in the atmosphere.

Heat it. Industrial Heating Technology.

Our subsidiary Vötsch Industrietechnik complements our product range in the area of heat treatment systems and technology. We develop, plan and produce reliable heating systems of the highest quality. This helps us realise tailor-made solutions for you, e.g. for curing and shaping composite materials - a future-oriented approach in the field of aerospace engineering.

Cool it. Climate Control Technology.

Complex production processes and operating conditions require the best possible climatic conditions. In addition to clean rooms i.e. containment systems for the protection of humans, products and the environment, we also offer stationary and mobile air conditioning for optimal temperature control of IT equipment, radar systems and operating units. As one of the leading providers of climate control technology, our expertise will guide you from the planning to the implementation of your projects.

Ready for Take-Off.

weisstechnik - and your product is all set.

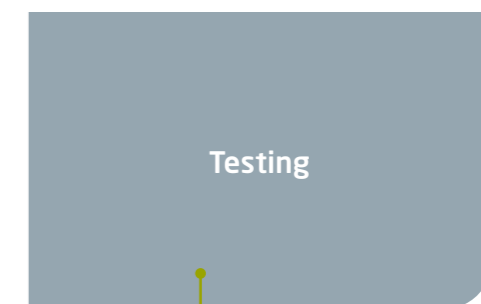
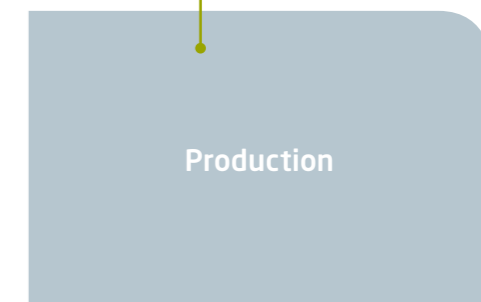
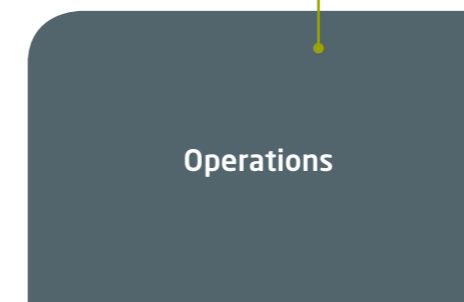
We love extremes, reproducible results, energy-efficient processes and excellent service, which is why we offer you exactly that.

Climate Control Technology/Specials

for the operation of systems - mobile and stationary. From satellite ground stations to mobile infrastructure for UN and German Army deployments.

Industrial Heating Technology

for example, for the production of light-weight components from composite materials, with hot air, microwaves or infra-red.



Climate Control Technology

for your production stations - from clean-room class 1 to 8 - as well as server room cooling, to ensure computer performance, even when things heat up.

Environmental Simulation

for quality assurance. In order that proper interaction between components in an integral system as well as for optimisation of processes and new components during development will function.



Your processes like it hot.

Customised, innovative heating technology for your production.

The field of heating technology, a key competence of our subsidiary Vötsch Industrietechnik, offers a wide range of production systems, including systems for composite materials and the heat treatment of metal components.

In projects with blue chip customers such as Airbus Helicopters, DLR and GKN Aerospace, our experience in building special systems was the decisive factor. Our focus:

- Short process times through high heating and cooling rates
- Ensuring high-quality products through homogeneous temperature distribution in the oven
- Reproducibility by use of components with consistently high quality
- 100% traceability via networked control
- Systems that are optimally adjusted to the production processes through the development of customer-specific solutions

Helicopter cockpits, carrier rocket fuselages and the doors of the A350 XWB are just a few of the products moulded in our ovens.

AMS 2750 Nadcap-conform aerospace system

As specialists for heating technology for the aerospace industry, our industrial ovens are of course AMS 2750 certified, making it possible for us to offer you a suitable solution for every oven class and instrumentation level. The FAT and the required recalibrations are included in our services.

Your perfect microwave.

Fast and energy-efficient production processes with vötschtechnik Hephaistos.

Micro this big.

The use of microwaves allows you to achieve fast and energy-efficient production processes. They are perfect for curing carbon fibre composite materials. Examples in the aerospace field are stringer, leading edge and hinged fairing. In the energy sector, there are to be mentioned the winding components for energy storage or pipes. In addition, curing with microwaves is cheaper, about 50% faster and up to 70% more energy-efficient than autoclave processes.

The new microwave system VHM Hephaistos by vötschtechnik is an internationally patented system. It stands out due to its hexagonal geometry with a very homogeneous field and thus temperature distribution in the component. The microwave technology is currently going through the qualification programme with a leading manufacturer of aircraft components.

With its wide spectrum of options and modification possibilities, even our basic series can meet the stringent requirements of the aerospace industry - with individual adjustment to your processes.

- During the targeted volumetric heating of the products, the microwaves directly enter the material, so that energy is delivered directly and the chamber does not require heating. This increases heating rate and throughput, saving energy and time in addition.
- The modular structure permits easy adjustment to your product - adapting your chamber to be one metre bigger is no problem.
- Metal parts, such as conventional tools and feeding systems, can be used in the microwave field with very few problems. This makes it possible to use existing toolings.
- Microwave systems for continuous processes allow automated production.

Microwave system Hephaistos VHM 180/200*

- Testing room size: 4200 l
- Microwave power: 20 kW

*Selected system - further information on other versions upon request, feel free to ask.



Your professional heaters.

Suitable solutions for curing, heat treatment and tempering of your products.



Tempering and Curing Oven

We use convection chambers for reliable curing and heat treatment of composite sand large-format carbon fibre-composite materials or PEEK. During this process, air recirculation ensures an optimal temperature distribution and guarantees high quality and safety.

Tempering and Curing Oven VTU 500/450/850-230 °C*

- Nominal temperature: +230 °C
- Heat output: 390 kW



Continuous Oven

Using conveyors and the combination of different heating systems, such as air recirculation and infra-red, allows for the best possible automation and optimisation of your processes.

Continuous Oven VDU 200/80/300*

- Nominal temperature: +200 °C
- 2 heating zones: combined convection and infra-red heating



High-Temperature Oven

Our VAW ovens for tempering, relaxing and annealing metal parts are also used by service and maintenance. They can achieve temperatures of up to 750 °C and are thus great for stress relief annealing of welds and for tempering brake disks.

High-Temperature Oven VAW 150/210/300*

- Temperature range: up to +500 °C
- Heat output: 80 kW

The right solution for all applications

- Vacuum dryer for simulation of aerospace conditions under temperature and for drying complex components
- Heating and drying cabinets for clean rooms
- Infra-red systems, e.g. for curing composite
- Explosion-proof ovens, e.g. for drying explosives

CFRP composite components from vötschtechnik tempering ovens.

With this material, you're sure to lift up.

Safe, stable, light, and robust - materials used in the aerospace industry are subject to extremely stringent requirements. Rightly so, as this is done to ensure the safety of people. Tempering ovens by vötschtechnik help to make components from composite materials more reliable and safer - as for the Airbus A350 XWB.

Due to their positive characteristics, carbon fibre reinforced plastics (CFRP) are among the most important materials in aerospace engineering. Composites, i.e. composite materials are produced with the help of special tempering ovens in which carbon fibres are melted together with a matrix and cured. "The plastic is more or less the filler and the fibres form the matrix. Without this bond with the plastic resin, the carbon fibres would not retain any particular shape," explains Reiner Wiesehöfer, Director of the Heating Technology division at Vötsch. Due to the very low density and high stiffness, the material is ideal for the construction of many aircraft components. Compared to other materials,

such as steel, CFRP is extremely light and significantly stronger. The composite material is used on components such as wing shells, fuselage segments, vertical stabilisers and landing flaps.

Airbus places its trust in the know-how of Weiss Technik

Vötsch engineers are building an innovative, specialised oven for Airbus Helicopters, which is used for the construction of the aircraft doors of the wide-body aircraft A350 XWB. CFRP constitutes more than 50% of the



material of this machine. In this manner, the airlines set to use the wide-body aircraft in the future will save fuel and help preserve the environment. This also makes it possible to transport more people and heavier loads.

Manufacturing process in three phases

The three phases of the production process for the vötschtechnik continuous oven are evenly spaced. An airplane door consists of about 80 to 100 components. The first phase begins when Airbus Helicopters' production employees drape the components as a dry base layer on a table with a system slab.

Phase 1: The components are first covered with a special rubber membrane, placed in a vacuum and compacted with the binding material at an exactly prescribed temperature. This creates the blank moulds of the component. Then the plastic resin is filled, without creating air bubbles, which would make the resulting product unusable.

Phase 2: After loading the right programme for the control of vacuum and temperature, the lifting gate of the continuous oven opens and the batch moves inside. In the oven, the batch is exposed to temperatures between 140 to 180 degrees Celsius for a period of about 30 minutes. The homogeneity of the oven temperature is especially important for the later product quality. "This makes the construction of ovens of this size especially challenging" according to Reiner Wiesehöfer. "Despite the large dimensions of the systems it is important to achieve as exact of a temperature distribution as possible so that the parts cure evenly. Only this way can you produce components of a usable quality with the desired

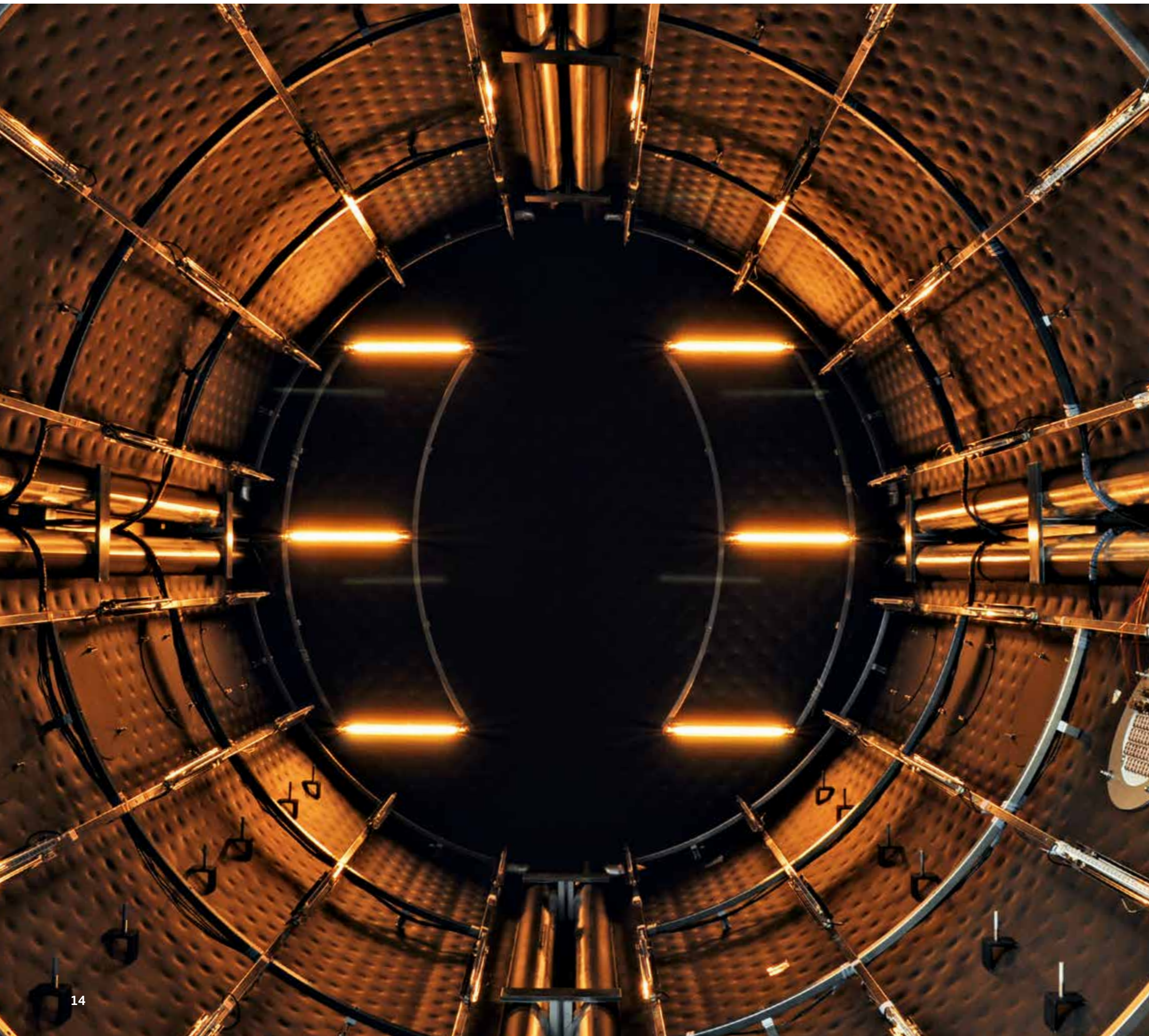
characteristics." The vacuum further ensures that the shape continues to be stable even at high temperatures. The oven heats both with air recirculation and the help of infra-red lamps.

Phase 3: After this, the lifting gate opens at the exit and the palettes are transported to the cooling area. Depending on the batch, the cooling takes place with air of 4 to 8 degrees Celsius. In order to ensure an even step frequency in the circulation of the system, the cooling time always remains the same. The composite material must be cooled specifically in a way that prevents damaging internal stress. "For large components, we achieve equal cooling times by means of correspondingly low temperatures," explains Erwin Ninic, Project Manager for Airbus Helicopters. "For smaller components, the temperature is correspondingly higher." After the cooling, the lifting slab lowers again and the system slab is moved back under the system. The cycle in the loading station begins again.

Professional and cost-effective

Other important factors in the construction of the special ovens are user-friendliness and safe operation. For instance, the redesigned photoelectric gate turns on and off automatically, so that production can proceed without confirmation and thus without interruptions. Vötsch engineers have also optimised the accessibility of the machine parts. This significantly facilitates regular maintenance and reduces the required downtime to a minimum. In this manner, the vötschtechnik system makes it possible to optimise/accelerate production and at the same time allows for economic and cost-effective operation.





Simulate the future Now.

Know today what would happen if your product took off tomorrow.

Whether satellites, airplanes or helicopters: these systems are exposed to extreme conditions when in use. But even in cases of strong vibrations, extreme temperature fluctuations or vacuum conditions in outer space, all components must work reliably and safely.

weistechnik test chambers make it possible to simulate extreme flight programmes for testing highly stressed components, reproducible in carefully-controlled environments, and conforming to international norms such as DO160 or MIL-STD-810. This does not only ensure safety but also saves costs.

Our test chambers have been used successfully in the fields of research, development, production and quality management for many years.

Our standard series of test chambers easily meet your specific wishes with a multitude of options. In addition, our expert teams develop special chambers upon request that are perfectly tuned to your technical requirements.

Your test drive to space.

**Test in outer space conditions -
with your feet on solid ground.**

Thermal Vacuum Chamber

Testing space flight equipment before the first flight into space is a prerequisite to be able to predict the behaviour of these valuable components, and is done by simulating space conditions. **weisstechnik** Thermal Vacuum Chambers accurately reproduce outer space conditions and thus allow testing in a completely controlled environment. Our high-performance pump systems can achieve a vacuum of down to 10^{-7} mbar. Liquid nitrogen circulating in a Thermal Vacuum Chamber create low temperatures comparable to outer space of $-185\text{ }^{\circ}\text{C}$ to $+165\text{ }^{\circ}\text{C}$. Specific features such as infra-red radiation or aspatial temperature gradient can be simulated to meet our customer requirements.

Vacuum Chamber Space Simulator*

- Testing room size: 20 m^3
- Temperature range: from $-135\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$
- Pressure range: down to 10^{-7} mbar
- Infra-red radiation: 2500 W/m^2



*Selected system - further information on other versions upon request, feel free to ask.

Your border crossers.

Test to the limit - only if the individual parts pass can the system fly.



Altitude Chamber

During flight, airplanes are exposed to extreme pressure and climate conditions. Such parameters greatly impact the function of individual components and must be inspected and measured for safety reasons. **weisstechnik** test chambers facilitate the testing of aerospace components in an environment that allows control of the parameters pressure, temperature and/or humidity. It is possible to simulate heights of 100,000 feet. Upon request, combined icing tests cat B can also be performed according to the norms RTCA DO-160 and MIL-STD-810.

Altitude Chamber temperature, climate, vacuum*

- Testing room size: 1 m³
- Temperature range: from -70 °C to +180 °C
- Humidity range: from 10 % to 98 % RH
- Pressure range: 1 mbar



Testing Systems for highly accelerated aging and stress tests

Subject your products to the endurance test and ensure the reliability of electronic or mechanically-moving components such as hydraulic locks. The HALT stress test (Highly Accelerated Life Test) examines step-wise and spasmodic thermal stress, also in combination with vibration. Thereby the usage limits of a product during the prototype phase are determined and weaknesses in design and components are revealed. The succeeding HASS test (Highly Accelerated Stress Screening) is performed after production and aims to reveal defects early on that could cause hidden or latent failures.

Testing System HALT/HASS, Star Galaxy™ 44*

- Testing room size: 2330 l
- Temperature range: from -100 °C to +200 °C
- Integrated: three-axis pneumatic vibrating table with 3 degrees of fineness
- Liquid nitrogen cooling (LN₂) for quick re-tempering and maximal product stress



Kerosene Climatic Test Bench

The environmental conditions met by aircrafts during flight modify the properties of the kerosene thus inducing potential malfunctions that have to be detected during test phase. **Weiss Technik** provides solutions to test your critical pieces of equipment with preheated or cooled kerosene, and the possibility to simulate water pollution and icing conditions. Combined with a climate/altitude chamber, it is then possible to simulate real operating conditions.

Kerosene Climatic Test Bench*

- Capacity: 100 l
- Temperature: -53 °C to +85 °C
- Safety: nitrogen inerting system



Low Temperature Chamber

Thermal stress induced by extreme space temperatures is so important that temperature tests of aerospace equipment are often performed even before the vacuum test. Our liquid nitrogen cooling system allows a very precise temperature adjustment over a large range, from -185 °C to +200 °C. **weisstechnik** Low Temperature Chambers achieve rapid temperature changes and great homogeneity, in small volumes as well as in large walk-in chambers.

Low Temperature Chamber*

- Testing room size: 31 m³
- Temperature range: from -185 °C to +200 °C

Your stress makers.

Details are essential to help ease your mind.

Temperature-Shock Testing Cabinet

During flight, aircraft equipment often passes through several temperature zones in a brief period of time. Rapid temperature changes can impact the function and safety of individual components. **weisstechnik** Testing Cabinets allow for temperature changes of up to 30 K/min.

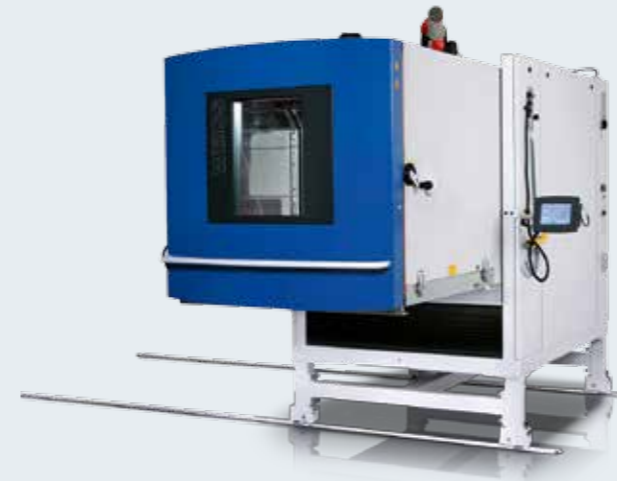
Temperature-Shock Testing Cabinet TS 120*

- Lifting cage volume: 120 l
- Temperature range: heat chamber from +50 °C to +220 °C, cooling chamber from -80 °C to +70 °C



Vibration Testing Cabinet

Airplane engines, rotor blades and space craft experience intense vibrations during take-off and landing. At the same time, these components experience rapid temperature changes in different types of climate. The **weisstechnik** series WT3-V and WK3-V permit the simulation of such dynamic processes in order to plumb the stress limits and thus allow for safe flight operation.



Vibration Testing Cabinet WK3-2200/70/15/V*

- Testing room size: from 600 l to 2200 l
- Temperature range: from -70 °C to +180 °C
- Humidity range: from 10 % to 95 % RH
- Mobility (pursuant to figure): optional

Stress Screening System

High product reliability is a basic requirement for today's competitive market and very often is the only difference between different manufacturers. During the ESS test, the products are subjected to precisely-prescribed stress in order to recognise defects in components and circuit boards timely in the production plant. Unreliable systems are scrapped before reaching the customer.

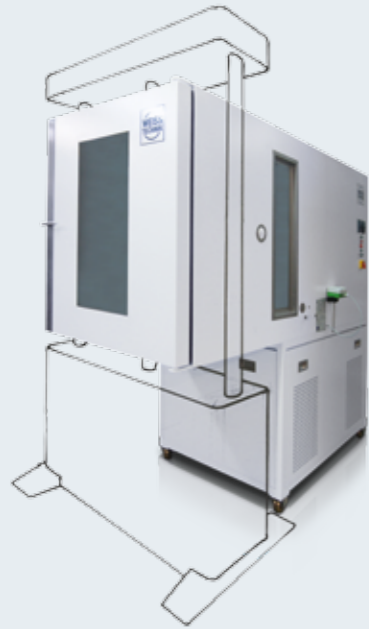


Stress Screening System WKS 3-480/70/15*

- Testing room size: 480 l
- Temperature range: from -70 °C to +180 °C
- Change speed: 15 K/min.

Your bugs.

Put your products through hell until you feel safe.



Tension Test Chamber

Environmental conditions during production, storage, transportation and use impact the functionality and life span of a product. Tension tests must be performed under prescribed climate conditions in order to ensure the quality of materials during use under harsh airspace conditions. With our tensile test climate chambers, you can determine behaviour under real environmental conditions and thus ensure the usability of new materials under harsh airspace conditions.

Tension Test Chamber ETE (temperature)/EKE (climate)*

- Testing room size: from 30 l to 1000 l
- Temperature range: from -30 °C (-60 °C) to +180 °C
- Humidity: from 10% to 90% RH



Lithium-Ion Testing Cabinet

Energy storage units are important components in aerospace, which also must stand up to extreme conditions. With the **weisstechnik** Testing Cabinets, you can perform temperature, climate, vibration and temperature shock tests, which can be supplemented by additional safety components corresponding to EUCAR hazard levels 0-6.

Lithium-Ion Testing Cabinet*

- Testing room size: various sizes upon request
- Comprehensive safety equipment: CO₂ cooling and neutralisation, H₂ concentration measurement, CO and CO₂ concentration measurement, safety temperature limiter, electro-mechanical door clamps



Corrosive Gas Testing Cabinet

The effects of corrosive gases can corrode materials. In order to detect possible susceptibility, we expose aerospace components to precisely dosed gas volumes in a climatized air environment. Relevant for testing are H₂S, SO₂, Cl₂ with carrier gas and N₂, NO₂ with carrier gas synthetic air and other gases upon request.

Corrosive Gas Testing Cabinet*

- Testing room sizes: 340 l, 600 l, 1000 l
- Corrosive gas storage container (included): 120 l, 270 l, 380 l



Sun Simulation Chamber

Surfaces and materials can react to long-term sun light irradiation. Our test chambers for global and UV radiation let you test your products for any quality deficiencies with reference to sun radiation. In addition, it is possible to pretreat products with UV radiation before testing in a temperature or climate chamber.

Sun Simulation Chamber SUN 600*

- Testing room sizes: 340 l, 600 l, 1000 l, 3400 l
- Temperature range: from -20 °C to +100 °C (with radiation)
- Humidity range: from 10% to 80% RH (with radiation)

Fit for space with our Vacuum Chambers.

Test whether your components can withstand outer space.

Components for satellites must withstand the pressure and temperature conditions in outer space for years. In order to test whether the materials can withstand these extreme conditions, the French manufacturer of electronic components Radiall places its trust in vacuum chambers by Weiss Technik France.

Before a component may be used for a satellite, it must undergo intensive testing. It is of vital importance that all components remain stable in a vacuum and do not ignite spontaneously due to overheating. The pressure in space is up to 10^{-6} millibars. This corresponds to a billionth of earth's atmosphere. The pressure conditions inside a satellite are the same as outside.

Many materials change phase in underpressure conditions and become unstable. In the worst case the components could self-destruct. "The vacuum chamber TVC Space Simulator 240 L was tailored especially to the strict

specifications of Radiall and customised to the needs of the customer," explains Hervé Salmon, Sales Manager for the Special Products department at Weiss Technik France. "We can build devices in horizontal and vertical orientation. It can create a vacuum of 10^{-5} to 10^{-7} millibars and simulate extreme temperature conditions." Satellites usually stay in space between two and ten years. Since it is not possible to do maintenance work during this time, all components must be fully reliable. The company Radiall mainly builds electronic components for satellites, which must meet the strict requirements of the European Space Agency (ESA).

Solar radiation, UV and cosmic rays age materials at a record pace. The side of satellites, which is exposed to the sun, heat up to $+200\text{ }^{\circ}\text{C}$. On the shadow side the temperature can drop down to $-200\text{ }^{\circ}\text{C}$. The temperatures are compensated by the rotation of the satellite, as the individual sides are exposed to the sun only for brief periods due to the rotation.

The electronic devices on a satellite also generate heat. In order to ensure that electronic components in space do not heat up to the point that they ignite spontaneously, their behaviour is also tested under extreme temperatures in the vacuum chamber. For the tests, the components are first affixed to a heatable metal plate that acts as heat exchanger. After the doors are closed, the pressure set by the testers is generated and the tests begin.

Since the simulation takes place in a vacuum, there is no temperature transfer through air. The test object is heated and cooled through the heat exchanger. In addition, liquids such as silicon oils or liquid nitrogen are used for temperature testing, and are fed into the heat exchanger through a specially constructed circulatory system. The temperature impact of the sun can also be simulated with the help of infra-red lights.



Coolness is regulated through the heat exchanger and the wall plates on the inside of the chamber. The temperature is measured and regulated through sensitive sensors in the vacuum chamber, on the heat exchanger, and on the test object itself. In this way, the vacuum chamber can simulate all temperature and pressure conditions that can exist in space.

Since 2011, the company Radiall has been testing the reliability of all electronic components designated for use in space in a vacuum chamber designed by Weiss Technik France. Another chamber has already been ordered.





Individually planned. Competently implemented.

An optimally comfortable climate for your applications.

Weiss Climate Control Technology - your expert for climate control for 50 years.

For demanding development, production and testing processes, conditions such as cleanliness, temperature, humidity, pressure and their permitted fluctuation tolerances are vital.

The use of process climate control technology makes it possible to set the required tight limits and regulate them precisely through space and time.

In addition, humans, the environment or the product itself must be protected against impurities during various processes. These core areas require a clearly more complex control than other production steps.

Different applications - different solutions

With a wide product portfolio, Weiss Climate Control Technology offers systems for every application - from complete clean rooms, measurement spaces, process climate systems and individual work benches to special climate-control units for data centres. Especially here, customised solutions are our strength.

Universal, reliable, compact and comprehensive

From precision climate control to mini-environments, our components and systems prove their worth through compact design combined with innovative technology. We will care for all your needs right from the start - from planning to inspection measurements to employee training. The constant availability of our systems and facilities is ensured by our service network.

Your perfect quality assurance.

Controlled process environment for your clean production and precision products.

Clean-Room Climate System and devices

With our product range ultraclean®, we offer our customers integrated systems for all clean-room classes and application areas. They are, depending on requirements, equipped with partial or complete climate control function - i.e. cooling and heating, humidification and dehumidification. With our system solutions we ensure compliance with national and international clean-room standards, e.g. VDI 2081 or DIN EN ISO 14644.

Our sphere of competence reaches from simple housing of machines over laminar flow-systems up to complex clean-room facilities. We plan and build together with you and according to your wishes and needs.

Clean-Room Climate System and devices*

Mini-environment ultraclean® with high-precision climate system for inspection tool microelectronic

- Temperature stability: ± 0.05 K
- Humidity stability: $\pm 1\%$ RH
- Clean-room class 2 according to DIN EN ISO 14644



Measurement Unit

Measurement units are key quality assurance components in production. Important: the greater the measurement accuracy, the smaller the reject rate. This plays a big role especially for tight production tolerances of sensitive components such as aircraft engines.

Environmental conditions, in particular temperature significantly influence measurement errors. Weiss Climate Control Technology plans and realises customised measurement units pursuant to the requirements of VDI/VDE 2627. These reduce the rate of measurement error by suppressing temperature impact, for instance by preventing drafts or direct light, by encasing the measurement device and by installing thermal insulation in the measurement unit.



Measurement Unit*

- Area: 112 m²
- Clear room height: 3.50 m
- Ventilation: TMS (turbulent mixed flow) through swirl diffusers

Your protection for man and environment.

Efficient solutions for your secure work areas with air curtain technology.



Grinding Station

Especially when processing composite materials, precision, as well as the safety of people and buildings, has top priority. When sanding parts made of fibreglass reinforced plastics (GRP), such as rotor blades, it is essential to suction off arising dust. WIBOject® free work stations with additional point suction protect employees' airways and thus prevent sick time and work-related illnesses. Equipped with Zone 21 EX-protection, the work environment is safe from the risk of explosion.

Grinding Station WIBOject® FCRJE 500/200*

- Exhaust air filtering and explosion protection pursuant to ATEX guideline Zone 21



Clean-Room Work Station

Clean conditions for specific area: our WIBObarrier® systems with patented ventilation. The targeted air circulation with its high efficiency requires only small air volumes and ensures conformity up to clean-room class 5 pursuant to DIN EN ISO 14644-1. The jets ensure a long range of the aircurtain without creating a draft. Together with the ergonomic design, this ensures a clean, safe and pleasant working atmosphere.

Clean-Room Work Station WIBObarrier® BGKVO 200/157*

- Clean-room class 5 pursuant to DIN EN ISO 14644-1

Your flexibility for higher efficiency.

Intelligent climate control for your data centre.

IT Climate Control

An absolute innovation in the area of IT climate control: CoolW@II® turns the entire technology room into a refrigerator and makes it possible to achieve extremely high cooling performance with low energy consumption. The technology is built into the walls, which saves space in the server room. Say goodbye to climate control cabinets!

IT Climate Control CoolW@II® 300.4 CW*

- Air volume: 30,000 m³/h
- Cooling output: 150 kW at 10/15 °C water and 30 °C recirculation

The most important benefits of Coolw@II® at a glance:

- Most energy-efficient water-cooled climate control system for data centres
- Highly useful cooling output with a small installation area
- Modular system design with coordinated individual elements
- Can be freely adjusted to every room's infrastructure
- Maintenance-friendly walk-in system



By the way: our latest product, the innovative air conditioner deltaclima® mini DC won second place in the Deutscher Rechenzentrumspreis 2015.



Anywhere.
Any day.
Anytime.

Mobile and complex special devices must function properly - always and everywhere.

Letting machines, and people, keep their cool

Complex, technical specialised devices must function perfectly when deployed - independent of local climate conditions. In order to ensure safe operation of satellite antennas, radar systems, command centres, shelters in military and refugee camps and field hospitals, Weiss Technik offers robust stationary and mobile climate control devices.

Compact, indestructible, easy to use and absolutely reliable

Our mobile devices are suitable for use in deserts, jungles or in arctic conditions. Easy to move. Easy to transport. With flexible connections for air recirculation or outside air operation.

Your extreme is our norm.

Reliable operation so you can keep at ease.



Know what happens in space

For the seamless control of satellites and monitoring in space, the European Space Agency (ESA) operates a worldwide network of ground stations. Powerful satellite antennas are pointed at orbits around the clock in various climate zones in remote areas in Europe, South America, Asia and Australia. Under difficult climate and topographic conditions, we ensure reliable operation and secure connections to space.

Ready to use - anywhere

Worldwide deployments require innovative and efficient climate control technology for mobile command centres, clinics, combat posts or radar systems, which must work securely and reliably in all climate zones. Weiss Technik has developed a mobile climate control device that is especially robust and flexible, Module-R. Our development engineers developed light, silent, easy-to-use systems that can be networked to save energy and that are electromagnetically compatible (EMC).

Weiss Module-R*

- Cooling capacity: 5 to 17 kW at 55 °C
- Available in three different sizes and in horizontal, vertical or split design



Jet engine off? Cooling on.

Long-standing times in searing heat are no longer a problem. This is because the German Army uses robust, mobile and reliable **weisstechnik** Air Field Climate Control Technologies. They are adapted and optimised for temperatures of up to +55 °C and provide necessary cooling for man and machine - independent of jet engines.



Two is better than one.

Climate control systems with redundant operation for satellite and space monitoring.

The Deep Space Antenna DSA3 of the European Space Agency (ESA) reaches an imposing 40 metres into the air. This system, at the foot of the Andes in the Argentinian Malargüe, plays an especially important role. It completes the network of ESA ground stations in place for researching space and its missions. In order to protect the sensitive electronics of the ground station from dangerous climate fluctuations, ESA places its trust in climate and cooling technology with 100% redundancy by Weiss Technik.

Since the start of the space age, European countries have been active participants in space flight. Since 1975, ESA has controlled the development of European activities in space. By bundling the resources of its 20 member states, ESA facilitates the implementation of programmes and activities. Its responsibilities also include monitoring of all satellites and space missions with the help of its worldwide ground systems. "If the climate control in the ground systems fails, then the sensitive electronics also fail. The antennas cannot be operated and important data are lost," explains Jürgen Süßlin, Technical Customer Consultant in the Defense Sector of Weiss Umwelttechnik. "For this reason,

we built a device and climate monitoring system that achieves an availability of 99.95%, which is extremely high."

For about 30 years we have been developing, building, maintaining, repairing and caring for the climate control and cooling systems of the ESA ground stations worldwide. "When we buy products from Weiss Technik, we simply know that they work reliably," explains Filippo Concaro, manager of the European Space Operation Center (ESOC) of ESA. "The quality simply speaks for itself and has done so for decades." The electronics in the ground stations are very complex and very sensitive to temperature



fluctuations. High heat loads must be constantly and safely conducted away through cooled air and directly with cooling fluids. However, the climate conditions in Australia are different from those in northern Sweden or Argentina. This is a challenge for the climate control technicians who adapt the respective systems individually to local humidity, heat, cold, dust and wind. In order to design and construct the systems to be as safe and reliable as possible, the climate control and cooling systems, as well as the systems controls, are always installed twice.

100% redundant operation gives ESA decisive benefits:

It allows for absolutely reliable operation of the antenna and extremely low downtime in case of maintenance and repair work. Another plus are the regulated dehumidification and overpressure in the antenna, which ensure optimal protection of the electronic equipment.

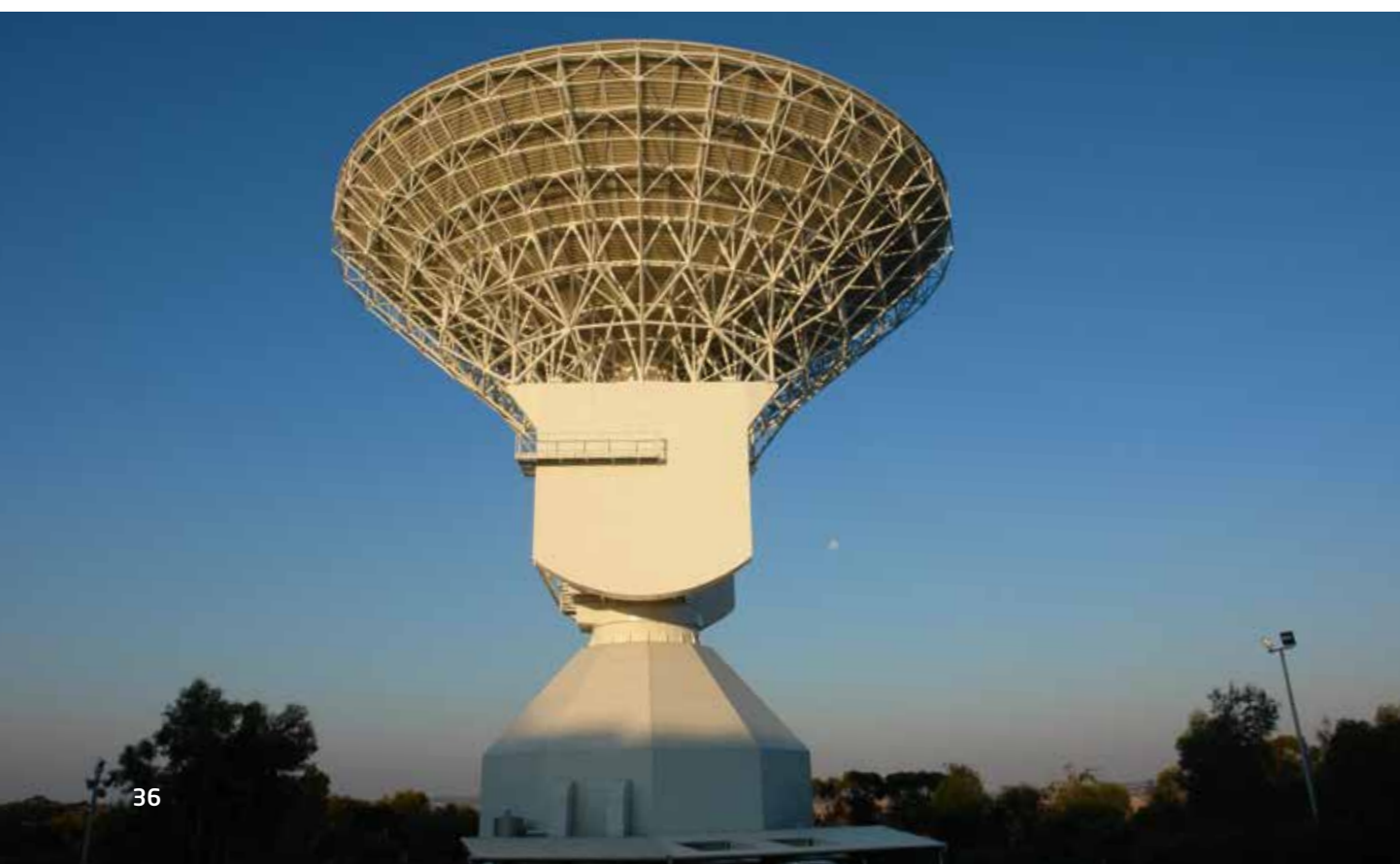
For the ground station of the Deep Space Antenna in the Argentinian Malargüe, Weiss Technik used the latest generation of compact climate control devices, which was developed especially for universal use in diverse climate conditions. These devices ensure that both the electronic equipment in the racks inside the antenna and the room are climate controlled. The devices with integrated control cabinet have full climate control for heating, cooling and humidification/dehumidification. High operating reliability and low energy costs are additional benefits. This is achieved by the efficiency-optimised high-performance

radial ventilators and very large heat exchanger surfaces with low pressure loss. In addition, our built-in compact climate control devices were designed to be easy to service and easy to clean.

The cooling of the climate control system and the fluid-cooled electronic equipment are ensured by correspondingly-dimensioned cooling water tanks. Regulation valves ensure very constant temperatures in the fluid circulatory system.

The total system is centrally-controlled and monitored on site. This control concept was also designed and implemented by Weiss Technik. In case of disruptions or failures, the system automatically switches to the redundancy system (stand-by) in order to continue the operation of the antenna. Status reports and error messages are sent to a superordinate management system of ESA. This way, ESA is able to monitor our **weiss**technik Climate and Cooling System via ESOC in Germany and ensure the availability of the antenna for their missions.

Since 2006, Weiss Technik has converted almost all ground stations with 15-metre-high antennas to the new reliable redundancy concept. The new system for the 35-metre-high Deep Space Antenna in Malargüe was also developed and installed based on the concept of the 15-metre antennas. The system was started up in 2012 and handed over to ESA. Since then, our service department has been managing this and all other systems.



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Weiss Umwelttechnik is one of the most innovative and significant manufacturers of environmental simulation systems. With these testing systems, we can simulate all climatic conditions around the globe and beyond, under accelerated conditions. Whether temperature, climate, corrosion, dust or combined shock testing: We have the proper solution. We supply systems in all sizes, from standard versions up to customised, process-integrated facilities - for high reproducibility and precise test results.

Vötsch Industrietechnik, a subsidiary of Weiss Umwelttechnik, offers a wide product portfolio in the field of heating technology. With an experienced team of engineers and designers, we develop, plan and produce high-quality and reliable heating technology systems for virtually any field of application. Products include heating/drying ovens, clean room drying ovens, hot-air sterilisers, microwave systems and industrial ovens. The portfolio reaches from technologically sophisticated standard versions to customised solutions for individual production operations.

A further Weiss Technik company, Weiss Klimatechnik, also offers reliable climate solutions wherever people and machinery are challenged: in industrial production processes, hospitals, mobile operating tents or in the area of IT and telecommunications technology. As one of the leading providers of professional clean room and climate solutions, we deliver effective and energy-saving solutions. Our experts will guide you from the planning to the implementation of your projects.

Weiss Pharmatechnik, a subsidiary of Weiss Klimatechnik, is a competent provider of sophisticated clean room and containment solutions. The product range includes barrier systems, laminar flow facilities, security workbenches, isolators and double door systems. The company emerged from Weiss GWE and BDK Luft- und Reinraumtechnik and has decade-long experience in clean room technology.

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