

KITCHEN FIRE SUPPRESSION SYSTEM

SYSTEM MANUAL

Designed in Sweden

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SECTION 1 – GENERAL INFORMATION

1.1 Design and Application

KitchenX is a pre-engineered wet chemical fire suppression system designed to suppress fires originating from kitchen appliances and to prevent such fires from spreading through the ventilation system or to other parts of the premises. The system is mechanically activated, manually or automatically, and operates independently of any electrical supply or water piping connection.

The system operating temperature is between -5 to 55 °C and operating pressure is 7.6 bar at the outlet of the pressure reducing regulator supplied by 145 bar nitrogen cartridges. Installation is intended for indoor environments where wind conditions cannot interfere with system operation.

Strict adherence to this manual is required to successfully suppress fires with KitchenX.
For reliable function, the system must be designed, installed, commissioned and maintained according to this manual by a KitchenX certified technician trained by a Dafo approved trainer.

The end user must also operate and maintain their kitchen and their KitchenX system in accordance with the KitchenX user manual to minimize the risk of uncontrolled fire development or system failure.

1.2 System Approvals

The system is approved according to the standard EN 17446 – "Fire Extinguishing Systems in Commercial Kitchens" by an independent testing laboratory accredited to EN ISO/IEC 17025.

1.3 Safety Summary

Design, installation, and service of KitchenX involve situations and practices associated with risk. To avoid injuries and damage to system components, to nearby equipment, and to the premises, technicians and system designers must be trained by a Dafo-approved trainer before they perform design, installation, service, or commissioning of a KitchenX system.

Situations and practices associated with risk are indicated with the symbols defined below.

⚠ DANGER ⚠

Indicates a situation or practice where there is risk of considerable harm to the person in the situation or to people who will be subjected to a situation because of a faulty practice.

⚠ WARNING ⚠

Indicates a situation or practice where there is risk of considerable damage to system components, to nearby equipment, or to the property.

! NOTE !

Indicates information, a situation, or practice that has cause for close attention or careful consideration.

1.3.1 Cartridges and Pressurized Systems

Agent tanks and gas expellant gas hoses must be hydrostatically tested and pressure reducing regulators must be flow tested no less than every twelfth (12) year.

Nitrogen cartridges must be hydrostatically tested no less than every tenth year (10). Shipping caps should be mounted whenever cartridges are not installed at the release mechanism. Cartridges can explode if the temperature exceeds their operating temperature. Refer to the safety data sheet in the appendix for complete contents.

1.3.2 Wet Chemical Agent and Flushing Concentrate

For complete content, see the safety data sheets in the appendix.

1.4 Definition of Terms

Auto-Ignition Temperature

Auto-ignition temperature is the lowest temperature at which a substance will spontaneously catch fire in air without any. external flame or spark.

Broiler

A cooking appliance where the food is on a grate, directly exposed to an intense heat source by radiation or convection. Neither the food nor the radiation source necessarily needs to be in a horizontal position.

Deep Fat Fryer

A cooking appliance where the food is fried submerged in a fixed vat filled with oil, exposed to an intense radiant or convective heat source.

Discharge Time

Time during which the discharge of the extinguishing agent occurs without interruptions, excluding the residual expellant gas discharge.

Drip board

A section of a fryer that is located at or just below the oil surface. It is used as a surface where fried food items can drip off excess oil.

Duct

A channel that carries away smoke, steam, heat, odours, and grease particles produced during cooking.

Fat Fire Extinguishing Agent

Normally referred to as a wet chemical agent. Extinguishing is achieved by a saponification reaction, causing cooling and oxygen depletion simultaneously.

Flow Number

A number that relates to the volume discharged through a nozzle upon system activation. A higher value indicates more volume discharged.

Fire Suppression System

A system designed to detect and suppress a pre-determined fire hazard, usually by automatic discharge through distribution piping with nozzles.

Expellant Gas

Pressurized gas, either in an external cartridge or in the headspace of an extinguishing agent tank, used to discharge extinguishing agent.

Fat Fire

A fire that primarily uses fat as fuel. This includes vegetable oils, grease, animal fats, and other oily substances used in or resulting from the preparation of food. These fires differ from conventional fires by the extreme heat involved and their high auto-ignition temperature. Typically, they re-ignite after being extinguished with CO_2 and react explosively if extinguishing is attempted with water. Such fires are denoted as class F in the EN 3 system and class K in the NFPA system.

Fusible Link

A fire detector constructed with an alloy designed to melt and separate at a specific temperature.

Griddle

A cooking appliance where the food is cooked on a flat heated surface.

Hood

A part of a kitchen exhaust system that directs and captures grease and oil vapors and the combustion gases from cooking appliances.

Nozzle

A means to control the discharge of an extinguishing agent. Nozzle types differ in their specific flow rates, spray patterns, and droplet sizes. KitchenX nozzles are marked with the flow number and the spray angle.

Perimeter

Either the position directly above the edge of a hazard or the geometrical circumference. For rectangular shapes: The sum of the lengths of all sides. For circular shapes, the circumference is calculated as the diameter × π.

Plenum

The space inside a kitchen hood enclosed behind the filters.

Pre-engineered System

Performance-tested system with predetermined, standardized components and/or requirements regarding flow rates, pipe sizes, or structural elements. Installation of such systems must be made in accordance with the limitations prescribed by the manufacturer and the system manual.

Fat Fire Hazard

Hazards that should be protected with a fire suppression system. Includes any hot surfaces and appliances that produce fat-saturated vapors or risk igniting or propagating fat fires. A kitchen hood's duct, plenum, and the associated filters are also classified as hazards.

Referred to as *hazard* in this manual.

Range Top

A cooking appliance where the food is cooked using cookware on a heated surface. It can be powered by electrical conduction, induction, or by gas.

Saponification

A chemical reaction in which fat or oil reacts with a base to produce a non-combustible soap-like product.

Split-Vat Deep Fat Fryer

Fryer that incorporates a divided partition, which splits the fryer into sections, where each vat incorporates a separately controlled heating source.

Spray Angle

When extinguishing agent is discharged in a cone shape, the spray angle describes the angle of this cone in degrees. A wider angle covers a larger area but delivers lower agent density.

System Manual

Manufacturer's documentation where the function and the requirements of design, installation, and maintenance of the system are defined.

Tilt Skillet

A cooking appliance with a flat-bottomed, high-sided pan with a powered or manual tilting mechanism where the food is cooked, boiled, sautéed, or fried.

Wok

Bottom-domed round frying pan. Can be used on a range top or at specific wok stations.

1.5 Version History

Version	Publishing Date	Change Summary
1.0	2026-05-01	Initial publication.
1.1	2026-07-02	Updated requirements for expellant gas line.

1.6 Warranty Terms and Conditions

Design, installation, maintenance, and commissioning of KitchenX involve situations and practices associated with the risk of damaging system components, property, and nearby equipment. The approval of any warranty claims requires:

1. That the system was designed, installed, commissioned, and serviced by KitchenX-approved technicians and that design, installation, commissioning, and maintenance were performed according to this system manual.
2. That only components described in this manual or otherwise approved by a written statement by an official Dafo KitchenX representative were used in any function critical part of the system, including components of the system cabinet, detection system, distribution system and the extinguishing agent.
3. That the kitchen appliances and KitchenX system have been maintained and operated according to the KitchenX user manual.

The warranty period is 12 months from the date of commissioning of the system by the installer, however no later than 18 months from the date of delivery to the distributor.

SECTION 2 – SYSTEM DESCRIPTION

2.1 Working Principle

KitchenX systems consist of one to three non-pressurized wet chemical agent tanks, one nitrogen cartridge, and distribution piping with nozzles. The system is mechanically activated with a release mechanism, either automatically — with fusible links — or manually — with one or two manual pull stations.

The KitchenX wet chemical agent has been specifically designed for effective suppression of fat fires (class F fires). The potassium salts of the agent react with superheated fat, oil, or grease to create a saponification layer. This layer inhibits oxygen from transferring to the fire, thus allowing the fire to cool down below the auto ignition temperature before re-ignition can occur.
KitchenX nozzles discharge the agent as a spray to prevent splashing hot oil droplets upon activation. The small droplet size also contributes to more efficient cooling of the fire.

2.2 Systems Summary

There are four types of KitchenX systems:

1. KX1R – Single Tank System
2. KX2R – Double Tank System
3. KX2RM – Double Tank Manifold System
4. KX3R – Triple Tank System

Refer to *SECTION 4 – SYSTEM DESIGN* for the selection of system for specific installations. Other equipment necessary for the completion of the system is described in *SECTION 3 – SYSTEM COMPONENTS* and includes components of the distribution system, the detection system, the manual pull station, and electrical switches used to shut off kitchen appliances or to trigger the fire alarm at system activation.

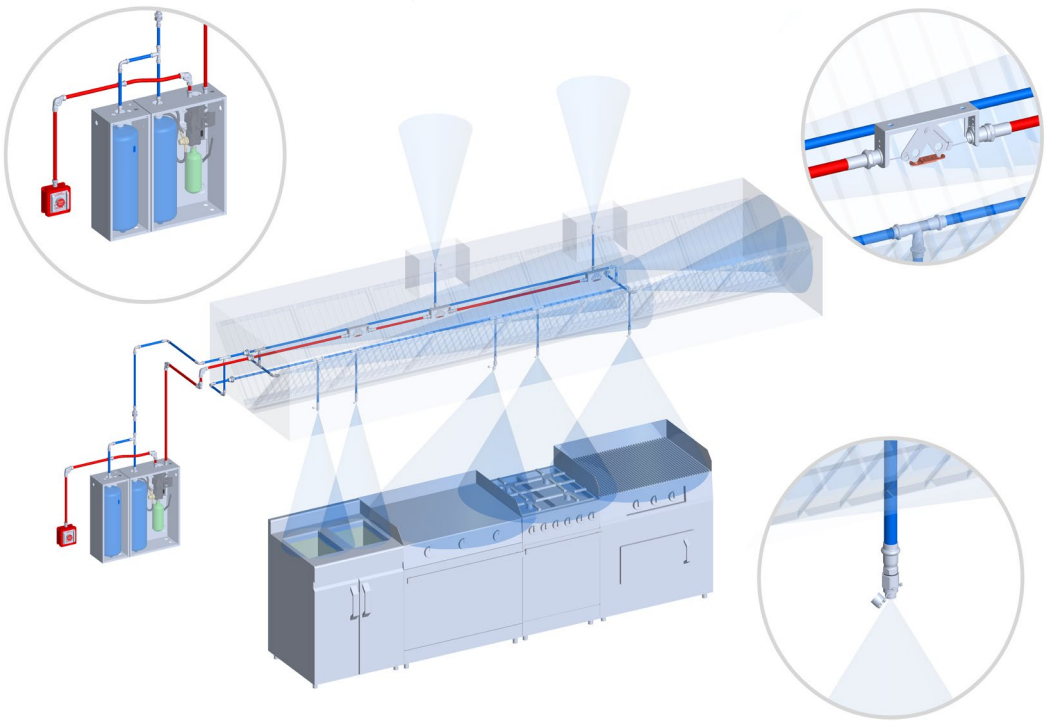


Figure 2.1: KitchenX system overview. Agent tank and distribution piping are coded in blue, detection line and manual pull station are coded in red, the nitrogen cartridge is coded in green and the release mechanism is coded in black.

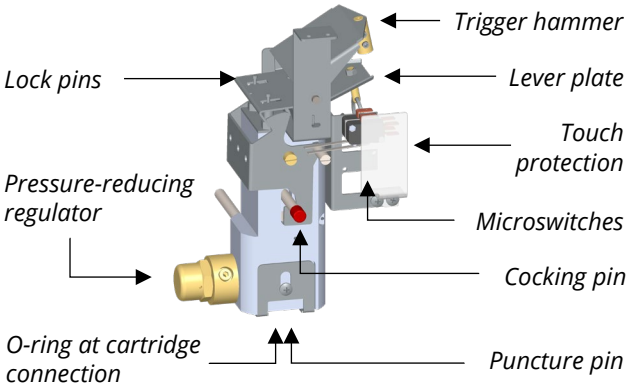
SECTION 3 – SYSTEM COMPONENTS

Tank and Release Mechanism Cabinet p/n 55-1618-40



Includes a KitchenX agent tank, release mechanism, pressure reducing regulator, expellant gas hose and two microswitches. The cabinet does not include nitrogen cartridges or KitchenX agent.

KitchenX systems larger than KitchenX single tank systems must be supplemented with additional single tank cabinets and expellant gas hoses. Touch protection is available as a spare part (p/n 55-2019-65).



Single Tank Cabinet p/n 55-1618-60



Includes an uncharged KitchenX agent tank. The single tank cabinet is used for KitchenX systems larger than KitchenX single tank systems.

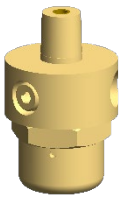
Burst Disc p/n 55-1618-80

The burst disc prevents agent leakage into the distribution piping due to temperature and pressure fluctuations. It bursts when the system is activated.



Pressure Reducing Regulator p/n 55-1618-50

The pressure reducing regulator reduces and stabilizes the pressure from nitrogen cartridges to the distribution system. The secondary outlet of the regulator is used as an expellant gas feed for one additional tank in double and triple tank system configurations.



KitchenX Agent Tank p/n 55-1618-00

Includes a valve with a riser tube. The valve contains a vent plug and a burst disc. The vent plug equalizes the pressure with the ambient pressure when the system is installed and not activated. The tank is connected to distribution piping with an NPT ⅜" adapter.

The tank is shipped uncharged and must be filled with 11.7 liters of KitchenX agent during installation. The vent plug is available as a spare part (p/n 55-1618-12).



Nitrogen Cartridges
p/n see table below

The gas cartridges store nitrogen expellant gas under pressure until the system is activated. Upon activation, the cartridge seal is punctured, and the released gas causes discharge of the agent from one or more tanks through the distribution piping and nozzles.

Two nitrogen cartridges are available.

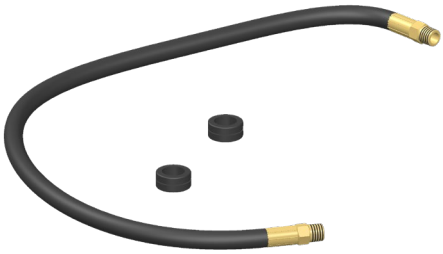
Part No.	Component	Pressure	Vol.
55-1320-04	N8A	145 bars	0.8 l
55-1320-30	N16A	145 bars	1.6 l



Expellant Gas Hose
p/n 55-5840-20

The expellant gas hose connects the agent tank to the outlet of the regulator. For triple systems, it is used to connect two agent tanks.

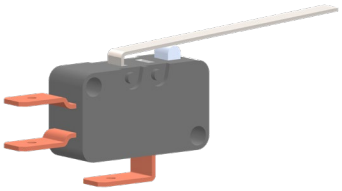
Both ends of the hose have swiveling connections. Two rubber grommets are included.



Microswitch kit
p/n 55-2019-62

The microswitch is used to shut off or turn on functions like electrical gas valves, alarms, contactors and other electrical devices when the system is activated. Two microswitches are installed on a release mechanism by default and two additional microswitches can be installed.

Two microswitches, screws and nuts and isolating plastic is included in the kit.



Wet Chemical Agent Type KitchenX, 11.7 liter
p/n 55-1618-20

The KitchenX wet chemical agent is a potassium-based liquid designed for fast knock-down and suppression of fat fires. The agent is shipped in plastic containers that provide one complete tank charge. It has a freezing point of -30°C.
Shelf life is five years at -30 to 55 °C.
When installed, the accepted temperature range is -5 to 55 °C.



KitchenX Flushing Concentrate, 1000 ml
p/n 55-1618-90

The flushing concentrate is used to flush the distribution system before resetting a KitchenX system after discharge. It is diluted at one part water and ten parts concentrate.
Shelf life is 5 years at -35 to 55 °C.



Manual Pull Station
p/n 55-1135-12 (incl box) 55-1135-12 (excl box)

The Manual Pull Station is used to manually activate the suppression system and can be purchased with or without a box. It includes a breakable rod which splits upon activation.

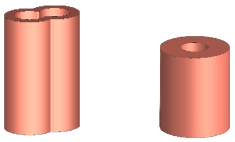
The breakable rod is available as a spare part (p/n 55-1135-94).





Stop- and Oval Sleeve for 1.6 mm Wire Rope
p/n 55-1116-16 & 55-1116-18

Stop sleeves are used at the ends of wire ropes to create a stop point for tension. Oval sleeves are used to construct a wire rope loop. These two components are needed to fasten the detection and manual activation wire rope to the pull station(s) and the release mechanism.



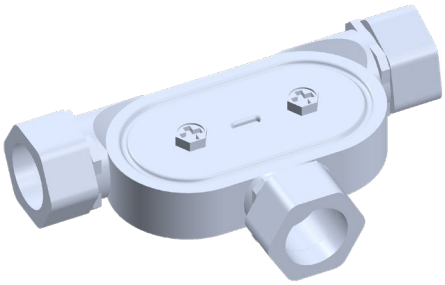
Pulley Elbow
p/n 55-1119-31

The pulley elbow allows a direction change of 90° for wire ropes used in the detection and manual activation systems. It includes compression rings for connecting to 18 mm conduit piping and a ball bearing to allow efficient force transfer of the wire rope from fusible links and manual pull stations.



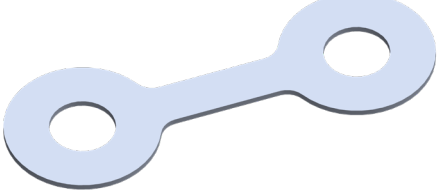
Pulley Tee
p/n 55-1119-40

The pulley tee allows the joining of two conduit pipes used for two separate manual pull stations.



Test Link
p/n 55-3291-90

The test link replaces the fusible link at the terminal detector during the test procedure at commissioning and semi-annual maintenance.



Fusible Links
p/n see table below

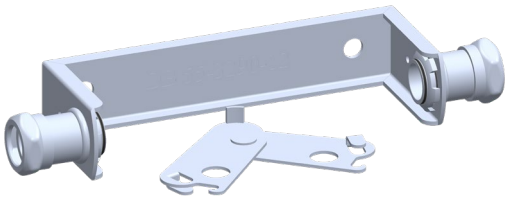
The fusible link is used in the detector assembly and is designed to separate at a specific temperature. This releases slack in the wire rope and activates the system. The fusible links are available in several different fixed temperatures.



Part No.	Marked	Temperature
55-3292-07	Black	74°C
55-3292-13	Blue	138°C
55-3292-18	Red	182°C
55-3292-23	Green	232°C
55-3292-26	Yellow	260°C

Detector Bracket and Linkage Scissor
p/n 55-3290-20

The detector bracket includes the bracket, scissor linkage, and two conduit couplings with threads. Fusible links are not included. When the fusible link's alloy melts, the scissor linkage releases slack into the detection system, triggering activation of the KitchenX system.



Wire Rope
p/n 55-1115-10 & 55-1115-13

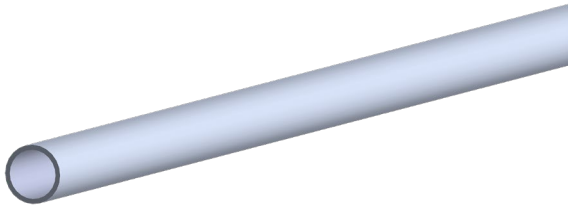
The ø1.6 mm stainless steel wire rope is available in 150 m and 15 m lengths. It is used in the detection and the manual pull station conduit piping.

Part No.	Length
55-1115-10	150 m
55-1115-13	15 m



Conduit Pipe 18 mm
p/n 55-5008-18

Aluminum pipe for the detection system and manual activation conduit piping.
Dimensions are 18 × 1.5 mm, length 2 m.



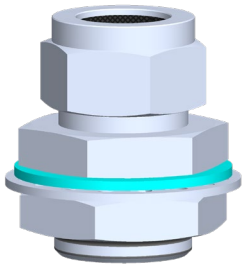
Pipe Bend
p/n 55-5009-80

The pipe bend is used to bring conduit piping towards the cabinet from the wall without the use of pulley elbows.



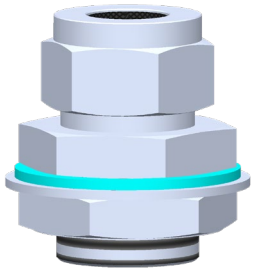
Compression Connector for 18 mm pipe
p/n 55-5199-10

This compression connector is used to get a tight seal when penetrating a kitchen hood with the 18 mm conduit piping used for the detection system.



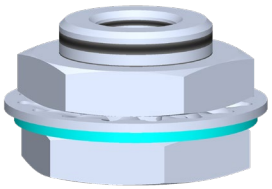
Compression Connector for 15 mm pipe
p/n 55-5199-06

This compression connector is used to get a tight seal when penetrating a kitchen hood with the 15 mm pipe used for the distribution system.



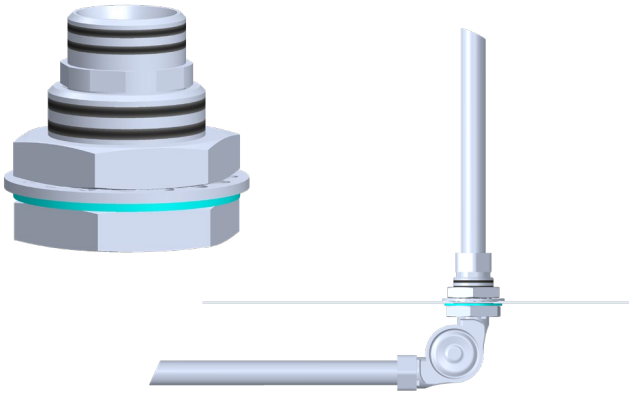
Compression Connector for ⅜" Adapter
p/n 55-5199-04

This compression connector is used to get a tight seal when penetrating a kitchen hood with the agent distribution system with pipe adapters. It has an NPT ⅜" inner thread for each connection.



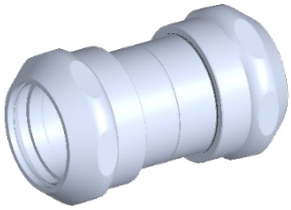
Compression Connector for Pulley Elbow
p/n 55-5199-18

This compression connector is used to get a tight seal when penetrating a kitchen hood with the detection system, with a pulley elbow on one end and a conduit pipe at the other end. When used, the compression ring of the pulley elbow is used at the protruding side of the connector.



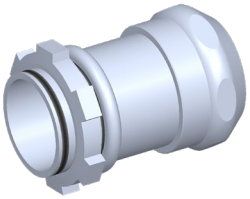
Conduit Coupling
p/n 55-5199-02

The conduit couplings are used to connect the conduit piping in the detection and the manual activation systems.



Conduit Coupling with Thread
p/n 55-5199-00

The conduit couplings with threads are used at detector brackets and at pull stations to connect to the conduit piping of the detection and manual activation systems.



KitchenX components for Distribution System
p/n see Table 3.1

The distribution piping and system components are manufactured of stainless steel and approved for working pressures up to 20 bar at a temperature range of -20 to 100 °C. Most connections are made by press couplings to enable easy installation. The couplings are compatible with the nozzles available for the KitchenX system.

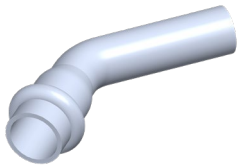
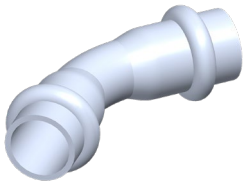
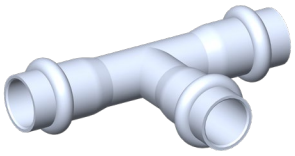
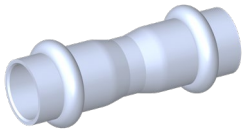
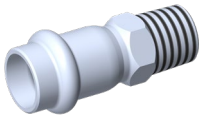
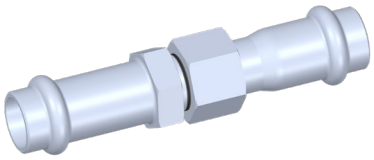
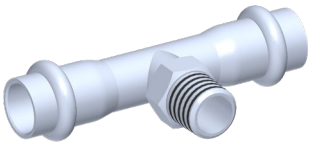
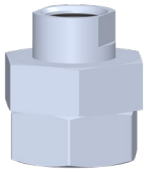
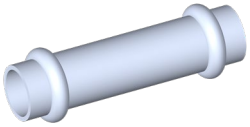
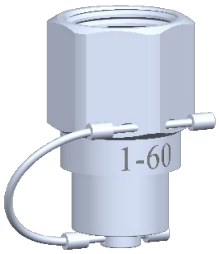
Part	Picture	Part No.	Picture
55-5200-01 Elbow coupling M/F		55-5200-02 Elbow coupling F/F	
55-5200-03 Coupling 45° M/F		55-5200-04 Coupling 45° F/F	
55-5200-05 T-coupling F/F/F		55-5200-06 Straight coupling F/F	
55-5200-08 Adapter F/NPT ⅜”		55-5200-09 Union coupling F/F	
55-5200-13 T-coupling F/F/NPT ⅜”		55-5200-12 Elbow coupling F/NPT ⅜”	
55-5200-15 15 mm pipe		55-1621-27 Manifold union coupling with burst disc NPT ⅜”/ NPT ⅜”	
55-5200-07 Splicing sleeve F/F			

Table 3.1: Components for KitchenX distribution system.

Nozzles
p/n see table below

Nozzles with ⅜" NPT thread are available for different applications of the system. They are marked on the neck of the nozzles with the flow number and the spray angle. A blow-off cap is attached to the nozzle body with stainless steel wire rope. The strainer in the nozzle cup can be removed for cleaning with the help of a circlip plier.

Nozzle caps (p/n: 55-6156-91) and O-rings (p/n 55-6156-92) are available as spare parts.



Part No.	Marking	Number of Flow	Spray Angle
55-6156-16	1-60	1	60°
55-6156-11	1-110	1	110°
55-6156-23	2-30	2	30°
55-6156-26	2-60	2	60°

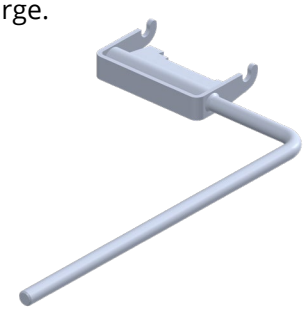
Swivel Adaptor
p/n 55-6155-90

The Swivel Adaptor assembly consists of a swivel nut, swivel body, and swivel ball. The swivel adaptor enables nozzles to be rotated 30° in all directions.



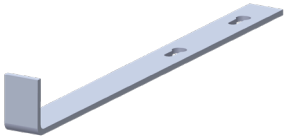
Cocking Lever and Lock Plate
p/n 55-9650-10

The cocking lever is used to set the release mechanism in operational mode at installation. or after discharge.



Lock Plate
p/n 55-9650-00

When the release mechanism is in operational mode, the lock plate is used to prevent accidental activation of the system.



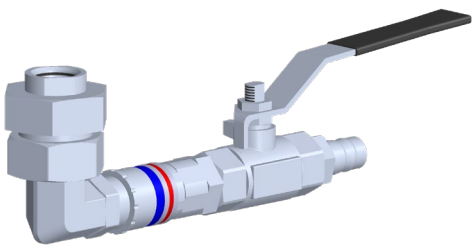
Regulator testing tool
p/n 55-9650-22

The regulator testing tool is used to flow test pressure-reducing regulators.



Purge Adapter for Distribution System
p/n 55-9650-04

Used with a compressor to blow through or purge distribution piping.



SECTION 4 – SYSTEM DESIGN

4.1 Design Workflow

To effectively design a KitchenX system, the following step-by-step sequence should be followed.

1. Identification of hazards to protect.
2. Nozzle selection and placement for each hazard.
3. Selection of tanks and cartridges.
4. Design of distribution piping.
5. Design of detection system.

These steps are described in detail in the following paragraphs.

4.2 Identification of Hazards to Protect

Hazards to protect include any hot surfaces and appliances in the kitchen that produce fat-saturated vapors or risk igniting or propagating fat fires. It also includes the hoods and exhaust ducts that evacuate cooking fumes and gases away from those appliances.

One larger or several smaller systems can be chosen to protect the hazards depending on the premises. For instance, a food court including several kitchens of different restaurants can be protected with multiple smaller systems or a single large one. If a multitude of kitchens share a common duct, the duct must be protected so that fires in the duct are prevented from spreading to other kitchens, regardless of which kitchen the fire originates from.

4.3 Nozzle Selection

Once the hazards have been identified, the discharge nozzles must be selected. The choice between two or more nozzles can be made for some hazards, and multiple nozzles are required for other hazards. All nozzle placement measurements originate from the tip of the nozzle.

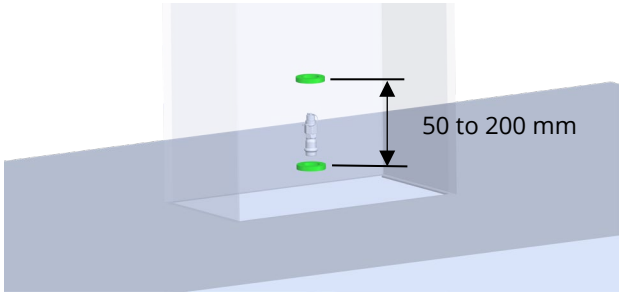


Figure 4.1: Nozzles are placed 50 to 200 mm into the duct from the duct opening.

4.3.1 General Requirements

1. For each hazard protected with KitchenX, there is a specified nozzle type, nozzle aiming point (indicated in red), nozzle placement (indicated in green), and coverage area.
2. The nozzle spray cone should not be obstructed such that it prevents the agent from reaching the entire area of a hazard.

4.3.2 Ducts

Ducts are protected with single or multiple 1-110 nozzles. The nozzle(s) must be placed 50 to 200 mm into the duct opening, and they must aim up along the duct direction. If the duct is protected with a single nozzle, the nozzle must be placed in the center of the duct.

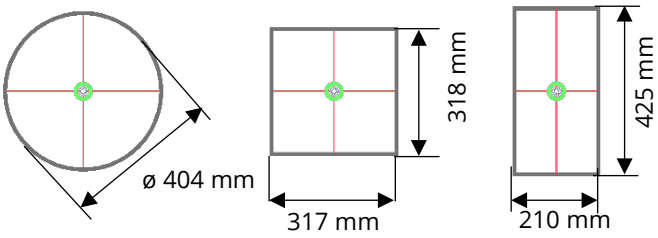


Figure 4.2: Single nozzle protection of ducts. The 1-110 nozzle will protect circular ducts with diameter up to 404 mm and rectangular ducts with perimeter up to 1270 mm.

Multiple nozzles are used in case the perimeter or diameter exceeds those of *Figure 4.2*. For larger ducts, the cross-section of the duct can be divided into smaller sections that are possible to protect with single nozzles. Each section must be within an area enclosed by the maximal rectangular perimeter for each single nozzle section, and the nozzles must be placed in the center of their dedicated area.

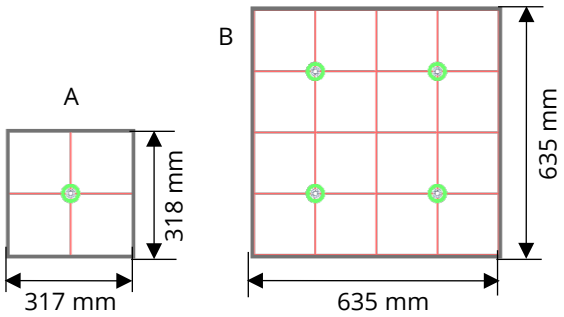


*Figure 4.3: Multiple nozzle protection of ducts. **A**: A single nozzle protects an area with a maximum perimeter of 1270 mm. **B**: A large duct is protected by more nozzles of which each cover an area with perimeter of maximum 1270 mm.*

4.3.3 Plenum Protection

Plenums are protected with single or multiple 1-60 nozzles. Placement of nozzles is always horizontal. If there are multiple nozzles they must aim in the same direction.

Plenums with Angled Filters

The first nozzle must be placed up to 150 mm from either end of the plenum, facing straight into the rest of the plenum interior. To protect plenums with single rows of filters, one or more 1-60 nozzles are used. The nozzles must be placed at a 50 to 100 mm distance perpendicular to the faces of the filters, equidistant to the filter top and bottom edges. This will protect a maximum of 3000 mm of horizontal distance from the start of the plenum for the first nozzle, and a maximum of 3000 mm of horizontal distance from the nozzle tip for the following nozzles. The maximum width is 600 mm.

To protect double rows of filters ("V" style filters), one line of 1-60 nozzles can be used for each filter row separately. Similarly, as for single rows of filters, the nozzles must be placed at a 50 to 100 mm distance perpendicular to the faces of the filters, protecting a maximum of 3000 mm of horizontal distance from the start of the hood for the first nozzle, and a maximum of 3000 mm of horizontal distance from the nozzle tip for the following nozzles. As long as these requirements are met, the nozzles can be horizontally distributed according to what is easiest for installation. The maximum width is 1200 mm.

Plenums with Filters of Other Types

Plenums with other types of filters are protected similarly. A 1-60 nozzle is placed at the start of the plenum and protects a maximum horizontal distance of 3000 mm and a maximum width of 600 mm.

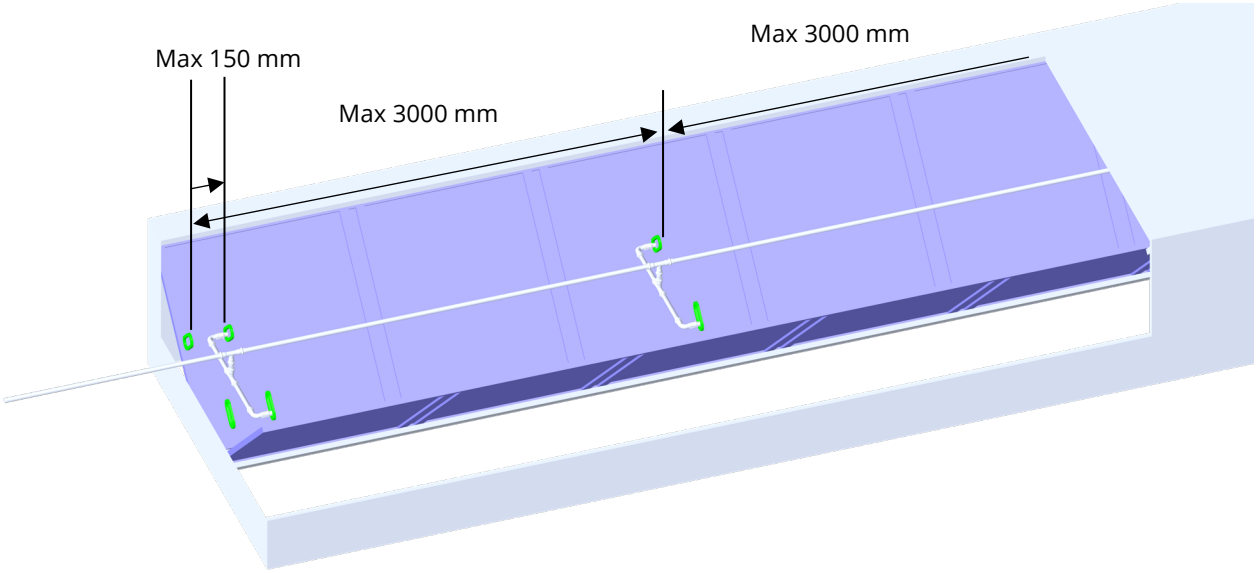


Figure 4.4: Nozzle placement in plenums. Nozzles are positioned in the same direction, and each nozzle protects maximum 3 meters of horizontal distance.

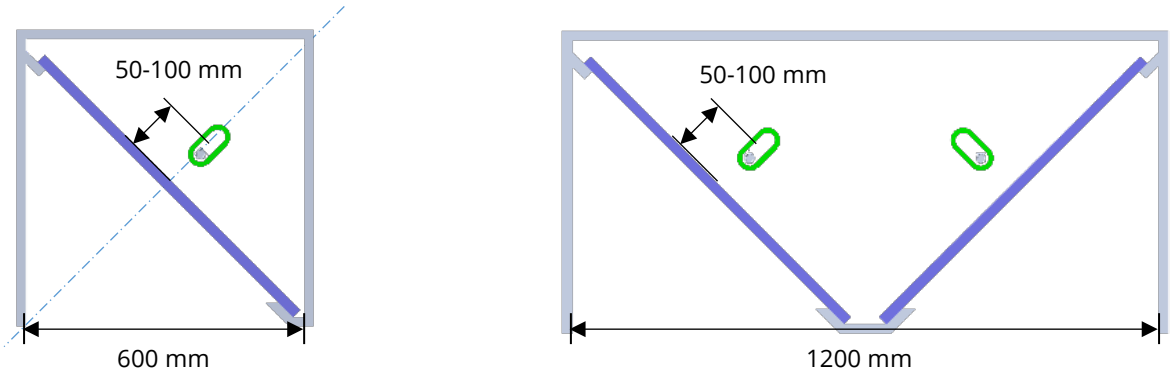


Figure 4.5: Linear nozzle placement in plenums. Nozzles are placed 50-100 mm from the filter on the centerline perpendicular to the filter surface. For two rows of filters, nozzles are placed similarly, but with one line of nozzles for each row of filters.

4.3.4 Deep Fat Fryer

The 2-30 nozzle is used for the protection of deep fat fryers. A single nozzle protects single vat and split vat fryers, both with and without drip boards.

The nozzle must be placed within the perimeter of the fryer and aim towards the middle of the fry pot. The nozzle is placed at a height of 690 to 1200 mm measured from the top of the fryer.
This configuration allows single-nozzle protection of fryers with a maximum side of 380 mm and a maximum area of 0.137 m^2.

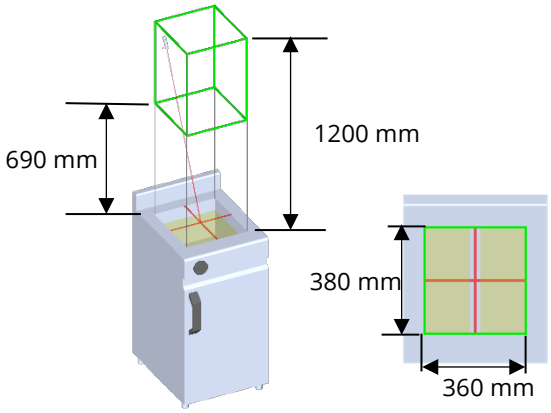


Figure 4.6: Maximum coverage and nozzle height of a single nozzle for split vat or non-split vat fryer without drip board.

In case the fryer has a drip board, the maximum dimensions are a side of 540 mm and an area of 0.194 m^2, of which the fry pot's maximum dimensions are a side of 380 mm and an area of 0.137 m^2.

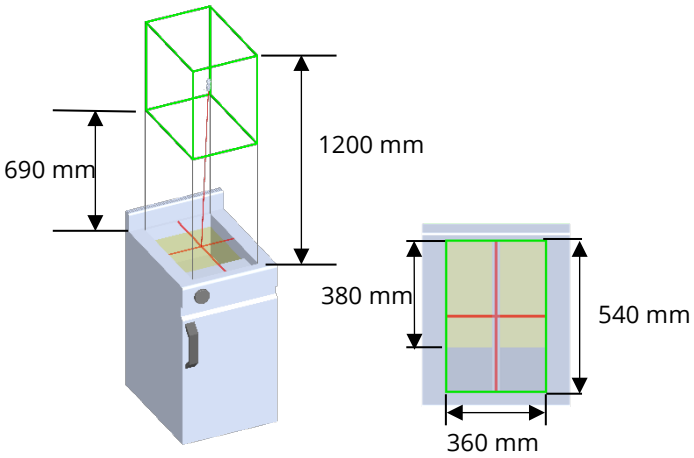


Figure 4.7: Maximum coverage and nozzle height of a single nozzle for split or non-split fryer with drip board.

For fryers exceeding these dimensions, multiple 2-30 nozzles can be used, provided that the entire fryer area does not exceed 0.55 m^2. In this case, the nozzles must be aiming at the center of their dedicated area and be located within the perimeter of their dedicated area.

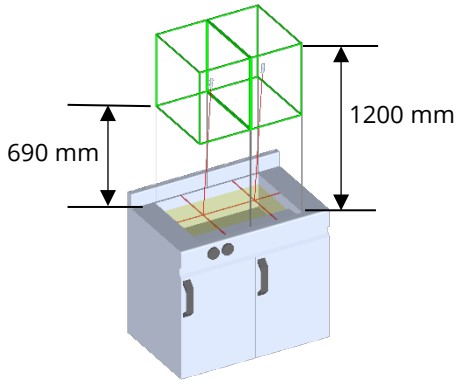


Figure 4.8: Multiple nozzle protection of fryers.

For fryers without drip boards, each nozzle covers at most 0.137 m^2 with a longest side of 380 mm.

For fryers with drip boards, each nozzle covers at most 0.194 m^2 with a longest side of 540 mm if the section includes the drip board. If the section that the nozzle is dedicated to does not include the drip board, the maximum area of that section is 0.137 m^2 with a longest side of 380 mm.

4.3.5 Griddle

The 1-60 nozzle is used for the protection of griddles. A single nozzle protects a maximum total area of 0.578 m^2 with a longest side of 760 mm.

The nozzle is positioned at a height of 760 to 1020 mm measured from the surface of the cooking area, and it must aim towards the midpoint of the cooking surface.

The nozzle is placed within the perimeter of the griddle or at a maximum 50 mm distance from the perimeter towards the center

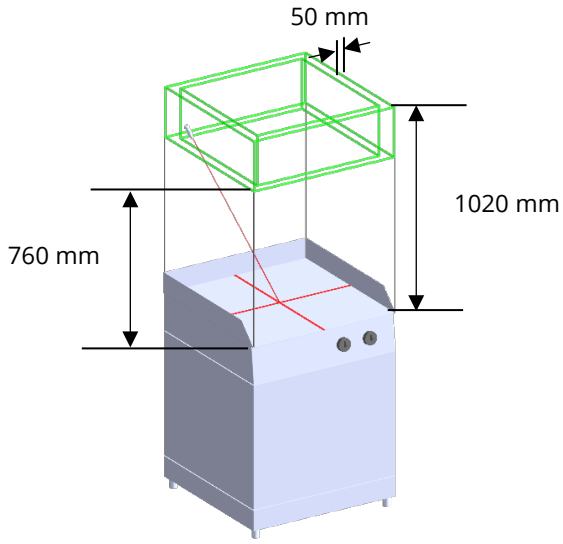


Figure 4.9: Single nozzle protection of griddles.

Multiple nozzles can be used for larger griddles. In this case, the griddle area is divided into sections possible to protect with a single nozzle.
The nozzles are placed within the perimeter of their dedicated area.

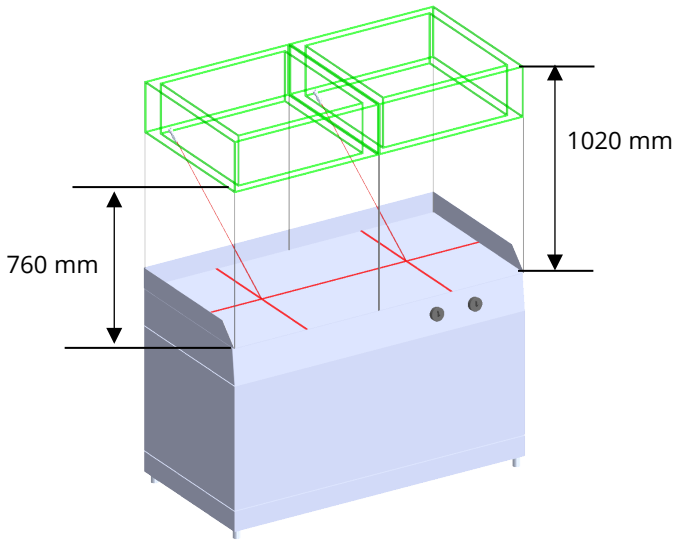


Figure 4.10: Multiple nozzle protection of griddles.

4.3.6 Range Top

Range tops are protected using the 2-60 nozzle. The nozzle is centered over the protected area, aiming straight down at a height of 760 to 1020 mm measured from the cooking surface.

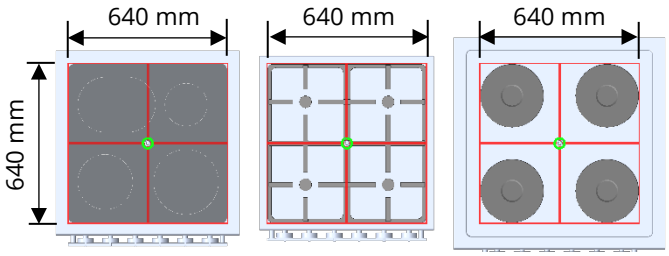


Figure 4.13: Single nozzle protection of range tops. One nozzle will protect a square of 640 × 640 mm.

One nozzle will protect a square with sides of 640 mm. Alternatively, it will protect a rectangular area with a maximal diagonal length of 866 mm and a maximal longest side of 792 mm. Other rectangular dimensions are also possible, provided that a standard 260 mm diameter pot cannot be placed with its center point further away than 270 mm from the nozzle aiming point.

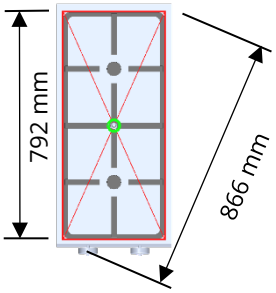


Figure 4.12: Maximum diagonal and side for a rectangular area protected with a single nozzle.

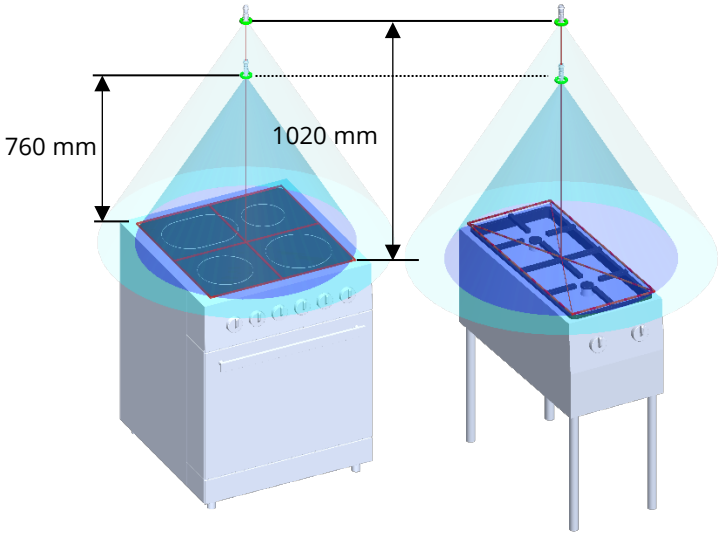


Figure 4.11: Spray pattern for the 2-60 nozzle at minimum height 760 mm and maximum height 1020 mm.

Larger range tops can be protected by dividing the hazard area into sections that are possible to protect with a single nozzle.

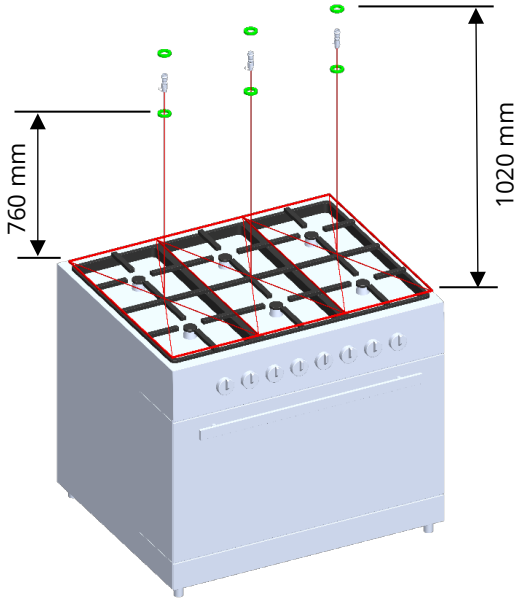


Figure 4.14: Multiple nozzle protection of range top. The range top is sectioned into three rectangular areas with diagonal less than 866 mm and longest side less than 792 mm.

In case there is a shelf above the range top, the nozzle must be placed so that the shelf does not interfere with the spray pattern. Ensure that the line between the nozzle and the inner edge of the hazard is free. If necessary, the nozzle can be moved away from the shelf, provided that the entire hazard area is within the area dedicated for the nozzle(s). The nozzle should still aim straight down. See example in *Figure 4.13*.

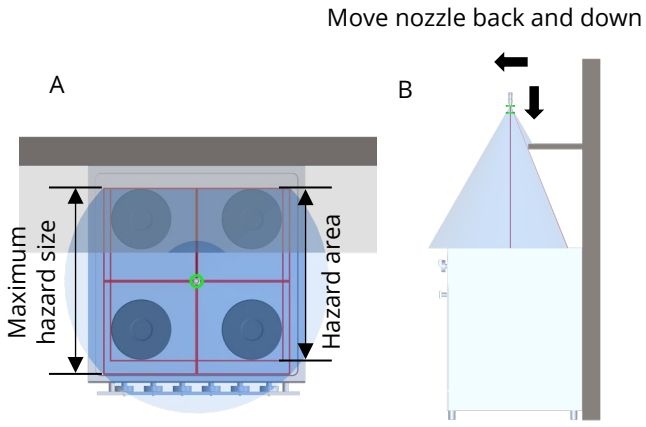


Figure 4.15: Nozzle placement with obstruction.
***A**: The nozzle can be moved away from the shelf provided that the entire hazard area is enclosed by the dedicated area of the nozzle(s). **B**: The height is adjusted such that there is a clear line from the nozzle to the inner edge of the hazard area.*

4.3.7 Broiler

Electric- and gas-powered broilers are protected with the 1-60 nozzle. The nozzle is placed within the perimeter of the broiler at a height of 500 to 1020 mm measured from the broiler grate. The nozzle must aim towards the middle of the grate.

This configuration protects broilers with a maximum area of 0.561 $m^{2,}$ with a longest side of 920 mm.

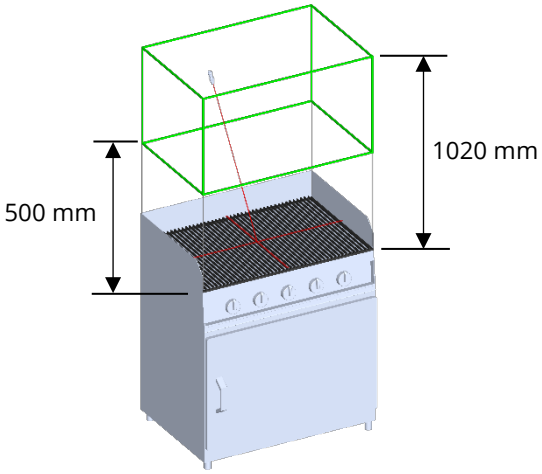


Figure 4.17: Single nozzle protection of broilers.

4.3.8 Wok

The 2-30 nozzle is used to protect woks. The nozzle is placed within the perimeter of the wok pot at a height of 690 to 1200 mm from the burner, aiming at the center of the wok.

This configuration protects woks with a diameter up to 410 mm and a depth up to 230 mm.

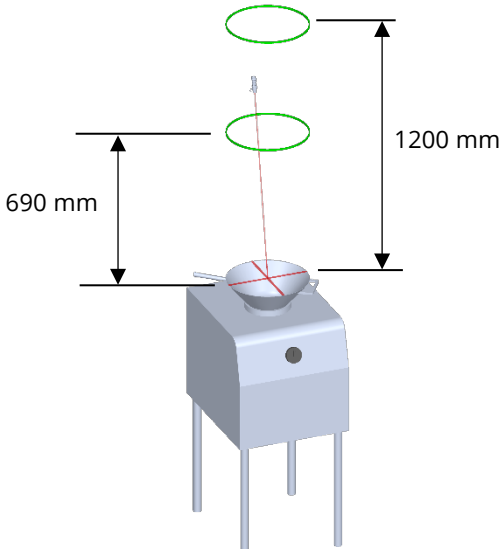


Figure 4.18: Protection of woks.

4.3.9 Tilt Skillet

Tilt skillets are protected as fryers. The 2-30 nozzle is used and must be placed within the perimeter of the tilt skillet, aiming towards its midpoint. The nozzle is placed at a height of 690 to 1200 mm measured from the top of the skillet.

This configuration protects tilt skillets with a maximum area of 0.194 m^2 and a longest side of 540 mm.

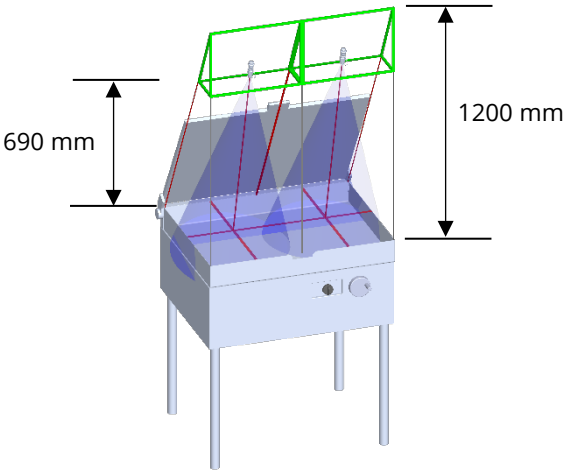


Figure 4.16: Protection of tilt skillets. The maximum height of the nozzle may need be reduced to prevent the lid from obstructing the spray angle.

For tilt skillets exceeding these measurements, multiple 2-30 nozzles are used. In this case, each nozzle covers at most 0.194 m^2 with a longest side of 540 mm, and they must aim at the center of their dedicated area.

If the tilt skillet has a lid, the nozzle must be placed so that the lid does not interfere with the spray pattern when it is in its opened position. Ensure that the line between the nozzle and the inner edge of the skillet is not obstructed.

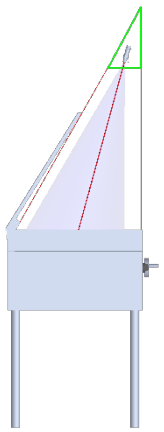


Figure 4.19: Nozzle placement with lid.

4.3.10 Summary of Nozzle Selection

Hazard	Hazard Dimensions	Nozzle(s)	Nozzle Placement
Duct	Circular duct with a maximum diameter of 404 mm	1-110	50 to 200 mm into the duct opening, centered in the duct, aiming straight up.
	Rectangular duct with a maximum perimeter of 1270 mm	1-110	50 to 200 mm into the duct opening, centered in the duct, aiming straight up.
	Ducts with a perimeter exceeding 1270 mm	1-110	Duct area is split into rectangular sections with perimeters of max 1270 mm. Nozzles are placed in the center of their dedicated area.
Plenum	Single row of filters. Maximum width: 600 mm Maximum length: 3000 m	1-60	Placed horizontally 50 to 100 mm from the center of filter faces. Nozzle placed maximum 150 mm from plenum start. For longer plenums, a nozzle is placed maximum every 3 m facing the same direction.
	Double row of filters (V-style) Maximum width: 1200 mm Maximum length: 3000 mm	1-60	Placed horizontally 50 to 100 mm from the center of filter faces. Nozzle placed maximum 150 mm from plenum start. For longer plenums, a nozzle is placed maximum every 3 m facing the same direction.
Deep fat fryer (split or full vat) without drip board	Maximum length of one side: 380 mm Maximum area: 0.137 m^2	2-30	Within the perimeter at a height of 690 mm to 1200 mm above the top of the fryer, aiming towards the center of the fryer.
	Area from 0,137 m^2 up to 0.55 m^2	Multiple 2-30 nozzles	Each nozzle covers at most 0.137 m^2 with a longest side of 380 mm. Nozzles must aim at the center of their dedicated area and be located within the perimeter of their dedicated area.
Deep fat fryer (split or full vat) with drip board	Maximum length of one side: 540 mm Maximum area: 0.194 m^2 Of which the fry pot's maximum dimensions are: Maximum length of one side: 380 mm, maximum area: 0.137 m^2	2-30	Within the perimeter at a height of 690 mm to 1200 mm above the top of the fryer, aiming towards the center of the fry pot.
	Area from 0,137 m^2 up to 0.55 m^2	Multiple 2-30 nozzles	For sections with drip board, each nozzle protects at most 0.194 m^2 with a longest side of 540 mm. Fry pot area may be at most 0.137 m^2 with a longest side of 380 mm. For sections without drip board, each nozzle protects at most 0.137 m^2 with a longest side of 380 mm. Nozzles must aim at the center of their dedicated area and be located within the perimeter of their dedicated area.

Hazard	Hazard Dimensions	Nozzle(s)	Nozzle Placement
Range top	Square area with sides of 640 mm. Rectangular area with maximum diagonal of 866 mm and longest side of 792 mm	2-60	760 to 1020 mm over the center of the cooking area, aiming directly down.
	Larger range tops	Multiple 2-60 nozzles	Hazard area split into sections capable of being protected with single nozzles. Nozzles placed 760 to 1020 mm over the center of the nozzle's dedicated section, aiming directly down.
Griddle	Maximum length of one side: 760 mm Maximum area: 0.578 m^2	1-60	Above the perimeter at a height of 760 to 1020 mm, aiming towards the center of the griddle.
	Griddles larger than 0.578 m^2	Multiple 1-60 nozzles	Each nozzle protects maximum 0.578 m^2, placed within the perimeter at a height of 760 to 1020 mm, aiming towards the center of their dedicated area.
Gas or electric broiler	Maximum side: 920 mm Maximum area: 0.561 m^2	1-60	Within the perimeter at a height of 500 to 1020 mm, aiming at center of the broiler.
	Broilers larger than 0.561 m^2	Multiple 1-60 nozzles	Each nozzle protects maximum 0,561 m^2, placed within the perimeter at a height of 500 to 1020 mm, aiming at the center of their dedicated area.
Wok	Maximum diameter of 410 mm Maximum depth: 230 mm	2-30	Within the perimeter at a height of 690 mm to 1200 mm above the top of the pot, aiming towards the center of the pot.
Tilt skillet	Maximum area for one nozzle: 0,194 m^2 Maximum length of a side for a nozzle: 540 mm	2-30	Within the perimeter at a height of 690 mm to 1200 mm above the top of the skillet, aiming towards the center of the nozzle's dedicated area. If there is a hinged lid, ensure that spray pattern is not obstructed when the lid is open.

Table 4.1: Nozzle selection quick guide.

4.4 Selection of Tanks and Cartridges

Once the number of nozzles and flow numbers required to cover all hazards has been determined, the appropriate quantity of tanks and cartridges can be chosen based on *Table 4.2*.

System	Flow Numbers	Quantity of agent tanks	Cartridge Type and Quantity
KX1R – KitchenX Single Tank	1 to 11	One	Single N8A
KX2R – KitchenX Double Tank	12 to 22	Two	Single N16A
KX2RM – KitchenX Double Tank Manifold	12 to 22	Two	Single N16A
KX3R – KitchenX Triple Tank	22 to 33	Three	Single N16A

Table 4.2: Selection guide for number of tanks and type of cartridge.

⚠ DANGER ⚠

Do not use any other combination of cartridges and tanks than those described in *Table 4.2*. Failing to do so may result in the extinguishing agent not reaching the fire hazard or excessive pressure in the discharge piping. Multiple systems may not be interconnected.

4.5 Design of Expellant Gas Line

The expellant gas line is the hose or pipe leading expellant gas from the pressure reducing regulator towards the agent tank valves. The line is generally constructed of single sections of expellant gas hoses (p/n 55-5840-20). Refer to *5.2 Cabinet and Cabinet Components* for installation details.

However, for KitchenX double tank systems, the expellant gas line can be extended to allow the cabinets to be placed further apart. If so, expellant gas hoses should not be placed unshielded outside the cabinets. Instead, construct the gas line with piping with an inner diameter between 8 to 10 mm. The piping must be manufactured of galvanized steel, chrome plated steel, stainless steel or metal with similar corrosive resistance. It must resist working pressures of 16 bars, and must be rated for temperatures of 0 to 100 °C. The maximum expellant gas line length from the regulator to the additional tank's valve is 8 m with 9 couplings.

4.6 Design of Distribution Piping

The distribution piping must ensure an adequate amount of agent is distributed to each hazard protected by the system. The wet agent must also be distributed at the correct pressure to avoid splashing of oil and fat and to achieve the correct spray pattern of the nozzles.

4.6.1 Definition of Distribution Piping Terms

The *supply line* is defined as the length of piping originating from the agent tank and concluding at the final nozzle branch point.

A supply line can be *linear* or *split*. A split line is a supply line with a tee and two legs. If the supply line is split, the length of the supply line is the sum of both legs of the supply line and piping leading up to them.

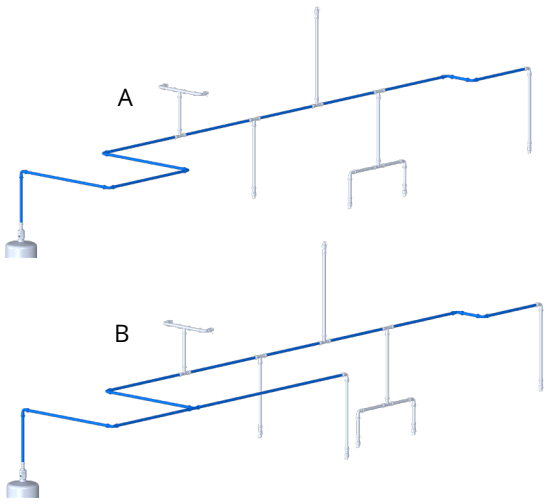


*Figure 4.20: **A**: Linear supply line highlighted in blue. **B**: Split supply line highlighted in blue.*

A *branch point* is defined as the point at which a portion of the agent is directed towards one or more nozzles. This is usually at a tee or an elbow.

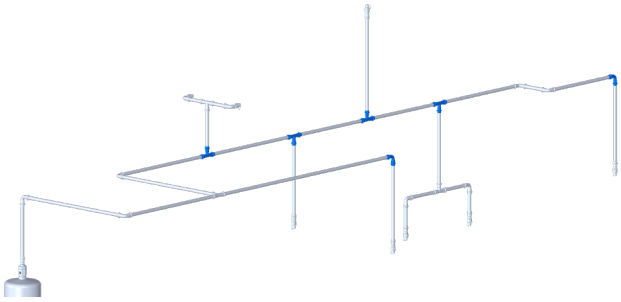


Figure 4.22: Branch points are highlighted in blue.

Branches have different limitations depending on whether they protect appliances, plenums, or ducts.

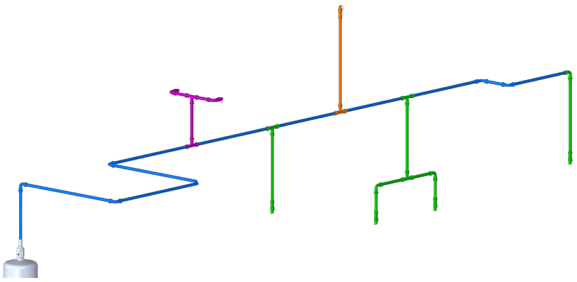


Figure 4.23: Supply line in blue, (3) appliance branches in green, (1) plenum branch in purple and (1) duct branch in orange.

! NOTE !

Duct and plenum nozzles are allowed to be installed on the same branch line, provided that the branch line's length, rise, quantity of fittings and flow are within the limitations of both duct and plenum branch lines.

The final branch point marks the end of the supply line. This point can be chosen downstream or upstream along the supply line pipe, provided that the general piping requirements and the criteria of *Table 4.3* and *Table 4.4* are satisfied.
Refer to *Figure 4.21*.

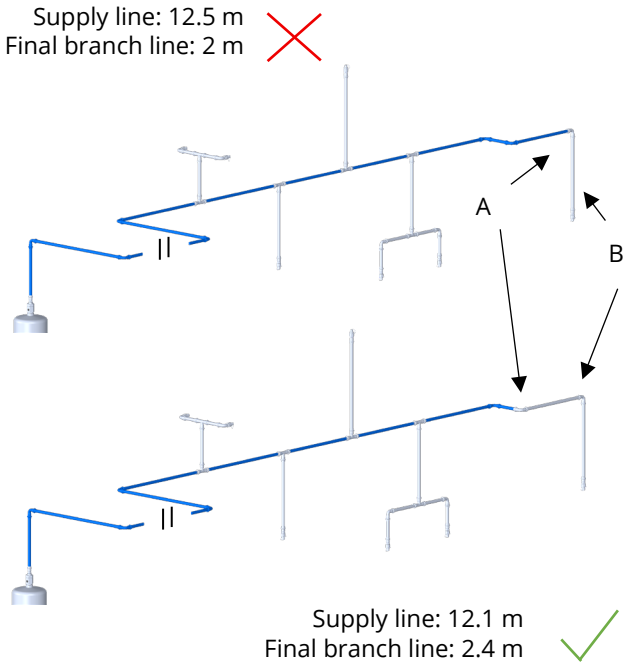


Figure 4.21: Supply line indicated in blue.
***A**: Final branch point. **B**: Final branch line.*

4.6.2 General Piping Requirements

The distribution piping must satisfy the following requirements as well as the system-dependent requirements of *Table 4.3* or *Table 4.4.*

1. The distribution system must be constructed with KitchenX-approved components. It is crucial that components are manufactured of stainless steel or of metal with similar corrosion resistance. Galvanized components should not be used. Components must resist working pressures of 16 bars and be rated for temperatures between 0 to 100 °C. The inner diameter of pipes should be between 13 to 13.8 mm.
2. To ensure adequate volume of Kitchen agent is available at each nozzle, maximum 18.2 m total piping after the first tee is allowed. This length includes the legs of the supply line if the supply line is split.

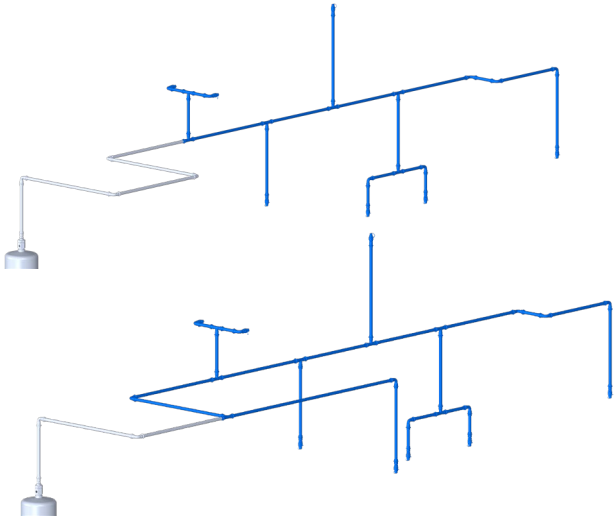


Figure 4.24: Length of piping following first tee highlighted in blue. Maximum length after first tee is 18.2 m.

3. Piping and fittings can be installed under the hood if temperatures do not exceed 100 °C and components are not subjected to direct flame impingement.
4. To prevent splashing of heated oil droplets, the length of piping from the tank outlet to any nozzle protecting a wok, a fryer, a tilt skillet or a range top shall be minimum 1.8 m.
5. The length of piping is calculated from center to center of fittings. The length of pipe inserted into a fitting is not considered.



Figure 4.25

6. When calculating bends, two 45° elbows are counted as one 90° elbow.
7. Change of direction can only be achieved by fittings. Bending piping is not allowed.

4.7 Design of Distribution Piping

4.7.1 KitchenX Single Tank System

The allowed total flow number of every nozzle in a KitchenX Single system is 1 to 11. Maximum total piping length is 23 m. This is calculated as the sum of all branch lines and the supply line, excluding the parts of pipes that are inserted into fittings.

The values of *Table 4.3* cannot be exceeded for the piping system. For the supply line, the values are calculated between the agent tank and the final branch point, excluding the final coupling.

For the appliance, plenum, and duct branches, the values are calculated from each branch point and include the initial coupling.

A KitchenX single system will contain one supply line and one or more appliance branches, plenum branches, and duct branches.

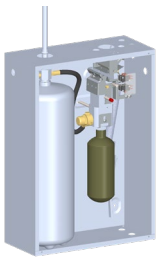


Figure 4.26: KitchenX single tank system

The limitations of *Table 4.3* apply to the supply line and each branch separately, and there is no restriction on the number of branches. For the supply line, the rise is calculated from the agent tank. For the appliance, plenum, and duct branches, rise is calculated from the branch point.

	Supply Line	Appliance Branch	Plenum Branch	Duct Branch
Length	12.1 m	3.6 m	1.2 m	2.4 m
Rise	1.8 m	0.6 m	0.6 m	1.2 m
Elbows	9 pcs	6 pcs	4 pcs	4 pcs
Tees	1 pc	4 pcs	2 pcs	2 pcs
Flow	11	4	2	2

Table 4.3: Limitations for KitchenX single tank systems and for each distribution line of a KitchenX double and triple tank system.

4.7.2 KitchenX Double Tank Manifold System

The KitchenX Double Manifold system is a convenient solution when one supply line is needed but the flow numbers of a single system do not suffice. Directly after the agent tank, the supply lines of both tanks are combined. The burst disc is removed from each tank valve and replaced with a burst disc at the start of the supply line.

The allowed total flow number of every nozzle in a KitchenX Double Manifold system is between 12 and 22. Maximum total piping length is 20.6 m. This is calculated as the sum of all branch lines and the supply line, excluding the parts of pipes that are inserted into fittings**.**

The values of *Table 4.4* cannot be exceeded by the piping system. For the supply line, the values are calculated between the agent tank and the final branch point, excluding the final coupling.

For the appliance, plenum, and duct branches, the values are calculated from each branch point and include the initial coupling.

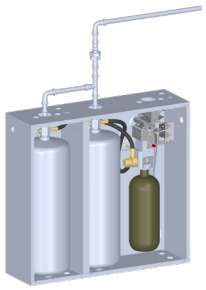


Figure 4.27: KitchenX Double Tank Manifold System.

A KitchenX double tank manfold system will contain one supply line and one or more appliance branches, plenum branches, and duct branches. The limitations of *Table 4.4* apply to the supply line and each branch separately, and there is no restriction on the number of branches. For the supply line, the rise is calculated from the agent tank. For the appliance, plenum, and duct branches, the rise is calculated from the branch point.

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	Supply Line	**Appliance Branch**	**Plenum Branch**	**Duct Branch**
Length	9.7 m	3.6 m	1.2 m	2.4 m
Rise	1.8 m	0.6 m	0.6 m	1.2 m
Elbows	8 pcs	6 pcs	4 pcs	4 pcs
Tees	2 pcs	4 pcs	2 pcs	2 pcs
Flow	22	4	2	2

Table 4.4: Limitations for KitchenX Double Tank Manifold systems.

4.7.3 KitchenX Double Tank and KitchenX Triple Tank Systems

A separate supply line is connected to each of the tanks. For the supply lines, the same limitations as for a KitchenX single system apply to each line separately. See *Table 4.4*. For a KitchenX double tank system, the total flow number may be 12 to 22, maximum 11 for each supply line. For a KitchenX triple tank system, the total flow number may be 23 to 33, maximum 11 for each supply line.

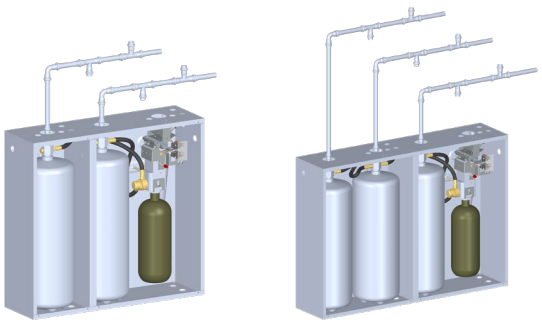


Figure 4.28: KitchenX double tank system on the left and KitchenX triple tank system on the right.

4.8 Design of Detection System

The detection system should be constructed with KitchenX detection components or other KitchenX approved components.

4.8.1 Design of Conduit Piping

When designing the conduit piping for automatic detection, the values of *Table 4.5* must not be exceeded.

	Without pipe bend	With pipe bend
Max number of detectors	12 pcs	12 pcs
Max length of wire rope	40 m	40 m
Max number of pulley elbows	20 pcs	16 pcs

Table 4.5: Maximum length, number of detectors and number of pulley elbows for a detection system.

4.8.2 Detector Placement and Selection

Detectors must be placed at each duct opening and above each cooking appliance protected by the system.

If one or more appliances are completely within an area of 1220 mm × 1220 mm with the center of the area directly underneath a detector, they do not require separate detectors. If a detector for a duct also covers an appliance, the detector must be placed at a maximum of 300 mm into the duct opening.

Detectors for appliances should be placed in the center of the exhaust gas stream leading to the exhaust duct. In most scenarios, the detector should be placed offset from the center of the appliance towards the duct.

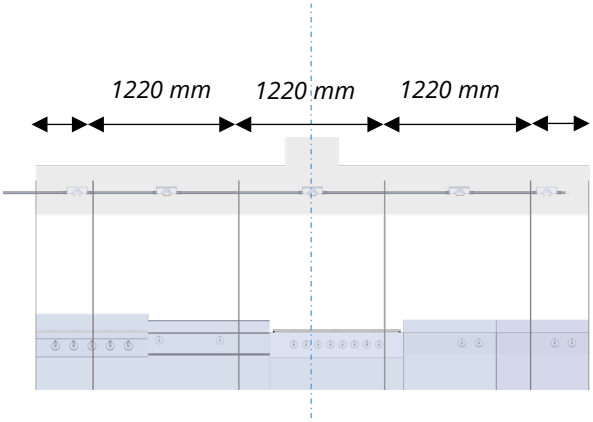


Figure 4.29

Only one detector is required for appliances having a continuous area less than 1220 mm × 1220 mm. Otherwise, multiple detectors must be placed so that each area of the appliance is within a 1220 mm × 1220 mm area of any of the detectors for the appliance. For the selection of detector, refer to *Table 4.6: Detector selection guide.*

It is recommended to take a temperature reading of the maximum temperatures reached during normal cooking operations over each appliance and duct to ensure correct selection.

Part No.	Color	Temp. rating	Max cooking temperature
55-3292-07	Black	74 °C	38 °C
55-3292-13	Blue	138 °C	107 °C
55-3292-18	Red	183 °C	143 °C
55-3292-23	Green	232 °C	182 °C
55-3292-26	Yellow	260°C	204 °C

Table 4.6: Detector selection guide.

4.9 Manual Pull Station and Conduit

At least one and at most two manual pull stations should be installed for each KitchenX system.
A pulley tee is required for systems with two pull stations.

The requirements of *Table 4.7* must be satisfied for each conduit piping leading to a pull station.

Maximum length of wire rope	45 m
Maximum number of pulleys	20 pcs
Maximum number of pulley tees	1 pc
Maximum number of pipe bends	1 pc

Table 4.7: Pull station requirements.

If there are two pull stations sharing an initial section of conduit piping, the length of the piping and the number of pulley elbows are calculated between the cabinet and each pull station separately and must be within the requirements of *Table 4.7*. The total length and number of pulley elbows for the system are allowed to exceed those of *Table 4.7.*

Where a pipe bend is used, no pulley tees are permitted to be used in the detection system.

4.10 Electrical Switches

Two switches come as standard on the mechanical release device. Their purpose is to activate alarms or turn on or off electrical devices. To shut off gas supply, the microswitch signal must be relayed to an electrically activated gas shut-off valve.
Appliance shut off is often performed after system installation. Responsibility for wiring of the appliance shut-off function should be clearly defined and agreed upon by all involved parties before commissioning.

! NOTE !

To prevent re-ignition, activation of the KitchenX system must immediately cause shutdown of electrical power and gas supply to all protected hazards.

Each microswitch has a single-pole, double-throw contact rated at 16 A at 125/250 VAC, 10 A at 30 VDC or 1/3 hp at 125 VAC 10 A. For installation at a KitchenX cabinet, the maximum current of the connection to the microswitch cannot exceed 4 A at 49 VAC/VDC.

⚠ WARNING ⚠

Wiring must be performed by a qualified electrician according to national standards and regulations.

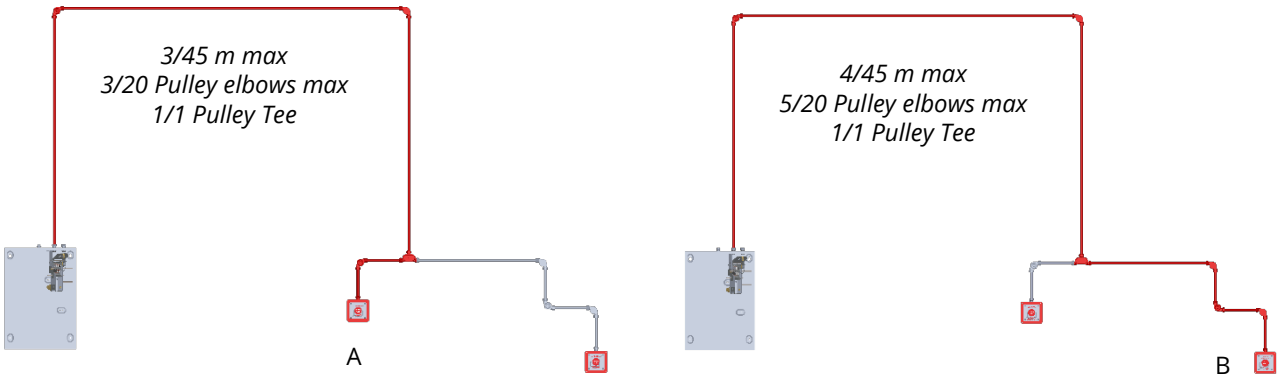


*Figure 4.30: The conduit factors of Table 4.7: Pull station requirements. are calculated for each conduit length to a pull station separately. Ensure that conduit length, nr of pulley elbows and pulley tees along the red path are within the requirements, both for pull station **A** and for pull station **B**.*

SECTION 5 – INSTALLATION

5.1 Installation Workflow

Before proceeding with installation, ensure that the system design is complete and that flow numbers, pipe lengths and conduit piping lengths are within the requirements specified in *SECTION 4*.
Installation involves:

- Installation of cabinets and cabinet components.
- Installation of distribution system components and nozzles.
- Installation of detection system.
- Installation of manual pull station.
- Installation of electrical switches.

⚠ WARNING ⚠

Installation of a KitchenX system may only be performed by a KitchenX-certified technician.

Ensure that each installation step is understood completely before proceeding in practice. Failure to do so may result in accidental activation of the fire suppression system or injury caused by the puncture of nitrogen cartridges.

5.2 Cabinet and Cabinet Components

All cabinets used must be placed where the ambient temperature is within the operating temperature of -5 to 55 °C. Avoid placing a cabinet close to cooking equipment radiating heat.
The cabinets must also be installed so that they are accessible for service maintenance.

Cabinets shall be mounted on a structurally sound vertical surface with four screws. If installing multiple cabinets side by side, they must be placed with an 8 mm gap. Before mounting additional cabinets, punch out the knockout holes and install grommets included with the expellant gas hose (p/n 55-5840-20).
It is crucial to place a grommet in each knockout hole to prevent chafing of expellant gas hoses.

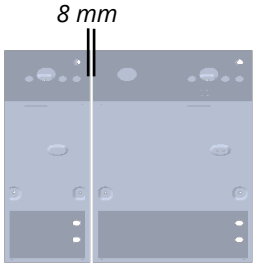


Figure 5.2: An 8 mm distance is required to allow space for the grommet.

Fill up each agent tank with 11.7 liters of KitchenX agent. When filling, the agent temperature should be 16 to 27 °C.
After filling, ensure the distance from the tank outlet to the KitchenX agent surface is between 46 to 51 mm.



Figure 4.1: The agent surface fill level is 46 to 51 mm from the tank outlet.

⚠ WARNING ⚠

Wear safety goggles when handling KitchenX agent. In case of contact with eyes, immediately rinse for 15 minutes and contact emergency services if irritation persists.

After filling the agent, fasten the valve to the agent tank and tighten until metal-to-metal contact is achieved.

Apply thread tape and fasten the expellant gas hose that is attached to the regulator to the tank valve. Both connections of the hose are swiveling.

KitchenX Single Tank System

If installing a KitchenX single tank system, ensure a vent plug is fastened at the second connection of the tank valve and that the regulator's secondary connection is plugged with a fixed plug.

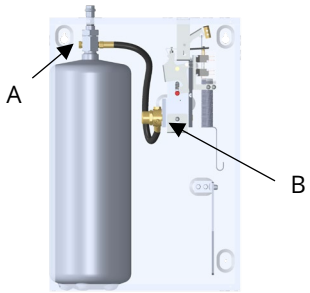


*Figure 5.3: **A**: A vent plug is necessary to prevent pressure buildup due to temperature fluctuations.*
***B**: The secondary connection of the regulator must be plugged to prevent leakage of expellant gas.*

KitchenX Double Tank System

If installing a KitchenX double tank system, remove the plug from the secondary connection of the regulator. Apply thread tape and fasten a new expellant gas hose (p/n 55-5840-20) at this position. Route the hose to the second cabinet. Apply thread tape and fasten it to the second tank's valve. Ensure that each tank's secondary connections are plugged with a vent plug.

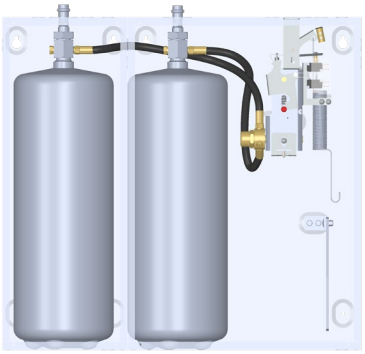


Figure 5.4: Routing of expellant gas hose for a KitchenX double system.

In case the additional cabinet is not placed side by side with the cabinet of the release mechanism, the expellant gas line from the regulator to the additional tank's valve is a maximum of 8 m with 9 couplings. It can be installed with a combination of piping and expellant gas hoses but expellant gas hoses should not be placed unshielded outside cabinets. Piping must be attached with adequate supports, and threaded connections must be taped. Ensure that the expellant gas line cannot interfere with the action of the release mechanism.

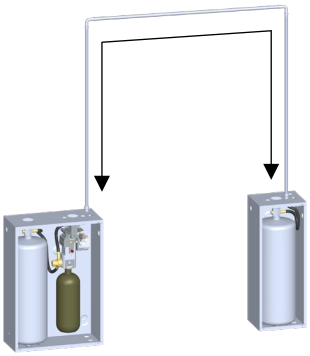


Figure 5.5: Maximum length of expellant gas line to second tank valve is 8 m with 9 couplings.

KitchenX Triple Tank System

If installing a KitchenX triple tank system, follow the steps for a KitchenX double system, but remove the plug from one of the first two tanks' valves. Instead, attach a third expellant gas hose and fasten it to the third tank's valve. Ensure that the two remaining tank valves are plugged with a vent plug.

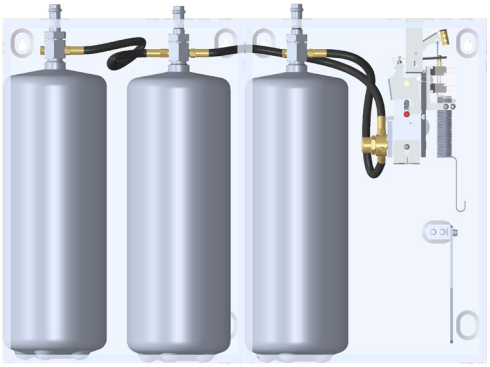


Figure 5.6: Routing of expellant gas hoses for a KitchenX triple system.

! NOTE !

Do not arm the system and do not mount cartridges at this point. Finish the installation of the distribution and the detection systems first. Cabinet front covers can be left unmounted until commissioning the system.

5.2.1 Distribution System

The following points must be complied with when installing the distribution piping.

1. Ensure all pipes, couplings and nozzles are internally clean before mounting them.
2. Cutting of pipes should be performed with appropriate tools to prevent angled or deformed cuts. After cutting, ream the pipe ends and clear any debris.
3. Ensure the pipes are supported properly. Pipe hangers or brackets are recommended at every 1.5 m of pipe or at every 0.6 m of pipe in case there is an elbow or a tee between the supports.
4. Apply new thread tape whenever fastening components with threaded connections in the distribution system that do not use a gasket or O-ring for sealing. This includes nozzles, swivel adapters and ⅜“adapters. Ensure the thread tape does not occlude the orifice of couplings or nozzles.
5. Install each nozzle according to the system design and ensure it is correctly oriented regarding height, aim point and positioning. The swivel adapter can be especially useful for some hazards.
6. When tightening a nozzle, use two spanners to prevent creating torsion at pressed joints, which can otherwise weaken them.

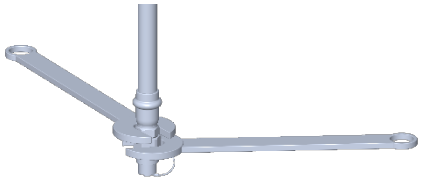


Figure 5.7: A 17 mm spanner is used for 3/8” adapters and a 20 mm spanner is used for nozzles.

7. Pressing of KitchenX press couplings must be performed with the appropriate tool with V15 jaws or inserts.
8. If the distribution pipe design must be adapted during installation, ensure that the requirements of *4.6 Design of Distribution Piping* are satisfied.

Penetration of kitchen hoods with distribution piping should be done with oil-tight fittings. Use leakage-tight compression connectors when possible (p/n 55-5199-04, 55-5199-04).

When connecting the distribution piping to the agent tank, unscrew the packing nut from the valve, press a 3/8” adapter (p/n 55-5200-08) to the pipe and fasten the packing nut to the adapter. Before fastening the packing nut to the tank valve, ensure the burst disc is not damaged.

⚠ WARNING ⚠

A broken burst disc can allow KitchenX agent to creep up into the distribution piping where it may solidify, thus preventing proper discharge of KitchenX agent.

KitchenX Double Tank Manifold Systems

There are special steps to consider regarding the burst discs when installing a manifolded system.

1. Remove the packing nut from both tank valves and take out the burst discs. Remove the foil from the discs and discard it. Place the gasket piece back in the valves.
2. Connect a piping configuration as illustrated in *Figure 5.8*. Press a ⅜” adapter and a 90-degree elbow to a short pipe. Fasten it to one of the tank valves. At the other tank, make a similar attachment but with a tee instead. Connect the pieces with a horizontal pipe segment. Mount a union coupling for the manifold with a burst disc (p/n 55-1621-27) directly following the tee. It should be mounted with the protruding segment in the direction towards the nozzles. Use ⅜” adapters at both pipe connections to the union coupling and fasten with thread tape.

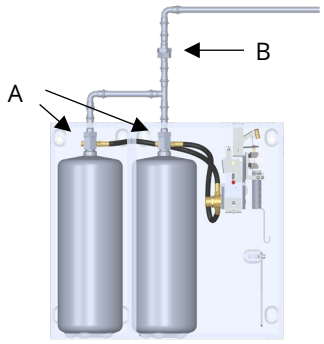


Figure 5.8: Piping system for a manifolded system.
***A**: Remove the foil from the burst discs in the tank valves.*
***B**: Mount a manifold union coupling with burst disc directly after the joining tee.*

5.2.2 Detection System

Installation of the detection system is identical regardless of system size. It is recommended to start fastening the detector brackets, then installing the conduit piping, and lastly threading the wire rope and mounting the fusible links.

The following points must be complied with when installing the detection system.

1. Cutting of pipes should be performed with appropriate tools to prevent angled or deformed cuts. After cutting, ream the pipe ends and clear any debris.
2. Detector brackets should be attached with two screws, or if placed at the duct, with two pipes that are fastened immediately at the perimeter of the opening. Refer to *Figure 5.9.*

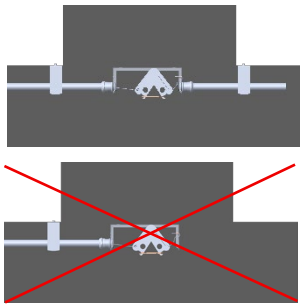


Figure 5.9

3. Install all conduit piping with adequate fastening points, at least two attachments per pipe section are recommended. Compression fittings at detector brackets, pulleys, and joints must be tightened completely with the pipe in its innermost position.
4. In case the detection system design needs to be adapted during installation, ensure that the lengths and quantities of *Table 4.5* are not exceeded.
5. The entire length of the wire rope must be enclosed by conduit piping except for inside the cabinet and within detector brackets.
6. Change of direction can only be achieved with a single pipe bend immediately connected to the cabinet, or by pulley elbows and pulley tees.
7. Penetration of kitchen hoods with conduit piping should be done with oil-tight fittings. Use leakage tight compression connectors when possible. (p/n 55-5199-10, 55-5199-18).

The wire rope can be threaded through the conduit piping from either the terminal detector bracket or the release mechanism. If the wire gets stuck at the pulleys, the covers can be detached so that the wire can be fed to the next section more easily.

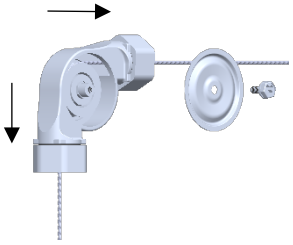


Figure 5.10

Cut the wire rope after the entire conduit piping has been fed, but leave a long tail at the release mechanism.

! NOTE !

The wire rope should not be spliced. If the wire rope is too short, cut it from the sleeve at either end and use an oval sleeve to crimp it to the end of a new wire rope. Cut excess wire and tape over the sleeve with electrical tape. This will enable it to pass pulley elbows when pulling the wire from the opposite end. In case it nevertheless gets stuck, remove the pulley elbow caps to help it through the bends.



In case the terminal detector bracket is attached by the screw-holes, the wire rope is fixed with a stop sleeve as illustrated in *Figure 5.11*.

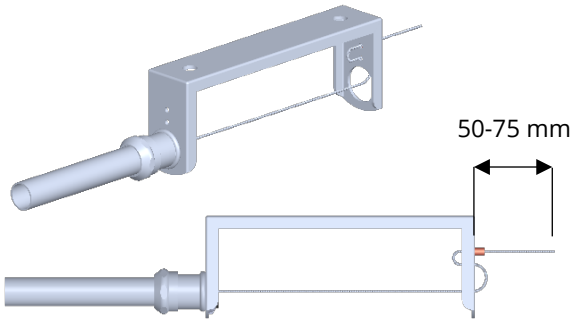


Figure 5.11: Leave 50-75 mm when crimping the stop sleeve. Afterwards, the wire can be cut closer to the sleeve.

However, in case the terminal detector is at a duct and therefore fixed in position by two pipes, route the wire rope as illustrated in *Figure 5.12*.

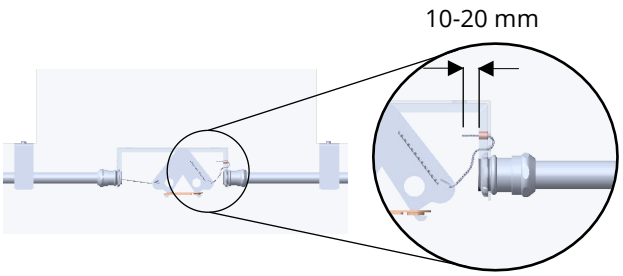


Figure 5.12: Leave 50 to 75 mm when crimping the stop sleeve but shorten it to 10 to 20 mm after crimping.

To prevent crimping at any frayed part of the wire rope, it is recommended to push 50 to 75 mm of wire through the crimp sleeve before crimping. Afterwards, ensure that the crimp sleeve is fixed in position on the wire and remove all slack.
To prevent the loose end from interfering with the linkage scissors, it should be cut to leave 10 to 20 mm of tail.

When proceeding to place fusible links, the wire should be put under light tension by hanging a small weight or tool from the wire at the cabinet. Place the scissor linkages with the appropriate fusible link as illustrated in *Figure 5.13.*
Refer to *Table 4.6: Detector* selection *guide.*

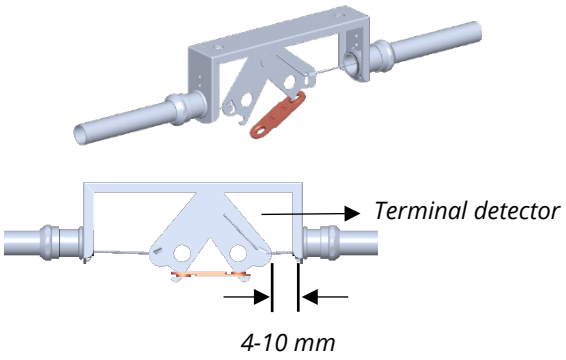


Figure 5.13: Mounting of fusible link. The scissor linkage should sit close to the terminal end side of the bracket without touching the conduit opening. An adjustable plier can be used in the scissor linkage holes to hold it in a suitable position for mounting fusible links.

Tensioning the Wire Rope

When all the entire wire rope has been threaded and the fusible links have been mounted, the wire rope should be put to appropriate tension for proper system activation.

1. Run the wire rope through the trigger hammer of the release mechanism.

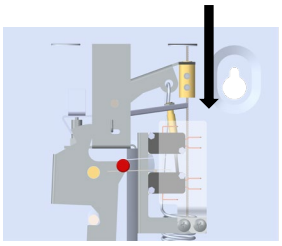


Figure 5.14

2. Activate the release mechanism by using the cocking lever to put the cocking pin in the upper position.

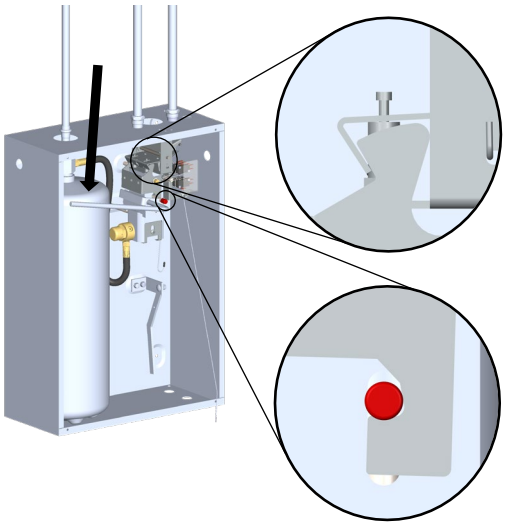


Figure 5.15. Ensure that the cocking pin is in position and that the plate lever is in lower position at the lock pins.

3. Insert the lock plate to prevent accidental system activation.

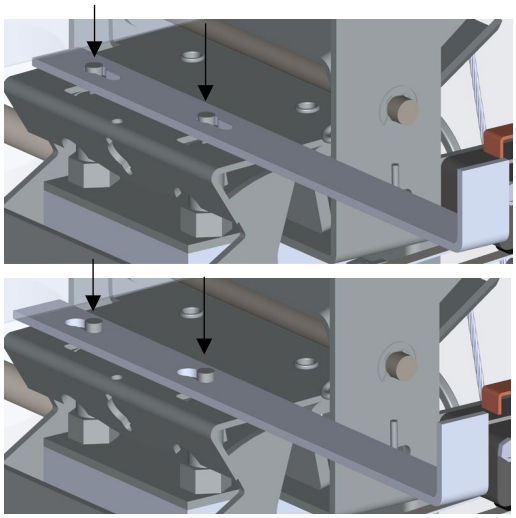


Figure 5.16. Ensure the lock plate grabs the lock pins.

4. Pull the wire rope to tension and lift the trigger hammer. If the wire rope is long with many detectors and pulleys, more tension will be required.

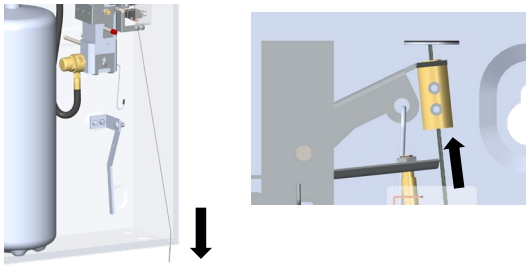


Figure 5.17

5. Fasten the hexagonal socket screws with a 2.5 mm hex key. Make sure they grip the wire rope firmly.

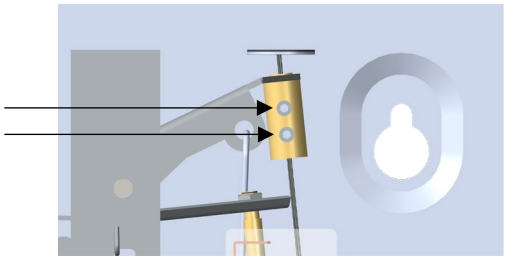


Figure 5.18

6. Pull down the tension lever.

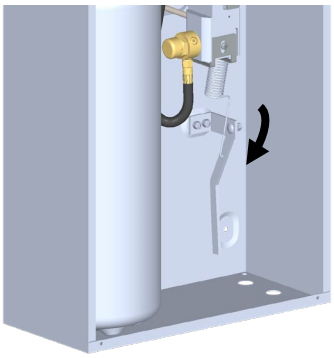


Figure 5.19

7. Confirm that the distance between the bottom of the trigger hammer and the bottom of the lever plate is 6.5 to 9.5 mm.

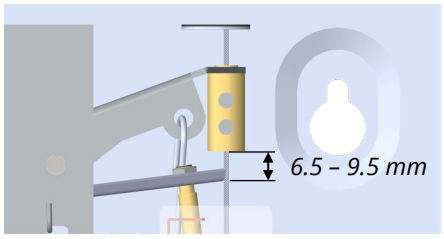


Figure 5.20

8. To prevent the wire rope from interfering with the action of the release mechanism, pull it through the interior of the spring.

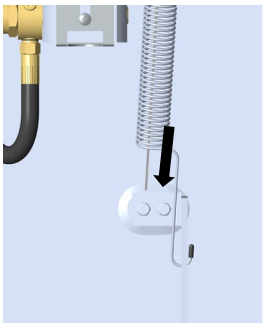


Figure 5.21

! NOTE !

After putting the wire rope under tension, ensure that all fusible links are still positioned towards the terminal end and that there is no slack in the system.

Otherwise, non-released slack may suddenly be released at a later point, resulting in accidental system activation.

5.3 Manual Pull Station

At least one and at most two manual pull stations should be installed for each KitchenX system. Unless local regulations prescribe otherwise, the following points should be complied with.

- Manual pull stations should be placed at least 2 m away from the closest kitchen hazard, thus allowing manual activation during an active fire.
- Manual pull stations should be placed in the evacuation route leading from the kitchen, at a height of 1 to 1.2 m above the floor.
- The wire rope should run through conduit piping throughout its entire length.
- Turns and bends can only be achieved with pulley elbows, pulley tees, or one pipe bend.

Follow these steps for the installation of the pull station(s).

1. Ensure that the lock plate is correctly positioned at the lock pins and that there is no cartridge attached to the release mechanism.
2. Install the conduit piping in accordance with the design section. Do not exceed 45 m of wire and pipe, 20 pulley elbows, one pulley tee, and one pipe bend.
3. The manual pull station can be installed at a junction box or flush-mounted in the wall. If mounted at a junction box, push out the knockout hole of the box and attach the conduit with a compression connector. It is not necessary to mount an elbow pulley to achieve the 90-degree bend inside the box. If the pull station is flush-mounted, an elbow pulley is attached directly to the backside of the pull station. The pull station should be securely mounted with each screw hole.

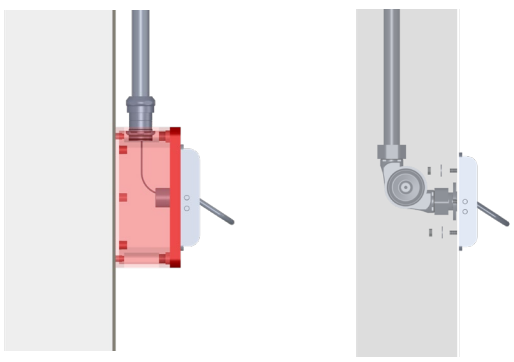


Figure 5.22

4. The wire rope can be threaded through the conduit piping from either the pull station or from the release mechanism.
5. Attach the wire rope to the release mechanism with an oval crimp sleeve according to *Figure 5.23*.

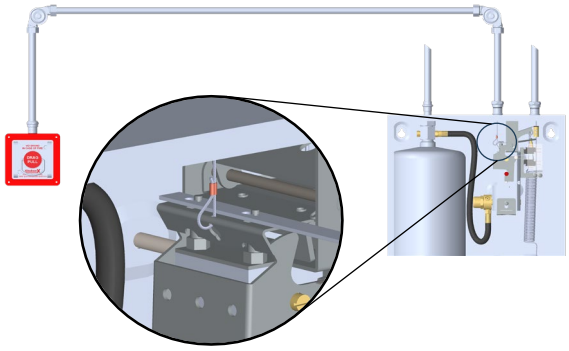


Figure 5.23. Crimp the wire rope with an oval sleeve with 50 to 75 mm excess wire. After crimping, use a wire cutter and shorten the wire rope down to maximum 10 mm.

6. If two pull stations are used, the wire ropes are joined according to Figure 5.25 or Figure 5.24.

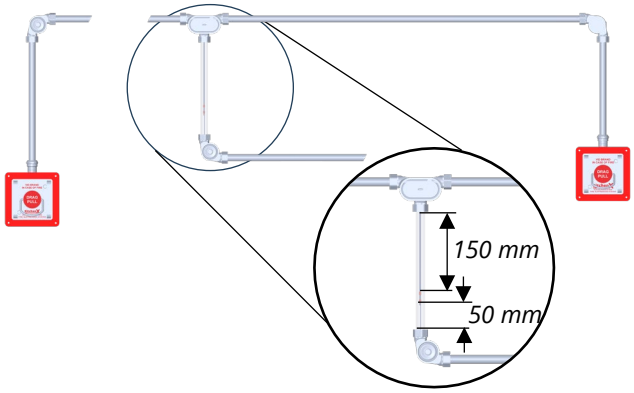


Figure 5.24: If there are any pulley elbows between the cabinet and the pulley tee, the wires are crimped with two oval sleeves with at least 150 mm distance to the pulley tee's compression connector, and 50 mm distance to the closest compression connector towards the cabinet.

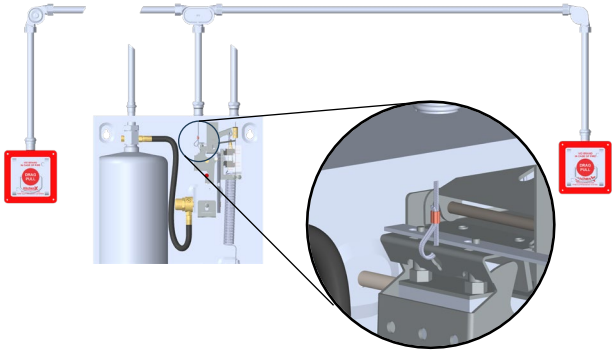


Figure 5.25: In case the first pulley after the cabinet is a pulley tee, both wire ropes can be connected to the release mechanism.

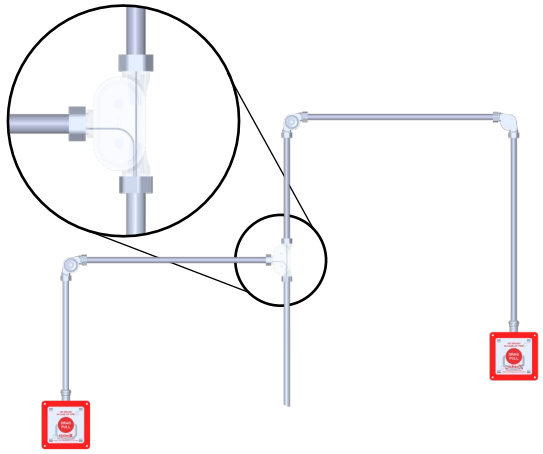


Figure 5.26. The pulley tee may also be placed side-tee configuration.

7. Remove the handle from the pull station and crimp the wire rope with an oval crimp sleeve with 50 to 75 mm of excess wire. After crimping, use a wire cutter and shorten the excess wire rope down to a maximum of 10 mm.
8. Push back the handle of the pull station into the plate. Remove the socket screw from either side of the station and insert a breakable rod (p/n 55-1135-94) through the handle. Re-fasten the socket screw.

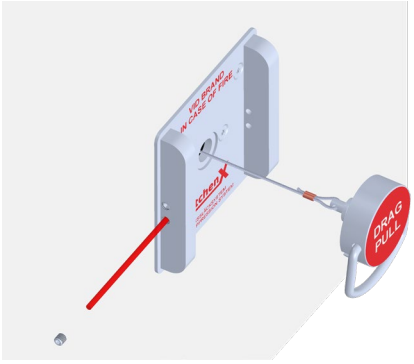


Figure 5.27: Socket screws can be removed from either side of the pull station.

5.4 Electrical Switches

To prevent re-ignition after extinguishing, electrical switches should be connected to shut off gas valves and kitchen appliances when the KitchenX system is activated. This task is often performed by an electrician after system installation. Perform the following steps to prevent having to open the cabinet to access the wires.

1. Punch out one of the knockout holes on the right-hand side of the cabinet or at the top and right-hand side of the cabinet closest to the wall.

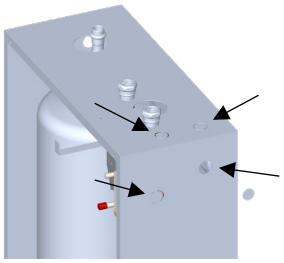


Figure 5.28

2. Install an electrical junction box (p/n 55-2413-00). The box can either be installed on the side or on top of the cabinet.
3. In case there is a risk of chafing of the electrical wires, mount a cable fitting or a grommet at the interface between the box and the cabinet.

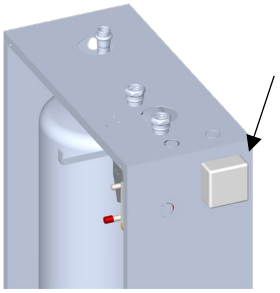


Figure 5.29

4. Pull through the cables and bundle them according to the microswitch they connect to, for example, with a cable tie.
5. Put a wire cap or electrical tape on the loose cable ends.

If necessary, two additional electrical switches can be installed in the lower position of the microswitch bracket. These switches will be oriented upside down compared with the pre-installed upper switches. If adding such additional microswitches, mark the cable bundles to indicate the **lower** and the **upper** microswitches.

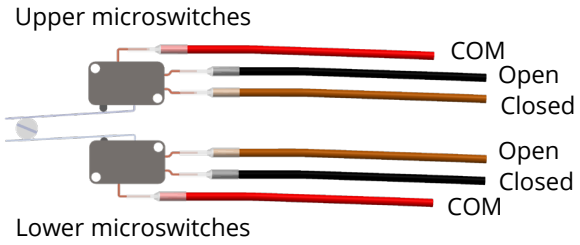


Figure 5.30: Upper and lower microswitches with release mechanism in operating mode.

⚠ WARNING ⚠

Electrical wiring must be performed by a qualified electrician according to national standards and regulations.

If you are qualified to perform electric installations, follow the wiring diagram of *Figure 5.31* for the **upper** microswitches.

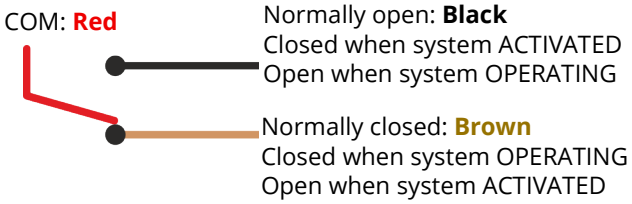


*Figure 5.31: Wiring diagram for **upper** microswitches.*

If more than two microswitches are used, the additional **lower** microswitches will have opposite wiring to the upper microswitches, as illustrated in the wiring diagram of *Figure 5.32*.

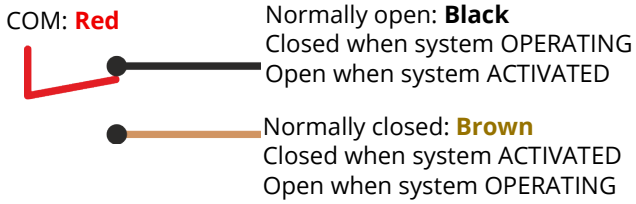


*Figure 5.32: Wiring diagram for **lower** microswitches. Additional, lower microswitches will have opposite wiring to the upper microswitches.*

Despite the microswitches' higher rating, when used for the purposes of this system, the loads may not exceed 4 A or 49 VAC/VDC. Ensure that all unused wire ends are capped to prevent malfunctions and electrical shock.

New microswitches (p/n 55-2019-62) are installed pairwise with two screws and nuts and separated by an isolating piece of plastic. Refer to *Figure 4.28*.

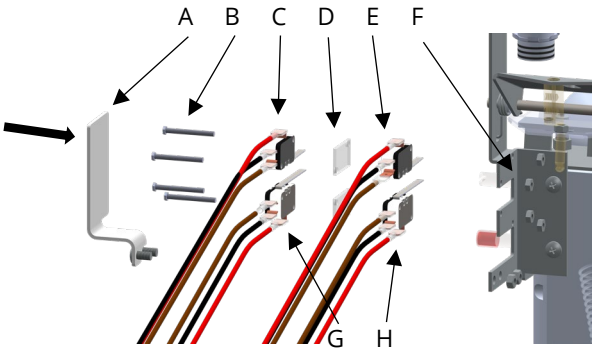


*Figure 5.33: **A**: Touch protection attached with one screw. The second screw prevents it from turning. **B**: Screws. **C**: Microswitch 1 (upper). **D**: Isolating Plastic. **E**: Microswitch 2 (upper). **F**: Hexagonal nuts attached to screw from behind bracket. **G**: Microswitch 3 (lower). **H**: Microswitch 4 (lower).*

SECTION 6 – COMMISSIONING

After installation is complete, key components of the KitchenX system must be tested to ensure proper function in case of fire.

⚠ DANGER ⚠

Make sure that no nitrogen cartridge is installed at the release mechanism and that the lock plate is correctly mounted at the lock pins before proceeding.

6.1 Testing of Pull Station

1. Remove the lock plate from the lock pins.
2. Pull the handle of the pull station. The release mechanism should trigger easily. If excessive force is needed, open the pulleys and check that the ball bearings can rotate without resistance and that the wire rope does not snag along its conduit.
3. When finished, push the handle back into the pull station, insert a new breakable rod (p/n 55-1135-94), and re-fasten the socket screw.
4. Use the cocking lever to put the cocking pin in the upper position and reposition the lock plate at the lock pins.

6.2 Testing of Detection System

1. Remove the tension of the wire rope by moving the tension lever to the up position.
2. Find the terminal detector scissor linkage, furthest away from the release mechanism along the conduit piping. Remove the fusible link and replace it with a test link.
3. Re-tension the wire rope by pulling the tension lever to the down position.
4. Remove the lock plate.
5. Use a wire cutter to cut the test link and check if the release mechanism has activated. If not, troubleshoot according to the bullet list below and re-test from step 1.

Make certain that:

- The scissor linkages of all detectors are placed towards the terminal detector in their brackets.
- The wire rope does not snag anywhere along the conduit.
- The wire rope is not frayed at the pulley elbows and does not jam at the detector brackets.
- Lock plate is removed and the release mechanism is in operating position.

6. If the release mechanism is properly activated, push the tension lever to the up position.
7. Place the correct fusible link at the terminal scissor linkage. Ensure that it is mounted towards the terminal side in the bracket.
8. Use the cocking lever to put the cocking pin in the upper position and re-place the lock plate at the lock pins.
9. Push the tension lever to the down position and check that the 6.5 to 9.5 mm distance between the trigger hammer and the lever plate is maintained.

6.2.1 Testing Electrical Switches

Test the switches by method one or method two.

Method One

A multimeter is required to test the electrical switches. Use it in continuity mode.



Figure 6.1: Continuity symbol

Start by checking the microswitches with the cocking pin in operating position. The wiring is opposite for microswitches in the upper position and the lower position.

1. For **upper** microswitches, firstly test across the COM (red cable) and the Normally Closed terminals (brown cable). The multimeter should register the connection, usually with a beeping sound. Secondly, test across the COM and the Normally Open (black cable) terminals. The multimeter should *not* register the connection.
2. For **lower** microswitches, firstly test across the COM (red cable) and the Normally Closed terminals (brown cable). The multimeter should *not* register the connection. Secondly, test across the COM (red cable) and the Normally Open terminals (black cable). The multimeter should register the connection, usually with a beeping sound.

The switches should also be checked with the cocking pin in activated position. Make sure no cartridge is installed at the release mechanism, remove the lock plate and then activate the release mechanism.

1. For **upper** microswitches, firstly test across the COM (red cable) and the Normally Closed terminals (brown cable). The multimeter should now not register the connection. Secondly, test across the COM and the Normally opened (black cable) terminals. The multimeter should register the connection.
2. For **lower** microswitches, firstly test across the COM (red cable) and the Normally Closed terminals (brown cable). The multimeter should now register the connection. Secondly, test across the COM (red cable) and the Normally Open terminals (black cable). The multimeter should now *not* register the connection.

Finalize by using the cocking lever to place the cocking pin in operating position and position the lock plate at the lock pins.

Method Two

Alternatively, in case wiring to shut off appliances has already been made, the shut-off function should be checked.

1. Turn the power source to the kitchen appliances on.
2. If the breakable rod is mounted in the pull station, remove it by unscrewing one of the socket screws on the side.
3. Remove the lock plate from the release mechanism.
4. Pull the handle of the pull station. If wiring has been performed correctly, the kitchen appliances will shut off.
5. Push the handle back into the pull station, insert the breakable rod and re-fasten the socket screw.
6. Use the cocking lever to put the release mechanism in operational mode and re-position the lock plate at the lock pins.
7. Check that the kitchen appliances can now be turned on again.

If the kitchen appliances do not shut off upon activation of the system, the electrical wiring should be inspected. Restarting appliances may require actions separate from the KitchenX system.

6.3 Inspection of Distribution System

All press couplings should be confirmed that they have been pressed. Check that thread tape is used at connections where the threads are used to create a pressure-tight seal.

6.4 Placing in Service

1. Ensure that the lock plate is correctly positioned at the lock pins.
2. Select the correct cartridge and remove the shipping cap. An N8A tank is used for a KitchenX single tank system and an N16A cartridge is used for KitchenX double tank and triple tank systems.
3. Weigh the cartridge and verify that the weight is no less than 14 g below the filling weight.
4. Ensure that the membrane of the cartridge is *not* punctured
5. Fasten the cartridge firmly by hand.
6. Ensure that the tension lever is in the down position.
7. Remove the lock plate.
8. Mount the cabinet cover and fasten with all four screws.
9. Record the installation date in the system journal.

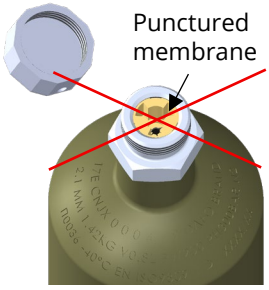
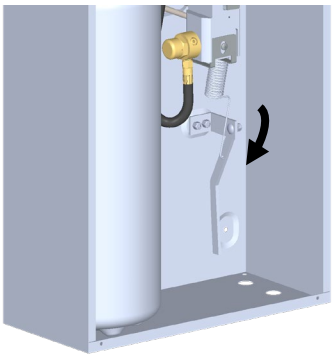


Figure 6.2

⚠ DANGER ⚠

Failure to put the tension lever in the down position will cause the system to remain unresponsive during automatic detection.



6.5 Installation and Commissioning Checklist

Site and Design

- Installation is indoors, protected from wind, and within -5 to 55 deg C.
- System size is correct: KX1R 1-11 flow/N8A; KX2R or KX2RM 12-22 flow/N16A; KX3R 23-33 flow/N16A.
- Distribution pipe design is within limits: approved corrosion-resistant 13-13.8 mm ID pipe, max piping after first tee 18.2 m.
- Total piping is within limit: single or separate supply line max 23 m; double manifold max 20.6 m.
- Detection conduit is within limit: max 12 detectors, 40 m wire rope, 20 pulley elbows or 16 if pipe bend is used.
- Pull station conduit is within limit per station: max 45 m wire rope, 20 pulley elbows, 1 pulley tee, 1 pipe bend.

Cabinet and Tanks

- Cabinet is securely mounted with four screws, accessible for service, and away from excessive heat.
- Side-by-side cabinets have 8 mm gap and grommets fitted in knockout holes.
- Each tank is filled with 11.7 liters KitchenX agent at 16-27 deg C.
- Filled level is checked: agent surface 46-51 mm below tank outlet.
- Tank valve is tightened to metal-to-metal contact.
- Nitrogen cartridge is not installed during installation or functional testing.

Distribution Piping and Nozzles

- Pipes, couplings, and nozzles are clean; pipe cuts are square, reamed, and debris-free.
- Pipe supports are fitted every 1.5 m, or every 0.6 m where elbow/tee is between supports.
- Press couplings are pressed with correct tool and V15 jaws/inserts.
- Thread tape is used at nozzles and does not block any nozzle/coupling orifice.
- Minimum 1.8 m pipe length from tank outlet to fryer, wok, tilt skillet, or range-top nozzle is met.
- Nozzles match the protected hazard and are correctly positioned, aimed, and unobstructed.
- Key nozzle limits checked where relevant: duct 50-200 mm in; plenum max 3 m/nozzle; fryer/wok/tilt skillet 690-1200 mm; griddle/range top 760-1020 mm; broiler 500-1020 mm.
- Hood penetrations are oil-tight.

Detection, Pull Station, Shut-off

- Detectors are fitted at each duct opening and above each protected appliance.
- Detector coverage is checked: max 1220 x 1220 mm appliance area per detector; duct detector covering appliance max 300 mm into duct.
- Fusible links are suitable for normal cooking temperature and installed in correct locations.
- Scissor linkage is 4-10 mm toward terminal side; wire rope is enclosed by conduit except at cabinet/detectors.
- Pull station at least 2 m from hazard, in exit route, approx. 1-1.2 m above floor.
- Electrical/gas shutdown is connected for all protected hazards; cabinet load max 4 A at 49 VAC/VDC.

Functional Tests and Commissioning

- Manual pull station activates release mechanism easily; new breakable rod fitted after test.
- Detection system tested with approved test link at terminal detector.
- Wire rope does not snag, fray, or jam at pulleys, conduit, or detector brackets.
- Trigger hammer to lever plate distance is 6.5-9.5 mm after tensioning.
- Microswitches or appliance shutdown function tested.
- Correct cartridge installed after tests: N8A single tank for single tank system, N16A for double/triple tank system.
- Cartridge is weighed, within 14 g of filling weight, and membrane is not punctured.
- Tension lever is down, lock plate removed, cabinet covers fitted, installation date recorded.

SECTION 7 – MAINTENANCE AND SERVICE

Due to the harsh nature of kitchen environments, maintenance is required at 6-month intervals. Extended maintenance is required at 10-year intervals.

⚠ WARNING ⚠

Maintenance and service of a KitchenX system may only be performed by a KitchenX certified technician.

Before commencing service, confirm that all kitchen appliances are turned off and have cooled down.

Confirm also that the system design is correct and that each hazard is protected with the correct nozzle(s). Take into consideration that new kitchen appliances may have been installed or existing ones rearranged and that this could require that nozzles and detectors need to be added or moved.

Cleaning of the kitchen is necessary to prevent excessive buildup of grease but is also associated with risk of damaging or displacing system components. If possible, plan the maintenance to be done just after any extensive cleaning.

7.1 Semi-Annual Maintenance

First check the installation date or previous extended maintenance date of the KitchenX system. In case it will be more than 10 years ago at the next semi-annual maintenance occasion, also perform the steps of *7.2 Extended Maintenance*.

Follow these steps to perform semi-annual maintenance:

7.1.1 Actions at the Cabinet

1. Remove the KitchenX cabinet cover(s).
2. Place the lock plate at the lock pins and make sure they are properly engaged.
3. Remove the cartridge and fasten a shipping cap to prevent accidental puncture of the burst membrane. Discard and replace the cartridge if any such damage is found. If it is more than 10 years since the manufacture date or the previous hydrostatic test, the cartridge should be replaced with a new or a newly tested cartridge. If so, it is recommended to perform all steps of *7.2 Extended Maintenance* if the 10-year interval is near.

⚠ WARNING ⚠

Cartridges must be de-pressurized in a controlled manner before being discarded in accordance with local regulations.

A suitable method is to install the cartridge in the release mechanism and to disconnect the expellant gas hose(s) while still leaving the regulator connected. Then trigger the release mechanism.

4. Remove and inspect the release mechanism's O-ring at the cartridge connection. Replace it if it shows signs of damage or dryness (p/n 55-1618-48). Apply grease before placing it back in the mechanism.

! NOTE !

Use grease that is suitable for rubber for all O-rings of a KitchenX system. For example, silicone-based grease such as Dupont Molykote 55.

Do not use petroleum, alcohol or solvent-based lubricants as they can cause the rubber to swell excessively or crack.

5. Check other parts of the release mechanism for damage according to *Figure 7.1*.

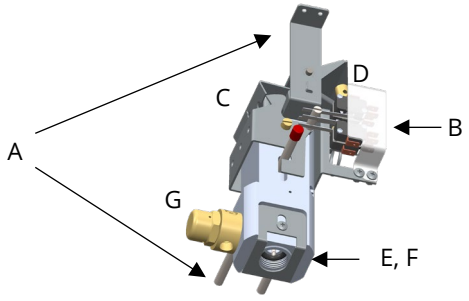


*Figure 7.1: Ensure that **A**: mechanism is attached firmly to the cabinet, **B**: Microswitches and microswitch bracket are not loose, **C**: trigger plate is not deformed, **D**: trigger hammer is not loose and holds wire rope firmly, **E**: threads of the cartridge connection are not damaged, **F**: puncture pin is straight, **G**: Regulator is well attached to the mechanism and not damaged.*

6. If it will be more than 12 years since the regulator was manufactured or flow tested at the next maintenance occasion, perform a flow test according to section *7.2.4 Flow Test of Pressure-Reducing Regulator.*

7. Disconnect the expellant gas hoses from the agent tanks. Unfasten the packing nuts from the agent tank valves to disconnect them from the distribution piping.
8. Inspect the expellant gas hoses and their connections. Replace them if they show signs of corrosion or chafing. If it will be more than 12 years since manufacturing or the previous test at the next maintenance occasion, replace the hose or perform a hydrostatic test according to section *7.2.3.*
9. Remove the agent tank from the cabinets and unscrew the valve. Check the agent tank, the valve, and the riser for corrosion, dents, or other damage. Replace it with a new tank if necessary (p/n 55-1618-20). Likewise, remove the O-ring and inspect it. Replace it if showing signs of damage or dryness (p/n 15-6024-80). Apply grease before placing the O-ring back at the valve. If it will be more than 12 years since manufacturing or the previous test at the next maintenance occasion, replace the agent tank or perform a hydrostatic test according to section *7.2.2.*
10. Remove the vent plug from the valve. Check it for damage and make sure that the internal rubber ball has free movement. If not, clean it and test again. Replace it if necessary (p/n 55-1618-12). Apply new thread tape and re-fasten it to the tank valve.
11. Check that the burst disc is *not* perforated. Otherwise, replace it (p/n 55-1618-80). Make sure that the silver side is facing up when placing it at the valve.

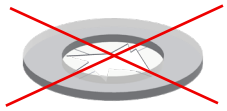


Figure 7.3

12. Ensure that there is the correct amount of KitchenX agent in the tank. There should be between 46 to 51 mm from the agent surface to the top of the tank outlet at an agent temperature of 16 to 27 °C.
13. Re-fasten the valve to the tank until metal-to-metal contact is achieved. Place the tank back in the cabinet and reconnect it to the distribution network.
14. Apply new thread tape and re-fasten expellant gas hoses.

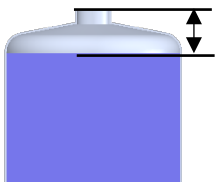


Figure 7.4: The agent surface fill level is 46 to 51 mm from the tank outlet.

7.1.2 Distribution System

1. Check that each nozzle is correct for the hazard it should protect regarding the aiming point, position, hazard dimension, and nozzle type.
2. Clean each nozzle of excess grease. Remove the cap and check it for deformation or damage. Replace it if necessary (p/n 55-6156-91). Replace the O-ring (p/n 55-6156-92) at one-year intervals. Inspect it and likewise replace it if it shows signs of damage or if it is dry. Apply grease to the O-ring before placing it back at the nozzle, paying careful attention to avoid the nozzle orifice. Apply new thread tape to the adapter before re-fastening the nozzle.
3. Remove the nozzle and inspect the piping in case there is evidence that cooking grease has entered the distribution piping, for example, if the cap has been left off or there is grease under the cap. If so, branch lines may need to be cleaned or replaced. Use new thread tape when re-fastening the nozzle.
4. Perform a blow-through test. Attach a purge adapter (p/n 55-9650-04) to the distribution system with the packing nut that is normally connected to the agent tank valve. For KitchenX double tank and triple tank systems, purge each distribution line one at a time. For manifolded systems, connect the purge adapter to the union coupling where the flow from each tank is combined.

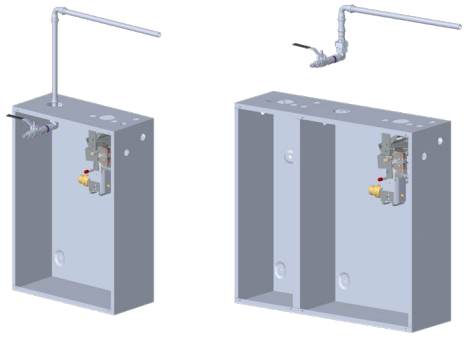


Figure 7.2: Connection point for purge adapter. Attach with the packing nut already attached at the distribution piping.

a. Make sure that all nozzle caps are fitted at all nozzles.
b. Connect an air compressor to the adapter with a quick-connect coupling hose to the adapter.
c. At ca 8 bars, open the ball valve for a few seconds and then close it.

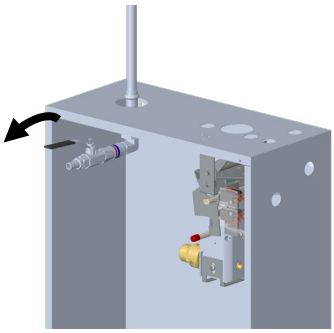


Figure 7.5

d. Check that the nozzle caps have come off from each nozzle.

If the nozzle cap did not come off one or more nozzles, this indicates that the nozzle's O-ring may be dry, the cap may be deformed, or the distribution pipe may be clogged at a section. Inspect the nozzle cap and pipe and replace them if necessary. If it is not possible to fully investigate the pipe, it should be replaced.

7.1.3 Manual Pull Station

⚠ DANGER ⚠

Make sure that no nitrogen cartridge is installed at the release mechanism.

1. Remove the lock plate from the lock pins.
2. Pull the handle and make sure that the release mechanism activates without the need for excessive force. Make sure that the breakable rod does not interfere with activation.
3. Check that the oval sleeve holds the wire rope firmly and that the wire rope does not show signs of fraying.
4. Push back the handle into the pull station, insert a new breakable rod (p/n 55-1135-94) and re-fasten the socket screw. Pull out the wire rope slack into the cabinet. Ensure that the oval sleeve holds the rope firmly and that there are no signs of the wire rope fraying. If necessary, replace the wire rope as illustrated in section *5.2.2 Detection System*.

7.1.4 Electrical Switches

1. While the release mechanism is still in activated mode, check the electrical switches. For upper (standard) microswitches, the switch lever *should not* produce a clicking sound when moving it up and down. If microswitches have been mounted in the lower position, moving the switch lever *should* produce a clicking sound.
2. Use the cocking lever and place the release mechanism in operating mode, position the lock plate at the lock pins, and then check the microswitches again. When moving the switch lever, upper microswitches *should* produce a clicking sound and lower microswitches *should not* produce a clicking sound.
3. If there are any issues in the previous steps, the trigger lever can be adjusted by bending it slightly. Replace the switches if they show any signs of damage (p/n 55-2019-62).

7.1.5 Detection System

1. Remove all fusible links from the detection system and take note of which fusible link type was placed at which detector bracket.
2. Pull the slack of the wire rope, first in the terminal bracket direction and then in the cabinet direction. Look for damage and fraying at each wire rope endpoint and where it contacts conduit couplings at the detector brackets. Replace it if it shows any signs of damage.

! NOTE !

A frayed wire rope may be more flexible, which can cause accidental activation. Replace damaged wire ropes as illustrated in section *5.2.2 Detection System*.

3. Lower the tension lever and check that there is a 6.5 to 9.5 mm distance between the bottom of the lever plate and the bottom of the trigger hammer.

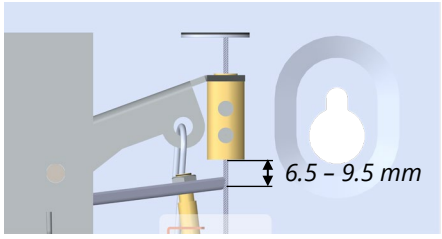


Figure 7.6

4. Move the tension lever to the up position and replace the terminal fusible link with a test link (p/n 55-3291-90).
5. Lower the tension lever to the down position and use a wire cutter to cut the test link.
6. If the system did not activate, check that:
   a. The scissor linkages of all detectors are placed towards the terminal detector in their brackets.

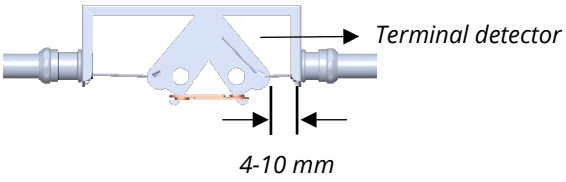


Figure 7.7

   b. The wire rope does not snag anywhere along the conduit.
   c. The wire rope is correctly positioned in the center of the pulley ball bearings.
   d. The wire rope is not frayed at the pulleys and does not jam at the detector brackets.
   e. The lock plate is removed, and the release mechanism is in operating position.
   f. There is no solidified grease buildup preventing the free movement of the wire rope or the linkage scissors.
7. Check that the shut-off function is working and that the protected kitchen appliances cannot be turned on.
8. Raise the tension lever to the up position and confirm that there is a 6.5 to 9.5 mm distance between the bottom of the lever plate and the bottom of the trigger hammer.

! NOTE !

Restarting appliances may require actions separate from the KitchenX system.

7.1.6 Re-commissioning

1. Ensure that the release mechanism is in operating mode and that the lock plate is correctly positioned at the lock pins.
2. Remove the shipping cap of the nitrogen cartridge and weigh it to verify that the weight is no less than 14 g below the filling weight.
3. Attach the cartridge to the release mechanism by hand-tightening.
4. Remove the lock plate and make sure that the tension lever is in the down position.

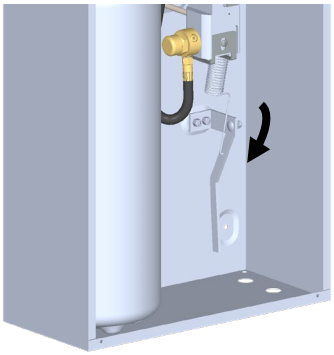


Figure 7.8

5. Attach the cabinet covers.
6. Note the service date and any additional system services performed in the system journal.

⚠ DANGER ⚠

Failure to put the tension lever in the down position will cause the system to remain unresponsive during automatic detection.

7.2 Extended Maintenance

Additional maintenance steps are required on top of the semi-annual maintenance procedure at 10-year intervals. This includes:

- Hydrostatic testing and refilling of nitrogen cartridges. Performed at maximum 10-year intervals from the cartridge manufacture date.
- Replacement of KitchenX agent, performed at 10-year intervals from the system installation date, maximum 12 years to accommodate to the testing interval for the system cartridge.



Figure 7.9

- Hydrostatic testing of agent tanks, performed at 10-years intervals from manufacture date, maximum 12 years to accommodate to the testing interval for the system cartridge.



Figure 7.10

- Hydrostatic testing of expellant gas hoses, performed at 10-year intervals from the manufacture date, maximum 12 years to accommodate to the testing interval for the system cartridge.

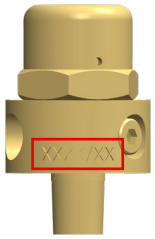


Figure 7.11

- Flow testing of pressure-reducing regulators, performed at 10-year intervals from manufacture date, maximum 12 years to accommodate to the testing interval for the system cartridge.
- Extended maintenance of distribution system.

As an alternative to testing components, newly manufactured cartridges, agent tanks, expellant gas hoses or pressure-reducing regulators can be installed in the system.

! NOTE !

Unmarked pressure-reducing regulators and expellant gas should be tested in the year 2036.

Perform the initial steps of section *7.1.1 Actions at the Cabinet* and then the following sections once the agent tank and cartridge have been removed from the cabinet. All steps of semi-annual maintenance must also be performed during the extended maintenance occasion.

7.2.1 Extended Maintenance of Distribution System

1. Remove each nozzle, taking note of where it was mounted.
2. Inspect the pipe for clogging. If a pipe is clogged, remove and clean it, and use a straight F/F coupling (p/n 55-5200-06) to re-attach it.
3. Inspect the nozzle's adapter and replace it if showing signs of corrosion. Part of the pipe may need to be replaced as well.
4. Make sure that the nozzle's strainer is clear and that the cap is not damaged. Wash the nozzle clear of grease.
5. Replace the O-ring (p/n 55-6156-92) and re-fasten the nozzle with new thread tape.

7.2.2 Replacement of KitchenX Agent and Hydrostatic Pressure Test

⚠ WARNING ⚠

Use eye protection when handling KitchenX. In case of eye contact, immediately rinse for several minutes.

1. Pour out the KitchenX agent into a plastic container with a volume of at least 12 liters. Use a funnel to prevent spills.
2. Rinse the KitchenX tank and then fill it with water and perform a hydrostatic pressure test at 23 bar. Mark the tank with the year that the pressure test was performed.

⚠ DANGER ⚠

Pressure testing must be done with water.
Since air is compressible, pressure testing with air can result in explosive bursting of hoses or tanks.

3. Pour out the water and fill the agent tank with new KitchenX agent at a temperature of 16 to 27 °C.
4. Ensure KitchenX agent surface is between 46 to 51 mm from the tank outlet.
5. Seal the plastic container with old KitchenX agent and dispose of it according to local regulations.
6. Replace the O-ring at the agent tank valve (p/n 55-1618-14).

7.2.3 Hydrostatic Pressure Test of Expellant Gas Hoses

The expellant gas hoses used for the system should be hydrostatically tested at 23 bars. They must be completely dry, and new thread tape must be applied before re-fastening them to the regulator and tank valve.

7.2.4 Flow Test of Pressure-Reducing Regulator

1. Apply thread tape and connect a regulator testing tool (p/n 55-9650-22) to the pressure-reducing regulator.
2. Ensure that the other regulator connections are plugged, that the release mechanism is in operating mode, and that the lock plate is correctly installed at the lock pins.
3. Remove the shipping cap and fasten an N8A or an N16A cartridge to the release mechanism. If the system's cartridge is scheduled to be replaced during the same service occasion, use this old cartridge. The cartridge should be conditioned at 16-27 °C before being used for the test.
4. Make sure that the regulator testing tool's ball valve is closed.
5. Remove the lock plate and activate the release mechanism.
6. When the ball valve is still closed, ensure that there are no leakages, indicated by stable pressure on the manometer and no noise.
7. Open the regulator testing tool's ball valve completely and ensure that the pressure is stable at 6.6 to 8.6 bars during release.
8. If the test failed, dispose of the regulator and replace it with a new one (p/n 55-1618-50). Otherwise, ensure the regulator is marked with the year that the flow test was performed.
9. Detach the regulator testing tool and clear the internal threads of the regulator from thread tape remnants.

An alternative to performing the flow test is to replace the regulator with a new one or a regulator that has already been flow tested. In this case, apply new thread tape and then fasten the regulator at the release mechanism.

7.2.5 Hydrostatic Pressure Test and Refilling of Nitrogen Cartridge

1. Ensure that the release mechanism is in operating mode and that the lock plate is correctly positioned at the lock pins.
2. Remove the cartridge. Fasten a shipping cap in case the cartridge was not used for flow testing of the pressure-reducing regulator.
3. Remove and replace the O-ring (p/n 55-1618-48) at the cartridge connection of the release mechanism, paying careful attention not to damage the pin of the release mechanism.
4. Select a cartridge suitable for the system, N8A for single tank systems and N16A for multiple tank systems, which has been hydrostatically tested according to national regulations.
5. Before installing, verify that the cartridge weight is no less than 14 g below the filling weight.

7.3 Maintenance Checklist

Before Service

- Confirm service interval: semi-annual every 6 months; extended maintenance every 10 years.
- Check test dates: nitrogen cartridges at least every 10 years; tanks/hoses/regulator at least every 12 years.
- Kitchen appliances are off and cooled down.
- System is made safe for service; cartridge removed and fitted with cap.
- Kitchen layout still matches design; changed appliances, ducts, nozzles, or detectors are resolved before return to service.

Semi-Annual Maintenance

- Cabinet, release mechanism, lock plate, regulator, tank valve, O-rings, and cartridge connection inspected.
- Expellant gas hoses inspected for corrosion, chafing, damage, age, and secure routing.
- Distribution piping, nozzles, and nozzle caps inspected for clogging, corrosion, damage, correct type, and correct aim. Blow-through test performed.
- Manual pull station activates easily; wire rope, sleeve, handle, and breakable rod checked; new breakable rod fitted.
- Detection wire rope checked for fraying/damage at endpoints, pulleys, conduit couplings, and detector brackets.
- Detection system tested with test link at terminal detector; release mechanism activates when test link is cut.
- Fusible links are replaced and their type and location are confirmed; detector scissor linkages sit 4-10 mm toward terminal side.
- Detection tension confirmed: 6.5-9.5 mm trigger hammer to lever plate.
- Electrical switches or appliance shutdown function tested.
- Agent tank fill level checked: agent surface 46-51 mm below tank outlet and burst disc has silver side up.

Extended Maintenance

- Nozzles removed, locations noted, strainers/caps cleaned and inspected; nozzle O-rings replaced.
- Distribution piping inspected for clogging/corrosion; clogged or suspect pipe cleaned or replaced.
- KitchenX agent replaced; old agent disposed of correctly.
- Agent tank hydrostatically tested at 23 bar, and marked with test year.
- Tank refilled with 11.7 liters new agent at 16-27 deg C; fill level 46-51 mm below outlet.
- Agent tank valve O-ring replaced.
- Expellant gas hoses hydrostatically tested at 23 bar or replaced.
- Pressure-reducing regulator flow tested.
- Nitrogen cartridges hydrostatically tested/refilled or replaced.
- O-ring at release mechanism replaced.

Re-comissioning

- Correct cartridge installed: N8A for single tank system, N16A for double/triple tank system; weighed within 14 g of filling weight.
- Tension lever down, lock plate removed, cabinet covers fitted, service and/or recharge date recorded.

SECTION 8 – SYSTEM RESET & RECHARGE

⚠ WARNING ⚠

Resetting and flushing of a KitchenX system may only be performed by a KitchenX-certified technician.

8.1 Cleanup After Discharge

⚠ DANGER ⚠

Before proceeding to clean up, disconnect electrical appliances and ensure the kitchen appliances and any cooking oil have cooled down.

Electrical equipment can be damaged by the KitchenX agent, which can cause electrical shock. Applying water to heated grease and oil can cause explosive vaporization and splashing of heated oil droplets.

In case of discharge, KitchenX should be cleaned from kitchen surfaces within 24 hours to protect the surfaces from corrosive damage.

When KitchenX agent reacts with grease, it forms a foam-like product. This product and the KitchenX agent in itself are not toxic but should be disposed of according to local regulations. The products are most easily soaked up with rags and sponges.

⚠ WARNING ⚠

Use eye protection when handling KitchenX.
In case of contact with the eyes, immediately rinse for several minutes.

After coming in contact with KitchenX agent, the oil and grease of kitchen appliances are no longer suitable for cooking and should be discarded.

Thoroughly clean all kitchen surfaces and appliances with soap and water and allow them to dry completely before use. Check the electrical connections of the kitchen appliances. KitchenX is highly conductive and can cause damage to exposed electrical connections.

8.2 Troubleshooting

Before recharging and resetting the system, ensure that the reason for activation has been correctly determined. In case activation occurred unintentionally, some possible reasons are:

- Accidental manual activation. In this case, the breakable rod at the pull station will have been split.
- Incorrect selection of detector. If this is suspected, take a temperature reading with the kitchen appliances at intense cooking conditions and reevaluate the selection of detectors.
- Incorrect installation of the detection system. The system might have been activated by slack being suddenly released from the detection system wire rope, or the wire rope or detection conduit components may have been damaged. Inspect and/or replace the wire rope and conduit components.

8.3 Flushing of Distribution System

! NOTE !

Prolonging the time until flushing of the distribution system and allowing piping to be exposed to the heat of normal cooking operations will increase the risk of KitchenX agent solidifying in the distribution piping.

⚠ WARNING ⚠

Use eye protection, gloves and protective clothing when handling flushing concentrate. In case of contact with eyes, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.



If skin irritation occurs or eye irritation persists, get medical attention and bring the safety data sheet of the flushing concentrate which is in the appendix of this manual.

Wash hands thoroughly after handling.

To flush distribution piping, follow these steps:

1. Remove the KitchenX cabinet cover(s).
2. Disconnect the expellant gas hoses from the agent tanks and unfasten the packing nuts from the agent tank valves to disconnect them from the distribution piping.
3. Remove the agent tank from the cabinets and unscrew the valve. Remove and inspect the O-ring for damage and replace it if necessary (p/n 15-6024-80). Apply grease before placing the O-ring back at the valve.
4. Remove the vent plug from the agent tank valve and check for corrosion and proper function. Ensure that the internal rubber ball has free movement. If not, it can be washed with soapy water. Replace the vent plug if necessary (p/n 55-1618-12).
5. Apply new thread tape and re-fasten the vent plug.
6. Pour one bottle of KitchenX flushing concentrate into each agent tank of the KitchenX system.
7. Fill the agent tanks with warm, clean water until half full, irrigate, then fill them completely full.
8. Fasten the agent tank valves and reconnect them to the distribution system.
9. Apply new thread tape and re-fasten the expellant gas hoses to the tank valves.
10. Create a means to collect the discharge through the nozzles, for example, heavy-duty plastic bags or plastic tubing. If using a bag, it should have a capacity of at least 5 liters. Create a hole close to the nozzle tip to prevent the expellant gas from bursting the bag. Attach the bag with a cable tie.

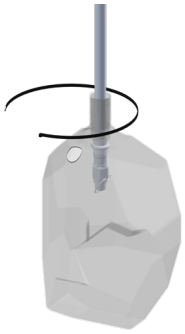


Figure 8.1

11. Use the cocking lever to put the release mechanism in operating mode.

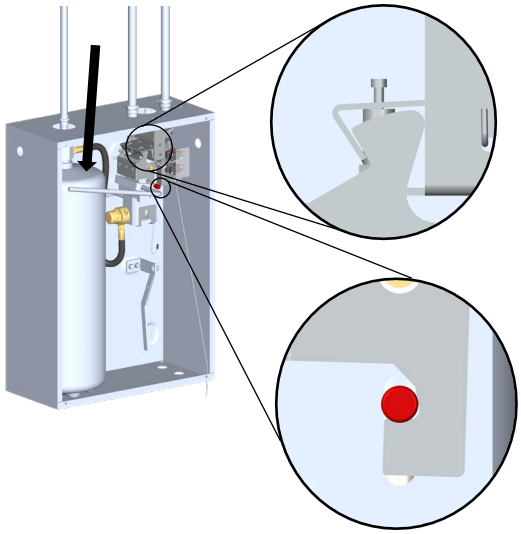


Figure 8.2. Ensure that the cocking pin is in position and that the plate lever is in lower position at the lock pins.

12. Place a lock plate at the lock pins.

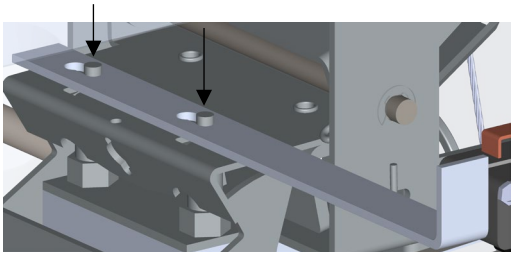


Figure 8.3: Ensure that the lock plate grabs the lock pins.

13. Remove and inspect the release mechanism's O-ring at the cartridge attachment point. Replace it if damaged (p/n 55-1618-48). Apply grease before placing the O-ring back in the mechanism.
14. Mount a cartridge suitable for the system and hand-tighten.
15. Remove the lock plate and trigger the system with the manual pull station.
16. If using bags, check that each bag is filled with an appropriate volume of flushing solution. There should be approximately twice as much at two-flow nozzles as compared to one-flow nozzles. Dispose of the solution according to local regulations.
17. Remove all nozzles and wash them with soapy water.
18. Apply new thread tape and re-install the nozzles, making sure to maintain the correct nozzle type, position, and aim point in relation to the hazard.
19. Unfasten the expellant gas hose from the tank valve and disconnect the agent tank from the distribution piping. Remove the valve from the tank.

8.4 Recharging and Resetting

To recharge the KitchenX system, follow these steps:

1. Fill up each agent tank with 11.7 liters of KitchenX agent. When filling, the temperature should be 16 to 27 °C. Measured at this temperature range, there should be between 46 to 51 mm from the agent surface to the tank outlet.

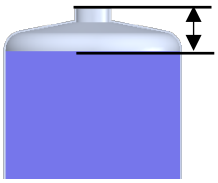


Figure 8.4: The agent surface fill level is 46 to 51 mm from the tank outlet.

2. Replace the burst disc in the agent tank valve (p/n 55-1618-80). Make sure that it is positioned with the silver-colored side in the up direction.
3. Raise the tension lever to the up position.

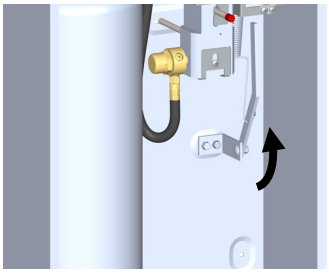


Figure 8.5

4. Fasten the valve to the agent tank until metal-to-metal contact is achieved. Install it in the cabinet. Apply new thread tape and fasten the expellant gas hose. Connect the valve to the distribution piping with the packing nut.
5. Use the cocking lever to place the release mechanism in operating mode and position the lock plate at the lock pins.
6. Remove the cartridge used for flushing.
7. In case system activation was due to a fire, all detectors should be replaced. Otherwise, the same fusible links as were previously installed can be used. Install the correct fusible link at each scissor linkage except for at the terminal detector bracket, where a test link should be mounted.
8. Lower the tension lever to the lower position.
9. Remove the lock plate and test the detection system by using a wire cutter to cut the test link at the terminal detector bracket. If the test is not successful, refer to step 6 of section *7.1.5 Detection System*.
10. If the test was successful, use the cocking lever to place the release mechanism in operating mode and install the lock plate at the lock pins.
11. Raise the tension lever and install the correct fusible link at the terminal detector bracket.

! NOTE !

Ensure that all scissor linkage is correctly mounted at the detector brackets. There should be a distance of 4 to 10 mm towards the terminal side.

12. Lower the tension lever.

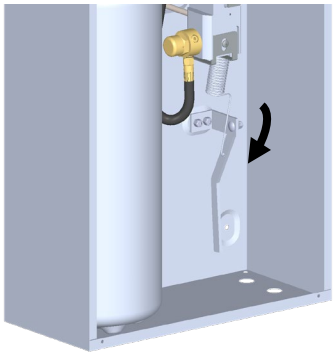


Figure 8.7

13. Check that there is a distance of 6.5 to 9.5 mm between the bottom of the trigger hammer and the bottom of the lever plate. If not, lift the tension lever and adjust the clamping position of the trigger hammer with the socket screws.

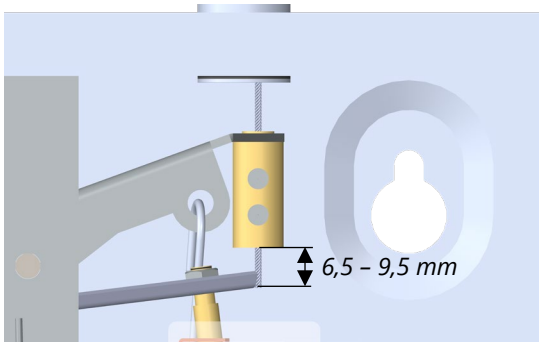


Figure 8.6

14. Remove the lock plate and test the manual activation system by pulling the handle at the pull station. If excessive force is needed, open the pulleys and check that the ball bearings can rotate without resistance and that the wire rope does not get stuck along its conduit. Make sure that the breakable rod does not interfere with activation.

15. If successful, use the cocking lever to place the release mechanism in operating mode and position the lock plate at the lock pins.
16. Reset the manual pull station by pushing in the pull handle and pull the slack at the release mechanism. Unscrew one of the socket screws on the side of the pull station plate. Push in a new breakable rod (p/n 55-1135-94). Afterwards, re-fasten the socket screw.

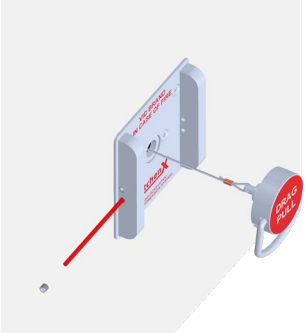


Figure 8.8

17. Before installing a new cartridge at the release mechanism, remove the shipping cap and weigh it. Verify that the weight is no less than 14 g below the filling weight.

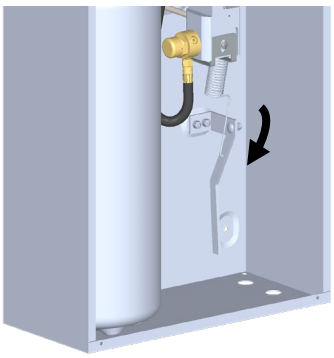
⚠ WARNING ⚠

Ensure that the lock plate is correctly installed and engaged at the lock pins.

18. Choose an N8A cartridge for a KitchenX single tank system and an N16A cartridge for a KitchenX double or triple tank system.
19. Install the cartridge by hand-tightening firmly.
20. Remove the lock plate and re-fasten the cabinet covers.
21. Record the recharge date in the system journal.

⚠ DANGER ⚠

Failure to put the tension lever in the down position will cause the system to remain unresponsive during automatic detection.



APPENDIX I – WET CHEMICAL AGENT TYPE KITCHENX SAFETY DATA SHEET

According to EC-Regulation 1907/2006 (REACH), annex II, including changes implemented by EC-Regulation 2020/878

SAFETY DATA SHEET

KITCHENX

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

1.1. Product identifier

Trade name

KITCHENX

Product no.

55-1618-20

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

Relevant identified uses of the substance or mixture

Appliance protection
Restricted to professional and industrial use.

Uses advised against

None known.

1.3. Details of the supplier of the safety data sheet

Company and address

Dafo Brand AB
Box 683
135 26 Tyresö
Sweden
+ 46 8 506 405 00
www.dafo.se

E-mail

info@dafo.se

Revision

13/04/2026

SDS Version

1.0

1.4. Emergency telephone number

In urgent situations: Call 113 and request the poison information centre. (24h service)
Poison Center at Tel.: + 47 22 59 13 00
See section 4 on 'First Aid Measures'
NCEC reference_copy

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Not classified according to Regulation (EC) No. 1272/2008 (CLP).

2.2. Label elements

Hazard pictogram(s)

Not applicable.

Signal word

Not applicable.

Hazard statement(s)

Not applicable.

Precautionary statement(s)

General

Not applicable.

Prevention

Not applicable.

Response

Not applicable.

Storage

Not applicable.

Disposal

Not applicable.

Hazardous substances

Contains no substances that need to be listed on the label.

Additional labelling

2.3. Other hazards

Additional warnings

This mixture/product does not contain any substances known to fulfil the criteria for PBT and vPvB classification. This product does not contain any substances considered to be endocrine disruptors in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2023/707.

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable. This product is a mixture.

3.2. Mixtures

Contains no substances that need to be listed on the label.

See full text of H-phrases in section 16. Occupational exposure limits are listed in section 8, if these are available.

Other information

-

SECTION 4: First aid measures

4.1. Description of first aid measures

General information

In the case of accident: Contact a doctor or casualty department – take the label or this safety data sheet. Contact a doctor if in doubt about the injured person's condition or if the symptoms persist. Never give an unconscious person water or other drink.

Inhalation

Upon breathing difficulties or irritation of the respiratory tract: Bring the person into fresh air and stay with him/her.

Skin contact

Remove contaminated clothing and shoes immediately. Ensure to wash exposed skin thoroughly with water and soap. Skin cleanser can be used. DO NOT use solvents or thinners.

Eye contact

If in eyes: Flush eyes with water or saline water (20-30 °C) for at least 5 minutes. Remove contact lenses. Seek medical assistance and continue flushing during transport.

Ingestion

If the person is conscious, rinse the mouth with water and stay with the person. Never give the person anything to drink.
In case of malaise, seek medical advice immediately and bring the safety data sheet or label from the product. Do not induce vomiting, unless recommended by the doctor. Have the person lean forward with head down to avoid inhalation of or choking on vomited material.

Burns

Not applicable.

4.2. Most important symptoms and effects, both acute and delayed

None known.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

Information to medics

Bring this safety data sheet or the label from this product.

SECTION 5: Firefighting measures

5.1. Extinguishing media
The product is not flammable

5.2. Special hazards arising from the substance or mixture
None

5.3. Advice for firefighters
No specific requirements.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Contaminated areas may be slippery.

6.2. Environmental precautions
Avoid discharge to lakes, streams, sewers, etc.
Keep unauthorized persons away from the spill

6.3. Methods and material for containment and cleaning up
Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations.
Wherever possible cleaning should be performed with normal cleaning agents. Avoid use of solvents.

6.4. Reference to other sections
See section 13 “Disposal considerations” on handling of waste.
See section 8 "Exposure controls/personal protection" for protective measures.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Smoking, drinking and consumption of food is not allowed in the work area.
See section 8 "Exposure controls/personal protection" for information on personal protection.

7.2. Conditions for safe storage, including any incompatibilities
Containers that have been opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage material
Always store in containers of the same material as the original container.

Storage conditions
No specific requirements.

Incompatible materials
Strong acids, strong bases, strong oxidizing agents, and strong reducing agents.

7.3. Specific end use(s)
This product should only be used for applications quoted in section 1.2.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
No substances are listed in the national list of substances with an occupational exposure limit.

DNEL
No data available.

PNEC
No data available.

8.2. Exposure controls
Apply general control to prevent unnecessary exposure

General recommendations
Smoking, drinking and consumption of food is not allowed in the work area.

Exposure scenarios
There are no exposure scenarios implemented for this product.

Exposure limits
Occupational exposure limits have not been defined for the substances in this product.
Appropriate technical measures
Apply standard precautions during use of the product. Avoid inhalation of vapours.
Hygiene measures
In between use of the product and at the end of the working day all exposed areas of the body must be washed thoroughly. Pay special attention to hands, forearms and face.
Measures to avoid environmental exposure
No specific requirements.
Individual protection measures, such as personal protective equipment
Generally
No specific requirements.
Respiratory Equipment
No specific requirements.
Skin protection
No specific requirements.
Hand protection
No specific requirements.
Eye protection
No specific requirements.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties
Physical state
Liquid
Colour
Transparent
Odour / Odour threshold
Characteristic
pH
7,5-8,5
pH in solution
(100%)
Density (g/cm^3)
1,250-1,260 (20 °C)
Kinematic viscosity
No data available.
Particle characteristics
Does not apply to liquids.
Phase changes
Melting point/Freezing point (°C)
-30
Softening point/range (°C)
Does not apply to liquids.
Boiling point (°C)
No data available.
Vapour pressure
No data available.
Relative vapour density
No data available.
Decomposition temperature (°C)
No data available.
Data on fire and explosion hazards
Flash point (°C)
No data available.

Flammability (°C)
No data available.
Auto-ignition temperature (°C)
No data available.
Lower and upper explosion limit (% v/v)
No data available.
Solubility
Solubility in water
No data available.
n-octanol/water coefficient (LogKow)
No data available.
Solubility in fat (g/L)
No data available.
9.2. Other information
Other physical and chemical parameters
No data available.
Oxidizing properties
No data available.

SECTION 10: Stability and reactivity

10.1. Reactivity
No data available.
10.2. Chemical stability
The product is stable under the conditions, noted in section 7 “Handling and storage”.
10.3. Possibility of hazardous reactions
None known.
10.4. Conditions to avoid
None known.
10.5. Incompatible materials
Strong acids, strong bases, strong oxidizing agents, and strong reducing agents.
10.6. Hazardous decomposition products
Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008
Acute toxicity
Based on available data, the classification criteria are not met.
Skin corrosion/irritation
Based on available data, the classification criteria are not met.
Serious eye damage/irritation
Based on available data, the classification criteria are not met.
Respiratory sensitisation
Based on available data, the classification criteria are not met.
Skin sensitisation
Based on available data, the classification criteria are not met.
Germ cell mutagenicity
Based on available data, the classification criteria are not met.
Carcinogenicity
Based on available data, the classification criteria are not met.
Reproductive toxicity
Based on available data, the classification criteria are not met.
STOT-single exposure
Based on available data, the classification criteria are not met.
STOT-repeated exposure

Based on available data, the classification criteria are not met.

Aspiration hazard

Based on available data, the classification criteria are not met.

Symptoms related to the physical, chemical and toxicological characteristics

None known.

11.2. Information on other hazards

Endocrine disrupting properties

This mixture/product does not contain any substances known to have hormone-disrupting properties in relation to health.

Other information

None known.

SECTION 12: Ecological information

12.1. Toxicity

Based on available data, the classification criteria are not met.

12.2. Persistence and degradability

Based on available data, the classification criteria are not met.

12.3. Bioaccumulative potential

Based on available data, the classification criteria are not met.

12.4. Mobility in soil

No data available.

12.5. Results of PBT and vPvB assessment

This mixture/product does not contain any substances known to fulfil the criteria for PBT and vPvB classification.

12.6. Endocrine disrupting properties

This mixture/product does not contain any substances considered to have endocrine-disrupting properties in relation to the environment.

12.7. Other adverse effects

None known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product is not covered by regulations on dangerous waste.
Disposal to the sewer is discouraged.
Commission Regulation (EU) No 1357/2014 of 18 December 2014 on waste.

EWC code

16 03 06 Organic wastes other than those mentioned in 16 03 05

Contaminated packing

EWC code

15 01 02 Plastic packaging

SECTION 14: Transport information

	14.1 UN / ID	14.2 UN proper shipping name	14.3 Hazard class(es)	14.4 PG*	14.5 Env**	Other information:
ADR/ADN/RID	-	-	-	-	-	-
IMDG	-	-	-	-	-	-
IATA	-	-	-	-	-	-

Additional information

Not dangerous goods according to ADR/ADN/RID, IATA and IMDG.

14.6. Special precautions for user

Not applicable.

14.7. Maritime transport in bulk according to IMO instruments

No data available.

SECTION 15: Regulatory information

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

Restrictions for application

Restricted to professional users.

Demands for specific education

No specific requirements.

SEVESO - Categories / dangerous substances

Not applicable.

Additional information

Not applicable.

Sources

Commission Regulation (EU) No 1357/2014 of 18 December 2014 on waste.
Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures (CLP).
Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

15.2. Chemical safety assessment

No

SECTION 16: Other information

Abbreviations and acronyms

ADN = European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway
ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
CAS = Chemical Abstracts Service
CE = Conformité Européenne (European conformity)
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
CSA = Chemical Safety Assessment
CSR = Chemical Safety Report
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EC = Effective concentration
ED = Effective dose
EINECS = European Inventory of Existing Commercial chemical Substances
EL = Effective Loading
ErC = Concentration associated with x% growth rate response
ES = Exposure Scenario
EUH statement = CLP-specific Hazard statement
EuPCS = European Product Categorisation System
EWC = European Waste Catalogue
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
GWP = Global warming potential
HP = Hazardous Property code
IARC = International Agency for Research on Cancer (IARC)
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IC = X maximum inhibitory concentration
IMDG = International Maritime Dangerous Goods
LC = Lethal concentration
LCLo = Value is the lowest concentration of a material in air reported to have caused the death of animals or humans
LD = Lethal dose
LOAEC = Lowest Observed Adverse Effect Concentration
LOAEL = Lowest Observed Adverse Effect Level

LOEC = Lowest Observed Effect Concentration
LogKow = logarithm of the n-octanol/water coefficient
LL = Lethal Loading
M = For multiplication factor
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
NOAEC = No Observed Adverse Effect Concentration
NOAEL = No Observed Adverse Effect Level
NOEC = No Observed Effect Concentration
NOELR = No Observable Effect Loading Rate
OECD = Organisation for Economic Co-operation and Development
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail
RRN = REACH Registration Number
SCL = A specific concentration limit
SVHC = Substances of Very High Concern
STOT-RE = Specific Target Organ Toxicity - Repeated Exposure
STOT-SE = Specific Target Organ Toxicity - Single Exposure
TWA = Time weighted average
UN = United Nations
UVBC = Unknown or variable composition, complex reaction products or of biological materials
VOC = Volatile Organic Compound
vPvB = Very Persistent and Very Bioaccumulative

Additional information

Not applicable.

The safety data sheet is validated by

Charlotta Reimertz

Other

A change (in proportion to the last essential change (first cipher in SDS version, see section 1)) is marked with a triangle.
The information in this safety data sheet applies only to this specific product (mentioned in section 1) and is not necessarily correct for use with other chemicals/products.
It is recommended to hand over this safety data sheet to the actual user of the product. Information in this safety data sheet cannot be used as a product specification.
Country-language: NO-en

APPENDIX II – KITCHENX FLUSHING CONCENTRATE SAFETY DATA SHEET

According to EC-Regulation 1907/2006 (REACH), annex II, including changes implemented by EC-Regulation 2020/878

SAFETY DATA SHEET

KitchenX Flushing concentrate

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

1.1. Product identifier

Trade name
KitchenX Flushing concentrate

Product no.
55-1618-90

Unique formula identifier (UFI)
7UPY-SFQ8-9JE3-R59W

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

Relevant identified uses of the substance or mixture
Appliance protection
Restricted to professional and industrial use.

Uses advised against
None known.

1.3. Details of the supplier of the safety data sheet

Company and address
Dafo Brand AB
Box 683
135 26 Tyresö
Sweden
+ 46 8 506 405 00
www.dafo.se

Manufacturer
Dafo Fomtec AB
Box 683
SE-13526 Tyresö
Sweden
+46 8 506 405 00
info@fomtec.com
www.fomtec.com

E-mail
info@dafo.se

Revision
13/05/2026

SDS Version
1.0

Date of previous version
30/04/2026 (1.0)

1.4. Emergency telephone number

Healthcare professionals: Dial 0344 892 0111 to reach The National Poisons Information Service (NPIS) (24 hour service)
General public:
England - Dial 111 to reach NHS 111 (24 hour service)
Scotland - Dial 111 to reach NHS 24 (24 hour service)

Wales - Dial 111 or 0845 4647 to reach NHS Direct (24 hour service)
See section 4 “First aid measures”.

SECTION 2: Hazards identification

Classified according to Regulation (EC) No. 1272/2008 (CLP) as retained and amended in UK law.

2.1. Classification of the substance or mixture

Skin Irrit. 2; H315, Causes skin irritation.
Eye Irrit. 2; H319, Causes serious eye irritation.
STOT SE 3; H335, May cause respiratory irritation.

2.2. Label elements

Hazard pictogram(s)



Signal word

Warning

Hazard statement(s)

Causes skin irritation. (H315)
Causes serious eye irritation. (H319)
May cause respiratory irritation. (H335)

Precautionary statement(s)

General

Not applicable.

Prevention

Wash hands thoroughly after handling. (P264)
Wear eye protection/protective gloves/protective clothing. (P280)

Response

IF ON SKIN: Wash with plenty of water and soap. (P302+P352)
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. (P305+P351+P338)
If skin irritation occurs: Get medical advice/attention. (P332+P313)
If eye irritation persists: Get medical advice/attention. (P337+P313)

Storage

Store in a well-ventilated place. Keep container tightly closed. (P403+P233)

Disposal

Dispose of contents/container in accordance with local regulation. (P501)

Hazardous substances

Potassium carbonate

Additional labelling

UFI: 7UPY-SFQ8-9JE3-R59W

2.3. Other hazards

Additional warnings

This mixture/product does not contain any substances known to fulfil the criteria for PBT and vPvB classification. This product does not contain any substances considered to be endocrine disruptors in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2023/707.

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable. This product is a mixture.

According to EC-Regulation 1907/2006 (REACH), annex II, including changes implemented by EC-Regulation 2020/878

3.2. Mixtures

Product/substance	Identifiers	% w/w	Classification	Note
Potassium carbonate	CAS No.: 584-08-7 EC No.: 209-529-3 UK-REACH: 01-2119532646-36 Index No.:	40-60%	Skin Irrit. 2, H315 Eye Irrit. 2, H319 STOT SE 3, H335	
acetic acid ... %	CAS No.: 64-19-7 EC No.: 200-580-7 UK-REACH: 01-2119475328-30-xxxx Index No.: 607-002-00-6	<1%	Flam. Liq. 3, H226 Skin Corr. 1A, H314 (SCL: 90.00 %) Skin Corr. 1B, H314 (SCL: 25.00 %) Skin Irrit. 2, H315 (SCL: 10.00 %) Eye Dam. 1, H318 Eye Irrit. 2, H319 (SCL: 10.00 %)	[1]

See full text of H-phrases in section 16. Occupational exposure limits are listed in section 8, if these are available.

Other information

[1] European occupational exposure limit.

SECTION 4: First aid measures

4.1. Description of first aid measures

General information

In the case of accident: Contact a doctor or casualty department – take the label or this safety data sheet. Contact a doctor if in doubt about the injured person's condition or if the symptoms persist. Never give an unconscious person water or other drink.

Inhalation

Upon breathing difficulties or irritation of the respiratory tract: Bring the person into fresh air and stay with him/her.

Skin contact

IF ON SKIN: Wash with plenty of water and soap.
Remove contaminated clothing and shoes. Ensure to wash exposed skin thoroughly with water and soap. DO NOT use solvents or thinners.
If skin irritation occurs: Get medical advice/attention.

Eye contact

If in eyes: Flush eyes immediately with plenty of water or isotonic water (20-30 °C) for at least 5 minutes and continue until irritation stops. Remove contact lenses. Make sure to flush under upper and lower eyelids. If irritation continues, contact a doctor. Continue flushing during transport.

Ingestion

If the person is conscious, rinse the mouth with water and stay with the person. Never give the person anything to drink.
In case of malaise, seek medical advice immediately and bring the safety data sheet or label from the product. Do not induce vomiting, unless recommended by the doctor. Have the person lean forward with head down to avoid inhalation of or choking on vomited material.

Burns

Not applicable.

4.2. Most important symptoms and effects, both acute and delayed

Irritation effects: This product contains substances, which may cause irritation upon exposure to skin, eyes or lungs. Exposure may result in an increased absorption potential of other hazardous substances at the area of exposure.

4.3. Indication of any immediate medical attention and special treatment needed

If eye irritation persists: Get medical advice/attention.

Information to medics

Bring this safety data sheet or the label from this product.

According to EC-Regulation 1907/2006 (REACH), annex II, including changes implemented by EC-Regulation 2020/878

SECTION 5: Firefighting measures

5.1. Extinguishing media
The product is not flammable

5.2. Special hazards arising from the substance or mixture
None

5.3. Advice for firefighters
Wear self-contained breathing apparatus and protective clothing to prevent contact. Upon direct exposure contact The National Poisons Information Service (dial 111, 24 h service) in order to obtain further advice.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Avoid direct contact with spilled substances.
Ensure adequate ventilation, especially in confined areas.
Avoid inhalation of vapours from spilled material.
Contaminated areas may be slippery.

6.2. Environmental precautions
Avoid discharge to lakes, streams, sewers, etc.
Keep unauthorized persons away from the spill

6.3. Methods and material for containment and cleaning up
Limit spillage and collect using granular absorbent or similar materials, and dispose of it in accordance with the regulations on dangerous waste.
Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations.
Wherever possible cleaning should be performed with normal cleaning agents. Avoid use of solvents.

6.4. Reference to other sections
See section 13 “Disposal considerations” on handling of waste.
See section 8 "Exposure controls/personal protection" for protective measures.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Smoking, drinking and consumption of food is not allowed in the work area.
See section 8 "Exposure controls/personal protection" for information on personal protection.

7.2. Conditions for safe storage, including any incompatibilities
Containers that have been opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage material
Always store in containers of the same material as the original container.

Storage conditions
Dry, cool and well ventilated (< 55 °C)

Incompatible materials
Strong acids, strong bases, strong oxidizing agents, and strong reducing agents.

7.3. Specific end use(s)
This product should only be used for applications quoted in section 1.2.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
acetic acid ... %
Long term exposure limit (8 hours) (ppm): 10
Long term exposure limit (8 hours) (mg/m^3): 25
Short term exposure limit (15 minutes) (ppm): 20

Short term exposure limit (15 minutes) (mg/m³): 50

The Control of Substances Hazardous to Health Regulations 2002. SI 2002/2677 The Stationery Office 2002. EH40/2005 Workplace exposure limits (Fourth Edition 2020).

DNEL

acetic acid ... %

Duration:	Route of exposure:	DNEL:
Long term – Local effects - General population	Inhalation	25 mg/m³
Long term – Local effects - Workers	Inhalation	25 mg/m³
Short term – Local effects - General population	Inhalation	25 mg/m³
Short term – Local effects - Workers	Inhalation	25 mg/m³

Potassium carbonate

Duration:	Route of exposure:	DNEL:
Long term – Local effects - Workers	Inhalation	10 mg/m³
Short term – Local effects - Workers	Inhalation	10 mg/m³

PNEC

acetic acid ... %

Route of exposure:	Duration of Exposure:	PNEC:
Freshwater		3.058 mg/L
Freshwater sediment		11.36 mg/kg
Intermittent release (freshwater)		30.58 mg/L
Marine water		305.8 µg/L
Marine water sediment		1.136 mg/kg
Sewage treatment plant		85 mg/L
Soil		470 µg/kg

8.2. Exposure controls

Compliance with the given occupational exposure limits values should be controlled on a regular basis.

General recommendations

Smoking, drinking and consumption of food is not allowed in the work area.

Exposure scenarios

There are no exposure scenarios implemented for this product.

Exposure limits

Professional users are subjected to the legally set maximum concentrations for occupational exposure. See occupational hygiene limit values above.

Appropriate technical measures

The formation of vapours must be kept at a minimum and below current limit values (see above). Installation of a local exhaust system if normal air flow in the work room is not sufficient is recommended. Ensure eyewash and emergency showers are clearly marked.
Apply standard precautions during use of the product. Avoid inhalation of vapours.

Hygiene measures

Take off contaminated clothing and wash it before reuse.

Measures to avoid environmental exposure

No specific requirements.

Individual protection measures, such as personal protective equipment

Generally

Use only UKCA marked protective equipment.

Respiratory Equipment

According to EC-Regulation 1907/2006 (REACH), annex II, including changes implemented by EC-Regulation 2020/878

Type	Class	Colour	Standards	
S/SL	P1	White	EN149	

Skin protection

Work situation	Recommended	Type/Category	Standards	
	Dedicated work clothing should be worn.	-	-	

Hand protection

Work situation	Material	Glove thickness (mm)	Breakthrough time (min.)	Standards	
	Vinyl/PVC	0.6	-	-	

Eye protection

Work situation	Type	Standards	
	Wear safety glasses with side shields.	EN166	

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state
Liquid

Colour
Clear

Odour / Odour threshold
Characteristic

pH
12-14

Density (g/cm^3)
~1,44

Kinematic viscosity
No data available.

Particle characteristics
Does not apply to liquids.

Phase changes

▼Melting point/Freezing point (°C)
- 35

Softening point/range (°C)
Does not apply to liquids.

Boiling point (°C)
No data available.

Vapour pressure
No data available.

Relative vapour density
No data available.

Decomposition temperature (°C)
No data available.

Data on fire and explosion hazards

Flash point (°C)
No data available.

Flammability (°C)
No data available.

Auto-ignition temperature (°C)
No data available.

Lower and upper explosion limit (% v/v)
No data available.

Solubility

Solubility in water
Completely soluble

n-octanol/water coefficient (LogKow)
Not applicable

Solubility in fat (g/L)
Not applicable

9.2. Other information

Other physical and chemical parameters
No data available.

Oxidizing properties
No data available.

SECTION 10: Stability and reactivity

10.1. Reactivity
No data available.

10.2. Chemical stability
The product is stable under the conditions, noted in section 7 “Handling and storage”.

10.3. Possibility of hazardous reactions
None known.

10.4. Conditions to avoid
None known.

10.5. Incompatible materials
Strong acids, strong bases, strong oxidizing agents, and strong reducing agents.

10.6. Hazardous decomposition products
Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity

Product/substance	Potassium carbonate
Species:	Rat
Route of exposure:	Oral
Test:	LD50
Result:	1879.00 mg/kg

Based on available data, the classification criteria are not met.

Skin corrosion/irritation
Causes skin irritation.

Serious eye damage/irritation
Causes serious eye irritation.

Respiratory sensitization
Based on available data, the classification criteria are not met.

Skin sensitisation
Based on available data, the classification criteria are not met.

Germ cell mutagenicity
Based on available data, the classification criteria are not met.

Carcinogenicity
Based on available data, the classification criteria are not met.

Reproductive toxicity
Based on available data, the classification criteria are not met.

STOT-single exposure
May cause respiratory irritation.

STOT-repeated exposure
Based on available data, the classification criteria are not met.

Aspiration hazard
Based on available data, the classification criteria are not met.

Symptoms related to the physical, chemical and toxicological characteristics
Irritation effects: This product contains substances, which may cause irritation upon exposure to skin, eyes or lungs. Exposure may result in an increased absorption potential of other hazardous substances at the area of exposure.

11.2. Information on other hazards

Endocrine disrupting properties
This mixture/product does not contain any substances known to have hormone-disrupting properties in relation to health.

Other information
None known.

SECTION 12: Ecological information

12.1. Toxicity

Product/substance	acetic acid ... %
Species:	Fish
Duration:	96 hours
Test:	LC50
Result:	75.00 mg/L

Based on available data, the classification criteria are not met.

12.2. Persistence and degradability

Product/substance	acetic acid ... %
Conclusion:	-

12.3. Bioaccumulative potential

Product/substance	Potassium carbonate
Conclusion:	-

Product/substance	acetic acid ... %
LogKow:	-0.31
Conclusion:	-

12.4. Mobility in soil
No data available.

12.5. Results of PBT and vPvB assessment
This mixture/product does not contain any substances known to fulfil the criteria for PBT and vPvB classification.

12.6. Endocrine disrupting properties
This mixture/product does not contain any substances considered to have endocrine-disrupting properties in relation to the environment.

12.7. Other adverse effects

None known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product is covered by the regulations on hazardous waste. (*)
HP 4 - Irritant (skin irritation and eye damage)
HP 5 - Specific Target Organ Toxicity (STOT)/Aspiration Toxicity
Dispose of contents/container to an approved waste disposal plant.
Regulation (EU) No 1357/2014 of 18 December 2014 on waste as retained and amended in UK law.

EWC code

16 03 05* Organic wastes containing dangerous substances

Contaminated packing

Packaging containing residues of the product must be disposed of similarly to the product.

SECTION 14: Transport information

	14.1 UN / ID	14.2 UN proper shipping name	14.3 Hazard class(es)	14.4 PG*	14.5 Env**	Other information:
ADR/ADN/RID	-	-	-	-	-	-
IMDG	-	-	-	-	-	-
IATA	-	-	-	-	-	-

* Packing group
** Environmental hazards

Additional information

Not dangerous goods according to ADR/ADN/RID, IATA and IMDG.

14.6. Special precautions for user

Not applicable.

14.7. Maritime transport in bulk according to IMO instruments

No data available.

SECTION 15: Regulatory information

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

Restrictions for application

Restricted to professional users.

Demands for specific education

No specific requirements.

SEVESO - Categories / dangerous substances

Not applicable.

REACH, Annex XVII

acetic acid ... % is subject to UK-REACH restrictions (entry 40).

Additional information

Not applicable.

Sources

Regulation (EU) No 1357/2014 of 18 December 2014 on waste as retained and amended in UK law.
Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP) as retained and amended in UK law.
Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as retained and amended in UK law.

15.2. Chemical safety assessment

Yes

SECTION 16: Other information

Full text of H-phrases as mentioned in section 3

H226, Flammable liquid and vapour.
H314, Causes severe skin burns and eye damage.
H315, Causes skin irritation.
H318, Causes serious eye damage.
H319, Causes serious eye irritation.
H335, May cause respiratory irritation.

Abbreviations and acronyms

ADN = European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway
ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
CAS = Chemical Abstracts Service
CE = Conformité Européenne (European conformity)
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
CSA = Chemical Safety Assessment
CSR = Chemical Safety Report
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EC = Effective concentration
ED = Effective dose
EINECS = European Inventory of Existing Commercial chemical Substances
EL = Effective Loading
ErC = Concentration associated with x% growth rate response
ES = Exposure Scenario
EUH statement = CLP-specific Hazard statement
EuPCS = European Product Categorisation System
EWC = European Waste Catalogue
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
GWP = Global warming potential
HP = Hazardous Property code
IARC = International Agency for Research on Cancer (IARC)
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IC = X maximum inhibitory concentration
IMDG = International Maritime Dangerous Goods
LC = Lethal concentration
LCLo = Value is the lowest concentration of a material in air reported to have caused the death of animals or humans
LD = Lethal dose
LOAEC = Lowest Observed Adverse Effect Concentration
LOAEL = Lowest Observed Adverse Effect Level
LOEC = Lowest Observed Effect Concentration
LogKow = logarithm of the n-octanol/water coefficient
LL = Lethal Loading
M = For multiplication factor
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
NOAEC = No Observed Adverse Effect Concentration
NOAEL = No Observed Adverse Effect Level
NOEC = No Observed Effect Concentration
NOELR = No Observable Effect Loading Rate
OECD = Organisation for Economic Co-operation and Development

PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail
RRN = REACH Registration Number
SCL = A specific concentration limit
SVHC = Substances of Very High Concern
STOT-RE = Specific Target Organ Toxicity - Repeated Exposure
STOT-SE = Specific Target Organ Toxicity - Single Exposure
TWA = Time weighted average
UN = United Nations
UVBC = Unknown or variable composition, complex reaction products or of biological materials
VOC = Volatile Organic Compound
vPvB = Very Persistent and Very Bioaccumulative

Additional information

The classification of the substance/mixture in regard of health hazards are in accordance with the calculation methods given by Regulation (EC) No. 1272/2008 (CLP) as retained and amended in UK law.

The safety data sheet is validated by

Charlotta Reimertz

Other

A change (in proportion to the last essential change (first cipher in SDS version, see section 1)) is marked with a triangle.
The information in this safety data sheet applies only to this specific product (mentioned in section 1) and is not necessarily correct for use with other chemicals/products.
It is recommended to hand over this safety data sheet to the actual user of the product. Information in this safety data sheet cannot be used as a product specification.
Country-language: GB-en

APPENDIX III – NITROGEN CARTRIDGES SAFETY DATA SHEET

SAFETY DATA SHEET

Nitrogen

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

1.1 PRODUCT IDENTIFIER

Nitrogen cartridge N8A item nr. 55-1320-08
Nitrogen cartridge N16A item nr. 55-1320-30

1.2 RELEVANT IDENTIFIED USES OF THE SUBSTANCE OR MIXTURE AND USES ADVISED AGAINST

Industrial and professional. Perform risk assessment prior to use.
Purge gas / expellant gas for use in fire suppression systems.

1.3 DETAILS OF THE SUPPLIER OF SAFETY DATA SHEET

Supplier: Dafo Brand AB
Address: Box 683, 135 26 Tyresö
Telephone: +46 (0)8-506 405 00
E-mail: info@dafo.se
Web page: www.dafo.se

1.4 EMERGENCY TELEPHONE

Poison Centre 112 (acute), +46 (0)10-456 67 00 (office hours)

SECTION 2: Hazards identification

2.1 CLASSIFICATION OF THE SUBSTANCE OR MIXTURE ACCORDING TO CLP (1272/2008 / EC)

Physical hazards: Gases under pressure - Compressed gas - Warning - (CLP : Press. Gas) - H280

2.2 LABEL ELEMENTS ACCORDING TO CLP (1272/2008 / EC)

Hazard pictograms:



SECTION 3: Composition/information on ingredients

3.1 SUBSTANCES

Name	Product identifier	%	Classification according to Regulation CLP (1272/2008 / EC)
Nitrogen, compressed	CAS-No.: 7727-37-9 EC-No.: 231-783-9 REACH-no: Listed in Annex IV / V REACH, exempted from registration.	100	Press. Gas (Comp.), H280

SECTION 4: First aid measures

4.1 DESCRIPTION OF FIRST AID MEASURES

INHALATION

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.

SKIN CONTACT

Adverse effects not expected from this product.

EYE CONTACT

Adverse effects not expected from this product.

INGESTION

Ingestion is not considered a potential route of exposure.

4.2 MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. See section 11.

4.3 INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED

None

SECTION 5: Firefighting measures

5.1 EXTINGUISHING MEDIA

Suitable extinguishing media:	Water spray or fog. Product does not burn, use fire control measures appropriate for the surrounding fire.
Unsuitable extinguishing media:	Do not use water jet to extinguish.

5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE

Reactivity in case of fire:	No reactivity hazard other than the effects described in sub-sections below.
Specific hazards:	Exposure to fire may cause containers to rupture/explode.
Hazardous ccombustion products:	None.

5.3 ADVICE FOR FIREFIGHTERS

Specific methods	: Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems. If possible, stop flow of product. Use water spray or fog to knock down fire fumes if possible. Move containers away from the fire area if this can be done without risk.
Special protective equipment for fire fighters	: In confined space use self-contained breathing apparatus. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters. EN 15090 Footwear for firefighters. EN 443 Helmets for fire fighting in buildings and other structures. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

SECTION 6: Accidental release measures

6.1 PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

6.1.1 For non-emergency personnel

Emergency procedures:	Act in accordance with local emergency plan. Try to stop release. Evacuate area. Ensure adequate air ventilation. Stay upwind. See section 8 of the SDS for more information on personal protective equipment.

6.1.2 For emergency personnel

Emergency procedures:	Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Oxygen detectors should be used when asphyxiating gases may be released. See section 5.3 of the SDS for more information

6.2 ENVIRONMENTAL PRECAUTIONS

Try to stop release.

6.3 METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP

Methods and material for containment and cleaning up: Ventilate area.

SSECTION 7: Handling and storage

7.1 PRECAUTIONS FOR SAFE HANDLING

Safe use of the product:	Do not breathe gas. Avoid release of product into work area. The product must be handled in accordance with good industrial hygiene and safety procedures. Only experienced and properly instructed persons should handle gases under pressure. Consider pressure relief device(s) in gas installations. Ensure the complete gas system was (or is regularily) checked for leaks before use. Do not smoke while handling product. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Avoid suck back of water, acid and alkalis.
Safe handling of the gas receptacle:	Do not allow backfeed into the container. Protect containers from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps, when provided, in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets clean and free from contaminants particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer gases from one cylinder/container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the content of the container. Suck back of water into the container must be prevented. Open valve slowly to avoid pressure shock.

7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES

Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Container valve guards or caps, when provided, should be in place. Containers should be stored in the vertical position and properly secured to prevent them from falling over. Stored containers should be periodically checked for general condition and leakage. Keep container below 50°C in a well ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials.

7.3 SPECIFIC END USE(S)

None.

SAFETY DATA SHEET

Nitrogen

SECTION 8: Exposure controls/personal protection

8.1 CONTROL PARAMETERS

8.1.1 National occupational exposure and biological limit values

No additional information available.

8.1.2 Recommended monitoring procedures

No additional information available.

8.1.3 Air contaminants formed

No additional information available.

8.1.4 DNEL and PNEC

Nitrogen, compressed (7727-37-9)	
DNEL/DMEL (additional information)	
Additional information	None available
PNEC (additional information)	
Additional information	None available

8.1.5 Control banding

No additional information available.

8.2 EXPOSURE CONTROLS

Appropriate engineering controls

Provide adequate general and local exhaust vSentilation. Oxygen detectors should be used when asphyxiating gases may be released. Systems under pressure should be regularily checked for leakages. Consider the use of a work permit system e.g. for maintenance activities.

Personal protection equipment

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered: PPE compliant to the recommended EN/ISO standards hould be selected.

Personal protective equipment symbol(s)



Eye and face protection

Eye protection: Wear safety glasses with side shields. Standard EN 166 - Personal eye-protection – specifications.

Skin protection

Hand protection: Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risks, performance level 1 or higher. Recommended types include wrist gloves from leather or synthetic material with equivalent performance, fabric gloves, fabric gloves with leather palms.

Respiratory protection

Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres. Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

Thermal hazard protection

None in addition to the above sections.

Environmental exposure controls

None necessary.

Other information

Wear safety shoes while handling containers. Standard EN ISO 20345 – Personal protective equipment – Safety footwear.

SECTION 9: Physical and chemical properties

9.1 INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES

Physical state	Gas
Colour	Colourless.
Form	Compressed gas
Odour	Odourless.
Odour threshold	Odour threshold is subjective and inadequate to warn of overexposure.
Melting point	-210 °C
Freezing point	Not applicable
Boiling point	-196 °C
Flammability	Non flammable.
Oxidising properties	No oxidising properties.
Explosive limits	Not available
Lower explosion limit	Not applicable.
Upper explosion limit	Not applicable.
Flash point	Not applicable for gases and gas mixtures.
Auto-ignition temperature	Non flammable.
Decomposition temperature	Not applicable.
pH	Not applicable for gases and gas mixtures.
Viscosity, kinematic	Not applicable for gases and gas mixtures.
Viscosity, dynamic	0.171 mPa·s literature; Not applicable for gases and gas mixtures.
Solubility in water	0.02 mg/l
Partition coefficient n-octanol/water (Log Kow)	Not applicable for inorganic products.
Partition coefficient n-octanol/water (Log Pow)	Not applicable for gas mixtures.
Vapour pressure	Not applicable.
Vapour pressure at 50°C	Not applicable.
Critical pressure	3390 kPa
Density	Not applicable for gases and gas mixtures.
Relative density	0.8
Relative vapour density at 20°C	Not applicable.
Relative gas density	0.97
Particle characteristics	Not applicable. Not applicable for gases and gas mixtures. Nanoforms are not relevant for gases and gas mixtures.

9.2 OTHER INFORMATION

9.2.1 Information with regard to physical hazard classes

Critical temperature: -147 °C

9.2.2 Other safety characteristics

Molecular mass: 28 g/mol

Gas group: Compressed gas

Additional information: None

SECTION 10: Stability and reactivity

10.1 REACTIVITY

No reactivity hazard other than the effects described in sub-sections below.

10.2 CHEMICAL STABILITY

Stable under normal conditions.

10.3 POSSIBILITY OF HAZARDOUS REACTIONS

None.

10.4 CONDITIONS TO AVOID

Avoid moisture in installation systems.

10.5 INCOMPATIBLE MATERIALS

For additional information on compatibility refer to ISO 11114.

10.6 HAZARDOUS DECOMPOSITION PRODUCTS

None.

SAFETY DATA SHEET

Nitrogen

SECTION 11: Toxicological information

11.1 INFORMATION ON HAZARD CLASSES AS DEFINED IN REGULATION (EC) NO 1272/2008

Acute toxicity	No known toxicological effects by inhalation from this product.
Acute toxicity (oral)	Not classified
Acute toxicity (dermal)	Not classified
Acute toxicity (inhalation)	Not classified
Skin corrosion/irritation	No known effects from this product.
pH	Not applicable for gases and gas mixtures.
Serious eye damage/irritation	No known effects from this product.
pH	Not applicable for gases and gas mixtures.
Respiratory or skin sensitisation	No known effects from this product.
Germ cell mutagenicity	No known effects from this product.
Carcinogenicity	No known effects from this product.
Reproductive toxicity	Not classified
Toxic for reproduction: Fertility	No known effects from this product.
Toxic for reproduction: Unborn child	No known effects from this product.
STOT-single exposure	No known effects from this product.
STOT-repeated exposure	No known effects from this product.
Aspiration hazard	Not applicable for gases and gas mixtures.

11.2 INFORMATION ON OTHER HAZARDS

11.2.1 Endocrine disrupting properties

No additional information available.

11.2.2 Other information

The substance/mixture has no endocrine disrupting properties.

SECTION 12: Ecological information

12.1 TOXICITY

Assessment:	No ecological damage caused by this product.
Hazardous to the aquatic environment, short–term: (acute)	Not classified.
Hazardous to the aquatic environment, long–term: (chronic)	Not classified.

12.2 PERSISTENCE AND DEGRADABILITY

Assessment: No ecological damage caused by this product.

12.3 BIOACCUMULATIVE POTENTIAL

Partition coefficient n-octanol/water (Log Pow):	Not applicable for gas mixtures.
Partition coefficient n-octanol/water (Log Kow):	Not applicable for inorganic products.
Assessment:	No ecological damage caused by this product

12.4 MOBILITY IN SOIL

Assessment:	No ecological damage caused by this product.

12.5 RESULTS OF PBT AND vPvB ASSESSMENT

Assessment:	Not classified as PBT or vPvB.

12.6 ENDOCRINE DISRUPTING PROPERTIES

Other adverse effects:	Not classified as PMT or vPvM.
Assessment:	The substance/mixture has no endocrine disrupting properties.

12.7 OTHER ADVERSE EFFECTS

Other adverse effects:	Not classified as PMT or vPvM.
Effect on the ozone layer:	No effect on the ozone layer.
Effect on global warming ozone layer:	No effect on the ozone layer.

SECTION 13: Disposal considerations

13.1 WASTE TREATMENT METHODS

Waste treatment methods:	May be vented to atmosphere in a well ventilated place. Do not discharge into any place where its accumulation could be dangerous. Return unused product in original container to supplier.
List of hazardous waste codes (from (Commission Decision 2000/532/EC as amended)	: 16 05 05 : Gases in pressure containers other than those mentioned in 16 05 04.

SAFETY DATA SHEET

Nitrogen

SECTION 14: Transport information

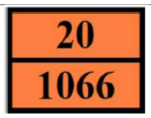
ADR	IMDG	IATA	AND	RID
14.1 UN NUMBER OR ID NUMBER				
UN 1066	UN 1066	UN 1066	UN 1066	UN 1066
14.2 UN PROPER SHIPPING NAME				
NITROGEN COMPRESSED	NITROGEN COMPRESSED	NITROGEN COMPRESSED	NITROGEN COMPRESSED	NITROGEN COMPRESSED
Transport documentation description				
UN 1066 NITROGEN, COMPRESSED, 2.2, (E)	UN 1066 NITROGEN, COMPRESSED, 2.2	UN 1066 Nitrogen, compressed, 2.2	UN 1066 NITROGEN, COMPRESSED, 2.2	UN 1066 NITROGEN, COMPRESSED, 2.2
14.3 TRANSPORT HAZARD CLASS(ES)				
2.2	2.2	2.2	2.2	2.2
				
14.4 PACKING GROUP				
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
14.5 ENVIRONMENTAL HAZARDS				
Dangerous for the environment: No	Dangerous for theenvironment: No Marine pollutant: No	Dangerous for the environment: No	Dangerous for the environment: No	Dangerous for the environment: No
No supplementary information available				

14.6 SPECIAL PRECAUTIONS FOR USER

Special transport precautions: Avoid transport on vehicles where the load space is not separated from the driver's compartment, Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency, Before transporting product containers: - Ensure there is adequate ventilation, - Ensure that containers are firmly secured, - Ensure valve is closed and not leaking, - Ensure valve outlet cap nut or plug (where provided) is correctly fitted, - Ensure valve protection device (where provided) is correctly fitted.

SAFETY DATA SHEET

Nitrogen

Overland transport	
Classification code (ADR)	1A
Special provisions (ADR)	378, 392, 406, 662
Limited quantities (ADR)	120ml
Excepted quantities (ADR)	E1
Packing instructions (ADR)	P200
Mixed packing provisions (ADR)	MP9
Portable tank and bulk container instructions (ADR)	(M)
Tank code (ADR)	CxBN(M)
Tank special provisions (ADR)	TA4, TT9
Vehicle for tank carriage	AT
Transport category (ADR)	3
Special provisions for carriage - Loading, unloading and handling (ADR)	CV9, CV10, CV36
Hazard identification number (Kemler No.)	20
Orange plates	
Tunnel restriction code (ADR)	E
Transport by sea	
Special provisions (IMDG)	378
Limited quantities (IMDG)	120 ml
Excepted quantities (IMDG)	E1
Packing instructions (IMDG)	P200
EmS-No. (Fire)	F-C
EmS-No. (Spillage)	S-V
Stowage category (IMDG)	A
Properties and observations (IMDG)	Non-flammable, odourless gas. Lighter than air (0.97).
Air transport	
PCA Excepted quantities (IATA)	E1
PCA Limited quantities (IATA)	FORBIDDEN
PCA limited quantity max net quantity (IATA)	FORBIDDEN
PCA packing instructions (IATA)	200
PCA max net quantity (IATA)	75kg
CAO packing instructions (IATA)	200
CAO max net quantity (IATA)	150kg
Special provisions (IATA)	A69, A202
ERG code (IATA)	2L
Inland waterway transport	
Classification code (ADN)	1A
Special provisions (ADN)	378, 392, 653, 662
Limited quantities (ADN)	120 ml
Excepted quantities (ADN)	E1
Equipment required (ADN)	PP
Number of blue cones/lights (ADN)	0

Rail transport	
Classification code (RID)	1A
Special provisions (RID)	378, 392, 653, 662
Limited quantities (RID)	120ml
Excepted quantities (RID)	E1
Packing instructions (RID)	P200
Mixed packing provisions (RID)	MP9
Portable tank and bulk container instructions (RID)	(M)
Tank codes for RID tanks (RID)	CxBN(M)
Special provisions for RID tanks (RID)	TA4, TT9
Transport category (RID)	3
Special provisions for carriage - Loading, unloading and handling (RID)	CW9, CW10, CW36
Colis express (express parcels) (RID)	CE3
Hazard identification number (RID)	20

14.7 MARITIME TRANSPORT IN BULK ACCORDING TO IMO INSTRUMENTS

IBC Code: Not applicable.

SECTION 15: Regulatory information

15.1 SAFETY, HEALTH AND ENVIRONMENTAL REGULATIONS/LEGISLATION SPECIFIC FOR THE SUBSTANCE OR MIXTURE

15.1.1 EU-Regulations

REACH Annex XVII (Restriction List)

Not listed on REACH Annex XVII

REACH Annex XIV (Authorisation List)

Not listed on REACH Annex XIV (Authorisation List)

REACH Candidate List (SVHC)

Contains no substance(s) listed on the REACH Candidate List

PIC Regulation (Prior Informed Consent)

Not listed on the PIC list (Regulation EU 649/2012)

POP Regulation (Persistent Organic Pollutants)

Not listed on the POP list (Regulation EU 2019/1021)

Ozone Regulation (1005/2009)

Not listed on the Ozone Depletion list (Regulation EU 2024/590)

VOC Directive (2004/42)

Restrictions on use: None.

Seveso Directive (Disaster Risk Reduction)

Seveso Directive : 2012/18/EU (Seveso III): Not covered.

Explosives Precursors Regulation (EU 2019/1148)

Contains no substance(s) listed on the Explosives Precursors list (Regulation EU 2019/1148 on the marketing and use of explosives precursors)

Drug Precursors Regulation (EC 273/2004)

Contains no substance(s) listed on the Drug Precursors list (Regulation EC 273/2004 on the manufacture and the placing on market of certain substances used in the illicit manufacture of narcotic drugs and psychotropic substances)

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15.1.2 National regulations

Ensure all national/local regulations are observed.

Safety data sheet in accordance with commission regulation (EU) No 2020/878.

Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work

Directive 2016/425/EEC on personal protective equipment

Directive 2014/34/EU on equipment and protective systems intended for use in potentially explosive atmospheres (ATEX)

Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food

additives.

This Safety Data Sheet has been produced to comply with Regulation (EU) 2015/830.

15.2 CHEMICAL SAFETY ASSESSMENT

A CSA does not need to be carried out for this product.

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SECTION 16: Other information

Indication of changes:

Safety data sheet in accordance with commission regulation (EU) No 2020/878.

Indication of changes	
Version	**Changes**
1.0	Created

Abbreviations and acronyms	
ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
ADR	ADR - Agreement concerning the International Carriage of Dangerous Goods by Road
ATE	ATE - Acute Toxicity Estimate
BLV	Biological limit value
BOD	Biochemical oxygen demand (BOD)
CAO	Cargo Aircraft only / Cargo Aircraft only
CAS-No.	Chemical Abstract Service number
CLP	CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
COD	Chemical oxygen demand (COD)
CSA	CSA - Chemical Safety Assessment
DMEL	Derived Minimal Effect level
DNEL	Derived-No Effect Level
EC50	Median effective concentration
EC	European Inventory of Existing Commercial Chemical Substances
ED	Endocrine disruptor
EINECS	EINECS - European Inventory of Existing Commercial Chemical Substances
EN	European Standard
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
IOELV	Indicative Occupational Exposure Limit Value
LC50	Median lethal concentration
LD50	Median lethal dose
LOAEL	Lowest Observed Adverse Effect Level
NOAEC	No-Observed Adverse Effect Concentration

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Abbreviations and acronyms	
NOAEL	No-Observed Adverse Effect Level
NOEC	No-Observed Effect Concentration
N.O.S.	Not Otherwise Specified
OECD	Organisation for Economic Co-operation and Development
OEL	Occupational Exposure Limit
PBT	Persistent Bioaccumulative Toxic
PCA	Passenger and Cargo Aircraft / Passenger and Cargo Aircraft
PNEC	Predicted No-Effect Concentration
PPE	PPE - Personal Protection Equipment
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
RMM	RMM - Risk Management Measures
STP	Sewage treatment plant
ThOD	Theoretical oxygen demand (ThOD)
TLM	Median Tolerance Limit
TRGS	Technical Rules for Hazardous Substances
STOT-RE	Specific Target Organ Toxicity-Repeated Exposure
STOT-SE	Specific Target Organ Toxicity-Single Exposure
UFI	Unique Formula Identifier
UN	UN - United Nations
VOC	Volatile Organic Compounds
vPvB	Very Persistent and Very Bioaccumulative
WGK	Water Hazard Class
NOAEL	No-Observed Adverse Effect Level
NOEC	No-Observed Effect Concentration

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Training advice:	The hazard of asphyxiation is often overlooked and must be stressed during operator training. For more guidance, refer to EIGA SL 01 "Dangers of Asphyxiation", downloadable at http://www.eiga.eu.
Other information:	Classification in accordance with the procedures and calculation methods of Regulation (EC) 1272/2008 (CLP). Key literature references and sources of data are maintained in EIGA doc 169 : 'Classification and Labelling Guide', downloadable at http://www.Eiga.eu

Full text of H- and EUH-statements:	
Press. Gas (Comp.)	Gases under pressure : Compressed gas
H280	Contains gas under pressure; may explode if heated.

This classification complies with:	ATP 12.
DISCLAIMER OF LIABILITY:	Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.