



memmert
Experts in Thermostatics

Nothing but the best

Temperature control appliances for the industry
Automotive - Electronics - Plastics - Metal



100% ATMOSAFE. MADE IN GERMANY.

www.memmert.com | www.atmosafe.net



Quality. Reliability. Precision. Down to the tiniest detail.

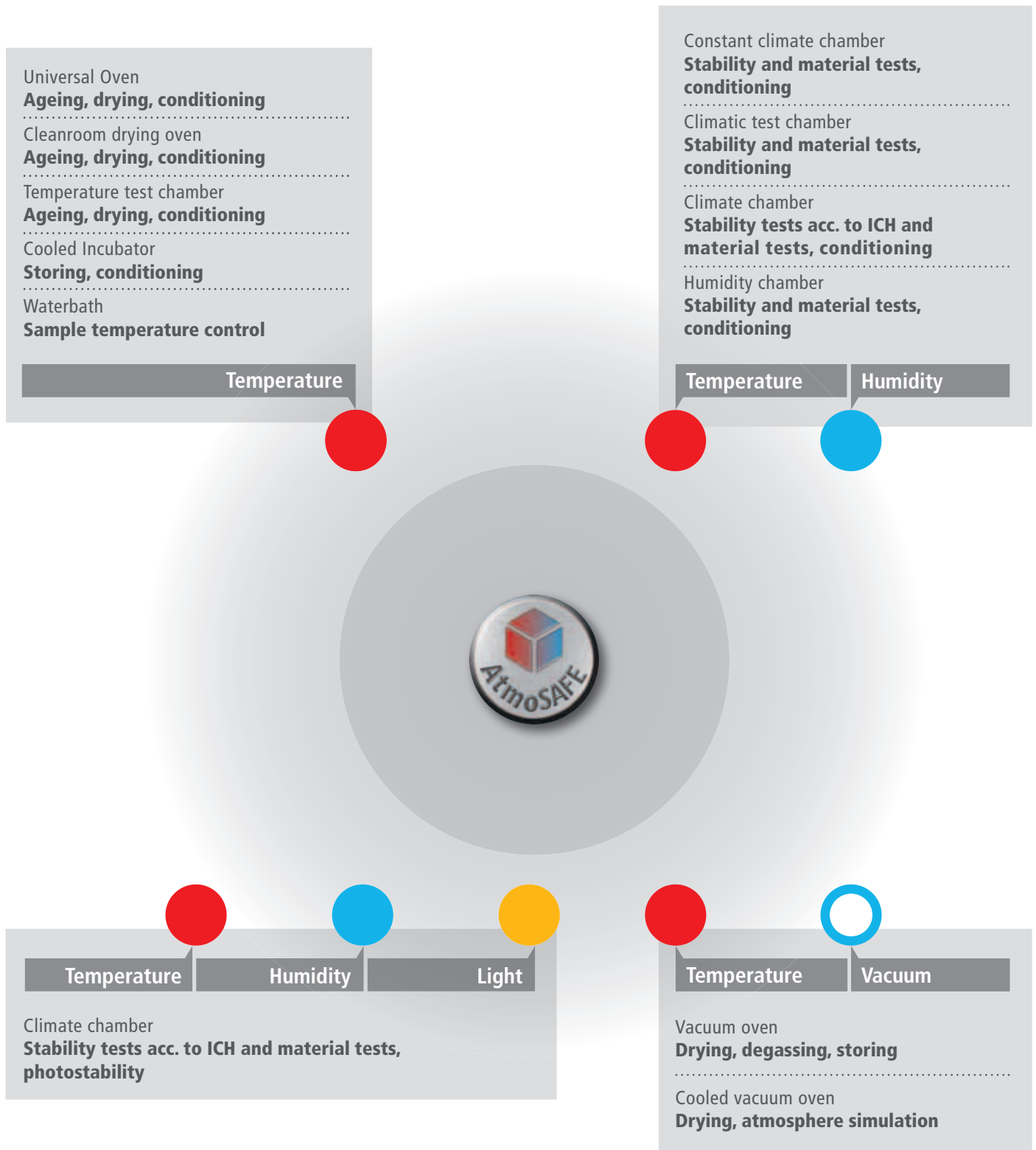


Just imagine that your highly sensitive sensors are stored in a climate chamber with a maximum temperature deviation of 0.2 K and this across the entire chamber interior.

Just imagine that your process times during vacuum drying are reduced to an optimum, thanks to programme-controlled cycles for ventilation and temperature.

Just imagine that your oven runs for many decades, precisely and reliably.

With a Memmert your vision becomes reality. Our passion for detail determines the outstanding quality of our temperature control appliances and has made us the leader in technology. 100% AtmoSAFE is our promise to you to guarantee a perfect atmosphere in all our appliances. What can we do for you?



GENERATION 2012



UNIVERSAL OVEN U

32 to 1060 litres

+30 °C to +300 °C

Natural convection or
forced air circulation

The success story of Memmert began in the year 1947, with the development of a hot air steriliser for the Red Cross. Today, Memmert heating and drying ovens are an essential part of quality assurance and manufacturing. Since the company's establishment, an uncompromising philosophy of quality has gone into every new development. Aesthetics and design coupled with unparalleled precision and reliability: corrosion-resistant, easy-to-clean stainless steel in the interior and outside, large-area all-round heating, device-specific interaction of heating and control.

POSSIBLE APPLICATIONS

Tempering/burning-in of electronic and mechanical components

Drying of components

Heated storage of plastics, metal parts and electronic components

Hardening of adhesive compounds

Ageing and conditioning of cables and wiring at defined air exchange rates

Migration tests, heat resistance tests of paints and varnish

We know how: Controlled air exchange

Certain standard applications require controlled fan function and fixed air exchange rates. For the appliances with a TwinDISPLAY, fan speed and flap position can be set in the ControlCOCKPIT with the touch screen or can be programmed as parameters of the test routine with the control and logging software AtmoCONTROL.



Application U:

Sample conditioning for cable ageing

As a manufacturer of cable measurement equipment, we work together very closely with the industry in the conception of modules for cable testing. Conditioning of test specimens that conforms to standards is essential for a valid measurement result.

In this respect, the greatest challenge represents the various different regulations for ventilation in the interior of the heating oven. With a standard oven without modifications such as specially adapted ventilation flaps, it is hardly possible to perform even one test conforming to standards, let alone conforming to the wide range of national, international and company specific standards for cable testing.

Whereas one standard demands the renewal of air in the interior 8 times per hour, other standards require 20 – 100 air changes per hour. Cyclical programming of automatic air change is a must as is, of course, the outstanding spatial temperature homogeneity. Since the heating oven needs to be opened to load it with test objects, the recovery times after the door has been opened should be as short as possible.

Heiko Freund, director | iiM measurement + engineering AG

iiM MEASUREMENT
ENGINEERING





Application UFP: Tempering of optical lenses



The future of cameras, sensors, measuring equipment and other opto-electronic systems belongs to plastic optical lenses. The Nuremberg-based company UPT Optik Wodak GmbH has specialised in the development and manufacturing of these innovative optical components.

In order to defuse tensions in plastics, to increase form stability, to minimise the danger of crack formation and to degas undesired volatile substances, the plastic components are tempered for 24 hours in a Memmert drying oven after injection moulding and other processing steps such as coating. The average glass transition temperature of materials used to manufacture plastic optical lenses lies at 105 °C. If these plastics are exposed to higher temperatures for a prolonged period, they transform into a rubber-like, gooey substance. Tempering is thus done at temperatures between 90 and 95 °C, just below the glass transition temperature.

As a certified manufacturer of medical products, UPT decided to purchase the Memmert drying oven UFP 800, which is suitable for use in a cleanroom. Excellent controllability, variable programming and possibility of logging and reading out process parameters were also part of their decision criteria.



PASS-THROUGH OVEN UFP TS

256 and 749 litres

+30 °C to +220 °C

Forced air circulation

The pass-through oven UFP TS is based on a standard heating oven and features all technological highlights like product specific heating and perfectly adjusted control technology. For the curing of lead frames and adhesive bonds or tempering of components the pass-through oven can be equipped, for example, with belt input and output at the side as well as with turn pulleys.

The specialists of the Memmert customisation department will gladly provide customer-specific adjustments as well as develop tailor-made application solutions.

We know how:

Precision and perfect temperature distribution

The smaller the heating elements in an oven, the more they must be heated up to reach the required temperature in the interior. A standard ring heater with an overall heating element length of one metre will even start to glow, making a gentle and accurate adjustment considerably more difficult to achieve.

A Memmert heating oven with a volume of 749 litres is surrounded on all sides by 52 metres of heating elements. Six heating circuits are controlled separately from one another so that the required temperature is exactly attained and maintained at every point in the interior – linearly and without fluctuations. In a Memmert drying oven, the heating doesn't simply switch off when the



set temperature has been reached but the temperature is controlled permanently, gently and evenly throughout the entire chamber.

The logical consequence of this unique system: Excellent values for temperature homogeneity and temperature stability.



VACUUM OVEN VO

29 | 49 | 101 litres

+20 °C to +200 °C

Pressure range:

10 to 1100 mbar

Cooled vacuum drying oven

29 | 49 litres

+5 °C to +90 °C

Pressure range: 10 to 1100 mbar

Hardening, storing and conditioning, degassing, ageing. The VO vacuum oven can do much more for you than just drying. Heat and oxygen-sensitive materials are treated gently and components with complex geometries are dried residue-free. Thanks to the digital pressure control system, this is done at turbo speed. The ramp programming of temperature and vacuum cycles in combination with direct heating of the shelves enables excellent heating-up and process times, even when fully loaded.

POSSIBLE APPLICATIONS

Tempering/burning-in of electronic and mechanical components

Degassing and evaporating volatile substances and solutions from adhesive compounds, synthetic resin or thermoset material

Residue-free drying of components with complex geometries

Drying and heating of powder and granulate

Drying of cleaned (machine) parts in production

Oxygen-free storage of electronic parts

Simulation of atmospheric pressures (special model with cooling unit)



Application VO:

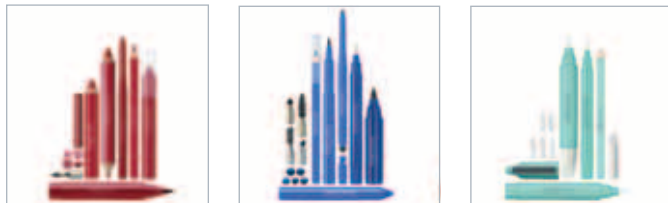
Drying of blood pumps made of PUR



If an acute heart insufficiency should occur in a patient, there is usually no donor heart available. In this case, artificial hearts, so-called VADs (ventricular assist device), step into the breach as lifesavers.

In the production of artificial hearts by Berlin Heart, the highest standards of quality apply for all processes. Clockmakers and precision engineers are responsible for the precise finishing, down to the micrometre, of pumps and cannula, which, of course, takes place under cleanroom conditions, since the slightest unevenness or deviation could lead to life-threatening complications for the patient.

For many years, Memmert vacuum ovens have been used for the drying process. For example, the assembled EXCOR® blood pumps from Berlin Heart are subsequently dried and degassed in the vacuum oven VO. The gentle drying of the components made from heat-sensitive polyurethane is done in a vacuum at 30 °C over a period of 24 hours. In doing this, Berlin Heart makes use of the advantages of the vacuum cycles in the Memmert vacuum oven. The pressure in the interior is briefly reduced by the programme under controlled circumstances, so that humidity and possible residue is removed more quickly.



Application IPP:

Storage tests of decorative cosmetics



As a partner of internationally renowned cosmetics manufacturers, Faber-Castell Cosmetics is one of the leading private label manufacturers of products for decorative cosmetics. Based on in-house developments and using innovative technologies, high-quality cosmetic pencils for face, eyes, lips and nails are produced adapted to individual customer requirements. For storage tests, the Faber-Castell Cosmetics test laboratory relies on a Memmert cooled incubator IPP.

The wood or plastic-cased cosmetic pencils are stored in the cooled incubator between 5 °C and 50 °C for twelve weeks and subsequently tested for changes of the colouring component and case. The cooled incubator is moreover used for temperature tests at changing temperatures. Since storage tests are performed at defined temperatures, temperature stability is an important criterion. The permissible maximum temperature deviation over time and throughout the chamber is ± 1 °C.

Additional decision criteria in choosing the right appliance were the comfortable programming as well as the possibility of logging and reading out the process parameters saved in the cooled incubator even after a longer period of time.

COMPRESSOR-COOLED INCUBATOR ICP

53 | 108 | 256 | 449 | 749 litres

-5 °C to +60 °C (ICP 55)

-12 °C to +60 °C (ICP 110 to 750)

If a large number of samples needs to be permanently incubated, you can rely on the maximum utilisation of the chamber in the cooled incubator ICP. And if rapid and precise alternation between heating up and cooling down phases in ramp operation is called for, Memmert cooled incubators with compressor cooling prove to be in peak form – yet working extraordinarily quiet. Thanks to the finely adjusted control technology, temperatures reach the set point precisely, without any energy-intensive surge heating and without any temperature fluctuations.

We know how:

Drying of powder and granulate

If vacuum ovens are applied to dry large amounts of powder and granulate, the occurring volume expansion of the heated atmosphere in the interior sets a physically defined end to the capability of the vacuum pump to transfer humidity. The result: Heat transfer and steam removal come out of balance and the samples dry extremely slow or even simmer in their own juice.

Just opening the door of the vacuum oven to ventilate the interior would be the worst possible solution of this problem. For this reason, Memmert as the first manufacturer worldwide has developed a turbo-drying

system with vacuum cycles for its vacuum oven VO. Thanks to this ramp programming, two vacuum values can be set between which the pressure in the interior is adjusted in a digital, well-controlled way. The advantages are obvious: Large amounts of dry air, which absorbs humidity, can be admitted within a short time and is then immediately extracted by the vacuum pump.

PELTIER-COOLED INCUBATOR IPP

32 | 53 | 108 | 256 | 749 litres

0 °C to +70 °C

The Memmert IPP Peltier-cooled incubators operate at high precision, without vibration and in addition provide unparalleled energy efficiency, as, in contrast to compressor technology, energy is only used during the heating or cooling process. As the IPP cooled incubator does not need a compressor, it saves valuable space in the laboratory.

GENERATION 2012



CONSTANT CLIMATE CHAMBER HPP

108 | 256 | 749 litres

0 °C to +70 °C

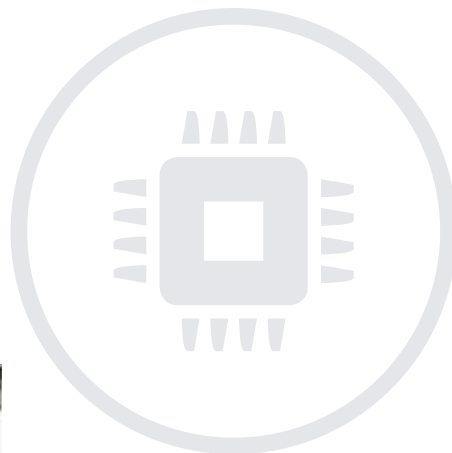
Humidity 10 to 90 % rh

100% AtmoSAFE! Climate chambers must work reliably and without interruption because a breakdown not only means that the employees cannot enjoy their leisure time but in some cases could threaten an experiment running over months. The Peltier technology of the Memmert HPP constant climate chamber works reliably over many years, enables absolutely precise temperature regulation and requires, in contrast to compressor equipment, no maintenance work at all, such as the replacement of coolant. Since the efficiency of Peltier appliances is considerably better than that of conventional climate chambers and since they are considerably more eco-friendly in their production, the HPP makes a significant contribution to improving the climate balance.

POSSIBLE APPLICATIONS

Stability tests

Storage of plastics, metal parts, compound materials and electronic components in constant climate for conditioning, ageing, corrosion tests etc.



S+S REGELTECHNIK

Application HPP: Adjusting sensors

Energy efficiency and comfort in buildings depend to a large degree on the technology with which temperature, air quality, air humidity or brightness can be precisely measured and automatically adjusted. For years, the innovative Nuremberg company S+S Regeltechnik has been one of the German manufacturers who have been setting the pace in the development of sensor technology. For the fine adjustment of temperature and humidity sensors, S+S Regeltechnik uses two Memmert HPP models with a volume of 749 litres.

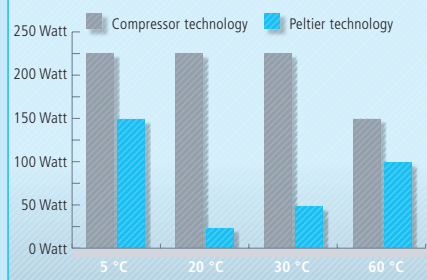
During the adjustment, the sensitive sensors must be subject to a defined and constant environment for several hours. Here, S+S set the constant climate chamber a challenging hurdle in terms of homogeneity and temperature stability: The temperature deviation over time and throughout the whole chamber may be no more than a maximum of ± 0.2 K and humidity fluctuation in time may only be a maximum of 1 %. Additionally, the HPP has the advantages that it only takes up little space and works in an energy-saving manner although it has a large interior.

We know how: Saving energy

The subject of energy efficiency has long since reached industry. Energy-saving laboratory equipment cuts operating costs and is an integral aspect of environmental certification and management. However, in order to actually create exemplary energy savers, innovative ideas like using Peltier technology are required.

In contrast to compressor technology, Peltier technology works in a particularly economical and energy-saving manner at temperatures close to the ambient temperature, since energy is only required if heating or cooling is needed. Therefore, very fine adjustments can be made to the heating or cooling functions.

Compressor technology VS Peltier technology



Up to 90 % less energy consumption at 22 °C ambient temperature



Customisation department as a "development assistant"

The Memmert customisation department regards itself as an extension of the customer's construction or R & D department. Users with special applications can have tests performed in advance in the Memmert MPTC Test Centre for laboratory appliances without having to invest in a new oven, vacuum oven or climate chamber first. The test, of course, also includes a detailed graphical documentation of all experimental conditions such as temperature, humidity, CO₂ concentration or pressure in the vacuum.

Customer-specific adjustment of standard models:



- Feed-throughs and ducts
- Special fittings such as weighing equipment
- Temperatures in the heating and cooling range
- Air pressure and air exchange
- Air speed and increased exhaust air
- Relative humidity
- Light intensity and spectrum
- Different gas concentrations (e.g. carbon dioxide CO₂ or nitrogen N₂)
- Fitted (wall) frames
- Telescopic trays
- Heavy duty appliances, heavy duty floor grids
- Special bases, stacking frames
- Central or integrated water supply

HUMIDITY CHAMBER HCP

108 | 153 | 246 | 749 litres

+20 to +90 °C (with humidity)

+20 to +160 °C (without humidity)

Humidity 20 to 95 % rh

Material testing in consumer goods industry, automotive industry, electronics or building physics must be repeatable and completely documentable. The high-precision temperature and humidity control as well as heating from all six sides ensure reliability and a condensation-free interior in the humidity chamber HCP. Another plus for the exact simulation of environmental conditions is the user-friendly ramp programming. Thanks to the "Celsius" standard software, an unlimited amount of different temperature and humidity setpoints can be combined on time ramps.

POSSIBLE APPLICATIONS

Air-conditioned storage of plastics, metal parts, coating, building materials, compound materials and electronic components for conditioning, ageing, corrosion tests etc.

GENERATION 2012



CLIMATE CHAMBER ICH

108 | 256 | 749 litres

-10 to +60 °C

Humidity 10 to 80 % rh

100% AtmoSAFE! Its excellent temperature and humidity homogeneity positions the climate chamber ICH in the international top league of stability test chambers. Thermal transfer to the interior – whether heat or cold – is guaranteed through a large-area air jacket on four sides. Thanks to its hermetically sealed interior, the ICH does not consume any water once the setpoints have been reached, provided that the door is not opened. The model ICH L features an illumination unit with cold white light (standard illuminant D65, 6,500 K) and UV radiation in the spectral range of 315 - 400 nm, 5 W/m² with a light intensity of approx. 6,000 Lux.



Application ICH:

Testing control appliances in the climate chamber

STUHL
REGELSYSTEME

The precision and reaction time with which sensors react to changes in ambient conditions is what makes the difference in a control appliance for building technology as well as in a temperature control chamber. For this reason, Stuhl Regelsysteme GmbH from Spalt in Bavaria is testing the functionality of its electronic control appliances for the fields heating, climate and ventilation in a Memmert climate chamber ICH 256.

Since nearly all its products contribute to maximising the energy efficiency of systems in building engineering, the exact and finely tuned interplay between sensors and electronics is the decisive quality feature of the appliances. The quality laboratory checks the characteristics of the sensors, measures the precision of the electronic control and subjects the appliances to regular stress tests, under defined temperature and humidity conditions.

The control appliances are subject to both constant temperature/humidity combinations and climate changes, whereby the test duration lies between a few hours and 14 days. The climate chamber ICH is connected to the company network via Ethernet and can be operated from any computer. The test specimens receive their signals through a cable feed-through. The signals are recorded on external calibrated measuring equipment along with the test parameters. At the same time, the chamber internal log of temperature and humidity is used for the plausibility test of the external measurement results. At Stuhl Regelsysteme, the many convenient functions that simplify and accelerate the test processes are highly appreciated in particular, along with the very good temperature/humidity distribution in the ICH.

POSSIBLE APPLICATIONS

Storage in a constant climate of plastics, metal parts, compound materials and electronic components for conditioning, ageing, corrosion tests

Test for photostability of plastics, metal parts, compound material

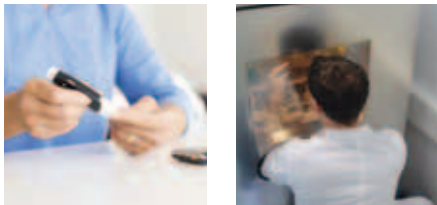


Application CTC: Climate testing of light-alloy wheels



The production of the Fuchsfelge® wheel for the legendary Porsche 911 is how Otto Fuchs KG became famous. Today, the product range includes different light-alloy wheels for several car makers' premium class, which is why Otto Fuchs KG places great importance on quality assurance. In a Memmert climatic test chamber, prototypes and pilot runs are tested for corrosion resistance.

Once a scratch mark is applied to the surface, it stays in a salt fog chamber under defined conditions for 24 hours for example and is afterwards put in a Memmert climatic test chamber CTC for 28 days for corrosion. The temperature-humidity combination varies according to the applied standard or manufacturer. However, usually 40 °C/82 % rh or 60 °C/82 % rh is used. Subsequently, the corrosion creep depth of the filiform corrosion is evaluated subsequently. Temperature may deviate by a maximum of ± 1 K over the entire test period. This is why Otto Fuchs especially appreciates the long-term stability and associated failure-free weekend operation of the climatic test chamber CTC along with the simple menu navigation.



Application customisation department CTC: Climate testing of in vitro diagnostics



ikfe GmbH, the renowned institute for clinical research and development in Mainz, in particular tests in vitro diagnostics such as glucometers or insulin pumps in the customised Memmert climatic test chamber CTC in accordance with the applicable ISO standards.

The constant temperature/humidity parameters differ per stage and the test time is up to an hour. Responsibility and reproducibility of the test conditions are vital for the validity of the studies. Therefore, the climate chamber is validated prior to each test. In order not to exceed the maximum deviation in the interior (usually ± 2 °C and ± 5 % rh) under any circumstances, ikfe performs tests with the help of chamber-independent sensors on the working surface. A viewing window and two entry ports were installed into the door. ikfe can now equip the climate chamber with gloves and operate the medical devices in the interior while the temperature/humidity conditions are constant. In order to reach physical limits such as an interior temperature of +12 °C and a relative humidity of less than 25 % and in order to restore them as quickly as possible after opening the door, the Memmert customisation department integrated one additional adjustable compressed air drying unit.



CLIMATIC TEST CHAMBER CTC TEMPERATURE TEST CHAMBER TTC

256 litres | -42 °C to +190 °C
Humidity 10 to 98 % rh

The climatic test chamber CTC and its equally accurate brother, the temperature test chamber TTC were designed specifically for standards-compliant temperature and climate testing. Due to the high capacity reserves in both the warm and cold ranges, both appliances quickly reach the set temperature even with alternating climates. In heating operation, temperature can be changed at an average speed of 10 K/min. In cooling operation from +190 °C to 0 °C, the average speed with which the temperature is changed is 5 K/min and 3 K/min in accordance with IEC 60068-3-5. Thanks to the active humidity system, the set humidity levels are reached quickly and precisely with short recovery times.

POSSIBLE APPLICATIONS

Storage in an alternating or constant climate of electrical appliances and components, varnish, coatings, compound materials, plastics and metal

Climate and temperature testing of electronic components and modules, plastics, textiles and compound materials

Overview of possible applications

There is certainly a huge number of other application possibilities. We would be very pleased if you told us about your application. Whatever the material, whatever the appliance and wherever you come from!

We would love to discuss with you your individual task at hand in order to find a suitable solution in the context of our standard programme or our customised designs.

Application	Appliance	Parameters
Burn-in of metal parts, varnish, contacts	Vacuum oven VO Universal oven U	+20 °C to +200 °C +30 °C to +300 °C
Hot air ageing of india rubber, rubber and elastomers	Universal oven U	+30 °C to +300 °C
Vulcanisation of india rubber	Universal oven U	+30 °C to +300 °C
Testing of leather through artificial ageing under dry heat	Universal oven U Temperature test chamber TTC	+30 °C to +300 °C -42 °C to +190 °C
Climate and temperature testing of electronic components and modules, plastics, textiles and compound materials	Climatic test chamber CTC Temperature test chamber TTC Climate chamber ICH	-42 °C to +190 °C, 10 to 98 % rh -42 °C to +190 °C -10 °C to +60 °C / +10 °C to +60 °C, 10 to 80 % rh
Hardening of adhesive compounds, synthetic resin	Universal oven U Vacuum oven VO	+30 °C to +300 °C +20 °C to +200 °C
Burn-in tests/long term stress tests of electronic components, PCBs and devices	Universal oven U	+30 °C to +300 °C
Drying of electronic components	Vacuum oven VO Universal oven U	+20 °C to +200 °C +30 °C to +300 °C
Migration tests, heat resistance tests for paints and printing ink	Universal oven U	+30 °C to +300 °C
Drying of powders and granulates	Vacuum oven VO	+20 °C to +200 °C
Ageing of cables and wires at different air exchange rates	Universal oven U	+30 °C to +300 °C
Conditioning of plastics, metals and compound materials for further tests (e.g. determining water absorption, stability testing)	Universal oven U Climatic test chamber CTC Constant climate chamber HPP Humidity chamber HCP Climate chamber ICH	+30 °C to +300 °C -42 °C to +190 °C, 10 to 98 % rh 0 °C to +70 °C, 10 to 90 % rh +20 °C to +160 °C / +20 °C to +90 °C, 20 to 95 % rh -10 °C to +60 °C / +10 °C to +60 °C, 10 to 80 % rh
Drying of cleaned machine parts, membrane filters, including in production	Vacuum oven VO Universal oven U	+20 °C to +200 °C +30 °C to +300 °C
Degassing of thermoset plastics, synthetic resins, adhesive compounds	Vacuum oven VO	+20 °C to +200 °C
Long-term exposure to heat of hard metals to determine change in mass under the influence of humidity	Humidity chamber HCP Constant climate chamber HPP Climatic test chamber CTC	+20 °C to +160 °C / +20 °C to +90 °C, 20 to 95 % rh 0 °C to +70 °C, 10 to 90 % rh -42 °C to +190 °C, 10 to 98 % rh
Storage of cleaned metal components under vacuum, prevention of oxidation	Vacuum oven VO	+20 °C to +200 °C
Long-term exposure to heat of plastics to determine dimensional stability and post-shrinkage, softening temperature testing of plastic	Universal oven U Waterbath	+30 °C to +300 °C +30 °C to +95 °C + boiling stage (with cooling unit CDP 115 from +10 °C)
High-temperature storage/alternating temperature tests of electronic components and modules for testing error mechanisms such as stress migration, the Kirkendall effect	Universal oven U Climatic test chamber CTC	+30 °C to +300 °C -42 °C to +190 °C, 10 to 98 % rh
Temperature/humidity storage of electronic components, varnish, coatings and compound materials for testing corrosion behaviour and stability	Climatic test chamber CTC Constant climate chamber HPP Humidity chamber HCP Climate chamber ICH	-42 °C to +190 °C, 10 to 98 % rh +5 °C to +70 °C, 10 to 90 % rh +20 °C to +160 °C, 20 to 95 % rh -10 °C to +60 °C / +10 °C to +60 °C, 10 to 80 % rh
Air-conditioned storage of electrical equipment for the calibration and testing of functionality	Climatic test chamber CTC Constant climate chamber HPP Humidity chamber HCP Climate chamber ICH	-42 °C to +190 °C, 10 to 98 % rh +5 °C to +70 °C, 10 to 90 % rh +20 °C to +160 °C, 20 to 95 % rh -10 °C to +60 °C / +10 °C to +60 °C, 10 to 80 % rh
Testing of plastics for UV resistance	Climate chamber ICH L	+10 °C to +60 °C, 10 to 80 % rh, standard illumination D65, UV-light 315 to 400 nm, 5 W/m ²