

FUTURETECH

Kärcher Group



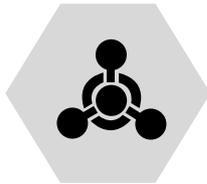
CBRN DECONTAMINATION PRINCIPLES

Innovative solutions to protect life

CBRN Threats

CBRN hazardous substances can be chemical (C), biological (B), radiological (R) and nuclear (N) in nature. An often underestimated threat comes from the release of contaminants. In industry, substances are used everyday that pose a hazard to people and the environment, and collateral damage can arise through accidental or incorrect use or even due to misuse.

The target-oriented deployment for military conflicts or terror attacks also expand the possible scenarios considerably. 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.



Chemical threats - e.g. the civil war in Syria, 2017
This includes chemical substances or preparations (mixture of substances) that are released in civilian areas, e.g. during industrial accidents or disasters, or via weapons used due to their high toxicity.



Biological threats - e.g. Ebola, 2014
This includes bacteria, fungi and their spores and viruses that spread due to outbreaks and epidemics or are introduced during asymmetrical conflicts to cause illness.



Radiological & nuclear threats - e.g. Fukushima, 2011
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.

CBRN Protection

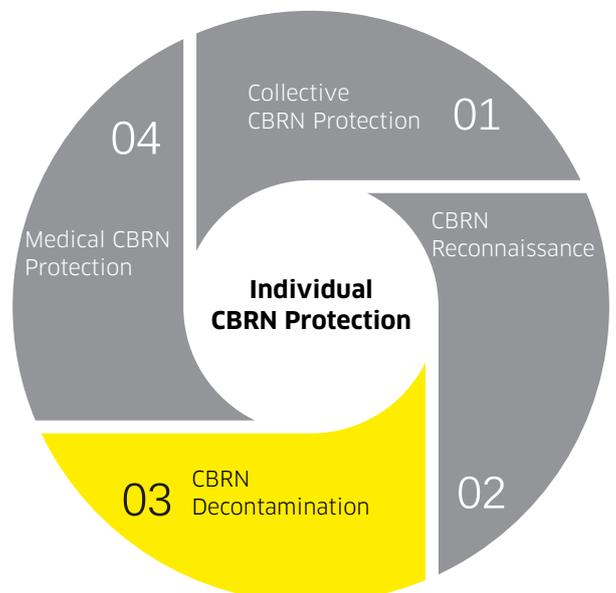
CBRN protection includes all defensive and protective measures against chemical, biological, radiological and nuclear hazards. Individual CBRN protection takes the form of personal protective equipment (e.g. a protective suit and protective mask). In order to ensure comprehensive safety, four additional subject areas must also be taken into account:

01 - "Collective CBRN protection" should be ensured via suitable construction measures (e.g. nuclear shelters) to prevent and/or minimise as much as possible the contamination of persons in the affected area who may not have individual protective equipment.

02 - In addition, the specific hazard ("which contaminates and in which concentration") must be quickly identified via a "CBRN reconnaissance" to enable the introduction of suitable, specific countermeasures.

03 - This identification then makes it possible to perform a "CBRN decontamination" of contaminated objects or persons.

04 - If not all persons in the contaminated area could be protected against contamination via individual and/or collective CBRN protection, then the affected persons must be treated via a "medical CBRN protection".



CBRN Decontamination

Decontamination is a special type of cleaning of highly contagious, highly toxic and radioactive contaminants. It can take place naturally or it can be counteracted with active measures.

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 removed from the surfaces

of various objects such as persons, vehicles, clothing or equipment.

In this way, direct or indirect injury to people is avoided to enable additional treatments for minimised residual risk. In addition, the risk of carrying contaminants into a non-contaminated area is also prevented with the help of decontamination.



The three types of decontamination

- > **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.
- > **B-decontamination (disinfection)**
 The destruction or inactivation of pathogenic micro-organism (pathogens) or their toxins which can cause illness that can lead to death.
- > **RN-decontamination (radioactive decontamination)**
 The removal or reduction of radioactive particles that can cause considerable health impairments depending on an individual's exposure.

Qualitative level of CBRN decontamination

The avoidance 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 an efficient decontamination.

The quality of the decontamination achieved depends on the duration and the available resources. In order to be able to determine goals for specific situations, an international, qualitative level of CBRN decontamination has been formulated:

Immediate decontamination	Operational decontamination	Thorough decontamination	Clearance decontamination
Decontamination of the body surface and personal equipment by oneself or with a comrade's help immediately after an event involving CBRN agents (the reduction of the CBRN protection is not possible).	Decontamination of mission-critical areas and equipment, etc. by the crew or troop (makes it possible to continue carrying out a mission to a limited extent for a limited period of time; CBRN protection is still required).	Decontamination of persons and equipment, etc. by qualified NBC defence forces (allows the continuation of the mission; CBRN protection is no longer necessary).	Decontamination and official approval of the unrestricted continued use of decontaminated objects without need for any CBRN protection.

Factors for Decontamination



Our know-how in decon technologies and agents takes these factors into account during the planning and development of systems and concepts.

We have extensive CBRN background knowledge, proven field experience, trained employees, decontamination systems that are currently in use, and tested chemicals that are well-suited for a wide range of CBRN applications.

Overview

Personnel

Well trained manpower is a critical factor for a safe and thorough decontamination, as well as their psychological and physiological condition.

Climate

Meteorological factors such as temperature, wind, precipitation and humidity influence the type of contamination distribution. The interplay of these factors also has a decisive influence on the procedure used for decontamination.

Contamination type

The decontamination methods to be carried out depend on the type and spread of CBRN contamination present and their effective specific physical and chemical parameters.

Regulations

Decontamination systems have to comply with national and international norms, such as the NATO Standardization Agreement STANAG 4521.

Technologies

A suitable process and suitable technology for decontamination must be used depending on the object requiring decontamination and the type of contamination present.

Agents

For humans, even a 1 % residual contamination can be lethal. Therefore, thorough decontamination and one that is as residue-free as possible is the objective. Decontamination agents that are matched to the corresponding hazardous substances achieve better results in contrast to universal decontamination agents and therefore better meet the requirements profile of thorough decontamination.

Kärcher Futuretech offers GDS 2000 for C-decontamination and BDS 2000 for B-decontamination. RDS 2000 was developed to fight RN contaminants.

› A sample of our decontamination solutions.



1 DSAP
For decontamination of persons



2 Hot Gas Chamber
For decontamination of heat resistant material

Our Competencies

We deliver systems for the safe decontamination of affected people, vehicles, terrain, high-value devices and sensitive equipment, which have already been tested under realistic conditions.



1 Decontamination of persons

The decontamination systems from Kärcher Futuretech are consistently designed for fast deployment and operational readiness largely independent of an available infrastructure. The entire operating concept is performed with the help of wet chemical decontamination technologies and is optimised for quick and effective treatment. In case of a large-scale emergency, it is also easy to use by civilians. Clear symbols and an intuitive design make sure of this.



2 Decontamination of material and clothing

In the event of major disasters, the availability and/or supply of personal protective clothes, detection material and other required pieces of equipment are limited. Kärcher Futuretech provides systems based on heat, steam and wet decontamination methods for the decontamination of protective clothing and equipment, thus enabling you to maintain operational readiness.



3 Decontamination of sensitive material

Laptops, communication and detection equipment and other important devices cannot withstand heat or wet decontamination processes. Therefore, Kärcher Futuretech has developed a vacuum decontamination technology based on extensive studies and real contaminants tests.



4 Decontamination of large equipment and vehicles

Our operating concept uses wet chemical decontamination and includes a three-phase process in which the complete treatment of the vehicle surface takes place down to the underbody using high-performance devices from Kärcher: a pre-treatment is necessary to remove dirt with water and the CBRN contaminants contained therein. The main treatment is the actual decontamination and includes the application of the corresponding decontamination agent. The after-treatment includes the removal of the residuals using hot water.



5 Decontamination of infrastructure and interiors

After a contamination incident, interiors of vehicles, buildings and wide areas such as road sections may be affected as well. In order to decontaminate e.g. curved shapes of surfaces and the large areas of buildings from the ceiling to the cellar Kärcher Futuretech offers spray extraction and fogging devices for whole room interiors or high performance application equipment as a spray-bar for road sections.



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