


VSH1230 Clean Agent Fire Suppression System
Novec™ 1230 Extinguishing Agent
Operation Manual



Viking Special Hazards

 **WARNING:** Cancer and Reproductive Harm-
www.P65Warnings.ca.gov



Read this manual prior to performing any task!

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- ⚠** This manual provides information on how to handle the fire extinguishing system VSH1230 (hereinafter referred as the "system") in a safe and efficient manner. This manual is an integral part of the system and must be kept in its immediate vicinity at all times. It is intended for the owner of the system ↪ *Chapter 2.5.1 "Qualifications" on page 19.*

Before commencing any work, the personnel must have carefully read and understood this manual. It is essential for the safe operation of the system that all safety information and operating instructions provided in this manual be observed. In addition to the information provided in this manual, all local accident prevention and general safety regulations applicable at the system's location must be observed. All images contained in this manual are intended to provide a general understanding and may vary from the model of the system you purchased.

This operating manual does not contain extensive information about installation, service and project planning. An installation and maintenance manual can be ordered from the manufacturer (↪ page 2) with the part number 916657. For the project planning of VSH1230 fire extinguishing systems, a design manual can be ordered from the manufacturer with the part number 916659.

The operation of the DesignManager software is described in a separate document (part number 924240).

Limitations of liability

All specifications and information provided in this manual have been compiled in consideration of all applicable standards and regulations as well as the state of the art. The manufacturer shall not be liable for any damages caused by:

- Failure to follow the instructions provided in this manual
- Disregarding local, federal, and state provisions and any regulations regarding the installation, operation and maintenance of fire extinguishing systems
- Operating the system in environmental and usage conditions other than the ones for which the system has been designed
- Improper use
- Use of untrained personnel

- Technical modifications not authorized by the manufacturer
- Use of unapproved components
- Non-compliance with maintenance intervals

Fire extinguishing systems are engineered to meet the standards of NFPA 2001, ISO 14520, EN 15004, FM Global, UL, CEA 4045 or other similar organizations, and will also need to comply with the provisions of governmental codes, ordinances, and standards where applicable. The system must be designed by qualified design professionals in conjunction with insuring bodies. The Authorized Distributor and the user are responsible for the design and configuration of the system, its appropriateness for the use intended and its compliance with all standards, codes, ordinances and the use intended. The manufacturer or private labeler of the products, described in this manual, does not design systems for specific installations and makes no representation or warranty concerning whether any specific system installation will be sufficient for the intended use or will comply with any standard, code or ordinance.

System depictions, calculations, graphs or reports provided by the manufacturer or private labeler of the products, described in this manual, are for illustrative purposes only, and are not warranted to be representative or descriptive of any specific system, installation or design, or of the performance of or results attainable through same. The manufacturer or private labeler and its representatives disclaim use of the accompanying system depictions, calculations, graphs and reports for any purpose other than illustration; any other application or usage is solely the responsibility of the user.

Customer service

Our customer service department will be happy to assist you with any technical question you may have regarding the system. For contact information and additional details, please log on to our website (↗ page 2). The members of our staff are, furthermore, always interested in obtaining information and learning about the experiences our customers have made while using our products as these may contribute to their improvement.

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1 General

Overview (sample)

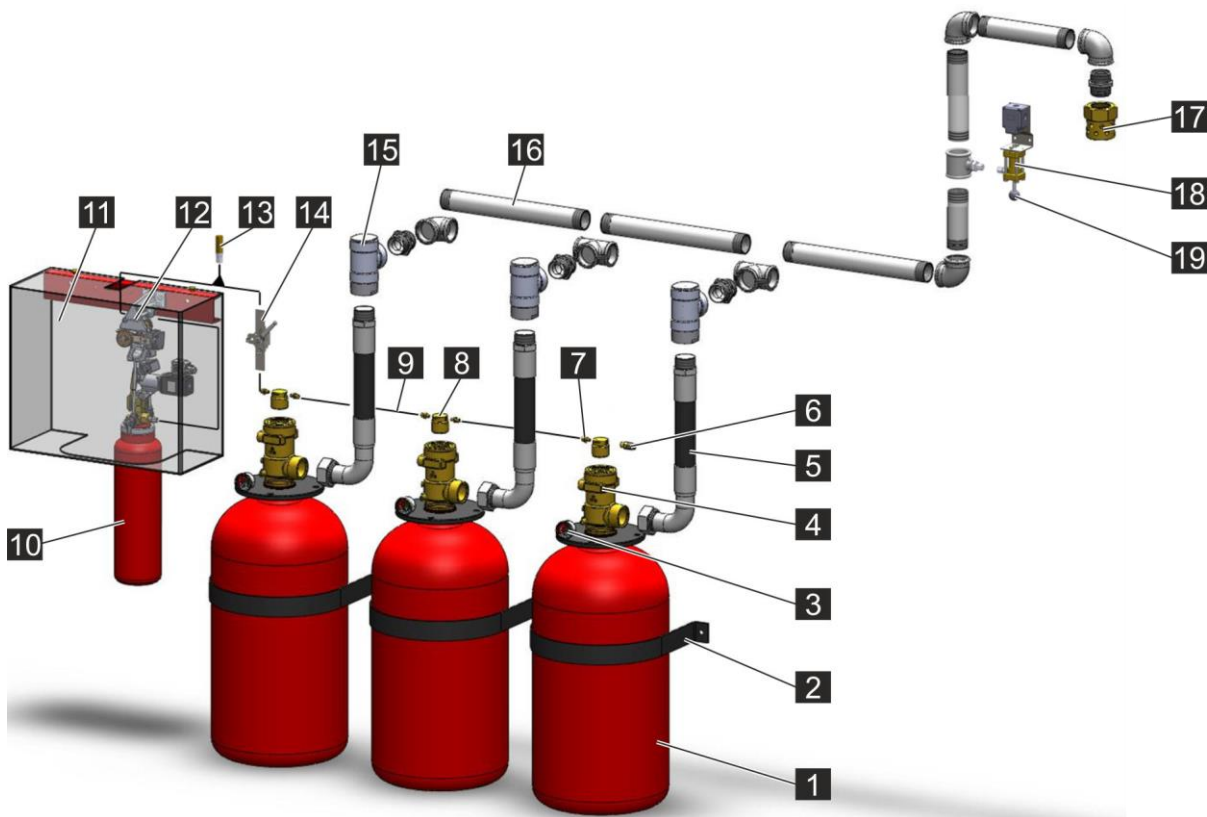


Fig. 1: Multi container system with pneumatic release device (PAE)

- | | |
|--|--|
| 1 Extinguishing agent container | 11 Protective cover |
| 2 Clamp | 12 Pneumatic release device (PAE), complete |
| 3 Pressure gauge/Contact pressure gauge | 13 Safety device malfunction pressure (safeguard against slow gas leaks) |
| 4 Valve | 14 Blocking device |
| 5 DN40/DN50 hose (1 1/2 inch and 2 inch) | 15 Check valve |
| 6 Manual pressure relief valve | 16 Pipeline |
| 7 Adapter | 17 Discharge nozzle |
| 8 Release device, pneumatic | 18 Pneumatically actuated limit switch |
| 9 DN4 hose (5/32 inch) / pilot line | 19 Manual release of the limit switch |
| 10 Pilot cylinder | |

1.1 Non-approved items

Please note, that some of the mentioned parts or system components in this document are not UL¹⁾ listed, not FM²⁾ Approved, not VdS³⁾ approved or not CNPP/A2P⁴⁾ approved.

These parts or system components are distinguished with

- an asterisk combined with "not UL", for those parts or system components not UL listed, example: Component* not UL.
- an asterisk combined with "not FM", for those parts or system components not FM Approved, example: Component* not FM.
- an asterisk combined with "not VdS", for those parts or system components not VdS approved, example: Component* not VdS.
- an asterisk combined with "not CNPP/A2P", for those parts or system components not CNPP/A2P approved, example: Component* not CNPP/A2P.

You will find the distinguished marks at the headlines.

¹⁾ Underwriters Laboratories

²⁾ FM Approvals

³⁾ VdS Schadenverhütung GmbH

⁴⁾ Centre National de Prévention et de Protection / A2P

1.2 Copyright

Any content in this document, particularly texts, photos, and graphics, are protected by copyright. If not otherwise clearly indicated, copyright lies with the manufacturer. Permission to use any content of this document must be obtained from the manufacturer. Anyone violating copyright law, e.g. by copying the contents into their own documentation without the respective permission, is liable to prosecution. Copyright violators shall also receive a written warning and be liable to pay costs.

1.3 Abstract

The system uses Novec™ 1230 manufactured by 3M™ (hereinafter referred to as "extinguishing agent") as its extinguishing agent.

This extinguishing agent is suitable for suppressing class A and class B fires and stored in the system's extinguishing agent containers. To create the pressure necessary for the agent to be released, the extinguishing agent containers are superpressurized with nitrogen at a pressure of 25 bar (360 psi), 42 bar (610 psi) or 50 bar (725 psi).

The system is activated by release devices located on the valves of the extinguishing agent containers or integrated in the valves. The valves open, and the extinguishing agent flows through the pipelines of the extinguishing agent containers to the discharge nozzles, where it vaporizes.

For more detailed brief descriptions of the different system models, please refer to the description of the system ↪ *Chapter 3 "Design and function" on page 32.*

Use the system only as intended in order to ensure its proper and trouble-free operation ↪ *Chapter 2.2 "Intended use" on page 12.*

2 Safety

This section provides an overview of all important aspects that are essential for the protection of personnel as well as safe and trouble-free operation. Additional task-specific safety instructions will be provided in the sections that refer to the individual life stages of the plant.

2.1 Explanation of symbols

Safety and warning notices

Safety and warning notices are marked with symbols in this document. The introductory signal words express the respective extent of the danger.

 **DANGER**

The signal word describes a danger with a high risk level. If the danger is not avoided, it will result in death or serious injury.

 **WARNING**

The signal word describes a danger with a medium risk level. If the danger is not avoided, it may result in death or serious injury.

 **CAUTION**

The signal word describes a danger with a low risk level. If the danger is not avoided, it may result in minor or moderate injury.

NOTICE

The signal word describes a danger with a low risk level. If the danger is not avoided, it may result in property and environmental damage.

Further markings



This marking emphasizes useful tips and recommendations as well as information for efficient and trouble-free operation.

Safety instructions in behavior guidelines

Safety instruction can refer to specific, individual behavior guidelines. Such safety guidelines are embedded in behavior guidelines so that they do not interrupt the reading flow when executing the action. The signal words described above are used.

Example:

1. ➤ Unscrew screw.
2. ➤ **L CAUTION! Clamping danger on the cover.**
Carefully close the cover.
3. ➤ Tighten screw.

Additional markings

This manual uses the following markings to highlight instructions, results, lists, references and other elements:

Marking	Explanation
⇒	Results of operating steps
↪	References to sections in this manual and other applicable documents
•	Unordered lists

2.2 Intended use

This system is intended to be used only for the proper purpose described herein.

The VSH1230 fire extinguishing system is intended only for suppressing fires in enclosed rooms using Novec™ 1230 extinguishing agent.

Typical fire hazards for which the system is suitable include:

- Electric or electronic equipment
- Telecommunications equipment
- Flammable and combustible liquids
- Other goods of particularly high quality

The system may only be used in the environmental and usage conditions for which it has been designed.

Intended use also includes the adherence to all specifications regarding assembly, installation, maintenance, and inspection.

Incorrect use

Any other use exceeding or deviating from the scope of intended use is considered incorrect use.

⚠ WARNING**Risk from incorrect use!**

- Do not perform any structural modifications on the protected enclosure or the system.
- Do not use the protected enclosure for any purpose other than the one designed by the Authorized Distributor.
- Do not block the discharge nozzles or the ventilation equipment.

If used incorrectly, the VSH1230 fire extinguishing system may lead to personal injury and property damage.

Do *NOT* use the system in conjunction with the following fire hazards:

- Chemicals that release oxygen
- Mixtures containing oxidizing substances (e. g. sodium chlorate, sodium nitrate, explosives, gunpowder)
- Chemicals capable of thermally decomposing autonomously (e. g. certain organic peroxides)
- Reactive metals (e.g. sodium, potassium, magnesium, titanium or zirconium) and reactive hybrids or metal amides
- The effects of agent decomposition on fire protection effectiveness and equipment shall be considered where using clean agents in hazards with high ambient temperatures (e.g., furnaces and ovens)

2.3 Safe operation

If system components are used improperly or for other than their intended purpose, the system in which they are used can pose hazards or be impaired. Only use undamaged and fully functional products and machines. If safe operation (e.g. visible damage) can no longer be assured, put the system out of operation without delay and secure against accidental start-up.

Also observe the following:

- Do not carry out any changes, extensions or modifications without the express permission of the manufacturer or distributor.
This also applies to welding work on load-bearing parts.
- Replace components not in perfect order immediately.
- Use only original spare and wear parts.

Also observe the following basic details:

- National safety regulations
- National accident prevention regulations
- National assembly and installation regulations
- Generally accepted technical principles
- Safety and warning notices as described in this document
- Demands on personnel as described in this document

2.4 General dangers

The following section describes remaining risks that can arise from the system even with proper use.

In order to reduce risks of personal injury and property damage and avoid dangerous situations, the safety instructions listed here and the safety instructions in the other sections of these instructions must be followed.

2.4.1 General dangers associated with fire extinguishing systems

Electrical current

⚠ DANGER

Risk of death due to electric shock!

- Allow only qualified electricians to work on electrical components and the electrical connection.
- Shut down the power supply immediately and consult the Authorized Distributor in the event of damage to the wire insulation.
- Keep moisture away from live components. This may lead to short circuits.

An imminent, risk of death due to electric shock exists if live components are touched. Damage to the wire insulation of individual components involves the risk of fatal injury.

High extinguishing agent concentration

⚠ WARNING

There is a life-threatening danger if the extinguishing agent concentration is too high!

- When handling extinguishing agent, always ensure sufficient ventilation or extraction. If this cannot be ensured, use a self-contained breathing apparatus.
- Avoid inhaling vapors, aerosols, and atomized spray that exceed the recommended exposure limits per NFPA 2001.

If the extinguishing agent concentration exceeds 10 % by vol. (NOAEL), the extinguishing agent can have a toxic effect. There is a danger of harming the heart and lungs, and danger of suffocating due to the reduced oxygen content in the air.

Decomposition products

 **WARNING**

Risk of injury from developing products of decomposition and fire smoke!

- Leave the extinguishing zone without delay and within the pre-discharge timer when an alarm is given.
- Do not re-enter the extinguishing zone after a fire until the fire department has given the all-clear.

Fires generate products of decomposition which may lead to chronic damage to a person's health if inhaled or coming into contact with the skin.

Pressurized extinguishing agent

 **WARNING**

Danger of injury due to pressure in extinguishing agent containers!

- Do not transport or store extinguishing agent containers unless they are sealed with a protective valve cap and an anti-recoil cap.
- Make sure the extinguishing agent container is adequately braced utilizing clamps.
- Have damaged extinguishing agent containers replaced immediately by the Authorized Distributor.

If pressurized extinguishing agent containers are damaged and extinguishing agent escapes uncontrollably, there is a risk of death.

Tipping extinguishing agent containers

 **WARNING**

Danger of injury due to tipping extinguishing agent containers!

- Allow only the Authorized Distributor or service personnel authorized by the Authorized Distributor to transport extinguishing agent containers.

Extinguishing agent containers are heavy and may have a high center of gravity depending on the design. If extinguishing agent containers tip while being handled, this can lead to severe injuries.

2.4.2 Dangers when the system is activated

Cold extinguishing agent

⚠ WARNING**Risk of injury from cold extinguishing agent!**

- Leave the extinguishing zone without delay and within the pre-discharge timer when an alarm is given.
- Stay out of the direct flow area of a discharge nozzle.

The extinguishing agent exiting at the discharge nozzles is very cold. Direct contact may result in injury.

Shock

⚠ WARNING**Risk of injury from shock!**

- Inform all persons staying inside or close to the protected enclosure about the existence of an automatic fire suppression system and the possibility of the system's activation.
- Make persons familiar with the procedures required in the event of an alarm, a fire or the activation of the fire suppression system.
- If in doubt, deny persons direct access to the protected enclosure.

The activation of the system involves noises from the discharged agent which may surprise persons to an extent that they suffer shock.

Faulty activation

⚠ WARNING**Risk of injury from faulty activation!**

- Activate the system only in the event of a fire.
- Protect the manual release devices in the protected enclosure from inadvertent activation.
- Refrain from smoking inside the protected enclosure.
- Before performing any work generating heat and smoke, observe the following:
 - Isolate the system.
 - Switch off the fire alarm system.

A faulty activation of the system may cause severe injuries and property damage.

Falling and flying objects

⚠ WARNING

Risk of injury from falling and flying objects!

- Do not place any loose objects into the discharge area of the discharge nozzles.
- Leave the extinguishing zone without delay and within the pre-discharge timer when an alarm is given.

The discharge velocity of the extinguishing agent may cause objects to tip over or become airborne. This may lead to severe injuries.

Noise

⚠ WARNING

Risk of injury from noise!

- Leave the extinguishing zone without delay and within the pre-discharge timer when an alarm is given.
- Stay out from the immediate vicinity of acoustic alarm equipment and discharge nozzles.

High sound pressure levels caused by discharged gas and acoustic alarm equipment (e. g. signal horns) may cause hearing damage.

Effects of cold

NOTICE

Property damage from cooling ambient air!

- Do not attach/store components that are sensitive to cold in the immediate vicinity of the discharge nozzles.

The discharged extinguishing agent extracts heat from the ambient air contained in the extinguishing zone in order to put out the flames. This cools down the extinguishing zone by as much as 20 °C (36 °F) when fighting a fire.

Overpressure/underpressure

NOTICE

Property damage from overpressure/underpressure!

- Ensure that pressure relief devices are installed in the protected enclosure and included in the design of the system, per NFPA 2001.
- Make sure that the function of the pressure relief is checked regularly.

Immediately after activated, the system briefly generates an underpressure which will then turn into an overpressure. This may cause damage to the walls of the protected enclosure.

2.5 Personnel requirements

2.5.1 Qualifications

The different tasks described throughout this manual require different qualifications and skills from the persons entrusted with these tasks.

WARNING

Risk from insufficiently qualified personnel!

- Allow only qualified personnel to perform the work.

Insufficiently qualified personnel is incapable of assessing the risk involved in handling the system and may cause severe or fatal injuries to themselves or others.

All work must be limited to personnel that can be expected to complete the work in a reliable manner. Persons whose ability to respond is impaired, for example, by drugs, alcohol or medication are not permitted.

The following is a list of qualifications this manual specifies as necessary for the persons entrusted with completing the different work tasks:

Authorized Distributor

The Authorized Distributor has verifiably undergone training provided by the manufacturer during which the company was made familiar with the knowledge and procedures necessary to install, commission and service fire suppression systems in a safe manner.

Person in charge of the system

The person in charge of the system has verifiably been given instructions by the company that installed the system as to the specifics of the tasks entrusted to him/her and all possible dangers that may arise from improper conduct.

The person in charge of the system has been appointed by the owner as the person who is responsible for the correct and proper completion of the work and inspections performed on the system.

Qualified electrician

The qualified electrician is capable of performing work on electrical systems and independently detecting and avoiding any possible risks due to his/her long years of expertise and experience and his/her familiarity with all applicable standards and regulations.

A qualified electrician must also provide proof of his/her professional qualification that confirms his/her capacity to perform work on electrical systems.

The qualified electrician must comply with the provisions of all applicable legal regulations regarding accident prevention.

2.5.2 Unauthorized personnel

WARNING

Risk of injury from unauthorized personnel!

- **Keep unauthorized personnel away from controlling and regulating equipment.**
- **If in doubt, ask the respective persons to step away from the controlling and regulating equipment.**
- **Make sure that a person in charge of the system is available who has the knowledge necessary to handle the system properly.**

Unauthorized personnel who do not meet the requirements described herein are not familiar with the risks involved in activating and/or isolating the system. This will lead to risk of injury.

2.6 System-specific design specifications

The system is composed of several approved components. Please consult the Authorized Distributor when planning structural modifications to the system/the protected enclosure or any other kinds of use.

i *Never perform any structural modifications or use the protected enclosure for other purposes.*

2.7 Personal protective equipment

Personal protective equipment is designed to protect people from risks to their safety and health at the workplace.

Personnel must wear personal protective equipment, which is specially indicated in the individual sections of this document, when carrying out the various tasks.

The personal protective equipment is described in the following section:



Extinguishing-agent-resistant safety gloves

Extinguishing-agent-resistant safety gloves protect the hands from contact with extinguishing agent.



Protective goggles

Protective goggles cover the entire area of the eyes (including the sides) and are used to protect the eyes from the extinguishing agent and from particles that are whirled up by the extinguishing agent.



Safety footwear

Safety footwear protects the feet from crushing injuries, falling parts, and slipping on slippery substrates.



Safety gloves

Safety gloves are used to protect the hands from friction, abrasions, puncture wounds or deeper wounds as well as coming into contact with hot surfaces.

2.8 Operator's obligations

Owner

The owner is the person or entity that operates the equipment himself/itself for commercial or economic purposes, or who transfers the device to a third person for use/application, and who bears the legal responsibility for protecting the user, personnel, or third parties.

Owner's obligations

- It is the owner's responsibility to ensure that the system complies with the provisions and regulations applying to the operation of fire suppression systems using the extinguishing agent Novec™ 1230 and verify the system's operability. In this regard the following particularly applies:
 - comply with the applicable NFPA 2001 regulations as well as all additional local regulations applying to the operation of the system.
 - always observe the inspection intervals specified in this manual.
 - perform these inspections and operate the system following the operating instructions described throughout this manual.
 - document the results of the inspections in the report log.
 - report any detected defects and/or damage to the Authorized Distributor.
 - document all shutdowns and faults the system experiences in the report log of the system.
- The "Occupational Safety and Health Act" of 1970 specifies that a safe workplace must be provided at all times for execution of tasks. To this end, the owner must ensure that the system is inspected and operated in accordance with all applicable commercial, industrial, local, federal and state laws, standards and regulations.
- The owner must ensure that the personnel performing the work have the qualifications necessary to complete the task.
- The owner must ensure that all employees working in the protected enclosure of the system have been informed of the existence of the system and know the risks involved and the steps necessary to handle the system (e. g. behavior in the event of a fire or inadvertent activation).

- The owner must appoint a person in charge of the system, who will be instructed by the Authorized Distributor about how the system operates and the sequence of operation. The owner will confirm in the documentation of the Authorized Distributor that these instructions have been given.
- The owner must confirm to the Authorized Distributor that the system's function and mode of operation have been understood and the system was ready for operation when accepted by the owner.
- The owner must ensure the availability of substitute extinguishing agents suitable for fire fighting in case the system is taken out of operation/disassembled.
- The owner must identify all extinguishing zones and specify that they are equipped with a fire suppression system.

2.9 Safety devices

WARNING

Risk of injury due to non-functioning safety devices!

- **Before starting work check whether all safety devices are functioning and correctly installed.**
- **Never render safety devices inoperable or bypass safety devices.**
- **Ensure that all system safety devices are always accessible.**

If safety devices are not functioning or have been rendered inoperable there is danger of severe injuries and considerable material damage.

The system has various safety devices that are described below.

Bursting disks

Bursting disks are safety devices that protect a container from excess pressure. If a critical pressure level is exceeded the disk bursts, the excess pressure is dissipated.

Bursting disks that have burst must be replaced.

Pressure relief dampers

Pressure relief dampers are installed in the exterior walls of buildings to dissipate the pressure increase or drop that occurs when the system is activated.

Pressure relief dampers are closed in idle position. If there is an increase or drop in pressure over or under a specified value the pressure relief dampers open and ensure that the pressure is relieved.

Pressure relief valves

Pressure relief valves are used to manually vent pilot lines. This ensures that the pilot lines can be depressurized without having to disconnect them.

Malfunction pressure safety device (SFD safeguard against slow gas leaks)

The "malfunction pressure safety device" dissipates a slow increase in pressure via a vent bore. Slow gas leaks can occur, for example, if there are leaks in the extinguishing agent container. The "malfunction pressure safety device" closes automatically if there is an abrupt pressure increase through an activation, so that the pilot line of the respective extinguishing zone is closed at flooding.

Safety valve

Safety valves are attached wherever dangers exist due to unreliably high pressure, e. g. at distributors for multi-zone systems.

In the event of impermissibly high pressure the safety valve ensures pressure compensation. The blow-off lines connected to the safety valve safely dissipate the medium.

Check valves

Check valves permit the flow of extinguishing agent in the flow direction and prevent it in the opposite direction. They are located at the transitions of hose to manifold.

Protective valve caps

Protective valve caps are used to protect sensitive components (e.g. valves) of the extinguishing agent containers. They prevent the valves from being damaged during transport. The protective valve caps must be attached before each transport.

Anti-recoil cap

The anti-recoil caps seal the valve outlets so that extinguishing agent does not escape in the event of unintentional release. They are provided with vent bores in order to enable a controlled release of pressure in case of unintentional activation.

The anti-recoil caps are secured with chains so that they are not lost.

2.10 Signage



The following symbols and information signs have been attached in the area of the system.

Risk from illegible or missing signs!

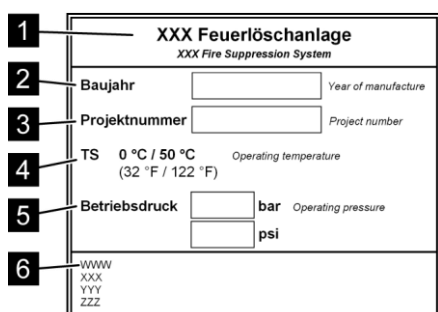
- Keep all safety, warning and operating instructions easily legible at all times.
- Immediately replace damaged signs or stickers.

Over time, stickers and signs can become dirty or illegible for other reasons, so that risks can no longer be recognized and necessary operating instructions can no longer be adhered to. This will lead to risk of injury.

System labeling

In addition to the information on the type plate attached to the extinguishing agent container, the system should be labeled with the following information.

Fig. 2 shows an example of a label. The actual layout depends on the local conditions.



- 1 System type (shown here as a placeholder)
- 2 Year of manufacture
- 3 Project number
- 4 Application temperature range
- 5 Operating pressure of the extinguishing agent containers
- 6 Authorized Distributor (shown here as a placeholder)

Fig. 2: System labeling (example)

Identification of the extinguishing zones



Fig. 3: Identification of the extinguishing zones

Non-toxic, non-flammable gas



This sign identifies containers containing non-toxic and non-flammable gases.

Inhaling high concentrations of these gases is hazardous to a person's health. Coming into contact with liquefied gas involves the risk of sustaining frostbite.

Protect the containers from tipping over and falling down as well as from heating, impact, and shock. Keep away from sparks, flames, and other sources of ignition. Do not smoke. The extinguishing agent containers are subject to labeling requirements as they are pressurized with nitrogen.

The owner must attach a sign to the access doors to identify the extinguishing zone, warning of the existence of a fire suppression system and the risks involved.

The text marked in Fig. 3 states:

- This area is protected by a VSH1230 fire suppression system

Alternatively, there are two additional variants for the text, the use of which is regulated by NFPA 2001 or local provisions.

- Do NOT enter unless automatic release is isolated
- Do NOT enter unless isolate valve is in the closed position

Labeling of extinguishing agent containers (labeling of dangerous substances)

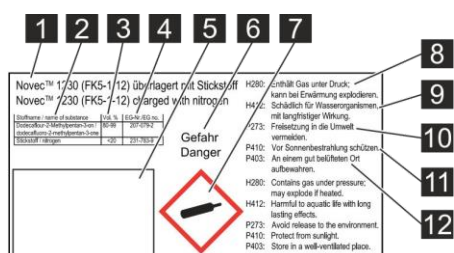


Fig. 4: Labeling in accordance with CLP/GHS

- 1 Extinguishing agent¹⁾: Novec™ 1230 (FK-5-1-12) charged with nitrogen
 - 2 Substance name¹⁾
 - 3 Volume percent¹⁾
 - 4 EC no.¹⁾
 - 5 Address label of the private labeler (system manufacturer)
 - 6 Signal word: Danger
 - 7 Hazard pictogram (GHS04)
 - 8 Danger note *H280*: Contains gas under pressure; may explode if heated
 - 9 Danger note *H412*: Harmful to aquatic life with long lasting effects
 - 10 Safety instruction *P273*: Avoid release to the environment
 - 11 Safety instruction *P410*: Protect from sunlight
 - 12 Safety instruction *P403*: Store in a well-ventilated place
- 1) Product identifier

Table 1: Product identifiers (🔗 Fig. 4)

Substance name	Volume percent	EC no.
Dodecafluoro-2-methylpentan-3-one	80-99	207-079-2
Nitrogen	< 20	231-783-9

Name plate - extinguishing agent container

There is a name plate on every container providing specific information about this container. It contains the specifications listed below.

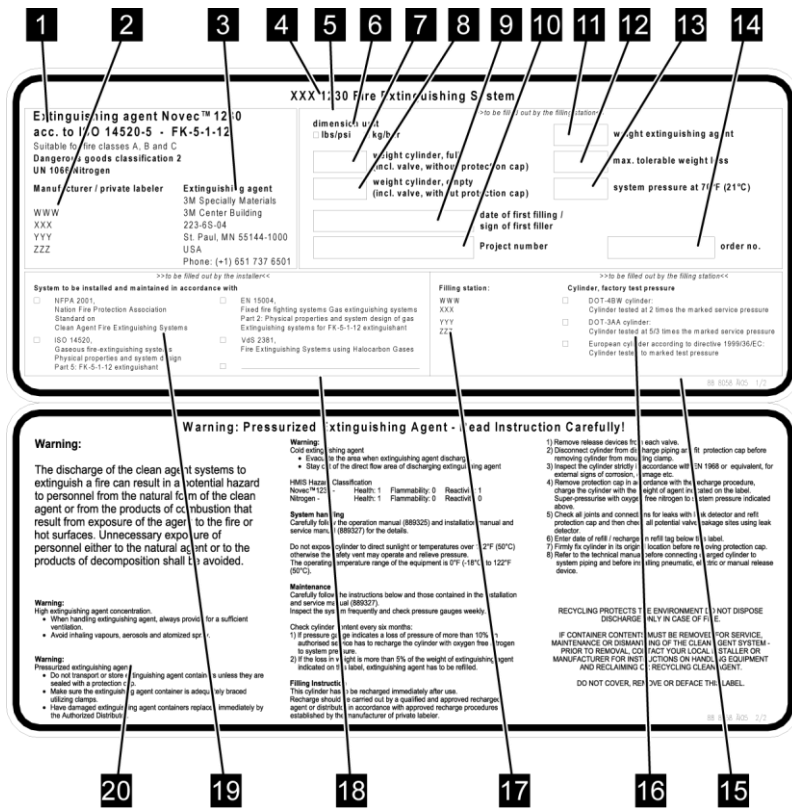


Fig. 5: Name plate - extinguishing agent container

- 1 Extinguishing agent filled
- 2 Manufacturer of the fire suppression system (shown here as a placeholder)*
- 3 Manufacturer of the extinguishing agent
- 4 Type of the fire suppression system (shown here as a placeholder)*
- 5 Field to be filled out by the refilling company
- 6 Unit, lbs/psi or kg/bar
- 7 Weight of the extinguishing agent container, full (including valve, without protective valve cap)
- 8 Weight of the extinguishing agent container, empty (including valve, without protective valve cap)
- 9 Date of first fill/Identification of the initial filling company
- 10 Project number
- 11 Weight of the extinguishing agent
- 12 Maximum permissible weight loss
- 13 System pressure at 21 °C (70 °F)
- 14 Part number of the extinguishing agent container
- 15 Field to be filled out by the refilling company
- 16 Specification of the type of pressure test of the extinguishing agent container
- 17 Refiller (shown here as a placeholder)

18 Field to be filled out by the Authorized Distributor
19 Specification of regulations with which the system complies

20 Safety instructions, handling of the system, filling and maintenance instructions

* printed on the name plate by the manufacturer

Languages

The extinguishing agent containers are delivered with original type plates in German and English. Type plates in other languages have to be ordered. Please contact your Authorized Distributor.



All specifications missing in these type plates have to be copied from the original type plate by the Authorized Distributor. This also applies to specifications of original type plates, that are printed by the manufacturer or completed by the filling company.

Marking extinguishing agent containers with the UL mark/FM mark

Extinguishing agent containers filled in accordance with UL requirements, are marked in the factory with a UL sticker. Retroactive marking of extinguishing agent containers with the UL mark that are not factory marked is not permitted.

Extinguishing agent containers filled in accordance with FM requirements, are marked in the factory with a FM sticker. Retroactive marking of extinguishing agent containers with the FM mark that are not factory marked is not permitted.

2.11 Environmental protection

NOTICE

Danger to the environment due to incorrect handling of materials that can harm the environment!

- Always heed the notes below about the handling of materials that can harm the environment and their disposal.
- If materials that can harm the environment accidentally escape into the environment, take suitable measures immediately. In case of doubt, inform the responsible local authority about the damage and ask what suitable measures to take might be.

In case of incorrect handling of materials that can harm the environment, especially improper disposal, there can be significant damage to the environment.

The following materials that might harm the environment are used:

Extinguishing agent Novec™ 1230

The extinguishing agent has been classified as slightly reactive to water. It must be disposed of in accordance with all applicable local waste disposal regulations. Follow the safety data sheet for the extinguishing agent (→ Appendix).

The photolytic half-life of the extinguishing agent is 3 – 5 days. The global warming potential (GWP) value is 1, while the value of the ozone decomposition potential (ODP) is 0.

2.12 Behavior in the event of a fire

Preventive steps

- Be prepared for fires and accidents at all times!
- Keep first-aid equipment (first-aid kit, blankets, etc.) and substitute extinguishing agents (e. g. fire extinguisher) in proper working order and readily available.
- Familiarize personnel with accident prevention, first aid and rescue equipment as well as options for activating the system manually.
- Keep access paths clear for rescue vehicles.

Steps in the event of a fire

⚠ WARNING**Danger to life from fire!**

- Leave the extinguishing zone immediately if it is affected by fire.
- Do not re-enter the extinguishing zone after a fire until the fire department has given the all-clear.

Severe fire smoke may develop when a fire erupts and while the fire is being suppressed. Staying inside a burning extinguishing zone may lead to severe injuries or death.

When the alarm equipment of the system is activated (main alarm), a pre-discharge timer (generally 10 s) will start to elapse. The system will subsequently be activated when the pre-discharge timer has elapsed.

Take the following steps when a fire erupts:

- If there is no risk to a person's health, activate the system manually when it is obvious that smoke/fire has developed.
- Provided there is no risk to your own health, evacuate all persons from the hazard zone.
- Leave the extinguishing zone immediately.
- Initiate first-aid measures if necessary.
- Alert any endangered persons in the adjoining areas.
- Notify the fire department and/or emergency medical services.
- Notify the person in charge at the system's location.

After the system is activated

The behavior after the activation of the system is subject to specific rules of conduct, which will be explained in a separate section.

3 Design and function

3.1 Single zone systems

Single container systems

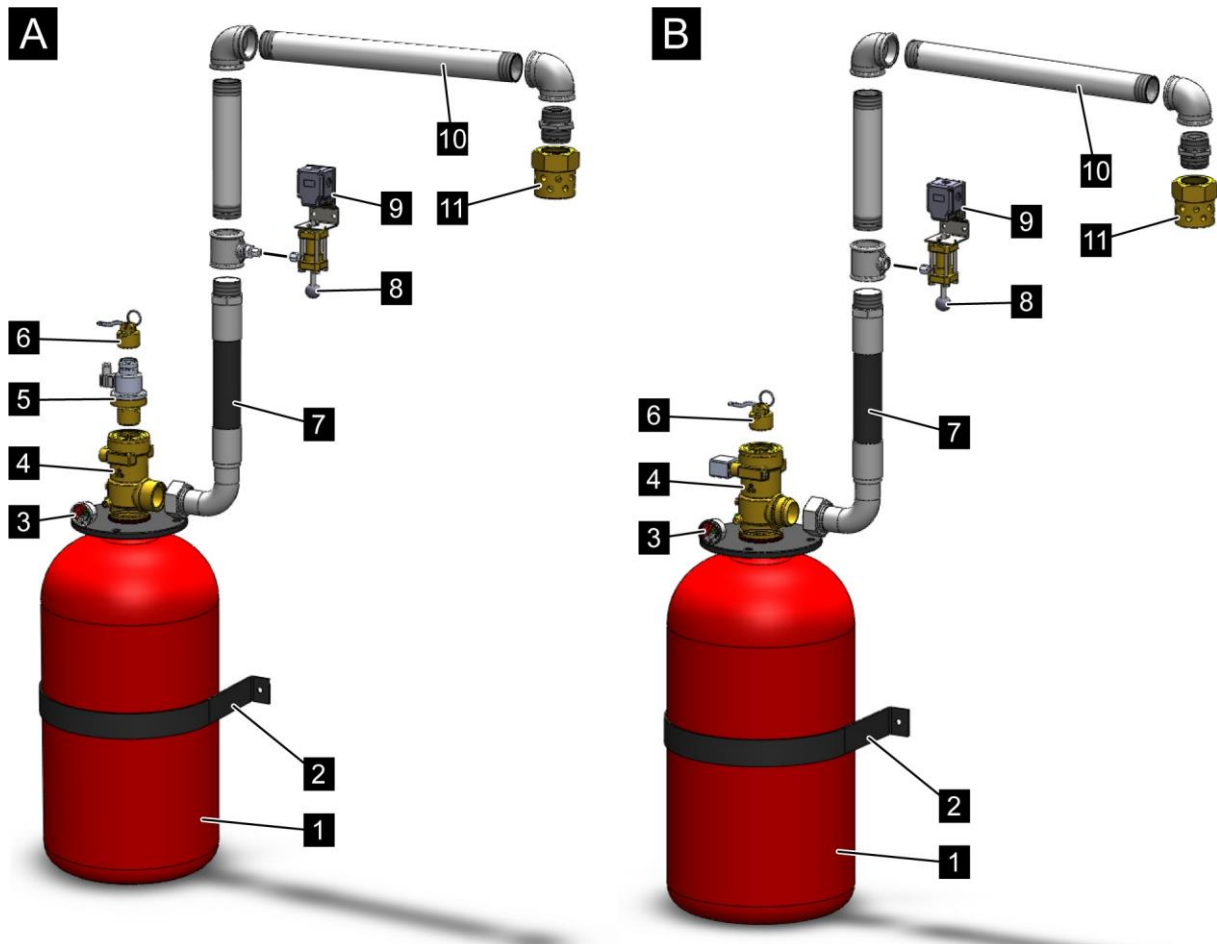


Fig. 6: Single container system

- | | |
|--|--|
| 1 Extinguishing agent container | 6 Release device, manual or pneumatic/
manual |
| 2 Clamp | 7 Hose DN40/DN50 (1 1/2" and 2") |
| 3 Pressure gauge/Contact pressure
gauge | 8 Manual release of the limit switch |
| 4A Valve | 9 Pneumatically actuated limit switch |
| 4B Valve with integrated electrical release | 10 Pipeline |
| 5 Release device, electric (also available
with a mechanic blocking device) | 11 Discharge nozzle |

Multi container system

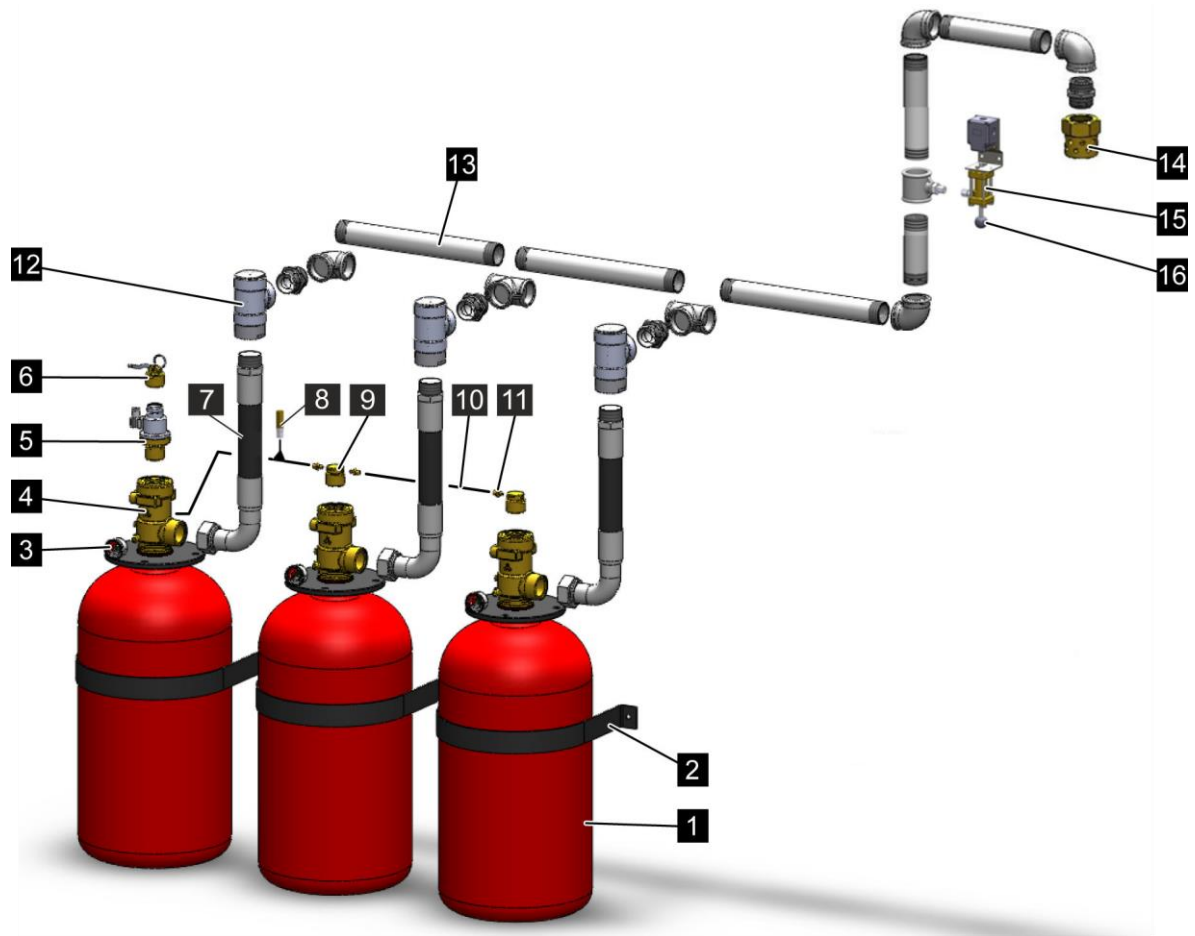


Fig. 7: Multi container system

- | | |
|---|---|
| 1 Extinguishing agent container | 8 Safety device malfunction pressure (safeguard against slow gas leaks) |
| 2 Clamp | 9 Release device, pneumatic |
| 3 Pressure gauge/Contact pressure gauge | 10 Hose DN4 (pilot line; $\frac{5}{32}$ ") |
| 4 Valve | 11 Adapter |
| 5 Release device, electric (also available with a mechanic blocking device) | 12 Check valve |
| 6 Release device, manual or pneumatic/manual | 13 Pipeline |
| 7 Hose DN40/DN50 (1 $\frac{1}{2}$ " and 2") | 14 Discharge nozzle |
| | 15 Pneumatically actuated limit switch |
| | 16 Manual release of the limit switch |

Multi container system with redundant electrical release

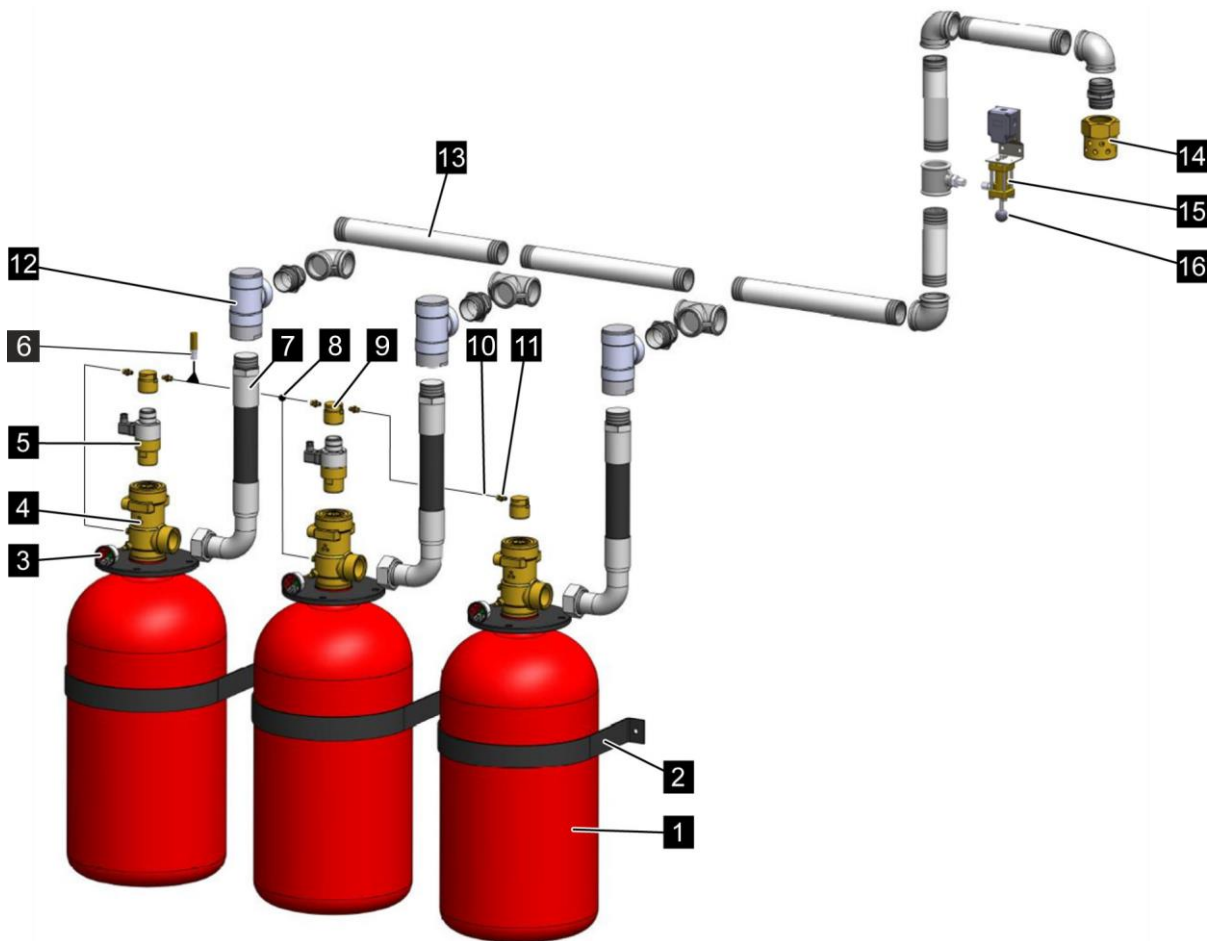


Fig. 8: Multi container system with redundant electrical release

- | | |
|---|--|
| 1 Extinguishing agent container | 8 Threaded union T 6-PL (part number 125633) |
| 2 Clamp | 9 Release device, pneumatic |
| 3 Pressure gauge/Contact pressure gauge | 10 Hose DN4 (pilot line; $\frac{5}{32}$ ") |
| 4 Valve | 11 Adapter |
| 5 Release device, electric (also available with a mechanic blocking device) | 12 Check valve |
| 6 Safety device malfunction pressure (safeguard against slow gas leaks) | 13 Pipeline |
| 7 Hose DN40/DN50 (1 $\frac{1}{2}$ " and 2") | 14 Discharge nozzle |
| | 15 Pneumatically actuated limit switch |
| | 16 Manual release of the limit switch |

**Multi container system with
pneumatic release device
(PAE)**

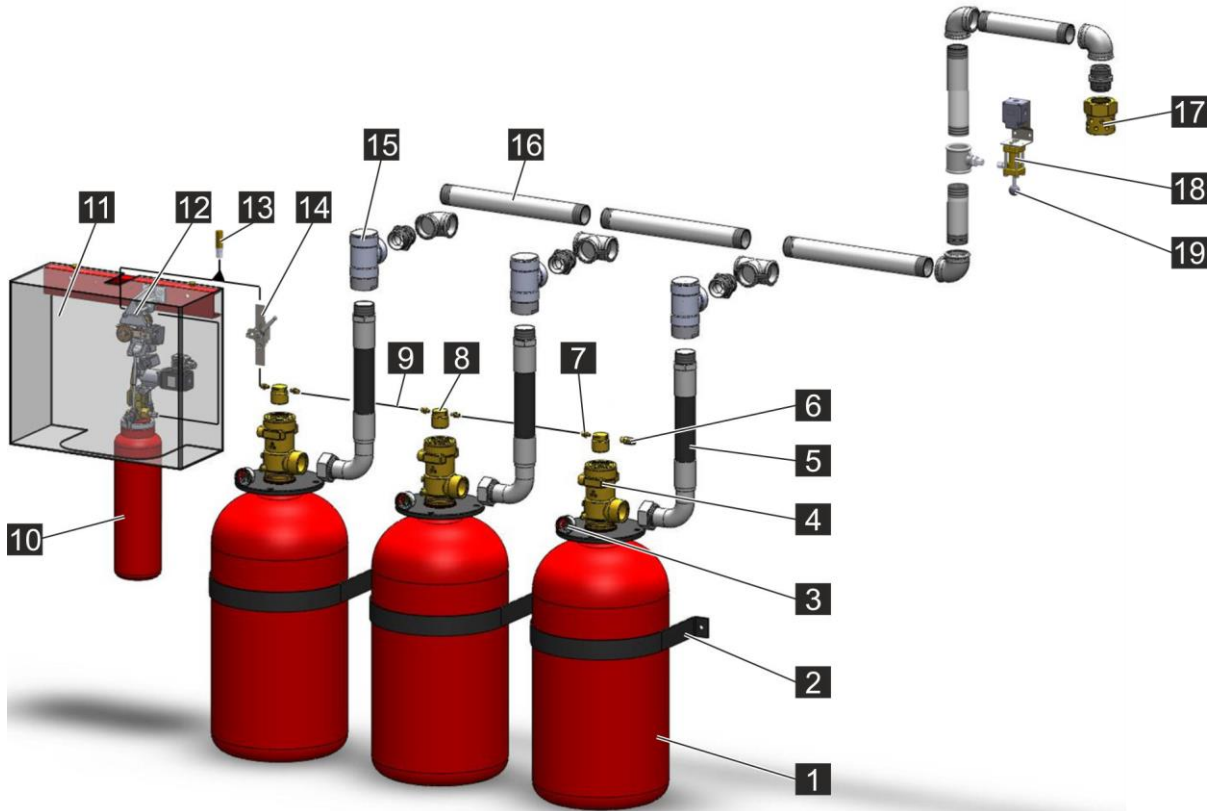


Fig. 9: Multi container system with pneumatic release device (PAE)

- | | |
|---|--|
| 1 Extinguishing agent container | 11 Protective cover |
| 2 Clamp | 12 Pneumatic release device (PAE), complete including weighing device |
| 3 Pressure gauge/Contact pressure gauge | 13 Safety device malfunction pressure (safeguard against slow gas leaks) |
| 4 Valve | 14 Blocking device |
| 5 Hose DN40/DN50 (1 1/2" and 2") | 15 Check valve |
| 6 Manual pressure relief valve | 16 Pipeline |
| 7 Adapter | 17 Discharge nozzle |
| 8 Release device, pneumatic | 18 Pneumatically actuated limit switch |
| 9 Hose DN4 (pilot line; 5/32") | 19 Manual release of the limit switch |
| 10 Pilot cylinder | |

Abstract

Single zone systems safeguard one protected enclosure and can be composed of one or several extinguishing agent containers.

Single zone systems equipped with only one extinguishing agent container (single container systems) have an electric release device (also available with a mechanic blocking device). The device is fitted on the valve of the extinguishing agent container and activated by the fire suppression detection system. There is also the option of fitting a manual release device on the electric release device in order to allow the system to be activated manually.

Multi container systems are equipped with several extinguishing agent containers which are connected by a pilot line. These are required, for instance, if you wish to safeguard an extensive protected enclosure. The first extinguishing agent container ("control cylinder") of a multi container system lacking a pneumatic release device (PAE) is activated electrically (and, as an option, manually as well) just as the extinguishing agent container of a single container system. All other extinguishing agent containers ("Slave") are activated pneumatically via a pilot line.

Multi container systems equipped with a pneumatic release device (PAE) have a pilot cylinder that is activated electrically. The CO₂ contained in the pilot cylinder flows through the pilot line to the pneumatic release devices, mounted on the extinguishing agent containers, and opens them.

In contrast to single container systems, the extinguishing agent released in a multi container system first flows from the hose via check valves to a manifold. The extinguishing agent flows from there through the nozzle pipeline to the discharge nozzles where it evaporates and exits into the extinguishing zone.

3.2 Multi zone systems

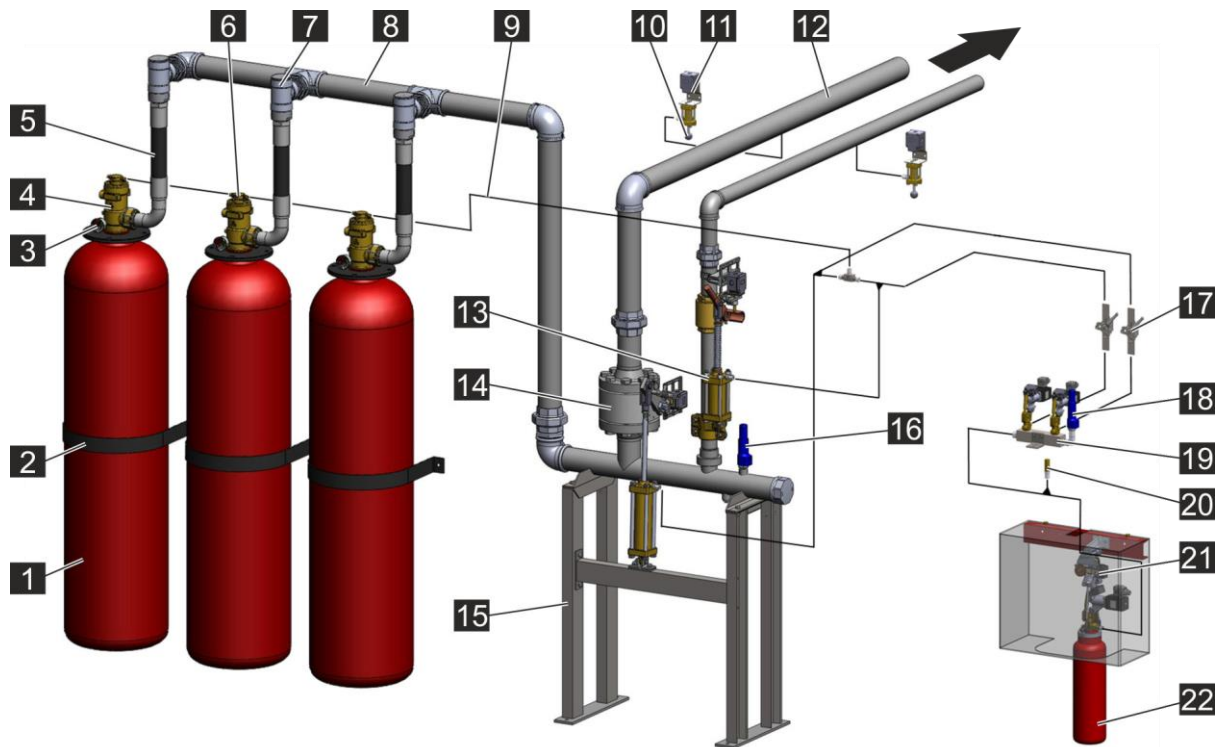


Fig. 10: Multi zone system

- | | |
|--|--|
| 1 Extinguishing agent container | 13 Selector valve |
| 2 Clamp | 14 Selector valve |
| 3 Pressure gauge/Contact pressure gauge | 15 Bracket |
| 4 Valve | 16 Safety valve 66 bar (957 psi) |
| 5 DN40/DN50 (1 1/2 inch and 2 inch) hose | 17 Blocking device |
| 6 Release device, pneumatic | 18 Safety valve 140 bar (2031 psi) |
| 7 Check valve | 19 DN15 (1/2 inch) pilot distributor |
| 8 Manifold | 20 Safety device malfunction pressure (safeguard against slow gas leaks) |
| 9 DN4 (5/32 inch) hose (pilot line) | 21 Pneumatic release device (PAE), complete including protective cover and weighing device |
| 10 Manual release of the limit switch | 22 Pilot cylinder |
| 11 Pneumatically actuated limit switch | |
| 12 Nozzle pipeline | |

Abstract

Multi zone systems safeguard several extinguishing zones. If the extinguishing zones are of different sizes, multi zone systems will be equipped with several extinguishing agent containers. The extinguishing agent supply and, thus, the number of extinguishing agent containers always follow the largest extinguishing zone. When activated, the system will only flood one extinguishing zone.

Multi zone systems are equipped with a pneumatic release device (PAE). The pilot cylinder of these systems is activated electrically when a fire is detected. The CO₂ contained in the pilot cylinder flows through the pilot line to the pneumatic release devices, mounted on the extinguishing agent containers, and opens them.

Pilot distributors and selector valves ensure that the extinguishing agent containers assigned to the associated extinguishing zone open and the corresponding pipings are released. This prevents the extinguishing agent from flowing into extinguishing zones that are not affected by fire.

Just as the extinguishing agent of single zone systems equipped with several extinguishing agent containers, the extinguishing agent of multi zone systems first flows, when the system is activated, from the hose via check valves to a manifold. The extinguishing agent flows from there via the selector valves and the nozzle pipe to the discharge nozzles (Fig. 10/arrow) where it exits and vaporizes into the extinguishing zone.

3.3 Functional description

As soon as the detection system installed in the protected enclosure detects a fire, an alarm will be triggered by the fire suppression detection system. A pulse is transmitted to the electric release devices after the specified pre-discharge timer has expired. Afterwards, the quick release valves of the pressurized extinguishing agent containers open.

The liquid extinguishing agent flows into the pipeline system. The check valves installed in the pipeline system prevent the extinguishing agent from flowing back into the container. The extinguishing agent flows to the discharge nozzle(s) of the system which are installed in the protected enclosure.

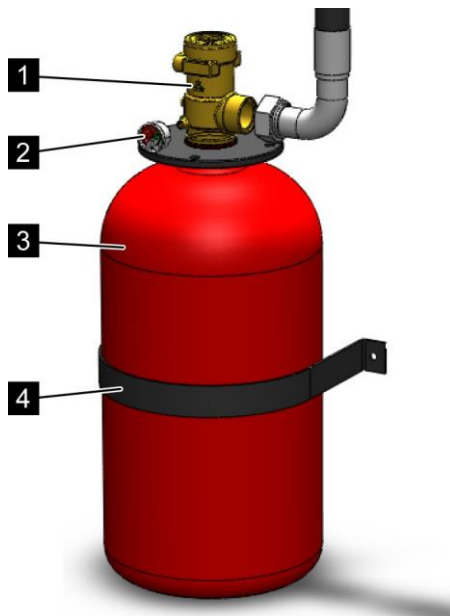
The extinguishing agent vaporizes at the discharge nozzles and is dispersed across the extinguishing zone as a gaseous mix made up of extinguishing agent and air. This suppresses the fire by extracting heat energy from the flames. Throughout the extinguishing process, the oxygen concentration in the extinguishing zone is slightly reduced. The retention time (hold time) of the extinguishing zone must comply with NFPA 2001.

In addition to the automatic, electric release, electric manual releases can be used to activate the system manually. These releases are installed at the extinguishing zone.

3.4 Description of important components

3.4.1 Extinguishing agent container with valve

Extinguishing agent container



The extinguishing agent is stored in extinguishing agent containers (Fig. 11/3). These containers are designed, manufactured and labeled in accordance with European directives, the standard of the US Department of Transportation (D.O.T), or in accordance with the country-specific pressure equipment directives.

The extinguishing agent containers have a siphon tube and are, thus, only suitable for upright operation. Attached to the extinguishing agent container is a type plate which contains, among other things, maintenance and filling instructions as well as information about the fill quantity. By default, the containers are painted red and must be secured (Fig. 11/4).

Fig. 11: Extinguishing agent container

Design and function

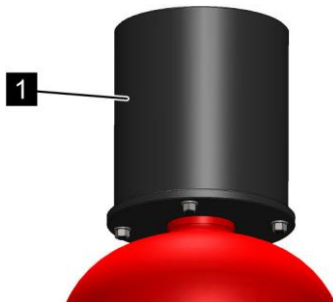


Fig. 12: Protective valve cap

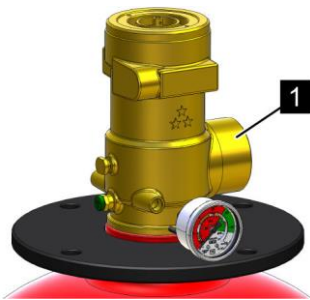


Fig. 13: Anti-recoil cap with vent bores and chain (not shown)

Valve

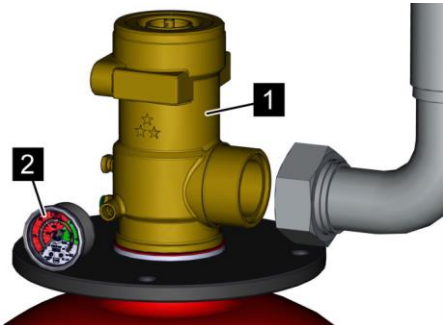


Fig. 14: Valve

Contact pressure gauge

Containers must not be moved and transported unless fitted with the protective valve cap (Fig. 12/1) and the anti-recoil cap (Fig. 13/1). When filled, the containers must be labeled and transported as hazardous material in accordance with all applicable local regulations.

If stored properly, the extinguishing agent, according to the manufacturer, has a shelf life of 30 years.

The valve (Fig. 14/1) is on the extinguishing agent container. This makes it possible to discharge the extinguishing agent within 10 s.

A contact pressure gauge (Fig. 14/2) is on the valve, it indicates the fill pressure of the container, there is also a bursting disk that is used to protect against overpressure. Contact pressure gauges enable additional monitoring of the fill pressure.

There is also an option of connecting an additional pressure switch to the valve or the pipeline, which will switch a potential-free electrical contact when the system is activated. The switching status of this contact can be monitored by the fire suppression detection system and, thus, indicate an activation of the system.

i For better readability in this manual, instead of the term “pressure gauge/contact pressure gauge” only the term “contact pressure gauge” is used below.

Multi container systems

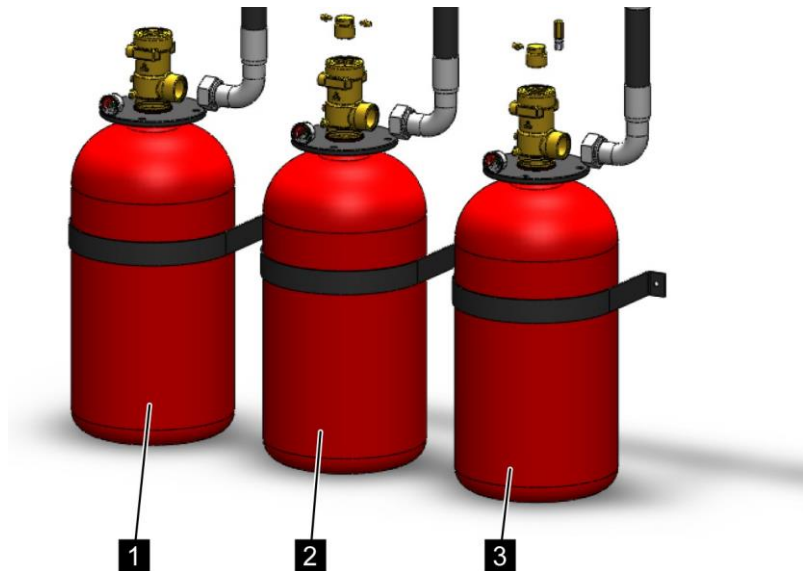


Fig. 15: Multi container system

Multi container systems are always equipped with a “control cylinder” extinguishing agent container (Fig. 15/1) or a pilot cylinder combined with a varying number of slave extinguishing agent containers (Fig. 15/2+3). The number of slave extinguishing agent containers varies with the number and size of the extinguishing zones and is determined when the system is designed. The number of slave containers is not optional.

While the “control cylinder” extinguishing agent container is released electrically, pneumatically, pneumatically/manually or manually, the slave extinguishing agent containers are always released and opened by the “control cylinder” extinguishing agent container or the pilot cylinder pneumatically via a pilot line. The length of the pilot line is not optional.

3.4.2 Weighing device

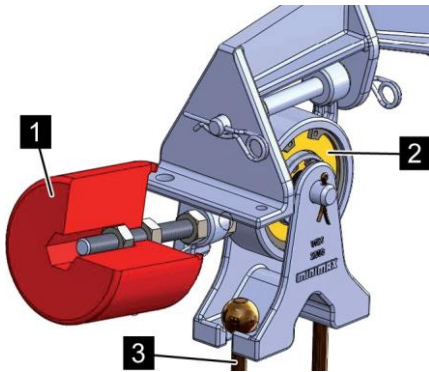


Fig. 16: Weighing device

The weighing device (Fig. 16/2) is part of the pneumatic release device (PAE). It is used to detect and indicate any leakage at the pneumatic release device (PAE). If leakage is detected, the counterweight will tilt down to make the leakage instantly visible.

A leakage is indicated by the specified difference between the weight of the container and a counterweight (Fig. 16/1). The pilot cylinder is hooked into the weighing device by means of holding rods (Fig. 16/3).

3.4.3 Liquid level indicator

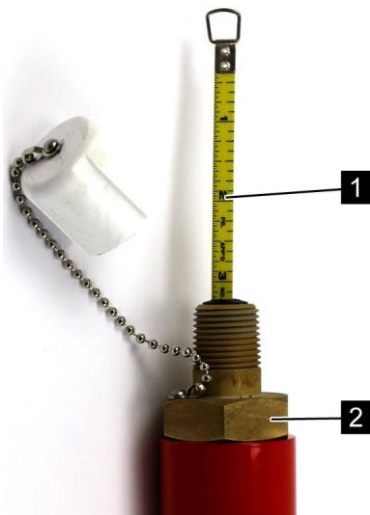


Fig. 17: Liquid level indicator

Some extinguishing agent containers are equipped with a liquid level indicator (Fig. 17/2). The level indicator is non-electrical and enables manual read-out of the fill level on an integrated tape measure (Fig. 17/1). Inside the extinguishing agent container a float equipped with a magnet moves on the stem of the liquid level indicator.

Liquid level indicators have been designed to resist shock and vibration. However, shock and vibration should be avoided.

4 Transport and storage

4.1 Transport

Improper transport

⚠ WARNING

Danger to life from faulty transport!

- Allow only the Authorized Distributor or service personnel authorized by the Authorized Distributor to transport the components of the system.
- Avoid unauthorized transport and location changes - including transporting and moving the extinguishing agent containers.

Errors occurring during transport may lead to life-threatening situations and cause significant property damage.



System components may only be transported by an Authorized Distributor or service personnel authorized by the Authorized Distributor. Contact can be established through the manufacturer (see page 2).

Pressurized extinguishing agent

⚠ WARNING

Danger of injury due to pressure in extinguishing agent containers!

- Do not transport or store extinguishing agent containers unless they are sealed with a protective valve cap and an anti-recoil cap.
- Have damaged extinguishing agent containers replaced immediately by the Authorized Distributor.

If pressurized extinguishing agent containers are damaged and extinguishing agent escapes uncontrollably, there is a risk of severe injuries or even death.

4.2 Storing extinguishing agent containers

Storing extinguishing agent containers

Store spare containers of extinguishing agent in the following conditions:

- Do not store outside.
- Store in a dry area.
- Do not expose to abrasive media.
- Protect against direct sunlight.
- Avoid mechanical vibrations.

- Avoid condensation moisture.
- Storage temperature: -18 to +50 °C (0 to +122 °F).
- Store with the protective valve cap installed.
- Store only upright inside the included transport frame or lying on the included pallet.
- Observe national regulations for the storage of extinguishing agent containers.
- When storing them for a period of more than 3 months, inspect the overall condition of all extinguishing agent containers on a regular basis. If necessary, contact an Authorized Distributor to replace any damaged or corroded extinguishing agent containers. Contact can be established through the manufacturer (see page 2).

 **WARNING**

Risk of injury from illegible symbols!

- Keep all safety, warning and operating instructions easily legible at all times.
- Replace any damaged signs or labels immediately (or have them replaced).

Over the course of the storage period, labels and signs can become soiled or illegible in some other way, which may result in risks no longer being detected and the necessary operating instructions no longer being followed. This will lead to a risk of injury.



The packing pieces may contain instructions that exceed the requirements specified herein. Follow these additional instructions accordingly.

5 Installation and commissioning

i *The system may be installed and put into operation only by the Authorized Distributor or service personnel authorized by the Authorized Distributor.*

⚠ WARNING

Danger to life from faulty installation and commissioning!

- Allow only the Authorized Distributor or service personnel authorized by the Authorized Distributor to install and commission the system.
- Avoid any unauthorized assembly and installation - including subsequent assembly and installation (also of subcomponents).

Errors occurring while the system is being installed or put into operation may lead to life-threatening situations and cause significant property damage.

⚠ DANGER

Danger of injury due to pressure in extinguishing agent containers!

- Allow only the Authorized Distributor or service personnel authorized by the Authorized Distributor to transport extinguishing agent containers.
- Make sure the extinguishing agent container is adequately braced utilizing clamps.
- Have damaged extinguishing agent containers replaced immediately by the Authorized Distributor.
- Ensure that the valve outlet is always closed with an anti-recoil cap and connected to a pipeline.

If pressurized extinguishing agent containers are damaged and extinguishing agent escapes uncontrollably, there is a risk of death.

6 Operation

6.1 Required tools

The following tools are required to operate the system:

Screw reset tool (887645)

The screw reset tool is used to reset a previously activated electric release device.

Wrench

Wrenches of different sizes

6.2 Isolating the system

If the work performed inside the protected enclosure makes it difficult to leave the protected enclosure within the pre-discharge timer, the system must be isolated for safety reasons.

This is also necessary in cases where work is performed on the fire suppression detection system or if the work may set off the system inadvertently - for instance, during welding operations. Isolating the system prevents the extinguishing agent from being released accidentally.

Multi zone and single zone systems equipped with a pneumatic release device (PAE) are fitted with blocking devices that are installed in the pneumatic pilot line and can be used to isolate the system. Single container and multi container systems that lack a pneumatic release device (PAE) are equipped with an electric release device that comes with an integrated blocking device.

6.2.1 Warnings regarding the isolation of the system

Fire hazard when system is isolated

⚠ WARNING**Danger to life from fire!**

- Keep potential fire loads and sources of ignition away from the protected enclosure.
- Maintain fire protection by, for example, keeping fire extinguishers readily available.
- Do not shut down the system longer than necessary.

When work is performed on the system or inside the protected enclosure and the system is shut down for this purpose, no fire protection will be in place. Fires that cannot be controlled during this time may cause severe injuries including death and result in significant property damage.

Inappropriate isolation

⚠ WARNING**Danger to life from inappropriate isolation!**

- Do not isolate the system unless necessary.
- Ensure that the system cannot be isolated by an unauthorized person.

When isolated, the system does not provide any fire protection. The suppression system is out of service.

Improper isolation

⚠ WARNING**Risk of injury from improper isolation!**

- Allow only the person in charge of the system to isolate the system.
- Make sure the isolation of the system cannot be reset by third parties in an unregulated manner.
- When isolating the system, follow the specifications and instructions contained in this document.

If isolated improperly, the system may be activated inadvertently. This may lead to severe injuries and significant property damage caused by discharged extinguishing agent.

6.2.2 Isolating a single zone system equipped with an electric release device

Without mechanical blocking device

- Personnel: ■ Person in charge of the system
- Protective equipment: ■ Safety gloves
■ Protective goggles

1. ➤ Maintain fire safety by, for example, keeping fire extinguishers readily available.
2. ➤ Unscrew the electric release device (Fig. 18/1) fitted on the "pilot cylinder" extinguishing agent container from the valve (Fig. 18/2).
3. ➤ If the status of the release devices (installed/removed) is monitored by additional limit switches, make sure the deactivation of the system is indicated on the fire detection and extinguishing control panel.

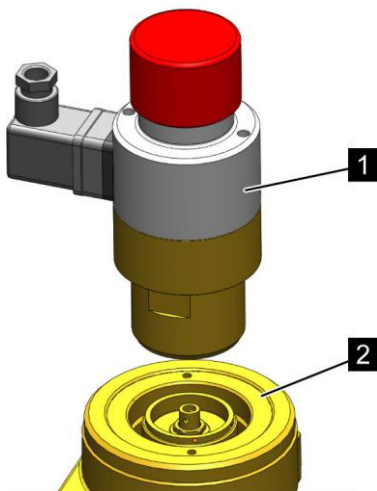


Fig. 18: Unscrewing the release device

With mechanic blocking device* not UL

- Personnel: ■ Person in charge of the system
- Protective equipment: ■ Safety gloves
■ Protective goggles
- Special tool: ■ Wrench

1. ➤ Maintain fire safety by, for example, keeping fire extinguishers readily available.
2. ➤ Undo the hexagon nut (Fig. 19/1) on the electric release device using a wrench.
3. ➤ Turn the manual lever (Fig. 19/2) on the electric release device to the "blocked" position.
4. ➤ Use a wrench to tighten the hexagon nut (10 Nm \pm 2 Nm (7.38 \pm 1.48 lb•ft)) as the isolation will otherwise not take effect.
 - ⇒ The system has been isolated.
5. ➤ Make sure the isolation is indicated on the fire detection and extinguishing control panel.

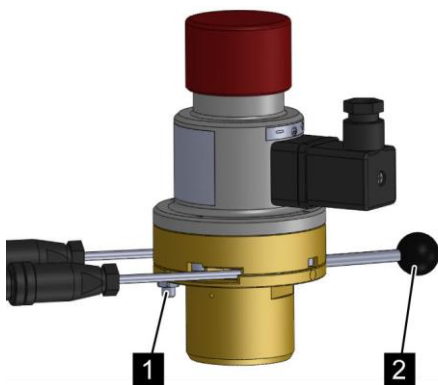


Fig. 19: Isolating the release device

6.2.3 Isolating a single zone system equipped with a pneumatic release device (PAE)

- Personnel: ■ Person in charge of the system
- Protective equipment: ■ Safety gloves
 ■ Protective goggles

Single zone systems equipped with a pneumatic release device (PAE) are used whenever more than one extinguishing agent container is needed to safeguard the protected enclosure. The blocking device used by these systems is a ball valve.

1. ➤ Maintain fire safety by, for example, keeping fire extinguishers readily available.
2. ➤ Open and remove the padlock on the blocking device.
3. ➤ Turn the ball valve (Fig. 20/1) of the blocking device as far as it will go in clockwise direction (Fig. 20/arrow).

⇒ The "isolation" labeling on the ball valve becomes visible, indicating the system has been isolated.

4. ➤ Hook the padlock into the locking eye (Fig. 20/2) of the blocking device and lock it.
5. ➤ Pull the key from the padlock and store it in a safe place to prevent unauthorized personnel from resetting the isolation.
6. ➤ Make sure the isolation is indicated on the fire detection and extinguishing control panel.

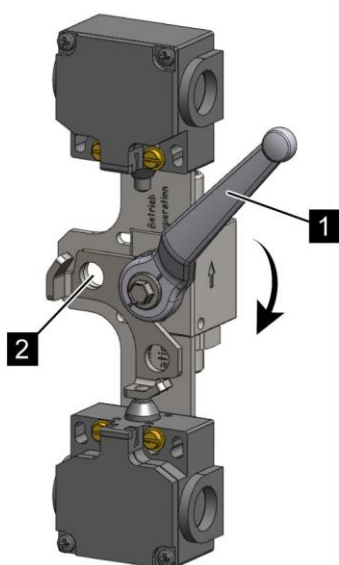


Fig. 20: Blocking device (optionally with 1 or 2 limit switches)

6.2.4 Isolating a multi zone system

Personnel:	■ Person in charge of the system
Protective equipment:	■ Safety gloves
	■ Protective goggles

Multi zone systems are equipped with blocking devices for each individual extinguishing zone. This makes it possible to isolate each extinguishing zone individually without the need to shut down the entire system.

1. ➤ Maintain fire safety by, for example, keeping fire extinguishers readily available.
2. ➤ Open and remove the padlock on the blocking device.
3. ➤ Turn the ball valve (Fig. 21/1) of the blocking device as far as it will go in clockwise direction (Fig. 21/arrow).
 - ⇒ The "isolation" labeling on the ball valve becomes visible, indicating the corresponding extinguishing zone has been isolated.
4. ➤ Hook the padlock into the locking eye (Fig. 21/2) of the blocking device and lock it.
5. ➤ Store the key of the padlock in a safe place to prevent unauthorized personnel from resetting the isolation.
6. ➤ Make sure the isolation is indicated on the fire detection and extinguishing control panel.

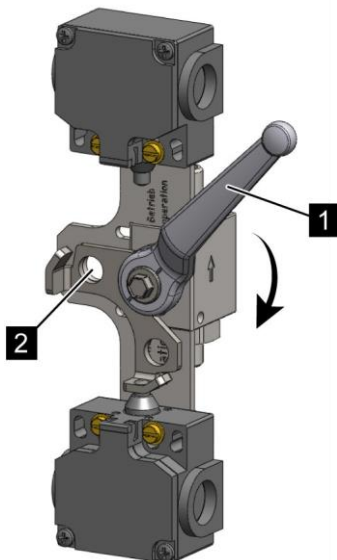


Fig. 21: Blocking device (optionally with 1 or 2 limit switches)

6.3 Resetting the isolation

6.3.1 Warnings regarding the resetting of the blocking

Failure to reset

⚠ WARNING

Danger to life from failure to reset the isolation!

- Do not shut down the system longer than necessary.
- Reset the isolation without delay when all work is complete.

When isolated, the system does not provide any fire protection in the assigned extinguishing zone. There is danger to life and a risk of significant property damage in case a fire erupts.

Early resetting

⚠ WARNING

Danger of injury from resetting the isolation prematurely!

- Do not reset the isolation until all work that may cause inadvertent activation is complete.
- Allow only the person in charge of the system to reset the isolation.
- Make sure the isolating of the system cannot be reset by third parties in an unregulated manner.

If the isolation of the system is reset while work is still being performed in the extinguishing zone, the system may be activated inadvertently. This may lead to injury and significant property damage caused by discharged extinguishing agent.

Reset on activation

⚠ WARNING

Risk of injury from resetting the isolation during an activation!

- Do not reset the isolation until no release device is being actuated.

If the isolation is reset while a pneumatic or electric release device is being actuated, the system will be activated instantaneously.

6.3.2 Resetting the isolation of a single zone system equipped with an electric release device

Without mechanical blocking device

Personnel:	■ Person in charge of the system
Protective equipment:	■ Safety gloves ■ Protective goggles
Special tool:	■ Screw reset tool (887645)

1. ▶ Ensure that the fire detection and extinguishing control panel do not indicate an alarm and that the system is not currently activated.
2. ▶ Screw the screw reset tool (Fig. 22/2) into the electric release device (Fig. 22/1).
⇒ Press the release pin into the inactive position to hide the red color marking on the release pin.
3. ▶ Unscrew the screw reset tool (Fig. 22/2) out of the electric release device.

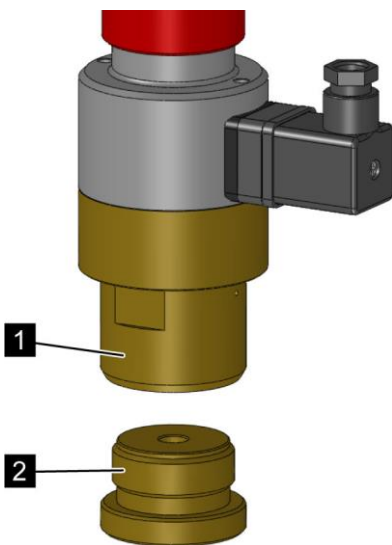


Fig. 22: Resetting the isolation

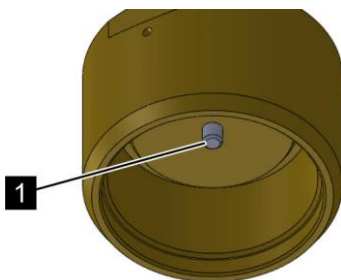


Fig. 23: Release pin

4. ▶ Ensure that the release pin (Fig. 23/1) of the electric release device is not active.

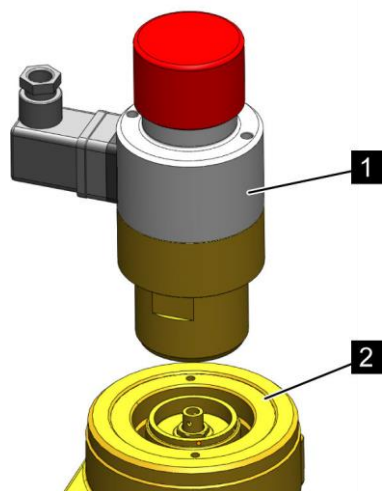


Fig. 24: Screwing on the release device

5. ➤ Screw the electric release device (Fig. 24/1) onto the valve (Fig. 24/2) of the associated extinguishing agent container and tighten with $50 \pm 15 \text{ Nm}$ ($36.878 \pm 11.063 \text{ lb}\cdot\text{ft}$) until it metallically rests on the valve.

i Just before the release device rests on the valve (approximately the last 10mm (0.4 inches)), the resistance when screwing on will increase.

6. ➤ Check whether the release device is firmly seated on the extinguishing agent container.

⇒ The deactivation has been reset.

7. ➤ If the status of the release devices (installed/ removed) is monitored by additional limit switches, make sure the deactivation of the system is no longer indicated on the fire detection and extinguishing control panel.

With mechanical blocking device

Personnel: ■ Person in charge of the system

Protective equipment: ■ Safety gloves
 ■ Protective goggles

Special tool: ■ Wrench

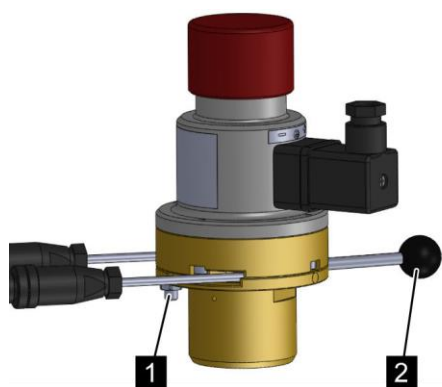


Fig. 25: Resetting the isolation

1. ➤ Ensure that the fire detection and extinguishing control panel do not indicate an alarm and that the system is not currently activated.

2. ➤ Undo the hexagon nut (Fig. 25/1) on the electric release device using a wrench.

3. ➤ Turn the manual lever (Fig. 25/2) on the electric release device to the "Operation" position.

4. ➤ Use a wrench to tighten the hexagon nut ($10 \text{ Nm} \pm 2 \text{ Nm}$ ($7.38 \pm 1.48 \text{ lb}\cdot\text{ft}$)).

5. ➤ Ensure that the fire detection and extinguishing control panel signal the operational readiness of the electric release device and the electric release device is not blocked.

⇒ The isolation has been reset.

6.3.3 Resetting the isolation of a single zone system equipped with a pneumatic release device (PAE)

- Personnel: ■ Person in charge of the system
- Protective equip- ■ Safety gloves
ment: ■ Safety footwear
■ Protective goggles

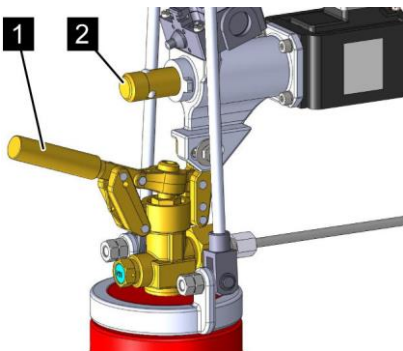


Fig. 26: Opened pilot cylinder

1. ➤ Ensure that the fire detection and extinguishing control panel do not indicate an alarm and that the system is not currently activated.
2. ➤ Ensure that the pilot cylinder of the pneumatic release device (PAE) is not open and that no pressure is applied to the pilot line.

i If the valve lever (Fig. 26/1) is thrown and the release pin (Fig. 26/2) is protruding, the pilot cylinder is open. Do not reset the isolation in this case and consult the Authorized Distributor.

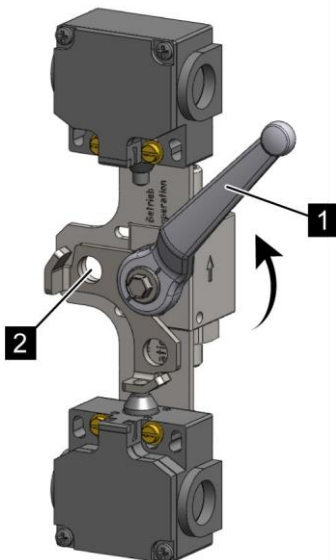


Fig. 27: Resetting the isolation (optionally with 1 or 2 limit switches)

3. ➤ Open and remove the padlock at the locking eye (Fig. 27/2) of the blocking device.
4. ➤ Turn the ball valve (Fig. 27/1) of the blocking device as far as it will go in counterclockwise direction (Fig. 27/arrow).
 - ⇒ The "Operation" labeling on the ball valve is visible, indicating that the isolation of the release device has been reset.
5. ➤ Hook the padlock into the locking eye (Fig. 27/2) of the blocking device and lock it.
6. ➤ Pull the key from the padlock and store it in a safe place to prevent unauthorized personnel from isolating the system or parts thereof.
7. ➤ Make sure the isolation is no longer indicated on the fire detection and extinguishing control panel.

6.3.4 Resetting the isolation of a multi zone system

- Personnel: ■ Person in charge of the system
- Protective equipment: ■ Safety gloves
 ■ Safety footwear
 ■ Protective goggles

1. ➤ Ensure that the fire detection and extinguishing control panel do not indicate an alarm and that the system is not currently activated.
2. ➤ Ensure that the pilot cylinder of the pneumatic release device (PAE) is not open and that no pressure is applied to the pilot line.

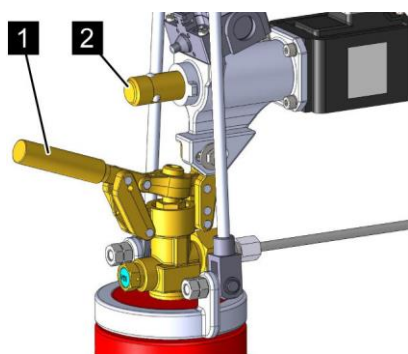


Fig. 28: Opened pilot cylinder

⚠ If the valve lever (Fig. 28/1) is thrown and the release bolt (Fig. 28/2) is protruding, the pilot cylinder is open. Do not reset the isolation in this case and consult the Authorized Distributor.

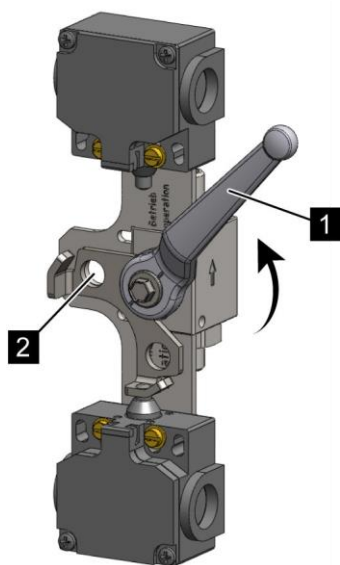


Fig. 29: Resetting the isolation (optionally with 1 or 2 limit switches)

3. ➤ Open and remove the padlock at the locking eye (Fig. 29/2) of the blocking device.
4. ➤ Turn the ball valve (Fig. 29/1) of the blocking device as far as it will go in counterclockwise direction (Fig. 29/arrow).
 ⇒ The "Operation" labeling on the ball valve is visible, indicating that the isolation of the release device has been reset.
5. ➤ Hook the padlock into the locking eye (Fig. 29/2) of the blocking device and lock it.
6. ➤ Pull the key from the padlock and store it in a safe place to prevent unauthorized personnel from isolating the system or parts thereof.
7. ➤ Make sure the isolation is no longer indicated on the fire detection and extinguishing control panel.

6.4 Resetting the isolation in the event of fire

If the system is isolated when activated in the event of a fire, the isolation can be reset retroactively.



The isolation cannot be reset retroactively unless the control voltage is still supplied to the fire suppression detection system. As some fire suppression detection systems send only a single pulse, releasing the system retroactively is not possible with these types of control panels.

1. ▶ Make sure no one is still inside the extinguishing zone.
2. ▶ To reset the isolation, set the blocking device to the Operation position.

***i** If the system was isolated by removing the release devices because it is not equipped with a blocking device, it must not be put back into operation immediately by refitting the release devices.*

⇒ The extinguishing agent containers open instantaneously.

3. ▶ Leave the extinguishing zone immediately.

6.5 Activating the system



Danger of injury due to escape of gas under pressure!

- **Wear protective goggles and safety gloves.**
- **When triggered, maintain some distance to the release device and turn your face away from the release device.**

When triggered, pressurized gas briefly escapes from the area between the valve of the extinguishing agent container and the release device. If the gas directly contacts unprotected body parts, and in particular the face, there is a risk of severe or even fatal injuries.

The system is activated automatically by fire alarm systems installed in the protected enclosure. Other options to activate the system manually vary with the design of the system.

- Electric manual release at the extinguishing zone
- Manual activation at the "master" extinguishing agent container or the pilot cylinder



If a release device has been activated, the activation of the system can no longer be stopped or interrupted.

This will happen after an activation

- 1 - If one or several fire alarm systems (depending on the system design), the fire detection system or a manual release are activated, the alarm will be transmitted to the fire detection and extinguishing control panel.
- 2 - A buzzer will sound on the fire detection and extinguishing control panel.
- 3 - All connected, central ventilation and air conditioning units as well as any other devices, for example the power supply, will be switched off. Fire-proof doors and windows equipped with automatic locking mechanisms will be locked.

Air conditioning units in recirculation mode, if available, may continue to be operated in order to cool sensitive electrical components. This also promotes the mixing of the gaseous extinguishing agent in the enclosure.
- 4 - The alarm devices will be activated.
- 5 - The selector valves of the corresponding extinguishing zone (only for multi zone systems) will open.
- 6 - The set pre-warning time will start counting down.
- 7 - When the pre-warning time has elapsed, the valves of the extinguishing agent containers will open and the extinguishing agent will flow through the pipeline system to the discharge nozzles within the set flooding time.
- 8 - The extinguishing agent will evaporate at the discharge nozzles and be spread across the extinguishing zone.
- 9 - The hold time of the extinguishing agent, during which its effective concentration for suppressing fires is retained, will start counting down.

i *If the system is activated by pneumatic/manual release devices or manual release devices, the activation will be immediate without any visual or acoustic alarm device.*

Pre-discharge timer

The pre-discharge timer is the time between the release of the main alarm and the beginning of the fire extinguishing process. It is usually set to 10 s.

All persons within the affected extinguishing zone must leave within this period and lock all access doors and windows in the extinguishing zone that are not equipped with automatic locking devices.

i *Fireproof doors that have already been closed can be opened at any time to provide an exit from the extinguishing zone.*

6.5.1 Activating the system with the electrical manual release

⚠ CAUTION

Danger of injury from broken glass!

- **If available, use a suitable break-proof object (e.g. a shoe) to smash the pane in order to protect your hands.**
- **If no suitable objects are available, protect your hand by wrapping a rag or similar material around it when smashing the pane.**
- **Turn your face away from the electrical manual release when smashing the pane to protect your eyes from any broken glass that may be flying around.**

Smashing the pane of an electrical manual release may cause cutting injuries.

- 1.** **▶ Use caution when smashing the pane of the electrical manual release and turn your face away.**
- 2.** **▶ Press the release button.**
 - ⇒ The system is activated, and the electrical alarm devices (e.g. signal horn, signal lights) trigger immediately.
- 3.** **▶ Leave the protection zone immediately.**

6.5.2 Activation by pneumatic/manual release device

Protective equipment: ■ Safety gloves
■ Protective goggles

1. **⚠ WARNING! Danger of injury due to escaping extinguishing agent!**

Make sure no one is still inside the extinguishing zone.

2. With multi zone systems, open the selector valve of the affected extinguishing zone.

3. Pull the safety pin (Fig. 30/2) out of the pneumatic/manual release device on the "pilot cylinder" extinguishing agent container.

4. *i* When the release lever is operated, the upper valve chamber in the valve is vented. Pressurized gas flows through it through a pressure relief hole in the cap nut of the release device (Fig. 30/3).

⚠ WARNING! Danger of injury due to escape of gas under pressure!

When triggering this, maintain your distance to the release device, turn away from the pressure relief hole and wear protective equipment.

5. Press the release lever (Fig. 30/1) of the pneumatic/manual release device as far as it will go clockwise or counterclockwise (Fig. 30/arrow) and hold it down for 5 s.

⇒ The system will be activated immediately.

6. Leave the extinguishing zone immediately.

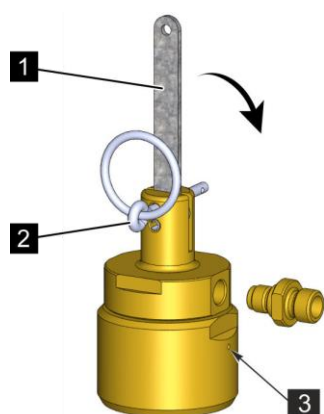


Fig. 30: Activating

6.5.3 Activation by manual release device* not VdS, not CNPP/A2P

Protective equipment: ■ Safety gloves
 ■ Protective goggles

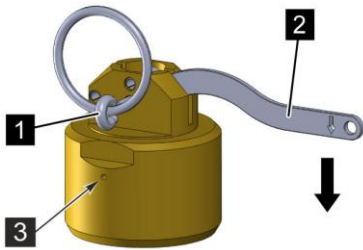


Fig. 31: Activating

1. ➤ Pull the safety pin (Fig. 31/1) out of the manual release device.
2. ➤ *i* When the release lever is operated, the upper valve chamber in the valve is vented. Pressurized gas flows through it through a pressure relief hole in the cap nut of the release device (Fig. 31/3).

L WARNING! Danger of injury due to escape of gas under pressure!

When triggering this, maintain your distance to the release device, turn away from the pressure relief hole and wear protective equipment.

3. ➤ Press down the release lever (Fig. 31/2) of the manual release device as far as it will go (Fig. 31/ arrow) and hold it down for 5 s.
 - ⇒ The system will be activated immediately.
4. ➤ Leave the extinguishing zone immediately.

6.6 Actions after the system is activated

Steps to be taken after a fire

Personnel: ■ Person in charge of the system

⚠ WARNING

Life-threatening danger through the occurrence of decomposition products and fire smoke!

- Never enter the extinguishing zone without a self-contained breathing apparatus.
- Do not re-enter the affected rooms until the fire department has given the all-clear.
- Follow the instructions given by the rescue workers.

If the fire energy is high, hydrogen fluoride as a product of thermal decomposition will form during the extinguishing process alongside the toxic smoke gases produced by the process. This substance is extremely caustic and will cause significant long-term and chronic harm to a person's health merely upon contact with the skin.

⚠ WARNING**Danger to life from re-ignition!**

- Do not re-enter the affected rooms until the fire department has given the all-clear.
- Be prepared for re-ignition at all times. Keep suitable extinguishing agents (e. g. fire extinguishers) on hand when ventilating the extinguishing zone .

When the effective concentration of the extinguishing agent drops due to the ventilation of the extinguishing zone , the fire may be reignited by any sources of ignition that may still exist. There is a risk of sustaining severe or fatal injuries.

1. ➤ Do not re-enter the affected rooms until the fire department has given the all-clear.
2. ➤ Enter the extinguishing zone under the supervision of the fire department and open windows and doors.
3. ➤ Keep an eye on the fire sources that have been put out.
4. ➤ Do not clear the extinguishing zone for access until it has been sufficiently ventilated and there are no remnants of extinguishing agent left.
5. ➤ Notify the Authorized Distributor or service personnel authorized by the Authorized Distributor so that the operational readiness of the system can be restored.
ⓘ Do not replace extinguishing agent containers without authorization even if they are empty.
6. ➤ Perform function checks ↪ *Chapter 7 “Inspections” on page 64.*

Steps after faulty activation

Personnel: ■ Person in charge of the system

If no fire has occurred, the all-clear from the fire department is not necessary in case of a faulty activation of the system.

i *In addition to the instructions specified below, all applicable local regulations regarding the behavior in the event of an activation of automatic fire suppression systems must be observed.*

1. ▶ Make sure that no unauthorized persons can enter the affected premises before they have been cleared for access by the person in charge of the system.

2. ▶ Enter the extinguishing zone carrying substitute extinguishing agents (e. g. fire extinguisher) and open windows and doors to ventilate the area.

i *Have the extinguishing agent extracted by the fire department in lower situated premises where sufficient ventilation cannot be achieved.*

3. ▶ Do not clear the extinguishing zone for access until it has been sufficiently ventilated and there are no residues of extinguishing agent remaining.

4. ▶ Notify the Authorized Distributor or service personnel authorized by the Authorized Distributor so that the operational readiness of the system can be restored.

i *Do not replace extinguishing agent containers without authorization even if they are empty.*

5. ▶ Perform function checks ↗ *Chapter 7 “Inspections” on page 64.*

6.7 Reading the fill level

- Personnel: ■ Person in charge of the system
- Protective equip- ■ Protective goggles
ment: ■ Extinguishing-agent-resistant safety gloves

⚠ WARNING

Danger of injury due to extinguishing agent escaping under pressure!

- Do not unscrew the brass hexagon (Fig. 32/3) of the liquid level indicator.

If the liquid level indicator has been unscrewed from the extinguishing agent container, there is danger of severe or fatal injury.

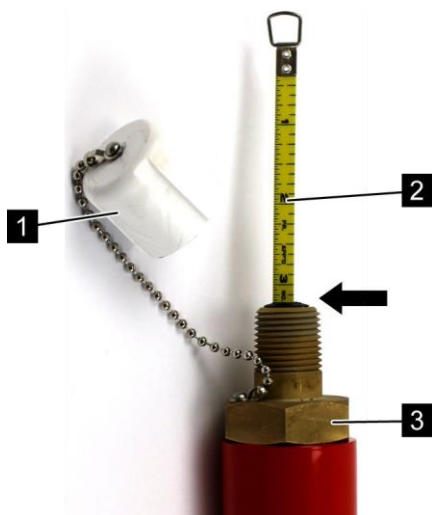


Fig. 32: Reading the fill level

1. ➤ Unscrew the plastic protective cap (Fig. 32/1).
2. ➤ Pull tape measure (Fig. 32/2) out of the liquid level indicator to the stop.
3. ➤ Slowly lower the tape measure into the liquid level indicator until a slight pull is felt.
 - ⇒ The measuring tape is arrested magnetically on the float.
4. ➤ Read the fill level on the measuring tape above the threaded union (Fig. 32/arrow).
5. ➤ Detach the measuring tape (Fig. 32/2) from the float with rapid hand movement, and lower it completely into the liquid level indicator.
6. ➤ Screw on the plastic protective cap (Fig. 32/1).



A detailed description for checking the amount of extinguishing agent by means of the liquid level indicator can be found in the installation and maintenance manual.

7 Inspections

Interval

Listed below are important inspections necessary to ensure that the system functions properly, at its best efficiency and without failure. Perform these inspections on a **weekly** basis and record the performance in the report book.

Contact an Authorized Distributor if you have any questions concerning the inspections that need to be performed. Contact can be established through the manufacturer, see page 2.



A master copy containing all mentioned inspection questions is included as a checklist in the Appendix to this manual.


Inspections

Personnel:	■ Person in charge of the system
Protective equipment:	■ Safety gloves
	■ Protective goggles

 **WARNING**
Danger of injury from faulty release!

- **Activate the system only in the event of a fire.**
- **Protect the manual release devices in the protected enclosure from faulty release.**
- **Refrain from smoking inside the protected enclosure.**
- **Before performing any work generating heat and smoke, block the system.**

A faulty release of the system may cause severe injuries and property damage.

1. → Clean the system  *Chapter 8 “Cleaning” on page 67.*
2. → Check the operability of the system **weekly** based on the following questions.
 - Does the contact pressure gauge show system pressure? The pressure varies with the system design and amounts to 25 bar (360 psi), 42 bar (610 psi) or 50 bar (725 psi) at 21 °C (70 °F).
 - Have all extinguishing agent containers been fitted with release devices?
 - Have all extinguishing agent containers been sufficiently fastened with a clamp?
 - Do the extinguishing agent containers contain the required quantity – including any potential reserve quantities in accordance with the installation attest?
 - Are the extinguishing agent containers, valves, release devices, hoses, selector valves, non-return valves, and pneumatic pilot lines in sound condition?
 - Are the electrical pilot lines leading to the fire detection and extinguishing control panel and the equipotential bonding connected properly and in sound condition?
 - Are the pipe system, the pipe clips and the discharge nozzles intact?
 - Are the alarm devices intact?
 - Are the manual release elements accessible and in sound condition?
 - Are the automatic fire detectors intact?

- Are the discharge zones of the discharge nozzles unobstructed?
- Are all wall breakthroughs sealed off to the adjoining areas?
- Are the pressure relief dampers closed?
- Are the flow openings of the pressure relief dampers unobstructed?
- Are all structural openings (windows, doors) closed or fitted with operational automatic locking devices?
- Are the escape routes of the protected enclosure unobstructed?
- Are additional fire loads (e.g. boxes, packaging material) removed from the protected enclosure?
- Have all information signs of the system been attached and is the information they contain easily legible?
- Does the fire detection and extinguishing control panel show line voltage?
- Is no fault displayed on the fire detection and extinguishing control panel?



If one or several of these inspection questions cannot be answered with "Yes" or if you are uncertain as to the correct answer, please contact an Authorized Distributor immediately. Contact can be established through the manufacturer, see page 2.

8 Cleaning

8.1 Warnings regarding the cleaning of the system

Faulty activation

⚠ WARNING**Risk of injury from faulty activation!**

- Always use caution when cleaning the component surfaces of the system.
- Clean the fire detection and release devices (e. g. electric manual releases, smoke detectors) as specified by their respective manufacturers.
- Avoid stirring up dust.

Cleaning the surfaces of the system components may set off the system if too much dust is stirred up, too much manual pressure is exerted or the release devices are activated by accident. This may result in injury and significant property damage.

Cleaning agents

NOTICE**Property damage from abrasive cleaning agents!**

- Use only water (a damp cloth) to clean the surfaces of the components.
- Never clean the system using acids, bases or other cleaning agents containing acid.

Acids and bases may cause significant property damage to the system and its components.

Cleaning equipment

NOTICE**Property damage from wrong cleaning equipment!**

- Use only a damp cloth to clean the surfaces of the components.
- Never use files, grinders or similar cleaning equipment that abrade material to remove residue and/or corrosive residue from the component surfaces.

Wrong cleaning equipment may cause significant property damage to the system.

8.2 Cleaning the system

Personnel:	■ Person in charge of the system
Protective equipment:	■ Safety gloves
	■ Protective goggles
Materials:	■ Damp cloth

The component surfaces of the system must be cleaned prior to every function check of the system (weekly) in order to, in particular, allow for visual inspections.

1. ► Use a damp cloth to carefully remove dust and dirt deposits from all surfaces of the components.
2. ► Report any corrosion damage and/or coating stuck on the component surfaces to the Authorized Distributor.

9 Servicing

i *Allow only an Authorized Distributor or service personnel authorized by the Authorized Distributor to perform any maintenance and repairs on the system. Contact can be established through the manufacturer (see page 2).*

10 Malfunctions

The following section describes possible causes for faults and the work required to correct these faults.

If faults occur frequently or cannot be remedied by following the instructions listed below, contact a company approved to install the system. Contact can be established through the manufacturer (see page 2).

10.1 Warnings regarding troubleshooting

Non-operational system

⚠ WARNING

Risk of death when system is not ready for operation!

- **Correct malfunctions (or have malfunctions corrected) immediately.**
- **Check the system for proper operation before putting it back into service** ↪ *Chapter 7 “Inspections” on page 64.*

If the system experiences malfunctions, it may not be operational. Fires cannot be fought effectively and may lead to severe injuries including death as well as significant property damage.

Improperly performed troubleshooting operations

⚠ WARNING

Risk of injury from improper troubleshooting!

- **Have faults that cannot be remedied by following the instructions specified in this section corrected only by the Authorized Distributor or service personnel authorized by the Authorized Distributor.**

Improperly performed troubleshooting operations may cause severe injuries and significant property damage.

Behavior if there is a fault

The following always applies:

1. ➤ Determine cause of fault using the following fault table.
2. ➤ If a fault cannot be remedied by following the instructions specified therein, consult the Authorized Distributor or the service personnel authorized by the Authorized Distributor and have them correct the fault.
3. ➤ Notify the owner of all detected faults.

i *The fault table provided below specifies who is authorized to correct a fault.*

10.2 Fault indicators

Possible faults are indicated on the fire extinguishing detection system.

i *This manual does not include a description of the fire extinguishing detection system. Follow the separate operation manual of the fire extinguishing detection system.*

Other indications of faults such as leakage of extinguishing agent are provided by the contact pressure gauge fitted on the extinguishing agent cylinders, the liquid level indicators (if present), and the weighing device of the pneumatic release device (PAE).

Malfunctions

10.3 Fault table

Fault description	Cause	Remedy	Personnel
The contact pressure gauge installed on the extinguishing agent container indicates leakage of extinguishing agent.	The temperature has dropped below the minimum operating temperature of the contact pressure gauge	Increase the temperature in the cylinder storage room to more than 5 °C (41 °F). Contact the manufacturer if this is not possible.	Person in charge of the system
	Leakage	Have the extinguishing agent containers replaced.	Authorized Distributor
Leakage of extinguishing agent is indicated on the fire suppression detection system.	The temperature has dropped below the minimum operating temperature of the contact pressure gauge	Increase the temperature in the cylinder storage room to more than 5 °C (41 °F). Contact the manufacturer if this is not possible.	Person in charge of the system
	Leakage	Have the extinguishing agent containers replaced.	Authorized Distributor
The weighing device indicates leakage.	Weighing device set incorrectly	Have the weighing device adjusted.	Authorized Distributor
	Leakage of the pilot cylinder	Check the filling quantity of the pilot cylinder (if present) and have it replaced if necessary.	Authorized Distributor
Leakage of extinguishing agent is determined via the liquid level indicator.	Reading error	Repeat reading ↪ <i>Chapter 6.7 "Reading the fill level" on page 63.</i>	Person in charge of the system
	Liquid level indicator is defective	Have extinguishing agent quantity checked through weighing.	Authorized Distributor
	Leakage	Have the extinguishing agent containers replaced.	Authorized Distributor
The fire suppression detection system displays a short circuit or an interrupted electrical transmission line.	Short circuit or wire break	Check the cable and the connection and have them repaired.	Qualified electrician

10.4 Correcting leakage of extinguishing agent

Personnel: ■ Person in charge of the system

NOTICE

Material damage due to excessive enclosure temperature!

- Do not increase the enclosure temperature unless all electrical equipment is safeguarded against overheating.
- Comply with the specifications provided by the manufacturer of the electrical devices. Consult with the manufacturer if in doubt.

Excessive enclosure temperature (e. g. inside PC or server rooms) may cause electrical equipment to overheat and lead to significant property damage.

1. → Use the installed heating equipment to increase the enclosure temperature to at least 5 °C (41 °F).
2. → Check the indicator position on the contact pressure gauge (Fig. 33/1).
 - ⇒ The indicator of the contact pressure gauge must return to the green area.



Fig. 33: Indicator position

i *If the indicator is not in the green area despite the enclosure temperature being above 5 °C (41 °F), either leakage of extinguishing agent has occurred or the contact pressure gauge is defective. Contact the Authorized Distributor of the system.*

10.5 Putting the system back into operation after a corrected malfunction

i *Allow only an Authorized Distributor or service personnel authorized by the Authorized Distributor to perform the work necessary to put the system back into operation after the correction of a fault. Contact can be established through the manufacturer (see page 2).*

11 Final shutdown, disassembly, and disposal

After the end of the facility's useful life has been reached, the facility must be disassembled and disposed of in an environmentally appropriate manner.

11.1 Final shutdown and disassembly



The final shutdown and disassembly of the system must be entrusted to an Authorized Distributor or service personnel authorized by the Authorized Distributor. Contact can be established through the manufacturer (see page 2).

WARNING

Danger to life from faulty shutdown and disassembly!

- Allow only the Authorized Distributor or service personnel authorized by the Authorized Distributor to perform the final shutdown and disassembly of the system.
- Do not allow the final shutdown and disassembly to be performed without authorization.

Errors occurring while the system is being shut down and disassembled may lead to life-threatening situations and cause significant property damage.

11.2 Disposal



The components of the system may be disposed of only by the Authorized Distributor or service personnel authorized by the Authorized Distributor. The manufacturer of the extinguishing agent is responsible for its disposal. Contact can be established through the manufacturer (see page 2).

NOTICE

Danger to the environment from improper disposal!

- Entrust only the Authorized Distributor or service personnel authorized by the Authorized Distributor with the disposal of the system and its components.
- Allow only the manufacturer of the extinguishing agent to dispose of the extinguishing agent.
- Avoid unauthorized disposal.

Improper disposal may result in danger to the environment.

12 Technical data

Specification	Value	Unit
Pre-discharge timer (recommended)	10	s
Flooding time, maximum	10	s
Hold time (recommended)	10	min
System pressure 21 °C (70 °F) ¹⁾	25/42/50	bar
	360/610/725	psi

¹⁾ depending on the design



For more technical specifications, please refer to the installation and maintenance manual. Contact an Authorized Distributor if necessary. Contact can be established through the manufacturer (see page 2).

13 Glossary

Approved	Approved by an Authority Having Jurisdiction (ADJ) / competent authority.
Blocking device	Mechanical device used to prevent the extinguishing agent from flowing into the extinguishing zone, e. g. during maintenance, inspections, and repairs inside the extinguishing zone.
Check valves	The check valve allows the extinguishing agent to flow only in the designated direction of flow (towards the extinguishing zone). It is installed in the inlets of the manifold (multi-container system) and prevents extinguishing agent originating from other extinguishing agent cylinders to exit the manifold into the open when the system is activated or extinguishing agent cylinders have been removed.
Discharge nozzle	Last component in the pipe system of a fire suppression system from which extinguishing agent flows into the extinguishing zone. The orifice cross section of the discharge nozzle opening(s) has an overall or partial effect (depending on the extinguishing agent) on essential parameters including ⚡ flooding time and extinguishing agent distribution.
Enclosure temperature	The usually prevalent temperature in the protected room. The calculation of the extinguishing agent quantity must be made based on the enclosure temperature that is to be expected.
Extinguishing zone	Total of all areas that will be flooded with extinguishing agent simultaneously in the event of fire.
Flooding	Outflow of the extinguishing agent into the extinguishing zone.
Flooding time	Period during which the required quantity of extinguishing agent flows out.
Hold time	Period during which a concentration of the extinguishing agent is present inside the extinguishing zone which is higher than the specified minimum concentration.
Manifold	Manifolds connect several extinguishing agent cylinders with one another and merge them into a single unit. Each manifold is fitted with a ⚡ check valve.

Multi-zone system	Multi-zone systems are equipped with central extinguishing agent stockpiling, which is intended for several extinguishing zones. Selector valves are used to discharge the quantity of extinguishing agent into the respective extinguishing zone (↻ single zone system).
Operating pressure	Pressure inside a container at the maximum permitted operating temperature.
Pilot cylinder	Compressed gas cylinder, the contents of which is used for control purposes.
Pre-discharge timer	Period between the time when the alarm signal is issued as a warning to evacuate persons and the release of the extinguishing agent.
Pressure relief device	Preventing damage to the containment components caused by excessive overpressures (required for extinguishing gases as they must be introduced at high concentrations and rates) requires a mechanical pressure relief device which will limit the increase or drop of pressure inside the extinguishing zone to a specified value.
Protected enclosure	Total of all extinguishing zones connected to a fire suppression system.
Release	Automatic or manual activation of the fire suppression system for the purpose of flooding the extinguishing zone by opening the container valves and – if present – the selector valves.
Release device	<p>Device integrated into the container valve or screwed on to the container valve. It opens the cylinder valve to allow the extinguishing agent to flow out. There are the following different types of release devices:</p> <p>Manual release device: It can/may only be fitted on top of the "Master" extinguishing agent container and, if applicable, also on top of an electrical release device already mounted on the container.</p> <p>Electrical release device: It is used to electrically release the container. The electrical release device receives its triggering signal from the fire extinguishing detection system.</p>

	<p>Pneumatic release device: It is used to pneumatically release additional containers in multi-container systems. It is screwed onto the extinguishing agent container instead of the electric release device and connected to a pneumatic pilot line that is located at the side release outlet of the electrically activated "master" extinguishing agent container.</p> <p>Pneumatic/manual release device: The pneumatic/manual release device also makes it possible to release a container manually on location.</p>
Safety device malfunction pressure	☞ Safeguard against slow gas leaks
Selector valve	A valve installed in the main supply line which will, when activated, release the extinguishing agent into the respective zone to be flooded.
SFD safeguard against slow gas leaks	Device ensuring that slow gas leaks cannot release the fire suppression system unintentionally. Safeguards are also necessary in cases where discharging ☞ pilot gas is not always possible due to the design of the system.
System pressure	Pressure for which the fire suppression system has been designed and tested.

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Appendix

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- A** **Inspections**
- B** **Safety data sheet FK-5-1-12**

Inspections

A Inspections

Inspection	Yes	No
Does the contact pressure gauge show system pressure? The pressure varies with the system design and amounts to 25 bar (360 psi), 42 bar (610 psi) or 50 bar (725 psi) at 21 °C (70 °F).		
Have all containers been fitted with release devices?		
Have all extinguishing agent containers been sufficiently fastened with a clamp?		
Do the extinguishing agent containers contain the required quantity – including any potential reserve quantities in accordance with the installation attest?		
Are the extinguishing agent containers, valves, release devices, hoses, selector valves, check valves, and pneumatic pilot lines in sound condition?		
Are the electrical pilot lines leading to the fire detection and extinguishing control panel and the equipotential bonding connected properly and in sound condition?		
Are the pipeline, the pipe clips and the discharge nozzles intact?		
Are the alarm devices intact?		
Are the manual releases accessible and in sound condition?		
Are the automatic fire detectors intact?		
Are the discharge areas of the discharge nozzles unobstructed?		
Are all wall breakthroughs sealed off to the adjoining areas?		
Are the pressure relief flaps closed?		
Are the flow openings of the pressure relief flaps unobstructed?		
Are all structural openings (windows, doors) closed or fitted with operational automatic locking devices?		
Are the escape routes of the protected enclosure unobstructed?		
Are additional fire loads (e.g. boxes, packaging material) removed from the protected enclosure?		
Are all information signs present and easily legible?		
Does the fire suppression detection system show line voltage?		
Is no fault displayed on the fire suppression detection system?		

i *If one or several of these inspection questions cannot be answered with "Yes" or if you are uncertain as to the correct answer, please contact an Authorized Distributor immediately. Contact can be established through the manufacturer (see page 2).*

B Safety data sheet FK-5-1-12

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH)

VSH1230, CPS 1230

Version number: 4.1
Replaces version of: 2017-09-26 (4.0)

Revision: 2017-09-27
First version: 2012-11-14

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name VSH1230, CPS 1230
Other names or synonyms Novec™ 1230 (FK 5-1-12) charged with nitrogen
Registration number (REACH) not relevant (mixture)
CAS number not relevant (mixture)

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses Fire extinguishing agent

1.3 Details of the supplier of the safety data sheet

Minimax GmbH & Co.KG Telephone: +49 (0) 4531 - 803 0
 Industriestrasse 10/12 Telefax: +49 (0) 4531 - 803 248
 23840 Bad Oldesloe Website: www.minimax.de
 Germany

National contact MV Global R&D Technical Product Management
 Halocarbon based Products
 Tel.: +49 45 31 80 3-543, Fax: +49 45 31 80 3-499
 E-Mail: Habitlw@minimax.at

e-mail (competent person) sdb@csb-online.de

Please do not use this e-mail address to ask for the latest safety data sheet. For this purpose contact Minimax GmbH & Co.KG.

1.4 Emergency telephone number

Emergency information service Consultank GmbH +49 (0) 178 433 7434

Poison centre			
Country	Name	Telephone	Telefax
Germany	Giftinformationszentrum - Nord Göttingen	+49 551 19240	

As above or next toxicological information centre.

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SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 (CLP)

Classification acc. to GHS				
Section	Hazard class	Category	Hazard class and category	Hazard statement
2.5	gases under pressure	C	Press. Gas C	H280
4.1C	hazardous to the aquatic environment - chronic hazard	3	Aquatic Chronic 3	H412

for full text of abbreviations: see SECTION 16

Contains gas under pressure; may explode if heated.

Additional information

This mixture does not contain any substances that are assessed to be a PBT or a vPvB.

EIGA-0783: Contains fluorinated greenhouse gases covered by the Kyoto protocol. .

EIGA-As: Asphyxiant in high concentrations.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP)

Signal word warning

Pictograms

GHS04



Hazard statements

H280 Contains gas under pressure; may explode if heated.

H412 Harmful to aquatic life with long lasting effects.

Precautionary statements

P273 Avoid release to the environment.

P410+P403 Protect from sunlight. Store in a well-ventilated place.

2.3 Other hazards

There is no additional information.

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Results of PBT and vPvB assessment

This mixture does not contain any substances that are assessed to be a PBT or a vPvB.

SECTION 3: Composition/information on ingredients**3.1 Substances**

not relevant (mixture)

3.2 Mixtures**Description of the mixture**

Hazardous ingredients acc. to GHS					
Name of substance	Identifier	Wt%	Classification acc. to GHS	Pictograms	M-Factors
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	CAS No 756-13-8 EC No 436-710-6 Index No 606-108-00-X REACH Reg. No 01- 0000018239- 65-xxxx	80 – 99	Aquatic Chronic 3 / H412		
nitrogen	CAS No 7727-37-9 EC No 231-783-9	< 20	Press. Gas C / H280		

SECTION 4: First aid measures**4.1 Description of first aid measures****General notes**

In all cases of doubt, or when symptoms persist, seek medical advice.

Following inhalation

Provide fresh air.

If breathing is irregular or stopped, immediately seek medical assistance and start first aid actions. Mouth to mouth resuscitation should be avoided. Use alternative methods, preferably with oxygen or compressed air driven apparatus.

VSH1230, CPS 1230

Following skin contact

Wash with plenty of soap and water.

Following eye contact

Rinse cautiously with water for several minutes.

Remove contact lenses, if present and easy to do. Continue rinsing.

Following ingestion

Rinse mouth. Do not induce vomiting.

Get medical advice/attention if you feel unwell.

Notes for the doctor

none

4.2 Most important symptoms and effects, both acute and delayed

These information are not available.

4.3 Indication of any immediate medical attention and special treatment needed

none

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

co-ordinate firefighting measures to the fire surroundings

5.2 Special hazards arising from the substance or mixture

Hazardous decomposition products: Section 10.

Contact with the product can cause burns and/or frostbite.

Contains gas under pressure; may explode if heated.

Hazardous combustion products

hydrogen fluoride (HF)

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes.

Co-ordinate firefighting measures to the fire surroundings.

Do not allow firefighting water to enter drains or water courses.

Collect contaminated firefighting water separately.

Fight fire with normal precautions from a reasonable distance.

Special protective equipment for firefighters

use suitable breathing apparatus

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SECTION 6: Accidental release measures**6.1 Personal precautions, protective equipment and emergency procedures****For non-emergency personnel**

Remove persons to safety.

Ventilate affected area.

Wearing of suitable protective equipment (including personal protective equipment referred to under Section 8 of the safety data sheet) to prevent any contamination of skin, eyes and personal clothing.

For emergency responders

Wear breathing apparatus if exposed to vapours/dust/spray/gases.

6.2 Environmental precautions

Keep away from drains, surface and ground water.

Retain contaminated washing water and dispose of it.

6.3 Methods and material for containment and cleaning up

Ventilate affected area.

Other information relating to spills and releases

Place in appropriate containers for disposal.

6.4 Reference to other sections

Hazardous combustion products: see section 5.

Personal protective equipment: see section 8.

Incompatible materials: see section 10.

Disposal considerations: see section 13.

SECTION 7: Handling and storage**7.1 Precautions for safe handling****Measures to prevent fire as well as aerosol and dust generation**

Use local and general ventilation.

Prevent from heating up above 50 °C/122 °F.

Pressurized container: may burst if heated.

Specific notes/details

None.

Measures to protect the environment

Avoid release to the environment.

Advice on general occupational hygiene

Do not eat, drink and smoke in work areas.

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7.2 Conditions for safe storage, including any incompatibilities

Flammability hazards

Protect from sunlight.

Incompatible substances or mixtures

Incompatible materials: see section 10. **Protect against external exposure, such as**
heat

Consideration of other advice

Keep away from food, drink and animal feedingstuffs.

Ventilation requirements

Provision of sufficient ventilation.

Packaging compatibilities

Only packagings which are approved (e.g. acc. to ADR) may be used.

7.3 Specific end use(s)

No information available.

SECTION8: Exposure controls/personal protection

8.1 Control parameters

Relevant DNELs of components of the mixture						
Name of substance	CAS No	End-point	Threshold level	Protection goal, route of exposure	Used in	Exposure time
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	DNEL	1,286,130 mg/m ³	human, inhalatory	worker (industry)	acute - systemic effects
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	DNEL	780 mg/m ³	human, inhalatory	worker (industry)	chronic - systemic effects
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	DNEL	1,000,000 mg/m ³	human, inhalatory	worker (industry)	chronic - local effects
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	DNEL	147 mg/kg	human, dermal	worker (industry)	chronic - systemic effects

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Relevant PNECs of components of the mixture				
Name of substance	CAS No	Endpoint	Threshold level	Environmental compartment
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	PNEC	0.008 mg/l	freshwater
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	PNEC	0.001 mg/l	marine water
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	PNEC	1 mg/l	sewage treatment plant (STP)
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	PNEC	0.006 mg/kg	freshwater sediment
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	PNEC	0.001 mg/kg	marine sediment
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	PNEC	0.006 mg/kg	soil

8.2 Exposure controls

Appropriate engineering controls

General ventilation.

Individual protection measures (personal protective equipment)

Eye/face protection

Use protective eyewear to guard against splash of liquids.

Hand protection

Material	Material thickness	Breakthrough times of the glove material
data are not available	data are not available	data are not available

Respiratory protection

[In case of inadequate ventilation] wear respiratory protection.

Self-contained breathing apparatus (EN 133).

Environmental exposure controls

Use appropriate container to avoid environmental contamination. Keep away from drains, surface and ground water.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state	liquid
Form	pressurized
Colour	colourless
Odour	odourless
Odour threshold	these information are not available

Other safety parameters

pH (value)	not relevant
Melting point/freezing point	these information are not available
Initial boiling point and boiling range	49 °C
Flash point	not applicable
Evaporation rate	these information are not available
Flammability (solid, gas)	non-combustible

Explosive limits

Lower explosion limit (LEL)	these information are not available
Upper explosion limit (UEL)	these information are not available
Vapour pressure	these information are not available
Density	1.6 g/cm ³ at 20 °C
Vapour density	these information are not available
Relative density	these information are not available

Solubility(ies)

Water solubility	insoluble
------------------	-----------

Partition coefficient

n-octanol/water (log KOW)	these information are not available
Auto-ignition temperature	these information are not available
Relative self-ignition temperature for solids	not relevant (Gaseous)
Decomposition temperature	these information are not available

VSH1230, CPS 1230**Viscosity**

Kinematic viscosity	not relevant (gaseous)
Dynamic viscosity	not relevant (gaseous)
Explosive properties	not explosive
Oxidising properties	shall not be classified as oxidising

9.2 Other information

None

SECTION 10: Stability and reactivity**10.1 Reactivity**

Gas under pressure.

If heated:

danger of explosion, gas under pressure, danger of bursting container

10.2 Chemical stability

See below "Conditions to avoid".

10.3 Possibility of hazardous reactions

No known hazardous reactions.

10.4 Conditions to avoid

Contains gas under pressure; may explode if heated.

10.5 Incompatible materials

bases, amine

10.6 Hazardous decomposition products

Carbon monoxide (CO).

Carbon dioxide (CO₂).

Hydrogen fluoride (HF).

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Classification procedure

If not otherwise specified the classification is based on:
 Ingredients of the mixture (additivity formula). **Classification**
according to GHS (1272/2008/EC, CLP) Acute toxicity

Acute toxicity of components of the mixture						
Name of substance	CAS No	Exposure route	Endpoint	Value	Species	Source
1,1,1,2,2,4,5,5,5-nonafuoro- 4-(trifluoromethyl)-3-pentan- one	756-13-8	oral	LD50	>2,000 mg/kg	rat	ECHA
1,1,1,2,2,4,5,5,5-nonafuoro- 4-(trifluoromethyl)-3-pentan- one	756-13-8	dermal	LD50	>2,000 mg/kg	rat	ECHA

Skin corrosion/irritation

Classification could not be established because:
 Data are lacking, inconclusive, or conclusive but not sufficient for classification.

Serious eye damage/eye irritation

Classification could not be established because:
 Data are lacking, inconclusive, or conclusive but not sufficient for classification.

Respiratory or skin sensitisation

Skin sensitisation

Classification could not be established because:
 Data are lacking, inconclusive, or conclusive but not sufficient for classification.

Respiratory sensitisation

Classification could not be established because:
 Data are lacking, inconclusive, or conclusive but not sufficient for classification.

Germ cell mutagenicity

Classification could not be established because:
 Data are lacking, inconclusive, or conclusive but not sufficient for classification.

Carcinogenicity

Classification could not be established because:
 Data are lacking, inconclusive, or conclusive but not sufficient for classification.

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Reproductive toxicity

Classification could not be established because:
Data are lacking, inconclusive, or conclusive but not sufficient for classification.

Specific target organ toxicity - single exposure

Classification could not be established because:
Data are lacking, inconclusive, or conclusive but not sufficient for classification.

Specific target organ toxicity - repeated exposure

Classification could not be established because:
Data are lacking, inconclusive, or conclusive but not sufficient for classification.

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

SECTION 12: Ecological information**12.1 Toxicity****Aquatic toxicity (acute)**

Test data are not available for the complete mixture.

Aquatic toxicity (acute) of components of the mixture

Aquatic toxicity (acute) of components of the mixture						
Name of substance	CAS No	Endpoint	Value	Species	Source	Exposure time
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	LC50	>1,070 mg/l	fathead minnow (Pimephales promelas)	ECHA	96 h
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	EC50	>1,080 mg/l	daphnia magna	ECHA	48 h

Aquatic toxicity (chronic)

Harmful to aquatic life with long lasting effects.
Test data are not available for the complete mixture.

12.2 Persistence and degradability**Degradability of components of the mixture**

Degradability of components of the mixture				
Name of substance	CAS No	Process	Degradation rate	Time
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	carbon dioxide generation	1.8 – 3.4 %	28 d

VSH1230, CPS 1230

Biodegradation

The relevant substances of the mixture are readily biodegradable.

Persistence

Data are not available.

12.3 Bioaccumulative potential

Data are not available.

Bioaccumulative potential of components of the mixture

Bioaccumulative potential of components of the mixture			
Name of substance	CAS No	BCF	Log KOW
1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone	756-13-8	4.8	3.08 (30 °C)

12.4 Mobility in soil

Data are not available.

12.5 Results of PBT and vPvB assessment

This mixture does not contain any substances that are assessed to be a PBT or a vPvB.

12.6 Other adverse effects

Global warming potential 1

Endocrine disrupting potential

None of the ingredients are listed.

Remarks

None.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

This material and its container must be disposed of as hazardous waste. Dispose of contents/container to an authorized waste treatment facility.

Sewage disposal-relevant information

Do not empty into drains.

Waste treatment of containers/packagings


It is a dangerous waste; only packagings which are approved (e.g. acc. to ADR) may be used. Handle contaminated packages in the same way as the substance itself.

VSH1230, CPS 1230

Remarks

Please consider the relevant national or regional provisions.

SECTION 14: Transport information

14.1	UN number	1956
14.2	UN proper shipping name	COMPRESSED GAS, N.O.S.
	Technical name (hazardous ingredients)	NITROGEN, DODECAFLUORO-2-METHYLPENTAN-3-ONE
14.3	Transport hazard class(es)	
	Class	2.2
	Subsidiary risk(s)	2.2 (gas under pressure)
14.4	Packing group	not assigned to a packing group
14.5	Environmental hazards	non-environmentally hazardous acc. to the dangerous goods regulations
14.6	Special precautions for user	Provisions for dangerous goods (ADR) should be complied within the premises.
14.7	Transport in bulk according to Annex II of MARPOL and the IBC Code	The cargo is not intended to be carried in bulk.
14.8	<u>Information for each of the UN Model Regulations</u>	
	Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN)	
	UN number	1956
	Proper shipping name	UN1956, COMPRESSED GAS, N.O.S., (NITROGEN, DODECAFLUORO-2-METHYLPENTAN-3-ONE), 2.2, (E)
	Class	2
	Classification code	1A
	Danger label(s)	2.2
		
	Special provisions (SP)	274, 378, 655, 662
	Excepted quantities (EQ)	E1
	Limited quantities (LQ)	120 ml
	Transport category (TC)	3.
	Tunnel restriction code (TRC)	E

VSH1230, CPS 1230

Hazard identification No 20

Emergency Action Code 2TE

International Maritime Dangerous Goods Code (IMDG)

UN number 1956

Proper shipping name UN1956, COMPRESSED GAS, N.O.S.,
(NITROGEN, DODECAFLUORO-2-METHYLPENTAN 3-ONE), 2.2

Class 2.2

Marine pollutant -

Danger label(s) 2.2



Special provisions (SP) 274, 378

Excepted quantities (EQ) E1

Limited quantities (LQ) 120 ml

EmS F-C, S-V

Stowage category A

International Civil Aviation Organization (ICAO-IATA/DGR)

UN number 1956

Proper shipping name UN1956, Compressed gas, n.o.s., (NITROGEN, DO-
DECAFLUORO-2-METHYLPENTAN 3-ONE), 2.2

Class 2.2

Danger label(s) 2.2



Special provisions (SP) A202

Excepted quantities (EQ) E1

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SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Relevant provisions of the European Union (EU)

Restrictions according to REACH, Annex XVII

none of the ingredients are listed

List of substances subject to authorisation (REACH, Annex XIV)

none of the ingredients are listed

Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) - Annex II

none of the ingredients are listed

Regulation 166/2006/EC concerning the establishment of a European Pollutant Release and Transfer Register (PRTR)

none of the ingredients are listed

Directive 2000/60/EC establishing a framework for Community action in the field of water policy (WFD)

none of the ingredients are listed

Regulation 98/2013/EU on the marketing and use of explosives precursors

none of the ingredients are listed

SECTION 16: Other information

Indication of changes (revised safety data sheet)

Section	Former entry (text/value)	Actual entry (text/value)
1.3		National contact: MV Global R&D Technical Product Management Halocarbon based Products Tel.: +49 45 31 80 3-543, Fax: +49 45 31 80 3-499 E-Mail: Habitziw@minimax.at
14.8	Proper shipping name: UN1956, COMPRESSED GAS, N.O.S., (contains: NI- TROGEN, DODECAFLUORO-2-METHYLPENTAN- 3- ONE), 2.2, (E)	Proper shipping name: UN1956, COMPRESSED GAS, N.O.S., (NITROGEN, DODECAFLUORO-2-METHYLPENTAN-3-ONE), 2.2, (E)

Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
ADN	Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures (European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways)
ADR	Accord européen relatif au transport international des marchandises dangereuses par route (European Agreement concerning the International Carriage of Dangerous Goods by Road)

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Abbr.	Descriptions of used abbreviations
Aquatic Chronic	Hazardous to the aquatic environment - chronic hazard
BCF	Bioconcentration factor
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
CLP	Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures
DGR	Dangerous Goods Regulations (see IATA/DGR)
DNEL	Derived No-Effect Level
EC No	The EC Inventory (EINECS, ELINCS and the NLP-list) is the source for the seven-digit EC number, an identifier of substances commercially available within the EU (European Union)
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
EmS	Emergency Schedule
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods Code
index No	The Index number is the identification code given to the substance in Part 3 of Annex VI to Regulation (EC) No 1272/2008
log KOW	n-Octanol/water
MARPOL	International Convention for the Prevention of Pollution from Ships (abbr. of "Marine Pollutant")
NLP	No-Longer Polymer
PBT	Persistent, Bioaccumulative and Toxic
PNEC	Predicted No-Effect Concentration
Press. Gas	Gas under pressure
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)
vPvB	Very Persistent and very Bioaccumulative

Key literature references and sources for data

VSH1230, CPS 1230

Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures. Regulation (EC) No. 1907/2006 (REACH), amended by 2015/830/EU.

Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN).

International Maritime Dangerous Goods Code (IMDG).

Dangerous Goods Regulations (DGR) for the air transport (IATA).

Classification procedure

Physical and chemical properties.

Health hazards.

Environmental hazards.

The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

List of relevant phrases (code and full text as stated in chapter 2 and 3)

Code	Text
H280	Contains gas under pressure; may explode if heated.
H412	Harmful to aquatic life with long lasting effects.

Responsible for the safety data sheet

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Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.

