

# DENIOS

ENVIRONMENTAL PROTECTION  
& WORK SAFETY



## Thermotechnology

- Heat chambers and heating systems
- Storage of temperature-sensitive materials
- Cooling and air conditioning systems
- Individual solutions

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# DENIOS expertise



## Together we know more!

Are you looking for a reliable and competent partner to increase efficiency in the thermal processing of materials? Someone who talks with you in person to understand your task and your needs from all angles?

Wanted - Found: 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 been developing in over 30 years of dialogue with our business partners - we're happy to share it with you.

Take a look at what we offer online too. You can contact us directly by e-mail or using our enquiry form.

 [www.denios.de/thermotechnik](http://www.denios.de/thermotechnik)

 [www.denios.at/thermotechnik](http://www.denios.at/thermotechnik)

 [www.denios.ch/thermotechnik](http://www.denios.ch/thermotechnik)

"We bring together your knowledge of the application with our knowledge of the technical possibilities, legal requirements and physical relationships."



DENIOS expertise



### 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 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 a 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 creates quick, uniform heating of the products. The interaction between the heater, the air flow, 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, but should be kept as low as possible in order to achieve high efficiency and energy savings.



#### 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 five-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 wrap 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 30 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. For our process technology, in particular heat chambers, different legal requirements sometimes apply compared to our storage technology.

### Machine safety

DENIOS heat chambers are subject to the Machinery Directive 2006/42/EC. A wide range of standards have been taken into account for conformity. Standards EN 12100, EN 746-1, EN 60204 and EN ISO 13849 are examples of legislation to guarantee the "safety of machines". Standards EN 61508 and EN IEC 62061 cover "functional safety".

### 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? We take all your requirements into account. For example, we offer silicone-free solutions for the automotive industry.

### 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 it is 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.

-  [www.denios.de/ratgeber-ex-schutz](http://www.denios.de/ratgeber-ex-schutz)
-  [www.denios.at/ratgeber-ex-schutz](http://www.denios.at/ratgeber-ex-schutz)
-  [www.denios.ch/ratgeber-ex-schutz](http://www.denios.ch/ratgeber-ex-schutz)

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, is a compact guide to the storage of hazardous materials and activities involving hazardous substances.

### 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. This is substantiated by standard DIN EN ISO 19353 "Safety of machinery - Fire protection". It sets a level for fire safety and requires an assessment of the fire risk. But target-oriented fire protection designs are also required for specific systems. 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. Our practical guide will help you learn how to consider fire protection aspects in your risk assessment:

-  [www.denios.de/ratgeber-brandschutz](http://www.denios.de/ratgeber-brandschutz)
-  [www.denios.at/ratgeber-brandschutz](http://www.denios.at/ratgeber-brandschutz)
-  [www.denios.ch/ratgeber-brandschutz](http://www.denios.ch/ratgeber-brandschutz)

### Documentation

We'll provide comprehensive documentation for every system. As part of the planning and approval process, we provide important documents (including statics calculations and construction drawings) in dialogue with planners, property insurers and the authorities. 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.

### 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? 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. We'll find a solution for everything. That's why you'll also find information about the DENIOS range of services in the planning notes. If you've still got questions, we'll be happy to help on-site!



Now you may ask yourself which factors play a role in the planning of your heat chamber. We have summarised the most important points in a checklist for you.

#### 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 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, potential measures for water, fire and explosion protection must be considered. The operator is responsible for the risk assessment and consequent suitable protection measures.

#### 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 the preparation process. These depend not only on viscosity and container size or quantity of the material, but also on the efficiency of the heat chamber.



**For the efficiency of the heat chamber it is crucial to reach the desired core temperature as quickly as possible and to maintain temperature accuracy until the preparation process is completed.**



### Which energy sources can (efficiently) be used for the heat chamber?

Electric current is the most frequently used energy source for a heat chamber energy supply. However, your general 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 when planning your treatment plant, as the plant components are selected to suit it.

### Which structural conditions have to be considered in the 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 must usually be planned. A modular construction or outdoor installation are also possible variants.

### 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 process 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 between preparation and processing plant to provision for further processing

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 (degree of automation: zero to fully automated operation)? Which requirements result from the process control technology?

### 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 Manufacturing Practice

**HACCP:** Hazard Analysis and Critical Control Points

### 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.


### 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 the 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.


### We would be pleased to provide you with advice

We will not leave you to plan your heat chamber alone. It's important to us to be able to offer the right level of advice in person. Let us know your requirements and we'll find the right solution for you.

#### Telephone advice line:

 0800 753-000-3

 06225 20533

 056 417 60 60

# DENIOS expertise

## Technical Centre and leased systems

### DENIOS Technical Centre - Room for innovation

As a developer and manufacturer we regularly update our products or completely rethink them. The DENIOS Technical Centre is our innovation nerve centre. From mechanical components to energy-efficient air conditioning technology, electronics and sensor technology to the storage of hazardous substances 4.0: our innovation team is working on new solutions every day, getting them ready for market with tests in our own DENIOS Technical Centre. In addition we offer customers the opportunity to test both technical room systems and technical ventilation equipment before purchase.



#### Check the thermal behaviour of your process substances

Do you have a new product in your range and want to understand how it will react at various temperatures? How long are the heating periods? Is tempering in a heat chamber the right solution for you? Why not simply try it out? Tests in the DENIOS test heat chamber will give you certainty in your design and manufacturing. Individual series of measurements are performed to study the thermal behaviour of your products under real-life conditions. Our test systems can also be used to accurately analyse heating times, or the melting behaviour of substances for example. At the end of the series of tests, our experts will provide you with extensive measurement reports and analyses that you can use to make sure that your investment will be safe and sustainable.

## Leased systems

Why can leasing be an alternative option? As a logistics company, you need to keep products in temporary temperature controlled storage, but there's no certainty this will be a long term requirement. With a leased system you have known costs and can avoid major investments. At times of peak production you might have a short term need for additional capacity. DENIOS offers you flexibility, giving you the chance to react to the latest changes in your company. Every year you face the problem that products are harder to process in the colder months of the year due to increased viscosity. A leased heat chamber is an attractive option for this period. Many systems are taken on by our customers so we always have a regularly changing range of heat chambers to offer. Use our leasing systems as a temporary aid, to ensure a ready to use system is available as soon as a contract is awarded. Ask about the currently available range of DENIOS leased systems.



### 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
- Leasing offers flexibility, which is essential for innovation
- Better planning of follow-on costs, as service, maintenance and repair are covered
- More flexibility for capital reserves, which can then be profitably invested

### Training for professional and personal development

When it comes to environmental protection, the storage of hazardous substances and work safety, on-site experts with specialist knowledge are needed to ensure safety. The DENIOS Academy is the place where these experts grow. Whether you are a beginner, still getting use to your role, or a seasoned professional who wants to maintain and increase your knowledge, the specialised, in-depth training provided by the DENIOS Academy offers you the right place to expand your skills.



#### Knowledge from practitioners for practitioners

Knowledge is a critical factor for economic success, especially when it can be shared. As the world market leader it is our duty to pass on our know-how - to our customers, to companies or to individuals. Each year we do so to increase safety and environmental protection.

In globally-relevant training events, practical workshops, training courses and qualified educational courses we raise awareness of hazardous substances with workers and decision makers and we train specialist personnel.

#### Your advantages

With over 400 events each year held at our facilities or partner sites, we can help ensure environmental protection and work safety in your operation. We make sure our seminar programme includes all the latest themes so you don't miss out on any important knowledge updates. Good to know: by taking part in training courses at the DENIOS Academy, you can also collect valuable VDSI points.

- ✓ **Current topics and practical teaching content**
- ✓ **Competent speakers with many years of practical experience**
- ✓ **Certified courses and qualifications**
- ✓ **Detailed documentation and accompanying materials**



## Open training courses

We don't just design, plan and build legally-compliant hazardous materials stores and offer support with the regulatory processes, we also offer training to support the required qualifications. We're used to the practical problems involved and we know our way around them. So, it's not just our customers who benefit, but all participants who attend the DENIOS Academy.

### H&S and security

In the areas of health and safety and security, ensuring you have up to date expertise is vital. The DENIOS Academy training courses meet this need perfectly, delivering concrete approaches for the practical implementation of legal requirements in operational safety.

### Hazardous substances and environmental legislation

Our programme offers you a broad and Germany-wide range of open courses and training - specialised in the areas of occupational safety, hazardous substances, fire protection and environmental law. Our open training courses offer you the opportunity to learn from numerous well-known experts. You can also use the opportunity to exchange experiences and network with colleagues.

### Fire protection

The DENIOS Academy offers optimum training and education for all relevant areas of fire protection - a complex task. Whether it's initial training, legally-required training or additional qualifications, all our training courses give you valuable solutions, with plenty of practical examples.



## In-house training courses

We conduct in-house training on-site at your company! Training content can then be individually adapted to your operational needs. You'll also benefit from simple organisation, cost and time savings. Use our in-house offers to bring all your employees up to the same level of knowledge - for example as part of annually prescribed safety training.

Are you interested in one of our events or do you have a question? Call us free of charge or take a look at our website.

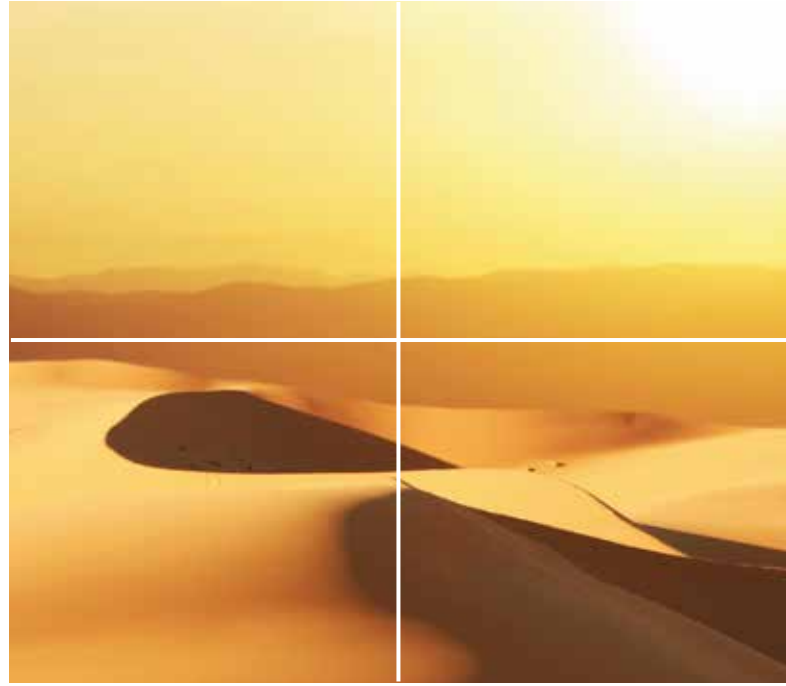
**We would be pleased to provide you with advice!**

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🇦🇹 06225 20 533 [www.denios-academy.com/at](http://www.denios-academy.com/at)  
🇨🇭 056 417 60 60 [www.denios-academy.com/ch](http://www.denios-academy.com/ch)





# Heat chambers and heating systems



## Efficient heating and melting

The heating or melting of a substance can be done for different purposes:

- To reduce viscosity of a fluid so it can be more easily pumped and filled,
- To melt solids for process feed,
- To temper substances so they are at the optimum working temperature,
- To avoid crystallisation or coagulation and many more applications.

For the technical implementation we have developed a proven product range based on over 30 years of experience, which meets today's strict requirements for quality, energy efficiency and process accuracy.

**“DENIOS heat chambers ensure a precise operating temperature and optimum thermal transfer for uniform heat distribution.”**



# Heat chambers and heating systems

## Heat chambers WK

### Precision tempering - uniform and quick

Each of our heat chambers is designed to ensure the required temperature is 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. In modern, automated manufacturing processes with high process speeds, the substances used need to be available quickly. DENIOS heat chambers ensure rapid heating cycles. Only energy-optimised heating, ventilation and control systems are used, in combination with the latest insulation and sealing materials as specified in the German Energy saving ordinance, to ensure the energy efficiency of the system as a whole. The integral spill pallet with WHG approval ensures that this heat chamber may also be used as a legally-compliant heated store for your products.



For up to 72 drums  
or 18 KTCs / IBCs



up to 150°C



Order No. 263-175-T0

Heat chamber WK 414-2-K with removable spill pallet for reliable warming of drums and IBCs

## Overview of the product range



**WK, 1 bay**  
in three sizes



**WK, 2 bay**  
in three sizes



**WK, 4 bay**  
in three sizes

On request, solutions with 3 or 6 compartments as well as an extra deep version are also possible.

### Door equipment

- Basic equipment with 2-wing door, high thermal insulation. A seal all round keeps energy losses to a minimum. A sturdy retaining arm ensures safe door opening.
- Special designs available on request

### Structural analysis

- Structural analysis to Eurocode 3 (DIN EN 1993) measured for a characteristic wind load with a dynamic pressure of  $q_{k,w} = 0.585 \text{ kN/m}^2$  and a characteristic ground snow load of  $s_k = 2.5 \text{ kN/m}^2$
- Structural analysis sufficiently measured in accordance with DIN 4149/EN 1998-1:2004 for earthquake zone 3

### Equipment options



Slide-out spill tray



Conveyors



Door locking



Signal column



Extinguishing connection



Door design



Door hold-open system



Canopy for outdoor installation



Air extraction



Pressure relief panels

The complete range of equipment options can be found on page ➔ 56.

### ATEX designs

The equipment of a heat chamber for heat treatment of substances in Ex zones in accordance with ATEX directive 2014/34/EU can be adapted to the respective requirements of the Ex zone or temperature class.

As an operator you will need to define Ex zones if your explosion protection document requires an Ex zone.

We offer all equipment which could represent a potential source of sparks in the Ex zone in the corresponding Ex design.

A ventilation / air extraction device can occasionally avoid the inner room being classified as Zone 0.





# Heat chambers and heating systems

## Heat chambers WK



### Product features

#### Making use of the space

Heat chamber WK can be filled with drums, goods on Euro or chemical pallets or with IBCs/ KTCs. Access underneath (100 mm ground clearance) makes it possible to load the heat chamber with a hand guided electric forklift. The doors close tightly, have a twist lock, which prevents them closing by themselves, and can be locked to prevent unauthorised access. A door contact switch is available as an option.

#### External cladding

Flat sheet panels with high insulation, painted RAL 5010 (gentian blue) or a different colour on request.

#### Heaters

consisting of 1. air circulation fan with weather protection, 2. control system including temperature regulator, 3. heating system (electric, steam, thermal oil or hot water), 4. safety temperature limiter, 5. Pt 1000 sensor for temperature recording.

#### Base design

In the standard version, the heat chamber has a water law tested, single-piece 5 mm spill pallet. Galvanised fluid guides all around ensure any leaked fluids are safely diverted to the spill pallet. The sturdy shelving (shelf load capacity up to 5,500 kg) is fitted with removable hot-dip galvanised grids, which meet the guidelines for quality and tests RAL GZ 638. Hot dip galvanised footplates ensure safe anchoring of the heat chamber to the foundation. A mounting kit is included in the delivery.

#### Transportability

Your heat chamber is fitted with crane eyes as standard. These ensure safe and easy handling with a crane and are also used to secure the container during transport on the lorry.



## Heat chamber WK - 1 bay

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



For up to 12 drums  
or 3 KTCs / IBCs

Heat chambers and heating systems



An extra deep version is also available on request.

Heat chamber WK 414-1K including type-approved spill pallet

Designation	Structure	Capacity IBC / CP / EP / Drum	Spill pallet volume (l)	External dimensions (W x D x H mm)	Bay dimensions (W x D x H mm)	Load capacity (kg/m <sup>2</sup> )	Weight (kg)
WK 114-1-K		1 / 1 / 1 / 4	1,000	2,030 x 1,730 x 2,700	1,300 x 1,340 x 1,700	1,250	1,700
WK 214-1-K		2 / 2 / 3 / 8	1,000	3,430 x 1,730 x 2,500	2,700 x 1,340 x 1,700	1,250	2,060
WK 414-1-H		3 / 3 / 4 / 12	1,000	4,630 x 1,730 x 2,400	3,900 x 1,340 x 1,700	1,250	2,330

**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 chambers and heating systems

## Heat chambers WK

### Heat chamber WK - 2 bay

This design impresses with its compact construction: lots of space inside on a small footprint. The integral spill pallet also ensures safe storage.

These compact heat chambers reach an air circulation rate of 4,000 m<sup>3</sup>/hour. The balance between heating and air circulation is set to an optimum level. Uniform temperature and quick heating are guaranteed.



For up to 24 drums  
or 6 KTCs / IBCs



Heat chamber WK 214-2-k for reliable tempering  
of drums and IBCs



On request, solutions with 3 bays as well as an  
extra deep version are also possible.

Designation	Structure	Capacity IBC / CP / EP / Drum	Spill pallet volume (l)	External dimensions (W x D x H mm)	Bay dimensions (W x D x H mm)	Load capacity (kg/m <sup>2</sup> )	Weight (kg)
WK 214-2-K		4 / 4 / 6 / 16	1,000	3,430 x 1,730 x 3,700	2,700 x 1,340 x 1,400	1,250	2,700
WK 414-2-K		6 / 4 / 8 / 20	1,000	4,110 x 1,730 x 3,700	3,380 x 1,340 x 1,400	1,250	3,000
WK 414-2-H		6 / 6 / 8 / 24	1,000	4,630 x 1,730 x 3,650	3,900 x 1,340 x 1,400	1,250	2,930

**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 - 4 bay

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 m<sup>3</sup> air is circulated per hour, ensuring the necessary heat reaches every container.



For up to 48 drums  
or 12 KTCs / IBCs



On request, solutions with 6 bays as well as an extra deep version are also possible.

Heat chamber WK 514-2-K with removable spill pallet (galvanised) and rear heater

Designation	Structure	Capacity IBC / CP / EP / Drum	Spill pallet volume (l)	External dimensions (W x D x H mm)	Bay dimensions (W x D x H mm)	Load capacity (kg/m <sup>2</sup> )	Weight (kg)
WK 514-2-K		8 / 8 / 12 / 32	1,000	6,560 x 1,900 x 3,600	2,700 x 1,340 x 1,400	1,250	4,700
WK 714-2-K		12 / 8 / 16 / 40	1,200	7,920 x 1,900 x 3,650	3,380 x 1,340 x 1,400	1,250	4,850
WK 814-2-H		12 / 12 / 16 / 48	1,200	8,960 x 1,900 x 3,600	3,900 x 1,340 x 1,400	1,250	5,360

**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 chambers and heating systems

## Heat chambers WK

### Optimal heating and air circulation

We offer efficient combinations of heat exchangers and air recirculation systems to ensure a rapid warming time combined with uniform temperature distribution, and an option in an Ex proof design. 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

Also suitable for hot water and thermal oil

- Heat exchanger for max. 12 bar operating pressure
- 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 on trigger (optional)
- Flanged connection on the condensate drain side
- Optional condensate separator
- Air recirculation fan with motor protection switch
- Temperature gauge via analogue thermostat



#### Steam heating with electrical temperature regulation

Also suitable for hot water and thermal oil

- Heat exchanger for max. 12 bar operating pressure
- 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)
- Flanged connection on the condensate drain side
- Condensate separator (optional)
- Control system incl. digital temperature regulator
- Pt 1000 to record the temperature



#### Electric convection heating with digital temperature regulator

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

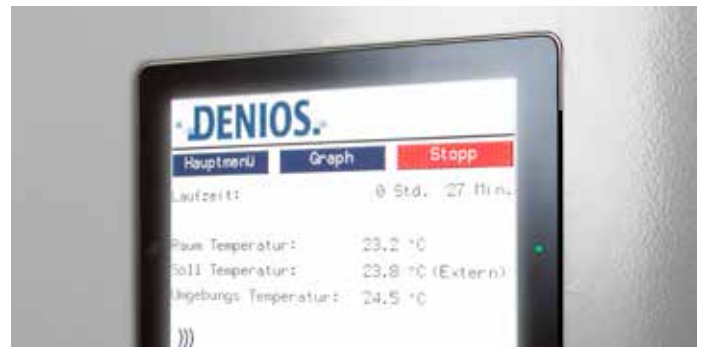


## Control system and control components depending on requirements

All heating systems with electrical temperature regulation are managed by microprocessor to ensure high levels of control. Only established brands are used for the fitted electrical components. The systems are delivered ready for connection. Our control systems offer the best possible troubleshooting for a long life. So we can best meet your needs with the minimum investment, choose from two control versions and add additional options to extend your operational requirements.



Digital temperature controller - basic control system



Touchscreen for premium control system

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 times, door opening, ambient temperature, room temperature, operating status, fault notifications)	-	✓
Data output via USB-interface	-	✓
Stepped operation (time dependent temperature process) <sup>1)</sup>	-	✓
Temperature adjustment in Ex Zones <sup>2)</sup>	-	✓
MODBUS connection	-	✓
Touch screen display (also in Ex design)	-	✓
Web interface for remote control	-	○

<sup>1)</sup>For improved temperature control we recommend an air extraction fan to be fitted for the stepped function

<sup>2)</sup>With ATEX compliant touchscreen

- not available ○ optional ✓ feature



# Heat chambers and heating systems

## Heat chambers WK

### View the internal temperature values



Our client BP is a market leader with the well-known lubricant brands for engine and transmission oils Castrol and Aral. They are produced in the Hamburg-Neuhof lubricant works for use in both cars and lorries. Castrol's on-site development centre works closely with major car manufacturers to develop more efficient lubricant solutions for new generations of engines. *Company description: [www.bp.com](http://www.bp.com)*

#### Challenge and project

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 pre-set 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 were faced with a similar problem. This time they're not worried about a Sunday roast, but the sophisticated lubricant Castrol®. During the manufacturing process there is a heating stage where a consistently high product quality is required. 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.

#### Result and customer benefit

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 the customer can keep the manufacturing process both lean and safe.

## Heating up to 18,000 litres in just 15 m<sup>2</sup>



Our customer specialises in the production of process auxiliaries 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.

### Challenge and project

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 to ensure the highest possible storage capacity. In this way, the room system was able to accommodate up to 18 IBCs or up to 72 drums – on just 15 m<sup>2</sup> 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 m<sup>3</sup> 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 9 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 stored in a last-in-first-out manner. A fire recognition system and noise insulation complete the safety systems.

# Heat chambers and heating systems

## Heating systems for individual containers

### Flexible heating jackets HM for drums and IBCs

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.



**Control range**  
0 to 90 °C

#### Your advantages

- **Light, compact, cost-effective:** the heating equipment is light in weight and needs just a small space for storage.
- **Practical, space-saving:** this heating equipment can temper your containers right where you need them to be used.
- **Simple handling:** they are quick to fit and just as easy to remove.
- **Flexibility with precision fit:** heating jackets fit snugly round the shape of the container to be heated. Oval, flattened or convex containers can easily be heated.

#### Product features

- Includes thermostat: control range 0 to 90° C
- Power supply: 230 V
- Protection: IP 44
- With 5 m power cable



Heating jacket HM 3

Heating jacket HM 3.A

Heating jacket HM 4

Designation	Heating capacity (W)	Container circumference min (mm)	Container circumference max (mm)	Height (mm)	Suitable for	Order number
Heating jacket HM 1	200	870	1,000	400	25/30 litre steel / plastic containers	117-721-T0
Heating jacket HM 2	250	1,100	1,250	460	50/60 litre steel / plastic containers	117-722-T0
Heating jacket HM 3	450	1,800	1,900	450	205 L steel / plastic drum	117-723-T0
Heating jacket HM 3.A	1,100	1,800	1,950	850	205 L steel / plastic drum	156-179-T0
Heating jacket HM 4	2,000	4,060	4,310	950	1000 L IBC	117-724-T0

## Safe heating especially in explosion-protected areas

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.



**Automatic  
temperature control**

### Heating jackets for containers up to 60 litres in Ex zones

- Suitable for steel and plastic containers from 25 to 60 litres
- ATEX certified: Ex II 2 G D Ex e IIC T4 Gb / (IECEX) tb IIIC T135°C Db (zones 1 and 2)
- Certified automatic temperature control: max. wall temperature 80 °C
- Protection: IP 54
- Power supply: 240 V

### Heating jackets for IBCs and 205 litre drums in Ex-zones

- Suitable for 205 litre steel and plastic drums and IBCs
- ATEX certified: II 2 G Ex e II T3 (zones 1 and 2)
- Certified automatic temperature control: max. wall temperature 80 °C (drum) and 55°C (IBC)
- Protection: IP 44
- Power supply: 240 V



Heating jacket HM 3A Ex



Heating jacket HM 4 Ex

Designation	Heating capacity (W)	Container circumference min (mm)	Container circumference max (mm)	Height (mm)	Suitable for	Order number
Heating jacket HM 1 Ex	90	870	1,020	400	25/30 litre steel / plastic containers	236-434-T0
Heating jacket HM 2 Ex	130	1,100	1,250	460	50/60 litre steel / plastic containers	236-436-T0
Heating jacket HM 3A Ex	720	1,800	1,950	850	205 L steel / plastic drum	236-437-T0
Heating jacket HM 4 Ex	1,700	4,060	4,310	950	1000 L IBC	236-438-T0



# Heat chambers and heating systems

## Heating systems for individual containers

### Drum heater for 205 litre drums

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



**Manual  
temperature control**

#### 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
- HG-F: simple spring catch fastening



**Base heater HBD, even heat distribution over the whole base**



**Heating belt HG-F, example: common usage with several belts.**



**Drum heating belt HG-S, with terminal box and enclosed heating motor with capillary tube thermostat**

Designation	Heating capacity (W)	Protection type	Height (mm)	Suitable for	Order number
Base heater HBD	900	IP 40	70*	Max. drum Ø: 600 mm	171-803-T0
Flexible drum heating belt HG-F, in silicone	1,000	IP 40	125	Drum Ø: 550 - 600 mm	117-717-T0
Drum heating belt HG-S, in galvanised steel	1,200	IP 30	200	Drum Ø: 575 mm	117-720-T0

\*Base plate height



## Induction drum heater, suitable for use in Ex zones

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).



**Automatic  
temperature control**

### Product features

- ATEX certified - Ex II 2 GD / Ex e II T3
- Protection: IP 66
- Electrical connection (IBP, IHG): 240 V
- Cable length (IBP, IHG): 5 m
- Material: GRP, powder coated
- Glass fibre-plastic cover (GRP cover) minimises heat loss at the top of the drum
- Automatic temperature limitation



Designation	Heating capacity (W)	Container circumference min (mm)	Container circumference max (mm)	Height (mm)	Suitable for	Order number
Induktions-Bodenheizplatte IBP	500	1,800	1,950	60	205 L steel drum	178-875-T0
Induction heater IHG	2,750	1,800	1,950	740	205 L steel drum	117-719-T0
GRP cover for induction heating systems	-	1,800	1,950	650	200 L Stahlfass	178-877-T0

# Storage of temperature-sensitive substances



## Product protection for any season

Your heat or frost-sensitive valuable goods can be safely stored in a technical room system with complete protection. The integral spill pallet is always tested and approved in accordance with the water laws to ensure the protection of the environment and groundwater.

If flammable liquids are to be stored and safety distances cannot be maintained, fire-rated stores in thermally insulated, fire-resistant F 90 design are available.

The heating system is designed for frost-free storage (external temperature  $-15^{\circ}\text{C}$ , internal temperature  $+5^{\circ}\text{C}$ ). Depending on the size of the store, we will choose the best heating for your needs. We also design the equipment with cooling units or air conditioning systems in accordance with the application while keeping the emphasis on effective solutions with minimum energy use.



**"Variations in temperature mean things are cold - temperature-sensitive substances are properly protected in DENIOS storage systems."**

Storage of temperature-sensitive materials

# Storage of temperature-sensitive materials

## Insulation

### Reliable protection from temperature variations

Technical room systems have impressive versatility. Thermal insulation may be necessary for the outdoor storage of temperature-sensitive materials. Insulation in A or B class material effectively protects against the effects of heat and frost and the associated energy losses when heating or cooling systems are used. Insulation in non-combustible A class materials is suitable for the storage of flammable liquids. In addition to thermal insulation, DENIOS fire-rated stores offer 90-minute fire resistance on both sides (F 90).



Walk-in hazmat store MCV 4320 in insulated design

**DIBt**

ALLGEMEINE BAUAUFSICHTLICHE  
ZULASSUNG – DIBt  
Deutsches Institut für Bautechnik

## Application-related thermal insulation

The proven design principle of the technical room system is also used for the insulated version. The sturdy welded steel frame design is covered on all sides with special panels. PUR panels (construction material class B in accordance with EN 13501-1) are used for the storage of non-flammable substances. If flammable liquids are to be stored, the various systems use non-combustible mineral wool panels (construction material class A) as required by law. The all-round system insulation protects against energy losses for temperature controlled or frost-free storage.

### Mineral wool panel (ISO A)

Various sandwich elements (ISO A) with a mineral wool supporting core and steel outer sheets for insulation are available.

- Good insulation, long life and excellent fire protection
- Material thickness 40 or 50 mm, building material class A, non-combustible,  $U = 0.69 \text{ W} / (\text{m}^2\text{K})$
- Material thickness 100 mm, building material class A, non-combustible,  $U = 0.36 \text{ W} / (\text{m}^2\text{K})$
- CE marked



**Non-combustible mineral wool panels (building material class A)**

If you need to store flammable liquids, additional requirements need to be considered:

- Ventilation
- Explosion protection
- Earthing / lightning protection
- Safety distances

### PUR panels (ISO B)

- Sandwich elements (ISO B) with a polyurethane hard foam (PUR) supporting core and steel outer sheets
- Very good insulation against heat / cold
- Material thickness 50 mm, construction material class B,  $U = 0.47 \text{ W} / (\text{m}^2\text{K})$
- CE marked



**Flame-retardant PUR panels (building material class B)**



# Storage of temperature-sensitive materials

## Heating and cooling systems

### Efficient room temperature control

Thermal insulation alone is often not sufficient for temperature-sensitive materials. Heating systems are designed for frost-free storage, meaning that they guarantee a constant internal temperature of +5 °C down to an external temperature of -15 °C. In addition to electric heating systems for heating or air conditioning, designs are also available which use warm water, heat transfer oils or saturated steam. Direct connection to customer equipment is also possible.



Storage container with shelving SC 2K 714 with recirculated air heating



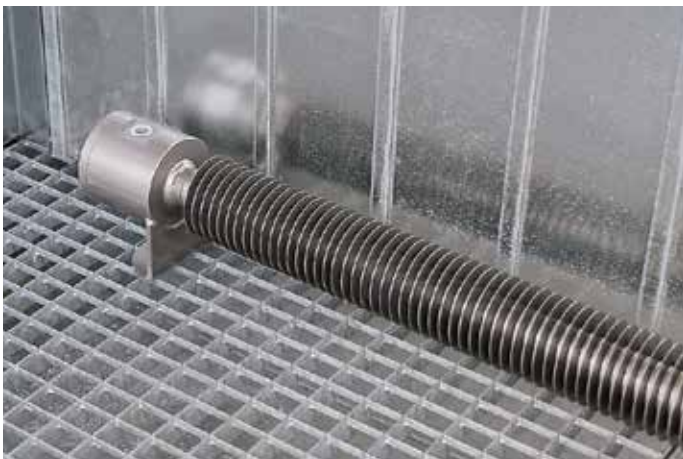
Insulated designs combine temperature controlled heating systems and well-designed air flow to ensure uniform temperature distribution.

### Thermal processing of materials

Are you looking for a system for the thermal processing of materials in your process chain? We understand that the requirements for process technology differ from those for conventional storage requirements. But synergies can be created. DENIOS heat chambers are based on proven store designs and include comprehensive protective mechanisms and a sturdy body. To support your core heating or melting tasks, its functions are optimised for precision temperature control and short warm-up periods (from page † 14).

### Finned tube heaters

Our finned tube heaters are fitted with an integral safety temperature limiter. This protects the heater surfaces from overheating. Accessories also include appropriate impact protection as this heater is usually fitted near the shelf guard. Available as Ex and nEx versions, each with 1 or 2 kW rating.



### Additional ventilation

For large room systems which are fitted with finned tube heaters, additional ventilation is provided. Connected to the heating system, the system takes the warmed air from inside the room and distributes it evenly across the storage area.



### Heating fan

In contrast to finned tube heaters, heating fans ensure active, targeted convection. The effective heating produced is higher than for heating media with a natural heat flow.

Heating fans are therefore the ideal choice for larger, walk-in hazardous materials stores with insulation. Heating fans also have a recirculating function ensuring a uniform temperature distribution in the store.



### Air conditioning system

In the standard design, the air conditioning system ensures internal temperatures of +5 °C at an external temperature down to -15 °C, or an internal temperature of +25 °C at an external temperature up to +35 °C. Modular cooling and air conditioning solutions enable precision temperature control of the storage room. Ex designs are also available.



# Storage of temperature-sensitive materials

## Overview of storage systems

### Walk-in storage system for small containers

The walk-in storage systems MCV and WFP (F 90) are characterised by high comfort and variability. Various sizes of container can be stored, from small containers up to 205 litre drums. There are no limits on the individual configuration of your storage system.



Hazmat store MCV

Order No. 265-971-T0



Fire-rated storage container WFP

Order No. 265-966-T0

### Compact storage system with a small footprint

The compact storage systems SolidMaxx and RFP-S (F 90) impress with their robust design and use the storage capacity available on a small footprint to best advantage. Despite low space requirements, 1 to 2 IBCs or 205 litre drums can be stored on Euro/chemical pallets.



Hazmat store SolidMaxx

Order No. 265-968-T0



Fire-rated storage container RFP-S

Order No. 265-965-T0

## Storage containers with shelving and optimum bay dimensions for every size of container

Storage containers with shelving SC and RFP (F 90) are the most versatile room systems from DENIOS. different versions are optimised to suit typical large containers (drum, KTC / IBC) with/without pallets or for mixed storage. A comprehensive range of equipment options rounds off the range, ensuring your store's configuration will meet your needs perfectly.



Hazmat store SC

Order No. 265-969-T0



Fire-rated storage container RFP

Order No. 265-967-T0

Storage of temperature-sensitive materials

### Structural analysis

- Structural analysis to Eurocode 3 (DIN EN 1993) measured for a characteristic wind load with a dynamic pressure of  $q_{k,w} = 0.585 \text{ kN/m}^2$  and a characteristic ground snow load of  $s_k = 2.5 \text{ kN/m}^2$
- Structural analysis sufficiently measured in accordance with DIN 4149/EN 1998-1:2004 for earthquake zone 3
- Versions for higher loads available upon request

### "Technical room systems" brochure

Hazmat stores, fire-rated stores, technical safety rooms - in our "Technical room systems" brochure you will find, in addition to our product range, extensive specialist knowledge as well as a wide range of equipment and service options.

#### Request yours now!

- 🇩🇪 0800 753-000-3 [info@denios.de](mailto:info@denios.de)
- 🇦🇹 06225 20 533 [info@denios.at](mailto:info@denios.at)
- 🇨🇭 056 417 60 60 [info@denios.ch](mailto:info@denios.ch)



# Cooling and air conditioning systems



## Air conditioning and cooling to 0°C

When we're looking at cooling and air conditioning systems at DENIOS, we pay special attention to the specific requirements of the operator. Whether it's a storage container with shelving or a walk-in version, all our cooling and climate control chambers are designed to meet individual requirements. All-round thermal insulation is generally provided by PUR insulation with a minimum thickness of 100 mm. Depending on application, this can also be thicker. The air conditioning or cooling equipment, just like the control system, are designed in accordance with the requirements and the overall system. With an integral spill pallet, hazardous substances in all water-polluting classes may be safely stored. If required, in addition to an EnEV compliant design, we can also include explosion protection and secondary fire protection.





**"When we're looking at cooling technology at DENIOS, we pay special attention to the specific requirements of the operator."**

Cooling and air conditioning systems

# Cooling and air conditioning systems

Air conditioning or cooling to 0 °C

## High-performance systems for uniform temperature distribution

Whether you're looking for air conditioning or cooling down to temperatures of 0 °C, both our chamber systems fitted with shelving and our walk-in systems can be designed for this purpose. The basic frame for our cooling and climate control chambers is in 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/m<sup>2</sup>K, 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. 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.

Features table

Function	Storage container with shelving	Walk-in system
Air conditioning	✓	✓
Cooling (down to 0 °C)	✓	✓
Hazardous material storage (WHG)	✓	✓
Large container storage	✓	-
Small container storage	-	✓
Fire protection	○	○
Explosion protection	○	○
EnEv compliance	○	○
Freezing (below 5 °C) down to -25 °C Special solution on customer request	○	○

- not available ○ optional ✓ feature



Air-conditioned storage container with shelving RFP 615.30 with fire-protection

## Cooling equipment for cooling and climate control chambers

DENIOS uses high performance cooling equipment to ensure the reliable and trouble free operation of its cooling systems. Due to the potential risk inherent in some substances, failure prevention can be a key requirement for customers. Because of this risk, the air conditioning system design is configured on the basis of a simulation of the actual circumstances. In practice combination units are then generally specified, which combine both cooling and heating functions.

The equipment consists of 2 components:



**Split cooling unit (internal view)**

An interior unit with a heat exchanger and a fan that works as an evaporator in the cooling circuit for cooling operation. When the unit is used for heating it is used as a condenser.



**Split cooling unit (external view)**

An exterior unit that dissipates the heat from the heat exchanger to the outside air by condensing the refrigerant. Heat transport is reversed if the system is used for heating.



### Info

#### Ex-proof design

As an operator you will need to define Ex zones if your explosion protection document requires an Ex zone.

We offer all equipment which could represent a potential source of sparks in the Ex zone in the corresponding Ex design.



To achieve free air flow through the inner room, the optimum installation position is determined taking into account type, size and quantity of the goods to be stored, specifically for the system in question.

High-resolution controllers and temperature sensors ensure that the required temperatures are carefully complied with. In addition an explosion proof design for the air conditioning system can also be considered.

Technical ventilation with a 5 times air exchange rate can be achieved when flammable substances are to be tempered. The resulting energy loss is minimised by using a heat exchanger. The heat energy is extracted from the exhaust air and is returned to the system.

# Cooling and air conditioning systems

## Examples of use

### Cooling chamber for temperature-controlled storage of explosive gases

The customer's key requirement was that explosive gases had to be stored safely at a stable inner room temperature of -20 °C. The need to use a technical ventilation system where 0.4 times the total air volume was changed every hour called for a high-performance cooling unit that featured autonomous automatic defrosting. Due to the hazard class of the gases stored, the interior is explosion-proof and has automatic fire detection. The high level of safety with good thermal insulation combined with fire protection on all sides resulted in a highly specialised cooling system that can satisfy the highest technical demands.



### Stainless steel equipment for the food industry

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





## 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 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 organic peroxides, 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 you fire-rated storage containers as specially equipped peroxide storage systems that meet these special legal requirements.

### Halve the required safety distances

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 design of our fire-rated stores may halve the required safety distance for example.



# Cooling and air conditioning systems

## Examples of use

### 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 fail-safe, 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 chambers inside the five rooms. 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,  $+5\text{ }^{\circ}\text{C}$  ( $\pm 3\text{ K}$ ) and  $+20\text{ }^{\circ}\text{C}$  ( $\pm 5\text{ K}$ ), 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?**

Do you need a custom room solution for your gas applications? Or do you have another application with a similar room requirement? Our individually planned technical safety rooms offer the perfect solution. Get in touch!

- 🇩🇪 0800 753-000-3 [info@denios.de](mailto:info@denios.de)
- 🇦🇹 06225 20 533 [info@denios.at](mailto:info@denios.at)
- 🇨🇭 056 417 60 60 [info@denios.ch](mailto:info@denios.ch)

# Individual solutions



## Best fit und Full service

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.

Why do our customers trust DENIOS? Because the combination of best fit and full service is unbeatable.

Best fit results from an outstanding understanding of the customer's processes and specifications. Best fit develops through professional advice and coordinated, reliable planning. In-house production and an extensive range of services round off the best fit range of products and services to form a comprehensive full service.

Are you looking for the best fit for your project? Let's take the first step together: our experts will be happy to advise you!

Contact us on the numbers below:

🇩🇪 **0800 753-000-3** **info@denios.de**  
🇦🇹 **06225 20 533** **info@denios.at**  
🇨🇭 **056 417 60 60** **info@denios.ch**

**"Benefit from outstanding advice,  
individual planning and holistic solutions  
directly from the manufacturer."**



Individual solutions



# Individual solutions

## Best fit und Full service

### How your custom heat chamber is made

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 and easy communication options. Project management monitors all the stages, from start to finish. „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 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 important. It ensures a meaningful and economic design. This, too, is part of best fit: you won't receive any services from us that you do not need. In our experience, perfect integration works best when everything is controlled by one party, from the needs analysis to the implementation and commissioning of the individual solution. This is the only way to prevent information being lost where interfaces occur. We are 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. We also support you while your product is in operation. Our Customer Service Department will ensure that your investment retains its value. With a service and maintenance plan which is tailored to you and your product, we guarantee a high quality, long lasting solution.



## Solutions that fit your needs

Standard or individual - both are justified and both benefit from each other. We want to retain our tried and tested products and also extend our range with innovative ideas developed in close cooperation with our customers. If, for example, our customers are confronted with unique features in a process sequence, space requirements or the networking of systems and processes, we'll look for your best fit in every phase of development. The wide range of DENIOS equipment options is available for all heat chambers (from page ➔ 56).

### 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. To make optimum use of the available space, scaling in every dimension is possible, 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. We can meet requests for an extremely large storage capacity for substances to be heated. 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.



# Individual solutions

## Examples of use

### Melting times reduced and costs cut

Based on proven industrial standards for heat chambers, DENIOS 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.



**Impressive, pharma-technical overall concept**

The customer needed to extend its existing production facilities. 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.



**Quick, precise melting with high efficiency**

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 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 30 years' experience of hazmat 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. An abnormally quick or high rise in temperature triggers an immediate alarm at the works fire brigade. 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 extensively 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 supplies important information for operation, maintenance and repair of the equipment.

### Development concept for a fully automatic heating system

For over 30 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 m<sup>2</sup> 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 requirements.

Two gantry robots - one arranged at each end - ensure smooth storage and transfer. The pallet infeed station can be loaded either 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.

### The benefits

The fully automatic heating system from DENIOS meets all the requirements of a modern process technology solution. 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.



### 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 closely linked, explosion and gas protection components must be installed to protect employees and the test laboratory must be set up indoors. 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 40-60 degrees Celsius. 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.

## A heat chamber for the desert

DENIOS is making a contribution to flight safety in Qatar – emergency chutes are being tested under extreme temperature variations at Doha International Airport. It's a good thing they exist, but better if they are not needed: emergency chutes in commercial aircraft. For most passengers they remain hidden away, as they are fortunately only seldom used. But if they are ever needed, their operation must be guaranteed. This is why all airline companies check the operation of their safety equipment at regular intervals.



**Tests under realistic conditions**

Depending on the type of aeroplane, the emergency chutes are stowed either under the door area or underneath the body of the plane. They are subjected to the same extreme variations in temperature as the plane itself. From take-offs and landings at a hot desert airport to the extreme minus temperatures at a cruising height of 15,000 meters. 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  $-20^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ . 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 inflates 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.

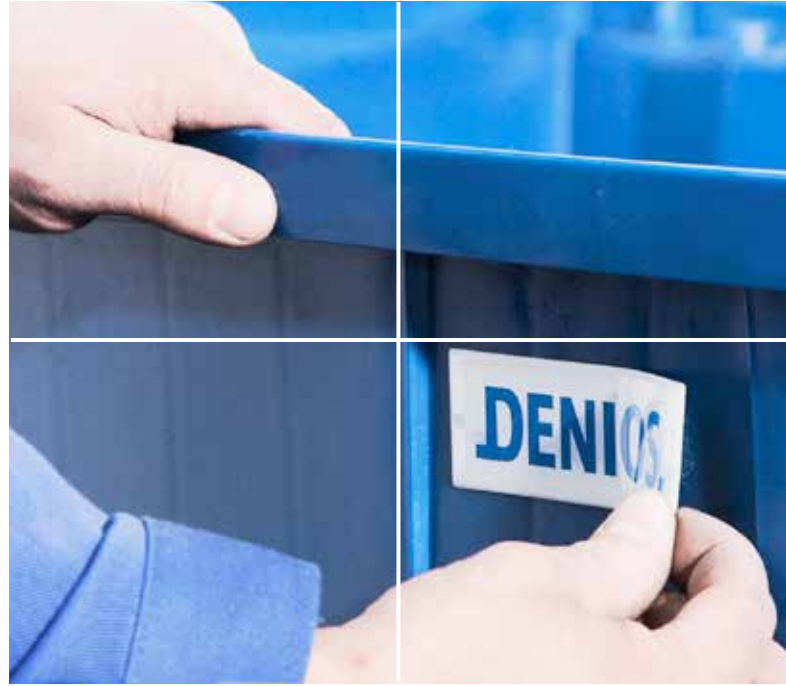


**Separate heating prevents the doors from freezing up**

The climate control chamber is designed and built by DENIOS and has a footprint of approximately 8 sq.m. The emergency chutes were first heated to  $+60^{\circ}\text{C}$ , then cooled to  $-20^{\circ}\text{C}$ .

So that this extreme temperature range could be produced DENIOS only used insulation materials with a high insulation value. The high performance air conditioning system consists of an internal unit and the external compressor, which is encapsulated for indoor installation and to reduce noise emissions. 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  $-20^{\circ}\text{C}$  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.

# Equipment



## Comprehensive, safe

We aim to optimise your heat chamber or room system to exactly meet your requirements in an uncomplicated and efficient manner. As a manufacturer we know exactly what our customers need and have included the right modules in our comprehensive range of equipment and accessories. Choose suitable options for your safety and convenience from a wide range of proven components.

In addition we offer over 12,000 proven standard products in our main catalogue to complete your safety design.

Whatever you need to make your work safer and more convenient, DENIOS has the right solution.

Process engineering processes often involve hazards arising from the use of toxic, flammable or potentially explosive materials. Alternatively, the process itself can be dangerous - for example due to high pressure, high temperatures or exothermic reactions.

With equipment tailored to your specific, process-related requirements, we ensure maximum operational process reliability.



Equipment

**"The equipment from DENIOS is unbeatably versatile and needs-oriented."**

# Equipment

## Convenient equipment

### Making use of the space



Our solutions are as flexible as your applications. This means you can adapt the basic structure of our systems according to your ideas in order to achieve maximum return.

#### Third level

Does the installation site offer sufficient height or is the heat chamber set up outdoors? Then a third level offers you an increase in total capacity of 33% for the same footprint. Due to its overall height, the system is supplied in sections and assembled by us on site.

#### Measuring equipment

Integrate your measuring equipment for quick access directly in the heat chamber. For example, if you use resistance thermometers with radio transmission of measured values to record the core temperature of your product, they can be installed in the immediate vicinity of the containers.

#### Vertical partition walls

Vertical partition walls are used to create separately regulated heat zones within a system. This makes it possible to keep each room at a different heat level. It also allows products that are incompatible with each other to be treated in one chamber (VCI concept).

#### Extra deep design

Maximise your throughput by doubling the storage capacity. Two containers are always placed one behind the other. Access is either from both sides or by "last-in - first-out" (LIFO) principle with "pushback trolley" (see picture below). And best of all: the system is delivered fully assembled (exception: system with three levels)



Chamber partition



## Product handling



The logistical processes within a production system are essential for your economic success. So that you do not have to repack, we can adapt handling to suit your material flow.

### Conveyor systems

Do you need to integrate your solution directly into your process flow? Integrated roller conveyors can then be used to create a continuous system based on the "first-in - first-out" (FIFO) principle. The roller conveyors can be motorised or gravity driven. Alternatively, chain conveyors can of course be used for crosswise pallet transport.

#### » Example of application

##### Continuous flow heat chamber according to the FIFO principle

This continuous flow heat chamber uses roller conveyors to deliver the media containers to another station in the production process according to the "FIFO" principle while heating. Further conveyors at the other side of the container take over the drums. In addition, separating the zones where the drums are placed in the container and removed from it has optimised transport in the company and, as a result, the overall process.

### Trolley rail systems

We use our pushback trolley as soon as several products are placed one behind the other. Due to the geometry, pallets of different sizes - both lengthwise and crosswise - can be used. Each space has a single tray and is pushed backwards when the container is placed in position. On removal, the trays slide forward, allowing each container to be removed easily (not available in Ex version)

### Horizontal drums

If you use drums as individual goods without loading aids, they may also be handled horizontally. For this purpose we offer either drum supports or roller supports. Roller supports may also be of the driven type. The drums are rolled on the spot by a drive, which allows the contents to mix, significantly reducing heating times.

# Equipment

## Convenient equipment

### Door equipment



Sliding doors



Roller door design

The door has a major influence on loading and unloading processes. We offer equipment options that enable smooth, comfortable and safe work processes.

### Door design

As standard, heat chambers are equipped with wing doors in 1 or 2-wing design. These provide optimal thermal insulation. We also offer roller doors (up to 150 C) and lifting doors, with convenient, automatic opening on request.

#### » Example of application

##### Heat chamber with stainless steel vertical-lift doors

In this application, narrow passage widths in front of the heat chamber and space restrictions required a special door solution. DENIOS found the right solution with automatic opening vertical lift doors. These guarantee very good access to the useful space inside, without affecting traffic in the passageway. In addition, the vertical lift doors had the same thermal properties as the rest of the insulation. The heat chamber was finished in stainless steel, both inside and out.



Lifting door design

#### » Example of application

##### Heat chamber in fireproof design with roller doors

The heat chamber is equipped with two independently-operated roller doors including electronic control and closing edge protection. OPEN and CLOSE operation is via push buttons. When the door is opened, the recirculation fan switches off automatically and the exterior lighting is switched on. If the system is without power, the doors can also be operated by a hand crank. The roller doors have a non-combustible insulation core in addition to the 5-sided fire protection of the heat chamber with EI 120 panels.

## Room access



When it comes to room access, door closing technology makes a decisive contribution to comfort and security when operating the doors\*. This isn't an area to cut corners, as selecting the right door closing technology pays off during use.

### Electronic access systems

The doors can be locked with a mechanical lock as standard to prevent unauthorised access. By fitting the system with an electronic access system, you can make access easier and considerably simplify the control of access rights.

Electronic access systems (keyless) are also available for 1 and 2-wing doors, enabling access via RFID transponder, code, fingerprint or handheld device with Bluetooth. Sliding doors can be fitted with remote control. This allows the doors to be operated conveniently and quickly e.g. from a forklift truck.

### Communication Bar

The latest in-house development from DENIOS combines maximum ease of use with modern technology. The Communication Bar allows you to operate all electronic components of the room system, e.g. the controls, lighting and electronic access control via RFID.

### Traffic route and impact protection

Protect your employees from passing vehicles when accessing the room system by using railings. To prevent greater damage to the room system, we also offer various impact protection devices, such as bollards and barriers.

### Door hold-open systems and door damper (SoftClose)

With the help of a magnetic door hold-open system, the doors are kept open and do not interfere with loading processes. Even higher retaining power is provided by electromagnets, which keep the door open even when the wind blows. When the door closing button is operated or if there is an alarm, the power to the electromagnet is cut and the door closes.

For outdoor installation, we also recommend the use of door dampers for personal and property protection.

\*To simplify, the term "doors" also includes "gates".

# Equipment

## Work and process safety

### Provision of information for preventive work safety



The provision of safety and health-related information is of great importance for preventive work safety. Clear labelling of hazards helps to reduce risks in the workplace and prevent occupational accidents.

#### Information display

Appropriate work instructions and information for work safety must be provided in accordance with the risk assessment for the use of the technical room system. For this purpose, information can be displayed on the outside of the room system in a weather-resistant, lockable info box in silver-anodised aluminium, with ESG safety glass. The back wall is a magnetic writing surface. A4 printouts can be attached with magnets or you can write important short messages directly on the board.

#### Digital information system

The ongoing change process for information provided must also be taken into account when choosing an information system in order to ensure that information is up-to-date and correct. Electronic systems can make this task much easier. With the DENIOS Cloud solution, all the information can be bundled into one application, for example quick access to operating instructions, operator's instructions, safety data sheets, etc. The application also allows you to integrate DENIOS Connect Condition Monitoring (see page ➔ 57).

#### Signage and marking

Clear, adequate signage increases safety during operation. Legally-required GHS markings and a large number of warning signs and markings for escape routes or hazard areas are mandatory. We would be pleased to plan appropriate signage and markings around your room system together with you.

## Emission and product protection



Gas warning detector



The air conditioning technology ensures that workplace limits are observed and thus protects employees. We support product protection with a well thought-out GMP-compliant design for high quality requirements.

### System monitoring

A hazard to persons or the environment may arise from the unintentional release of hazardous substances during thermal processing. It is the operator's responsibility to minimise the risk as far as possible. DENIOS offers numerous monitoring and warning systems for monitoring temperature, air extraction and air humidity as well as protection against gases which pose a risk to health.

### Air extraction

If hazardous vapours are created (e.g. harmful, toxic or flammable) in the internal room, the air extraction system can be turned on to remove the contaminated atmosphere and make it safe to open the doors. The extraction system can be operated manually or timer-controlled.

### Reliable product protection even under cleanroom conditions

For cleanroom applications in the food and pharmaceutical industries, we offer our heat chambers in high-quality stainless steel. They have no dirt-prone corners and edges and are therefore easy to clean. Extensive safety functions and the possibility of integration into the process control system ensure recipe compliance.



### Heat recovery

If a regular or continuous exchange of air is required, the thermally treated air is replaced by fresh air. This results in rising operating costs. By using an air-to-air heat recovery system, exhaust air heat can be transferred to the fresh air.



# Equipment

## Work and process safety

### Preventive fire protection measures

Preventive fire and explosion protection measures aim to identify risk (fire detection or gas detection), raise the alarm (visible/audible) and assist with evacuation. They are a useful addition to other technical fire protection measures, to structural and organisational measures and to fire protection measures by the fire brigade.

#### Fire detection

Our industrial fire detectors are intelligent, platform-based and microprocessor-controlled. They function indoors and outdoors, in the immediate vicinity of the facility to be protected, as well as from greater distances. They can be used in clean room areas as well as under harsh process conditions and in potentially explosive atmospheres, offering solutions for all requirements.



Industrial fire alarms

#### Gas detection and air extraction

If flammable vapours occur in the internal room, the air extraction system can be turned on to remove the contaminated atmosphere. The extraction system can be operated manually or timer-controlled.



Air extraction monitoring



Air extraction

#### Alarm systems, warning lights and sirens

Alarm systems such as warning lights and sirens can be used for fire warning or for system monitoring e.g. air extraction monitoring (controls the air flow) or air humidity. Various solutions are available - just get in touch!



Signal lights

#### Explosion pressure relief

A pressure relief device can be fitted in the roof area to relieve pressure in the event of an explosion. It will close again automatically when the pressure wave has been dissipated to seal the store so that the fire protection properties are maintained. This has been successfully demonstrated in a 120 minute long fire test.



Roof pressure relief panel

## Preventive fire protection

The targeted, preventive fire protection measures aim to prevent fires and explosions or to contain them until the fire brigade arrives. Unwanted changes in the chemical and / or physical properties of the stored goods due to temperature influence or contact with extinguishing agents should be excluded. The same applies to collateral damage (smoke damage, fire water damage, environmental damage and damage following equipment breakdown). The ultimate aim is to restore operational readiness as quickly as possible.

### Hold-open systems for fire-rated doors and gates

- A device approved by the building supervisory authority which ensures that door openings between fire compartments may remain open by means of a hold-open device (e.g. electromagnet)
- Automatic release: in the event of a fire, the fire-rated door closes automatically after the integral smoke detector has been triggered or can easily be manually closed

### Fire bulkheads

Fire-rated bulkheads for breakthrough points in fire-rated store walls for

- Cabling and pipes (bulkheads),
- Ventilation piping and ducts (fire protection flaps).



Maintenance, inspection and servicing are required by law

**Request a service or retrofit now!**

🇩🇪 0800 753-000-9 [info@denios.de](mailto:info@denios.de)  
 🇦🇹 06225 20 533 [info@denios.at](mailto:info@denios.at)  
 🇨🇭 056 417 60 60 [info@denios.ch](mailto:info@denios.ch)



Fire protection flaps for ventilation system

### Aerosol extinguishing technology

- Permanently operational technical equipment used for suppression of a fire until the fire brigade arrives to extinguish it.
- Extinguishing technology with aerosol according to EN 15276-1, without addition of water.
- The aerosol extinguishing generator is triggered by temperature (see sprinkler system) and effectively interrupts the chemical combustion process within 4.5 - 15 seconds (depending on model).
- The extinguishing agent technology is environmentally friendly and human-compatible (not harmful to health, does not displace oxygen). Among other things, it is listed as an official "HALON replacement extinguishing agent" by the United States Environmental Protection Agency (U.S.EPA).
- Easy and quick installation thanks to low weight / installation volume and because no piping is required.
- Low investment and follow-on costs due to low testing requirements (maintenance-free over the lifetime, no pressure vessels and no pressure tests) and long product life.



### Semi-fixed extinguishing systems



In contrast to stationary extinguishing systems, semi-fixed extinguishing systems do not have their own extinguishing agent supply, but use a connection to the fire brigade's extinguishing agent supply. They enable the emergency services to carry out a rapid and targeted extinguishing action. DIN 18230 "Structural fire protection in industrial buildings" states that a semi-fixed extinguishing system can only be considered in an industrial fire protection design with the approval of the public fire brigade if no works fire brigade is available.

# Equipment

## Outdoor installation

### Protected from wind and weather

Extreme weather conditions are becoming more frequent. This must be taken into account in the design and statics of a room system for installation outdoors. DENIOS room systems are stable and resistant to the effects of external forces. Additional equipment options also offer protection from the elements for both personnel and the product. A site-specific coating provides the steel structure with optimum corrosion protection.

#### Statics for wind, snow and earthquake loads

DENIOS room systems are suitable for outdoor installation. Structural analysis to Eurocode 3 (DIN EN 1993) measured for a characteristic wind load with a dynamic pressure of  $q_{k,W} = 0.585 \text{ kN/m}^2$  and a characteristic ground snow load of  $s_k = 2.5 \text{ kN/m}^2$

- Available with additional equipment for up to wind load zone 4, terrain category I ( $q_{k,W} = 1.064 \text{ kN/m}^2$ ) and for up to ground snow load  $s_k = 5.86 \text{ kN/m}^2$
- Structural analysis sufficiently measured in accordance with DIN 4149/EN 1998-1:2004 for earthquake zone 3



Room system with snow load

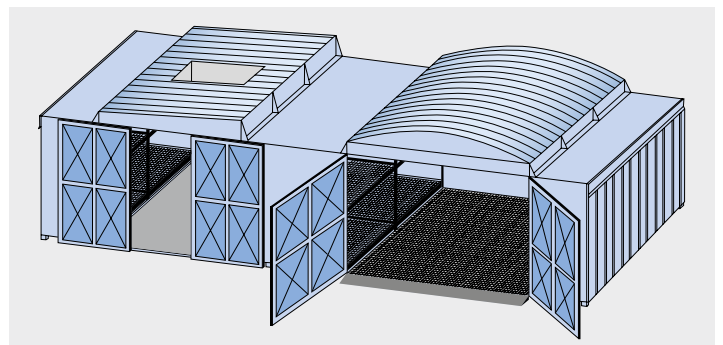
#### Extendable entrance canopy

Practical canopy for the entrance area of your walk-in fire-rated store for bad weather protection. The canopy is mounted on rails and fitted above the entrance area. Assembly takes place in our factory and is therefore an integral part of the turnkey system.



#### Weather-protected large-scale system

Technical room systems from DENIOS can be combined into installations of any size. Traffic routes and picking areas can be provided with a roof light strip to ensure weather protection for workers in the plant. Any requirements regarding temperature specifications, ventilation technology, etc. can be implemented. Legal regulations and fire protection standards are observed.



#### Paint

Technical room systems from DENIOS are usually painted in RAL 9002 (grey white) or RAL 5010 (gentian blue). Cooling and air-conditioning systems are painted in RAL 9002 as standard. This colour is especially suitable for preventing the absorption of sunlight and consequent heating of the external surfaces. This gives better protection for the room from the influence of external temperatures. Other colours are of course available on request.



## "Think Green" - use your green fingers

Sustainability begins with the responsible use of hazardous production materials. Technical room systems from DENIOS offer reliable protection during storage. Combine sustainability with individuality with the wide range of equipment and individual solutions from DENIOS. We also implement demanding, sustainable projects for our customers and with their cooperation.

### "Think Green" roof greening

Use your green fingers and increase the insulation value of your hazardous materials store at the same time. A living layer of insulation for the roof of the store makes a significant contribution to the environment, increasing insects, retaining rainwater and binding fine dust. The design brings a sense of wellbeing to the workplace.

Your hazardous materials store will be fitted with a tray on the roof, including basic filler and planting. The rot-proof basic filler protects the roof seal and also has a separation and water storage function. For the basic planting, make a selection from different planting options, for example perennials and ground cover or grasses and shrubby plants.



### Mains power-independent energy supply

To demonstrate the newest renewable energy technologies, Hoppecke needed a demonstration room. In close consultation with the customer, DENIOS designed an individual, two-part room system that meets a wide range of requirements for safety, fire and explosion protection. The first area was used as a technical room for batteries and fuel cells; the other area was used as a gas cylinder storage area for the hydrogen cylinders. This room system made possible the sensitive storage of hydrogen bottles for the operation of fuel cells and also the storage of lithium-ion batteries, which were to be charged via the fuel cells and the photovoltaic panels fitted on the roof.

On the one hand, we have shown that we can realise challenging, sustainable projects together with our customers. On the other, it's clear to see there's a wide range of possible applications for technical room systems from DENIOS. With a broad range of equipment and experts for individual solutions, we've got everything you need.



**HOPPECKE, is the largest manufacturer of industrial batteries, systems and charging equipment in Europe. The increasing use of renewable energy and the conversion to emission-free drives has made rechargeable energy storage units increasingly important. HOPPECKE has developed marketable designs for the future and is making an important contribution to solving the commercial challenges we must address in the face of global climate protection goals. Company description: [www.hoppecke.com/de](http://www.hoppecke.com/de)**





# Equipment

## Smart condition monitoring



### Simple – smart: from sensor to data portal

The sensor equipment, e.g. temperature sensor, fire/smoke detector, gas detector, etc. forms the basis for the smart condition monitoring ("DENIOS connect") of your room system. Depending on your functional requirements, you can choose between two control variants for data acquisition and processing. These can be individually extended in their functional range by additional options. Data transfer can be conveniently implemented via USB, Modbus or mobile telephone connection.

#### Measured variables for condition monitoring

Permanent status recording is possible for the following safety-relevant components of the technical room system:

- Internal and external lighting (ON / OFF)
- Technical ventilation (operating/fault)
- Heating (operating / fault)
- Door control unit (fault)
- Air conditioning system (operating / fault)
- Door (open / closed)
- Room temperature
- Runtimes
- Operating cycles (door)

In addition 1-2 signals can be integrated by the customer.

#### Mobile phone connection made easy

Connection of your room system's status monitoring system to a mobile phone network enables you to access the data and alarm messages independently of your company network. NarrowBand IoT is currently the most efficient mobile network technology for this application. This global industry standard is based on LTE and uses the associated 3GPP security mechanisms. As the technology is specially designed for smaller data volumes and dispenses with unnecessary LTE functions, it offers particularly cost-effective and reliable mobile communication.



#### The basic control system

##### Function: Data acquisition and processing

- Acquisition and processing of current measurement data
- Switching logic optimally matched to DENIOS storage and process technology
- Electromechanical control components in the switch cabinet
- Illustration of all electronic and sensor modules via operating and display elements in the front of the control cabinet in line with industrial standards



#### Functional features of the basic control system



- Actual measurement values are continually captured by the sensors and compared with setpoint values
- Visible and / or audible alarm signals
- DENIOS remote diagnosis possible
- Transmission of sensor data to customer connection, e.g. to a mail server
- Automatic triggering systems: e.g. automatic door closing or extinguishing systems in the event of fire and switching off all consumers in the event of fire



**Our systems have benefited from our condition monitoring expertise for many years. Our own innovations and experience as well as technological progress are continuously incorporated. No other manufacturer offers a comparable range of possibilities. Request your personal consultation: 0800 753-000-3.**



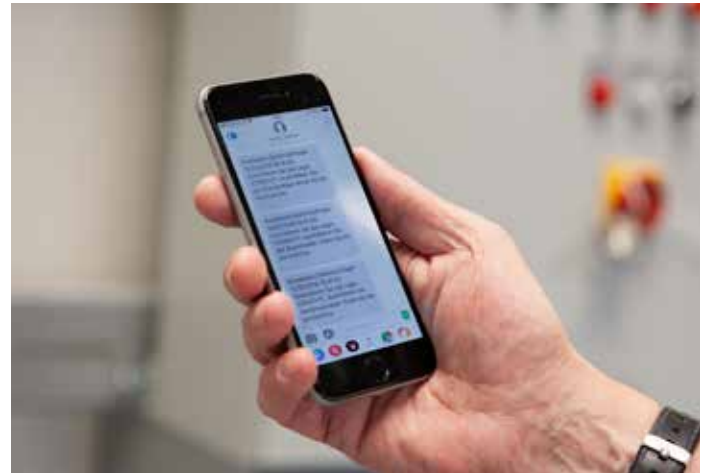
## Comfort control system



### Function: Data acquisition, processing, recording and output

In addition to recording current measurement data, the extended configuration DENIOS digital also offers data recording of operating states and fault messages as well as additional information on running times and maintenance intervals. This gives you an overview of all the safety-relevant data for your technical room system. For remote access, you establish a data connection easily and securely with a free VPN application and your Internet browser.

## Functional features of the comfort control system



- Actual measurement values are continually captured by the sensors and compared with setpoint values
- System parameters are stored for 12 months
- Mapping of running times and maintenance intervals
- Error or alarm messages for setpoint value deviations and alarm delays configurable via the control panel
- Visible and / or audible alarm signals
- DENIOS remote diagnosis possible
- Transmission of sensor data to customer connection, e.g. to a mail server
- Automatic extinguishing systems: e.g. the automatic door closing system or extinguishing system in the event of a fire, or automatic switching on of a technical ventilation system if air extraction limit values are exceeded

## Comfort control system hardware and software

- Modern touch panels/displays for indoor or outdoor use with high operating comfort
- High-performance controller connected to the operating unit via Modbus maintains its function even if the operating unit fails, thus ensuring reliable process control and documentation
- The control software developed by DENIOS and coordinated hardware components are optimally designed for the hazmat storage technology and are continually expanded with new innovations
- Simple data transfer via USB interface
- Modbus interface for connection to higher-level systems, such as the customer's process control system
- Modern control cabinet technology incl. potential-free contacts for providing fault messages for evaluation by the customer
- Customer-specific versions coordinated by our developers



## Your service partner



### **Comprehensive and worry-free service: from advice to maintenance**

We see ourselves as your partner, providing a comprehensive and worry-free service. And we take this seriously: for us, service means taking the best care of our customers before, during and after their purchase.

Before you decide on a room system, you need the certainty that it will exactly meet your needs and will also meet all the requirements of the law as well as from your insurers. We therefore offer comprehensive and personalised advice, on site if needed, and support you with additional full information on the desired solution. During the design and production phase, professional project management ensures that everything is covered. We'll be there for you after your purchase too, for example with our professional maintenance service and many years of experience to help answer any questions or offer training.



Your service partner

**"Good support makes  
the difference."**



# Your service partner

## Our service concept

### One order - full support!

Our job is not just to supply an approved room system for your company's premises. Our service concept has a holistic approach and covers the whole order process. You'll receive excellent quality services, all from one supplier. As a manufacturer we are aware of our responsibility to our customers and ensure the highest levels of quality and best advice at every step along our journey together.



#### Step 1: Needs analysis and advice

Special projects need specialist advice. As requirements and risks can vary massively from company to company, a room system must always be adapted to suit your individual needs. Working together with you, our engineers will develop the optimum design for your storage or test system. Not everything can be solved by a telephone call. That's why it's important that we can offer personal advice, on-site if needed. As part of the professional needs analysis, we'll evaluate your individual company circumstances, requirements and processes. On the basis of this analysis we'll produce a customised design and firm quote. Efficient advantage: many solutions are already part of our digital configurator. Your customised room system can be planned in just a few clicks. But individual solutions are not a problem. Personalised advice is always important: one of our experienced engineers will take charge of your project right from the start and will be available as a direct contact from the initial offer phase to final acceptance.



#### Step 2: Design and project development

Our standardised room systems cover many application fields and already have General Technical Approval. This allows for quick design as well as easy processing with building authorities and insurers. But individual projects (e.g. tailor-made solutions) are also not a problem: as part of the design phase we can use proven modules to put together a customised solution. You'll be able to take advantage of the combination of cost effective standard production and individual design. We have many years of experience with legal requirements, approval authorities and insurers and will work alongside you throughout the project. Working closely with the customer, the room system is planned in accordance with applicable regulations. At the end of the design phase an approval drawing is produced. As soon as this has been checked and approved, your room system will go into production.



#### Step 3: Production and factory acceptance

Your room system will be manufactured in our own production facilities by certified specialists to meet international quality standards. Bought-in components undergo strict quality controls at goods-in. This means we can guarantee the same high level of quality for every product. Our room systems are pre-assembled in the factory and provided with all the necessary connections so that they are quick to set up at the customer's premises. A Factory Acceptance Test checks your system conforms with all specifications and quality requirements. In addition to the Factory Acceptance Test (FAT), you may also monitor the progress of production phases in person at any time.





#### Step 4: 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.



#### Step 5: Installation and commissioning

DENIOS technicians will ensure 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. But there's no need to worry: right from the design and production phase, we are in continual contact with the relevant authorities, so individual approvals can be obtained with the minimum of fuss. Our specialist staff will then instruct the users directly on the product and comprehensive product documentation will be handed over. DENIOS room systems: set up, commission, stay safe!



#### Step 6: Maintenance and repair

If your room system is already in operation, you're not left on your own. Our technicians know all there is to know about DENIOS systems and can take over regular maintenance for you. This leaves you free to concentrate on your business - we'll look after the rest. More information on our maintenance services can be found on the following pages.

# Your service partner

Quality throughout the whole process

## Our quality promises



A DENIOS hazmat store ensures the customer can rely on tested, certified quality. All our DENIOS hazmat stores are produced in-house. This is why we had our production conditions certified in accordance with DIN EN 1090 at an early stage - comprehensively and completely. The three-part Euronorm DIN 1090 has been valid since July 2014 for all manufacturers of load-bearing structures made of steel and aluminium and sets Europe-wide quality standards. EU trade is not possible without EN 1090 certification. Right from the planning stage, we ensure that all requirements are met and that our solutions are both highly efficient and economical. So that you as a customer can be sure of this, we have ourselves and our products regularly certified by independent institutes. These include DEKRA, TÜV nord, DVS, IBS and the Deutsches Institut für Bautechnik in Berlin.

### DENIOS is ISO certified

Energy and the environment are key components of DENIOS' history and its self-image. Efficient, careful and economical use of all resources is a matter of course. At our headquarters in Germany, we have been certified in accordance with international standards ISO 9001, ISO 14001 and ISO 50001.

### Demonstrably sustainable

Sustainability is one of our key company values. At the same time, sustainable management is a necessary responsibility that affects all areas of a company, from development and production to human resources. In the first DENIOS Sustainability Report, we not only show that we are already very well positioned in many areas and are acting sustainably. We also recognise our potential and set concrete goals for the future.



Your service partner



## Quality control

The motto "Trust is good - control is better" sounds somewhat negative. We'd rather say: control and evaluation are the basis for continuous quality and product improvements. The better and more reliable the quality, the greater and more sustainable our customers' trust in DENIOS and their satisfaction with our services.

That's why we don't just rely on random sampling. Every room system that leaves our production facilities is thoroughly inspected and functionally tested before it is handed over to the customer. Every detail is recorded in a digital acceptance report and extensive photo documentation. In addition to the technical drawing, we then have an exact picture of the delivered product and can use this information later on for servicing.

If we come across something during acceptance that does not correspond to the expected product quality, it will be repaired immediately. The test reports

are evaluated and the assembly personnel interviewed in regular quality rounds. Any error factors are therefore sustainably eliminated. In a dynamic business environment in which not only laws and regulations but also operational processes are subject to change, we have always attached great importance to the continuous improvement of production conditions and product quality. In this way, we are able to sustainably meet the company's goals of meeting delivery dates and customer satisfaction.

# Your service partner

## Transport and assembly



After successful factory acceptance, it's important that your room system is quickly delivered to the installation site and put into operation smoothly. Our professional transport and assembly service ensures that your room system is ready for use on time and without fuss. We ensure a smooth logistical process and keep interruptions to your internal processes during assembly as short as possible. Unloading, installation and commissioning of your room system are usually completed in just 3.5 hours.

### Transport? We'll take care of it!

Whether to the Mosel or Shanghai: Just let us know where and we'll get your room system to you safely and on time. Special oversized load transport for oversize widths or heights can also be arranged. Our professional management team will accompany the shipment from start to finish. We take care of all logistical tasks for you, including obtaining the necessary special permits. Transport and installation of your room system is carried out by a qualified and experienced team of drivers and fitters. Our room systems are already pre-assembled at the factory and are delivered to you in almost one piece by a special lorry from our own fleet or by a trusted forwarding agent. This considerably shortens the assembly time needed on your site.

#### Safe transport to your site:

- DENIOS takes over the complete logistical handling process for you
- Delivery takes place with our own fleet of vehicles or through long-standing forwarding partners
- Special oversized load transport - oversize widths or heights are not an issue
- Delivery worldwide

### Safe unloading

You are welcome to unload your room system yourself - however, many of our customers use our convenient unloading service. Our trained employees will then ensure safe, damage-free unloading for you. On request, we can also organise suitable lifting equipment, e.g. forklift trucks, truck-mounted cranes or aerial work platforms. We will inform you in good time about any preparatory work to be carried out by the customer, such as the preparation of the floor, so that the commissioning can be carried out on schedule.

#### Our unloading service at a glance:

- Provision of suitable lifting equipment
- Safe unloading of the room system by trained personnel





## Professional assembly

DENIOS room systems are pre-assembled at the factory and equipped with all the necessary connections so that final assembly at the installation site can be carried out quickly and easily. Trained and experienced fitters ensure that your room system is installed professionally and to your complete satisfaction. A Site Acceptance Test (SAT) can of course also take place on request and after prior agreement. Only after final acceptance by you as the operator is our assembly task complete.

### Assembly services:

- Installation and alignment of the system
- Compensation for up to 10 mm unevenness (not for fire-rated storage containers)
- Removal of transport safety devices
- Securing the system to the prepared floor
- If necessary, assembly of additional components on the supplied system

## Technical training

Technical training is needed for the safe, professional operation of your room system. This will be carried out by our specialist personnel after the assembly work has been completed. In this way, your employees get to know all the functions directly on site and receive practice-oriented handling instructions. This ensures processes and functions run properly right from the start. This is accompanied by comprehensive technical documentation.

### This is how we get you ready to use your room system:

- Professional, practical technical training
- Handover of technical documentation

# Your service partner

## Customer service and maintenance

### Securing your investment in the long term

With a DENIOS product, you can rest assured that you are safe. Right from the design and production stages all laws, standards and required certifications are taken into account. There's a simple way to make sure that you and your employees remain safe in the long term: regular maintenance. Equipment and tools for the storage and transport of hazardous materials are complex. In addition to design-based tests, the technical components also need to be regularly inspected. The functionality of each component can have an important effect on the construction as a whole. Regular inspections will increase your productivity and the life of your investment. You choose: for long term safety we offer an attractive maintenance contract - or you can book just a single inspection.

#### Maintenance from the manufacturer - advantages!

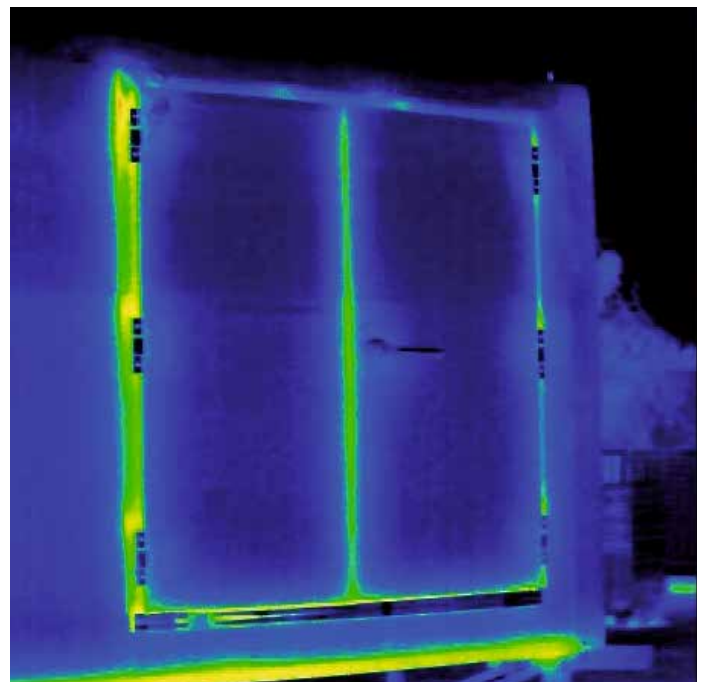
There's more than one good reason to choose maintenance direct from the manufacturer:

- Minimise the risk of downtime and extend the life of your equipment
- Repairs are carried out exclusively by qualified and trained DENIOS AG service technicians
- As the manufacturer we ensure high quality original parts are supplied quickly
- You'll save travel costs and time - our technicians always carry materials for small repairs
- Service with that little extra: our technicians will alert you to any changes in legislation and show you the necessary adjustments on currently available or future products. Our professional technicians will recognise possible accident risks straight away and be able to deal with them quickly and professionally.

#### It's all covered: Service from DENIOS

When our technicians come to your site, every important detail is taken into consideration. Is the air exchange rate still ensured? Do the fire protection flaps operate correctly? Are the sensors supplying all the necessary data? Only when all the safety-relevant components have been extensively tested will we assign the proverbial tick. The process may vary, depending on the product to be inspected. For your room system, the following are of special importance:

- Inspection of general condition
- Visual inspection for damage and defects
- Safety testing of all functions
- Inspection of the switch cabinet
- Testing of the signalling technology (e.g. fire recognition, gas warning sensors)
- Inspection of heating and air conditioning technology
- Functional inspection of mechanical parts and doors
- Inspection of spill pallets for damage



**Membership pays**

When you sign a maintenance contract, you'll have access to the following benefits:

- Regular service intervals mean that expensive repairs can be avoided
- Legal requirements for maintenance intervals are observed
- Maintenance of your insurance protection including limitation of company liability in the event of a loss
- Extra long protection: we'll extend your warranty by up to 5 years\*
- Accurate cost control: we offer an attractive all-inclusive bundle
- Don't worry about tiresome scheduling. With a maintenance contract, we'll remind you in good time when maintenance is due

**Maintenance at an all-inclusive price**

The security of long term maintenance with full control of costs - our all-inclusive maintenance bundle has everything you'll need for an all-inclusive price:

- ✓ Reminder service: making sure you don't miss an inspection date
- ✓ Regular inspection of your entire room system and the technical components
- ✓ **Costs for travel, expenses, overnight accommodation and incidentals already included**
- ✓ **Small repairs carried out directly on site, more involved repairs will be quoted for separately**
- ✓ Production of a service report and test report
- ✓ Fitting the test sticker

**Sign up & start saving!**

When you take out a service contract, you'll benefit from our attractive all-inclusive offers as well as an extension of the DENIOS warranty of up to 5 years\*. Get your Carefree Card today and apply for your DENIOS Premium Service Card.

🇩🇪 0800 753-000-9



\* Applies when a service contract is taken out within the first year after the date of delivery.

# DENIOS

ENVIRONMENTAL PROTECTION  
& WORK SAFETY



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