



**ENVIRONMENTAL PROTECTION
& WORK SAFETY**

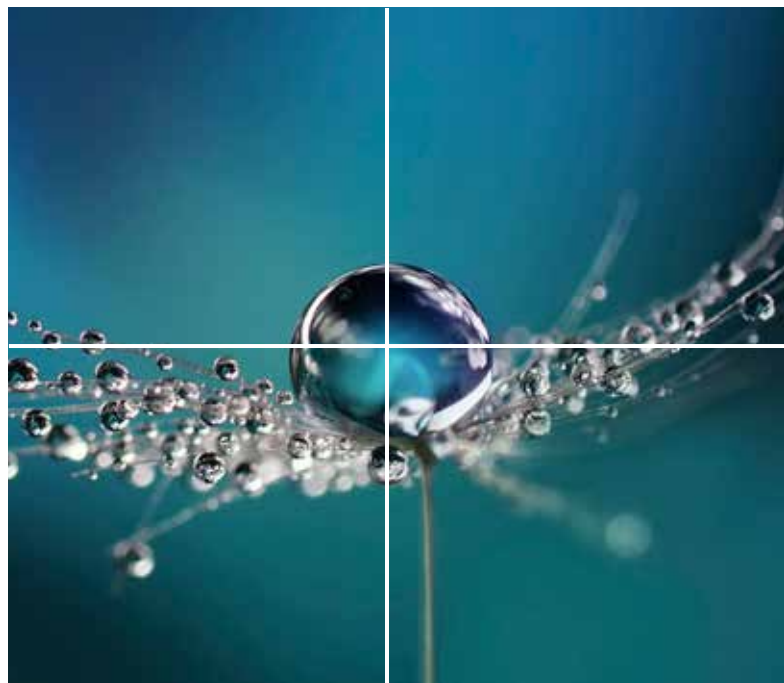
- **Comprehensive specialist knowledge**
- **Internationally certified products**
- **Numerous equipment and service options**



Technical room systems

-  **Hazmat storage containers**
-  **Fire-rated hazmat storage containers**
-  **Technical safety rooms**
-  **Thermotechnology**

Technical room systems from DENIOS





Contain the risk!

Acetone, phosphorous, peroxide, tetrachloromethane, hydrofluoric acid... the list goes on. Often with unimposing names, they are all commonly found in production processes as raw materials, additives, waste products or as the desired end product of production. The problem is they are hazardous substances which are flammable, oxidising, toxic or even potentially explosive. The right knowledge is vital for the risk assessment and implementation of suitable protective measures. This is where DENIOS, with our specialist expertise, can act as your partner. We've put together the most important information for you from page ➔ 6.

We can also help with appropriate storage solutions:

- When storing or dispensing hazardous substances, you need to contain the risk! **Hazmat storage containers** from DENIOS prevent the substances stored inside from causing serious damage to the environment (from page ➔ 30).
- At the same time Technical room systems are secured from external effects, such as the risk of fire (**fire-rated hazmat storage containers** from page ➔ 68).
- Our technical room systems are also suitable for housing sensitive or high-value technology. For this application, we mostly create custom solutions, which we term **technical safety rooms** (from page ➔ 94).
- As a manufacturer we are constantly developing our technical room systems to meet the most varied challenges. We offer **heat chambers** based on our proven technical room system designs for the temperature controlled storage and processing of additives (from page ➔ 106).

One order - full support!

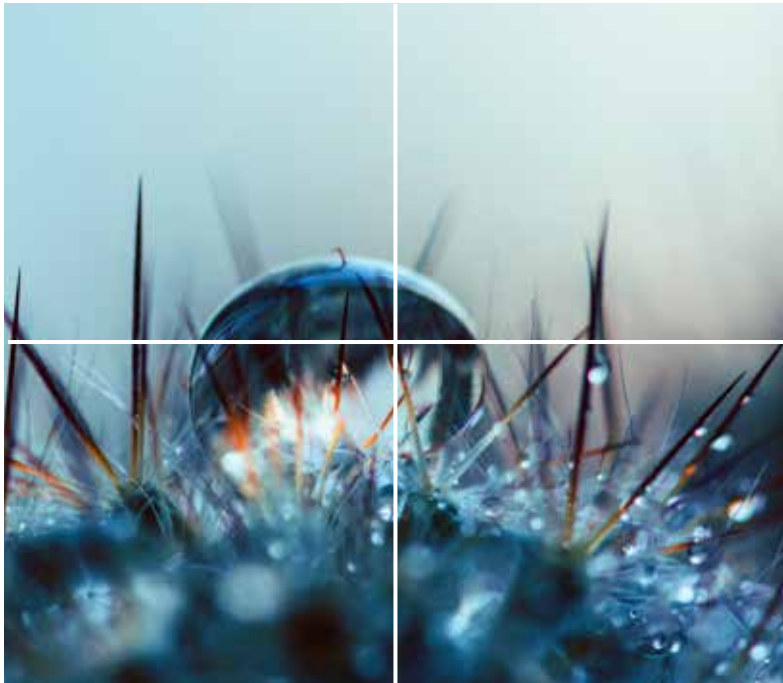
Before you select a technical room system, you need to know that it meets all your requirements as well as the legal regulations and your insurance requirements.

We will advise you in detail - at your site if desired - and offer additional support with comprehensive information on your required solutions.

As a manufacturer we know exactly what our customers need and have already included the right accessories in our comprehensive range of equipment (from page ➔ 122).

And of course we are also there for you once your purchase has been made. Our technicians know all there is to know about DENIOS technical room systems and can take over regular maintenance for you. This leaves you free to concentrate on your business - we'll look after the rest. (DENIOS - your service partner, from page ➔ 136)

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DENIOS expertise

Many years of experience and continuous staff training ensures that we are competent to offer advice on hazardous substances. We love to share our knowledge, for example in the popular DENIOS Hazmat Manual, in seminars in the DENIOS Academy or in these pages.

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If you still have questions, our experienced team of experts will be pleased to assist you.

 **+49 800 753-000-3**

info@denios.de

Visit **www.denios.com** to get in contact with your local representative.

Hazmat storage containers without fire protection

Walk-in hazmat storage containers

WHG | Storage area: 2 to 15 m² **32**

MCV | Storage area: 5 to 17 m² **36**

Compact hazmat storage containers

SolidMaxx | for up to 8 drums or 2 IBCs **40**

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Fire-rated hazmat storage containers

Walk-in fire-rated hazmat storage containers

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Compact fire-rated hazmat storage containers

BMC-S | for up to 4 drums or IBC **74**

Fire-rated hazmat storage containers with shelving

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DENIOS expertise



How do you become a hazmat specialist?

Normally it takes years to gain both the necessary theoretical knowledge as well as the practical skills. But you're in luck - we're happy to share our expertise with you. On the following pages you'll find information on

- the current legislation for hazmat storage in Germany (from page ➔ 8),
- an insight into the international requirements we come across when dealing with fire protection (from page ➔ 14)
- and we point out the regional differences in construction requirements for hazmat storages outdoors (from page ➔ 20)

There are some important notes on useful tools as well as our offers for advice and training.

Still looking for some help? Got an idea on how we can improve something? Take a look at what we offer online. On our website it's easier to see complex information and you can contact us directly by email or by using our contact form.

 www.denios.de

Visit www.denios.com to get in contact with your local representative.

"Our customers rely on our advice. We can help make you confident in the safe handling of hazardous substances too."



Basic legal knowledge for the safe storage of hazardous substances

The following legal information relates to the storage of hazardous materials in Germany. National legislation differs from country to country, but deals with the same themes. For applicable legal information please contact your local DENIOS branch.



What sources of information are available?

One of the most important sources of information on the safe handling of hazardous materials in Germany is the Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (BAuA) [Federal Institute for Occupational Safety and Health]. On www.baua.de you can find information on European and national legislation as well as current scientific developments in the field of hazardous substances. Additional important information can be found directly in the laws, regulations and technical rules.

Operations involving hazardous substances in Germany are also governed by the health and safety law (ArbSchG). Alongside the chemicals law (ChemG) this regulation forms the legal basis for hazardous substances law (GefStoffV), which regulates protection from hazardous substances in German work safety. The regulations are put into concrete terms and related to the current state of the art in the technical rules for hazardous materials (TRGS).

The Federal Water Act (Wasserhaushaltsgesetz, WHG, in German) controls the safe handling of water-polluting substances in Germany. The regulation regarding systems for handling water-polluting substances (AwSV) is one of the pieces of legislation associated with the WHG. This controls the classification of substances and mixtures, the technical and organisational requirements for equipment and the requirements for specialists, examiners and specialist companies.

In accordance with European legislation, the REACH and CLP regulations offer additional important information and legal knowledge on handling hazardous substances. REACH stands for Registration, Evaluation, Authorisation of Chemicals. The regulation unifies chemical laws across Europe and improves knowledge on hazards and risks associated with chemicals. The CLP regulation is the legal basis for the classification, labelling and packaging of chemicals in the EU.

Structural installations of any type in Germany are regulated by the nationally-applicable construction law and the state building law (LBO) for the individual states.

You can find an overview of the current legislation at www.bauordnungen.de.



Info

Further specialist literature on the subject can be found at

 www.denios.de/fachliteratur










Visit www.denios.com to get in contact with your local representative.

How are hazardous substances defined?

BAuA defines hazardous substances by their effect:

"Hazardous substances are substances or mixtures, which can be hazardous for people or the environment or can have a damaging effect."

GefStoffV defines hazardous substances by their properties: *"Hazardous substances are such substances, preparations and products which have certain physical or chemical properties, for example highly flammable, toxic, corrosive, carcinogenic, to name but the most dangerous."*

| | | | | | |
|---|-------------------------------------|---|----------------------------|---|----------------------------|
|  | Hazardous to the environment |  | Toxic, highly toxic |  | Hazardous to health |
|  | Corrosive, irritant |  | Explosive |  | Oxidising |
|  | Flammable |  | Pressurised gas |  | Harmful to health |

The term "hazardous substance" is also defined in § 19 ChemG and in § 3a ChemG.

Help is at hand: The German Social Accident Insurance's Hazmat information system (GESTIS) contains information on the safe handling of hazardous materials and other chemical substances in the workplace. It contains information on approximately 9400 substances. A mobile version for smartphones and tablets can be found at gestismobil-de.itrust.de

Alongside the classification of "hazardous substance" there is also a classification of "water-polluting" in German law. The Federal Water Act (Wasserhaushaltsgesetz, WHG, in German) defines water-polluting substances as follows: *"Water-polluting substances (...) are solid, liquid and gaseous substances likely to have a permanent or significant detrimental effect on water quality."*

In accordance with § 3 paragraph 1 of AwSV, water-polluting substances are classified into three German water hazard classes (WGK):

- **WGK 1:** slightly water-polluting,
- **WGK 2:** significantly water-polluting,
- **WGK 3:** highly water-polluting.

Help is at hand: The information on a substance's water-polluting class can often be found in the safety datasheet. More extensive information on the classification of water-polluting substances as well as an up to date database of all official classifications can be found on the website of the Federal environment agency (UBA) www.umweltbundesamt.de.

The BAuA clarifies: *"The water-polluting class has an effect in particular on the requirements for equipment for handling water-polluting substances. Depending on the water-polluting class of the substance involved, as well as its quantity, so-called hazard levels are set for the equipment. The classification into hazard level A to D generally sets the requirements for the equipment."*



Expert advice

We provide information on subjects that concern you on a daily basis. This allows you to take advantage of our expertise. The subjects are generally kept more general, so as many of our customers as possible can benefit. The best information, however, will be gained from individual advice. Our extensive team of office-based and field representatives will be delighted to assist.

You can reach our experts on the following number:

+49 800 753-000-3

info@denios.de

Visit www.denios.com to get in contact with your local representative.



What does an operator or employer need to consider when planning a hazmat store?

Hazardous substances are a risk in operations. For this reason, a risk assessment must be carried out in accordance with TRGS 400 for operations involving hazardous substances, including storage. The corresponding protective measures in accordance with TRGS 500 need to be taken.

Help is at hand: The Berufsgenossenschaft für Gesundheitsdienst und Wohlfahrtspflege (BGW) [German Professional Association for Health Service and Welfare] has an online portal www.bgw-online.de under "Health at Work" > "Risk assessment" with a comprehensive collection of short articles and help with documentation for hazmat risk assessments.

Risk assessment for activities with hazardous materials in accordance with TRGS 400

"The requirement in health and safety law for a risk assessment to be carried out is based on the hazardous substance law (GefStoffV). (...) The Technical rules for hazardous substances (TRGS 400) give the specific methods for counteracting the risks and the resulting measures."

Protective measures for activities with hazardous materials in accordance with TRGS 500

"TRGS 500 puts §§ 8 to 11 of GefStoffV into concrete terms with regard to technical, organisational and personnel-related protective measures, in particular for inhalation hazards.(...) The exact measures to be taken in practice will depend on the results of the risk assessment in accordance with TRGS 400."

The safety datasheet (SDS) – essential for a risk assessment

Under REACH, the safety datasheet is the central tool for conveying information. It must be passed on from the substance seller or importer to the user or consumer along the supply chain. The safety datasheet must permit the user to take the necessary measures to protect human health and ensure safety in the workplace and environmental safety. The employer will find the information needed for the risk assessment in accordance with TRGS 400 in the safety datasheet. The SDS does not replace the need to carry out a risk assessment. An extended safety datasheet (eSDS) has additional information in the form of exposure scenarios (ES) in an attachment. Under certain conditions, the ES can be used directly for certain parts of the risk assessment. In accordance with § 6 Paragraph 7 GefStoffV the ES can be used as an included risk assessment, as long as the requirements described in TRGS 400 are met.

The most commonly used Technical rule for the storage of hazardous materials is TRGS 510 for the storage of hazardous materials in nonstationary packages. The protective measures required in TRGS 510 depend on the quantities of hazardous substances to be stored and the hazard characteristics (H phrases).

The DENIOS Hazmat Manual

Detailed explanations and advice on TRGS 510, as well as additional interesting information, can be found in the DENIOS Hazmat Manual - the compendium for hazardous substance storage. Available in our Online Shop now!

 www.denios.de/fibel

Visit www.denios.com to get in contact with your local representative.



The DENIOS Newsletter – Knowledge at your fingertips

Would you like to be kept up to date on current themes and legal issues? The DENIOS Newsletter will keep your finger on the pulse.

 www.denios.de/newsletter

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What do I need to consider when storing various hazardous substances together?

Hazardous substances of the same storage class may generally be stored in the same compartment of a store. For many companies, however, the storage of hazardous substances with differing hazard potentials is a daily problem. The possibilities for combined storage are however limited by law so that increased risks are avoided. TRGS 510 provides classification of hazardous substances into storage classes so that combined storage may be controlled.

Help is at hand: A table clearly shows the possibilities for combined storage based on storage class. Go to our online advice webpage and take a look at the combined storage table. Additional detailed information is provided on the subject and we answer important questions such as:

- What storage classes are there?
- How do I classify a product into a storage class?
- What information does the combined storage table show?

Link to the online advice webpage:

 www.denios.de/ratgeber-zusammenlagerung

Visit www.denios.com to get in contact with your local representative.



What do I need to consider when storing flammable liquids?

Flammable liquids are defined as storage class 3 (see "Combined storage") and labelled H224, H225 or H226. They must be stored in tightly closed, approved containers suitable for hazardous goods (passive storage).

TRGS 510 gives information on the state of the art for storage of hazardous materials in nonstationary packages and also gives concrete information within its scope of application on the requirements of GefStoffV. If activities are carried out in the store, e.g. dispensing or removal (active storage), these must be evaluated separately in the risk assessment in accordance with TRGS 400 and the necessary protective measures implemented.

For the storage of hazardous flammable liquids outdoors, TRGS 510, Appendix 5 "Special measures for fire and explosion protection when storing flammable liquids", No. 4 describes a distance regulation for preventative "protection from the effects of fire from both sides between nonstationary packages outdoors and neighbouring plant and buildings" and a requirement to "secure the store against any sources of ignition from outside".

The following set distances are given in TRGS 510:

"Nonstationary packages containing flammable liquids must be a minimum of 10 m from buildings. For a total quantity stored of less than 200 kg a distance from buildings of 3 m is sufficient and for a total quantity stored of more than 200 kg and less than 1000 kg a distance from buildings of 5 m is sufficient."

The distances given in Paragraphs 1 and 2 are not needed if technical fire protection measures are taken. More information is given on this in the next chapter "Fire and explosion protection" (from page ➔ 14).

What equipment is required for a hazmat store?

TRGS 510 describes the following important equipment options:

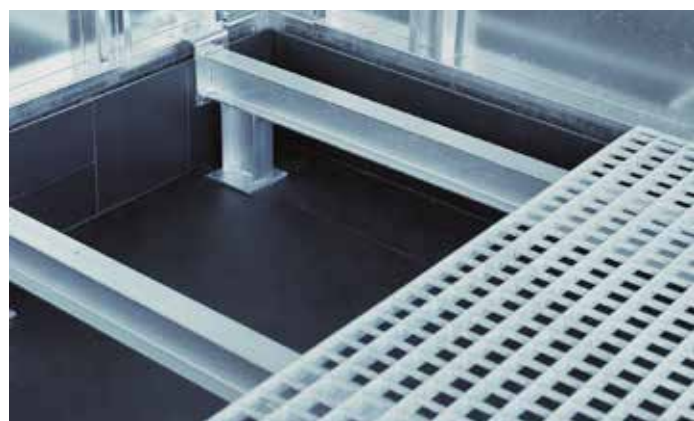
Lighting

Sufficient lighting must be provided in a hazardous materials store. The lighting must be fitted so that warming of the stored goods, which could lead to a hazardous reaction, is avoided.



Containment device for liquids

Hazmat stores must be fitted with a "Containment device for liquids": "Leaked liquids must be recognised and cleared up and may not be allowed to penetrate into areas not intended for this purpose. Various surfaces must be provided (e.g. dispensing or guide surfaces, containment areas) which are sufficiently sealed and resistant to the stored hazardous substances as well as to the expected mechanical stresses."



Ventilation

There must be sufficient natural or technical ventilation in the store, to ensure that if an accidental release of hazardous substances occurs there is no hazard for employees or other persons. Technical ventilation is required if natural ventilation is not possible or not sufficient.



Info

In addition to the legally prescribed equipment, DENIOS offers many other options for improving the safety and comfort of your storage system (see page ➔ 122). We would be happy to help you plan your hazardous materials store. We can use our digital variant configurator (see page ➔ 146) to help design a technical room system which is not only legally-compliant but also meets your needs. It only takes a few clicks to plan your custom hazmat store - with a 3D model.



Does a mobile hazmat store installation need approval?

A hazmat store installation for drums and IBCs will almost always need approval and certain building requirements will also need to be met. These include provisions and regulations concerning stability, fire protection, snow loads, wind loads, protection of the environment and trees, clearances, boundaries and construction lines. Information on the construction requirements for outdoor hazmat stores is given from page ➔ 20.



What's next in the building phase, after planning and approval of the hazmat store?

VDI guideline VDI 3975 Page 3 describes the construction and operation phases which follow on after the planning and approval stages for a hazmat store. Construction should be carried out in close cooperation with the approval bodies and approval obtained. Equipment for storing water-polluting substances must be examined for fitness in accordance with Federal Water Act §63 (Wasserhaushaltsgesetz, WHG, in German) and must be monitored and tested in accordance with AwSV § 46 (Regulation on equipment for water-polluting substances).



What operator duties need to be observed for operating a hazardous materials store?

A complete overview of operator duties can be found under VDI guideline 3975 page 3 Storage of hazardous substances - Operating hazardous materials stores. DENIOS is able to offer assistance with the following parts of the specified operator duties:

- Access limitation when storing certain substances in large quantities: in this case, only authorised, specially trained employees should have access. A sign specifying "Access prohibited for unauthorised personnel" must be displayed at each entrance to the store.
- Order and cleanliness are ensured with marking of storage and traffic areas, emergency exits and rescue routes and limitations on stacking heights.
- Regular monitoring of the equipment either in person or by technical devices.
- Employees must be regularly trained (min. annually) if they handle hazardous substances, water-polluting substances and equipment.

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🇩🇪 www.denios.de/service

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Fire protection basics

Particularly high safety requirements are set for highly flammable stored goods and flammable, toxic and oxidising media. To safeguard people and the environment, legislators require strict fire protection regulations to be observed. You should get information in good time on the various requirements and define the measures which will give the best possible protection from the risks of fire. Are you dealing with hazardous materials storage and fire protection for the first time? We would be happy to provide you with the right basic knowledge to get you started.



Fire protection: definition and important terms

Fire protection covers all the measures which prevent the creation and spread of a fire (= fire and smoke) (preventive fire protection) and which permit the rescue of people and animals as well as effective extinguishing actions (defensive fire fighting). When planning a hazardous materials store **preventive fire protection** should be primarily considered, to minimise the risk of any possible fire caused by the stored substances up front and to prepare measures for effective fire fighting in an emergency. Measures are sub-divided into structural, technical and organisational measures.

In the right order!

To define suitable fire protection measures and implement them correctly, you first of all need to know the hazards which are to be expected in your operation. Is there any risk of fire with the hazardous substances present in your company? If there is such a risk, how should it be classified? All this should be determined in your risk assessment. Our online advice webpage can show you how fire protection can be assessed in your risk assessment:

 www.denios.de/ratgeber-brandschutz

Visit www.denios.com to get in contact with your local representative.

| | |
|---------------------------------------|--|
| Structural fire protection | For example: <ul style="list-style-type: none"> Division into fire compartments (a fire compartment is an area that will burn itself out and therefore will not permit any flashover to other fire compartments) Requirements for construction materials and components Fire resistance duration Safety distances |
| Technical fire protection | For example: <ul style="list-style-type: none"> Fire alarm systems Automatic extinguishing equipment Extinguishing water supply Equipment to remove smoke and heat |
| Organisational fire protection | For example: <ul style="list-style-type: none"> Alarm plans Fire protection regulations Emergency exit and rescue route plans Marking Carrying out exercises |

Hazardous substances and fire protection - you need to take note of the legal requirements

When fire protection is combined with the storage of hazardous substances, particular hazards need to be considered which could be caused by the stored substances. In addition to the individual risk assessment, companies may also take specific information on fire protection measures from various regulations which cover the safe storage and handling of hazardous substances. For example the German **dangerous substance directive (GefStoffV)**, in particular Appendix I Number 1, which contains special regulations for hazardous substances with a risk of fire and explosion. As part of the Technical rules for hazardous materials **TRGS 510** (in particular Paragraph 6) sets out the requirements for fire protection in a hazmat store depending on the type and quantity of substances to be stored. The **Technical rules in the 700 and 800 series** deal with the specific aspects of fire and explosion protection when handling hazardous materials.

Ex Zones and their classification



The environment around the combustible substance is divided into three different zones, both spatially and in terms of time, taking into consideration any outgassing. As part of his obligations under §5 ArbSchG the employer must determine the risk to his workers from explosion, evaluate this risk and take

the necessary protective measures. An explosion protection document must be produced, in which zones are laid down and the required explosion protection measures are determined.

Depending on the zone, various safety precautions must be taken to prevent explosions. If there is any doubt about the correct identification of the zones, the scope of protective measures taken must be suitable for the highest probability of occurrence of a dangerous explosive atmosphere. Explosion protection measures are divided into three areas (the sequence reflects their priority):

- Avoidance or limitation of the formation of explosive atmospheres
- Avoidance of effective sources of ignition
- Limitation of the effects of any explosion to a harmless level

| | |
|---------------|--|
| Zone 0 | An area in which a dangerous explosive atmosphere is present continuously, over a long period or often (i.e. for most of the time). e.g. the inside of containers |
| Zone 1 | An area in which during normal operation a dangerous explosive atmosphere can be formed occasionally. e.g. near to Zone 0 or the area around a dispensing point |
| Zone 2 | An area in which during normal operation a dangerous explosive atmosphere is not normally formed or is only formed for a short period. e.g. areas which surround Zones 0 or 1 |

The creation of an explosive atmosphere can be avoided for example by replacing flammable substances with ones which do not create an explosive mixture. Substitution of operational substances is however not often possible. This is why a DENIOS hazmat store has appropriate safety modules. Technical ventilation can help to reduce flammable vapours in the ventilated area (effectiveness must be evaluated and monitored in terms of strength, quality and availability). DENIOS offer solutions for natural or technical ventilation including air extraction monitoring. Your hazmat store can be fitted with ex-proof components to avoid effective sources of ignition. Pressure release panels can also be fitted in the roof to ensure active safety in the event of an incident. Details on safety equipment for your hazmat store can be found on page ➔ 122.

Image: Zone allocation for gas explosion protection

European standards and classifications

Following the progressive harmonisation of standards across Europe, an extensive unified classification system for fire protection was introduced and has gradually been enshrined in the national legislation of several EU states. The set of standards EN 13501-1 and -2, which deal with the classification of building product fire behaviours and fire resistance durations, has been used as a basis. Significant requirements include the load capacity of the design as well as the spread of fire. These are met through proof of fire resistance for the load bearing and/or room enclosing components over a certain time frame. This is evidenced by fire tests. After successfully completing a fire resistance test the complete system is given a classification, indicated as REI tt, e.g. REI 120:

Résistance = Load capacity

The capacity for withstanding a fire load under set mechanical influences without losing stability.

Étanchéité = Integrity

The capacity of a component with a room separating function to withstand the passage of fire to the side not exposed to the flames.

Isolation = Insulation

The capacity to prevent heat transfer for a single sided fire load so that on the side not exposed to the fire no surfaces or materials catch fire ($\Delta T < 180 \text{ K}$).

120 = Duration in minutes

The time during which all criteria (R, E and I) are met.

The European system has put together detailed possible classifications times of 15, 20, 30, 45, 60, 90, 120, 180 and 240 minutes – for fire-rated stores however the usual classifications are REI 30, 60, 90 and 120, which are taken from previous standards amongst other things. In the same way fire protection doors are classified as EI 30 to EI 120.

REI 30 / EI 30
fire-retardant

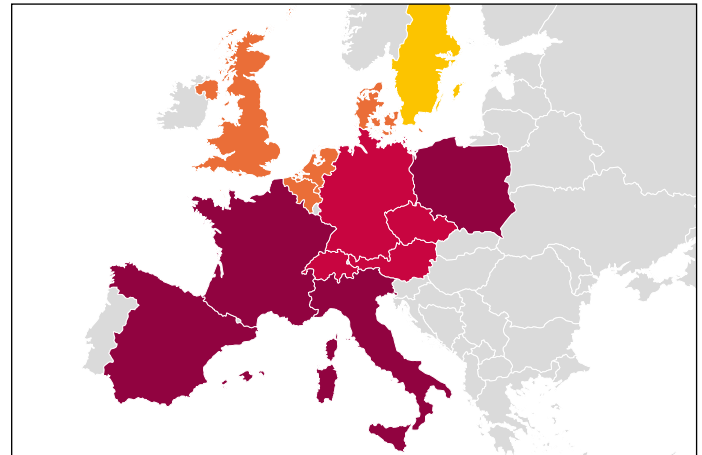
REI 60 / EI 60
highly fire
retardant

REI 90 / EI 90
fire resistant

REI 120 / EI 120
highly fire
resistant

National regulations and laws have different classification times in some areas, regardless of the Europe-wide unified classification system. For example in Germany, Austria and Switzerland classification to F 90 / REI 90 is considered to be state of the art, in other countries REI 120 is more important. Currently this is the case for France, Spain, Italy and Poland.

Important: Other areas have different requirements to be observed, in addition to fire resistance, for example water protection, where various requirements are given for the containment volume of spill pallets.



Special case - Germany

In accordance with German law, DIN 4102 "Fire behaviour of building materials and components", must still be observed, despite the fact that it has been withdrawn. European standard EN 13501 was not transposed into national law with DIN EN 13501 "Fire behaviour classification of building products and building types", as this law was not harmonised in Germany. For this reason the German and European classifications are still different. VVTB (Administrative regulation on technical building regulations) which has been valid since 01.01.2019, gives a comparison of the terms from DIN 4102 and DIN 13501-2 for the first time.

The state building regulations remain unchanged, so fire-rated room systems (as so-called unregulated building products) may only be installed if their usability is proven - e.g. by national technical approval (abZ) from the Deutsches Institut für Bautechnik (DIBt). The DIBt in turn bases the fire resistance class proof on DIN 4102.

DIN 4102 describes the fire resistance class of a building product using the letter F and the fire resistance time. Doors are classified with the letter T.

Staying safe internationally - with tested fire protection

Our promise as a developer and manufacturer of technical room systems is to offer you internationally legally-compliant safety when it comes to fire protection. We therefore offer technical room systems for all the required fire protection classes in Europe. The conformity of our fire-rated hazmat storage containers is confirmed by accredited, independent test institutes.



DIBt – national technical approval (abZ) with 90 minute fire protection

In accordance with German building law a room system with fire protection is classed as a so-called unregulated building product. National technical approval (abZ) must be

obtained for this type of building product. This is given by the Deutsches Institut für Bautechnik (DIBt). National technical approval gives reliable proof of the suitability of DENIOS products for storing hazardous substances in accordance with the applicable regulations. The approval is based on tested structural analysis. These points are all benefits, which show that you are choosing a tested system which has been recognised by the authorities. The approval process is handled quickly and efficiently, so that you can start using your hazmat storage container as soon as possible. To gain national technical approval the building over the spill pallet must meet the strict DIBt requirements for fire protection. Proof is obtained from both theoretical and actual fire tests.

Find all you need to know on national technical approval (abZ) at

www.denios.de/dibt

Visit www.denios.com to get in contact with your local representative.



iBS Linz – REI 90 classification

The Institut für Brandschutztechnik und Sicherheitsforschung (Austrian Institute for fire protection technology and safety research) in Linz is a Notified Body which determines the fire resistance of building products to

European standards and test methods. Load capacity, integrity and thermal insulation of the room system are determined in accordance with EN 13501-2 and a classification provided for the complete system. An official test report certifies the fire resistance determined and serves as proof for approval authorities and insurers.



Efectis France – REI 120 classification

To classify a fire protection system as REI 120, it must withstand a minimum of 120 minutes of fire for load capacity, integrity and thermal insulation. DENIOS fire-rated stores have passed the strictest Efectis fire tests in

accordance with EN 13501-2. With a laboratory which has been accredited for over 40 years, Efectis France is a recognised body for certifying and testing fire protection products. An official test report certifies the REI 120 classification of our room system in countries with particularly strict fire protection requirements.



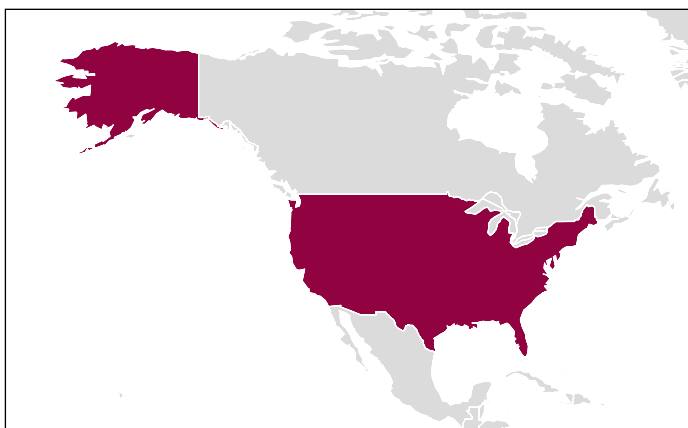
Fire testing of additional equipment and various components



Checking fire tests with thermography

Worldwide fire protection expertise

There are still varied fire protection requirements in individual European countries, despite a unified classification system. No wonder then that regulations for this area are anything but unified in the rest of the world. DENIOS customers can benefit from our many years' experience in international markets. Our worldwide customers also receive safe fire-rated stores which meet their country-specific legislation. For example in the USA and China.



USA: Fire protection record - 4 hours

In the USA the NFPA (National Fire Protection Association) is the main body concerned with fire protection. The NFPA is similar to the Vereinigung zur Förderung des deutschen Brandschutzes (Association for the promotion of German fire protection) in Germany. In addition the requirements of FM global also apply - the world's largest commercial and industrial insurer. Depending on the decision of the local authorities in each case, fire-rated systems in the USA must provide either two or four hours fire protection. Proof of fire resistance is however based on different test methods to Europe: in the USA, the primary factor is integrity, i.e. the fire must not leave the inner room of the fire-rated hazmat storage container during the defined time period. FM global has also described how the systems must be constructed to meet the requirements. When developing and producing fire-rated hazmat storage containers for the US American market we work strictly to these requirements.



China: Regional requirements are the rule

In China there are no universal regulations for room systems to our knowledge. The Chinese laws cover fixed constructions and buildings. When classifying a room system, DENIOS is guided by a general understanding that for fire-rated stores, they are seen as building products or "buildings". Our Chinese customers therefore generally tend to use the requirements of the country where the system manufacturer is based. In a similar way to the Netherlands, there is a type of collective regulations GB 15603/1995. GHS and REACH are included and form the basis for hazardous materials storage. For issues concerning fire protection, decree 591 is also consulted.



What could we do for you?

DENIOS fire-rated hazmat storage containers can be designed and equipped for every requirement, regardless of where you are based in the world. We can help make the process of dealing with approval bodies and insurers simpler with our long experience and comprehensive, recognised documentation. In Germany, DENIOS customers benefit from national technical approval (abZ) from the Deutsches Institut für Bautechnik. In the rest of Europe the required fire protection is confirmed by official classification reports.

But we also deliver systems meeting the locally-applicable regulations in countries such as the USA and China. What could we do for you? We would be delighted to advise you on the right solution for you.

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Fire protection: DENIOS

You'll have seen that if you store hazardous substances and need to calculate the possible risks of fire, there are numerous directives and regulations to consider. It's not just building regulations that need to be met. The specific requirements which legislators set out for safe hazardous materials storage also have a role to play. And finally, the safety of people and protection of company values need to be considered. It's good when you have a partner at your side with decades of experience in this area.

We create products exactly suited to your needs, which offer fire protection from both inside and out, thanks to their double frame design. Up to 120 minutes fire resistance is possible internationally - tested and certified as a complete system. While fire protection is an all-embracing theme, our diverse team of experts can ensure you receive comprehensive service with the usual DENIOS quality. Fire protection from DENIOS: Customised. Certified. Unparalleled. More information on our fire-rated storage containers can be found from page ➔ 68.

Fire Protection: DENIOS.

tried. tested. certified.



Your DENIOS fire-rated hazmat storage container can do it all

With over 30 years' experience as a developer and manufacturer of systems for fire-rated hazardous materials storage, we know exactly what is needed in practice. From needs-based storage capacity to comprehensive equipment options, to solutions meeting all the required fire protection classes across Europe: you'll find we have the fire-rated hazmat storage container which exactly meets your needs. Fire-rated hazmat storage containers from DENIOS have fire-rated walls and ceilings and a spill pallet in accordance with Federal Water Act (Wasserhaushaltsgesetz, WHG, in German). The effective fire protection insulation with tested panels (building material class A) in conjunction with a double steel frame construction offer safe fire protection from both inside and outside. With a fire resistance of up to 120 minutes, a DENIOS fire-rated store offers the highest levels of safety in the event of a fire. Any leaked liquid is contained in a steel spill pallet. Thanks to extensive

equipment options your fire-rated hazmat storage container can be customised to your requirements. Various sizes and storage capacities ensure customised storage options and optimum use of the space you have available.

- Sturdy design with high quality fire protection insulation
- Up to 120 minute fire protection, from inside and out
- Installation possible without the need for safety distances
- Installation possible inside buildings
- Comprehensive range of equipment options (e.g. fire detection, ventilation, Ex-proof design, extinguishing technology, pressure release panels, alarm systems and many more)

Sturdy, resistant to external influences

Protection from wind and weather is a vital prerequisite for the safe storage of hazardous substances in hazmat stores located outdoors. Extreme weather conditions are becoming more common and need to be taken into consideration in the design and structural analysis of buildings, which includes our technical room systems.



Effects of wind, snow and earthquakes

Hazardous materials stores outdoors are often affected by various external influences, which differ markedly according to region:

- wind and snow loads form part of the various effects on buildings caused by the climate. Snow and wind loads generally affect surfaces on the external envelope. Snow loads have an effect in the gravitational direction, so vertically downwards on the roof. Wind loads generally affect the side surfaces in a vertical direction and the roof.
- Earthquakes cause limited sideways movements of the ground, in varying intensities. Earthquake loads stress a building both vertically and horizontally.



Standards and regional load zones

Snow, wind and earthquake loads are described in the following standards:

- **DIN EN 1991-1-4:** Wind loads (see page ➔ 23)
- **DIN EN 1991-1-3:** Snow loads (see page ➔ 24)
- **DIN 4149:** Earthquakes (see page ➔ 25)

These standards aim to ensure, for the above-mentioned loads on buildings, that human life is protected, damage is limited and important buildings remain functional to protect the population. The regional difference in loads is described in the standards by classification of locations to various intensities in the form of load zones.

Help is at hand: When we prepare a quotation, the circumstances at the location where the measurements are made are taken into consideration in detail. To determine the snow, wind and earthquake zones for your planned installation location, see the link on our website to an online service:

🇩🇪 www.denios.de/weiterfuehrende-links

Visit www.denios.com to get in contact with your local representative.

Safe under every load

Every technical room system is tested under extreme conditions so that our customers remain safe, regardless of where the equipment is installed at a later date. Before a new room system is brought into production comprehensive stress tests are carried out. Our main concerns: How will the system behave when exposed to unexpected but possible loads when the customer uses it at a

later date?

Various loading cases and extreme stresses are simulated. The results mean not only that our system can withstand all conceivable loads, but, based on the measured values, we can pass on concrete information and recommendations to our customers.



Weights and measuring equipment are prepared



The technical room system is anchored



The technical room system loaded with weights is lifted



The technical room system resists the loads

Wind loads

The effects of wind determined in accordance with DIN EN 1991-1-4 are characteristic values, which are determined using the basic wind speed or the corresponding dynamic pressure. The basic values are characteristic values with an annual probability of being exceeded of 2% (98-% fractile), corresponding to a 50 year average recurrence period. In accordance with the national Appendix to DIN EN 1991-1-4 (NA) Germany is split into four wind zones (1 to 4), to take account of the regionally-differing wind speeds and the resulting different wind loads.

Wind zone 1

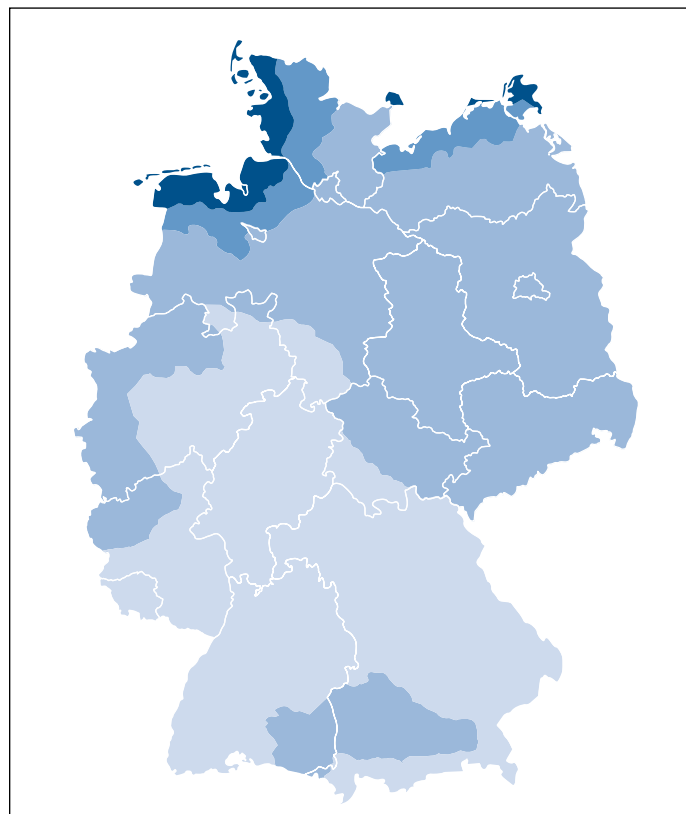
Wind zone 2

Wind zone 3

Wind zone 4

| Wind zone | Wind speed V_{ref} (m/s) | Dynamic pressure q_{ref} (kN/m ²) |
|-----------|-------------------------------|--|
| 1 | 22.5 | 0.32 |
| 2 | 25.0 | 0.39 |
| 3 | 27.5 | 0.47 |
| 4 | 30.0 | 0.56 |

The dynamic pressures apply to level terrains. In accordance with national Appendix B of the standard, an increase factor (coefficient) for different terrain categories (I-IV) may be required.



What does this mean in practice?

All DENIOS technical room systems are designed for up to wind zone 2 as standard with a terrain category III coefficient. This gives a characteristic wind load $q_{k,w} = \text{coefficient} \times q_{ref} = 1.5 \times 0.39 \text{ kN/m}^2 = 0.585 \text{ kN/m}^2$. For requirements up to wind load 4, terrain category I ($q_{k,w} = 1.064 \text{ kN/m}^2$) please request our standard additional equipment for fire-rated storage containers RFP and WFP. Different requirements will be considered on an individual basis.

To counter the wind load and ensure the store remains safe, the hazmat store must be anchored to a concrete foundation slab provided by the customer. The requirements for the foundation slab and anchoring systems are given in a separately available guide.



Expert advice

Speak to our customer advisors directly about the regional requirements for structural design.

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Snow loads

As snow loads vary geographically, snow load zones are also used here. In Germany, zones are regulated by DIN EN 1991-1-3 (Eurocode 1: Actions on structures - Part 1-3: General actions, snow loads; Standard replaces DIN 1055-5). In this standard the snow climate is captured using a snow load zone map and the snow intensity is given for various geographical regions. The lowest snow load is expected in the smallest zone.

**Snow load
zone 1**

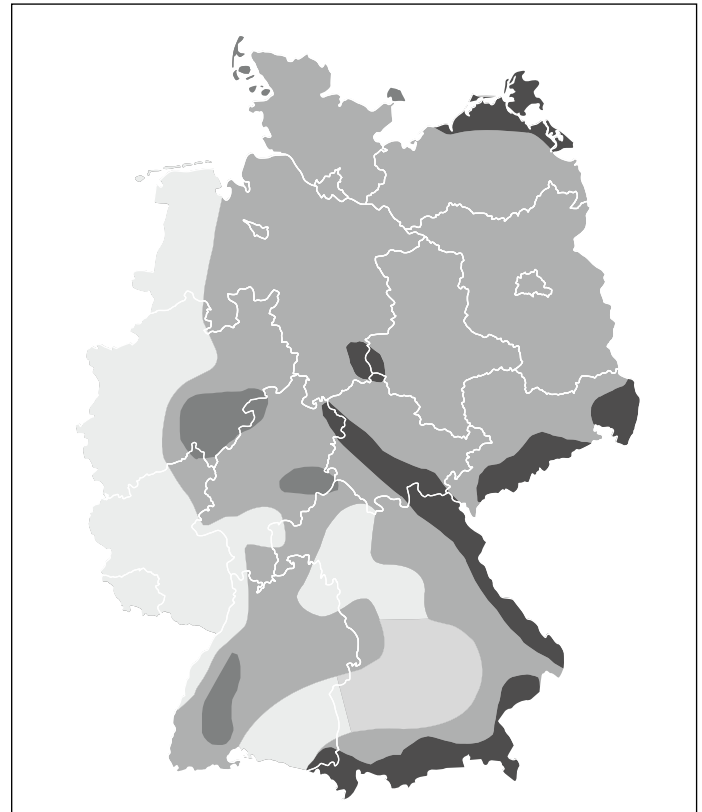
**Snow load
zone 1a**

**Snow load
zone 2**

**Snow load
zone 2a**

**Snow load
zone 3**

| Snow load zone | Characteristic minimum value for snow load s_{sk} on the ground |
|----------------|--|
| 1 | 0.65 kN/m ² (up to 400 m above sea level) |
| 1a | 0.81 kN/m ² (up to 400 m above sea level) |
| 2 | 0.85 kN/m ² (up to 285 m above sea level) |
| 2a | 1.06 kN/m ² (up to 285 m above sea level) |
| 3 | 1.06 kN/m ² (up to 285 m above sea level) |



What does this mean in practice?

All DENIOS technical room systems are designed for up to snow load zone 2 as standard with a terrain height above sea level of $A = 685$ m. This allows calculation of a characteristic ground snow load of $s_k = 0.25 + 1.91 \times ((A + 140)/760)^2 = 0.25 + 1.91 \times ((685 + 140)/760)^2 = 2.5$ kN/m². For requirements up to $s_k = 5.86$ kN/m² please request our standard additional equipment for fire-rated storage containers RFP and WFP. Different requirements will be considered on an individual basis.



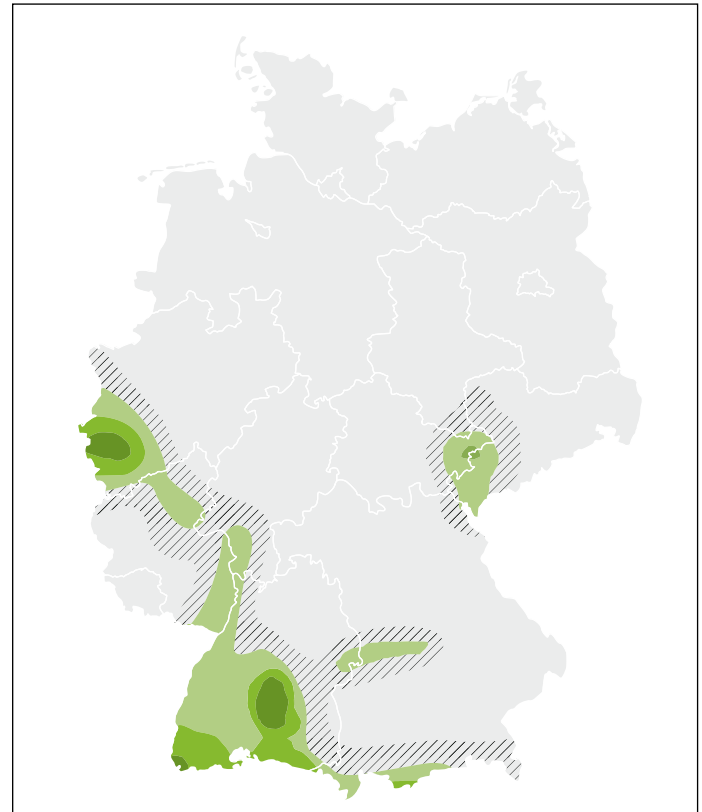
Earthquake loads

The risk of earthquakes in Germany is relatively low compared to the rest of the world, however it is not insignificant. European standard EN 1998-1: 2004/ Eurocode 8 contains European-wide unified concepts to describe the seismic effects as well as rules for the calculation, measurement and design of building constructions. This information is included in the earthquake standard which applies for Germany DIN 4149:2005-04 "Building in German earthquake areas – Loading assumptions, measurements and design of common buildings".

Using the earthquake zone map, the Federal Republic of Germany is divided into earthquake zones 0 to 3 (no risk to high risk):



Noticeable earthquakes or ones which cause damage are a rare event in Germany. As high value assets are concentrated in earthquake zones 1-3 however, large scale damage could be caused.



What does this mean in practice?

In regions at risk of earthquakes, steel constructions are better suited than buildings in stone or concrete. Steel is deformable to a certain extent and can even move with noticeable movements of the ground. All DENIOS technical room systems are designed with a sturdy steel frame construction and are suitable for earthquake zones 0 to 3 as standard. They are therefore perfect for all regions in Germany.



Expert advice

Speak to our customer advisors directly about the regional requirements for structural design. For Austria and Switzerland differing requirements apply to those shown here for Germany.

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Room for innovation

As a developer and manufacturer we regularly update our products or completely rethink them. The DENIOS Technical Centre (German: Technikum) is our innovation nerve centre. From mechanical components to energy-efficient climate control technology, electronics and sensors to hazmat storage 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.



The leading innovator among medium-sized companies

Highly structured innovation processes and a distinctive outward-looking approach saw DENIOS receive a Top 100 Seal for SME companies for the second time in 2017. In 2019 participation in the innovation competition will take place again.

DENIOS is also a key company in the it's OWL specialist cluster, a technology network comprising over 180 companies, universities, scientific centres and other organisations in Ost-Westfalen Lippe. During the current phase up to 2022, which is promoted by the state of North Rhine-Westphalia in Germany, solutions are being explored in the fields of machine learning, big data in production, digital twins, new business models and the working environment of the future. DENIOS is working together with partners in the Digital Business joint project. The aim is to create approaches which allow the potential of digital platforms to be harnessed. We aim to develop and offer database services using digital platforms to bring added value to our customers in terms of improved safety, transparency and legal compliance.



DENIOS steht für Zukunft.

Im Technologie-Netzwerk:
Intelligente Technische Systeme OstWestfalenLippe

it's owl

Would you like to be part of our development process? We regularly work with customers to develop new and innovative solutions. Just get in touch!

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Put our technical room systems to the test

Would you like to check out what our products can do before buying? Why not use our well-equipped technical department as a showroom for your tests. For new customers it can be difficult to get a good impression of the size and quality of our technical room systems. You would be very welcome to come along and see for yourself. Whether you are housing large containers in a hazardous materials store or would like to test the sensors on a fire-rated store, various room systems are available in the large outdoor area at our technical department so that our customers can put them through their paces.



Check the thermal behaviour of your process substances

Do you need to temper substances for your production and are considering buying a heat chamber? Demonstrations are really useful in this case for defining the optimum pre-requisites for the planned equipment. The DENIOS technical department has test heat chambers available where we can simulate the processes for your original substances under operating conditions. Detailed documentation on the recorded parameters, temperature changes and thermal images are as much a part of the service as the support from our expert team.



Test real technical ventilation equipment

The DENIOS technical department has many fully operational systems available, from an extraction arm to a large scale multi-task workstation. This equipment can be used to carry out tests, for example flow visualisations or testing retention capacities. Test substances or test smoke can be made available so that you can simulate your processes as accurately as possible, ensuring that your employees' safety will be guaranteed in the future. Numerous equipment options and accessories can also be tested so that the equipment can be adapted to meet your requirements as accurately as possible.



Theory and practice with a bang

We don't just design, plan and create legally-compliant hazardous materials stores and offer support with the regulatory processes, we also train responsible persons in accordance with the required qualifications. We are used to the practical problems involved and know our way around them. So, it's not just our customers who benefit, but all the seminar participants who attend the DENIOS Academy. With an exciting mixture of established expertise and practical sessions with a big impact, we have already helped over 6000 participants from all branches of industry with our know-how. From seminars for foundation to professional level, through training and education up to specialist conferences. With DENIOS you'll have a knowledgeable partner at your side, offering the best support possible for your operations.



Made to measure events

With over 400 events each year held in our state of the art conference rooms at Bad Oeynhausen and at customer and partner sites, we ensure environmental protection and work safety in your operation. We ensure our seminar programme includes all the latest themes so you don't miss out on an important knowledge update.

Are you on the hunt for a training course designed especially for your needs? Don't have time to travel a long distance? Not a problem! We would be delighted to come directly to your company site, wherever you are in the world. Speak to us - we'll be happy to help run your custom event.

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Health & Safety and Security

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



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 seminars make an impact, in particular by using practical examples.



Hazardous substances & environmental safety

The DENIOS Academy seminar offering for hazardous substances and environmental protection covers everything you might wish for. In addition to basic training including the foundations of hazmat storage or risk assessments in accordance with GefStoffVO (German Dangerous substances directive), the programme also covers current themes such as changes in hazmat law or professional conferences. The DENIOS Academy courses include "Specialist knowledge for Hazmat officers" with a certificate meeting GefStoffVO.

DENIOS Hazmat days

The annual update for everything to do with hazardous substances and environmental protection is made into an unforgettable event with the DENIOS Hazmat days. New to the programme: Lithium batteries.

Experimental and practical lectures

"Recognise and prevent hazards" - an apparently harmless substance, an unfavourable situation - only a few people would know how big the potential risks are in the day to day workplace. Using practical examples, the DENIOS experimental lectures make it clear what the consequences are when common, but also special, substances are handled incorrectly. They inform, raise awareness and entertain - a brilliant combination.



Hazmat storage containers without fire protection



Proven, classic hazardous materials storage

Whenever hazardous substances need to be stored in larger containers, usually in 205 litre drums or IBCs, hazmat storage containers become a requirement. DENIOS hazardous materials stores have all the required approvals and certifications for legally-compliant, safe storage:

- Approval in accordance with Federal Water Act (Wasserhaushaltsgesetz, WHG, in German)
- National technical approval (abZ) from the Deutsches Institut für Bautechnik (DIBt)

Our proven standard range contains solutions for

- walk-in hazardous materials stores (from page ➔ 32)
- compact hazardous materials stores (from page ➔ 40)
- storage containers with shelving (from page ➔ 44)

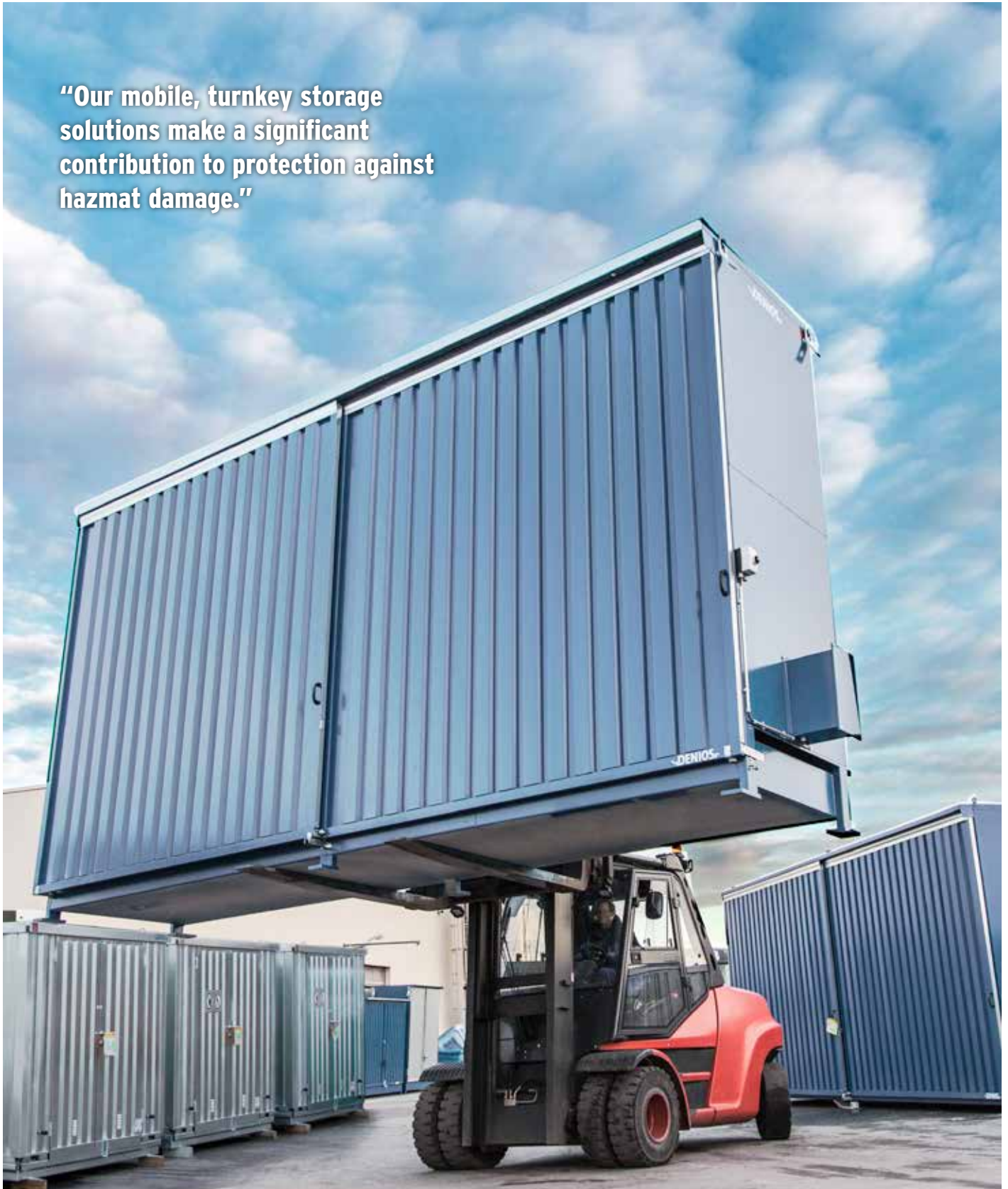
Our experts are available to discuss custom solutions. Experienced project engineers assist DENIOS customers right from production of the requirements profile to manufacturing and on-site commissioning, including training on the system. Wide-ranging, comprehensive service and maintenance options ensure a long product life, and therefore the safety of the environment and employees.

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"Our mobile, turnkey storage solutions make a significant contribution to protection against hazmat damage."



Hazmat storage containers without fire protection

Hazmat storage containers without fire protection

Walk-in hazmat store WHG

The proven, entry-level option

Hazmat store WHG is one of the most often purchased and proven room systems for various sizes of container, from small containers to 205 litre drums. User-friendliness is a priority, even for this entry level model, with an entry door sill height of just 150 mm. The standard version of WHG is perfect for passive storage of water-polluting / flammable substances, if safety distances are observed. Flexible equipment options can be added at any time. We have fitted special accessories and ventilation systems for many projects.

m²

Storage area:
2 to 15 m²



Walk-in hazmat store WHG 320,
optional shelves are available

DIBt

National technical approval (abZ)
– Z-38.5-177

| Description | Storage area (m ²) | Spill pallet volume (l) | External dimensions* (W x D x H mm) | Internal dimensions (W x D x H mm) | Weight* (kg) |
|-------------|--------------------------------|-------------------------|-------------------------------------|------------------------------------|--------------|
| WHG 210 | 2 | 320 | 2165 x 1028 x 2320 | 2000 x 830 x 2000 | 450 |
| WHG 320 | 6 | 650 | 2990 x 2215 x 2235 | 2830 x 2000 x 2000 | 860 |
| WHG 250 | 10 | 1100 | 5028 x 2215 x 2235 | 4830 x 2000 x 2000 | 1320 |
| WHG 360 | 15 | 1730 | 6028 x 2800 x 2235 | 5830 x 2590 x 2000 | 1860 |

Note: Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes.

* Without add-on equipment

Overview of the product range



WHG 210
approx. 2 m² storage area



WHG 320
approx. 6 m² storage area



WHG 250
approx. 10 m² storage area



WHG 360
approx. 15 m² storage area

Door equipment

- As standard with a 2-wing door (W x H) 1850 x 1920 on the long side, positioned centrally.

Designs according to substance properties

| | | |
|--|---|---|
| | Water-polluting | <ul style="list-style-type: none"> Approved for WGK 1-3 (see page ➔ 9) |
| | Corrosive | <ul style="list-style-type: none"> With PE inliner |
| | Flammable (H226, H225, H224) | <ul style="list-style-type: none"> Natural ventilation available on request The requirements for the storage of flammable liquids must be observed <p>For activities in the store (active storage):</p> <ul style="list-style-type: none"> Equipped with technical ventilation If necessary, equipped with air extraction monitoring The pre-requisites for storing flammable liquids must be observed |
| | All other hazardous substance properties | <ul style="list-style-type: none"> Equipment in accordance with risk assessment. Speak to us concerning special storage provisions. |
| | Temperature sensitive substances | <p>Insulated design, we also recommend</p> <ul style="list-style-type: none"> For frost-sensitive substances - storage room MCV (from page ➔ 36) For high heating or cooling - hazmat store SC (from page ➔ 44) |

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

(Hazardous materials stores outdoors, see from page ➔ 20)



Prerequisites for storing flammable liquids

- Observe distance from fire loads (mostly min. 10 m)
- Create equipotential bonding (earthing) (connection point provided); if required provide lightning protection
- Country-specific requirements for air exchange rate
- Specifications in Germany in accordance with TRGS 510
- Specifications in accordance with ATEX Directive 2014/34/EU

If distances to fire loads cannot be observed or if the store is to be located indoors, we recommend using a fire-rated storage container (from page ➔ 68).



Expert advice

Not found what you are looking for? Need more information?
Let DENIOS advise you!

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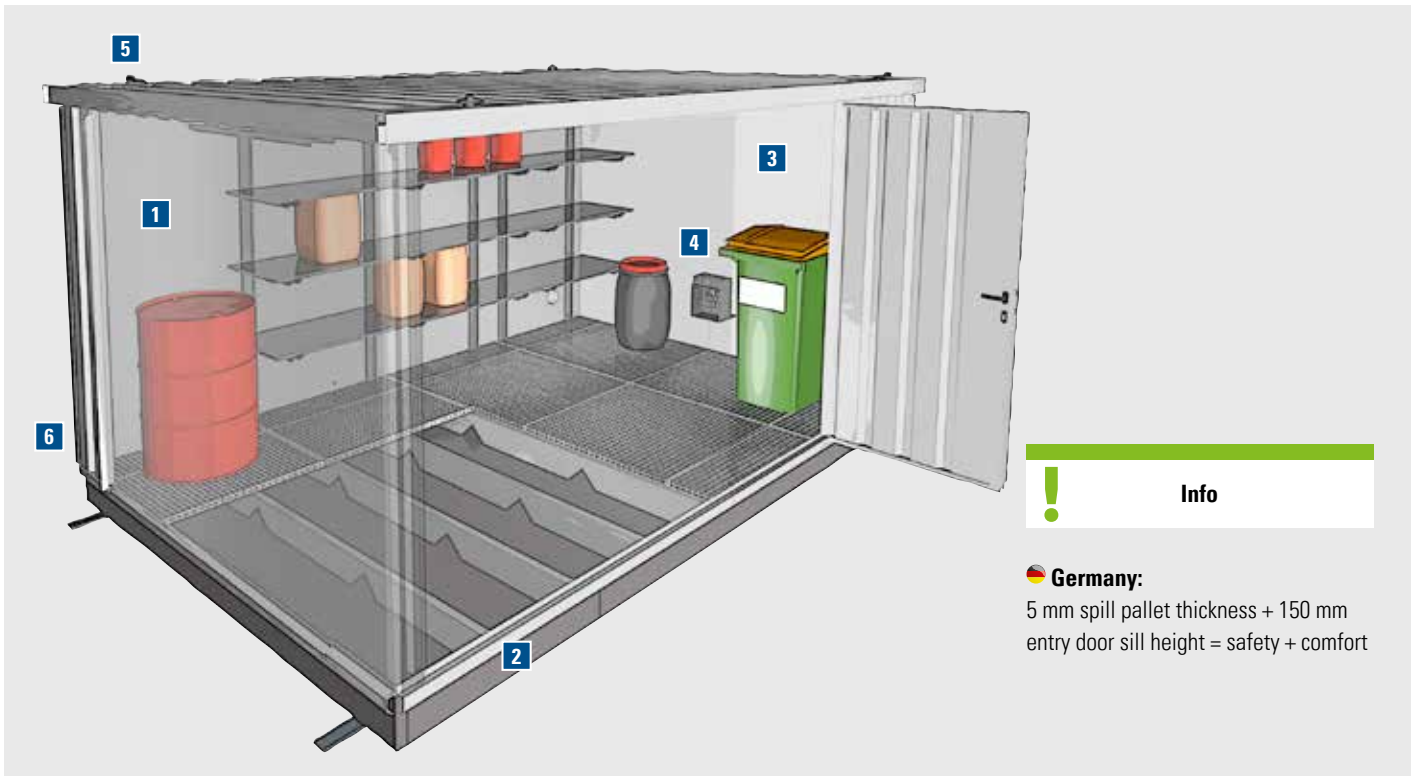
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Hazmat storage containers without fire protection

Walk-in hazmat store WHG

Product features



Info

Germany:

5 mm spill pallet thickness + 150 mm
entry door sill height = safety + comfort

1 Making use of the space

The walk-in hazmat store offers almost limitless ways to use the space. The inner room can be fitted with shelving or the floor can be used for storage. Shelves are available in the following versions (W x D): 1000 x 500 mm (shelf load capacity 75 kg, rack load capacity 225 kg) and 2000 x 500 mm (shelf load capacity 120 kg, rack load capacity 360 kg). Shelf loads are with an evenly distributed load. Narrow mesh grids ensure a pallet truck can be used. The hazmat store can be locked to prevent unauthorised access.

2 Base

The hazmat store has a tested, single-piece water law compliant hot dip galvanised spill pallet with grids as a loading surface. Galvanised fluid guides all around ensure any leaked fluids are safely diverted to the spill pallet. Removable grids meet the guidelines for quality and tests RAL GZ 638, load capacity: 1000 kg/m². The entry sill height is particularly low at 150 mm. For increased ease of use, an access ramp is available (see accessories). Brackets are provided for ground anchoring (foundation).

3 External cladding

The external cladding is in galvanised trapezium sheet, painted in either RAL 5010 (gentian blue) or RAL 9002 (grey-white).

4 Electrical equipment

Your hazmat store can be fitted with power sockets and lighting if required. In the standard version, the central power connection uses a sub-distribution unit. With a more elaborate electrical set-up, e.g. with technical ventilation, or if required, we can provide a switch cabinet with control and operating elements.

5 Transportability

Your hazmat store is fitted with removable 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.

6 Roof drainage

Rainwater collects in the grooves of the trapezium sheet roof and is guided into a U profile at the front and back and then away over the sides. Drain pipes are available as an option.



Walk-in hazardous materials store WHG 360,
example here shown with shelving and access ramp

Equipment options



Technical ventilation



Lighting (also available
with LED)



Switch cabinet for central
power connection



Air extraction monitoring for
air exchange > 2.0/h



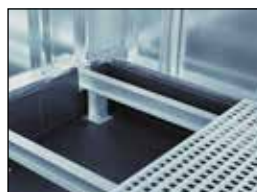
Sockets in Ex version



Shelving



Grids 22 x 11 mm
(mesh size)



PE inliner for acids and
alkalis (LGK 8), dissipative
version available



Ramp, suitable for pallet
trucks



Earthing rails

The complete range of equipment options can be found on page ➔ 122.



Info

Explosion-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.



Hazmat storage containers without fire protection

Walk-in hazmat store MCV

A multi-purpose, proven design

The walk-in hazmat store MCV has improved comfort and flexibility, offering a choice of dimensions, an insulated version and much more. The use of galvanised components ensures long-term corrosion protection. The modern flat sheet design* is galvanised and painted in RAL 5010 (gentian blue). Paint in custom RAL colours is also available to ensure perfect integration into existing surroundings. The doors can be positioned either in the long or short side of the room system. Various sizes of container can be stored, from small containers up to 205 litre drums. The inner room can be optimised with flexible shelving systems.

*In the non-insulated version the roof is in trapezium sheet.

m²

Storage area:
5 to 17 m²



MCV 6330, with 2-wing door on the long side, and optional shelving

DIBt

National technical approval (abZ)
– Z-38.5-177

| Description | Storage area (m ²) | Spill pallet volume (l) | External dimensions* (W x D x H mm) | Internal dimensions (W x D x H mm) | Weight* (kg) |
|-------------|--------------------------------|-------------------------|-------------------------------------|------------------------------------|--------------|
| MCV 2520 | 5 | 565 | 2422 x 2444 x 2365 | 2240 x 2240 x 2100 | 940 |
| MCV 3320 | 7 | 810 | 3422 x 2444 x 2365 | 3240 x 2240 x 2100 | 1230 |
| MCV 4320 | 10 | 1080 | 4422 x 2444 x 2365 | 4240 x 2240 x 2100 | 1520 |
| MCV 4330 | 12 | 1315 | 4422 x 2944 x 2365 | 4240 x 2740 x 2100 | 1740 |
| MCV 6320 | 14 | 1585 | 6422 x 2444 x 2365 | 6240 x 2240 x 2100 | 2060 |
| MCV 6330 | 17 | 1940 | 6422 x 2944 x 2365 | 6240 x 2740 x 2100 | 2350 |

Note: Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes.

* Without add-on equipment

Overview of the product range



MCV 2520
approx. 5 m² storage area



MCV 3320
approx. 7 m² storage area



MCV 4320
approx. 10 m² storage area



MCV 4330
approx. 12 m² storage area



MCV 6320
approx. 14 m² storage area



MCV 6330
approx. 17 m² storage area

Door variants

- With 1-wing door (W x H: 1000 x 2000 mm) or 2-wing door (W x H: 2000 x 2000 mm), either* on the short side or the long side of the room system in the set steps

* MCV 2520 only available with 2-wing door on the long side

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

(Hazardous materials stores outdoors, see from page ➔ 20)

Designs according to substance properties

| | | |
|--|---|--|
| | Water-polluting | <ul style="list-style-type: none"> ■ Approved for WGK 1-3 (see page ➔ 9) |
| | Corrosive | <ul style="list-style-type: none"> ■ With PE inliner |
| | Flammable (H226, H225, H224), | <ul style="list-style-type: none"> ■ Natural ventilation available on request ■ The pre-requisites for storing flammable liquids must be observed <p>For activities in the store (active storage):</p> <ul style="list-style-type: none"> ■ Equipped with technical ventilation ■ If necessary, equipped with air extraction monitoring ■ The pre-requisites for storing flammable liquids must be observed |
| | All other hazardous substance properties | <ul style="list-style-type: none"> ■ Equipment in accordance with risk assessment. Speak to us concerning special storage provisions. |
| | Temperature sensitive substances | <ul style="list-style-type: none"> ■ Wall and roof insulation in 40 and 50 mm A class material (non-combustible) ■ Optional temperature control (from page ➔ 60) ■ When storing flammable liquids technical ventilation is required. ■ If required, with temperature monitoring |



Prerequisites for storing flammable liquids

- Observe distance from fire loads (mostly min. 10 m)
 - Create equipotential bonding (earthing) (connection point provided); if required provide lightning protection
 - Country-specific requirements for air exchange rate
 - Specifications in Germany in accordance with TRGS 510
 - Specifications in accordance with ATEX Directive 2014/34/EU
- If distances to fire loads cannot be observed or if the store is to be located indoors, we recommend using a fire-rated storage container (from page ➔ 68).



Expert advice

Not found what you are looking for? Need more information? Let DENIOS advise you!

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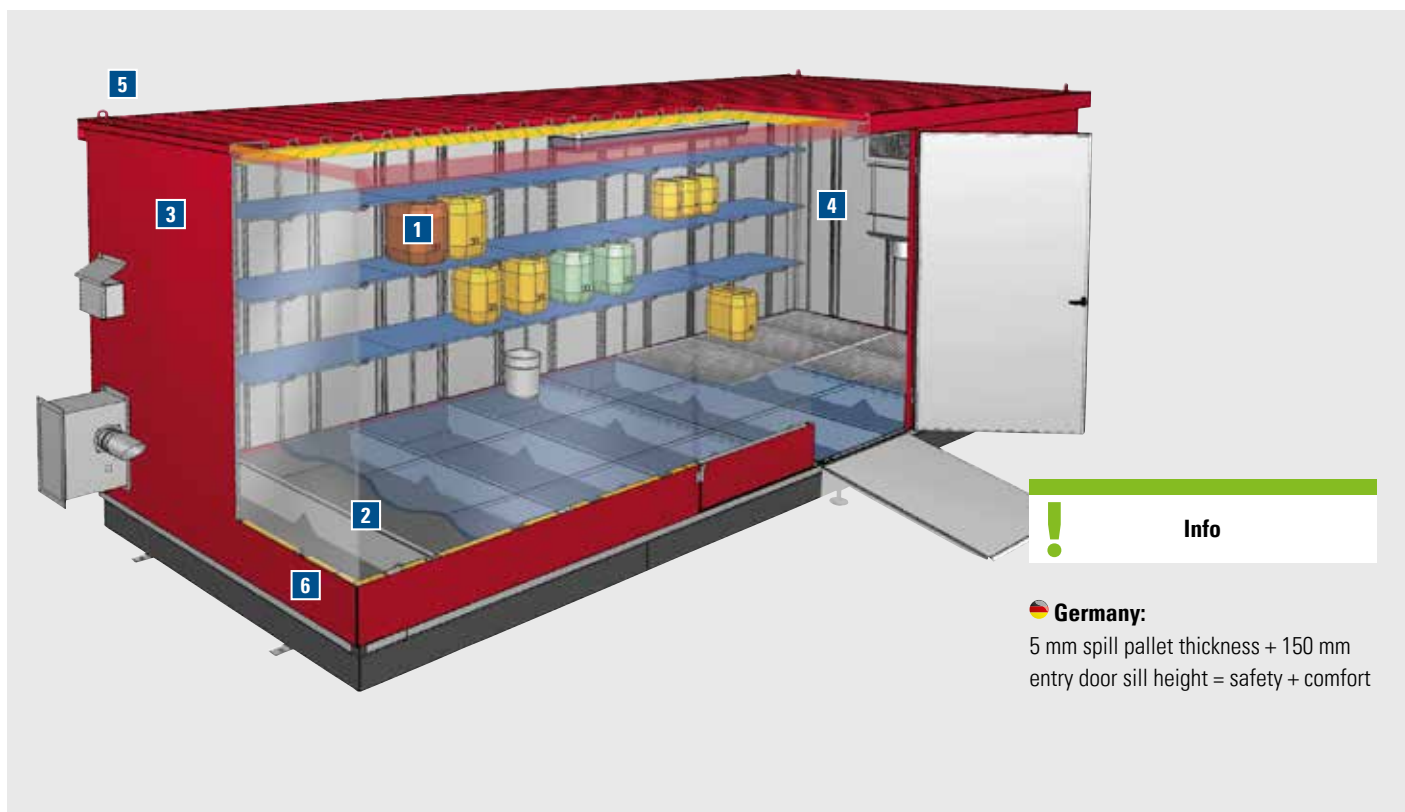
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Hazmat storage containers without fire protection

Walk-in hazmat store MCV

Product features



1 Making use of the space

The walk-in hazmat store offers almost limitless ways to use the space. The inner room can be fitted with shelving or the floor can be used for storage. Shelves are available in the following versions (W x D): 1000 x 500 mm (shelf load capacity 75 kg, rack load capacity 225 kg) and 2000 x 500 mm (shelf load capacity 120 kg, rack load capacity 360 kg). Shelf loads are with an evenly distributed load. Narrow mesh grids ensure a pallet truck can be used. The hazmat store can be locked to prevent unauthorised access.

2 Base

The technical room system has a tested, single-piece water law compliant hot dip galvanised 5 mm thick spill pallet with grids as a loading surface. Galvanised fluid guides all around ensure any leaked fluids are safely diverted to the spill pallet. Removable grids meet the guidelines for quality and tests RAL GZ 638, load capacity: 1000 kg/m². The entry sill height is particularly low at 150 mm. For increased ease of use, an access ramp is available (see accessories). Brackets are provided for ground anchoring (foundation).

3 External cladding

The external cladding is in flat sheets which are galvanised and painted in RAL 5010 (gentian blue) or another colour on request.

4 Electrical equipment

In the standard version, the central power connection uses a sub-distribution unit. With a more elaborate electrical set-up, e.g. with technical ventilation, or if required, we can provide a switch cabinet with control and operating elements.

5 Transportability

Your hazmat store is fitted with removable 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.

6 Roof drainage

Rainwater collects in the grooves of the trapezium sheet roof and is guided into a U profile at the front and back and then away over the sides. Drain pipes are available as an option.



MCV 2520, with 2-wing door on the long side and equipment: technical ventilation, switch cabinet, access ramp and shelving

Hazmat storage containers without fire protection

Equipment options



Technical ventilation



Lighting also available in LED



Switch cabinet for central power connection



Air extraction monitoring for air exchange > 2.0/h



Sockets in Ex version



Finned tube heater with impact protection



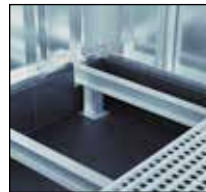
Grids 22 x 11 mm (mesh size)



Ramp, suitable for pallet trucks



Earthing rails



PE inliner for acids and alkalis (LGK 8) dissipative version available



Insulation



Individually adjustable shelves for storage of small containers

The complete range of equipment options can be found on page ➔ 122.



Info

Explosion-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.



Hazmat storage containers without fire protection

Compact hazmat store SolidMaxx

Solid space

The compact SolidMaxx hazmat store has a sturdy design and uses the storage capacity available on a small footprint to best advantage. The sturdy, corrosion-protected steel design with integral spill pallet has enough space to store up to 8 x 205 litre drums on Euro / chemical pallets or directly on the grids or up to 2 IBCs. Access underneath ensures a pallet truck or forklift can be used for loading. An air gap running around 3 sides ensures natural ventilation for the hazmat store. Technical ventilation is provided to ensure air exchange for the active storage of flammable liquids. In the high version (CH) the room system can be used with dispensing equipment as a dispensing station for IBCs.



**For up to 8 drums
or 2 IBCs**



Hazmat store SolidMaxx high version CH 2.1, galvanised, with optionally available dispensing platforms for IBC

DIBt

**National technical approval (abZ)
– Z-38.5-177**

| Description | Capacity IBC / CP / EP / Drum | Spill pallet volume (l) | External dimensions* (W x D x H mm) | Internal dimensions (W x D x H mm) | Load capacity total (kg) | Weight* (kg) |
|------------------|-------------------------------------|-------------------------------|--|---------------------------------------|--------------------------------|-----------------|
| SolidMaxx C 1.1 | 1 / 1 / 1 / 4 | 1000 | 1710 x 1595 x 2360 | 1350 x 1310 x 1405 | 2000 | 500 |
| SolidMaxx C 2.1 | 2 / 2 / 3 / 8 | 1000 | 2900 x 1595 x 2060 | 2540 x 1310 x 1405 | 4000 | 655 |
| SolidMaxx CH 1.1 | 1 / 1 / 1 / 4 | 1000 | 1760 x 1895 x 2570 | 1400 x 1610 x 1770 | 2000 | 545 |
| SolidMaxx CH 2.1 | 2 / 2 / 3 / 8 | 1000 | 3025 x 1895 x 2365 | 2665 x 1610 x 1770 | 4000 | 760 |

Note: IBC = Intermediate Bulk Container, 1000 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

Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes.

*With crane eyes

Overview of the product range



SolidMaxx C 1.1
for up to 4 drums or 1 IBC



SolidMaxx CH 1.1
for up to 4 drums or 1 IBC*



SolidMaxx CH 1.1, insulated
for up to 4 drums or 1 IBC



SolidMaxx C 2.1
for up to 8 drums or 2 IBCs



SolidMaxx CH 2.1
for up to 8 drums or 2 IBCs



SolidMaxx CH 2.1, insulated
for up to 8 drums or 2 IBCs

*Dispensing platform optional

Door equipment

- All hazmat stores are fitted with wing doors:
1-wing for SolidMaxx C / CH 1.1, 2-wing for SolidMaxx C / CH 2.1
- Internal door hook

Designs according to substance properties

| | | |
|--|---|---|
| | Water-polluting | <ul style="list-style-type: none"> ■ Approved for WGK 1-3 (see page ➔ 9) |
| | Corrosive | <ul style="list-style-type: none"> ■ With PE inliner |
| | Flammable (H226, H225, H224) | <ul style="list-style-type: none"> ■ Natural ventilation provided by weather-protected, all round openings ■ The pre-requisites for storing flammable liquids must be observed <p>For activities in the store (active storage):</p> <ul style="list-style-type: none"> ■ Equipped with technical ventilation ■ If necessary, equipped with air extraction monitoring ■ The pre-requisites for storing flammable liquids must be observed |
| | All other hazardous substance properties | <ul style="list-style-type: none"> ■ Equipment in accordance with risk assessment. Speak to us concerning special storage provisions. |
| | Temperature sensitive substances | <ul style="list-style-type: none"> ■ Wall and roof insulation in 40 and 50 mm A class material (non-combustible) ■ Optional temperature control (from page ➔ 60) ■ When storing flammable liquids technical ventilation is required. ■ If required, with temperature monitoring |

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

(Hazardous materials stores outdoors, see from page ➔ 20)



Prerequisites for storing flammable liquids

- Observe distance from fire loads (mostly min. 10 m)
- Create equipotential bonding (earthing) (connection point provided); if required provide lightning protection
- Country-specific requirements for air exchange rate
- Specifications in Germany in accordance with TRGS 510
- Specifications in accordance with ATEX Directive 2014/34/EU

If distances to fire loads cannot be observed or if the store is to be located indoors, we recommend using a fire-rated storage container (from page ➔ 68).



Expert advice

Need more information? Let DENIOS advise you!

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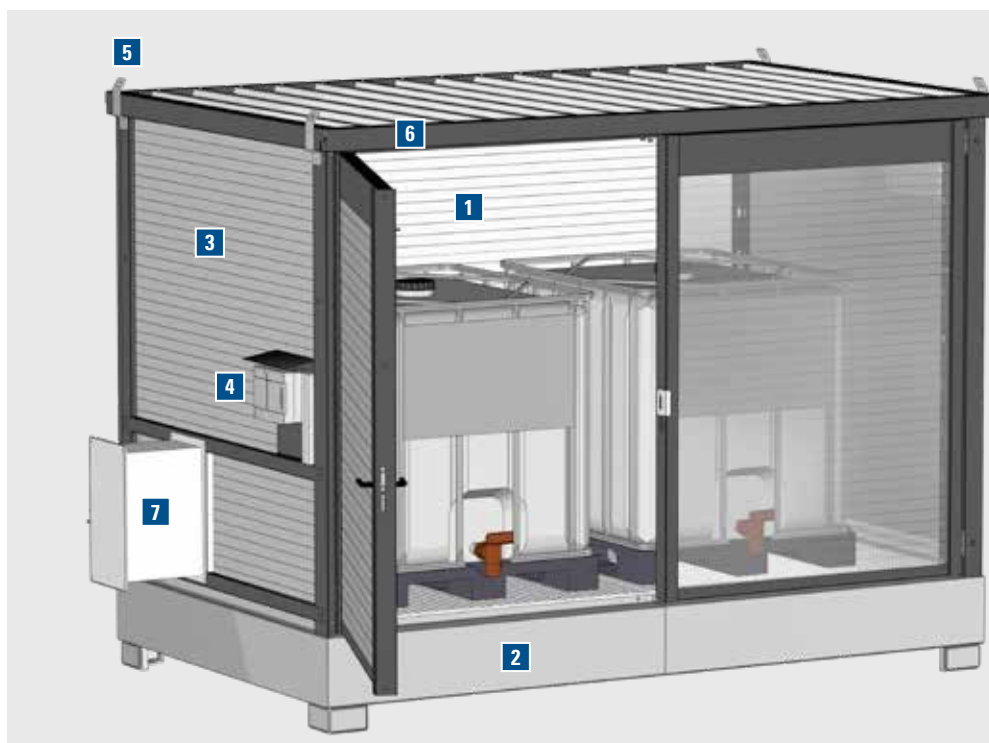
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Hazmat storage containers without fire protection

Compact hazmat store SolidMaxx

Product features



Info

Supplied ready assembled

1 Making use of the space

Hazmat store SolidMaxx can be filled with drums on Euro or chemical pallets or with IBCs. Mixed storage or storage of drums directly on the grids is also possible. Dispensing platforms (see equipment) can also be used to turn the room system into a comfortable dispensing station for IBCs. Access underneath (100 mm ground clearance) makes it possible to load the hazmat store with a hand guided electric forklift. The hazmat store can be locked from the outside to prevent unauthorised access.

2 Base

The technical room system has a tested, single-piece water law compliant 5 mm thick spill pallet (to density 1.9 g/cm³) with grids as a loading surface. Available with a 3 mm thick spill pallet (to density 1.0 g/cm³) as an option. When a PE inliner is fitted, galvanised fluid guides all around ensure any leaked fluids are safely diverted to the spill pallet. The removable grids meet the guidelines for quality and tests RAL GZ 638. Load capacity up to 4000 kg.

3 External cladding

Steel frames and spill pallet are powder coated in RAL 7021 (black-grey). The galvanised wall elements are made from trapezium sheet and A class insulated flat sheet panels painted RAL 9002 (grey-white).

4 Electrical equipment

Your hazmat store can be fitted with power sockets and lighting if required. In the standard version, the central power connection uses a sub-distribution unit. With a more elaborate electrical set-up, e.g. with technical ventilation, or if required, we can provide a switch cabinet with control and operating elements.

5 Transportability

Your hazmat store is fitted with removable crane eyes as standard. ausgerüstet. These ensure simple, safe craneability, as well as acting as transport safety devices for transport on the lorry.

6 Roof drainage

Rainwater collects in the grooves of the trapezium sheet roof and is guided to the front and back in a U profile and away over the sides.

7 Technical ventilation

Optional for insulated models for storing flammable liquids.



Hazmat store SolidMaxx CH 1.1 in insulated design 



Hazmat store SolidMaxx CH 1.1 in non-insulated design

Hazmat storage containers without fire protection

Equipment options



Technical ventilation for insulated version



Lighting also available in LED



Finned tube heater with impact protection



Air extraction monitoring for air exchange > 2.0/h



PE inliner for acids and alkalis (LGK 8) dissipative version available



Optional dispensing platform for CH models



Optional step (L x W x H mm) 675 x 424 x 200



Switch cabinet for central power connection

The complete range of equipment options can be found on page ➔ 122.



Info

Explosion-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.



Hazmat storage containers without fire protection

Hazmat storage container with shelving SC

Perfect fit for large containers

Hazmat storage container with shelving SC is the most flexible room system from DENIOS. Four different versions (G, P, K, H) are optimised to suit typical types of large containers (drum, IBC) with / without pallets or mixed storage. Up to three storage levels can be provided, one over the other. Each version offers the usual range of DENIOS models with an insulated and an extra-deep version for each model. A comprehensive range of equipment options rounds off the range, ensuring the configuration for your hazmat store will meet your needs perfectly. Investment costs and space requirements will therefore be reduced. Like all hazmat stores from DENIOS, the construction of the SC is legally-compliant and ideally designed for your protection design: with an integral type-approved spill pallet for containing leaked liquids and structural protection against the effects of the weather if located outside.



**For up to 144 drums
or 24 IBCs**



DIBt

National technical approval (abZ)
– Z-38.5-177

**Hazmat storage container with shelving SC 2K 514 with
sliding door**

Overview of the product range



Version K
Storage of IBCs



Version P
Drum storage on Euro and
chemical pallets



Version G
Drums stored directly
on the grid



Version H
Combined storage of drums
and IBCs

For each version there is an insulated and/or extra-deep variant.

On request: special heights and horizontal drum storage (Version A) (see special versions page ➔ 56)

Door options

- Single bay store: Wing doors
- Dual bay store: Sliding doors
- Roller doors (on request)

Designs according to substance properties

| | | |
|--|---|--|
| | Water-polluting | <ul style="list-style-type: none"> ■ Approved for WGK 1-3 (see page ➔ 69) |
| | Corrosive | <ul style="list-style-type: none"> ■ With PE inliner |
| | Flammable (H226, H225, H224) | <ul style="list-style-type: none"> ■ Natural ventilation available on request ■ The pre-requisites for storing flammable liquids must be observed <p>For activities in the store (active storage):</p> <ul style="list-style-type: none"> ■ With technical ventilation and slit cover ■ If necessary, equipped with air extraction monitoring ■ The pre-requisites for storing flammable liquids must be observed |
| | All other hazardous substance properties | <ul style="list-style-type: none"> ■ Equipment in accordance with risk assessment. Speak to us concerning special storage provisions. |
| | Temperature sensitive substances | <ul style="list-style-type: none"> ■ Insulation in 50 mm B class material or A class material for flammable liquids ■ Optional temperature control (from page ➔ 60) ■ If required, with temperature monitoring ■ When storing flammable liquids technical ventilation is required. ■ For a room width greater than 4 m, additional air recirculation (with impact protection) is fitted for optimum air / temperature distribution. |

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

(Hazardous materials stores outdoors, see from page ➔ 20)



Prerequisites for storing flammable liquids

- Observe distance from fire loads (mostly min. 10 m)
- Create equipotential bonding (earthing) (connection point provided); if required provide lightning protection
- Country-specific requirements for air exchange rate
- Specifications in Germany in accordance with TRGS 510
- Specifications in accordance with ATEX Directive 2014/34/EU

If distances to fire loads cannot be observed or if the store is to be located indoors, we recommend using a fire-rated storage container (from page ➔ 68).



Expert advice

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Hazmat storage containers without fire protection

Hazmat storage container with shelving SC

Product features



Info

Supplied ready assembled

1 Making use of the space

Hazmat storage container with shelving SC can be filled with drums, goods on Euro or chemical pallets or with IBCs. Mixed storage or storage of drums directly on the grids is also possible. The storage levels can be fitted with rollers in order to optimise working processes. Access underneath (100 mm ground clearance) makes it possible to load the hazmat store with a hand guided electric forklift. The hazmat store can be locked from the outside to prevent unauthorised access.

2 Base

The technical room system has a tested, single-piece water law compliant, 5 mm thick 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 5500 kg) are 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 hazmat store to the foundation. A mounting kit is included in the delivery.

3 External walls

Flat sheet / trapezium sheet (insulated version has flat sheet panels) painted in RAL 5010 (gentian blue) or another colour if required.

4 Electrical equipment

Your hazmat store can be fitted with power sockets and lighting if required. In the standard version, the central power connection uses a sub-distribution unit. With a more elaborate electrical set-up, e.g. with technical ventilation, or if required, we can provide a switch cabinet with control and operating

5 Transportability

Your hazmat store is fitted with removable crane eyes as standard. ausgerüstet. These ensure simple, safe craneability, as well as acting as transport safety devices for transport on the lorry.

6 Roof drainage

Rainwater collects in the grooves of the trapezium sheet roof. The roof slopes gently backwards, draining the water away.



Hazmat storage container with shelving SC 2K 714
in special version painted to customer's specification

Hazmat storage containers without fire protection

Equipment options



Technical ventilation



System monitoring / gas warning detector



Lighting also available in LED



PE inliner for acids and alkalis (LGK 8) dissipative version available



Alarm systems, warning lights and sirens



Rollers



Switch cabinet for central power connection



Canopy

The complete range of equipment options can be found on page ➔ 122.



Info

Explosion-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.



Hazmat storage containers without fire protection

Hazmat storage container with shelving SC, Version K

Storage of IBCs

A bay height of 1500 mm from 2 shelves allows easy storage of a maximum of 18 IBCs in Version K of the hazmat storage container with shelving SC. Up to three levels can be made one on top of the other. If the system is designed with just one level, containers with dispensing units can be housed, with a bay height of 2580 mm.



For up to 18 IBCs



**Hazmat storage container with shelving SC 2K 414,
with wing doors**



Info

All of the models shown can be made in an insulated and/or extra-deep version. Further information on insulated systems can be found on page ➔ 58.





Hazmat storage container with
shelving SC 1K 714, with sliding doors

DIBt

National technical approval (abZ)
– Z-38.5-120

| Description | 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) | Weight (kg) |
|-------------|-----------|----------------------------------|-------------------------------|---------------------------------------|----------------------------------|----------------|
| SC 1K 214 | | 2 / 2 / 3 / 8 | 1180 | 2820 x 1660 x 3122 | 2700 x 1340 x 2570 | 1010 |
| SC 2K 214 | | 4 / 4 / 6 / 16 | 1180 | 2820 x 1660 x 3692 | 2700 x 1340 x 1500 | 1400 |
| SC 1K 414 | | 3 / 2 / 4 / 10 | 1180 | 3500 x 1660 x 3062 | 3380 x 1340 x 2570 | 1090 |
| SC 2K 414 | | 6 / 4 / 8 / 20 | 1180 | 3500 x 1660 x 3635 | 3380 x 1340 x 1500 | 1530 |
| SC 1K 514 | | 4 / 4 / 6 / 16 | 2400 | 5640 x 1660 x 3125 | 2700 x 1340 x 2570 | 1760 |
| SC 2K 514 | | 8 / 8 / 12 / 32 | 2400 | 5640 x 1660 x 3695 | 2700 x 1340 x 1500 | 2350 |
| SC 1K 714 | | 6 / 4 / 8 / 20 | 2400 | 7000 x 1690 x 3065 | 3380 x 1340 x 2570 | 2000 |
| SC 2K 714 | | 12 / 8 / 16 / 40 | 2400 | 7000 x 1660 x 3635 | 3380 x 1340 x 1500 | 2600 |
| SC 3K 714* | | 18 / 12 / 24 / 60 | 2400 | 7000 x 1640 x 5290 | 3380 x 1340 x 1500 | 3850 |

Note: IBC = Intermediate Bulk Container, 1000 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
Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes.

*Due to its height this model will be delivered in two sections and assembled on site.

Hazmat storage containers without fire protection

Hazmat storage containers without fire protection

Hazmat storage container with shelving SC, Version P

Optimised for drums on pallets

Our hazmat storage container with shelving SC Version P is optimised for the storage of drums on pallets. Use the 3900 mm bay width to store three chemical (CP) or four Euro (EP) pallets next to each other. Up to three storage levels give a maximum storage capacity of 72 drums on 24 EP or 18 CP.



**For up to 72 drums on
24 EP or 18 CP**



**Hazmat storage container with shelving SC 2P 414,
with wing doors in special paint**



Info

All of the models shown can be made in an insulated and/or extra-deep version. Further information on insulated systems can be found on page ➔ 58.





Hazmat storage container with shelving SC 2P 814
With technical ventilation and sliding doors

DIBt

National technical approval (abZ)
– Z-38.5-120

| Description | Structure | Capacity CP / EP / Drum | Spill pallet volume (l) | External dimensions* (W x D x H mm) | Bay dimensions (W x D x H mm) | Weight* (kg) |
|--------------|-----------|----------------------------|-------------------------------|--|----------------------------------|-----------------|
| SC 1P 414 | | 3 / 4 / 12 | 1100 | 4020 x 1660 x 3062 | 3900 x 1340 x 2640 | 1290 |
| SC 2P 414 | | 6 / 8 / 24 | 1100 | 4020 x 1660 x 3062 | 3900 x 1340 x 1250 | 1540 |
| SC 3P 414** | | 9 / 12 / 36 | 1100 | 4020 x 1690 x 4455 | 3900 x 1340 x 1250 | 2130 |
| SC 1P 814 | | 6 / 8 / 24 | 1100 | 8196 x 1715 x 3232 | 3900 x 1340 x 2640 | 2490 |
| SC 2P 814 | | 12 / 16 / 48 | 2100 | 8040 x 1660 x 3065 | 3900 x 1340 x 1250 | 2820 |
| 3P 814** | | 18 / 24 / 72 | 2100 | 8120 x 1710 x 4455 | 3900 x 1340 x 1250 | 4130 |
| SC 1P 1214** | | 9 / 12 / 36 | 3200 | 12,060 x 1645 x 3065 | 3900 x 1340 x 2640 | 4250 |
| SC 2P 1214** | | 18 / 24 / 72 | 3200 | 12,060 x 1645 x 3065 | 3900 x 1340 x 1250 | 4500 |

Note: 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

Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes.

* Without add-on equipment **This model will be delivered in two sections and assembled on site to ensure transport dimensions are observed.

Hazmat storage containers without fire protection

Hazmat storage container with shelving SC, Version G

Perfectly designed for direct drum storage

Up to 48 drums can be stored directly on a grid in the Version G. A maximum of three storage levels can be created in this hazmat storage container. A clear height of 1250 mm in each bay ensures enough room for loading and unloading. The Version G systems can also be manufactured in an extra-deep design. This means that not only is the storage area doubled, but, depending on requirements and space available on site, doors may be positioned on both sides.



For up to 48 drums



**Hazmat storage container with shelving SC 2G 314,
with wing doors**



Info

All of the models shown can be made in an insulated and/or extra-deep version. Further information on insulated systems can be found on page ➔ 58.





Hazmat storage container with shelving SC 2G 614, with sliding doors

DIBt

National technical approval (abZ)
– Z-38.5-120

| Description | Structure | Capacity CP / EP / Drum | Spill pallet volume * (l) | External dimensions*** (W x D x H mm) | Bay dimensions (W x D x H mm) | Weight*** (kg) |
|-------------|-----------|----------------------------|---------------------------------|--|----------------------------------|-------------------|
| SC 1G 314 | | 2 / 3 / 8 | 750 | 3200 x 1680 x 3065 | 3000 x 1340 x 2640 | 770 |
| SC 2G 314 | | 4 / 6 / 16 | 750 | 3200 x 1680 x 3065 | 3000 x 1340 x 1250 | 1220 |
| SC 3G 314** | | 6 / 9 / 24 | 750 | 3200 x 1690 x 4455 | 3000 x 1340 x 1250 | 1770 |
| SC 1G 614 | | 4 / 6 / 16 | 1500 | 6240 x 1660 x 3062 | 3000 x 1340 x 2640 | 1840 |
| SC 2G 614 | | 8 / 12 / 32 | 1500 | 6240 x 1660 x 3062 | 3000 x 1340 x 1250 | 2330 |
| SC 3G 614** | | 12 / 18 / 48 | 1500 | 6320 x 1710 x 4455 | 3000 x 1340 x 1250 | 3620 |

Note: 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

Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes.

* Other containment volumes available on request (e.g. water protection area). **This model will be delivered in two sections and assembled on site to ensure transport dimensions are observed.

*** Without add-on equipment

Hazmat storage containers without fire protection

Hazmat storage containers without fire protection

Hazmat storage container with shelving SC, Version H

Flexible, mixed storage

Maximum flexibility: The generous dimensions allow mixed storage of drums, IBCs and pallets in the hazmat storage container with shelving SC, Version H. The largest version can store 72 drums on 18 chemical pallets or directly on the grid, or 18 IBCs. For the insulated version, additional air recirculation (with impact protection) is fitted for optimum air / temperature distribution.



**For up to 72 drums
or 18 IBCs**



Hazmat storage container with shelving SC 2H 1214



Info

All of the models shown can be made in an insulated and/or extra-deep version. Further information on insulated systems can be found on page ➔ 58.





Hazmat storage containers without fire protection

Hazmat storage container with shelving SC 2H 814 in insulated design with technical ventilation for active storage, with additional air recirculation and sliding doors

DIBt

National technical approval (abZ)
– Z-38.5-120

| Description | 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) | Weight* (kg) |
|--------------|-----------|----------------------------------|-------------------------------|--|----------------------------------|-----------------|
| SC 2H 414 | | 6 / 6 / 8 / 24 | 1100 | 4100 x 1690 x 3635 | 3900 x 1340 x 1500 | 1750 |
| SC 2H 814 | | 12 / 12 / 16 / 48 | 2100 | 8040 x 1710 x 3545 | 3900 x 1340 x 1500 | 3230 |
| SC 2H 1214** | | 18 / 18 / 24 / 72 | 3200 | 12,060 x 1645 x 3565 | 3900 x 1340 x 1500 | 5400 |

Note: IBC = Intermediate Bulk Container, 1000 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
Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes.

* Without add-on equipment **This model will be delivered in two sections and assembled on site to ensure transport dimensions are observed.

Hazmat storage containers without fire protection

Hazmat storage container with shelving SC, Special version

Special version for horizontal drum storage

Advantage of horizontal storage: each drum is accessible to the user for dispensing. Rails in the storage bays enable this flexibility. Pulling out and turning the drums is made possible with drum support rollers. If the system is extra-deep, the room may also be entered from the rear to carry out dispensing operations.



DIBt

National technical approval (abZ)
– Z-38.5-120

Partially walk-in hazmat storage container with shelving SC, with pull-out rollers on three storage levels.

Special version with three storage levels

All hazmat storage containers with shelving versions G, P, K and H can be made with three storage levels - and also in an insulated version. Due to its size, the system is supplied in sections and assembled and commissioned on site by trained personnel.



DIBt

National technical approval (abZ)
– Z-38.5-120

Hazmat storage container with shelving SC 3P 826, with sliding doors on both sides

Special extra-deep version

More than double the storage area: hazmat storage container with shelving SC in the single bay design can be made as an extra-deep version. All models can be fitted with sliding, wing and roller shutter doors. The door solutions can be individually customised, for example a combination of a roller door on one side and a sliding door on the other. The extra-deep design makes it easy to access the stored goods from one side while loading and unloading from the other. Insulated versions are also available. When used with technical ventilation or a heating system, water-polluting and flammable substances can be stored frost-free, if the applicable safety distances and technical regulations are observed.



DIBt

National technical approval (abZ)
– Z-38.5-120

Double depth hazmat storage container with shelving SC 2K 726, with sliding doors on both sides

Hazmat storage containers without fire protection

Special version with roller shutter door

Wing doors need a lot of room to open out. Fitting the storage container with a roller shutter door is an ideal solution if there is limited space available. As an option, roller shutter doors may also be fitted to the rear of the system. This makes it possible to load containers from both sides. Remote control opening and closing is also possible.



DIBt

National technical approval (abZ)
– Z-38.5-120

Hazmat storage container with shelving SC 2P 814, with roller shutter doors

Hazmat storage containers without fire protection

Frost-free hazmat storage containers

Insulated Hazmat storage containers

DENIOS technical room systems have impressive versatility. Depending on the application and media to be stored, a frost-free or insulated design may be needed. Thermal insulation in A or B class materials ensure effective protection against energy losses and the effects of frost. Insulation in non-combustible A class materials is suitable for the storage of flammable liquids. The insulated hazmat store can also be equipped with a heating system (temperature controlled hazardous materials stores, from page ➔ 60) or temperature monitoring (sensors, see page ➔ 130).



DIBt

NATIONAL TECHNICAL APPROVAL (abZ) – DIBt
Deutsches Institut für Bautechnik

Walk-in hazmat store MCV 4320 in insulated design

Insulated design

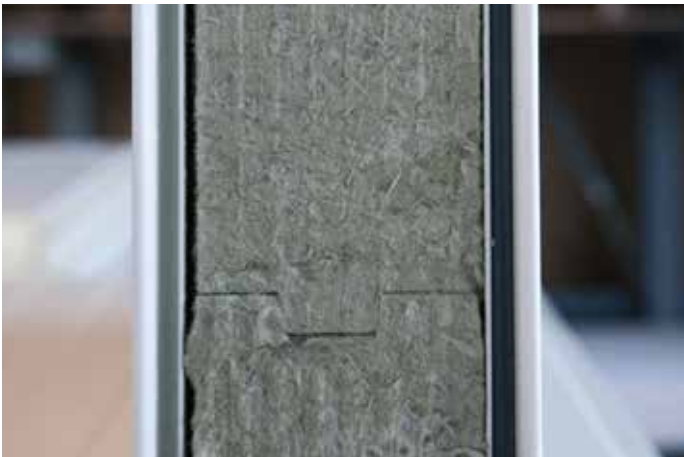
The proven design principle of the technical room system is also used for the insulated version. The sturdy welded steel frame design is covered on all sides with special panels. PUR panels (construction material class B in accordance with EN 13501-1) are used for the storage of non-flammable substances. 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 50 mm, construction material class A, non-combustible, $U = 0.78 \text{ W} / (\text{m}^2\text{K})$.
- Material thickness 100 mm, construction material class A, non-combustible, $U = 0.42 \text{ W} / (\text{m}^2\text{K})$.
- CE marked

For hazmat store MCV the wall panels are filled on the inside with 40 mm A class material.



Mineral wool wall insulation (construction material class A) joining edge to next panel. This material is not combustible.

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) - storage container SC only

- 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



Section through the PUR panel wall insulation (construction material class B). This material has better insulation properties and is flame-retardant.



Expert advice

Not found what you are looking for? Need more information? Let DENIOS advise you!

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Visit www.denios.com to get in contact with your local representative.

Hazmat storage containers without fire protection

Frost-free hazmat storage containers

Temperature controlled hazmat storage containers

Depending on the condition of the stored goods and the requirements of the application, it may be necessary or useful to fit a heating system to a hazmat storage container. All 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 climate control, designs are also available which use warm water, heat transfer oils or saturated steam. Direct connection to customer equipment is also possible.



Hazmat 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
Optimum temperature control in the storage system with intelligent heating systems and well-designed air flow

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 hazmat store designs and include comprehensive protective mechanisms and a sturdy body. To support your core tasks of heating or melting, its functions are optimised for precision temperature control and short warm-up periods (from page ➔ 106).

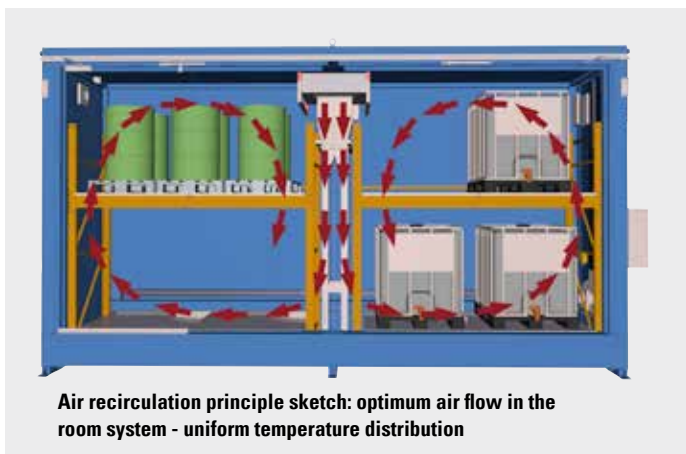
Finned tube heaters

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 air recirculation

For large room systems which are fitted with finned tube heaters, additional air recirculation is provided. Connected to the heating system, the air recirculation 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.



Climate control equipment

In the standard design, climate control equipment 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 climate control solutions enable precision temperature control of the storage room. Ex designs are also available.



Hazmat storage containers without fire protection

Examples of use

Storage of greases and oils

thyssenkrupp Hohenlimburg GmbH, formerly Hoesch Hohenlimburg GmbH, based in Hagen/Westfalen have over 150 years experience in processing Hohenlimburg hot rolled medium strip, marketed today as precidur®. This is a steel product with strict technical specifications, meeting individual customer requirements. precidur® is used as a primary material in the cold rolling industry and also in direct processing, mainly in the automotive supply industry. Company description: www.thyssenkrupp-steel.com



Challenge and project

When building new spaces for production and social areas, the existing oil store needed to be disposed of. A new hazardous materials store was needed for greases and oils. These substances which need to be stored in a legally-compliant manner (in a maximum of 150 drums) were to be split between two new storage areas. Initially an outdoor store for 100 drums was planned with a closed, lockable system for storing an additional 50 drums. This new store was to be integrated directly into the hall used for storing and issuing operating equipment (the depot). Quick access to substances in this area was the main requirement for ensuring frictionless production. A particular challenge was encountered with assembling the store indoors in view of the severely limited space.

The solution

Two criteria played a main role when the contract was awarded. First: Hoesch Hohenlimburg had already had a positive experience of working with DENIOS. DENIOS' regulatory knowledge also proved a deciding factor: for tasks in the engineering sector the developer offered customised solutions - meeting the

generally applicable legislation. After assessing the spatial requirements for the planned storage locations outdoors and indoors, it was decided to integrate both storage systems in the depot hall. DENIOS presented a solution with a made-to-measure combination of different hazardous materials stores. The proposal included one storage container with shelving with sliding doors and one with wing doors. The equipment was selected to best suit the hazardous substances to be stored - while observing the specific storage regulations. Inbuilt spill pallets in the lower levels ensured safe containment of any leaked water-polluting liquids. The severe space limitations were compensated for by the custom adaptation of the hazardous materials storage containers.

Result and customer benefit

Hoesch Hohenlimburg received an indoor storage system solution which was customised to meet the storage requirements of the company: space-saving and cost-effective. The hazmat storage containers met the current regulations and made an active contribution to company environmental protection.

Storage of water-polluting and flammable substances

The Hohenstein Institute is a family business, specialising for over 70 years in testing, certification and research for all types of textile products. As an internationally-recognised, reliable partner it helps companies bring their products to market throughout the value creation chain. Now with third generation management, the company employs about 1000 employees, at the Bönningheim head office as well as in laboratories and overseas offices around the world. Company description: www.hohenstein.de



Hazmat storage containers without fire protection

Challenge and project

The Hohenstein Institute required an insulated, heated, walk-in outdoor process materials store, for the storage of water-polluting and flammable substances. In addition, a separate store was needed for acids and alkalis.

The solution

DENIOS AG designed a 50 m² process materials store with electric recirculated air heating (2 x 15 kW) to achieve the required room temperatures. Technical ventilation, walk-on grids, lighting and PE inliners completed the insulated store. All electrical components inside the store were Ex-proof. A fire-rated store was not required as safety distances could be observed.

Result and customer benefit

The Hohenstein Institute received a customised solution meeting its needs: cost-effective, legally-compliant and ready to use. DENIOS AG's long experience in hazmat storage and fire and explosion protection meant that both storage containers could be designed, manufactured and commissioned within a short time.



Would you be interested in a similar solution?

Would you like to store flammable liquids outdoors to avoid the need for fire-protection equipment? Or would you like to store larger quantities of water-polluting substances indoors, without the need for a large amount of space? Our room systems offer the perfect solution. Just get in touch!

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Visit www.denios.com to get in contact with your local representative.

Hazmat storage containers without fire protection

Examples of use

Storage of paints and dyes

Founded in 1921 in Wallisellen, Dold AG has become one of Switzerland's leading manufacturers of paints and dyes. Part of the Dold Group, Dold AG is responsible for the manufacture and sale of high quality dyes and liquid paints. With approximately 100 employees, the company saw a turnover in the region of 30 million CHF. Alongside a range of high quality paint and dye systems for professional decorators, Dold AG, together with sister company IGP Pulvertechnik AG, offers a comprehensive range for industrial clients. *Company description: www.dold.ch*



Challenge and project

Dold AG was looking for a competent partner to plan and implement a turnkey raw materials store on the extensive company site. Legally-compliant storage for the safe handling of water-polluting and flammable hazardous substances (paints and dyes) was the central concern. Recommended by Stadler architects (Zürich), DENIOS AG was selected. The architects which represent Dold had already worked successfully with DENIOS on previous projects. The request was for a hazmat store, to passively store 205 litre drums on Euro pallets containing highly flammable, non-frost-sensitive liquids. As Dold AG was continuously increasing its production capacity, space was to be provided for the expected increase in storage capacity.

A fire-rated F-90 design was therefore not needed. DENIOS supplied three storage containers with shelving, which were accessible from both sides thanks to the double depth construction. The room systems had three storage levels and a load capacity of 1000 kg/m². They were supplied in sections and assembled on site. The complete store had space for 216 x 205 litre drums stored on Euro pallets; up to 360 of these could be stored directly on the shelf. The required storage capacity with sufficient space for increased storage was more than guaranteed. The stores were fitted with equipment appropriate to the hazardous substances to be stored, for example integral spill pallets to contain any leaked liquids. A steel construction covered the whole storage area, making the equipment pleasant to use.

The solution

Dold AG's extensive site allowed an optimum location to be selected for the planned outdoor store, which observed the legally required safety distances.

Result and customer benefit

After quick assembly, a raw materials store was handed over to the client which met all the technical and safety-relevant requirements. Dold AG received an efficiently operating, space-saving store which made a specific contribution to the company's environmental protection.

Central hazardous materials store for lubricants

Holcim (Deutschland) GmbH is one of Germany's leading building material manufacturers and is a subsidiary of the global construction material giant LafargeHolcim Ltd, Rapperswil-Jona / Switzerland. Absorbent materials, aggregates and concrete form the main areas in which the Holcim Germany group operates, whose management holding company is Holcim (Deutschland) GmbH based in Hamburg. The group employs about 1800 employees at over 130 sites across 12 German states. *Company description: www.holcim.de*



Hazmat storage containers without fire protection

Challenge and project

The previous practice of storing new lubricants such as oils and greases in drums, containers and canisters alongside used oil and grease, and used oil binders and dirty cleaning cloths, at four different sites across the plant made daily operations very awkward. A new store was needed at the Höver cement works which would make the work processes better suited to daily requirements and also Holcim's guidelines.

The solution

A new hazardous materials store was designed together with DENIOS AG. The hazmat store was designed as a container store, based on the standardised room system, with two storage areas: One area consisted of an insulated room system, where new lubricants could be stored frost-free. The non-insulated area was for the storage of used materials. In each area, up to 52 IBCs or 70 Euro pallets could be stored. Each area had a roof light strip allowing picking using industrial trucks while protected from the weather. The stores were

extended by a walk-in warehouse for the storage of flammable media in small containers and dispensing of oils. The warehouse was created using a walk-in F90 room system.

Result and customer benefit

The new lubricant store combined the storage and handling of new and used lubricants into one store. The indoor area is accessible by mobile lifting equipment. This increases the effectiveness of daily operations. The storage requirements for temperature and ventilation and also the legal requirements and fire protection standards were all met.



Would you be interested in a similar solution?

We can supply you with the right room system across the world - customised if required. Just get in touch!

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Hazmat storage containers without fire protection

Hazmat storage containers for gas cylinders

Safe gas cylinder storage

Many companies need to store gas cylinders to ensure a constant supply. Due to their high pressure as well as their contents (corrosive, toxic, combustible, oxidising, asphyxiating) they pose an increased level of risk. Generally, storage outdoors is the best alternative, as sufficient ventilation can then be ensured naturally. Fire protection is guaranteed by the marking out of protected areas and observance of safety distances.



**For up to
72 x 33 kg gas cylinders**



Gas cylinder store GSN 2:28, without base. Especially suited to gas cylinder pallets. The door's 160 mm ground clearance enables the gas cylinder store to be locked again even if gas cylinder pallets are open.

Gas cylinder cabinets and stores for outdoor use

Gas cylinder cabinets and stores for outdoor use offer optimum conditions for safe, legally-compliant storage. They have mesh side walls or ventilation slits in the walls allowing natural ventilation. Canopies ensure sufficient weather protection. Many gas cylinder cabinets and stores also have retention devices or safety chains to effectively prevent the gas cylinders falling over. A further advantage : gas cylinder cabinets and containers are generally lockable and therefore meet the requirements to protect the store against unauthorised access.

Our range contains compact gas cylinder cabinets for the legally-compliant storage of up to 16 gas cylinders outdoors. Our large gas cylinder stores and containers are suitable for storing up to 72 gas cylinders outdoors.

www.denios.de/gasflaschenlagerung

Visit www.denios.com to get in contact with your local representative.



Gas cylinder store G 1350, for up to 5 gas cylinders



Gas cylinder cabinet LB 8, for up to 8 gas cylinders



Gas cylinder cabinet LB 4 for storing up to 10 x 11 kg gas cylinders

Protected areas and safety distances

Important: when storing gas cylinders protected areas must be marked out where possible risks must be excluded. The prescribed safety distances for example to nearby buildings must also be observed. These distances can only be replaced by fire-rated partitions. The storage of gas cylinders in buildings is only permitted with fire protection and if additional protective measures are taken.

Solutions for fire-rated gas cylinder storage can be found on page ➔ 92.

Interesting information in the online advisor

Handling gases comes with many dangers - but the right knowledge helps effectively minimise these risks. Our online advisor gives helpful tips for the safe handling of gas cylinders: from the risk assessment to storage and transport.

www.denios.de/ratgeber-gasflaschen

Visit www.denios.com to get in contact with your local representative.

Fire-rated hazmat storage containers



Fire protection from the experts

Fire Protection: DENIOS.

tried. tested. certified.



With over 30 years' experience as a developer and manufacturer of systems for fire-rated hazardous materials storage, we know exactly what is needed in practice. We offer products suited to your needs, which

offer fire protection from both inside and out, thanks to their double frame design. Up to 120 minutes fire resistance is possible internationally - tested and certified as a complete system. While fire protection is an all-embracing theme, our diverse team of experts can ensure you receive comprehensive service with the usual DENIOS quality. Fire protection from DENIOS: Tried. Tested. Certified.

Our proven standard range contains solutions for

- walk-in fire-rated hazmat storage containers (from page ➔ 70)
- compact fire-rated hazmat storage containers (from page ➔ 74)
- fire-rated hazmat storage containers with shelving (from page ➔ 78)

Customised solutions are also available. Just let us know what you need!

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Visit www.denios.com to get in contact with your local representative.

"The interaction of all the components ensure reliable fire protection for our room system, from inside and outside."



Fire-rated hazmat storage containers

Walk-in fire-rated hazmat storage container WFP

The space miracle with outstanding fire protection

Walk-in fire-rated storage container WFP offers almost limitless ways to use the space for storing flammable liquids. Thanks to its fire protection approval, the room system can be integrated directly into your infrastructure without the need for safety distances, either indoors or outdoors. In six sizes and with a convenient room height, there's plenty of room for equipment inside and loads of storage space. Various door options and a comprehensive range of additional equipment enable the WFP to adapt to almost any situation. The low entry height of 147 mm and precise roof drainage are just two of the additional advantages of this considered design, making long term storage easy.

m²

Storage area:
approx. 6 to 22 m²



Fire protection (Germany)



Fire protection (Europe)



Fire protection (Europe)

Walk-in fire-rated storage container WFP-X 22, with technical ventilation accessories

| Description | Floor area inside (m ²) | Spill pallet volume (l) | External dimensions* (W x H x D mm) | Internal dimensions (W x H x D mm) | Weight* (kg) | Certified fire protection |
|-------------|-------------------------------------|-------------------------|-------------------------------------|------------------------------------|---------------|---------------------------|
| WFP-M 6 | 6.6 | 730 | 3018 x 2657 x 2784 | 2580 x 2280 x 2560 | Approx. 2400 | F 90 / REI 90 / REI 120 |
| WFP-M 14 | 14.1 | 1560 | 5938 x 2704 x 2952 | 5500 x 2280 x 2560 | Approx. 3750 | |
| WFP-X 6 | 6.6 | 730 | 3018 x 2877 x 2784 | 2580 x 2500 x 2560 | Approx. 2450 | F 90 / REI 90 / REI 120 |
| WFP-X 10 | 10.3 | 1150 | 4478 x 2921 x 2784 | 4040 x 2500 x 2560 | Approx. 3,100 | |
| WFP-X 14 | 14.1 | 1560 | 5938 x 2924 x 2952 | 5500 x 2500 x 2560 | Approx. 3850 | |
| WFP-X 22 | 21.6 | 2400 | 8858 x 2924 x 2952 | 8420 x 2500 x 2560 | Approx. 5050 | |

Note: Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes.

* Without add-on equipment

Overview of the product range



WFP-M 6
approx. 6.6 m² storage area



WFP-M 14
approx. 14.1 m² storage area



WFP-X 6
approx. 6.6 m² storage area



WFP-X 10
approx. 10.3 m² storage area



WFP-X 14
approx. 14.1 m² storage area



WFP-X 22
approx. 21.6 m² storage area

Door variants

- With a 1 or 2-wing door, either on the short or long side of the room system in the steps provided
- For 2-wing doors, the door sequence controller ensures reliable closure of the doors.
- We use EI₂ 90-C class doors in D, AT and CH. For countries such as FR, ES, PL and IT we use EI₂ 120 and for NL EI₁ 60 doors.

Door dimensions

- 1-wing door: 1165 x 1955 (W x H mm) Basic dimensions 1250 x 2000
- 2-wing door: 1915 x 1955 (W x H mm) Basic dimensions 2000 x 2000

Designs according to substance properties

| | | |
|--|---|---|
| | Water-polluting | <ul style="list-style-type: none"> ■ Approved for WGK 1-3 (see page ➔ 9) |
| | Corrosive | <ul style="list-style-type: none"> ■ With PE inliner |
| | Flammable (H226, H225; H224) | <ul style="list-style-type: none"> ■ Equipped with technical ventilation ■ If necessary, equipped with air extraction monitoring ■ The pre-requisites for storing flammable liquids must be observed |
| | All other hazardous substance properties | <ul style="list-style-type: none"> ■ Equipment in accordance with risk assessment. Speak to us concerning special storage provisions. |
| | Temperature sensitive substances | <ul style="list-style-type: none"> ■ The standard fire protection panels have high insulation properties ■ Optional : temperature controlled version (from page ➔ 60) |

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 $s_k = 2.5 \text{ kN/m}^2$
- 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

(Hazardous materials stores outdoors, see from page ➔ 20)



Prerequisites for storing flammable liquids

- Create equipotential bonding (earthing) to avoid hazardous electrostatic build-up (connection point provided); if required provide lightning protection
- Specifications in accordance with TRGS 510
- Specifications in accordance with ATEX Directive 2014/34/EU

If outdoor installation is planned and there is sufficient distance from fire loads, a hazardous materials store without fire protection may be used if needed (from page ➔ 30).



Expert advice

Need more information? Let DENIOS advise you!

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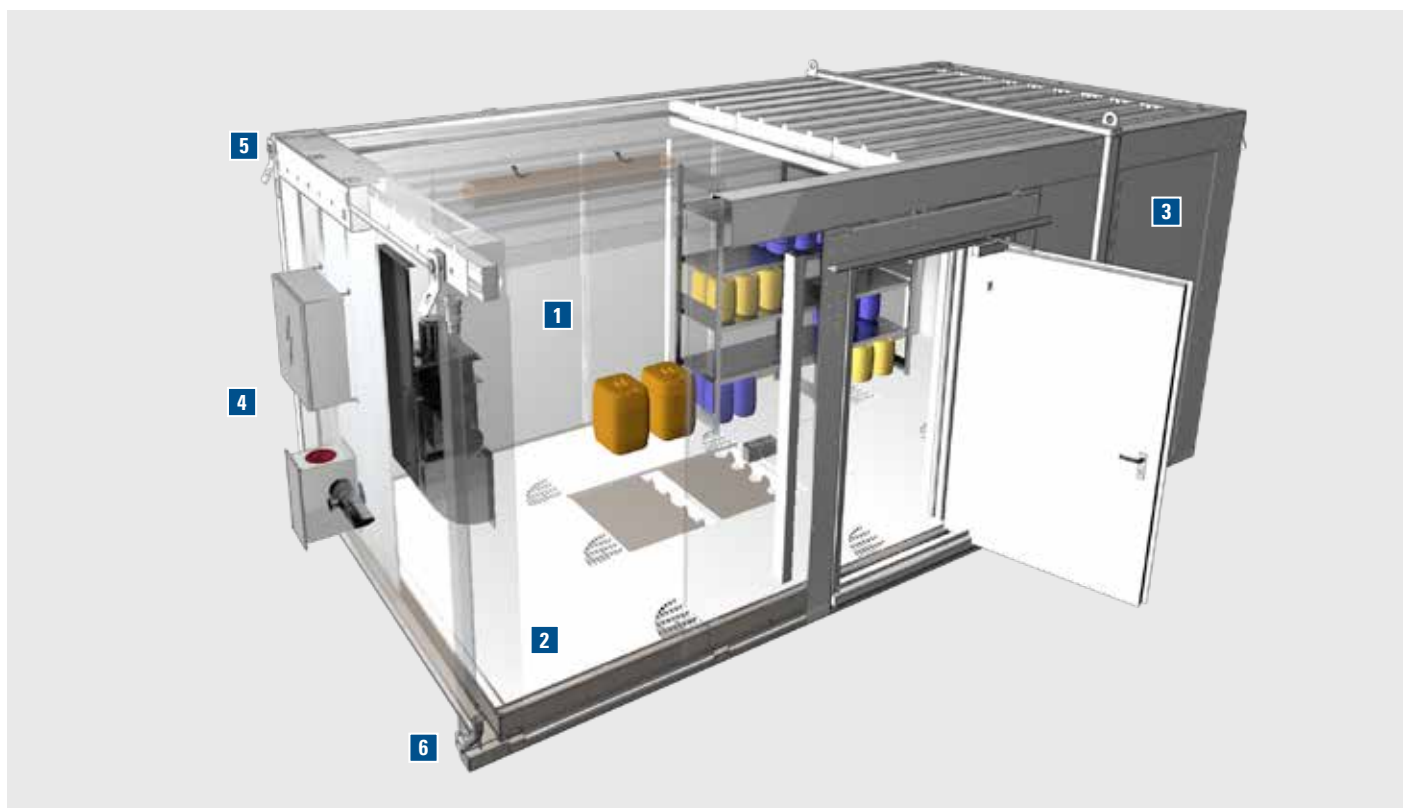
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Fire-rated hazmat storage containers

Walk-in fire-rated hazmat storage container WFP

Product features



1 Making use of the space

The walk-in fire-rated store offers almost limitless ways to use the space. The inner room can be fitted with shelving, the floor can be used for storage or as a work area. Shelving in three different widths (750, 1000 and 1300 mm) are available with a depth of 500 mm (shelf load with an evenly distributed load: 200 kg, rack load: 800 kg)*. Narrow mesh grids ensure a pallet truck can be used. The hazmat store can be locked to prevent unauthorised access.

*Nominal values

2 Base

The technical room system has a tested, single-piece water law compliant, hot dip galvanised 5 mm thick spill pallet with grids as a storage surface. The gap between the spill pallet and the wall panels is flexibly sealed so that no liquid can penetrate the gap. Removable grids meet the guidelines for quality and tests RAL GZ 638, load capacity: 1000 kg/m². The entry sill height is particularly low at 147 mm. For increased ease of use, an access ramp is available (see accessories). Brackets are provided for ground anchoring (foundation).

3 External cladding

The external cladding is in fire protection panels (A class material) with a high insulation factor. Long term corrosion protection is ensured by the use of galvanised components and 2K paint in RAL 9002 (grey-white) or a different colour if required.

4 Electrical equipment

In the standard version, the central power connection uses a sub-distribution unit. With a more elaborate electrical set-up, e.g. with technical ventilation, or if required, we can provide a switch cabinet with control and operating elements.

5 Transportability

Your hazmat store is fitted with removable crane eyes as standard. These ensure simple, safe craneability, as well as acting as transport safety devices for transport on the lorry.

6 Roof drainage

Rainwater is channelled to the frame running around the edge and drains on the short sides either to the left or the right.



Equipment options



Technical ventilation



Lighting also
available in LED



Switch cabinet for central
power connection



Air extraction
monitoring for air
exchange > 2.0/h



Sockets in Ex version



Finned tube heater
with impact protection



Ramp, suitable for
pallet trucks



Door / gate hold-open
system



Grids 33 x 11 mm
(mesh size)



PE liner for acids and
alkalis (LGK 8) dissipative
version available



Earthing rails



Pressure relief panels

The complete range of equipment options can be found on page ➔ 122.



Info

Explosion-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.



Fire-rated hazmat storage containers

Compact fire-rated hazmat storage container BMC-S

The compact solution

Not every company needs a large store for housing hazardous substances. Fire-rated hazmat storage container BMC-S offers a sturdy, fire-rated design with minimal footprint. If desired, the technical room system is available with a variable number of fixed or pull-out shelves – for optimum use of the inner space according to your needs.



**For up to 4 drums
or 1 IBC**



Fire-rated hazmat storage container BMC-S 180-2, used as a small container store, with additional shelving



| Description | Capacity IBC / CP / EP / Drum | Spill pallet volume (l) | External dimensions without extensions (W x D x H mm) | Bay dimensions (W x D x H mm) | Weight (kg) | Certified fire protection |
|--------------|----------------------------------|-------------------------------|---|----------------------------------|----------------|------------------------------|
| BMC-S 180-2 | - / - / 1 / 2 | 340 | 1848 x 1300 x 2463 | 1542 x 1012 x 2100 | 1330 | REI 90 / REI 120 |
| BMC-S 180-4 | - / 1 / 1 / 4 | 500 | 1848 x 1775 x 2463 | 1542 x 1487 x 2100 | 1500 | |
| BMC-S 180-10 | 1 / 1 / 1 / 4 | 1040 | 1848 x 1775 x 2463 | 1345 x 1350 x 1500 | 1730 | |

Note: IBC = Intermediate Bulk Container, 1000 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
Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes. Clear door dimensions: 1265 x 1955 mm.

Overview of the product range



BMC-S 180-2

up to 2 drums or 1 Euro pallet at right angles



BMC-S 180-4

For up to 4 drums or 1 chemical pallet



BMC-S 180-10

up to 4 drums or 1 IBC

Door equipment

- 1-wing fire protection door EI₂ 90-C in accordance with EN 1634-1

Door dimensions

- 1265 x 1955 (W x H mm) Basic dimensions 1350 x 2000

Designs according to substance properties

| | | |
|--|---|---|
| | Water-polluting | <ul style="list-style-type: none"> Approved for WGK 1-3 (see page ➔ 9) |
| | Corrosive | <ul style="list-style-type: none"> With PE inliner |
| | Flammable (H226, H225; H224) | <ul style="list-style-type: none"> Equipped with technical ventilation If necessary, equipped with air extraction monitoring The pre-requisites for storing flammable liquids must be observed |
| | All other hazardous substance properties | <ul style="list-style-type: none"> Equipment in accordance with risk assessment. Speak to us concerning special storage provisions. |
| | Temperature sensitive substances | <ul style="list-style-type: none"> The standard fire protection panels have high insulation properties |

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

(Hazardous materials stores outdoors, see from page ➔ 20)



Prerequisites for storing flammable liquids

- Create equipotential bonding (earthing) to avoid hazardous electrostatic build-up (connection point provided); if required provide lightning protection
- Specifications in accordance with TRGS 510
- Specifications in accordance with ATEX Directive 2014/34/EU

If outdoor installation is planned and there is sufficient distance from fire loads, a hazardous materials store without fire protection may be used if needed (from page ➔ 30).



Expert advice

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Fire-rated hazmat storage containers

Compact fire-rated hazmat storage container BMC-S

Product features



1 Making use of the space

Fire-rated hazmat storage container BMC-S can be filled with up to 4 drums, palletised goods on a Euro or chemical pallet or 1 IBC (see table on page ➔ 74). Mixed storage or storage of drums directly on the grid is also possible. The storage levels can be fitted with pull-out shelves in order to optimise working processes. The fire-rated store can be locked from the outside to prevent unauthorised access.

2 Base

The technical room system has a tested, single-piece water law compliant, 5 mm thick spill pallet. The sturdy storage levels have a load capacity of 1000 kg/m² (fire-rated storage container BMC-S 180-10: 1250 kg/m²) and are fitted with removable hot-dip galvanised grids, which meet the guidelines for quality and tests RAL GZ 638.

3 External cladding

The external cladding is in fire protection panels (A class material) with a high insulation factor. Long term corrosion protection is ensured by the use of galvanised components and 2K paint in RAL 9002 (grey-white) or a different colour if required.

4 Electrical equipment

In the standard version, the central power connection uses a sub-distribution unit. With a more elaborate electrical set-up, e.g. with technical ventilation, or if required, we can provide a switch cabinet with control and operating elements.

5 Transportability

Your hazmat store is fitted with removable transport brackets as standard. These ensure simple, safe craneability, as well as acting as transport safety devices for transport on the lorry.



Fire-rated storage container BMC-S 180-10, with 1040 l containment volume for IBC storage

Equipment options



Technical ventilation



Lighting also available in LED



Switch cabinet for central power connection



Air extraction monitoring for air exchange > 2.0/h



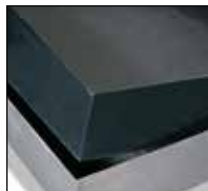
Sockets in Ex version



Finned tube heater with impact protection



Door hold-open system



PE inliner for acids and alkalis (LGK 8) dissipative version available



Earthing rails

The complete range of equipment options can be found on page ➔ 122.



Info

Explosion-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.



Fire-rated hazmat storage containers

Fire-rated hazmat storage container RFP

The spacious fire protection solution

Storage container RFP is the best option when larger quantities of hazardous substances or larger containers need to be accommodated. An integrated heavy duty rack with adjustable shelves allows the best possible use to be made of the inner room. It suits the most varied storage options, e.g. individual storage or storage in boxes, on pallets or special carrier frames. The system offers the best possible access via 2-wing doors and optimal use of the room height for easy loading and unloading.



**For up to 32 drums
or 8 IBCs**



Fire-rated hazmat storage container with shelving RFP 615.30 accessible underneath with concrete base and door hold-open system



| Description | 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) | Weight (kg) | Certified Fire protection |
|-------------|-----------|----------------------------------|-------------------------------|--|---|------------------|------------------------------|
| RFP 315.20 | | 2 / 2 / 3 / 8 | 1150 | 3660 x 1785 x 2630 | 2917 x 1440 x 1954 | Approx. 2,500 | F 90 / REI 90 / REI 120 |
| RFP 315.30 | | 4 / 4 / 6 / 16 | 1150 | 3660 x 1785 x 3575 | Top: 2700 x 1235 x 1393 Bottom: 2700 x 1440 x 1331 | Approx. 3100 | |
| RFP 615.20 | | 4 / 4 / 6 / 16 | 2300 | 6882 x 1785 x 2650 | 2x 2917 x 1440 x 1954 | Approx. 4400 | |
| RFP 615.30 | | 8 / 8 / 12 / 31 | 2300 | 6882 x 1785 x 3595 | 2x top: 2700 x 1235 x 1393 2x bottom: 2700 x 1440 x 1331 | Approx. 5600 | |

Note: IBC = Intermediate Bulk Container, 1000 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
Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes.

* Without equipment **Variable bay height

Overview of the product range



RFP 315
up to 16 drums or 4 IBCs



RFP 315, accessible underneath
up to 16 drums or 4 IBCs



RFP 615
up to 32 drums or 8 IBCs



RFP 615, accessible underneath
up to 32 drums or 8 IBCs

Door variants

- With 2-wing EI₂ 90-C door on long side of the room system
- A door sequence controller ensures reliable closure of the doors

Door opening angle

- 90°: Minimum value
- 102°: Door does not yet protrude beyond the body at the side
- 115°: Standard, the effective clear dimension is now fully accessible
- 128°: Maximum value

Door dimensions

- Models 315.20 and 615.20: 2915 x 1955 (W x H mm)
Basic dimensions 3000 x 2000
- Models 315.30 and 615.30: 2915 x 2955 (W x H mm)
Basic dimensions 3000 x 3000

Designs according to substance properties

| | | |
|--|---|--|
| | Water-polluting | <ul style="list-style-type: none"> ■ Approved for W GK 1-3 (see page ➔ 9) |
| | Corrosive | <ul style="list-style-type: none"> ■ With PE inliner |
| | Flammable (H226, H225; H224) | <ul style="list-style-type: none"> ■ Equipped with technical ventilation) ■ If necessary, equipped with air extraction monitoring ■ The pre-requisites for storing flammable liquids must be observed |
| | All other hazardous substance properties | <ul style="list-style-type: none"> ■ Equipment in accordance with risk assessment. Speak to us concerning special storage provisions. |
| | Temperature sensitive substances | <ul style="list-style-type: none"> ■ The standard fire protection panels have high insulation properties ■ Optional : temperature controlled version (from page ➔ 60) |

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 $s_k = 2.5 \text{ kN/m}^2$
- 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

(Hazardous materials stores outdoors, see from page ➔ 20)



Prerequisites for storing flammable liquids

- Create equipotential bonding (earthing) to avoid hazardous electrostatic build-up (connection point provided); if required provide lightning protection
- Specifications in accordance with TRGS 510
- Specifications in accordance with ATEX Directive 2014/34/EU

If outdoor installation is planned and there is sufficient distance from fire loads, a hazardous materials store without fire protection may be used if needed (from page ➔ 30).



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Fire-rated hazmat storage containers

Fire-rated hazmat storage container RFP

Product features



1 Making use of the space

Fire-rated hazmat storage container with shelving RFP can be filled with drums, goods on Euro or chemical pallets or with IBCs. Mixed storage or storage of drums directly on the grids is also possible. The hazmat store can be locked from the outside to prevent unauthorised access.

2 Base

The technical room system has a tested, single-piece water law compliant, hot dip galvanised 5 mm thick spill pallet. The gap between the spill pallet and the wall panels is flexibly sealed so that no liquid can penetrate the gap. The sturdy storage surfaces (shelf load capacities up to 4100 kg) are fitted with removable, hot dip galvanised grids, which meet the guidelines for quality and testing RAL GZ 638. Hot dip galvanised footplates ensure safe anchoring of the hazmat store to the foundation. A mounting kit is included in the delivery. A concrete pad can be provided separately if access underneath for a hand operated electric stacker is required. For the wide version, the store is fitted with two concrete pads of the same size.

3 External cladding

The external cladding is in fire protection panels (A class material) with a high insulation factor. Long term corrosion protection is ensured by the use of galvanised components and 2K paint in RAL 9002 (grey-white) or a different colour if required.

4 Electrical equipment

Your hazmat store can be fitted with power sockets and lighting if required. In the standard version, the central power connection uses a sub-distribution unit. With a more elaborate electrical set-up, e.g. with technical ventilation, or if required, we can provide a switch cabinet with control and operating elements.

5 Transportability

Your hazmat store is fitted with removable crane eyes as standard. These ensure simple, safe craneability, as well as acting as transport safety devices for transport on the lorry.



Fire-rated hazmat storage container with shelving RFP 615.30, with door hold-open system to keep the doors open during loading and unloading.

The roof drains are either on the left or the right hand side.

Equipment options



Technical ventilation



Lighting also available in LED



Switch cabinet for central power connection



Air extraction monitoring for air exchange > 2.0/h



Sockets in Ex version



Finned tube heater with impact protection



Hazmat storage container with shelving with pull-out rollers



Door hold-open system



"Pushback trolley" - system for "Last-In-First-Out" loading



PE inliner for acids and alkalis (LGK 8) dissipative version available



Earthing rails



Pressure relief panels

The complete range of equipment options can be found on page ➔ 122.



Info

Explosion-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.



Fire-rated hazmat storage containers

Fire-rated hazmat storage container FBM

Design: FBM with sliding doors

Fire-rated hazmat storage container with shelving FBM offers fire protection for large quantities of hazardous substances, stored in IBCs or drums. However many users need a space saving solution and are not able to use the normal wing door system. Our engineers' idea: FBM with sliding doors. This version not only offers optimum access to the stored goods but also makes the whole length available for storage. If required the doors can be opened at the push of a button. This means the user can open the doors from a forklift.



**For up to 48 drums
or 12 IBCs**



Fire-rated hazmat storage container with shelving FBM 714.30, with electric sliding doors.



| Description | 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) | Weight (kg) |
|-------------|-----------|----------------------------------|-------------------------------|---------------------------------------|----------------------------------|----------------|
| FBM 614.30 | | 8 / 8 / 12 / 32 | 2000 | 6575 x 2070 x 3605 | 2700 x 1340 x 1360 | 7500 |
| FBM 714.30 | | 12 / 12 / 16 / 40 | 2000 | 7935 x 2070 x 3605 | 3380 x 1340 x 1360 | 8000 |
| FBM 814.30 | | 12 / 12 / 16 / 48 | 2000 | 8975 x 2070 x 3605 | 3900 x 1340 x 1360 | 8500 |





Note: IBC = Intermediate Bulk Container, 1000 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
Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes.

* Without equipment **Variable bay height

Door equipment

- Tested fire-rated sliding doors meeting EN 1634, with manual or electrical operation by remote control

Designs according to substance properties

| | | |
|---|---|---|
|  | Water-polluting | <ul style="list-style-type: none"> ■ Approved for WGK 1-3 (see page ➔ 9) |
|  | Corrosive | <ul style="list-style-type: none"> ■ With PE inliner |
|  | Flammable (H226, H225; H224) | <ul style="list-style-type: none"> ■ Equipped with technical ventilation ■ If necessary, equipped with air extraction monitoring ■ The pre-requisites for storing flammable liquids must be observed |
| | All other hazardous substance properties | <ul style="list-style-type: none"> ■ Equipment in accordance with risk assessment. Speak to us concerning special storage provisions. |
|  | Temperature sensitive substances | <ul style="list-style-type: none"> ■ The standard fire protection panels have high insulation properties ■ Optional : temperature controlled version (from page ➔ 60) |

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
- (Hazardous materials stores outdoors, see from page ➔ 20)



Prerequisites for storing flammable liquids

- Create equipotential bonding (earthing) to avoid hazardous electrostatic build-up (connection point provided); if required provide lightning protection
- Specifications in accordance with TRGS 510
- Specifications in accordance with ATEX Directive 2014/34/EU

If outdoor installation is planned and there is sufficient distance from fire loads, a hazardous materials store without fire protection may be used if needed (from page ➔ 68).



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Equipment options

Fire-rated hazmat storage container with shelving FBM with sliding doors has the same range of equipment options as the RFP version (see page ➔ 78). The product features are almost identical. We would be happy to help you choose the best technical room system for your needs.

Fire-rated hazmat storage containers

Examples of use

Dispensing of chemicals in the hazardous materials store

Chemion Logistik GmbH has been a 100% subsidiary of CURRENTA GmbH & Co. OHG since 2001 and is an independent site logistics company which also specialises in handling hazardous goods and hazardous substances for their customers. Chemion is a valuable partner for companies in the chemical and quasi-chemical industries. With sites in Leverkusen, Dormagen, Krefeld-Uerdingen and two external warehouses in Duisburg, approximately 1000 employees ensure each day that goods are collected at the right moment, stored safely and reach their destination on time. *Company description: www.chemion.de*



Challenge and project

One of Chemion's activities involves the individual filling of chemicals into containers of various sizes: individual delivery volumes in large and small containers, special equipment for dispensing and filling of drums and IBCs as well as filling samples and labelling and dispatch within 24 hours. When the "Sample Service Center" was to be relocated from Krefeld to Dormagen an existing storage building needed to be adapted to suit the requirements for the filling and dispensing of product samples.

The solution

Chemion and DENIOS worked together to create a design for the dispensing activities in a hazmat store. An F 90 fire-rate storage container was fitted with integral workbenches, where chemicals could be dispensed into smaller containers from drums and IBCs. The inner area was fitted with electrically conductive PE inliners and set up for Ex zone 1 (design min. II 2G EEx e IIB T3). No Ex zone was needed outside the room system. Technical ventilation with air extraction monitoring ensures a 5 times per hour air exchange. The extracted air is cleaned through the customer's own scrubber.

Two dosing stations are sited behind the loading door, which are wide enough and long enough for IBCs. An adapter fitting also enables horizontal 205 litre drums to be used for dispensing. Inside the room system there are two dispensing tables with height adjustable feet (30 mm). They contain three stainless steel basins, designed as liquid-tight, welded spill pallets. Ejector nozzles are fitted into the front edges of the basins so that air-borne suspended matter can be removed in a targeted manner from the worker's breathing area. The extraction duct is located at the rear of the basins. In addition, an ATEX extraction arm with a control switch (on-off) is fitted in the inner room, in Ex design.

Result and customer benefit

Chemion received an important component for the legally-compliant and authority-approved solution, which perfectly met Chemion's requirements. The interaction of hazardous materials storage and ventilation technology ensured that a comprehensive solution could be developed which met all the requirements for sensitive area harmful substance capture and fire protection.

Fire and frost protected storage of printing inks

Since 1980 Constantia Nusser GmbH has been part of the Constantia Flexibles Group. The company was founded in 1923 as a printers and soon started to specialise in printing packaging materials for butter and cheese products. Today the company offers a broad range of aluminium packaging for the pharmaceutical and food industries. *Company description: www.cflex.com*



Fire-rated hazmat storage containers

Challenge and project

The storage capacity of the existing printing ink store at Constantia Nusser GmbH in Wangen, Allgäu was no longer sufficient. In order to avoid wide transport routes within the company, a new hazmat store needed to be located outside, near to production. 20,000 litres of flammable printing inks and solvents needed to be stored in the new container in 205 litre drums and IBCs, loaded using a forklift truck. Protection from frost and fire was also needed.

Result and customer benefit

Constantia Nusser GmbH received a customised, optimised solution, designed to suit the storage requirements of their company: space saving, advantageously priced, legally-compliant and ready to use. DENIOS AG's long experience in hazmat storage and fire and explosion protection meant that both fire-rated storage containers could be designed, manufactured and commissioned within a short time.

The solution

DENIOS recommended the installation of two, double-depth, fire-rated storage containers with shelving to increase the storage capacity in a limited space. They could be used outdoors without the need for a safety distance. All the components of the fire-rated storage containers were explosion protected, for example the technical ventilation (0.4 times air exchange) and the heating for frost-free storage.



Would you be interested in a similar solution?

Do you need to carry out filling activities in your fire-rated storage container? Do you need to keep flammable liquids close to production? Our fire-rated room systems offer the perfect solution. Just get in touch!

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Fire-rated hazmat storage containers

Examples of use

Centralised interim hazardous materials store for University of Düsseldorf

Founded in 1965, Heinrich-Heine-Universität Düsseldorf is one of the more recently formed universities in North Rhine-Westphalia. The modern campus offers some of the best facilities for academic life for approximately 35,000 students. As a campus university, all the buildings including the university hospital and specialised libraries are centrally located. The departments enjoy an excellent reputation, thanks to outstanding specialist research areas.

Company description: www.uni-duesseldorf.de



Challenge and project

Hazardous substance storage plays an important role in university research. Many water-polluting, flammable fluids and substances are used in the natural sciences: acids, alkalis, solvents, toxins and peroxides. The storage areas for these substances were previously spread out over the university site. A centralised store was to be created for use during a three year rebuild of the university facilities, which would allow individual, mobile components of the store to be reused after the rebuild.

The solution

Working closely with the customer and suppliers, DENIOS developed an interim central hazmat store. The whole facility consists of 17 individual fire-rated storage containers with shelving as well as walk-in fire-rated stores, joined together by covered walkways and logistical areas to form a complex. Each room system meets special requirements within the facility, designed to suit the stored media. The facility is divided into a storage area and a handling area. The goods-in department is located in the handling area. For the various elements of this facility, regulations applied regarding fire and explosion

protection, climate control and frost protection as well as the VCI concept for the combined storage of hazardous materials. A high level of safety was also required. All the fire-rated containers are fitted with switch cabinets, which relay messages to the control room in the event of a fault and to the fire control centre in the event of a fire. Remote monitoring via smartphone and the internet is made possible using an intelligent bus system. Pipework for emergency showers is provided for first aid in the event of contamination. This system is kept frost-free and protected from legionella contamination by a boiler system.

Result and customer benefit

Uni Düsseldorf received a centralised hazmat and chemicals store with an extremely short lead time. The contract was awarded in April and acceptance took place in November. The new store met all the customer's current requirements for storage and handling. In addition, the mobile individual components can be easily relocated on the university site after the 3 year rebuilding project.

Intelligent hazardous substance storage with smart early warning system

QUIN Group is a medium-sized, tier 1 supplier working across the world to develop high-end components for car interiors for the premium market. High quality materials such as wood, leather, plastic, carbon, textiles and films are used to create innovative products for automotive interiors. In a modern, automated facility in Romania (Siebenbürgen) 1534 employees manufacture high quality car interiors products. *Company description: www.quin-automotive.com*



Fire-rated hazmat storage containers

Challenge and project

Three room systems supplied by DENIOS to Romania will store materials such as special adhesives, which need to be kept at a constant temperature of 20°C around the clock so they remain usable: an easy task for a DENIOS room system with climate control. The temperature and climate control inside the room system also needed to be constantly monitored. QUIN therefore opted for three walk-in fire-rated containers, set up next to each other, and also invested in an additional function.

The solution

Recognising faults in good time, avoiding damages and follow-on costs: this is the aim of the DENIOS Mailserver ALARM Modem GPRS/UMTS. This technical wonder is used in fire-rate stores for QUIN and monitors temperature and climate control inside the room system. It also sends an immediate notification to a mobile should any of the pre-set parameters change. This helps those responsible to quickly exclude possible causes of faults, such as a door which has been left open.

The DENIOS experts can also easily check or amend settings remotely using a mobile.

Result and customer benefit

Distances are overcome, reaction times are reduced, damages due to an operational fault are limited or completely avoided, there are no follow-on costs. DENIOS' remote monitoring is part of our excellent service. The customer doesn't have to worry about a thing and can concentrate on his core business.



Would you be interested in a similar solution?

Do you need a smart early warning system for your fire-rated store? Or are you looking for a mobile solution for storing flammable liquids? Our fire-rated room systems and digital services offer the perfect solution. Just get in touch!

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Fire-rated hazmat storage containers

Fire-rated storage containers for batteries

Storage of lithium batteries

The hazard potential when incorrectly handling batteries is very high. Deep discharge, fire, chemical reactions, explosion of the batteries in the worst-case scenario – each individual situation means a risk for workers and the environment. And this may result in considerable financial losses and production downtime. Organisational and structural protective measures help to limit the potential for risks at an early stage. Technical room systems from DENIOS offer the right equipment you need for the safe storage of lithium batteries and will withstand the enormous fire load should the worst happen.



**Spacious,
walk-in solutions**



**Fire-rated storage containers
RFP 615.30, climate controlled**

The spacious shelving solution RFP

Fire-rated storage container with shelving RFP is the best option when larger quantities or larger-scale lithium batteries need to be accommodated. An integrated heavy duty rack with adjustable shelves allows the best possible use to be made of the inner room. The loading surfaces are removable hot dip galvanised grids. They suit the most varied storage options, e.g. individual storage or storage in boxes, on pallets or special carrier frames. The room system offers the best possible access via 2-wing doors and optimal use of the room height for easy loading and unloading. The fire-rated storage container is also available in an extra-deep version for larger quantities of stored goods.



**Fire-rated storage container RFP 315.30,
access underneath with concrete pad**

Test rooms for lithium batteries

When testing lithium batteries, aspects such as the manageability of the test object, the test process including test equipment and data collection are important. We've got the right room solution for this too (application examples from page ➡ 98).

The walk-in storage solution WFP

You need a store for smaller sized modules, which don't need a forklift for loading and unloading. You might want to safely store a larger piece of equipment or an electric vehicle (e.g. prototype and test equipment). The storage room needs to fulfil an additional function - for example as an analysis laboratory, a convenient place to charge batteries or as a temporary store for dispatch or for storing faulty batteries. The walk-in fire-rated hazmat store WFP is the convenient solution for all these scenarios.



**Walk-in fire-rated storage container
WFP-X 22 with racking**

"Storing and testing lithium batteries safely" brochure

Request your copy of our latest brochure on storing and testing lithium batteries safely.

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Visit www.denios.com to get in contact with your local representative.

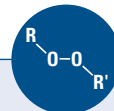


Fire-rated hazmat storage containers

Fire-rated storage containers for organic peroxides

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).



**Perfect
equipment options**



F 90 fire-rated store with equipment for storing organic peroxides

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 risks when storing organic peroxides, a range of regulations must be observed when constructing a peroxide store, for example the

German regulations for organic peroxides (DGUV 13) or the VKF fire protection regulations "Hazardous substances 26-15" in Switzerland. DENIOS offers fire-rated stores which are specially equipped for storing peroxides, and which meet these particular 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.

Safety with temperature controlled storage

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

Minimise explosion risks

Technical ventilation prevents the accumulation of potentially explosive gas mixtures within room systems. For effective avoidance of sources of ignition, the electrical components have an Ex proof design. Storage containers for organic peroxides in hazard groups OP I to OP III must also be provided with pressure relief panels. Guideline values are to be used for the required total pressure release panel area. This kind of pressure release device is installed in the roof of your store. The panel is designed so that when a previously determined pressure is reached, it opens. It will close again automatically when the pressure wave has been dissipated to seal the store so that the fire protection properties are maintained.

Equipment



Temperature monitoring



Fire protection panels in non-combustible A class material (mineral wool panels)



Climate control equipment



Pressure relief panels

For optimum safety when storing organic peroxides we offer additional equipment modules, for example system monitoring, alarm systems or extinguishing technology. Find an overview of your options on page ➔ 122.

Fire-rated hazmat storage containers

Fire-rated storage containers for gas cylinders

Fire-rated gas cylinder storage

In the event of a fire, gas cylinders must be reliably protected from the effects of heat and bursting. If stored outside, fire protection can be ensured by a minimum safety distance of 5 m. However, this is often not possible, for example when there is a lack of space on the site and safety distances simply cannot be observed. Or, when gas cylinders need to be stored indoors, directly next to where they will be used. DENIOS offers the right solution with fire-rated gas cylinder stores and cabinets.



**For up to
48 x 50 l gas cylinders**



Fire-rated gas cylinder store GFT 33.15 for up to 48 gas cylinders.
The doors can be locked and offer protection from unauthorised access.

Indoors or outdoors? DENIOS has the solution!

When storing pressurised gas containers, a distinction is made between storage in work rooms and storage outdoors. Companies choose fire-rated gas cylinder stores for outdoors, if gas cylinders are to be stored directly next to a building wall without a safety distance. Inside work rooms, pressurised gas containers may only be stored in appropriate safety cabinets with a fire resistance of a minimum of 30 minutes. Our EN 14470-2 type-approved, fire-rated gas cylinder cabinets ensure you have the right products for all these challenges.

 www.denios.de/gasflaschenlagerung

Visit www.denios.com to get in contact with your local representative.

Safe storage outdoors, without safety distances

With a sturdy steel frame construction, and fire-rated walls and roof our fire-rated gas cylinder stores are a safe place for storing gas cylinders outdoors. The store can act as its own fire compartment, so safety distances to neighbouring compartments or equipment are not needed. Our range includes compact and large-scale gas cylinder stores for the safe storage of up to 48 gas cylinders, with either a mesh door or a fire-rated door.



Fire-rated gas cylinder store GFT 17.9 for up to 12 gas cylinders.

Interesting information in the online advisor

Handling gases comes with many dangers - but the right knowledge helps effectively minimise these risks. Our online advisor gives helpful tips for the safe handling of gas cylinders: from the risk assessment to storage and transport.

🇩🇪 www.denios.de/ratgeber-gasflaschen

Visit www.denios.com to get in contact with your local representative.

Fire-rated storage in work rooms

A gas cylinder store outdoors is ideal from many points of view, however it's not always practical. DENIOS offers fire-rated gas cylinder stores for indoor installation for exactly these kinds of situations – type-approved to EN 14470-2 with either 30 or 90 minute fire resistance. This makes the provision, use and storage of pressurised gas cylinders in work rooms simple. In addition to a ventilation and air extraction system for connection to a technical ventilation system (NW 75), various additional equipment ensures optimum functionality, for example adjusters for floor unevenness, pipe breakthrough points for connections and mounting rails.



Fire-rated gas cylinder store G 90.14 for up to 4 gas cylinders.

Practical training - "Safe handling of technical gases"

Would you like to extend your safety knowledge in handling technical gases? And customised to suit your operational situation? DENIOS Academy training courses are carried out on site in your company by our hazmat experts. This allows you to ensure the contents of the seminar are adapted exactly to your requirements. If required, our presenters can plan the presentation to cover special situations (e.g. special types of gases or storage situations) and are of course ready to answer all your questions.

🇩🇪 www.denios.de/akademie

Visit www.denios.com to get in contact with your local representative.

Technical safety rooms

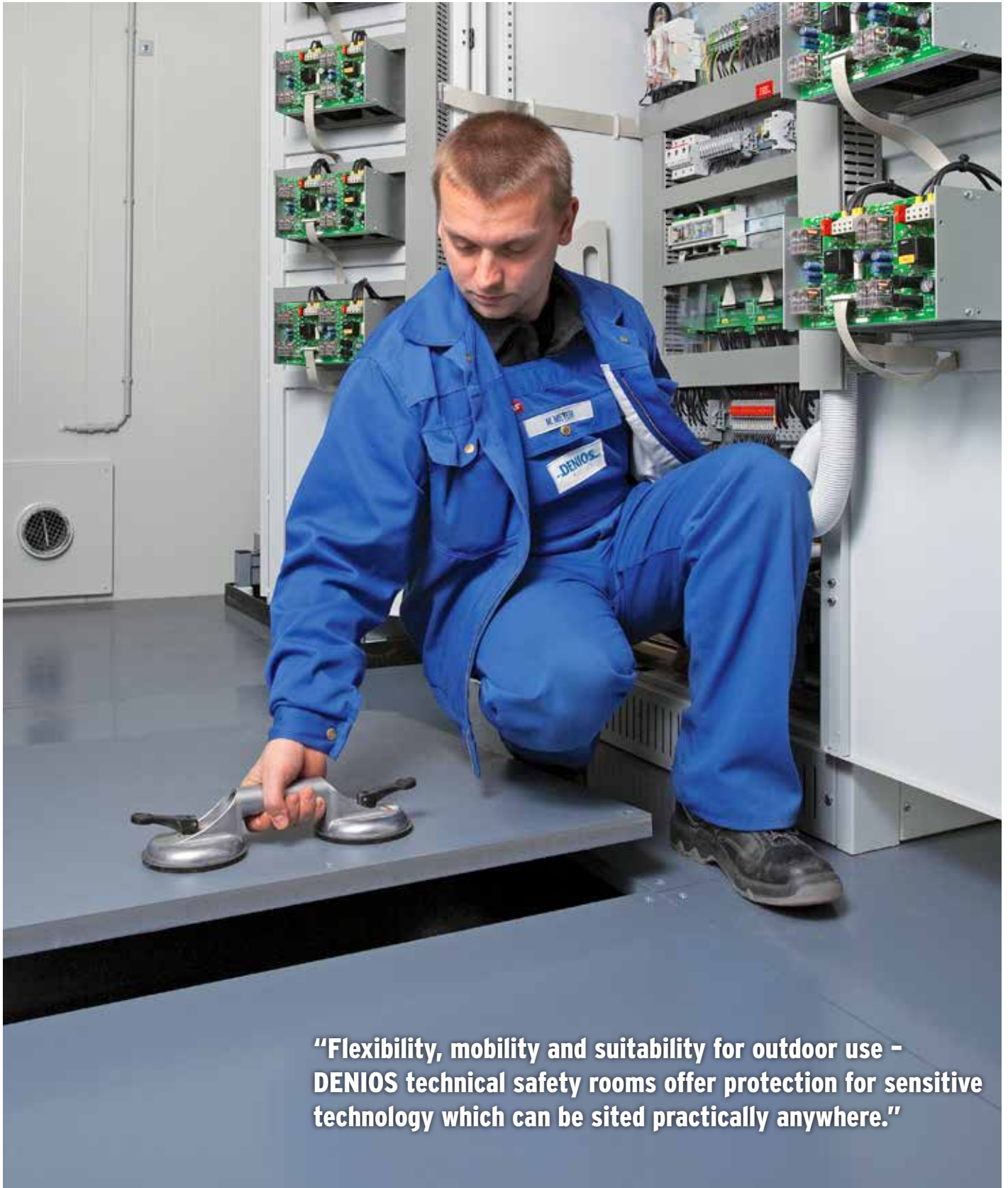


Sensitive technology safely housed

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

TSR room systems are always customised. They are designed in cooperation with the customer as a complete solution, in line with their requirements right from planning to installation. But they all have one thing in common: they meet state-of-the-art requirements for fire protection, explosion protection and access control.

- Find out more about the project schedule and how your customised technical safety room is created on the following pages (from page ➔ 96).
- We've also put together a range of application examples from our extensive portfolio (from page ➔ 98).



"Flexibility, mobility and suitability for outdoor use - DENIOS technical safety rooms offer protection for sensitive technology which can be sited practically anywhere."

How your technical safety room is created

Groundbreaking solutions are created when customer and manufacturer work closely together. Close cooperation is our top priority. Our experts will support you with planning right from the start. When our quote is given, you'll already have a direct contact and easy communication options. With a wide ranging team of specialists, DENIOS offers an integrated range of services, all covered by the same order. Project management monitors all the stages, from start to finish.

"Made by DENIOS" represents the highest levels of quality, all from one supplier.



Needs analysis and advice – the foundation of your custom room solution

What do your risk assessment and fire protection design say? Which climatic conditions should be taken into consideration? How will the test environment be integrated into your infrastructure and work processes? Well-directed questions help our engineers clarify what your optimum design could look like. Space requirements, installation location (indoors or outdoors), equipment, safety equipment – your individual requirements profile will be created from our needs analysis. You'll benefit from our expertise as manufacturers of technical room systems, which we will pass on to you and will use to create your design, allowing your employees and equipment to be protected in the best way possible.

There are no limits on configuration flexibility, thanks to the comprehensive knowledge and engineering skills of your DENIOS advisors. You decide where the interfaces will be positioned for connection to your services. We are also happy to install any equipment you may provide or coordinate with other trades. If required, we will supply a ready-to-use Plug and Play solution.

Professional project management

Our aim is the precise implementation of your project, on-time, ensured by our specialist staff. We will create an individual TSR technical safety room, customised to your individual requirements, in a step by step process in accordance with our integrated service concept (see page ➔ 138).

In addition to the Factory Acceptance Test (FAT), you may also monitor the progress of production phases in person. We have many years of experience with legislation, approval authorities and insurers and will work alongside you throughout the project. We will create a plan together to gain approval for your technical safety room's structural, environmental, EX and fire protection aspects - a vital prerequisite for insurance.

After the project has been completed you will receive comprehensive project documentation as well as tested structural analysis calculations. We also support you while your product is in operation. Our Customer Service 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.

Specialist solutions for any requirements

DENIOS prides itself on building rooms which perfectly meet your requirements and offer the highest levels of safety. This is why we manufacture technical safety rooms almost exclusively to customer-specific requirements. Your benefits: during design and production we can therefore take advantage of many proven standard elements. So you'll be able to benefit from the combination of cost effective standard production and individual design.

DENIOS modular principle

Technical safety rooms from DENIOS meet the highest requirements in terms of load capacity and safety. The stable base components and steel frame construction are always part of the DENIOS protection design. Regardless of whether you opt for a cabinet or larger, walk-in system. If required, your equipment can be fire-rated and break-in protected. The type and scope of the technical equipment, installation location and your individual requirements are deciding factors and are used as the basis for creating a reliable and secure system. We have met many varied customer requirements using the DENIOS modular principle and securely housed technical equipment such as radio or IT equipment and switchgear.

Equipment options

Use our comprehensive equipment options to customise your technical safety room – for increased safety and convenience (from page ➔ 122).



And size? Whatever size you want!

The variable dimensions of the TSR mean that it can be designed exactly for the space you have available and the required application. As a compact solution there are numerous space-saving applications which can fit in any position. The low net weight means that its position can also be easily changed (e.g. following internal re-organisation). Large scale solutions are also possible: from combined storage and test facilities to multi-room complexes with covered-over logistics and access areas.

Designed for transport by sea

Technical safety rooms are available in the standard ISO sizes 10 / 20 / 40 foot for overseas transport. Instead of transport brackets, these room systems have standard corner castings for transport safety.



Transport brackets - for transport over land



For sea transport, corner castings are used.

Test stand for stationary lithium batteries

Voltavision GmbH in Bochum, Germany is an independent R&D company, operating test equipment for high technology systems in the electromobility and renewable energy sectors. The size of the units tested ranges from lithium-ion batteries for electrical equipment right up to “large” energy storage systems. It was for these large applications that Voltavision and DENIOS developed a test room together, which had a customised test room volume and allowed testing of lithium energy storage devices over a wide temperature range.



Challenge and project

The energy revolution needs rethinking - in many respects. More and more energy is supplied by renewable sources such as wind farms or solar installations. Energy is often produced at sites and at times of the day when it can't be used directly. This also means that electrical energy storage devices are becoming an increasingly relevant issue. Comprehensive tests to determine the effects of a wide range of environmental factors on module life are needed.

Professional bodies have made many recommendations, but there are no laws or regulations in the proper sense which constructors and operators can use as guidance. Safety designs are therefore based more on insights than standards.

In this case, the risk assessment was based on the critical need to create a separate fire compartment to house the test unit. A fire-rated system which would resist a fire load from inside or outside for 90 minutes was required. Standard climate control chambers available on the market did not meet this requirement.

The solution

Working together, Voltavision and DENIOS developed a fire-rated test stand (F 90/ REI 90) for stationary energy storage devices. Very large batteries, within the permitted test volume of up to 30 m³, can be subjected to defined thermal and electrical conditions. A temperature range of - 20 °C to + 60 °C, e.g. for artificial ageing processes, can be simulated under standardised test conditions. The batteries are tested for cycling stability and calendar life. A comprehensive safety design was also taken into consideration. The inclusion of corresponding sensors allowed continuous room monitoring. Whether it's gas detection or temperature sensing - accident prevention is vital!

A pressure release panel in the roof allows for controlled pressure equalisation in the event of an incident. High performance technical ventilation also ensures that any harmful and potentially explosive gases are removed from the room. And if the worst should happen, contaminated cooling water is collected in a spill pallet. An acid resistant, anti-static inliner gives an additional level of safety. A separate connection is provided for emptying the spill pallet. This ensures that cooling water can be properly disposed of.



Result and customer benefit

An innovative, turnkey solution offering repeatable measurement results!
All this was done without a separate climate chamber in the test room!



Would you be interested in a similar solution?

Extensive projects and tasks often need large scale solutions. Do you need a large facility with covered-over access and logistic areas? We can supply this - as a turnkey project. Just get in touch!

+49 800 753-000-3

info@denios.de

"Storing and testing lithium batteries safely" brochure

Request your copy of our latest brochure on storing and testing lithium energy storage devices safely.

+49 800 753-000-3 info@denios.de

Visit www.denios.com to get in contact with your local representative.



Technical safety rooms

Examples of use

Mains power-independent energy supply

HOPPECKE, is the largest manufacturer of industrial batteries, systems and charging equipment in Europe. The increasing use of renewable energy and the conversion to emissions-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*



Challenge and project

To demonstrate the newest renewable energy technologies, Hoppecke needed a demonstration room, which had to meet many safety, fire and explosion protection requirements. This two-part demonstration room, designed to act as a showroom for the customer's company, needed to allow 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.

The technical room did not need to be explosion proof according to the customer requirements. DENIOS provided an anti-static floor. In order to house the fuel cells correctly, several ventilation bricks were included in the design. In addition, the technical room had a 1-wing door and wiring ducts running round the ceiling. In the hydrogen storage room a stud plate floor was fitted. Lighting and the light switch were in an Ex proof design. An additional fan in the floor area ensured optimum safety. Although the lower Ex limit for hydrogen is 4%, the fan would be activated by the gas detector at 1%. The customer had specified in the risk analysis that the fan did not need to have Ex protection. As hydrogen is lighter than air, additional ventilation bricks were fitted in the roof area. So that the cylinder racks could be easily loaded, a 2-wing door was fitted.

The solution

DENIOS designed a two-part technical safety room for these complex customer requirements. The two areas were separated by an F 90 wall. The left hand area was used as a technical room for batteries and fuel cells; the right hand area was used as a gas cylinder storage area for the hydrogen cylinders. A frame was constructed on the roof for the customer to fit photovoltaic equipment. All doors were fitted with door hold-open systems.

Result and customer benefit

For the completion of this challenging project, DENIOS could draw on many years of experience as a developer and manufacturer of walk-in fire-rated storage containers (see page ➔ 70). With access to all the right expertise, DENIOS was able to develop a technical safety room in a short time, which met all the requirements for F 90 fire protection, fire alarm sensor technology, explosion protection and ventilation technology.

External server room for data mirroring with break-in protection

CNS Computer Network Systemengineering GmbH is a medium-sized IT systems company with head office in Gelsenkirchen, Germany, which carries out complex IT projects. As an innovative supplier for the technical and organisational integration of IT infrastructure in medium to large sized companies, CNS is one of the leading system houses in the IT services industry. *Company description: www.cns-gmbh.de*



Challenge and project

CNS was tasked by the VULKAN Group in Herne to create a completely fitted out server room for data security outdoors on the company's site. CNS trusted the assistance of DENIOS AG for providing proven TSR technical safety rooms for housing the sensitive IT infrastructure. Effective insulation and climate control were needed alongside ensuring the complete container was secure against break-in in accordance with WK 4.

The solution

For this customer's requirements DENIOS designed a two-part TSR technical safety room for housing the server and UPS in two areas, separated by an F 90 wall. Thermal insulation is ensured by F 90 insulation panels (building material class A). Two 1-wing doors with self closing devices and anti-panic function are built into the room. An integral fan ensures cooling to 25 °C room temperature. The climate control equipment takes over this function at higher temperatures. To secure the room against break-in it has certified security to resistance class (WK) 4.

Result and customer benefit

For the completion of this project, DENIOS could draw on many years of experience as a developer and manufacturer of walk-in fire-rated storage containers. With access to all the right expertise, DENIOS was able to develop a technical safety room in a short time, which met all the requirements. CNS fitted all the end customer Vulkan's IT equipment into the TSR. The innovative Rack-System NETcell from apraNET is a further development of the conventional computer cabinet. This innovation ensures that open, sturdy 19" frames can be housed without further work needed. They meet all the energy advantages of a cold/hot system. One more advantage which is especially important where space is at a premium: the cables are routed through the load bearing components (the cabinet rails) which are designed as cable ducts. NETcell also has its own cable duct system on the cabinet roof. The routing system together with the innovative cable management opens up many more opportunities for cable routing and offers maximum independence from the container structure. The finished TSR was able to be lifted by crane when fully equipped, so that it could be installed as one unit at the end customer's site, ready for use.

Technical safety rooms

Examples of use

Gas cylinder store incl. dosing technology for air measurement station

The Federal environment agency needed an air measuring station at a location in Neuglobsow. The Integrated Monitoring Program (IM) is one of six international cooperation programmes (ICPs) of the Convention on Long Range Transboundary Air Pollution, CLRTAP which Germany is part of. It investigates the effects of air pollution on the ecosystem, not from local sources but from the large scale, cross-border transport of harmful substances.

Company description: www.umweltbundesamt.de



Challenge and project

As part of the laboratory extension to the existing building, the gas cylinder store including gas dosing technology was to be relocated outdoors. The following requirements were set:

- Lockable room with a fire-rated design, with ground-level access and lighting
- Ventilation and air extraction for the gas cylinder station
- Internal temperature control between min. 5°C and max. 35°C
- Storage space and securing system for 15 x 50 or 10 litre gas cylinders, including 13 extraction points and 2 storage points
- Installation at the gable end outside the building
- Manufacture of a sealed connection for the gas pipes from the gas cylinder station to the measuring room in the building
- Piping to all locations in the gas cylinder station and connection of the locations in the measuring room including cylinder pressure reducer and safety shut off valve for hydrogen
- Gases are for example helium, hydrogen, oxygen, nitrogen, compressed air, synthetic air

The solution

Working in close cooperation with the engineers from INTEGA GmbH in Ottendorf – Okrilla, DENIOS AG and a local building company created the required technical equipment within the timeframe set by DENIOS AG.

DENIOS AG in Bad Oeynhausen carried out project management and manufacture of the technical safety room. Project management for the gas pipes including the gas cylinder mountings, pressure control panels and valves, as well as assembly and commissioning in Neuglobsow, was carried out by INTEGA GmbH. All the construction work was carried out by the local construction firm. DENIOS AG in Bad Oeynhausen coordinated all the works as the general contractor.

Result and customer benefit

The Federal environment agency in Neuglobsow, in close cooperation with DENIOS, received a needs-based turnkey gas cylinder store with dosing technology. The local environment was maintained thanks to the low level of construction required.

Gas sampling system

INTEGA is a leading, innovative company in the high-purity technology field, with several sites in Germany and subsidiaries across Europe. INTEGA is a one-stop shop for the planning and creation of high-purity media systems. Customers in the semiconductor, solar, automotive, chemical, pharmaceutical and food industries, R&D companies as well as institutes and universities use the services of INTEGA GmbH. *Company description: www.intega.com*



Technical safety rooms

Challenge and project

During 2011 and 2012 INTEGA GmbH and DENIOS AG worked together to plan two technical safety rooms, each one to house a gas extraction station. The rooms needed to be climate controlled with an air drier as they were intended to be used in Vietnam. The climatic conditions at this location were the reason for the air and climate control technology needed in the technical safety rooms. INTEGA GmbH's customer required smooth execution of the contract, with high levels of quality and within a very tight time frame in order to win the order.

The solution

Close cooperation between the engineers at INTEGA GmbH and DENIOS AG allowed all the technical specifications to be met for the DENIOS AG mobile technical safety rooms within the time period set. Project management for the equipment began in Stuttgart and Munich, manufacturing was carried out at DENIOS AG's main site in Bad Oeynhausen, East Westphalia. Assembly and finishing was completed in Vietnam.

Result and customer benefit

The customer received two safe, functional and transportable technical safety rooms for gas extraction systems, which are now operational in Vietnam. The room layout was adapted to suit the space requirements.

This technically complex solution was able to be implemented quickly, economically and in line with the customer requirements. All safety aspects which are required in the industry were taken into consideration.



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. Just get in touch!

+49 800 753-000-3

info@denios.de

Visit www.denios.com to get in contact with your local representative.

Safe and efficient housing for extinguishing gases

A fire can, in principle, start anywhere. In the worst cases, every second is vital. It is important to detect it and extinguish it as quickly as possible, in order to limit injuries, downtime or total losses. The market for automatic fire extinguishing systems is constantly developing. Depending on the equipment to be extinguished, both foam and powder are available alongside inert gas extinguishing systems (CO₂, N₂, argon,...). Sensitive extinguishing equipment also needs optimum housing and protection so that it is ready when it's needed to be used. A safe and economic solution for housing your extinguishing technology is offered by DENIOS extinguishing rooms, regardless of extinguishing medium used.

Cabinet solution



1 Crane eyes

2 Insulated design

3 Open wall break-through points for customer's piping

4 Natural ventilation and air extraction with two ventilation openings opposite each other in the short sides, cladding in weather protection panels

5 Internal equipment: on the short sides, Halfen rails for customer equipment, floor covering: stud plate

6 On the long side, 2-wing doors offer excellent access, storm hooks for securing doors during servicing

Whether you choose a walk-in or non-walk-in solution, our extinguishing rooms offer the right safety design. By siting them outdoors, any issues with space are instantly solved. They can be connected to the hall wall to save space or located separately on the grounds with easy access from all sides. We develop our made to measure designs for the fire protection of your equipment in cooperation with the manufacturers of well-known extinguishing equipment. All national and international guidelines and standards are observed.

Help is at hand: Ask your insurer what financial incentives are available for your specific fire protection precautions.

If your extinguishing room also needs to be protected from potential external fire risks, instead of the insulated shell, we can supply a fire-rated variant with up to 90 minutes fire resistance.

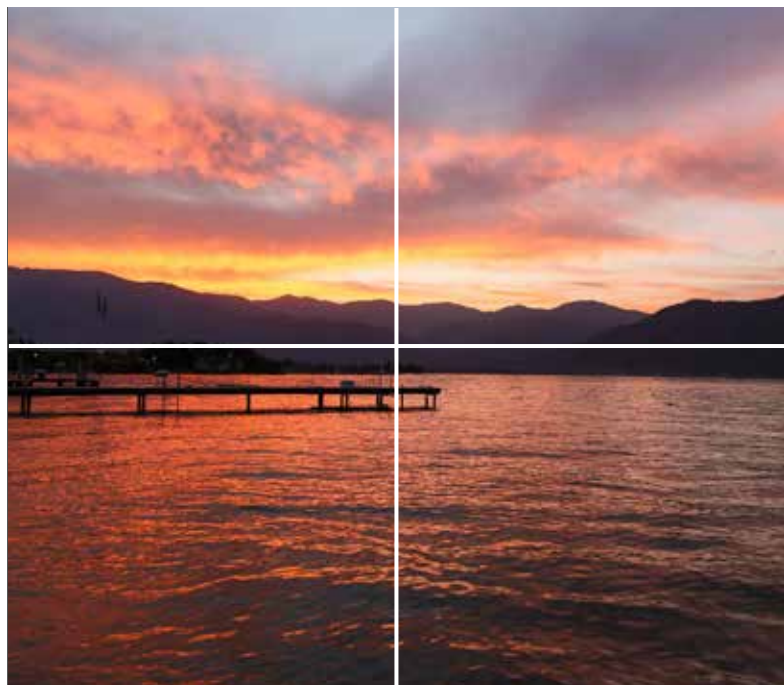
Walk-in extinguishing room



Warning: The system must always be transported without the extinguishing gas cylinders

- 1** Crane eyes
- 2** Wall break-through points for customer pipework
- 3** Open wall break-through points for customer's cabling
- 4** Optional internal fittings: sockets, heating, lighting
- 5** Floor covering: stud plate
- 6** Natural ventilation and air extraction with two ventilation openings opposite each other in the short sides, cladding in weather protection panels, partially with woven filter
- 7** Internal fittings: Halfen rails all around for customer equipment
- 8** Insulated design, 1-wing door on the short side, door hold-open system

Thermotechnology




Efficient heating, melting or cooling

Companies in the chemical sector and the food industry work with additives on a daily basis, from resins and additives to oil-based substances. Fats, fillings and chocolate are typical applications, especially in the food industry. These substances can only be optimally processed in a certain temperature range.

- DENIOS heat chambers prepare these substances within a set temperature range, up to 150 °C.
Higher temperatures are possible on request (from page ➔ 108).
- What temperature range is right for your application?
Our engineers will determine this with you using a test system and a dedicated needs analysis, before the first planning stages can begin (from page ➔ 120).
- Do you need a quick solution? For short term requirements we can make a leased system available (from page ➔ 121).

Find out all you need to know in our special brochure "Efficient heating, melting or cooling". Request yours now:

 **+49 800 753-000-3** **info@denios.de**

Visit **www.denios.com** to get in contact with your local representative.



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



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 approval in accordance with Federal Water Act (Wasserhaushaltsgesetz, WHG, in German) 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 IBCs**



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 3 sizes



WK, 2 bay
in 3 sizes







WK, 4 bay
in 3 sizes

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.

Designs according to substance properties

| | | |
|---|---|--|
|  | Water-polluting | <ul style="list-style-type: none"> ■ Approved for WGK 1-3 (see page ➔ 9) |
|  | Corrosive | <ul style="list-style-type: none"> ■ PE inliner or stainless steel spill pallet |
|  | Flammable (H226, H225; H224) | <ul style="list-style-type: none"> ■ Equipped with technical ventilation ■ If necessary, equipped with air extraction monitoring ■ Further equipment options: fire alarm system, temperature sensor, gas detector, extinguishing equipment etc. (see from page ➔ 122) |
| | All other hazardous substance properties | <ul style="list-style-type: none"> ■ Equipment in accordance with risk assessment. Speak to us concerning special storage provisions. |
|  | Temperature sensitive substances | <ul style="list-style-type: none"> ■ As standard with 100 mm mineral wool insulation for good thermal insulation, long life and fire protection classification (EI 120) ■ Operating temperature can be regulated up to 150°C by heater and control system, see page ➔ 166 ■ Uniform temperature distribution with ventilation and air ducts |

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

(Hazardous materials stores outdoors, see from page ➔ 20)

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 suit the requirements of the Ex zone and the temperature class.

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



Expert advice

Not found what you are looking for? Need more information?
Let DENIOS advise you!

 **+49 800 753-000-3**

info@denios.de

Visit **www.denios.com** to get in contact with your local representative.

Quick, precise melting with high efficiency

For technical reasons, solid substances are often melted before being used in chemical processes. The technical challenge lies in reaching the exact melting heat in the shortest possible time, and keeping the temperature at that precise point until the substance has completely melted. DENIOS heat chambers reach the melting temperature quickly and uniformly. Using inverters, energy-efficient

drive technology and high-efficiency insulation, DENIOS heat chambers also have a higher efficiency than comparable systems. The DENIOS heat chamber only needs a minimal supply of energy to maintain the inner temperature, as the high quality insulation ensures that hardly any energy is lost. Read more about this application example from page ➔ 118.



Principle of operation for a 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.



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

DIBt

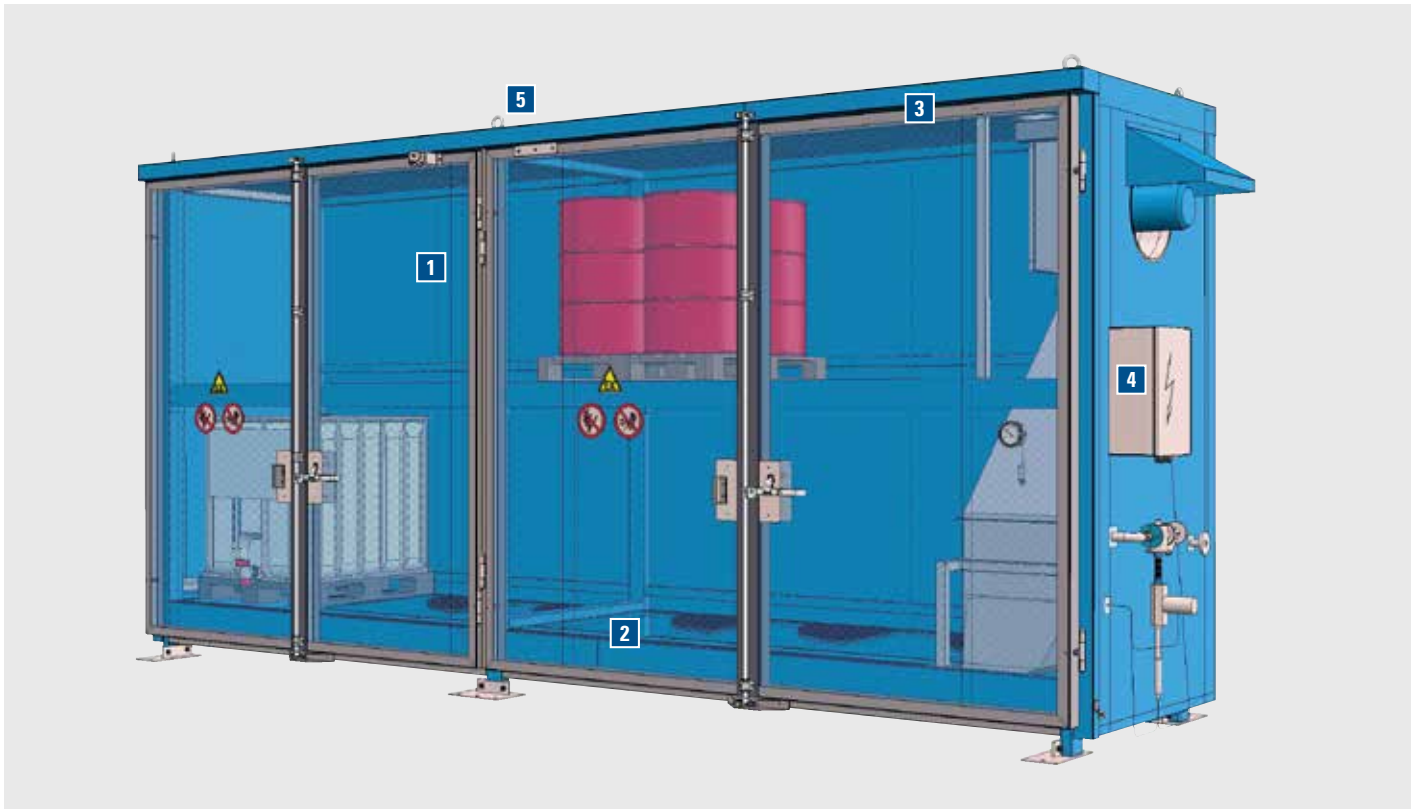
National technical approval (abZ) –
Z-38.5-120

| Description | 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 ²) | Weight (kg) |
|-------------|-----------|----------------------------------|-------------------------------|---------------------------------------|----------------------------------|--|----------------|
| WK 114-1-K | | 1 / 1 / 1 / 4 | 1000 | 2030 x 1730 x 2700 | 1300 x 1340 x 1700 | 1250 | 1560 |
| WK 214-1-K | | 2 / 2 / 3 / 8 | 1000 | 3430 x 1730 x 2500 | 2700 x 1340 x 1700 | 1250 | 2060 |
| WK 414-1-H | | 3 / 3 / 4 / 12 | 1000 | 4630 x 1730 x 2400 | 3900 x 1340 x 1700 | 1250 | 2330 |
| WK 214-2-K | | 4 / 4 / 6 / 16 | 1000 | 3430 x 1730 x 3700 | 2700 x 1340 x 1400 | 1250 | 2540 |
| WK 414-2-K | | 6 / 4 / 8 / 20 | 1000 | 4110 x 1730 x 3700 | 3380 x 1340 x 1400 | 1250 | 2820 |
| WK 414-2-H | | 6 / 6 / 8 / 24 | 1000 | 4630 x 1730 x 3650 | 3900 x 1340 x 1400 | 1250 | 2930 |
| WK 514-2-K | | 8 / 8 / 12 / 32 | 1000 | 6560 x 1900 x 3600 | 2700 x 1340 x 1400 | 1250 | 4450 |
| WK 714-2-K | | 12 / 8 / 16 / 40 | 1200 | 7920 x 1900 x 3650 | 3380 x 1340 x 1400 | 1250 | 4850 |
| WK 814-2-H | | 12 / 12 / 16 / 48 | 1200 | 8960 x 1900 x 3600 | 3900 x 1340 x 1400 | 1250 | 5360 |

Note: Dimensions and weights may differ depending on optional equipment. We reserve the right to make technical changes.

IBC = Intermediate Bulk Container, 1000 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

Product features



1 Making use of the space

Heat chamber WK can be filled with drums, palletised goods on Euro or chemical pallets or with IBCs. Mixed storage or storage of drums directly on the grids is also possible. The storage levels can be fitted with rollers in order to optimise the working processes. Access underneath (100 mm ground clearance) makes it possible to load heat chambers 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.

2 Base

In the standard version, the heat chamber has a water law tested, single-piece 5 mm thick spill pallet. Galvanised fluid guides all around ensure any leaked fluids are safely diverted to the spill pallet. The sturdy storage surfaces (shelf load capacities up to 5500 kg) are fitted with removable, hot dip galvanised grids, which meet the guidelines for quality and testing RAL GZ 638. Hot dip galvanised footplates ensure safe anchoring of the room system to the foundation. A mounting kit is included in the delivery.

3 External cladding

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

4 Electrical equipment

consisting of a) air circulation fan with weather protection, b) control system including temperature regulator, c) heating system (electric, steam, thermal oil or hot water), d) safety temperature limiter, e) Pt 1000 sensor for temperature recording.

5 Transportability

Your heat chamber is fitted with crane eyes as standard. These ensure simple, safe craneability, as well as acting as transport safety devices for transport on the lorry.



Heat chamber WK 514-2K with sliding doors and vertical chamber partition with two independent heat zones

Equipment options



Slide-out spill tray



Rollers



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 ➔ 122.



Info

Explosion-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.



Modules for numerous application solutions

DENIOS heat chambers are designed in accordance with the machinery guidelines 2006/42/EC and DIN EN 746-1 as well as EN 1090. A wide range of version variants are possible, e.g.:

Energy carriers:

- Power
- Steam
- Warm water
- Thermal oil

Spill pallet:

- Integral
- Removable
- Volume-optimised
- Without spill pallet

Surfaces:

- Steel, painted
- Galvanised
- Stainless steel V2A
- Stainless steel V4A

Applications:

- Fire-rated
- Explosion-proof
- GMP-compliant
- Silicon free
- Separate heating rooms

Explosion protection

When handling flammable substances you need to consider the creation of explosive atmospheres. This is especially the case for thermal processes. The operator must carry out a risk assessment and then define suitable protective measures.

DENIOS is able to offer support and will configure your heating systems in accordance with your Ex Zone evaluation if needed. This means that together, we can ensure safe, legally-compliant handling of your hazardous substances.

Versions:

- Internal Ex T3 or T4, Ex Zone 1 and external, no Ex zone
- Internal Ex T3 or T4, Ex Zone 1 and external Ex T3 or T4 Ex Zone 2
- Internal Ex T3 or T4, Ex Zone 1 and external Ex T3 or T4 Ex Zone 1



Examples of use

Flow-through heat chamber

This flow-through heat chamber uses roller conveyors to deliver the media placed in the container to another station in the production process according to the "first in, first out" 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.



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.



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.



Simulation chamber for emergency slides

It's a good thing they exist, but better if they are never needed. Emergency slides form part of the safety equipment on every commercial aircraft. The emergency slides are checked on a regular basis to guarantee their operation. DENIOS climate simulation rooms permit realistic testing. During the test phase a temperature window of -20°C to +60°C is passed through in a short time. Temperatures and times are documented.



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 control is either mechanical or electrical in the case of steam heating.

Steam heating with mechanical temperature regulation

Also suitable for hot water and heat transfer oil as heating media

- Heat exchanger for 12 bar operating pressure
- Designed in accordance with ADR 2000
- Control valve with thermostat, 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)
- Condensate side: Flange connection
- 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 heat transfer oil as heating media

- Heat exchanger for 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
- Optionally with electro-pneumatic drive
- Condensate side: Flange connection
- Optional: Condensate separator
- 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 material
- 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

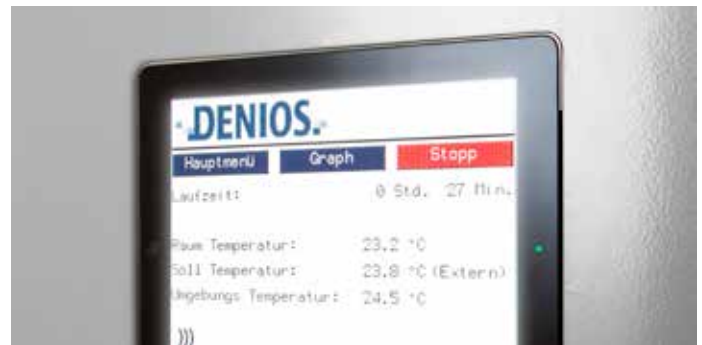


Control system and control components depending on requirements

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) ¹⁾ | – | ✓ |
| Temperature adjustment in Ex Zones (for indoor use) ²⁾ | – | ✓ |
| MODBUS connection | – | ✓ |
| Touch screen display (also in Ex design) | – | ✓ |
| Web interface for remote control | – | ○ |

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

²⁾ With ATEX compliant touchscreen

– not available ○ optional ✓ feature

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.



Challenge and project

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. Each process step needed to be verified and securely handed over to the guidance system. When selecting a suitable supplier for the GMP-compliant project, the customer laid special emphasis on product, process and user safety.

The solution

DENIOS manufactured three heat chambers in stainless steel, each of which had 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 carried out ensuring that the maximum permitted limit temperature is not exceeded by more than +3K. 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.

Result and customer benefit

Intelligent heat transfer and air recirculation together with good insulation of the heat chambers 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.

Heating up to 18,000 litres in just 15 m²

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 m² floor space. A certified, integral spill pallet with a containment capacity of 2000 litres ensures the Federal Water Act (Wasserhaushaltsgesetz, WHG, in German) 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). 8000 m³ air is circulated per hour, ensuring the necessary heat reaches every container. Air guides ensure a uniform temperature distribution across the entire room system.

Result and customer benefit

The customer opted for steam heating to ensure a particularly resource-efficient energy carrier - existing process heat is able to be efficiently used for the thermal preparation of the raw materials. The 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.

Test systems

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 sustainable.

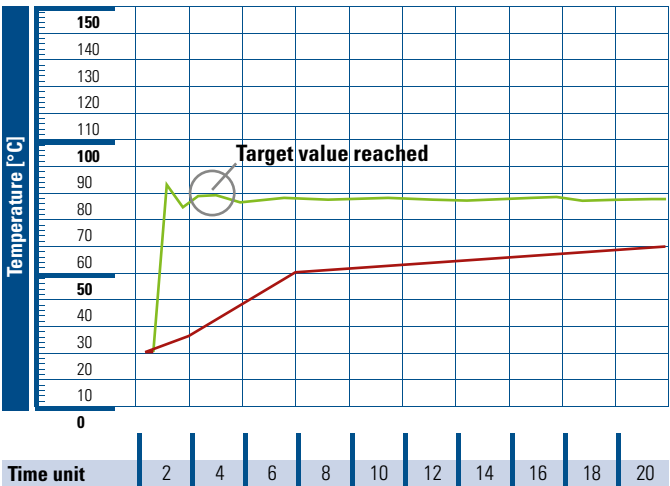
Infrared analysis at DENIOS

The infrared picture (see graph below) shows the outer skin of a unit with uniform, very low temperatures on its surface, indicating excellent insulation of the interior relative to the exterior. The increase in temperature visible at the door frame and in the lower section relates to joints that have a limited overall effect on the energy balance.

Their green/yellowish colour indicates the minimal loss of heat. This new construction is designed for optimum energy efficiency by making use of the highest quality components, enabling energy consumption to be lowered by up to 50% compared to conventional systems.

Measurement curves from a trial evaluation:

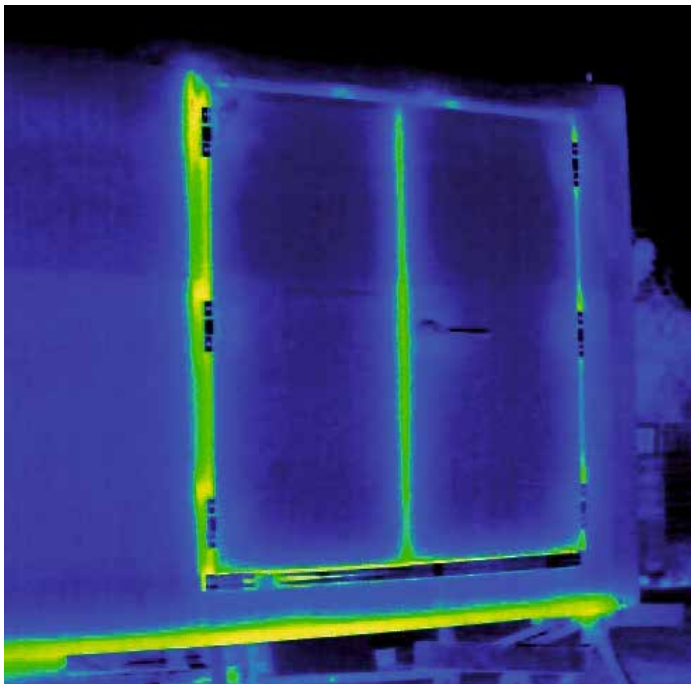
The red measurement curve clearly shows the increase in temperature of the medium during the time period examined, for a constant ambient temperature (green).



- Heat chamber internal temperature
- Temperature of the medium (temperature behaviour is dependant on substance)



Carrying out measurements



Infrared photo of a heat chamber

Rental 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 transition 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.

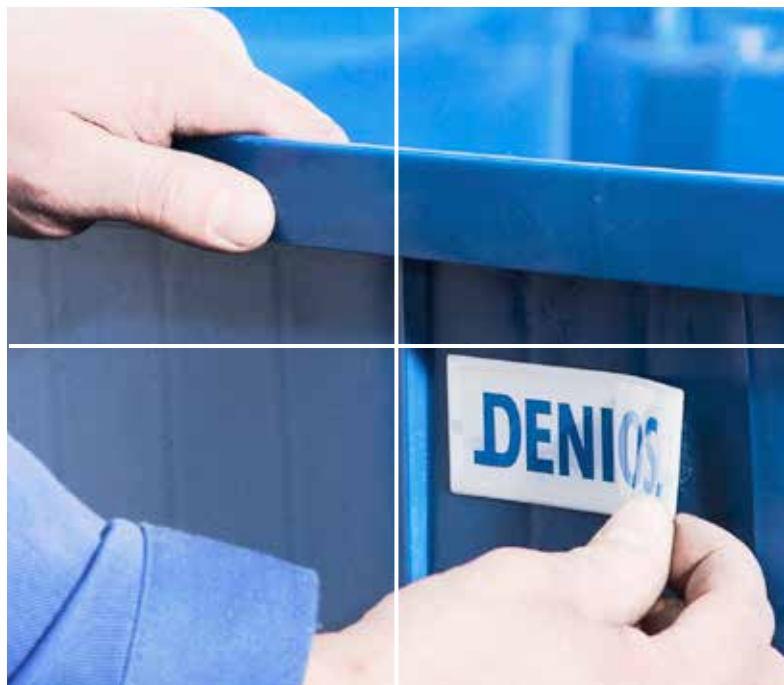


**Heat chamber WK 414-2-K with Ex protection (internal),
Premium control system, air extraction, removable spill pallet and more.**

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

Equipment



Comprehensive, safe

At DENIOS we have always supported our customers and partners with the changing requirements for handling hazardous materials and work safety. We began building our expertise in this area as far back as 1986, developing our sector-specific know-how for a wide range of industries. Today we offer a comprehensive portfolio of services to help protect people, the environment and company values effectively.

We aim to optimise your technical 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. 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.



"Our range of services and products and the standard of our customer care are second to none."

Safe equipment modules

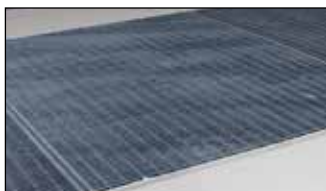
The modules required for the safety equipment of your technical room system will be selected depending on your operational, legal and insurance requirements. Individual requirements can be taken from your risk assessment, your safety design, your ATEX assessment and other specifications, for example for noise emissions. A needs analysis looking at your specific requirements is used during discussions to jointly determine the optimum system for you and corresponding safety equipment. As legislators require that safety-technical equipment should be regularly inspected, the expert DENIOS manufacturer's service team (from page ➔ 136) will keep you safe in the long term.

Protection from leaked liquids

Technical room systems from DENIOS have a tested spill pallet in steel meeting water pollution laws, which safely contains any leaked liquids. For the storage of aggressive media such as acids and alkalis (LGK 8) spill pallets can be fitted with a polyethylene (PE) inliner. This is available in a non-dissipative or dissipative version. Depending on the stored goods and the storage conditions, we also make spill pallets in stainless steel or provide them with a containment volume of 100% of the quantity stored (e.g. for use water protection areas). A separate connection is provided for emptying the spill pallet. If the spill pallet function is not needed, for example in a safety room for housing technical equipment, your room system can be fitted with an impermeable floor (e.g. double, heavy duty or linoleum floor).

Ex protection

If an Ex zone is defined in your ATEX assessment, equipment which could represent a potential source of sparks in the Ex zone can be supplied in the corresponding Ex design. Optional earthing equipment is available for equipotential bonding. Earthing rails for earthing operating equipment inside the technical room system as well as earthing brackets for customer connection can be provided. Pressure release panels can be fitted in the roof to ensure active safety in the event of an incident. Controlled pressure equalisation prevents serious situations such as the destruction of the room, employees being at risk from doors blowing off or an uncontrolled release of energy. The pressure release device closes again automatically when the pressure wave has been dissipated to seal the technical room system. Fire protection properties are retained.



Spill pallet in steel with grid (standard)



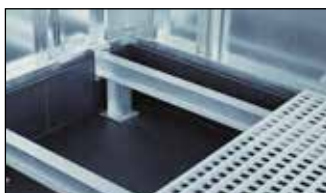
Spill pallet in stainless steel



Earthing point for customer earthing of the technical room system



Earthing bracket



PE inliner for storage of aggressive media



Double floor with inspection flap for technical equipment



Roof pressure release panels



Earthing rails inside the technical room system

Climatic protection

The room climate can be clearly defined so that your stored goods can be optimally housed. Insulation, technical ventilation and climate control technology can be set up to work together to ensure your requirements are met. The steel frame of your technical room system is covered with special panels for insulation. 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 room system is covered with non-combustible mineral wool panels (construction material class A in accordance with EN 13501-1). To protect against frost, an electric heater (finned tube heater as standard) together with the insulation ensure an internal temperature $> 5^{\circ}\text{C}$ for an external temperature of -15°C . For technical room systems over 4m wide, additional air recirculation is fitted to ensure uniform temperature distribution. Heating systems using warm water, heat carrier oils or saturated steam as well as heating fans for larger walk-in hazardous materials stores with insulation are available on request. Climate control split equipment or cooling equipment can be used to provide a cooling function. Comprehensive information on temperature-controlled storage can be found on page [60](#).

More information on the thermal preparation of substances (e.g. tempering up to 150°C) can be found from page [106](#).



Fire protection panels in non-combustible A class material (mineral wool panels)



Finned tube heater with integral safety temperature limiter and impact protection panel



Climate control equipment for precision tempering in the inner room



Heating fan for active, targeted convection in larger walk-in hazardous materials stores.

Emission control

Our technical room systems for the storage of water-polluting substances in all water-pollution classes (WGK 1-3, see page [9](#)) as well as for the passive storage of flammable liquids (flashpoint $\leq 60^{\circ}\text{C}$, labelled H224, H225 or H226)* are supplied as standard with weather protected air gaps running all round to ensure the legally required natural ventilation. To ensure permanent air extraction from your fire-rated hazmat storage container, the air exchange can be ensured by high performance technical ventilation (5 to 10 times exchange per hour), in accordance with local technical requirements. This ensures that the possible risk of harmful or explosive gases being created is taken care of.

We will also be happy to fit additional technical ventilation, which switches on automatically in the event that the air extraction limits are exceeded. DENIOS ventilation technology offers suitable solutions to ensure protection for employees, the environment and products from hazardous substances: additional extraction equipment or workplaces with ventilation technology can also be installed in your technical room system. More details on our ventilation technology can be found from page [128](#).

By the way: your technical room system can also be soundproofed. This is an important measure for emission protection, if an increased level of noise is expected in the inner room.

*Safety distances and ATEX requirements must be observed. If necessary, provide air extraction monitoring.



Technical ventilation



Technical ventilation with air extraction monitoring

Equipment

Safety for your technical room system

System monitoring and alarm systems

Comprehensive monitoring is vital as an addition to mechanical safety precautions. For example, the protection of a fire-rated hazmat storage container is directly dependent on early recognition of any fire. DENIOS offers approved multi-sensors, which quickly and reliably detect smoke and fire. If required, we can also fit your preferred specific fire detector. Gas detectors warn of a hazardous atmosphere in the inner room of your hazmat container. Together with other detectors, for example for leaks or heat, an effective monitoring system for the storage system can be created.

Whether it's gas detection, temperature monitoring, leak sensors, air extraction monitoring or early fire recognition, the provision of potential-free contacts for relaying to the (works) fire brigade offers the best levels of safety. An alarm function can be provided using visible warning lights and / or audible sirens. Additional notifications can be shown on a touchscreen on the technical room system or pushed to your smartphone, so you can react quickly to incidents wherever you are at any time. More information on the monitoring sensors for your technical room system can be found from page ➔ 132.



Air extraction monitoring



Fire detection



Temperature monitoring



Signal column



Gas detection



Leak sensors



Multisensor



Alarm notification on smartphone

Lighting

The right lighting inside and outside your technical room system is not only important for easy loading and unloading, but also contributes to safety. Bright wall lights are fitted to ensure optimum visibility in the hazmat store. However, the front area also needs good lighting so that loading or work with the stored goods can take place at any time. Suitable external lighting can be created, if needed with movement sensors.



Bright wall lights
(available as 2 x 18 W up to 2 x 58 W)



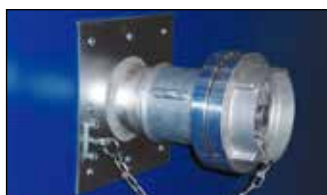
Exterior lighting

Fire extinguishing technology

If the worst happens, various extinguishing systems will operate to protect your equipment in the best possible way. Protection of workers, environmental concerns and the quick return to operation are important factors when considering how to secure your equipment and avoid damage following the use of the extinguishing systems. DENIOS offers e.g. sprinkler systems, semi-fixed low expansion foam extinguishing systems, aerosol, powder or CO₂ extinguishers for example. An extinguishing water retention system also needs to be created in the application area (in accordance with the AwSV regulations). When storing inside a building, inserted spill barriers and pivoted spill barriers in corrosion-proof aluminium, folding partitions for quick closure of a gateway and a storage area for retention of extinguishing water can be installed.



Sprinkler system



Extinguisher fittings



Inserted spill barrier



CO₂ extinguishing equipment

Protection from external influences

Technical room systems from DENIOS protect your stored goods and your technical installation from the external influences of the weather, but also from unauthorised access and damage.

When installed outdoors, rain, wind and snow will affect the technical room system. Our technical room systems are therefore fitted as standard with systems to drain water away and to withstand up to wind zone 2, snow load zone 2 and earthquake zone 3. Additional protection is offered by optional roof structures as well as our standard additional equipment for high wind and snow load zones. In areas which experience a lot of snow, the roof and rain gutters can be heated. Find more information on protection from the effects of the weather from page ➔ 20.

Your room system is also safely protected from unauthorised access (e.g. theft or manipulation). All room systems are supplied with a 17mm Euro cylinder lock as standard. For Switzerland this can easily be replaced by a KABA cylinder. The standard break-in protection with resistance class RC 1-4 as per DIN EN 1630 can be extended with a break-in alarm, video surveillance and access control (mechanical locking systems as well as access systems with fingerprint or transponder).



Access control with fingerprint



Canopy for minimising the effects of the weather

Safety of personnel

The walk-in room systems have a viewing window to ensure safety for employees working in the room. Video monitoring is also possible.



Walk-in store with viewing windows



Video surveillance

Ventilation and air extraction technology in the technical room system

When working with dusts and vapours which are hazardous to health, there are often requirements to use a technical solution in place of or in addition to personal protective equipment (PPE). DENIOS can custom-integrate its certified workbenches and extraction equipment into your technical room. Using fire and/or explosion protection measures, it is possible to integrate the technical room system, for example as a sampling or analysis room, either directly into the production process or to create a completely self-sufficient system outside production. Dust and vapours are widely extracted from within the technical room system using specific air ventilation. The most modern air extraction filters permit emission-free air extraction. To ensure consistent production conditions the intake air must be temperature controlled. Fire-rated underbench cabinets offer additional safety, for example for intermediate storage of retained samples or sample substances in small quantities. Comprehensive worker protection and ergonomically designed workbenches are always a priority.



Mobile dispensing room with integral air technology workbench

The highest levels of personal, room and product protection

The basic requirements for all DENIOS ventilation technology products are:

- Safe extraction of hazardous emissions
- Reliable personal, room and product protection
- Low air volumes for permanent operation
- Low noise levels
- High levels of flexibility/adaptability to client requirements



DENIOS ventilation technology offer

A detailed overview of our ventilation technology services can be found in the DENIOS "Ventilation technology" brochure or online under

 www.denios.de/lufttechnik

Visit www.denios.com to get in contact with your local representative.



Safe sampling and dispensing

For a customer from the chemical industry, DENIOS created a unique solution for sampling and dispensing, based on its technical room system. In this dispensing room, based on a hazmat storage SC, samples are taken from various packages, for example drums or IBCs, and dispensed into smaller packages. The system is fitted with an extraction arm with a flexible reach of up to 2 m to protect workers. All components inside the technical room system are suitable for Ex zone 1. In addition to a washing basin, there is an emergency eye shower available to employees in the event of an incident. Suitable heaters are also provided in addition to the extraction ventilation to create a complete DENIOS solution. The entire system is designed for outdoor installation. Due to capacity bottlenecks, a technical safety room (TSR) was ordered as a sampling room from DENIOS. The project required the permitted workplace limits to be observed to ensure safe handling of hazardous substances. This was achieved by integrating the hazardous substance workstation with a harmful substance capture system. The continuous supply of clean air was also important as was the controlled air extraction.



Dispensing room with integral extraction arm for at-source extraction of harmful vapours.



Sampling room with ventilation technology workplace and emergency shower. Additional safety is offered by fire-rated underbench cabinets for retained samples.

Sensors - safety with continuous system monitoring

Regardless of which hazardous substances you are handling, the earlier an incident can be detected and countermeasures taken, the more likely it is that damage can be limited or even prevented. Complete system monitoring is therefore essential. With a DENIOS technical room system this task is covered by a multitude of technical systems: numerous sensor-based monitoring systems continually capture actual values and compare them with setpoint values. Deviations are recorded as early as possible so system-side measures can be quickly implemented, for example the automatic door closing system or extinguishing system in the event of a fire, or automatic switching on of a second technical ventilation system if air extraction limit values are exceeded. Visual and / or acoustic alarm signals are triggered immediately so you can react quickly and take appropriate action. In addition there's an option to have a local mail server installed. In the event of an incident you would then automatically receive a notification on your device of choice (e.g. smartphone, tablet, laptop or desktop PC). This can gain you valuable reaction time, for example if your employees are not always on site.

Customised processing of measurement values and data

Evaluate and process your measurement data exactly how you want. All sensors have potential free contacts ensuring a suitable interface to customer connections, for example for integration into your processes or for logging measured value history. Of course the currently recorded measured values can be viewed on the system itself by responsible employees at any time. An integrated touchscreen gives a convenient overview of the data.

Our solutions for sensor equipment:

- Temperature monitoring
- Fire and smoke sensors
- Monitoring of relative humidity
- (Air) pressure sensors
- Gas detectors for various gases
- Air extraction monitoring
- Leak sensors
- (Infrared) video surveillance



Hazmat management 4.0 with the DENIOS smart app

We're opening the door to a new world of smart products! DENIOS connect is not just about access to the most important control and monitoring systems for individual technical room systems. DENIOS connect is also the gateway to intelligent services and important information on professional solutions for environmental protection and workplace safety. Come on in!



COMING SOON!

Up to date information on DENIOS connect can be found at

www.denios.de/connect

Visit www.denios.com to get in contact with your local representative.



Smart Safety Services

DENIOS connect has a host of smart services and functions for your DENIOS technical room system. Benefit from the advantages of hazmat storage 4.0 and optimise your costs, increase efficiency and process stability.

How it works: so that DENIOS connect can provide you with important information, services and additional specialist knowledge 24/7, product data, customer data and information from the DENIOS database are linked together to form a smart network.

- ✓ **Product data:**
Sensor data, process data and notifications for your technical room system are captured continuously.
- ✓ **Customer data:**
A connection to the DENIOS SAP system enables direct access to your order data and delivery information.
- ✓ **DENIOS database:**
Information, expertise and products are linked by our comprehensive database.

All data is securely transferred to the DENIOS Cloud and intelligently networked to provide you with a full range of services:



Maintenance

Overview of the maintenance log with smart memory function.



Condition Monitoring

Secure monitoring of your technical room system including fault alarms.



Manuals & Documents

Quick access to operating instructions, approvals, certificates and documentation concerning your technical room system.



Warehouse Management

Comprehensive monitoring of storage location occupancy and hazmat inventory with automatic safety check in accordance with TRGS 510.



My Services

Order replacement parts and accessories, check your order history and get individual advice.

Equipment

Convenience for your technical room system

Modules for extra convenience

Working in your technical room system is made easier by the right choice of convenient equipment. This not only makes you happier and saves you effort, but can save you time and money when your system is set up for efficient use. There's a wide range of equipment modules to choose from. We can offer advice and work with you to choose the optimum complete system for your needs. If required, we'll deliver the whole technical room system ready to use. Perfectly simple - from start to finish.

Making use of the space

A racking system offers flexibility in the number and arrangement of the shelves. Double the storage capacity can easily be created with a double-depth design of your hazmat storage container with shelving. Special bay heights can be arranged so that the storage layout exactly fits your individual stored goods. Shelving with rollers, rails or trolley rail systems can help with heavy loads, optimising work processes and reducing the risk of accidents. The walk-in technical room system offers almost limitless ways to use the space. The inner room can be fitted with shelving, the floor can be used for direct storage or for workplaces. The walls can be used for mounting components using anchor bars. Wheeled trolleys can be used to move heavy loads around inside the technical room system. Narrow mesh grids ensure a pallet truck can be used. Partitions and complete dividing walls can be built in so that you can separate your hazardous goods store into various storage areas (which can even have different levels of access authorisation).



Rollers for quicker processes



Hazmat storage container with three shelving levels and pull-out rollers



"Pushback trolley" - system for "Last-In-First-Out" loading



Narrow mesh grids for improved access



Individually adjustable shelves for storage of small containers



Additional vertical partition in a hazmat storage container with shelving

Electrical equipment

There are practically no limitations set on the electrical equipment for your technical room system. From the installation of sockets and additional lighting inside and out, to provision of interfaces for data capture or the professional integration of your IT technology, we're able to meet all your needs. Our DENIOS connect app offers you Smart Services meeting Industry 4.0 (see page ➔ 146).

In the standard version, the central power connection uses a sub-distribution unit. With a more elaborate electrical set-up, or if required, we can provide a switch cabinet with control and operating elements. Room sensors can be fitted by the customer and easily connected via a data transfer point, or can be fitted by us during production (see page ➔ 132). Displays and touchscreens can be fitted to allow data to be read. Whenever we make breakthrough points for cables or piping, these are protected against water penetration and contamination, and are also fitted so that the fire protection properties are guaranteed.



Fire protection insulation system for cable / pipe breakthrough points



Switch cabinet for central power connection



Sockets for connection of additional works equipment (230 V or 400 V, 50 Hz.)



Touchscreen for dosing unit



Sub-distribution unit (e.g. when sockets are used)

Room access

Walk-in fire-rated hazmat storage containers from DENIOS have a low entry sill height of 147 mm to give good accessibility. Access can be further improved by using an access ramp (1286 x 1000 x 140 mm for fire-rated hazmat storage container WFP; 1000 x 1348 x 145 mm for hazmat storage container WHG). The design of the doors or gates has a large effect on operational processes, for example when loading and unloading. Door / gate variants and positions can therefore be adapted for our technical room systems in a modular way. For walk-in technical room systems, you can choose between 1 and 2-wing doors, which can be located in various positions. Do you have a lot to store but not much space available? Our hazmat storage containers with shelving can also be made available with sliding doors or roller shutter doors. We would be happy to create door combinations too, for example for loading your technical room system from both sides. A door hold-open system can be added to any technical room system with a wing door. This holds the door open using an electromagnet. When the door closing button is operated or an alarm is triggered, the power to the electromagnet is cut. A door sequence controller is used to close 2-wing doors. Door dampers can be fitted, or there is an option to have the doors or gates opened and closed electrically by remote control, so you can concentrate on the important things when loading and unloading your store.



Access ramp for easy forklift access



Door / gate hold-open system for holding open doors during loading and unloading (114° opening angle)



Door / sliding door combination for optimum handling



Opening and closing by remote control

Transportability

Stay mobile! Our technical room systems are fitted with removable transport brackets as standard. These ensure safe and easy handling with a crane and are also used to secure the container during transport on the lorry. Depending on model, our hazmat storage containers with shelving also have a 100 mm ground clearance for use with lifting equipment. Not only is safe unloading at the installation site guaranteed, but the store can also be easily relocated at a later date.



Transport brackets



Storage container with shelving, accessible underneath



Standard paint (RAL 9002)



Custom paint

Paint

DENIOS technical room systems are painted in RAL 9002 (grey-white) or RAL 5010 (gentian blue) depending on model. Fire-rated storage containers 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.

Safe storage - even of small amounts

A safety cabinet is a safe, legally-compliant way of storing hazardous substances in workrooms, ensuring you meet the basic requirements of the current legislation. Storing hazardous substances close to the workplace minimises the risks in daily processes and also helps avoid unnecessary transit time, making work flows more efficient. Our Online Shop and our main catalogue both offer a comprehensive range of safety cabinets.

The right safety cabinet for every substance

Which safety cabinet you need depends largely on the properties of the substance you wish to store. In order to select the right type of cabinet, start with the greatest potential risk that the substance to be stored can pose. Our range includes

- Fire-rated hazmat storage containers with 30 or 90 minute fire protection for flammable substances
- Special safety cabinets for storing and charging lithium-ion batteries with fire protection from both sides
- Chemicals cabinets for environmentally hazardous substances
- Acid and alkalis cabinets for corrosive and irritant substances
- Combi-cabinets allowing the combined storage of various hazardous substances in one cabinet
- Gas cylinder cabinets suitable for indoor or outdoor use



Thought-out space

Every safety cabinet has a set of tried and tested internal fittings. Many of our models allow adaptation of the storage levels so that you can store your hazardous substances flexibly and react to a change in requirements. Height adjustable spill trays and shelves ensure the space can be optimally used. Additional shelves, spill trays and pull-out shelves can be configured in various ways depending on model, or are available as an accessory. Combi cabinets are the ideal solution when small amounts of various hazardous substances need to be stored. A vertical partition allows different substances to be stored in the same cabinet. Chemicals cabinets are available in variants with special type 30 safety compartments meeting EN 14470-1, which offer the required fire protection for small quantities of flammable hazardous substances.

Practical dimensions

Depending on the amount to be stored and the space available at the installation side, a customer generally chooses between a conventional cabinet which can be set up directly next to a workbench or worktable (depending on model, available in various widths), an underbench cabinet or a wall mounted cabinet which can be directly mounted on the wall. If you are not just storing small containers but also need to store drums at the workplace, a drum storage cabinet can be used which is specially designed for storing 205 litre drums. Whatever you need, DENIOS has just the thing.



Adjustable shelves



Pull-out spill trays



Hazardous materials cabinet with space-saving vertical pull-out



Underbench cabinet with mobile base

Door designs which meet your needs

Manual wing doors (1 or 2-wing) are the most common variant. Models with folding doors, sliding doors, shutters or vertical pull-outs are also options to consider when space is at a premium. The safety aspects of selecting a door design also need to be considered. In a fire, self-closing doors or drawers are vital when storing flammable substances. Product highlights include safety cabinets with automatic door closing as standard, which release the held-open doors or vertical pull-out after 60 seconds (an audible and visible warning is given before the door closes). The cabinets are therefore securely closed after every use. Models are also available with glass inserts in the doors so that the contents can be clearly seen. Our cabinets are also lockable to ensure that the stored goods are protected from unauthorised access.

Technical ventilation

Ventilation is an important factor linked to safety and the protection of worker's health. Especially when storing flammable hazardous substances, permanent Ex zones would need to be established and ensured in or around the cabinet if there were no technical ventilation. Depending on the model, our safety cabinets have natural ventilation or ventilation connection points for extraction to the outside. With the DENIOS air recirculation filter system, it is also possible to ensure cost-effective technical air extraction without expensive air extraction equipment and while avoiding explosion protection measures.



Fully automatic opening and closing at the press of a button



Profile cylinder lock for protection against unauthorised access



Air extraction monitoring for installation between safety cabinet and the customer's ventilation system



Recirculating air filter system for hazardous materials cabinets

Online and in the catalogue: over 12,000 products are available



Your direct line to DENIOS:

+49 800 753-000-3



24 hour ordering:

www.denios.de/shop

Visit www.denios.com to get in contact with your local representative.

Take a look now!



Your service partner



Comprehensive and worry-free: 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 technical room system, you need the certainty that it will exactly meet your needs and will also meet all the requirements of the current legislation 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. And of course we are there for you once your purchase has been made, with our professional maintenance service and many years of experience to help answer any questions or offer training.



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

Your service partner

Your service partner

Our service concept

One order - full support!

Our job is not just to supply an approved technical 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 technical room system must always be adapted to suit your individual needs. Working together with you, our engineers will develop the optimum design for your hazmat 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. Efficiency benefits: many solutions are already part of our digital configurator. Your customised technical room system can be planned in just a few clicks. But individual solutions are not a problem. Personalised advice is always the best: 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 technical room systems cover many application fields and already have national technical approval (abZ). 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 technical 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 technical room system will go into production.



Step 3: Production and factory acceptance

Your technical 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 technical 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 (FAT) checks your system conforms with all specifications and quality requirements. In addition to the 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 technical 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 technical room system and will work with you to complete the Site Acceptance Test (SAT) including all installation and operational tests. Our standardised solutions can be commissioned immediately, as they have national technical approval (abZ). For customised projects approval from the authorities needs to be obtained. But there is 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. With DENIOS technical room systems: set up, commission, stay safe!



Step 6: Maintenance and repair

If your technical 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.





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

Set up, commission, stay safe!

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 Frankfurt on the Main 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 for 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 - your 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 climate control 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 protection: we'll extend your warranty to 5 years*
- Precise control of costs: 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

Get one now & start saving!

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

🇩🇪 +49 800 753-000-9

Visit www.denios.com to get in contact with your local representative.

* Applies if a service contract is taken out within the first year after delivery.



Your service partner

Digital customer services

Digital³ – only available from DENIOS

As one of the leading innovators in the SME sector with distinction, we are pushing the boundaries of digitalisation in our sector. With three outstanding innovations, we have significantly simplified internal and customer-based processes, increased interactions and strengthened our relationship with our clients.



Variant configurator

Our field representatives have access to modern, mobile communications media. With the help of the variant configurator software developed by DENIOS, they can advise customers on site, designing a customised room system at the same time. Your customised room system can be designed with just a few clicks, including a visualised result and a guideline price.

Our service:

- All options (dimensions, equipment, colour etc.) at a glance
- Individual advice, selection and configuration

The advantages for you:

- Immediate design of a customised storage solution
- Visualisation with guideline price
- Reduction in complexity
- Configuration can be flexibly adapted
- Direct ordering or quotation



DENIOS connect

The operation and maintenance of a hazmat store is subject to comprehensive legislation. We support our customers with database services to help them operate correctly and efficiently. DENIOS connect combines testing, maintenance and documentation obligations in a user-friendly app.

Our service:

- Repair status and maintenance plans online
- Permanent condition monitoring and remote access to operating data
- Quick access to documentation
- Alarm in the event of a fault

The advantages for you:

- Early recognition of process risks and targeted fault management to avoid downtime
- Reduced management cost for operation and repair of the hazmat store
- Direct line to DENIOS Service
- Complete, up to date documentation



E-Procurement

Electronic procurement systems not only reduce process costs and increase purchasing safety – as a DENIOS customer you can buy sensitive and secure products directly from the certified manufacturer. Legally-compliant, country-specific ranges can be individually created for our customers' systems.

Our service:

- Over 15 years experience in e-business and over 100 catalogues in various formats
- More than 12,000 items with images, helpful descriptions and technical specifications
- Standards such as BMEcat, eCl@ss, UNSPSC
- Additional information available as a PDF to download to help you use our products in compliance with the law
- OCI interface/ simple integration of the DENIOS Online shop into your ERP system
- Suitable accessories and article variants are directly linked
- Country-specific legislation provided and database available in 13 languages

The advantages for you:

- Customised range of products
- Secure ordering process directly through customer's own ERP
- Budget and process transparency
- Savings on process costs



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