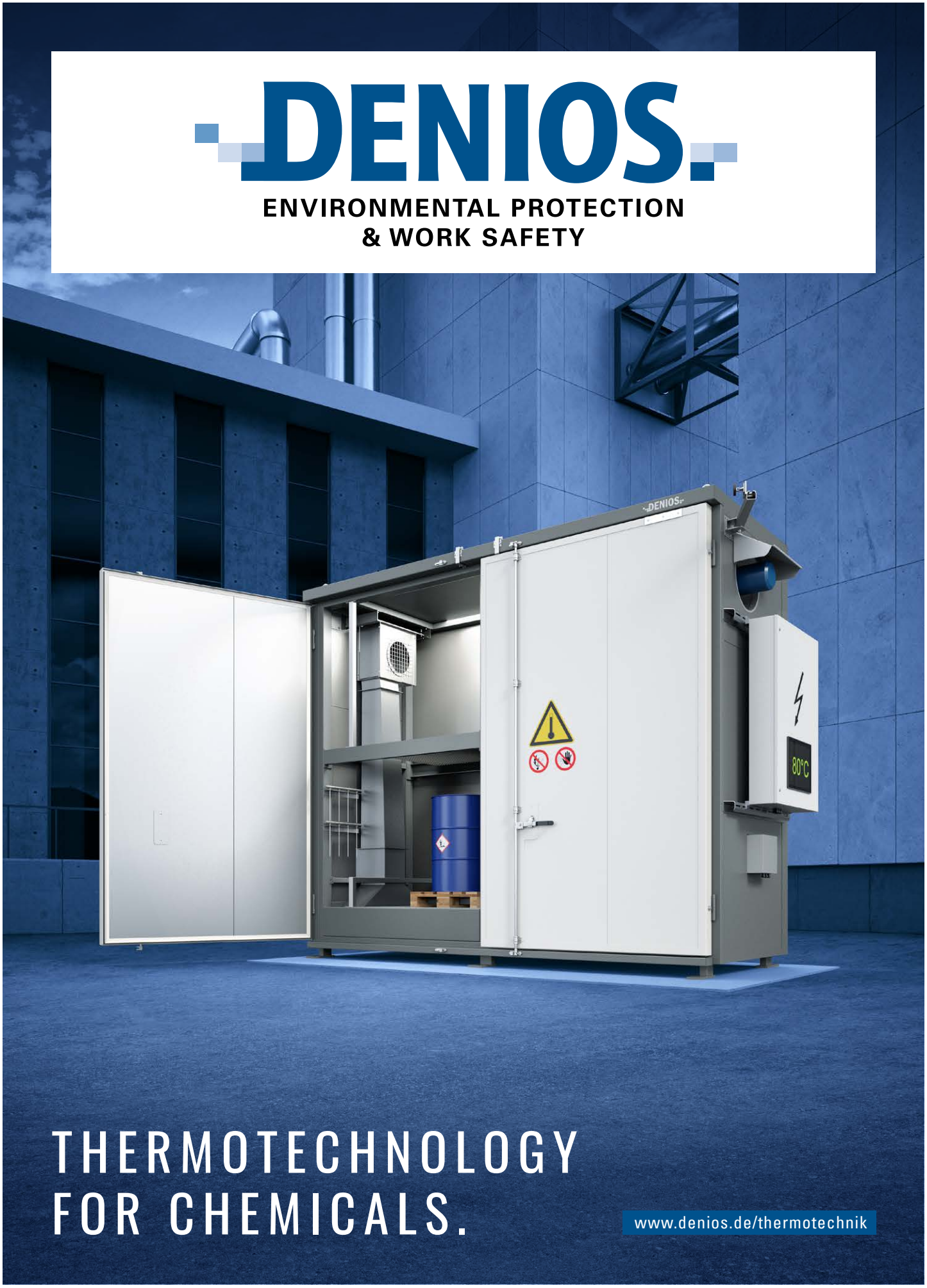
DENIOS

ENVIRONMENTAL PROTECTION
& WORK SAFETY



THERMOTECHNOLOGY FOR CHEMICALS.

www.denios.de/thermotechnik

THERMOTECHNOLOGY FROM DENIOS. CUSTOMISED SOLUTIONS.


PRODUCT TEMPERATURES UNDER CONTROL.
RELIABLE. EFFICIENT. SAFE. SICHER.

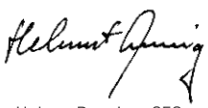
To heat, melt or cool a product with hazardous properties, various requirements must be reconciled. The focus needs to be on product quality, efficiency and safety. The exact process parameters to be taken into account are determined by your individual task. In order to understand these issues from all angles, we feel it's important to have a personal discussion with you.

For the DENIOS team, an extensive needs analysis and advice form the basis of every request. Bringing together your skills and experience with ours, we can develop solutions from which you will benefit in the long term. Take advantage of our specialist, project-specific knowledge, which we have developed over more than 35 years of working with our business partners - we're happy to share it with you.

CONTENTS.

With a heat chamber from DENIOS, you can work reliably, efficiently and safely.
We will support you, offering a holistic concept and customised solutions.

Thermotechnology from DENIOS. Customised solutions.



Helmut Dennig – CEO

Alexander Dolipski – COO

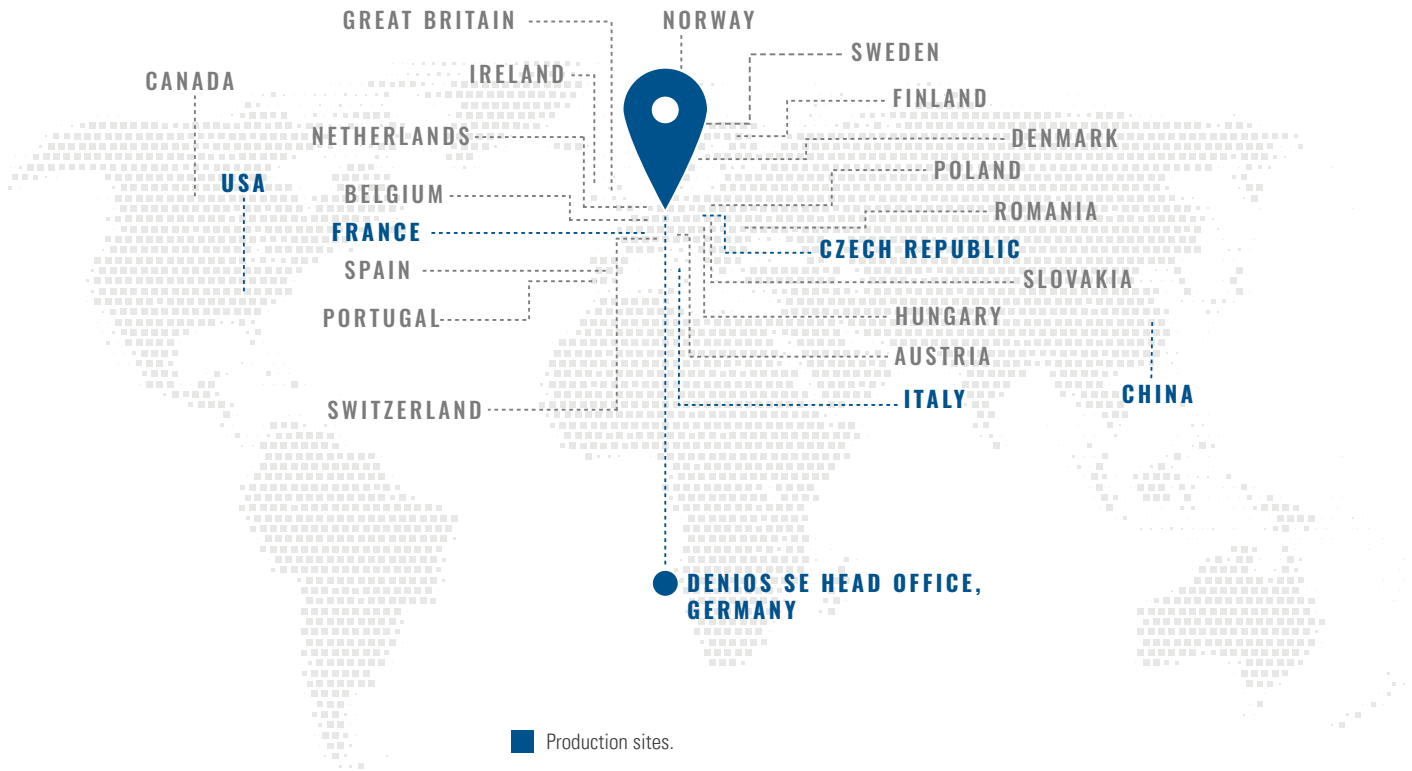
Ansgar Jost – Director Engineered Solutions

WORKING FOR YOU, ACROSS THE WORLD.

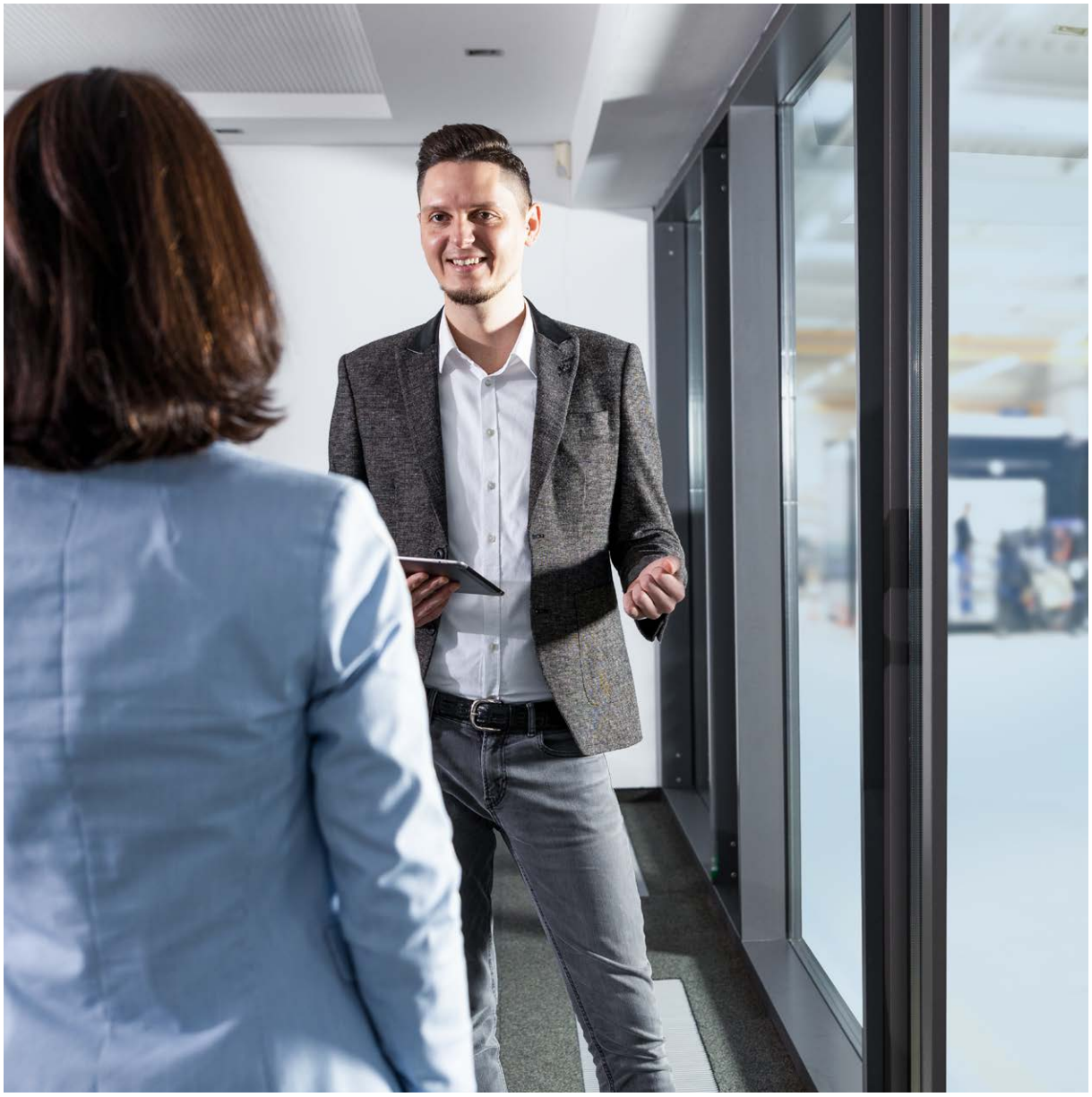
PERSONAL SERVICE EVERY TIME. ON SITE EVERY TIME.

Are you looking for an international partner and problem solver for hazardous substance safety who is always close at hand? You can rely on DENIOS' 35 years of experience as a developer and manufacturer. Operating worldwide, we are very familiar with local legislation. We are your one-stop shop for all hazardous material safety services - from personal consultations and on-site analysis to individual product configuration, commissioning and maintenance. Ensuring your project will run smoothly and in accordance with your requirements. Just get in touch.

- Over 1,000 employees.
- More than 20 branches in Europe, Asia and America.
- 6 production sites.
- Approx. 200 million Euro turnover a year.
- Over 35 years' experience.



International customers that trust DENIOS.



It's obvious: only those who have a precise picture of the situation can provide competent and solution-oriented advice. There should be no surprises, especially when planning. With an in-depth analysis by our experts on site, costly mistakes can be avoided right from the start.

BMW GROUP
SALZGITTER FLACHSTAHL
Ein Unternehmen der Salzgitter Gruppe

THERMOTECHNOLOGY FROM DENIOS. PRODUCT VARIETY FROM THE MANUFACTURER.

DENIOS offers a unique variety of products and equipment, backed by 35 years of experience, state-of-the-art production and seasoned experts. Whether heat chambers, heating systems or cooling and climate chambers - we'll manufacture the perfect fit solution for you, whether it's standardised or individually tailored to your needs.

THERMOTECHNOLOGY FOR HAZARDOUS SUBSTANCES.

TYPICAL AREAS OF APPLICATION.

Our products in the field of thermotechnology fulfil various tasks:

- Reducing viscosity of a liquid to improve pumping/filling,
- Melting solids for process feed,
- Temperature-controlling substances so they are at the optimum working temperature,
- Avoiding crystallisation or flocculation of hazardous substances,
- Storing temperature-sensitive substances safely,
- Avoiding thermal reactions, e.g. organic peroxides,
- and many other applications.

If the substance or mixture of substances has hazardous characteristics, protective measures must be derived from the operator's risk assessment in accordance with the applicable law. At DENIOS you will therefore also find product versions with fire and explosion protection.

HEAT CHAMBERS WK.

- FOR UP TO 48 DRUMS OR 12 IBCS
- HEATING OR MELTING UP TO 150°C
- CAN BE LEASED

FROM P. 10

HEATING SYSTEMS.

- FLEXIBLE HEATING JACKETS FOR DRUMS/IBCS
- DRUM HEATER WITH MANUAL OR AUTOMATIC TEMPERATURE CONTROL
- SAFE HEATING IN EX ZONES

FROM P. 28

COOLING AND AIR CONDITIONING SYSTEMS.

- AIR CONDITIONING OR COOLING TO -20 °C
- FIRE-RATED AND EX VERSIONS
- INDUSTRY-SPECIFIC VERSIONS

FROM P. 34

INDIVIDUAL SOLUTIONS.

- BEST FIT FOR PERFECT INTEGRATION
- FULL SERVICE: ALL FROM ONE SUPPLIER

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EQUIPMENT.

- FIRE AND EXPLOSION PROTECTION
- CONDITION MONITORING
- PRODUCT HANDLING AND MUCH MORE

FROM P. 54

THERMOTECHNOLOGY FROM DENIOS.

CUSTOMISED SOLUTIONS.

SECTION I

HEAT CHAMBERS.

Each DENIOS heat chamber is designed to ensure the required temperature is reached quickly, safely and efficiently and then reliably maintained, even when ambient temperatures are not stable. Control systems with a high control accuracy, combined with powerful heating systems ensure maximum precision and uniform temperature distribution in the room system.

ENERGY-EFFICIENT SYSTEMS ENGINEERING.

In order to bring your substances to a specific temperature level, energy must first be supplied to the process, e.g. in the form of electric current. The supplied energy is then converted into thermal energy for heating, cooling or air-conditioning, which is in turn transferred from a material flow (e.g. air) to your products via heat exchanger. To make this as effective as possible, the boundary air layer on the product must be broken through and the product surface supplied with forced energy. The best way of doing this is a targeted, turbulent air flow.

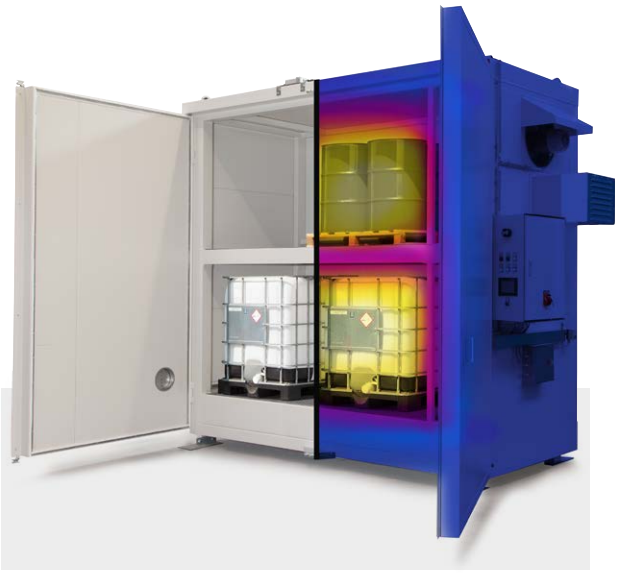
PRINCIPLE OF OPERATION FOR THE DENIOS HEAT CHAMBER.

A radial fan draws the air from the upper part of the heat chamber and passes it through a downstream heat exchanger where it is heated. Air ducts channel the heated air back under the products. The turbulent air flow ensures quick, uniform heating of the products. The interaction between the heater and the air flow, as well as the fan and the air duct geometry is essential to ensure that temperatures are evenly distributed around the entire room system.
A high energy level always seeks a way to a lower level. Energy losses are unavoidable. However, thanks to effective thermal insulation and a design which optimally coordinates the thermal elements, DENIOS heat chambers achieve a high level of energy efficiency.

INSULATION USED EFFECTIVELY.

Thermal insulation plays a central role here. Even 20 mm thicker insulation can reduce transmission losses by around 1/3*. Within 10 years, up to 10-figure energy costs can be saved. We adjust the insulation thickness according to your application. In order to reduce heat losses to a possible minimum, we enclose our systems. The supporting frame of our systems is completely enveloped, so that it does not constitute a thermal bridge.
The infrared image shows a DENIOS heat chamber, which has an even, very low temperature over the entire outer surface and therefore excellent insulation properties. Additional yellow-red coloured areas can be seen on the ventilation and exhaust air fans, the heating and the control system. This is primarily the inherent heat loss of the system components.

* e.g. using 100 mm mineral wool instead of 80 mm



SAFETY AND QUALITY.

For over 35 years, DENIOS has stood for environmental protection as well as work and process safety. Compliance with the law and sustainability of our products is our top priority. You can also rely on our process technology, in particular our heat chambers, to meet the basic legal requirements.

MACHINE SAFETY.

DENIOS heat chambers are subject to the Machinery Directive 2006/42/EC. The safety of the machines complies with the standards EN 12100, EN 746-1 and EN ISO 13849, among others. Standards EN 61508 and EN IEC 62061 ensure "functional safety".

PROCESS SAFETY.

For process safety, further directives and regulations have to be considered in project-related planning. This applies to both process and storage technology.
If they are used in potentially explosive areas, the ATEX Directive 2014/42/EC comes into effect. As a result, further standards such as DIN EN 1127-1 and 13643-1 as well as EN 60079-14 and 50495 also apply.
If hazardous substances are involved in the process, additional regulations and directives apply, such as the AwSV from the Water resources law (WHG) and GefStoffV or TRGS 510 from the Chemical law (ChemG). The DENIOS Hazmat Manual provides assistance on this topic: a compact guide to the storage of hazardous substances and activities involving hazardous substances.

WWW.DENIOS.DE/RATGEBER-EX-SCHUTZ

DOCUMENTATION.

We'll provide comprehensive documentation for every system. As part of the planning and approval process as well as in exchanges with planners, insurers and authorities, we'll support you with important documents such as structural calculations and construction drawings. The final documentation contains all the information you need for operation, maintenance and repair. We are also happy to create documentation for you according to specific requirements, e.g. GMP-compliant.

WWW.DENIOS.DE/FIBEL

PRODUCT PROTECTION.

Product protection also plays an important role in the process. With modern monitoring and control technology we offer solutions for permanent quality control and documentation. Connection to the central process control system is also possible. Do you have special requirements that apply to the entire system? DENIOS can provide you with custom-fit solutions. For example, we have developed silicone-free products for the automotive industry.

FIRE PROTECTION.

Fire protection is an important factor in machine and plant safety. Fire protection measures are already taken into account during the design and manufacture of machines. These are substantiated by standard DIN EN ISO 19353 "Safety of machinery - Fire protection".
This standard sets a level for fire safety and requires an assessment of the fire risk. In addition, object-specific fire protection designs are required. It is therefore advisable to look into the requirements and implementation possibilities at an early stage. We would be happy to provide you with the right basic knowledge to get you started.

WWW.DENIOS.DE/RATGEBER-BRANDGEFAHR

HEAT CHAMBERS WK.

Heat chambers from DENIOS are already available in the standard design in various sizes and equipment variants. Do you still have doubts about choosing the right product? With a DENIOS leased heat chamber, you'll have reliable planning security and gain important experience before making a purchasing decision.

WK 414-2-K

WK 514-2-K

WK 214-2-K

WK 214-1-K

HEAT CHAMBER WK - FOUR BAYS.

FOR UP TO 48 DRUMS OR 12 IBCS.

Heat chambers from DENIOS offer the perfect environment for protecting products with a constant temperature, high throughput for various production stations, provisioning of varied products and heating before delivery. 8,000 m³ air is circulated per hour, ensuring the necessary heat reaches every container.

Heat chamber WK 814-2-H
with roll doors.

DIBt APPROVED

EN 1090

- With general technical approval valid throughout Germany from the Deutsches Institut für Bautechnik (DIBt) [German institute of construction engineering].
- Compliance with DIN EN 1090 for manufacturers of load-bearing structures in steel.

PRODUCT DESCRIPTION.

- Constant substance preparation in fixed temperature ranges up to a maximum of 150°C (higher temperatures on request).
- Storage space for up to 12 conventional IBCs or up to 48 x 205 litre drums.
- Heating with saturated steam, electrical energy, heat carrying oil or hot water.
- The systems are painted, galvanised or finished in stainless steel.
- Suitable for indoor and outdoor use.
- Various ATEX designs are available.
- If required, as GMP-compliant design or fully bespoke to your individual requirements.
- Basic version with 2-wing doors with high insulating properties.
- A seal all round keeps energy losses to a minimum.
- Sturdy retaining arms (optional) ensure safe door opening.
- Special designs available on request.

MODEL	WK 514-2-K	WK 714-2-K	WK 814-2-H
Storage capacity IBC / CP / EP / Drum	**8 / 8 / 12 / 32**	**12 / 8 / 16 / 40**	**12 / 12 / 16 / 48**
Containment volume (l)	1,000	1,200	1,200
External dimensions* W x D x H [mm]	6,560 x 1,900 x 3,600	7,920 x 1,900 x 3,650	8,952 x 1,621 x 3,716
Dimensions per compartment W x D x H [mm]	2,700 x 1,340 x 1,400	3,380 x 1,340 x 1,400	3,900 x 1,340 x 1,400
Load capacity [kg/m²]	1,250	1,250	1,250
Weight [kg]	4,700	4,850	5,360
Number Storage levels	2	2	2

Note: Dimensions and weights may differ depending on optional equipment. Technical changes reserved.
IBC = Intermediate Bulk Container, 1,000 l ·CP = Chemical pallet for 4 x 205 litre drums· EP = Euro pallet for 2 x 205 litre drums· Drum = 205 litre drum directly on the grid.

STRUCTURAL ANALYSIS.

The structural calculations for the technical room system are based on Eurocode 3 (DIN EN 1993). The loads on the structure are measured according to Eurocode 1 (EN 1991-1-3) for a characteristic wind load $q_{k,w}$ = 0.585 kN/m² and a ground snow load s_k = 2.5 kN/m². The structure is also designed for earthquake zone 3 according to DIN 4149, EN 1998-1:2004.

EQUIPMENT OPTIONS.

Equipment plays a decisive role in the individual product configuration. Whether you need a motion sensor or a signal lamp, we will be happy to discuss this with you. Our experts will design a customised solution with you on site.
An overview of additional equipment options can be found here FROM P. 54.

External lighting with motion sensor.

Signal lamp for visual indication of operating status.

HEAT CHAMBER WK - TWO BAYS.

FOR UP TO 24 DRUMS OR 6 IBCS.

This design impresses with its compact construction: lots of space inside on a small footprint. The integral spill pallet also ensures safe storage. These heat chambers reach an air circulation rate of 4,000 m³ / hour. The balance between heating and air circulation is set to an optimum level. Uniform temperature and quick heating are guaranteed.

Heat chamber WK 214-2-K for reliable temperature control of drums and IBCs.

MODEL	WK 214-2-K	WK 414-2-K	WK 414-2-H
Storage capacity IBC / CP / EP / Drum	**4 / 4 / 6 / 16**	**6 / 4 / 8 / 20**	**6 / 6 / 8 / 24**
Containment volume (l)	1,000	1,000	1,000
External dimensions* W x D x H [mm]	3,430 x 1,730 x 3,700	4,110 x 1,730 x 3,700	4,630 x 1,730 x 3650
Dimensions per compartment W x D x H [mm]	2,700 x 1,340 x 1,400	3,380 x 1,340 x 1,400	3,900 x 1,340 x 1,400
Load capacity [kg/m²]	1,250	1,250	1,250
Weight [kg]	2,700	3,000	2,930
Number Storage levels	2	2	2

Note: Dimensions and weights may differ depending on optional equipment. Technical changes reserved.
IBC = Intermediate Bulk Container, 1,000 l ·CP = Chemical pallet for 4 x 205 litre drums· EP = Euro pallet for 2 x 205 litre drums· Drum = 205 litre drum directly on the grid.

HEAT CHAMBER WK - ONE BAY.

FOR UP TO 12 DRUMS OR 3 IBCS.

These heat chambers are ideal for use close to production facilities with their space saving design. Heating and air distribution are optimally matched to ensure a uniform temperature profile. Dispensing and dosing activities can therefore be carried out at any time. The integral spill sump with German water law approval ensures your products can also be stored for a longer time in a legally-compliant manner.

Heat chamber WK 414-1-H including type-approved spill pallet.

MODEL	WK 114-1-K	WK 214-1-K	WK 414-1-H
Storage capacity IBC / CP / EP / Drum	**1/1/1/4**	**2/2/3/8**	**3/3/4/12**
Containment volume (l)	1,000	1,000	1,000
External dimensions* W x D x H [mm]	2,030 x 1,730 x 2,700	3,430 x 1,730 x 2,500	4,630 x 1,730 x 2,400
Dimensions per compartment W x D x H [mm]	1,300 x 1,340 x 1,700	2,700 x 1,340 x 1,700	3,900 x 1,340 x 1,700
Load capacity [kg/m²]	1,250	1,250	1,250
Weight [kg]	1,700	2,060	2,330
Number Storage levels	1	1	1

Note: Dimensions and weights may differ depending on optional equipment. Technical changes reserved.
IBC = Intermediate Bulk Container, 1,000 l ·CP = Chemical pallet for 4 x 205 litre drums· EP = Euro pallet for 2 x 205 litre drums· Drum = 205 litre drum directly on the grid.

OPTIMAL HEATING AND AIR CIRCULATION.

ALSO SUITABLE FOR WARM WATER AND THERMAL OIL AS HEATING MEDIA.

In order to ensure rapid heating in conjunction with homogeneous temperature distribution, the heat exchanger and ventilation system work together optimally in DENIOS systems - also in explosion-proof design as an option. Various energy sources can be used to supply the energy. Instead of electricity, process heat or waste heat can also be used, in the form of steam, thermal oil or warm water. Temperature regulation is either mechanical or electrical in the case of steam heating.

STEAM HEATING WITH MECHANICAL TEMPERATURE REGULATION.

- Heat exchanger: max. permitted operating pressure 12 bar.
- Designed in accordance with ADR 2000.
- Control valve with thermostat without auxiliary power, setting range 20°C to 120°C or 50°C to 150°C (others on request), incl. dirt trap.
- Safety temperature limiter, mechanical trigger, pre-set if customer requires.
- Electrical signal (optional).
- Condensate side: flange connection / condensate separator optional.
- Air recirculation fan with motor protection switch.
- Temperature gauge via analogue thermostat.

STEAM HEATING WITH ELECTRICAL TEMPERATURE REGULATION.

- Heat exchanger: max. permitted operating pressure 12 bar.
- Designed in accordance with ADR 2000.
- Control valve with electric drive and a digital position regulator, which closes if the power is off, incl. dirt trap.
- Safety temperature limiter, electrical trigger, freely configurable.
- Electro-pneumatic drive (optional).
- Condensate side: flange connection / condensate separator optional.
- Control system incl. digital temperature controller.
- Pt1000 sensor to record the temperature.

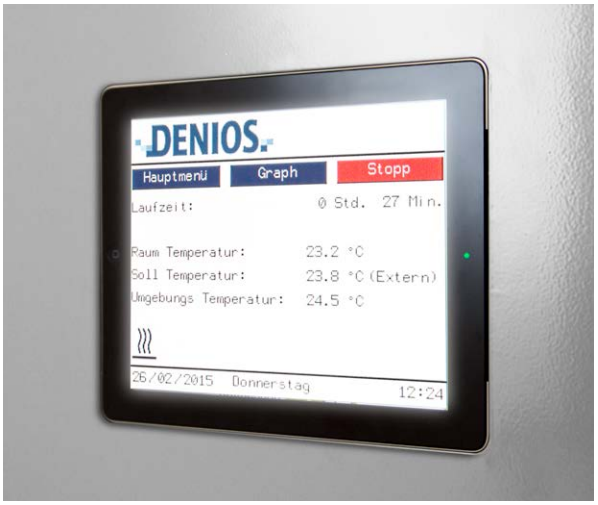
ELECTRIC RECIRCULATED AIR HEATING WITH DIGITAL TEMPERATURE REGULATOR.

- Electric heat exchanger.
- Stainless steel heating rods and housing.
- Integrated overheating protection.
- Controller incl. self-optimising digital controller.
- Digital setpoint and actual value displays.
- Temperature range pre-set if customer requires.
- Pt 1000 sensor to record the temperature.
- Safety temperature limiter, electrical trigger, freely configurable.
- Delivered ready to connect.

THERMOTECHNOLOGY CONTROL.

CONTROL COMPONENTS DEPENDING ON REQUIREMENTS.

All heating systems with electrical temperature regulation are managed by microprocessor to ensure high levels of control. We only use established branded products for the electrical components. The systems are delivered ready for connection. DENIOS control technology can solve many technical problems - and has a long service life. To best adapt the system to your individual needs with minimal investment, choose from two control versions (BASIC / PREMIUM) and add additional options to extend the range of functions.



FUNCTION	BASIC	PREMIUM
PID or PWM control	✓	✓
Collective alarm	✓	✓
Heat chamber temperatures below 50 °C	–	✓
Integration of air extraction function	–	○
Time-controlled fan run-on	✓	✓
Operation timer	○	✓
Integration of door contact switch	○	✓
Integration of automatic door locking	–	○
Data display with historical function (operating time, door opening, ambient temperature, room temperature, operating status, fault notifications)	–	✓
Data output via USB-interface	–	✓
Stepped operation (time dependent temperature process)[1)]	–	✓
Temperature adjustment (in Ex zones[2)])	–	✓
MODBUS connection	–	✓
Touchscreen display (also in Ex design)	–	✓
Web interface for remote control	–	○

1) For improved temperature control we recommend an air extraction fan is fitted for the stepped function.
2) With ATEX compliant touchscreen.

✓ **Feature** ○ **optional** – **not available**

LEASED HEAT CHAMBERS FROM DENIOS. THE PRACTICAL ALTERNATIVE.

The DENIOS leased heat chamber can be used as a temporary solution during production peaks. It is ideal as a quick replacement in case of breakdowns, or as a test system for a specific needs analysis prior to an investment. Let us know exactly what you need. We'll look at how we can best meet your requirements. Our leased heat chambers are constructed according to our type-approved systems with a wall thickness of 100 mm and are suitable for installation indoors or outdoors.

OVERVIEW OF ADVANTAGES.

- Full flexibility with a good cost overview, you decide when and for how long.
- No major investment needed for new products or short term orders.
- Better planning of follow-on costs, as service, maintenance and repair are covered.
- More flexibility for capital reserves, which can then be profitably invested.

LET OUR EXPERTS ADVISE YOU.

Are you planning a heat chamber? Give us a call - we'll give you the professional advice you need. Let us know your requirements and together we'll find the right solution for you.

Telephone advice line: +49 5731 753 216

CASE STUDY.

HOW A LEASED HEAT CHAMBER FROM DENIOS SAVED VEHICLE PRODUCTION.

For a major manufacturer in the commercial vehicle industry, rescue during a major emergency came from DENIOS. Preparation of a decorative paint for pumping was taking too much time in the newly installed paint shop, so a quick solution was sought.

THE CHALLENGE.

The customer had commissioned a new paint shop. The 2-component polyurethane decorative paint used for the painting process needed to be prepared so that it would flow and could be pumped before use in the dispensing station. First of all, a heating process took place within the paint shop. However, it turned out that the plant capacity was not sufficient for the desired throughput and the process was taking longer than planned. This led to a production bottleneck that had to be eliminated as quickly as possible. The existing plant had to be expanded or supplemented with a technical solution for the preparation process.

THE SOLUTION.

With a ready-to-connect leased heat chamber, DENIOS brought production back to the desired capacity levels. The decorative paint is now placed in the chamber in drums. The paint is made flowable for further use by an explosion-proof circulating air electric heating unit. The customer chose a heat chamber model that offers capacity for 205 l drums on eight Euro pallets (800 x 1,200 mm) or six chemical pallets (1,200 x 1,200 mm). The heat chamber is equipped with a spill pallet. This means that there is no danger to the environment if there is a leak of the water-polluting substance. The design corresponds to the proven, type-approved systems from DENIOS. A wall thickness of 100 mm ensures effective thermal insulation and efficient heat output. The heat chamber was set up within a storage area with WHG space. Final cleaning and transport were included.

BENEFITS FOR OUR CUSTOMERS.

Fast, simple assistance and reliable technology - DENIOS were able to get the customer's production up and running, and the experience gained during the transition period also formed a reliable basis for planning the expansion needed to the existing plant. The customer is very satisfied and plans to integrate a permanent DENIOS heat chamber into his system following the lease period.

FURTHER CASE STUDIES.

Because we know how important planning security is for our customers, we offer a range of leased heat chambers. But you'll also benefit directly from our experience. On the following pages you'll find a planning guide, in addition to details of other successfully implemented projects. And if you are looking for even more successful real-life examples, then feel free to take a look at the DENIOS website.

WWW.DENIOS.DE/PRAXISBEISPIELE-TT

CASE STUDY.

IT ALL COMES DOWN TO THE INTERNAL TEMPERATURE VALUES.

Our customer BP produces Castrol and Aral brand engine and transmission oils used in cars and trucks at its lubricants plant in Hamburg-Neuhof. Castrol's on-site development centre works closely with major car manufacturers to develop more efficient lubricant solutions for new generations of engines.

THE CHALLENGE.

Let's first take a metaphor to illustrate the task: the Sunday joint is put in the oven to roast. We set the temperature. Now we need to wait. Once the preset circulating air temperature is reached, it's maintained at a constant level. But what about the temperature in the centre of the joint? BP Europe SE in Hamburg was also faced with a similar question - even though this time they were not worried about a Sunday roast, but the sophisticated lubricant Castrol®. During production, the product is heated and the quality must remain constantly high. The circulating air temperature and also the core temperature of each individual container are recorded and documented in a verifiable manner, so that it's just what an engine needs.

THE SOLUTION.

DENIOS developed a solution for BP Europe SE which met all the challenges. Two DENIOS heat chambers, each with two independently controlled heating rooms, provide four different temperature levels for various substances. The circulating air temperature is permanently recorded and reliably transmitted with the aid of an evaluation section. Resistance thermometers with radio measurement transmission are inserted into every container. The DENIOS Premium controller ensures an exact temperature, by determining the ACTUAL temperatures of the product at regular and freely programmable intervals and sending them to the evaluation unit or the control room. Telegram coding ensures interference-free transmission. The temperature data is transferred loss-free from the receiver unit to a data logger and displayed in parameterisable diagrams on a TFT colour display. The paperless recorder with audit trail function ensures a manipulation-free data history. This enables reliable and well-founded quality assessment - whether for internal or external auditing.

BENEFITS FOR OUR CUSTOMERS.

By partitioning the heating rooms, different temperature levels can be used and monitored for production in a compact space. This provides the customer with high levels of flexibility and saves both time and space. The modern monitoring sensors and control technology ensure permanent quality control and documentation. This ensures our customer can keep the manufacturing process both lean and safe.

CASE STUDY.

HEATING UP TO 18,000 LITRES IN JUST 15 M².

One of our customers specialises in the production of process aids such as mould release substances and release agents. The products are supplied to customers from various branches of industry. A significant part of the manufacturing process is the temperature controlled liquefaction of raw materials for further processing. The customer required a custom heat chamber for this purpose, which met its individual requirements.

THE CHALLENGE.

The production areas at the customer's site were already almost fully occupied, with no possibility of expansion. The existing walkways and forklift traffic routes limited the situation even more, as they could not be affected by the new equipment. There was only a small space available for the new thermo-technical equipment in a storage area, which had to be used as efficiently as possible. Despite these limitations, the process capacity of the heat chamber to be installed needed to be sufficient for the company's production workload.

THE SOLUTION.

To create the required capacity, the heat chamber was designed with three levels. In this way, the room system was able to accommodate up to 18 IBCs or up to 72 drums – on just 15 m² floor space.
A certified, integral spill pallet with a containment capacity of 2,000 litres ensures the German Water Resources Law (WHG) is complied with. Space-saving 1-wing doors were used to ensure the traffic routes were not affected. This ensures that the equipment does not present an obstacle for people or vehicles when the doors are open. To reach the correct viscosity, the heat chamber has a heat output of 80 kW to maintain the heating of the chemicals at +60 °C (up to +120 °C possible). 8,000 m³ air is circulated per hour, ensuring the necessary heat reaches every container. Air guides ensure a uniform temperature distribution across the entire room system.

RESULT AND CUSTOMER BENEFIT.

The customer opted for steam heating to ensure a particularly resource-efficient energy carrier - existing process heat is able to be efficiently used for the thermal preparation of the raw materials. The nine bays in the heat chamber each offer sufficient space for two pallets, one in front of the other. A practical pushback trolley system allows pallets to be safely stored in a last-in-first-out manner. A fire recognition system and noise insulation complete the safety systems.

8 IMPORTANT QUESTIONS TO DISCUSS WHEN PLANNING A NEW HEAT CHAMBER.

Planning a heat chamber often brings up many questions: What functions should the heat chamber have? What size is required for the products to be heated? Which local conditions must be taken into account? DENIOS has a solution for every requirement. That's why you'll also find information about the our range of services in the planning notes. If you've still got more questions, we'll be happy to help on-site!

In the following, we use eight questions to provide you with the planning factors you need when investing in preparation equipment for heating materials for further processing in production.

1. WHICH MATERIAL WILL BE HANDLED?

The heat chamber must be tailored to the material to be processed and the containers in which the material is placed in the chamber. Material quality and quantity are therefore decisive for the technical design of the equipment. In addition to the technical process, the hazard potential the material poses must also be taken into account, e.g. in the case of water-polluting substances or hazardous substances. In addition to personal and product protection, measures for water, fire and explosion protection may need to be observed. The risk assessment and derivation of suitable protection concepts are part of your duties as the operator.

2. WHAT THROUGHPUT QUANTITY IS PLANNED IN WHAT TIME PERIOD?

If a new process plant is installed for which preheating or melting of the process materials is necessary, there are no values based on experience available for the required throughput and duration of preparation. Both these factors depend not only on the viscosity and container size or quantity of the material, but also on the efficiency of the heat chamber.

3. WHICH ENERGY SOURCES CAN (EFFICIENTLY) BE USED FOR THE HEAT CHAMBER?

Electric power is the most frequently used energy source for supplying a heat chamber. However, your individual situation can also favour using your process or waste heat, whether in the form of steam, thermal oil or hot water. Take the choice of energy source into account therefore when planning your preparation equipment, as the components are selected accordingly.

4. HOW IS THE PROCESS FLOW PLANNED?

As a rule, the process flow for heating substances for further processing in production can be illustrated using the following steps:

1. Possible (intermediate) storage of the unprocessed raw materials.
2. Preparation for processing.
3. Setting in the preparation plant or heat chamber.
4. Goods through-flow or output of the prepared materials.
5. Transfer of the material to the processing plant.

The planning of the individual process steps not only affects the design of the heat chamber. Handling of the material should also be considered. Are handling devices such as forklift trucks or drum lifters required? Which work processes must be carried out by the operating personnel? What is the extent of automated processes - from zero to fully automated operation? Which requirements result from the process control technology?

5. WHICH INDUSTRY-SPECIFIC REQUIREMENTS SHOULD BE CONSIDERED FOR THE HEAT CHAMBER?

Industry-specific factors such as GMP requirements in the pharmaceutical industry and HACCP concepts in the food industry may need to be added to the requirements profile.
GMP: Good **M**anufacturing **P**ractice.
HACCP: Hazard **A**nalysis and **C**ritical **C**ontrol **P**oints.

6. WHICH STRUCTURAL CONDITIONS HAVE TO BE CONSIDERED DURING PLANNING?

Available space, accessibility, traffic routes and media connections are restrictions that should be taken into account in the design of your heat chamber. These structural conditions must be used as economically as possible. In the case of severe restrictions, a custom solution is usually recommended. A modular construction or outdoor installation are also possible variants.

7. WHAT ARE THE REQUIREMENTS REGARDING PROCESS DOCUMENTATION AND QUALITY CONTROL?

Process documentation and quality control accompany the preparation process and should therefore be taken into account in process planning and supplier selection.
Here too, the question of the desired degree of automation needs to be considered. In order to ensure a consistently high material quality throughout the entire treatment process, it may be necessary to record the circulating air temperature and the core temperature of each individual container and to document this in a way that can be checked.

8. HOW IMPORTANT IS INTERNATIONAL SUPPORT TO YOU WHEN SELECTING SUPPLIERS?

If your company is set up internationally and you want to implement the same production or quality requirements throughout your group, then you will benefit from a supplier who has a corresponding international network, which also includes service and maintenance. Worldwide certified manufacturing processes and products provide the assurance that the supplier's quality promise will be kept.

LET OUR EXPERTS ADVISE YOU.

Are you planning a heat chamber? Give us a call - we'll give you the professional advice you need. Let us know your requirements and we'll find the right solution for you together.

Telephone advice line: +49 5731 753 216

THERMOTECHNOLOGY FROM DENIOS.

CUSTOMISED SOLUTIONS.

SECTION II

HEATING SYSTEMS.

In the chemical, pharmaceutical and food industries, substances are often used that have to be kept under certain thermal conditions. Heating jackets and drum heater systems were developed specifically for these tasks.

FLEXIBLE HEATING JACKETS HM FOR DRUMS AND IBCS.

CONTROL RANGE 0 TO 90° C.

Heating jackets are ideal for occasional or seasonal use. Or, when a high degree of flexibility or long term use is required. The upper material consisting of PU-coated polyamide is water-repellent and abrasion-resistant. The high-quality silicone insulation ensures energy-efficient use.

Heat output 450 Watt. Heat output 1.100 Watt. Heat output 2.000 Watt.

PRODUCT FEATURES.

- Lightweight, compact, space-saving and cost-effective.
- Containers can be temperature-controlled directly at the point of use.
- Simple handling.
- Flexible, with perfect fit.
- Includes thermostat: control range 0-90 °C.
- Power supply: 230 V.
- Protection: IP 44.
- With 5 m power cable.

MODEL	HEATING JACKET FOR 30 LITER DRUMS	HEATING JACKET FOR 60 LITER DRUMS	HEATING JACKET FOR 200 LITER DRUMS, 450 WATTS	HEATING JACKET FOR 200 LITER DRUMS, 1100 WATTS	HEATING JACKET FOR IBC
Heat output [W]	200	250	450	1,100	2,000
Container circumference min [mm]	870	1,100	1,800	1,800	4,060
Container circumference max [mm]	1,000	1,250	1,900	1,950	4,310
Height [mm]	400	460	450	850	950
Suitable for	Steel/plastic containers, 25/30 l	Steel/plastic containers, 50/60 l	Steel/plastic drums, 205 l	Steel/plastic drums, 205 l	IBCs, 1000 l
Order number	117721	117722	117723	156179	117724

SAFE HEATING IN EXPLOSION-PROTECTED AREAS.

AUTOMATIC TEMPERATURE CONTROL.

Often, explosive gas-air mixtures are created during warming, meaning that ATEX certified heating equipment is needed. DENIOS heating jackets for single containers are ATEX certified for zones 1 and 2. We would be pleased to provide information on legally-compliant use.

Heat output 720 Watt.

Heat output 1.700 Watt.

HEATING JACKETS FOR CONTAINERS UP TO 60 LITRES.

- Suitable for steel and plastic containers from 25 to 60 litres.
- Safe, fast heating especially in Ex-protected areas of temperature class T3.
- For use in Ex zones 1, 2, 21 and 22.
- Certified, automatic temperature control.
- High efficiency, reaches temperatures up to 80° C (wall temperature of a steel drum).
- Protection: IP 54.
- 240 V electrical connection (without plug) and 5 metre connection cable.

HEATING JACKETS FOR IBCS AND 205 LITRE DRUMS.

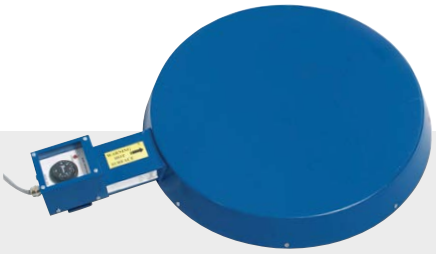
- Suitable for 205 litre steel and plastic drums and IBCs.
- Safe, fast heating especially in Ex-protected areas of temperature class T3.
- For use in Ex zones 1, 2, 21 and 22.
- Certified automatic temperature control: max. wall temperature 80 °C (drum) and 55°C (IBC).
- Protection: IP 44.
- Power supply: 240 V.

MODEL	HEATING JACKET FOR 30 LITER DRUMS, EX	HEATING JACKET FOR 60 LITER DRUMS, EX	HEATING JACKET FOR 200 LITER DRUMS, EX	HEATING JACKET FOR IBC, EX
Heat output [W]	90	130	720	1,700
Container circumference min [mm]	870	1,100	1,800	4,060
Container circumference max [mm]	1,020	1,250	1,950	4,310
Height [mm]	400	460	850	950
Suitable for	Steel/plastic containers, 25/30 l	Steel/plastic containers, 50/60 l	Steel/plastic drums, 205 l	IBCs, 1000 l
Order number	236434	236436	178874	176398

DRUM HEATER FOR 205 LITRE DRUMS.

MANUAL TEMPERATURE CONTROL.

The DENIOS heating systems for single containers offer mobility and flexibility. Keep oil, glue, or paint for example at a set temperature required for further processing. Whether warming or keeping warm, you will find the right product here.



Base heater HBD, for 205 litre drums.
Temperature control up to 150 °C.

Heating belt HG-F, flexible heating belt in silicone. Temperature control up to 150 °C.

PRODUCT FEATURES.

- Including thermostat for stepless temperature control.
- Electrical connection: 230 V / 50 Hz.
- Ready-to-use including 2 m long power cable and Schuko plug.
- Material: steel, powder coated.
- HG-F: the heating element is contained in a flexible vulcanised silicone mat.

MODEL	BASE HEATER HBD	FLEXIBLE DRUM HEATING BELT HG-F, IN SILICONE
Heat output [W]	900	1,000
Protection type	IP 40	IP 40
Height [mm]	70	125
Suitable for	Max. drum Ø: 600 mm	Drum Ø: 550 - 600 mm
Order number	117803	117717

INDUCTION DRUM HEATER FOR USE IN EX ZONES.

AUTOMATIC TEMPERATURE CONTROL: MODEL IBP TO 110 C, MODEL IHG TO 123 °C.

Induction-based heating systems generate the required heat directly in the body, so there is no need for heat conduction. This direct heating method is therefore highly efficient. Whether highly viscous or solidified products, they can be heated quickly and efficiently in 205 litre steel drums. The certification according to ATEX also permits the use of the induction heaters within an Ex atmosphere (Ex zones 1 and 2: Ex II 2 GD / Ex e II T3).

Drum base heater IBP.

Induction heater IHG.

GRP cover,
glass reinforced plastic cover.

PRODUCT FEATURES.

- Certified in accordance with ATEX for Ex zones 1 and 2.
- Protection: IP 66.
- Electrical connection (IBP, IHG): 240 V.
- Cable length (IBP, IHG): 5 m.
- Material: glass reinforced plastic (GRP), powder coated.
- GRP cover, minimises heat loss from the top of the drum.
- Automatic temperature limitation.

MODEL	INDUCTION BASE HEATER IBP	INDUCTION HEATER IHG	GRP COVER FOR INDUCTION HEATING SYSTEMS
Heat output [W]	500	2,750	-
Container circumference min [mm]	1,800	1,800	1,800
Container circumference max [mm]	1,950	1,950	1,950
Height [mm]	60	740	650
Suitable for	205 l steel drum	205 l steel drum	205 l steel drum
Order number	178875	117719	178877

THERMOTECHNOLOGY FROM DENIOS.

CUSTOMISED SOLUTIONS.

SECTION III

COOLING SYSTEMS.

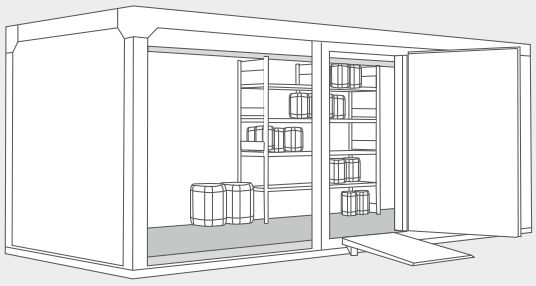
Our cooling and climate chambers cover temperature ranges from 0 °C to 35 °C. Depending on the temperature range needed, air conditioning split equipment or cooling equipment can be used. With a comprehensive range of accessories available, these systems can be customised to suit your individual requirements. This means our standard solutions can be adapted to suit the requirements of many sectors: whether chemical, pharmaceutical, automotive or food.

COOLING SYSTEMS FROM DENIOS. YOUR FIRST CHOICE.

Your requirement for storage capacity (small containers / drums / IBCs) determines the basic shape of the cooling system (walk-in / racking / compact). Depending on your requirements, the systems are designed with fire protection, explosion protection or GMP-compliant. Choose from our wide range of equipment to configure your individual cooling system. Get in touch - we'll give you the professional advice you need.

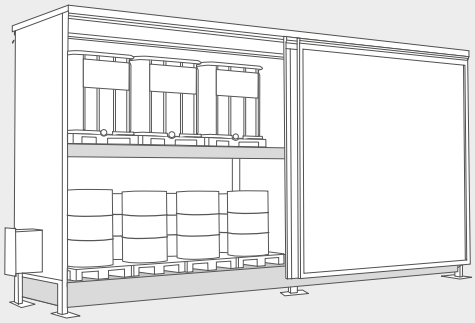
WALK-IN.

If you want to cool small containers, a walk-in cooling system is the optimal solution. DENIOS models ensure a high level of user comfort: the entry height is only 150 mm. The built-in shelves allow the contents to be conveniently and clearly arranged. If additional drums or larger containers need to be stored, the floor can also be used as a storage area.



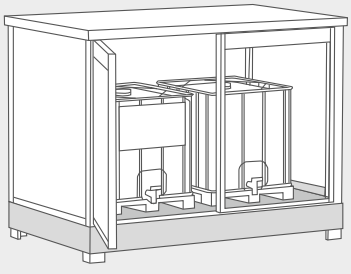
RACKING.

If larger storage capacities for drums, IBCs or palletised goods are required, a storage container with racking is the best choice. The compartment dimensions and load capacities of the various versions are optimally designed for the size of the relevant containers. Storage containers with racking can be loaded with a hand-operated electric forklift.



COMPACT.

Due to the small space requirement, the compact cooling system is often used close to production or the workplace. It allows direct access to IBCs, drums or small containers and can also be used as a dispensing or filling station.



COOLING EQUIPMENT FOR COOLING AND CLIMATE CONTROL CHAMBERS.

AIR CONDITIONING OR COOLING TO 0 °C.

The basic frame for our cooling and climate control chambers consists of solid welded steel profiles with an integral WHG-approved spill pallet. With all-round built-in insulation in polyurethane hard foam with a U value of 0.24 W/m²K, we ensure that high quality insulation is achieved. Insulated doors are used for the access area which can be fitted with anti-icing heating if required. Depending on the temperature range needed, air conditioning split equipment or cooling equipment can be used. Whether air conditioning or cooling to temperatures to 0 °C: with the help of powerful cooling units, materials are kept within a clearly defined temperature window in the DENIOS cooling and climate chambers. The range of permissible temperature fluctuations is coordinated by DENIOS engineers, including the relevant measurement and control technology. In practice combination units are generally specified, which combine both cooling and heating functions.

SPLIT COOLING UNIT (INTERNAL VIEW).

The interior unit with heat exchanger and fan works as an evaporator in cooling mode. When heating, it is used as a condenser.

SPLIT COOLING UNIT (EXTERNAL VIEW).

The external unit transfers the heat in the heat exchanger to the ambient air by liquefying the refrigerant. Heat transport is reversed if the system is used for heating.

In order to achieve a barrier-free air flow through the interior, the optimum installation position is determined specifically for the system in question, taking into account the type, size and quantity of the stored goods. High-resolution controllers and temperature sensors ensure that the required temperatures are carefully complied with. Freezing (below 5 °C) down to -25 °C is available as a special customer request. Get in touch with us today!

EX VERSIONS.

If there is an Ex zone in your company, you as the operator must specify the Ex zone classification on the basis of an explosion protection document. All equipment that could be a source of sparks in the Ex zone are available from DENIOS in the appropriate Ex version. Technical ventilation can be implemented with a 5-times air exchange. The energy loss that occurs is minimised by the use of a heat exchanger: the heat energy is extracted from the exhaust air and is returned to the system.

CASE STUDY.

COOLING CHAMBER FOR TEMPERATURE-CONTROLLED STORAGE OF EXPLOSIVE GASES.

One of our customers was faced with the challenge of safely storing explosive gases at a stable interior temperature of -20 °C. This required not only technical ventilation with 0.4 times the air exchange rate, but also a particularly powerful cooling unit that can defrost automatically. Due to the hazard class of the stored gases and the safety level required, the interior is explosion-proof and equipped with automatic fire detection. This combination of efficient thermal insulation and all-round fire protection created a cooling system for the highest technical demands.

Cooling container for temperature-controlled storage of explosive gases.

STAINLESS STEEL EQUIPMENT FOR THE FOOD INDUSTRY.

Storing flammable liquids at controlled temperatures calls for special, tailored systems, especially in the food industry. So, for a confectionery manufacturer, a fully stainless steel system for storing flammable flavourings was produced. A high-precision control system was used to maintain the narrow temperature window. Explosion protection and a sprinkler system complete this technically sophisticated system.

Economic solution for different temperature ranges.

STORAGE OF ORGANIC PEROXIDES.

Organic peroxides are unstable, temperature sensitive, oxidising and sometimes potentially explosive compounds. Pure peroxides are used in industry, or they are mixed with additives or auxiliary materials. When storing these chemicals, the most stringent safety precautions must be taken and numerous requirements from the authorities must be met. DENIOS peroxide stores have ETA approval, F 90 approval from Deutsches Institut für Bautechnik (DIBt) or REI 90 classification from IBS, an REI 120 classification from Efectis France or an expert opinion from Bundesanstalt für Materialforschung und -prüfung (BAM).

SPECIAL REQUIREMENTS, MET PERFECTLY.

Organic peroxides pose a high risk of danger because they decompose under the influence of temperature or the effects of a catalyst.
In order to minimise the risk when storing these media, a number of guidelines have to be observed when building peroxide storage facilities, such as the Trade association guidelines for organic peroxides (DGUV regulation 13) in Germany or the VKF fire protection directive "Hazardous substances 26-15" in Switzerland. DENIOS offers fire-rated storage containers as specially equipped peroxide stores that meet these special legal requirements.

MINIMISED SAFETY DISTANCE.

Buildings and outdoor installations where organic peroxides are handled must be separated from other buildings or installations depending on the hazard group and quantity of organic peroxides stored, as well as the location, arrangement and type of construction of the buildings and installations. By taking special safety measures such as fire protection, extinguishing or fire alarm technology, the requirement for safety distances may be partially or fully lifted in consultation with the approval authorities. The F 90 / REI 90 / REI 120 versions of our fire-rated stores allow safety distances to be significantly reduced under certain circumstances.

TEMPERATURE UNDER CONTROL.

The SADT (self-accelerating decomposition temperature) is the temperature above which there is a risk of the peroxide undergoing self accelerating decomposition. The temperature of the stored goods must be a minimum of 10 °C below the SADT. In order to guarantee the quality requirements and safety criteria for a constant temperature range for peroxide storage, good thermal insulation is also required alongside fire protection. Our peroxide stores guarantee excellent thermal insulation with mineral wool panels (construction material class A). Integrated climate control/cooling equipment reliably ensures the required temperature range is observed.

A product overview for organic peroxide stores can be found at WWW.DENIOS.DE/LAGER-ORGANISCHE-PEROXIDE

CASE STUDY.

EFFICIENTLY DIMENSIONED AIR CONDITIONING TECHNOLOGY OFFERS SIGNIFICANT SAVINGS POTENTIAL.

A pharmaceutical company based in Denmark is a leader in the development of drugs for the treatment of severe neurological and neurodegenerative diseases. This success is due in part to close collaboration with leading neurologists and neuroscientists. The selection of suppliers is also based on strict quality criteria and requires a high degree of professionalism.

CHALLENGE AND PROJECT.

Chromatography resins are used for protein purification and must be systematically stored and kept ready in a precisely defined temperature range. The defined temperature ranges must be maintained at all times and documented in accordance with GMP. Due to the flammability of the raw materials, fire and explosion protection measures must be provided.
The pharmaceutical company needed a GMP-compliant air conditioning solution for the storage, processing and supply of raw materials in the manufacturing process. The pharmaceutical manufacturer found the right partner in DENIOS for consulting, planning and delivery of a corresponding plant. The customer wanted to invest in twenty climate control chambers in a failsafe, redundant design for the large quantity of raw materials, predominantly in drums. The customer's concept would have meant very high costs, large space requirements and a lot of maintenance. Following a detailed needs analysis, DENIOS engineers were able to significantly streamline the concept and drastically reduce the planned investment.

THE SOLUTION.

The concept developed by DENIOS is based on five climate control chambers. Partition walls create four separate climate control rooms inside each of the five chambers. Each climate control chamber is extra deep and accessible from both sides. Cooling for each chamber is provided by a redundant split air-conditioning unit, which intelligently distributes the air-conditioned air to the individual rooms. This significantly reduces the number of air conditioning units required. Two temperature ranges were defined, +5 °C (±3 K) and +20 °C (±5 K), which can be provided by each of the five chambers.
The four sub-rooms in the chambers are equipped with trace heaters, which ensure exact temperature control. This means any deviations (for example due to material turnover) can be reacted to quickly. Technical ventilation systems counteract increasing temperatures and can blow cold air if needed. Each room is also monitored by a gas detector. If the gas concentration rises above a defined limit, the technical ventilation is switched on and ensures air

exchange. Compared to continuous ventilation, energy costs are thus significantly reduced.
In order to fulfil the fire protection design, the climate controlled chambers are equipped with fire protection insulation, quality class A1 (EI 120). Smoke detectors monitor the inner rooms and signal an alarm if an incident occurs. Sprinkler systems provide immediate fire fighting measures.

RESULT AND CUSTOMER BENEFIT.

DENIOS took a critical look at the system planning provided by the customer and came up with a much more efficient solution. With DENIOS' needs analysis and professional planning, the customer was shown a clear potential saving while maintaining the same high level of performance, quality and safety. During a 6-week factory acceptance test, an external inspector specially commissioned by the client was able to confirm the quality of the system. Thanks to intelligent system control and the optimum design of the power-consuming components, the customer can achieve a high potential saving in energy and maintenance requirements.

WOULD YOU BE INTERESTED IN A SIMILAR SOLUTION?

Take advantage of our manufacturer and developer know-how! Individual advice, competent service and a unique variety of products are our strengths. We'll be at your side right from the very start - always in person, always on site. .

Contact us for more information! +49 5731 753 216

THERMOTECHNOLOGY FROM DENIOS.

CUSTOMISED SOLUTIONS.

SECTION IV

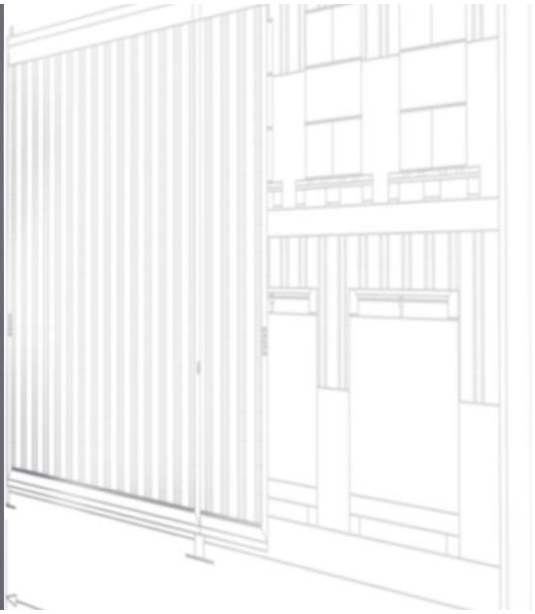
INDIVIDUAL SOLUTIONS.

DENIOS systems have proven themselves worldwide in many sectors and numerous applications. Our range of standard solutions has continually developed and offers outstanding flexibility for individual applications. DENIOS also has extensive experience in the planning and implementation of individual heat chambers and process plants for substance thermal preparation.

HOW YOUR CUSTOM HEAT CHAMBER IS MADE.

SOLUTIONS THAT FIT YOUR NEEDS.

Groundbreaking solutions are created when customer and manufacturer work closely together. Close cooperation is our top priority. When our quote is given, you'll already have a direct contact. Right from the start, you benefit from easy communication options and consistent project management. „Made by DENIOS" means Best fit and Full service – the highest levels of quality, all from one supplier.



BEST FIT – PERFECT INTEGRATION.

Adapted to your available space and to your production conditions: we use an individual solution where our standard range of services does not cover your requirements. This enables us to ensure optimum and uncompromising integration into your production environment. We call this 'Best fit'.
When analysing your needs, we first record your circumstances and ideas. This joint dialogue is really important. It ensures a meaningful and economic design. This is also what we mean by Best fit: you only receive the services from us that you really need.

In our experience, perfect integration works best when one central contact is responsible, from the needs analysis to the implementation and commissioning of the custom solution. This prevents information being lost where interfaces occur. DENIOS is a single source, offering all the services needed for your made-to-measure solution.

FULL SERVICE - CONSISTENTLY PERFORMANCE AND SERVICE ORIENTED.

Your individual solution will be planned, designed and produced for you in-house in accordance with the full service principle. As a supplier and manufacturer we have all the required expertise in-house. Our aim is the precise implementation of your project, on-time, ensured by our specialist staff. We will of course visit you in person for the needs analysis. Your personal project engineer will be available throughout the implementation phase, ready to give you up to date information on the current state of the project. Our door is always open: you may monitor the progress of the project and production in person at any time. Our service department will carry out all the logistics and install the system for you. The commissioning and handover of your heat chamber, including instruction, successfully completes the project. You will then receive comprehensive project documentation. Even when your equipment is up and running you can still rely on us. Our customer service makes sure that your investment retains its worth: with a service and maintenance plan which is tailored to you and your product, we guarantee a high quality, long lasting solution.

NEEDS-BASED CAPACITY AND OPTIMUM SPACE AVAILABILITY.

If a large storage capacity is required but the available space is limited, individual solutions are often the answer. In order to make optimum use of the available space, scaling in every dimension is conceivable, whether in height, width or depth. If existing passenger and forklift traffic routes place restrictions on door openings, insulated roller, lifting or sliding doors can be used instead of wing doors. These ensure space-saving opening and closing.
Do you need to be able to react flexibly to changes in production capacity? Thanks to our newly developed, individually configurable heat chamber system, you can expand at any time. DENIOS also offers large systems for outdoor use. Even if extremely large capacities are required for substances to be heated, we have suitable solutions at the ready. We also offer large thermal systems with roofs over the aisles between the heat chambers. This is an ideal, storage hall type of solution if your existing premises do not offer a sufficient storage area.

ECONOMIC SOLUTION FOR DIFFERENT TEMPERATURE RANGES.

Several separate heat chambers can be used for different materials with different process temperature requirements. However, different temperature ranges can also be realised within one heat chamber. When designing the circulating air heat transfer, we'll discuss together which is the most economical solution for you.

PRODUCTION LOGISTICS PROCESS OPTIMISATION.

In the standard version, our heat chambers are equipped with heavy-duty shelves and grids as storage space. Depending on the storage and retrieval concept, other solutions can also be implemented, such as systems based on the FIFO and LIFO principles. If the goods are to be transported within the heat chamber, we offer systems with gravity conveyors or electrical conveyors. In the age of Industry 4.0 there are almost no limits to process digitalisation. We are also happy to implement fully automatic systems for you with gantry robots, which take over storage and retrieval. Our heat chambers can be equipped with various connections and interfaces, for example to your production control centre or for process documentation. We bring trendsetting digitalisation and automation concepts into reality.

The wide range of DENIOS equipment options is available for all heat chambers FROM P. 54.

CASE STUDY.

INNOVATIVE SYSTEM SOLUTIONS AT A HIGH LEVEL.

Whether valves, pumps or control units: Alfmeier Präzision SE develops system solutions in the fields of plastics technology, electrical engineering, mechatronics and fluid technology - and does so with maximum precision. The international, owner-managed company employs around 2,000 people. Over 50 years of success have ensured that Alfmeier now occupies a leading position worldwide in the automotive sector. The subsidiary Alfmeier Automotive Systems (Shanghai) Co., Ltd. is responsible for the supply of components to the automotive industry. But before the components are installed, it is part of the Alfmeier Group's quality standard that each element is subjected to extensive testing.

THE WAY TO AN EFFICIENT AND SAFE TEST LABORATORY.

An Alfmeier laboratory has to meet a number of requirements in order to test the behaviour of components in fuel: among other things, the storage, inspection and test areas must be positioned near to each other, explosion and gas protection components must be installed to protect employees and the test laboratory must be set up in an indoor space. It is also important to design room systems in such a way that they can be used for long-term tests: a test can take up to 5,000 hours, i.e. about 30 days - a long time. Around 40 fuels will also be used for the tests. For the Shanghai location, the Alfmeier Group planned a laboratory that fulfils all these requirements. It was therefore only logical to commission the international experts in hazmat storage and technical room systems: together with DENIOS AG, Alfmeier Automotive Systems (Shanghai) Co., Ltd. developed an individually tailored three-chamber solution, which is so cleverly designed that all the requirements of a safe multifunctional room system are fulfilled and, in addition, good accessibility and operability are made possible. The solution from Germany also brought a considerable time advantage: as a self-contained and approved system, the DENIOS room system could be easily and quickly integrated into the existing production spaces.

THE DENIOS ROOM SYSTEM: A PERFECT TRIPLE TESTING SOLUTION.

As a multifunctional room system, the laboratory developed by DENIOS for Alfmeier is a real hazard protection all-rounder. The 3-room system is divided into a storage area where the fuels and additives are kept ready for testing, an inspection area where fuel and components are prepared for testing and further analysed before and after the influence of various thermal influences, and a heat chamber where the components are aged under the influence of various temperatures between 40 and 60 °C.

The storage and inspection area is fully air-conditioned, so that a constant temperature of 20 degrees Celsius is guaranteed. To ensure that the fuels are quickly available for testing, a pump can be used to transport substances from the warehouse directly into the test room by simply pressing the foot pedal. The greatest possible safety is also ensured by numerous explosion-proof elements.

CASE STUDY.

A HEAT CHAMBER FOR THE DESERT.

Qatar Airways, like every airline, has emergency slides. These are exposed to large temperature fluctuations. Therefore, tests were carried out in DENIOS climate chambers on possible material deviations. The DENIOS product therefore actively contributed to passenger [or airline] flight safety.

TEST: UNDER REALISTIC CONDITIONS.

Depending on the type of airplane, the emergency chutes are stowed either under the door area or underneath the body of the plane. Like the aircraft itself, they are exposed to extreme temperature fluctuations: from take-offs and landings at a hot desert airport to the extreme minus temperatures at a cruising height of up to 15,000 metres. This means it's vital that the emergency chutes are tested under realistic conditions. For this purpose, Qatar Airways ordered a climate control chamber from the East Westphalian company DENIOS AG, so the emergency chutes on their own fleet could be put through their annual operational tests with a temperature variation of 80 K. The range needed was from -20° C to + +60° C. Compressed air is used to explosively inflate the emergency chutes in the event of an incident. It can then be checked whether the emergency chute opens in the required time window. Before the test is performed, the emergency chutes are put into the climate chamber, to be subjected to both extremes of temperature, one after the other. Only then is the operational test performed.

SEPARATE HEATING PREVENTS THE DOORS FROM FREEZING UP.

The climate chamber is designed and built by DENIOS and has an area of approximately 8 m^2. The emergency chutes were first heated to +60 °C, then cooled to +20 °C. So that this extreme temperature range could be produced, DENIOS only used insulation materials with a high insulation value. The high performance climate chamber consists of an inner unit and the compressor fitted to the outside. The compressor is enclosed due to the internal layout and also to reduce operational noise.

The evaporator is located on the roof. A magnetic door hold-open system keeps the chamber doors open. As the doors would freeze shut at temperatures of -20° C a separate heating system is built into the door frame. Temperature sensors inside provide sufficient measurement data to ensure that the temperature of the chamber is evenly controlled. The control software is located in the external switch cabinet. Additional fittings include LED lighting and the pressure relief flap in the climate chamber roof, in case one of the emergency chutes is accidentally operated during one of the temperature control processes.

AUTOMATED TECHNOLOGY FROM PURIMA.

SEAMLESS INTEGRATION INTO YOUR PRODUCTION PROCESS.

PURIMA, a DENIOS Group company, designs and builds customised system solutions and special equipment for any level of automation. Specialising in industrial parts cleaning, PURIMA has adapted its experience in this field to the DENIOS product range, for example for heating technology. PURIMA designs and builds individual heat chambers for DENIOS, especially where there is a need for automation technology or a GMP-compliant design in stainless steel.

CASE STUDY:
DEVELOPMENT CONCEPT FOR A FULLY AUTOMATIC HEATING SYSTEM.

For over 35 years, DENIOS AG has been considered a reliable and solution-oriented partner for the protection of people and the environment. To remain competitive in the global economy, digitalisation, process automation and efficiency optimisation are at the top of the industry's agenda, as is the case with DENIOS. Customer focus is becoming even more important. Based on a corresponding customer requirement and needs analysis, DENIOS has developed a concept for a fully automatic heat chamber.

MODERNISATION FOR GREATER EFFICIENCY.

For a manufacturer of specialty chemicals, an existing heating system was no longer efficient by today's standards. The old system failed to meet current requirements both in terms of energy and space/benefit ratio. The 150 m² brick room had insufficient insulation. Manipulation areas ("shelf aisles") were forcibly heated and only a small ceiling fan provided some air movement. In addition to the old plant, there were other heat chambers whose capacity was already fully utilised due to production increases. The new facility to be planned therefore had to accommodate additional capacity on the existing floor space. The solution: the new plant will be built at a height and realised as a continuous tunnel.

DIGITAL TRANSFORMATION.

Within the next few years, the customer plans to partially automate the material flow. Driverless transport systems will then transport the containers to their destination. If the heat chamber can be networked, it can be integrated into the digital process environment. The new concept therefore provides for data exchange between the heat chamber and the customer's own control system. For the customer this would be an important addition to the digital transformation. Until now, production monitoring and control has still partly been done with the aid of handwritten notes.

AUTOMATED PRODUCTION PROCESSES.

An automated solution brings significant simplification and reliability to customer processes. Important questions that arise during the process can be answered with a systemic logic. The following questions, among others, arise during the thermal processing of hazardous substances:

- Was the correct substance set up with the substance-dependent target temperature?
- Can the substance be placed in the same area as the other substances?
- Does the substance pose an additional potential hazard?
- How long has the substance been standing in the heat chamber and in which position?

DENIOS AG has taken up the challenge of creating an automated solution based on the proven heat chamber design: a fully automatic heating system for hazardous substances.

FULLY AUTOMATIC HEATING SYSTEM.

As a centralised heating chamber, the fully automatic system supplies the entire operation with temperature-controlled hazardous substances, while precisely maintaining and monitoring the process parameters.
Designed as a continuous oven with several levels, the heat chamber has a very small footprint and can be modularly adapted to the customer's requirements. Two gantry robots - one arranged at each end - ensure smooth storage and transfer. The pallet infeed station can be loaded manually or via driverless transport systems. Here the hazardous substance container is scanned and analysed.
The ERP system then checks the requirements for target temperature, heating times and combined storage conditions according to the stored article master data and thus defines allocation to the appropriate heating lane of the continuous oven.
Each flow section can be heated and managed separately and individually. This results in maximum flexibility of temperature and storage zones. Sectional roller conveyors transport the containers through the tunnel. This enables accumulation and separation which makes optimum use of the total capacity.

PROTECTIVE MEASURES WHEN HANDLING HAZARDOUS SUBSTANCES.

If hazardous substances are handled in the plant, extensive protective measures are required to comply with the legal requirements. Monitored drip trays collect leaks and channel them into spill pallets - separately for each tunnel section if required. An alarm is triggered immediately if a container leaks. Preventive fire protection is also taken into account where necessary. Each chamber is equipped with insulation in fire protection class A1. Optional smoke detectors and extinguishing system pipework ensure appropriate safety and speed of reaction.

CUSTOMER REQUIREMENTS.

The fully automatic heating system from DENIOS meets all the requirements of modern process technology. It replaces manual and error-prone process control and monitoring with reliable, programmed sequences and offers a clear improvement in efficiency. In future, the customer will be able to view and adjust all process parameters digitally at any time. Based on a design proven over many years, all legal requirements are met. DENIOS is setting the course for future-proof process integration of the thermal treatment of substances in the material flow and production process.

PURIMA®

- Year founded: 1989 Headquarters: Porta Westfalica
- In use worldwide in various applications:

WWW.PURIMA.DE

CASE STUDY:

MELTING TIMES REDUCED AND COSTS CUT.

Based on many years of sector experience and proven industrial standards for heat chambers, DENIOS, working together with PURIMA, has developed innovative, process-controlled equipment for customers in the pharmaceutical industry. The equipment precisely controls the melting temperature of the substance to be handled, which needs to be quickly reached in a uniform manner. Further outstanding qualities of the GMP-compliant solution include a high quality, stainless steel design with comprehensive safety functions to protect personnel and maintain recipes, seamless integration into the customer's manufacturing process and ease of use.

CHALLENGE AND PROJECT.

The customer needed to expand its existing production: after studying optimum material flows, the capacities for raw material heating and provision needed to be significantly increased.
The raw materials should be completely melted in a defined time, where the product target temperature and thus the maximum circulating air temperature are subject to validated limit values. Each process step must be verifiable recorded and securely passed to the control system. The raw materials are provided via an air lock between two different cleanroom classes.
When selecting a suitable supplier for the GMP-compliant project, the customer laid special emphasis on product, process and user safety. DENIOS was able to impress with an overall concept for a heat chamber system that not only expanded production capacity, but also made the manufacturing process even more efficient.

THE SOLUTION.

DENIOS manufactured three heat chambers in stainless steel, each of which has two independent compartments. Each compartment had enough space for six Euro pallets, each loaded with two 205 litre steel drums. This gave a total drum capacity of 72 drums, or about 15 tonnes of material. Each compartment is designed as a conveyor oven with its own temperature control. The material is transported by gravity conveyors from the source to destination. The allocation of free locations and the corresponding temperature levels are controlled by the associated process control system. Inside the well-insulated heat chambers, the raw materials are melted in a set time, leaving no residue.
This is done with high-precision temperature uniformity (0.1 K) while ensuring compliance with the maximum permissible limit temperatures, which may deviate by a maximum of +3 K. This precision process reliability is ensured by the DENIOS heat chambers through the optimum interaction between air heating, flow geometry and controlled air volume. Energy efficiency class IE 3 motors combined with frequency inverters ensure the energy supply. Steam is used to ensure heat transfer to save resources. Intelligent heat transfer and air recirculation together with good insulation of the equipment ensure high levels of efficiency are achieved. The energy requirement for heating raw

PURIMA®

materials was significantly reduced by the DENIOS solution compared to the previously installed equipment. The melting times were almost halved and the planned use of steam has been significantly reduced.

SAFETY FROM THE EXPERTS.

DENIOS brings over 35 years' experience of hazardous materials storage to the manufacture of its own products. Every compartment has an integral, certified spill pallet for containing hazardous substance leaks. Each spill pallet is monitored by a level sensor and leaks are notified quickly and reliably to the control system.
The heat chambers are designed using non-combustible mineral wool in Euro class A1 in accordance with the client's fire protection design. Inside, temperature sensors and a separate overtemperature protection system permanently monitor the heat level in the equipment.
In the event of an unusually rapid or high rise, the works fire brigade is alerted immediately. They can then react immediately and would flood the interior of the heat chamber via the installed low expansion foam nozzles in the event of a fire.

CONSISTENTLY CONVINCING QUALITY IN PRODUCT AND SERVICE.

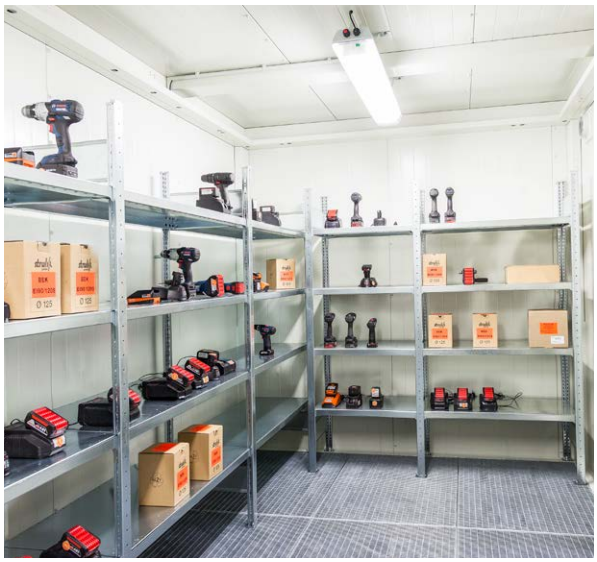
In addition to the plant technology, DENIOS was able to impress as a competent partner within the pharmaceutical industry through its GMP-compliant project management. Continuous quality assurance during production ensured smooth results for the Factory Acceptance Test (FAT), commissioning and Site Acceptance Test (SAT). DENIOS comprehensively supported the customer in preparing on-site activities with the provision of planning documents and checklists. Training for assembly technicians, users and service personnel ensured safe, smooth processes. Comprehensive documentation made available to the customer supplies important information for operation, maintenance and repair of the equipment.

OTHER PRODUCT AREAS. DENIOS STORAGE AND PROCESS TECHNOLOGY.

DENIOS manufactures safe and environmentally friendly storage technology in steel, as well as heat chambers and fume cupboards for process technology. Products are designed to suit the storage or process medium and the associated activities. Based on standardised systems, customers can choose individual elements from our wide range of equipment. Custom solutions can be created in all product areas. You'll benefit from excellent customer support - on site where needed.

STORAGE AND TEST ROOMS FOR LITHIUM BATTERIES. SAFETY FROM THE EXPERTS.

The hazard potential when handling lithium batteries is high. Deep discharge, fire, chemical reactions, explosion in the worst-case scenario – each individual situation means a risk for workers, companies and the environment. This is where DENIOS can help. We offer a comprehensive range of specialist products to ensure your safety. Whether you need to safely store, charge or test lithium energy storage devices.



WWW.DENIOS.DE/LITHIUM-AKKUS

HAZARDOUS MATERIALS STORAGE TECHNOLOGY.

In the field of hazardous materials storage technology, we offer hazardous materials stores and fire-rated stores - approved by the DIBt for the legally compliant storage of flammable, toxic, oxidising or water-polluting substances. Our team of experts will handle the complete planning and realisation process for you - for example for your new solvent store, paint supply room, waste store and much more!

WWW.DENIOS.DE/GEFAHRSTOFFLAGER

CONTAINMENT SYSTEMS. TECHNICAL VENTILATION SYSTEMS FOR CAPTURING HAZARDOUS SUBSTANCES IN THE WORKPLACE.

Work and production processes in many areas of industry and the chemical and pharmaceutical sectors require the handling of substances or materials which produce hazardous emissions while being processed. DENIOS worktables and multi-task workstations offer personal, product and room protection at the highest level, with explosion protection as an option.

WWW.DENIOS.DE/CONTAINMENT

TECHNICAL SAFETY ROOMS. SENSITIVE TECHNOLOGY SAFELY HOUSED.

High value, technical equipment and electrical installations are needed in all sectors. Often the technology is not just used in fixed buildings or rooms, for reasons of space. Mobile solutions are in demand for frequent infrastructure changes or for outdoor applications. This is where DENIOS technical safety rooms (TSR) are used – e.g. on the roof of a hospital or administration building, inside a substation, in a port terminal or on a railway line. Our fire and vandal-protected room systems house emergency power systems for uninterruptible power supplies, power generators (e.g. diesel generators or fuel cells) as well as radio and energy technologies in a flexible manner. Many other applications, such as the testing of lithium energy storage devices can be created.

THERMOTECHNOLOGY FROM DENIOS.

CUSTOMISED SOLUTIONS.

SECTION V

EQUIPMENT.

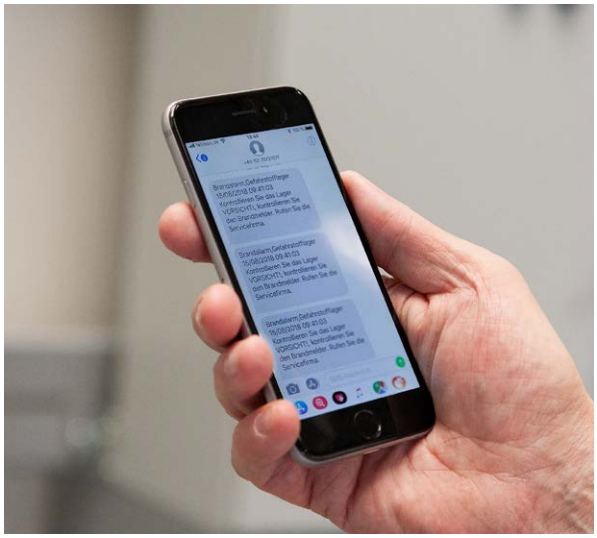
Use the huge variety of DENIOS products to set up your heat chamber to meet your specific needs. Thanks to our many years of experience, we know exactly what our customers need and have included the right modules in our comprehensive range of equipment. From numerous tried-and-tested components choose those that are optimally tailored to your task - for a safe, efficient and convenient solution.

EQUIPMENT FOR HEAT CHAMBERS.

INCREASING REQUIREMENTS. INNOVATIVE SOLUTIONS.

The pace of industrial, technological and social change is accelerating. The complexity of requirements is increasing. Manufacturing companies must keep pace especially in the areas of process optimisation and digitalisation, energy efficiency and plant safety and must be prepared for future requirements. We have set ourselves the goal of helping to shape the future, supporting our customers with modern and innovative solutions for their tasks. Even in the standard version, our heat chambers are energy-efficient and safe. Our wide range of equipment options allows us to flexibly adapt them to your individual needs.

Digital variant configuration: with a well-founded, personal needs analysis and consultation at your site, we'll create the basis for a custom-fit solution. By comparing your requirements with our product range, we'll design the system individually for you with the help of the digital variant configurator. If your requirements cannot be met by the standard version, a project team of our experienced engineers will develop a customised solution for you.



Condition monitoring: handling hazardous substances is subject to strict regulations and laws for reasons of work safety and environmental protection. Planning, organising and operating a store for hazardous materials entails a multitude of challenges and obligations. Digital services from DENIOS offer reliable and convenient support. Equip your heat chamber with DENIOS connect digital condition monitoring for example. This allows you to permanently record the status of your equipment, configure alarms and receive notifications via SMS and/or e-mail in real time.

PERSONAL ADVICE.

No matter how advanced technology may be, there is no substitute for a personal conversation. The first step towards creating a custom-fit solution is making contact with our experts on your premises, so they can assess your situation.

Take advantage of this free service and get in touch! +49 5731 753 216


Aktuell :
5.8°C
DENIOS
CAUTION
EX
DENIOS

SECURELY NETWORKED. CONDITION MONITORING FOR HAZARDOUS MATERIALS STORES.

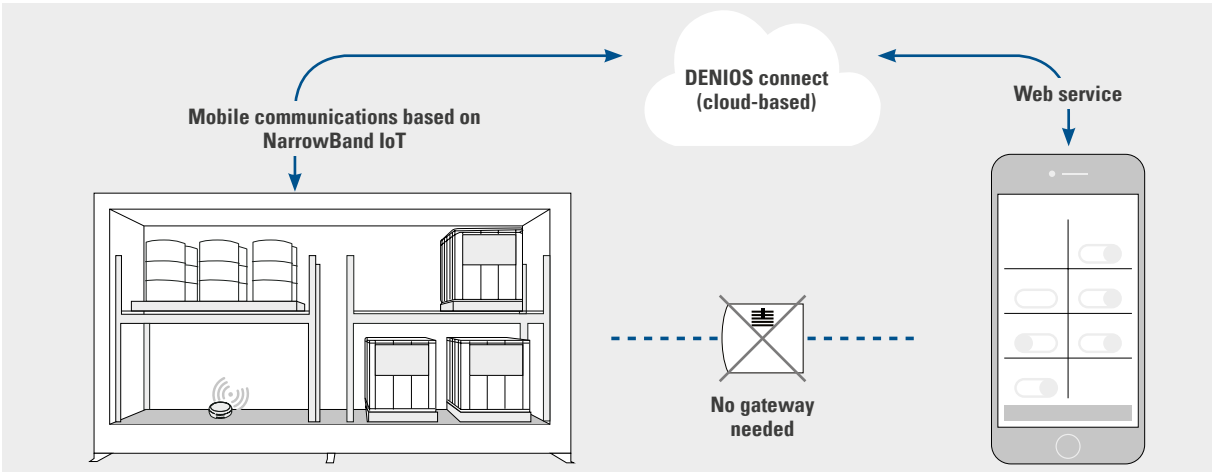
WEB APP FOR A NEW LEVEL OF SECURITY - ANYTIME, ANYWHERE.

As an operator, you know that you must regularly check the proper condition of your hazardous materials store, as required by law. The inspection must comply with the specific requirements of the Industrial safety regulation (BetrSichV) for the risk in question, e.g. in the case of fire and explosion hazards.
DENIOS connect offers you optimum support so that you can complete all the necessary checks properly - with the help of practical data transmission and intelligent condition monitoring solutions.

Regardless of whether you are on the move on your company premises or on standby duty: the active DENIOS connect sensors permanently monitor the condition of your equipment. If there is a leak, smoke or other fault, DENIOS connect sends you an alarm - in real time as an SMS or e-mail on your smartphone, tablet or desktop PC. You can react immediately, saving valuable time as well as any subsequent costs for rectifying the situation. The incident report documenting the event can be easily downloaded as a PDF. In addition, a reminder function ensures that you never miss a maintenance appointment. DENIOS connect makes heating, melting or cooling hazardous substances safer and more sustainable than ever before.

STATE-OF-THE-ART MOBILE COMMUNICATIONS TECHNOLOGY: NARROWBAND IOT.

DENIOS connect is a user-friendly, cloud-based web app. It has been tested according to the latest security criteria and complies with the strict rules of the General Data Protection Regulation. NarrowBand IoT, currently the most efficient mobile network technology for applications such as DENIOS connect, is used for data transmission. Independent of your company network, you will have access to the relevant data and alarm messages for your equipment at any time and from practically anywhere in the world. Narrowband IoT is based on LTE and uses the associated 3GPP security mechanisms. The technology is specially designed for smaller data volumes and dispenses with unnecessary LTE functions. It therefore offers particularly cost-effective and reliable mobile communication.



WEB APP - QUICK AND SIMPLE TO ACTIVATE.

The DENIOS connect web app can be activated in just a few steps. When you purchase a DENIOS connect product, you will receive a login code to enter when registering for your company account. The assignment of admin and user roles as well as passwords are easy to manage in the application itself.

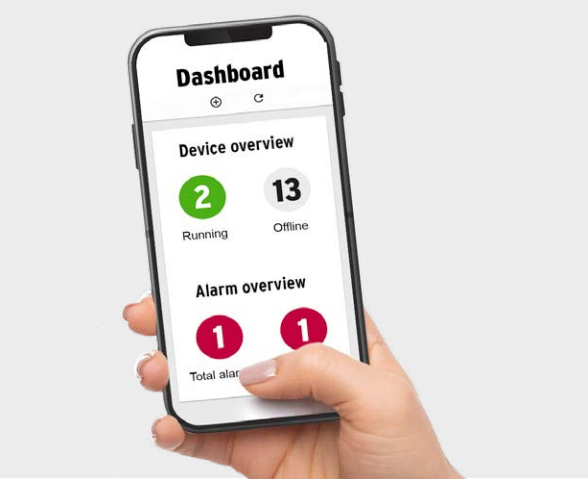
All your products are clearly displayed on the DENIOS connect user interface. Recipients for the alarm messages can be saved and the type of notification selected: SMS and/or e-mail. Choose from predefined details for the message text. Alternatively, you can opt for the "free text" option. In addition, you'll have access to dashboards and detailed information on your networked DENIOS products.

If there are several systems on your premises, you will of course be informed of the exact location for the alarm message in the event of a malfunction.

MEASUREMENTS FOR CONDITION MONITORING.

Permanent status recording, alarm configuration and notifications by SMS and/or email are possible for the following safety-relevant components of the system:

- Room temperature.
- Air conditioning system (operating / fault).
- Technical ventilation (operating / fault).
- Heating (operating / fault).
- Door control unit / fire alarm (fault).
- Door (open / closed).
- Central power supply (operating / power failure).
- Gas sensor (fault).
- Leak sensor (fault).
- Upcoming maintenance (info).

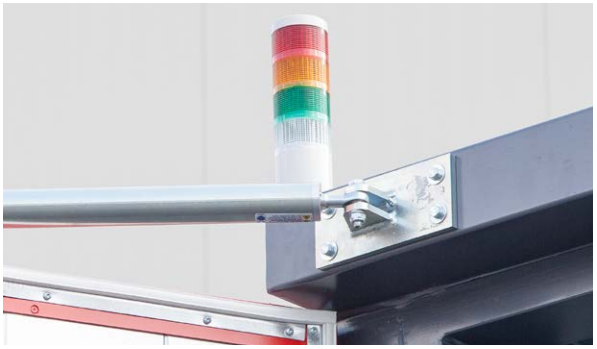


SPILLGUARD® CONNECT LEAK RECOGNITION.

The first warning system of its kind: fully autonomous, operated at the push of a button and suitable for fitting to any type of spill pallet, for temperatures up to 60 °C. SpillGuard® connect safely detects dangerous leaks and sends a leak warning message via SMS and/or email to your smartphone, tablet or desktop PC. You can react immediately, saving valuable time in cleaning up the leak as well as any subsequent costs.

THE ON-SITE WARNING.

DENIOS connect transmits data and signals that are also available to view on site at the equipment at any time. This gives you comprehensive warning as soon as there is a problem. For example, use the DENIOS Communication Bar (**see Control technology**, P. 71) to get a quick overview of all important condition variables on the easy-to-use touch screen. The alarm function can be provided using visible warning lights and/or audible sirens.



TEST DENIOS CONNECT – LIVE.

See the advantages of DENIOS connect technology for yourself in a live demonstration.

Get more information and book a free consultation: +49 5731 753 216 | WWW.DENIOS.DE/CONNECT

PRODUCT HANDLING.

www.denios.de/tt/produkthandling

The logistical processes within a production system are essential for your economic success. DENIOS develops products to make every hand movement and step even safer and more comfortable for your employees. This is the only way to increase work safety in everyday operations.

PUSHBACK TROLLEY CONVEYOR SYSTEM.

Item No. 274818

- For DENIOS storage containers with shelving SC and RFP in extra deep design.
- Pallets stored according to the Last-In-First-Out principle.
- The pallets can be set both lengthways and crossways.
- Particularly safe: despite rail angle, the pallets are in a horizontal position.

SUPPORT RAILS FOR PALLETS.

Item No. 274828

- Facilitates the positioning of pallets in the racking system.
- Full-length support rails.
- Enables exact positioning and thus optimum use of the available space.

CONVEYORS FOR DRUMS AND PALLETS.

Item No. 274820

- Drum/pallet transport by driven rollers or lifting and lowering roller conveyor (gravity conveyor).
- Adapts to suit the task exactly.
- Low maintenance and wear-free.

HAZARDOUS MATERIALS INTRALOGISTICS: EFFICIENT AND SAFE.

The intralogistics of hazardous substances poses special challenges for companies. Transport routes and process steps must not only be designed efficiently, but above all safely. This is because the transport, handling, storage and retrieval of containers leads to an increased risk of accidents. Any damage that leads to the uncontrolled escape of hazardous substances must be avoided at all costs.

Safety products from DENIOS reduce transport risks to a minimum and ensure safe and efficient handling of hazardous substances in your company.

Find out more now at WWW.DENIOS.DE/INTRALOGISTIK

In our equipment range you will find efficient solutions for handling drums and pallets. For example, roller conveyors and support rails make it easier to position pallets and enable optimum use of the storage space.

SHELF SUPPORTS FOR HORIZONTAL DRUMS.

Item No. 274817

- Handling system for installation in a DENIOS technical room system.
- For heat chambers: in combination with a drive, the drums and their contents can be rolled for fast temperature distribution.
- Pull-out shelf supports make it easier to load drums horizontally.

OVERHEAD CONVEYOR SYSTEM WITH DRUM TONGS.

Item No. 274819

- Handling system for installation in a DENIOS technical room system.
- Space-saving system with drum tongs for gripping containers.
- Safe, quick transport.

DRUM HANDLING.

www.denios.de/fasshandling

- Whether lifting, moving, turning, tilting or emptying - you will find the right solution for all your tasks at DENIOS.
- Special products for Ex areas.
- Various forklift attachments enable drums to be lifted and transported and stored in a space-saving manner without the help of other people.

AUTOMATED PRODUCT HANDLING.

A DENIOS heat chamber with integrated system control can be automatically loaded via your automated guided vehicle (AGV). To do this, the DENIOS control technology communicates with the control technology of the AGV. To ensure that IBCs and drums are always positioned by the transport vehicles exactly at the desired location in the heat chamber, near field communication (NFC) reflectors are used as positioning aids. With occupancy monitoring, the customer can also check via his control system which positions are occupied or free.

Would you like to know more about automation options? Get in touch with us today! +49 5731 753 216

MAKING USE OF THE SPACE.

www.denios.de/tt/raumnutzung

When storing hazardous substances, safety and also efficient use of the available storage space are important factors. The question is, what do you want to use the walk-in space for? At DENIOS you will find, for example, height-adjustable shelving for the convenient storage of small containers or partition walls to create different areas.

ADJUSTABLE SHELF HEIGHTS.

Item No. 274830

- Height-adjustable shelf unit with removable grids and shelf guard.
- Choose any number of shelves between 1 and 4.
- Enables optimum use of the space for different types of containers.

VERTICAL PARTITION WALLS.

Item No. 274831

- Create different placement / storage / climate / temperature areas in the same room system.
- Different substances can be placed / handled separately from each other in compliance with the law / temperature requirements.
- For smaller quantities, it's a cost-effective alternative to separate room systems.

EXTRA DEEP DESIGN.

Item No. 274832

- The extra-deep design of the shelving system offers an increased storage capacity and more space for bulky goods.
- In combination with access from both sides, the room system is easy to load.
- In the extra-deep version, the shelving system can also be created as a fully or partially walk-in room system.

THIRD STORAGE LEVEL.

Item No. 274829

- High storage capacity on a small footprint.
- Economic use of the production area.
- Can be combined with a handling system for simple and safe loading of the third storage level.
- Split delivery of the shelving system.

INDUSTRY-SPECIFIC VERSIONS.

www.denios.de/tt/branchenspezifische-ausfuehrungen

Whether heating, cooling, tempering, melting or drying: we offer customised thermotechnology systems [or equipment] for all industrial sectors that work with temperature-sensitive substances. Solutions for small requirements and for large volumes - with DENIOS you're ready for all requirements.

SILICONE FREE DESIGN

Item No. 274836

- Suitable for industrial areas where paint damage resistance is required.
- The product is as far as can be determined silicone-free and free of paint-incompatible substances.

STAINLESS STEEL DESIGN, GMP COMPLIANT.

Item No. 274835

- Suitable for cleanroom applications.
- The heat chamber design enables optimum cleaning processes to be used.
- GMP-compliant documentation is provided to accompany the product.

HEAT CHAMBERS FOR FOOD AND PHARMA.

In various projects for the food and pharmaceutical industries, we have developed modular and redundant heat chamber systems for our customers. From this, we have derived a standard that enables customised configuration. Whether 1, 2, 4, 6, 8 ... chambers: thanks to modularity, the standardised system can be scaled as desired - for flexible production capacities.

Would you like to know more about heat chambers for food & pharma? Give us a call! +49 5731 753 216

DOOR EQUIPMENT.

www.denios.de/tt/torausstattung

The heat chamber door has a major influence on loading and unloading processes. DENIOS offers equipment options that enable smooth, comfortable and safe work processes. As standard, our heat chambers are equipped with wing doors in 1 or 2-wing design.

SLIDING DOORS.

Item No. 274824

- The version with sliding doors offers more space and safety in the chamber access area.
- Electrically operated sliding doors can also be conveniently controlled from a forklift truck.
- When installed outdoors, a major advantage is that the doors cannot slam shut unintentionally due to wind loads.

ROLLER SHUTTER DOORS.

Item No. 274825

- In the version with roller shutter doors, access to the chamber area is unrestricted when the doors are open.
- Roller shutter doors can be used for heat chambers up to an operating temperature of 150°C.
- The doors can be operated electrically or by a hand crank.

VERTICAL LIFT DOORS.

Item No. 274826

- Vertical lift doors allow wide opening of the loading area without interfering with traffic.
- The doors offer the same insulation value as the rest of the side elements of the chamber.
- Operation is via an electronic control.

ADDITIONAL GATES AND DOORS.

Item No. 274827

- Example: additional / multi-sided access, two 1-wing doors instead of one 2-wing door for limited traffic areas, airlock / pass-through functionality, emergency exit / access.
- Possibility of separating different cleanroom areas.
- Possibility of access from both sides with extra-deep design.

ROOM ACCESS.

www.denios.de/tt/raumzugang

Digital access control and good lighting make a decisive contribution to safe room access. But the convenient and time-saving gate remote control also pays dividends in daily use.

COMMUNICATION BAR.

Item No. 274651

- For DENIOS walk-in fire-rated storage container WFP.
- Developed by DENIOS.
- Modern, central control unit for all electronic components of the technical room system incl. access control via RFID.

DOOR LOCKING.

Item No. 274863

The wing doors of the heat chamber are fitted with safety locks. Alternatively, we offer:

- Additional unlocking from inside.
- Vertical locking bars.
- Espagnolette locks.

EXTERNAL LIGHTING WITH MOTION DETECTOR.

Item No. 274840

- External lighting with motion sensor.
- For brightness and motion-dependent lighting control.
- Large detection range.

DOOR REMOTE CONTROL.

Item No. 274839

- For DENIOS fire-rated storage container RFP SD-ED.
- The electric sliding doors can be easily opened and closed from the forklift, saving time, with a practical remote control unit.

AIR EXTRACTION.

www.denios.de/tt/abluftfunktion

The air extraction function prevents the accumulation of dangerous gas concentrations when handling substances which release toxic gases. The air-gas mixtures are extracted so that the doors can be opened without danger, while complying with the occupational exposure limits (OEL). The creation of an explosive atmosphere is also counteracted. The energy discharged via the air extracted can be fed back into the system with the aid of heat recovery or used for other operational purposes.

AIR EXTRACTION FOR HEAT CHAMBERS.

Item No. 274837

- The air extraction function ensures that contaminated air is directed out of the system.
- Controls the air exchange permanently, time-controlled or signal-controlled.
- Prevents the occurrence of dangerous gas concentrations.
- Optionally combinable with resource-saving heat recovery.

GAS WARNING EQUIPMENT.

Item No. 272087

- Explosion-proof transmitter for the detection of combustible gases and vapours.
- Used for preventive fire and explosion protection.

HEAT RECOVERY FROM EXTRACTED AIR.

Item No. 274838

- Regenerative system in addition to the air extraction function.
- Recovery of thermal energy from the extracted air.
- Economic advantages: increase in energy efficiency, reduction of operating costs.
- Ecological advantages: conservation of resources and reduction of emissions.

OUTDOOR INSTALLATION.

www.denios.de/tt/aufstellung-im-freien

When installed outdoors, your heat chamber is exposed to the weather. To counteract this, an extendable canopy or roof and rain channel heating for example can help. After a longer period of operation, it is also worth having a reconditioning check carried out by our service technicians.

EXTENDABLE ENTRANCE CANOPY.

Item No. 272975

- For DENIOS walk-in fire-rated storage container WFP.
- Practical, extendable canopy for the entrance area for bad weather protection.
- Assembly takes place in the DENIOS plant and is therefore an integral part of the turnkey system.
- On site, the canopy is extended and locked in place.

ROOF HEATING.

Item No. 272100

- Heating of the roof surface helps to prevent a build up of snow.
- Can be installed with an external temperature sensor and a controller.
- Optional heated rain channels also remain frost-free in sub-zero temperatures ensuring optimum drainage.

PREPARATION CHECK.

www.denios.de/aufbereitungs-check

- Free check of the material condition, function and equipment of your hazardous materials store by our certified service personnel with manufacturer's expertise.
- Free initial consultation for preparation and preventive maintenance by our service technicians.

FIRE PROTECTION.

www.denios.de/tt/brandschutz

For flammable and oxidising media, legislators require compliance with the strictest fire protection regulations to protect people and the environment. You should get information in good time on the various requirements and define the measures which will give the best possible protection from the risks of fire.

FIRE BULKHEADS.

Item No. 274654

- Fire-rated bulkheads for breakthrough points in fire-rated store walls.
- For cable installations and pipes or ventilation pipes and ducts (fire protection flaps).

AEROSOL EXTINGUISHING TECHNOLOGY.

Item No. 272075

- Extinguishing technology with aerosol according to EN 15276-1, without addition of water.
- Significant cost savings as there is no need for fire water retention systems according to AwSV.

EXTINGUISHING SYSTEM.

Item No. 274844

- Semi-fixed extinguishing systems for supply by the fire brigade.
- Designed according to the VDS guideline for operation with water or low expansion foam.
- Pipe dimensioning according to hydraulic calculation of the sprinkler pipe network.

EXTINGUISHING WATER EXTRACTION.

Item No. 274845

- Targeted drainage of the extinguishing water from the spill pallet.
- Suction nozzle for emptying the spill pallet with on-site pump.
- The pipe break-though points through the side wall of fire-rated systems are fire-resistant with F 90 approval.

POWDER EXTINGUISHERS.

www.denios.de/feuerloescher

- Fast flow extinguishers.
- Ideal for areas which cannot be monitored by a person.
- Trigger automatically when exposed to heat.
- For fire classes A, B and C.
- 6 kg extinguishing medium.
- Trigger temperature +79 °C. Operating range to -30 °C.

HANDHELD POWDER EXTINGUISHER.

www.denios.de/feuerloescher

- High quality, low maintenance dry chemical powder extinguisher in accordance with EN 3.
- For fire classes A, B and C.
- Various sizes and extinguishing agent units available.

FIRE ALARM

Item No. 272077

- Protection of a fire-rated system is dependent on early recognition of any fire.
- DENIOS fire alarms are equipped with approved multi-sensors, which detect smoke and fire quickly and reliably.
- Integrated into the control technology of the room system, further protective measures can also be mapped.

THINK ABOUT MAINTENANCE NOW.

DENIOS fitters are qualified to maintain fire doors and gates and are also qualified to test and assemble fire protection flaps and fire protection elements. We'll remind you when regular maintenance is due and make sure it's carried out.

Book your free consultation now: +49 5731 753 216

WORK SAFETY.

www.denios.de/arbeitsschutz

The safety of your employees is the highest priority. We support you in meeting your operator duties: our product range includes many options for suitable work health and safety equipment.

SAFETY BARRIERS AND IMPACT PROTECTION.

www.denios.de/rammschutz

- Effective hazard prevention for internal traffic accidents.
- Depending on the application, variable impact protection systems and barriers are available.
- Products suitable for indoor and outdoor use.

VIDEO SURVEILLANCE.

Item No. 272096

- Camera surveillance and recording of the hazardous area, inside or outside.
- Also available in Ex proof design.
- For the observance of personal rights, the consent of the persons affected by the surveillance or an agreement between the employee and the company is required.

LOCKABLE INFOBOARD OUTDOOR.

Item No. 272407

- Weather-resistant, lockable information box made of aluminium, silver anodised, with ESG safety glass.
- Suitable for clearly displaying appropriate work instructions and information for work safety in accordance with the risk assessment.

EMERGENCY SIGNALING.

Item No. 274834

- Various signaling systems are available depending on requirements, e.g. alarm manual call point, fire alarm.
- Can trigger audible and/or visual warning signal and/or forward to process control system.
- Integrated into the control technology of the room system, further protective measures can also be mapped.

FIRST AID.

www.denios.de/erstehilfe

- A first aid station attached to the system or nearby provides quick access to the necessary first aid.
- Our first aid range contains a large selection of products.
- Choose your ideal options according to your needs.

WORKPLACE HEALTH AND SAFETY - TOPICS AT THE DENIOS ACADEMY.

Workplace health and safety brings different challenges and tasks to modern day operations. Often, these tasks can only be carried out by personnel specially trained for this purpose, e.g. hazardous substances officers, environmental protection officers or experts in fire protection and prevention. DENIOS is also the right partner for the training and further education of experts. You will find the right seminar in the extensive range offered by the DENIOS Academy.

Find out more! WWW.DENIOS-ACADEMY.DE

SERVICE & MAINTENANCE FROM DENIOS. EVERYTHING FROM ONE SUPPLIER.

Proper regular maintenance and servicing of a heat chamber is needed to ensure permanently safe operation that complies with the law at all times. It also ensures that your equipment retains its value. Only qualified and certified fitters and technicians are legally allowed to service and maintain electrical installations and electrical and mechanical fire/explosion protection systems. At DENIOS we're your service partner, with the all the expertise of a developer and manufacturer - reliable, competent and always at your side.


DENIOS
Technical Service
DENIOS

OFFICIALLY CONFIRMED: OUR TEAM HAS ALL THE REQUIRED CERTIFICATIONS.

Hazardous materials handling is a very sensitive area and must therefore comply with a large number of legal requirements. In order to be allowed to carry out services - especially on electrical systems and fire and explosion protection devices - the specialist must be appropriately qualified.

The DENIOS service team has a very broad base and is also ideally equipped to handle complex requirements. We have all the qualifications and certifications required to service and maintain your equipment. The use of DENIOS specialists ensures that you can benefit from our comprehensive expertise as a manufacturer for all service options.

We not only know the technical criteria of the individual components, but we also understand the interaction of all the factors involved - ensuring the holistic, safe functioning of your system.

Whether maintenance, repair or spare parts: we'll be happy to carry out a non-binding consultation at your location, free of charge, including a professional inventory. On this basis, we can then organise customised service from our team for you.

CERTIFICATIONS OF THE DENIOS SERVICE TEAM.

Our employees have up-to-date specialist knowledge and also regularly take part in further training. This allows us to react quickly to your requirements. Of course, we will always observe any company-specific safety regulations at the installation site. Here you will find an example of our qualifications for servicing heat chambers:

- SCC training.
- Qualified person for fire-rated doors and gates as well as specialist for hold-open systems.
- Expert for testing and assembling fire protection flaps and fire protection elements according to DIN 4102 and DIN 18017.
- Qualified person in electrical and mechanical explosion protection.
- Welding test certificate.
- Driving licence for motor-driven industrial trucks according to DIN 15140 (combustion engine and electric drive) and operator's licence for aerial work platforms.
- Measurement/testing technology seminar on electrical systems (DGUV V3, DIN VDE 0100, DIN VDE 0701-0702).
- Dangerous goods training according to 1.3 ADR and § 6 GbV.
- Qualified electrician for specified activities.
- Expert for the testing of electrical systems (DGUV V3, DIN VDE 0100, DIN VDE 0701-0702).
- Expert on refrigeration and air-conditioning systems and heat pumps. (Category EC 303/2008, EC 842/2006, § 5 ChemKlimaschutzV).

MORE HIGHLY QUALIFIED OFFERS FOR SAFETY & SERVICE.

Do you have other company equipment to maintain besides your heat chamber? Feel free to contact us, our portfolio of services is wide-ranging and is regularly expanded.

Book your free consultation now: +49 5731 753 216 | WWW.DENIOS.DE/SERVICE-WARTUNG

The DENIOS service team is your reliable partner. Advice at the ready, hands-on and always with a solution.

MAINTENANCE FROM DENIOS.

WHY PROFESSIONAL AND REGULAR SERVICE IS SO IMPORTANT.

For safety reasons, the handling of hazardous substances is subject to strict regulations and laws. Operating a heat chamber for hazardous substances comes with a number of challenges and obligations. Regular inspection, maintenance and servicing of the system and its individual components is not only required by law, but also ensures the long-term serviceable condition of the equipment.
Operators who fail to comply with these obligations risk heavy fines and, in the event of damage, the loss of insurance cover.

In addition, operators must also carry out inspections that are not directly mandated by law in order to maintain the equipment. For example this includes checking the roof drainage, to make sure it is not blocked. At DENIOS, we provide you with competent support and advice in all matters relating to prescribed and required maintenance activities.

THE DENIOS MAINTENANCE SERVICE COVERS:

- One-off inspection or maintenance contract.
- Trained and certified service technicians.
- On-site repair of defects and damage, where possible. Large scale repairs will be quoted for and carried out separately.
- Preparation of service reports and inspection records.
- Fitting the test sticker(s).
- Travel costs and small consumables are always included in the maintenance price.

THE ADVANTAGES FOR YOU:

- Legal compliance.
- Maintenance of your insurance protection including limitation of company liability in the event of a loss.
- Avoidance of costly repairs with regular maintenance.
- Minimised risk of downtime and extended product life.
- Maintenance appointment reminder from DENIOS.
- Safety for your employees and your company.

Ingo Schlutter, Head of Quality and Service, DENIOS SE, and his team will ensure that you comply with all the legally specified maintenance intervals. We will proactively contact you and will be happy to carry out all the necessary inspection, maintenance and servicing work for you. Professional and reliable.

INSPECTION PROCESS.

Our DENIOS service team completes the legally compliant testing procedure as a holistic process and checks each of the prescribed criteria conscientiously and professionally.

CONDITION MONITORING.

We check your equipment for damage inside and outside and identify possible problems in the way it operates. We pay special attention to the installation conditions: our experienced technicians check statics and mountings as well as safety distances and accessibility. We also check for contamination, especially in spill pallets, ventilation grilles and roof drainage.

COMPLIANCE INSPECTION.

Compliance with the legally prescribed safety measures, especially for fire and explosion protection, is an essential factor for the safety of your equipment and is therefore carefully checked. The presence of the legally required markings is also examined as part of the compliance inspection.

FUNCTIONAL TEST.

DENIOS specialists check the functionality of the heat exchangers on heating and air conditioning/cooling units. For the doors and gates, attention is paid to ensure a precise closing mechanism. We also inspect the electrics and control technology. In addition, fire detection and fire protection flaps are tested if your system is equipped with fire protection.

TEST REPORT AND STICKER.

After completion of all required inspections, the responsible inspector fills out and stamps the service booklet in accordance with the regulations.
If the hazardous materials store can be successfully approved, he issues the corresponding inspection sticker.

INSTALL. COMMISSION. STAY SAFE.

You can rest easy with DENIOS: we'll take care of the safe delivery and professional assembly and commissioning of your room system. We also take care of regular maintenance and servicing on request.

TRANSPORT TO THE INSTALLATION SITE.

Our worldwide logistics network ensures smooth travel arrangements for delivery. Whether we use our own DENIOS flat bed trailer or a trusted freight forwarder, we ensure your room system is transported safely and arrives on time. Even special transport (extra wide or extra high) and overseas deliveries are no problem. We will take care of all the arrangements including obtaining the necessary special permits. Appropriate transport packaging is of course ensured. If required we can also provide suitable lifting equipment for unloading and final assembly.

INSTALLATION AND COMMISSIONING.

DENIOS technicians guarantee the professional installation of your room system and will work with you to complete the Site Acceptance Test including all installation and operational tests. Our standardised solutions can be commissioned immediately, as they have General technical approval; for customised projects approval from the authorities needs to be obtained. Right from the design and production phase, we take care of contact with the responsible authorities so that individual acceptance can proceed smoothly. Our specialist personnel will then instruct the users directly on the product and comprehensive product documentation will be handed over. DENIOS room systems: install, commission, stay safe!

The delivery of a DENIOS heat chamber takes place as a heavy transport by low loader.

A crane is usually used to install a heat chamber outdoors.

ADVICE FROM DENIOS. PROFESSIONAL AND INDIVIDUAL.

The thermal treatment of hazardous substances sometimes poses a high safety risk. This makes it all the more important to have a competent partner with a high level of expertise at your side right from the planning stage. Our experienced consultants are there for you at any time and can visit your company to carry out an in-depth analysis and offer advice. Contact us to arrange an appointment.

THERMOTECHNOLOGY. THE HOLISTIC VIEW.

DENIOS has been developing and manufacturing thermotechnology products for hazardous substances for over 35 years. But that's not all. We always take a holistic and forward-looking view of your task. With individual advice, an understanding of local legislation, a wide range of products and qualified service, you'll receive a complete portfolio of services from a single source and can rely on a competent partner at your side throughout the entire product life cycle.

ALWAYS AT YOUR SIDE.

There's a lot to consider with thermotechnology for hazardous substances. That's why our experts are always there for you, providing personal, competent support and advice every step of the way.

Project request
You are welcome to make a project enquiry, without obligation, on **telephone number** +49 5731 753 455 **or email** SALESBERATERES@DENIOS.DE. We will get back to you as soon as possible.

Needs analysis and free, on-site advice
To ensure that the project runs smoothly without any surprises, it is important that our technical experts get a precise picture on site and analyse your individual requirements with you in detail.

Planning & Project management
Reliability in planning is important for both sides, which is why we'll give you a binding delivery date. For a project, a direct contact will coordinate the project and ensure adherence to deadlines.

Production
Whether standard or customised solution, thanks to state-of-the-art production and excellent quality management, you'll receive a wide range of high-quality products.

Transport, assembly & commissioning
Thought of every detail? Let us handle transport & installation. We'll check the conditions on site in advance so that everything runs smoothly on the day of commissioning.

Service & maintenance
After commissioning, you as the operator are responsible for the maintenance and proper condition of the system. We support you with our services n complying with your obligations.

Contact us for more information!

MORE ADVANTAGES WITH KEY ACCOUNT.

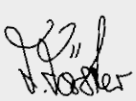
REACH YOUR POTENTIAL.

With international consulting at your location, when you partner with us you'll benefit from our specialist expertise in your local framework conditions and legal regulations. Following an holistic, company-wide needs analysis, the entire range of services offered by the DENIOS Group can be accessed to optimise safety when handling hazardous substances, operational safety and work safety.
We'll achieve the best possible result for your group. As your needs change over time, we'll proactively adjust our services at regular intervals so that you're always in safe hands. We are the strong partner at your side, helping you through even the most challenging projects. I'd like to take this opportunity to introduce myself as Head of Key Account Management. Please don't hesitate to get in touch.

GET IN TOUCH DIRECTLY:

TEL.: 0800 753 000 5
EMAIL: KEYACCOUNT@DENIOS.DE

OR CONNECT WITH ME ON LINKEDIN:



Felix Förster
– Head of Key Account Management –

A selection of our customers:

E-PROCUREMENT WITH DENIOS.

DIVERSITY SEAMLESSLY INTEGRATED.

As a developer and manufacturer, we offer the largest range of safety-relevant operating equipment and work safety products. The integration of catalogue data is

- Simple
- Quick
- Reliable
- Secure

At DENIOS, we go one step further: there's no technical challenge we can't solve. We can use any interface!

Everything is tailored to your individual requirements and is country-specific and legally compliant.

Optimise your purchasing processes and get in touch with us today.
We'll do the rest for you!

WWW.DENIOS.DE/E-PROCUREMENT

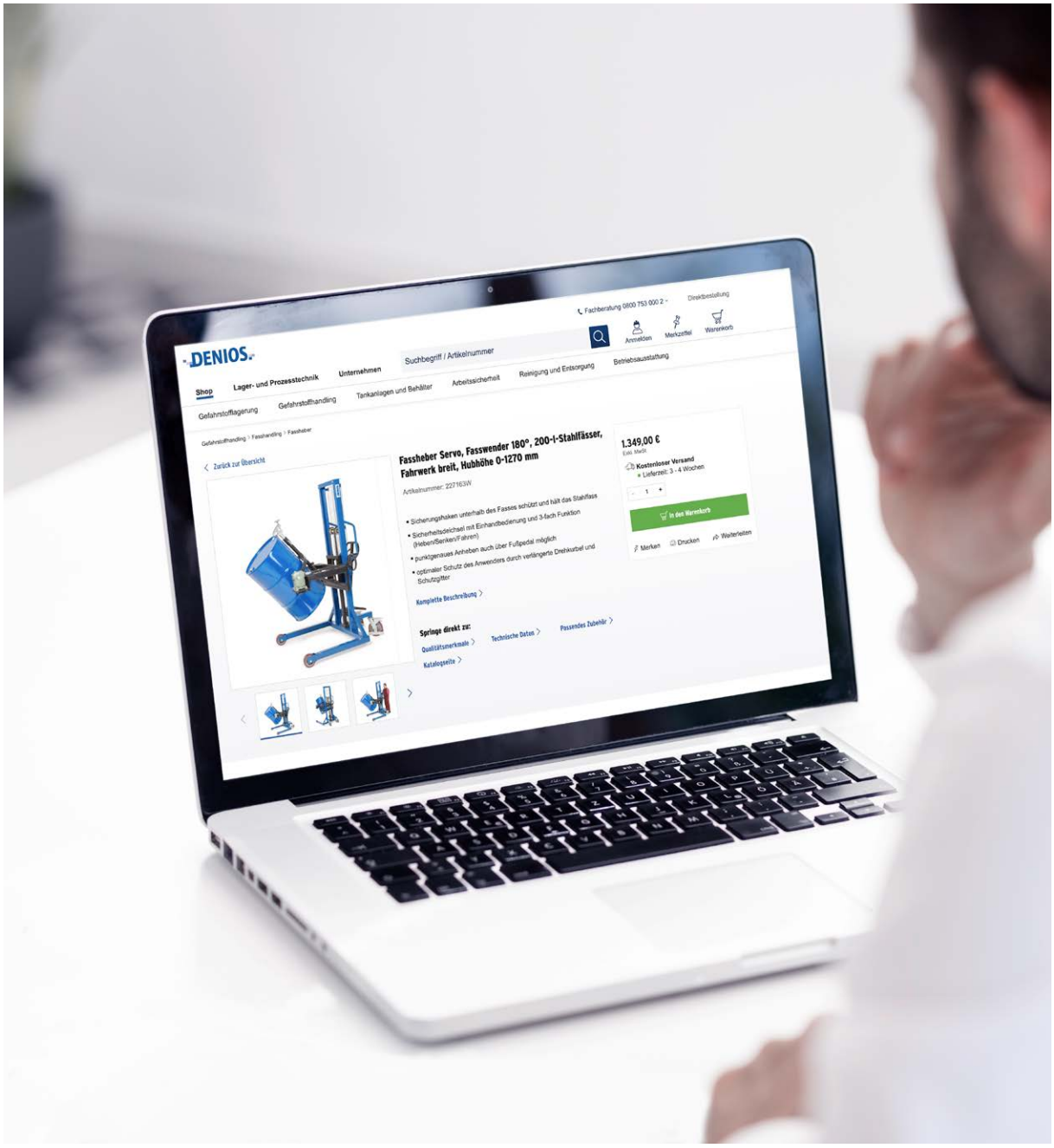
A selection of our e-procurement partners:

SAP Ariba
veenion® make your order
proactis
emeplato
onventis CLOUD PROCUREMENT NETWORK
coupa
JAGGAER
DIG WE CONNECT BUSINESS
poet
NEWTRON

YOUR SHOP FOR HAZARDOUS SUBSTANCE SAFETY.

OVER 16,000 PRODUCTS CAN BE ORDERED DIRECTLY.

When it comes to hazardous materials safety, industries from all over the world rely on DENIOS products. Today, our range comprises more than 16,000 products. It all started with a simple but innovative product idea: the spill pallet. In over 35 years, we have developed numerous other innovations: you'll find a quality product in our product range for every daily task, for every application and for almost every conceivable requirement.



HAZARDOUS MATERIALS STORAGE.

- Spill pallets.
- Dispensing stations.
- Spillage decking.
- Hazardous substance storage and safety cabinets.

HANDLING HAZARDOUS MATERIALS.

- Absorbent materials.
- Leak management.
- Drum handling.
- Gas cylinder handling.

FUEL TANKS & TRANSPORT CONTAINERS.

- IBCs.
- Drums.
- Canisters.
- Safety containers.

CLEANING AND DISPOSAL.

- Parts cleaning and washing tables.
- Surface cleaning.
- ASF and ASP containers.
- Waste oil containers.

WORK SAFETY.

- Safety barriers and impact protection.
- Personal Protective Equipment.
- Emergency showers and eye wash stations.
- Workplace matting.

PRODUCTION AND OPERATION EQUIPMENT.

- Transport and storage containers.
- Shelving.
- Transport and lifting equipment.
- Equipment cabinets and lockers.

VISIT THE DENIOS ONLINE-SHOP NOW!

Get to know the entire DENIOS product range in our online shop and order directly. Thanks to extensive search functions, you can quickly find the right product to meet your requirements.

Take a look at our offers now! WWW.DENIOS.DE

STAY IN TOUCH!

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