

FUTURETECH

Kärcher Group



MOBILE CBRN DECONTAMINATION

Innovative solutions to protect life.

CBRN hazards

CBRN hazardous substances can be chemical (C), biological (B), radiological (R) and nuclear (N) in nature.

If these are released, either deliberately or inadvertently, there is a serious threat. In highly industrialised countries, in particular, these materials are handled in industry on a daily basis (TICs/TIMs*). These substances, known as TICs/TIMs, pose a hazard to people and the environment, and enormous collateral damage can arise through their accidental or incorrect use or misuse.

In addition, the targeted deployment of CBRN substances in military conflicts or terror attacks considerably increases the possible risk scenarios. Sometimes, substances may be used that were designed and produced specifically for military use.

These generally have a far higher toxic potential than industrial chemicals, and require more extensive measures, which play an important part especially in strategic military considerations.

CBRN contamination can lead to a large number of casualties and injured, as well as pose a hazard to urban areas, important industrial facilities and infrastructure on a wide scale and over a long time period.

This can not only have severe economic consequences, but also lasting effects on human health in the affected region. Therefore, civilian and military organisations should be equipped to fight these potential threats in a professional manner when needed.

Examples of the use and occurrence of these hazardous materials



Chemical hazards

These include chemical substances or preparations (mixtures of substances) that are released in civilian areas, e.g. during industrial accidents or disasters, or used in weapons due to their high toxicity.

- Use of TICs and chemical nerve agents against the civilian population in the civil war in Syria
- Use of sarin (neurotoxin) by a terror organisation in Tokyo



Biological hazards

Bacteria, fungi and their spores, and viruses that spread due to outbreaks and epidemics or are introduced during asymmetric conflicts and cause illness.

- Ebola (viral disease)
- Regular outbreaks of animal diseases such as SARS, bird flu and swine flu, which can directly affect humans as well as inflicting serious economic damage



Radiological and nuclear hazards

These hazards can take the form of “dirty bombs” during terrorist attacks, the use of nuclear weapons, incidents in nuclear facilities or any resulting drifting fallout.

- Incidents in civilian nuclear power plants in Chernobyl and Fukushima
- Wide-scale release of radioactive cobalt in Goiânia, Brasil, which had previously been used for medicinal purposes

*TIC = Toxic Industrial Chemicals, TIM = Toxic Industrial Materials

CBRN protection

CBRN protection includes all defensive and protective measures against chemical, biological, radiological and nuclear hazards. All possible measures should always be taken to prevent the release of CBRN materials.

If hazardous materials are released despite all protective measures being taken, suitable, individual CBRN protection in the form of personal protective equipment (protective suit, protective mask, etc.) is a prerequisite for further action. To ensure comprehensive safety, further aspects such as detection, suitable shelter and medical treatment must also be taken into consideration.

CBRN decontamination

Decontamination is a special means of cleaning highly contagious, highly toxic and radioactive contaminants. This can take place naturally or active measures can be taken to mitigate the situation.

The objective, above all, is to destroy and/or inactivate chemical and biological hazardous substances (CB) as quickly as possible. Radioactive substances (RN) must be rapidly removed from surfaces. This applies to various objects such as persons, vehicles, infrastructure, clothing and equipment.

Fast and effective measures prevent direct or indirect harm to people. They pave the way for further action to minimise residual risk. In addition, decontamination also helps to prevent contaminants from spreading into non-contaminated areas, causing further damage.

The three types of decontamination

1

C-decontamination (detoxification)

The removal or inactivation of hazardous toxins (chemical warfare agents, TICs/ TIMs) that are lethal within a very short period of time due to their properties or can have extremely negative effects on human health.

2

B-decontamination (disinfection)

The destruction or inactivation of pathogenic microorganisms (pathogens) and their toxins, and viruses that can cause fatal illness.

3

RN-decontamination (radioactive decontamination)

The removal or reduction of radioactive particles that can considerably impact on health depending on an individual's exposure.



The various stages of decontamination

The prevention of any type of contamination always has priority. However, if it is not possible to protect persons or materials from CBRN contamination, the danger that arises from these contaminants can only be removed via efficient decontamination.

The quality of the decontamination achieved depends on the duration and the available resources. To enable goals to be defined for specific situations, internationally recognised quality levels have been formulated for CBRN decontamination:

Immediate decontamination	Auxiliary decontamination	Thorough decontamination	Certified decontamination
Decontamination of the body surface and personal equipment by yourself or with external help immediately after a CBRN event (no reduction of CBRN protection possible).	Decontamination of mission critical areas and equipment by the crew and/or troops (enables the mission to be performed in a limited manner for a limited time; CBRN protection is still required).	Decontamination of persons and equipment by qualified NBC defence personnel (enables the continuation of the mission; suspension of CBRN protection is possible).	Decontamination and authorised release for unrestricted further use without any CBRN protection.



Decontamination factors

The decontamination level to be achieved is influenced by numerous factors, which must be considered holistically if the desired decontamination result is to be attained. Through our expertise in decontamination technology and agents, we take these factors into account during the planning and development of systems and concepts.

1. Technologies

Depending on the object requiring decontamination and the type of contamination present, a suitable decontamination process and technology must be employed.

2. Decontamination agent

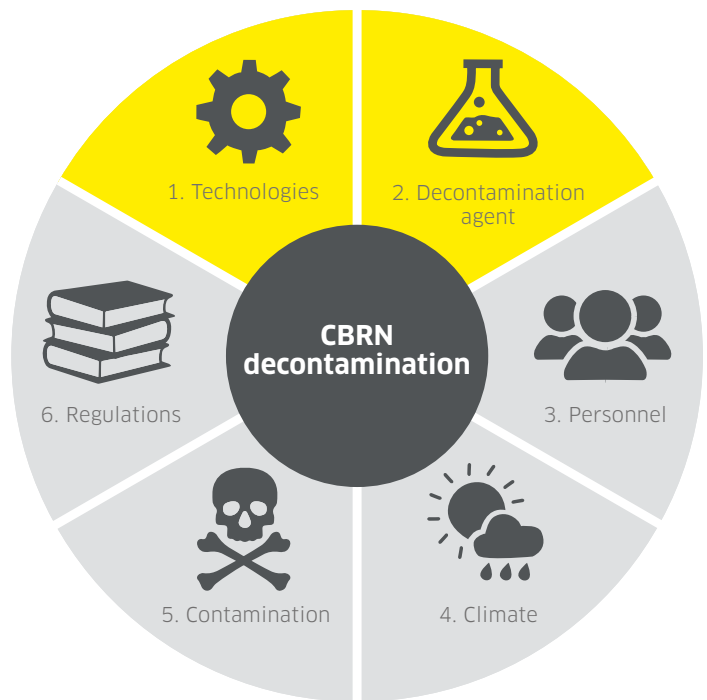
For humans, even a very low quantity of residual contamination can be lethal. Therefore, the objective is thorough decontamination that is as residue-free as possible. Our decontamination agents are matched to the different hazardous substances. In contrast to universal decontamination agents, they achieve better results and are therefore better equipped to satisfy the requirements profile of thorough decontamination.

3. Personnel

Deployed personnel are exposed to enormous emotional and physical stress, which is why they should not be subjected to unnecessary health stresses as well. It is therefore our mission to develop methods that constitute the state of the art and are as simple and safe as possible.

4. Climate

Meteorological factors such as temperature, wind, precipitation and humidity influence how contamination is distributed (e.g. concentration, risk of spreading). The interplay of these factors also has a decisive influence on the decontamination procedure used. Therefore, we continuously consider climate factors when developing our products.



5. Contamination

The decontamination methods and chemicals used depend on the type and spread of the existing CBRN contamination and its specific physical and chemical parameters. Due to the very broad spectrum of possible contaminants, these parameters may differ hugely. Consequently, at Kärcher Futuretech we adapt our decontamination technology and chemicals precisely to these different areas to achieve the best possible results. Universal solutions do not meet the requirements for the decontamination result.

6. Regulations

Decontamination results and thus the design of decontamination systems and chemicals must comply with national and international standards. We base our work on international standards such as those of NATO.

Our decontamination technologies

- have been tested and approved for a broad range of hazardous substances
- satisfy national and international standards, such as NATO STANAG 4521, AQAP-2110 of the German Armed Forces, and the European standard for environmental management systems ISO 14001
- conform to the high standards of ISO 9001
- are used successfully in virtually all climate zones

Human decontamination – Protecting every individual



For the decontamination of all kinds of military and civilian groups, we offer various systems and components that have been optimised for fast and effective deployment. Ease of use is especially important here, and this is achieved by an intuitive design and symbols that are easy to understand. This means that in a large-scale emergency, they can also be used by untrained persons. Human decontamination principally makes use of wet decontamination processes. Depending on the complexity of the equipment, this work can largely be performed independently of the existing infrastructure.

Hot water modules for small and flexible decontamination units

A mobile CBRN personal shower system is the ideal solution when rapid deployment is needed. Different components are required depending on the requirements, but hot water modules are the heart of these systems. We offer compact and powerful modules with efficient diesel burner technology that makes them suitable for various scenarios. You can find a selection of our hot water modules below.



	1 HWM 40	2 HWM 100	3 HWM 100 B
Empty weight kg	85	160	290
Dimensions (L x W x H) mm	880 x 680 x 860	960 x 600 x 800	1250 x 820 x 1060
Possible number of showers to be supplied	Up to 2	Up to 6	Up to 6
Flow rate l/min (at a temperature rise of approx. 30 °C)	6 - 20	12 - 50	< 1- 50 continuous > 50 for several minutes (buffer tank)
Burner output, continuous, kW	40	100	100
Fuel consumption diesel l/h (continuous operation at maximum load)	4.5	11	11
In accordance with international drinking water guidelines	Yes	Yes	Yes
Integrated isolated storage tank	No	No	Yes, with 125 l capacity
Immediate availability of hot water (80 °C)	No	No	Yes, up to 125 l
Thermal disinfection	Yes	Yes	Yes
Built-in frost protection	No	No	Yes

Large-scale human decontamination

The DSAP is suitable for decontaminating large numbers of both ambulatory and non-ambulatory persons. It can be configured to suit the deployment requirements. It could contain two shower lines for the rapid throughput of large numbers of contaminated non-ambulatory persons for treatment, for example, or four shower lines for large numbers of contaminated, ambulatory persons.



**GO TO THE
DSAP VIDEO
HERE**

	DSAP
	<ul style="list-style-type: none">■ Fast setup in less than 60 minutes■ Different shower line configurations possible■ Automatically controlled decontamination shower and “traffic-light” system for the shower process■ Adjustable shower temperature■ Water pipe system in conformity with international drinking water directives■ Buffer tank for hot water■ Shower room, floor and main components have stainless steel surfaces
Empty weight kg	10000, depends on the configuration
Container size	20-foot container, 1C
Capacity per hour depending on configuration	<ul style="list-style-type: none">■ 180 ambulatory persons■ 90 ambulatory and 4-6 non-ambulatory persons■ 8 -12 non-ambulatory persons



Decontamination of equipment and protective clothing – When equipment really matters



In the event of a major disaster, the availability and replenishment of personal protective equipment, detection devices and other items that are crucial to the mission is mostly severely limited. If contamination is present, the risk of it being spread by these items of equipment – with potentially fatal consequences for personnel – is high. We offer various technologies for the decontamination of protective clothing and equipment, and these are specifically adapted to the different characteristics of your personal equipment.

Wet decontamination



Chemically resistant equipment

Wet decontamination can be employed for equipment with chemical resistance, such as masks and impermeable protective clothing. In this process, our application devices pre-clean the objects and finish off the decontamination process by applying and then removing suitable decontamination agents. This process can also be used for vehicle decontamination. Below you will find two examples of application devices.



HD 5/11 Cage DJ

The mobile HD 5/11 Cage DJ is an extremely compact electric pressure washer, which cleans surfaces with cold water and can also work with single or two-component aqueous disinfectants or cleaning agents. It has a delivery capacity of up to 500 litres of cold water per hour, and builds up a working pressure of up to 110 bar.



DS 5 and DS 10

The DS 5 and DS 10 are portable pressure spraying devices with integrated mixer unit for spraying suspensions and liquid cleaning agents, disinfectants and decontamination agents. These units can therefore be used for decontaminating personnel wearing protective suits, as well as smaller surfaces and objects. The DS 10 can also be retrofitted with a compressed air connection.

Hot gas decontamination



Heat-resistant equipment

The hot gas decontamination process removes and/or deactivates chemical and biological contaminants on heat-resistant items of equipment, such as protective clothing. With temperatures of up to 170 °C and a combination of thermal energy, steam and air exchange, this decontamination process manages entirely without the use of chemical decontamination agents.

The HGSC 1400 hot gas/hot steam decontamination module can treat heat-resistant equipment in approx. 30 minutes. Contaminated and decontaminated material is separated to prevent the spread of contamination.



Vacuum decontamination



Sensitive equipment

Sensitive equipment cannot be decontaminated or detoxified with aggressive or liquid decontamination agents or thermal processes. Our VDM 265 vacuum chamber is the solution to this problem. Using effective and gentle chemical and biological decontamination, sensitive and electronic equipment can be decontaminated. This unique technology relies on the optimum harmonisation of temperature and vacuum cycles. The VDM 265 can be used either as a standalone unit or integrated in an ISO container or trailer.



VDM 265

- Fully automated operation
- Separation of contaminated and decontaminated material to prevent the spread of contamination
- Integrated NBC exhaust filter
- Unique vacuum decontamination technology

**Internal dimensions,
usable space
(L x W x H) mm**

1312 x 250 x 250

Interior volume l

256

Decontamination of vehicles and large items of equipment – The three-stage process



For the thorough decontamination of vehicles and large items of equipment, the wet decontamination process is divided into three treatment steps: pre-treatment, main treatment and post-treatment. This process incorporates the complete treatment of the vehicle surface, including the underbody.

The three steps of vehicle decontamination

1**Pre-treatment – Removal of coarse dirt**

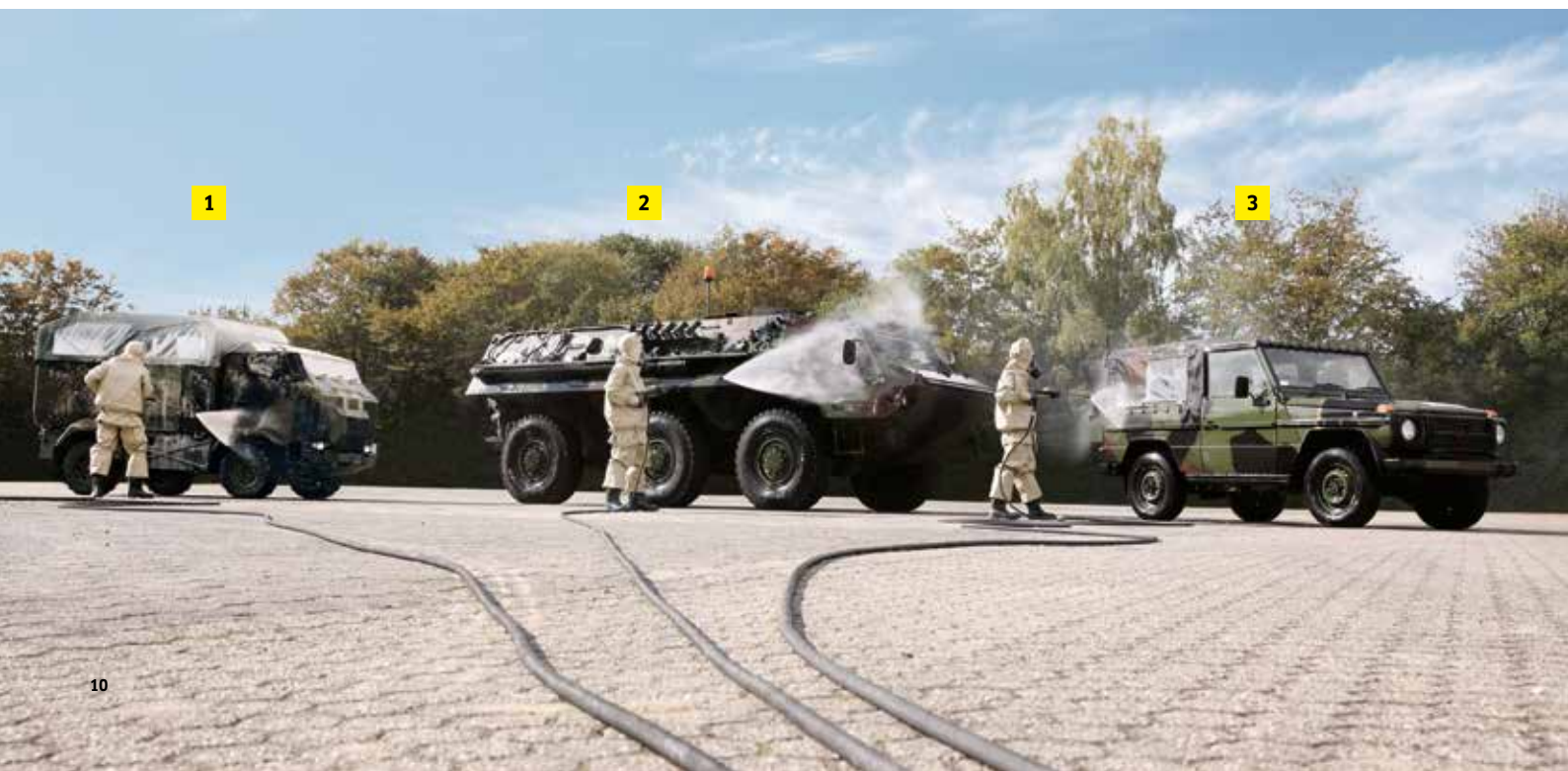
By removing coarse dirt with a cold water pressure washer in the pre-treatment phase, the vehicle surface is ideally prepared for the main treatment and CBRN contaminants adhering to it are removed.

2**Main treatment – Application of the decontamination agent**

In the main treatment phase, high-pressure pumps or special application pumps apply the suitable decontamination agent to the surface of the vehicle. Sometimes thermal energy is also used to achieve better results.

3**Post-treatment – Removal of reaction products**

During post-treatment, reaction products and encased particles from the main treatment process are washed off surfaces by a pressure washer. Thermal energy is also used here in some cases.



The ideal assistant for vehicle decontamination – One device for all steps

The diesel-powered MPDS 2 decontamination system is the smallest and most efficient multi-purpose unit in its class for the decontamination of materials and vehicles. It can be operated with up to three lances, enabling pre-treatment, main treatment and post-treatment to be performed simultaneously. Easy transport is guaranteed by its compact and robust design in a stackable tubular frame, and its Euro pallet-compliant dimensions. The innovative, clearly laid out user interface enables fast and intuitive operation.



	MPDS 2
	<ul style="list-style-type: none">■ Automatic burner shutdown on low water level or overheating■ Electric start■ High-quality drive concept■ High-capacity burner with upright heating coil and continuous ignition with no explosion risk■ Automatic dosing of decontamination and cleaning agents■ Economical, diesel-powered internal combustion engine (EU STAGE V)
Empty weight kg	290
Dimensions (L x W x H) mm	1200 x 800 x 1100
Cold water high pressure bar	Up to 120
Cold water flow rate l/h	Up to 930
Steam level temperature °C	Up to 150

Kärcher pressure washer technology since 1950 – For effective wet CBRN decontamination

- Unique surface cleaning as the relevant process parameters – water flow, nozzle pressure, temperature, and cleaning agent – are combined in the optimum way
- The pressure water jet achieves a strong mechanical impact thanks to the ideal combination of pressure and water flow rate based on the spray angle, spray distance and type of nozzle
- Decontamination agents are automatically added to the pressure water jet

Decontamination of infrastructure and interiors – Minimising the risk of spreading



In many cases, contamination incidents also affect the interiors of vehicles, buildings and vital infrastructure. To prevent the risk of spreading, sections of surfaced roads, vehicle interiors and parts of buildings can be decontaminated using various processes.

Technology for interior decontamination

Aerosol

Aerosol generators are employed to decontaminate, disinsect and disinfect interiors and surfaces. They convert the decontamination agent into fine aerosol droplets, producing a suspended mist. Thanks to this mist, even the smallest indoor corners and recesses can be decontaminated.



	Aerosol generator SN 50
	<ul style="list-style-type: none">■ Easy operation by a single person■ Autonomous operation for approx. 30 minutes thanks to its integrated fuel tank■ Enables the use of various aqueous solutions (water, oil and water-soluble powder)■ Adjustable droplet size
Empty weight kg	9
Dimensions (L x W x H) mm	1330 x 290 x 330
Application rate of decon agent l/h	20.5
Heating capacity kW	18.7



Spray extraction

Spray extraction modules can also be used for the decontamination of interiors. The agent is applied directly to the contaminated surface and vacuumed off again in the same operation. This way, contaminants are detached, inactivated and removed in a single step. The decontaminated surfaces are ready for use soon afterwards.



Spray extraction module SXM 30 C

- Compact design, transportable by a single person
- User-friendly and self-explanatory
- Simple replacement of activated carbon filters to prevent contamination from spreading

Empty weight kg	13
Dimensions (L x W x H) mm	665 x 320 x 528
Spray output l/min	2
Pump capacity W	80



The principles behind road decontamination

The decontamination of infrastructure and road sections minimises the risk of contamination being carried into other areas and limits the further spread of contaminants. Many of our decontamination systems already include a spray beam on their vehicle for this purpose, or a detachable spray beam kit can be fitted to the front of the vehicle.

The aqueous or non-aqueous decon liquid is sprayed by the device on the front of the vehicle, enabling sections of road to be decontaminated while driving along at walking speed.



Large systems with diverse decontamination abilities – With customised configuration

The devices and modules already described can be integrated in mobile systems and are available as large systems in the form of containers, trailers, platforms and system modules. These systems contain functional components that target specific cases, encompassing a range of technologies and processes. Below you will find examples of our large systems that were created in collaboration with customers.

Cage – Frame-based, modular decontamination system

The Cage system can be individually configured for different scenarios and is made up of autonomous, compact and fully compatible modules. Up to nine modules can be transported on a 10' or 20' carrier platform, for the decontamination of persons, sensitive and personal equipment, interiors, vehicles and sections of road, for example.



Cage system

- Different configurations possible (modular system)
- Water tanks and generators can be integrated
- Quick to set up
- Platform with ISO twistlocks
- Cages consist of robust GFRP sandwich panels

Empty weight kg

Depends on the configuration

Dimensions (L x W x H) mm





10' or 20' platform



DSVP 10C – Compact on a 10’ container

The container-based DSVP 10C decontamination system is one of our most compact solutions and is suitable for a large variety of decontamination jobs. The integrated components are stowed in a 10’ container and can be set up and ready for use in just a few minutes. Two pull-out, height-adjustable shelves allow easy and ergonomic access to most items of equipment.







DSVP 10C				
<ul style="list-style-type: none">■ Integrated generator and 1000 l water tank■ Easy to use■ Standard 10' container■ Autonomous for 1 hour				
Empty weight kg		4000		
Dimensions (L x W x H) mm		2991 x 2438 x 2438		
				
1 hour	19	2	150 - 200 m²	

Decocontain 3000 – All you need in one 20’ container

The Decocontain 3000 is a highly mobile system that is ready for deployment in less than 30 minutes. It boasts all the key components required for a complete decontamination centre. These components are ideally integrated in a 20’ container, which is supplied with electricity by a central generator. The flexible and mobile Decocontain 3000 can be used both on the carrier vehicle or separately.



Decocontain 3000			
	<ul style="list-style-type: none">■ Integrated generator and 2700 l water tank■ Semi-automated processes■ Standard 20' container■ Autonomous for 1 hour■ Hose reels for easy use of hoses		
Empty weight kg	9000, depends on the configuration		
Dimensions (L x W x H) mm	6058 x 2438 x 2438		
			
1 hour	160	20 - 30	8 - 12

CBRN decontamination agents – Researched, developed and produced for our customers

Our mission is thorough decontamination with as little residue as possible, which is why we decided to develop three different decontamination agents. These decontamination agents have been tested and certified by independent laboratories (e.g. German Research Institute for Protective Technologies – NBC Protection (WIS) or Netherlands Organisation for Applied Scientific Research (TNO)) using real hazardous substances in various climatic conditions and deployment scenarios. Furthermore, they satisfy NATO requirements as per AEP 7 and STANAG 2609, as well as additional requirements such as short reaction time. All decontamination agents can be used in NATO-relevant climate zones (-30 °C to +49 °C / -22 °F to +120 °F).

CBRN threat

Chemical



GDS 2000

Biological



BDS 2000

Nuclear



RDS 2000

We offer the GDS 2000 for C-decontamination, the BDS 2000 for B-decontamination, and have introduced the RDS 2000 to fight RN contaminants.

RM 21 skin cleaner is also available for personnel cleaning in the event of contamination.



At a glance – The right agents for any scenario



Decontamination agent

1 GDS 2000

Applied using: DS 5, DS 10, AMGDS 2000, application pumps

2 BDS 2000

Applied using: DS 5, DS 10, HD + HDS devices with automated dosing systems

3 RDS 2000

Applied using: DS 5, DS 10, HD + HDS devices with automated dosing systems

4 RM 21

Application as a shower gel or with an automated dosing system, for cleaning only

Decontamination of

Decontamination of	1 GDS 2000	2 BDS 2000	3 RDS 2000	4 RM 21
Large equipment and vehicles	✓	✓	✓	✓
People	X	X	X	✓
Persons in protective equipment	✓	✓	✓	✓
Equipment	✓	✓	✓	✓
Sensitive equipment	X	PAA * components in the vacuum chamber (e.g. VDM 265)	X	X
Infrastructure	✓	✓	✓	✓
Interiors	also with spray extraction	also with spray extraction, aerosol generator	also with spray extraction	✓

✓ Provided that the materials are suitable for the decontamination process/agent

* PAA: peracetic acid

Your advantages: Powerful and certain of success

- Extremely good and reliable results
- Short reaction time with maximum impact
- Easy, safe handling and rapid response
- Long shelf life and minimal logistical effort
- Biodegradable and effective on a huge variety of surfaces

CBRN Protection Systems in use around the world 2017 - 2022



1 USA

Personnel decontamination system DSAP

2 Ireland

Pressure spraying device DS 10 | Platform system CDS 1000

3 Germany

Container decontamination system DSSM |
Cage frame-based modular decontamination system |
Multi-purpose unit MPDS | Pressure spraying device
DS 5 and DS 10 | Hot water module HWM 100 and HWM 40 |
Pressure washer HD 5/11 Cage DJ

4 Czech Republic

Aerosol generator SN 50

5 Austria

Aerosol generator SN 50 |
Pressure spraying device DS 5 and DS 10

6 Spain

Multi-purpose unit MPDS |
Pressure spraying device DS 5 and DS 10

7 Algeria

Personnel decontamination system DSAP |
Platform system CDS 1000

8 Kuwait

Container system Decocontain 3000 | Pressure spraying device DS 10 |
Aerosol generator SN 50 | Personnel Decontamination System DSAP

9 United Arab Emirates

Multi-purpose unit MPDS 2

10 Indonesia

Hot water module HWM 100 | Multi-purpose unit MPDS |
Application device AMGDS | Pressure spraying device DS 10

11 New Zealand

Hot water module HWM 100 | Multi-purpose unit MPDS |
Application module AMGDS



Rapid response system DSVP 10C

In the Netherlands in 2017, the DSVP 10C rapid response system, which is used for various decontamination jobs, underwent intensive testing after handover.



Handover of a total of 11 decontamination systems to the Austrian Armed Forces

Since the end of 2018, the new "Mammoth" decontamination systems have been helping the Austrian Armed Forces to decontaminate persons, vehicles, objects, buildings, roads and border posts. Alternatively, the 36-ton vehicle helps to remove large quantities of snow, as was the case in early 2019.



Animal disease prevention and control by the THW

In 2022, the German Federal Agency for Technical Relief (THW) tested some of our decontamination components and agents in order to be prepared for animal epidemics such as african swine fever.

For further information please contact us at:

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