FIRETRACE® LTD

AUTOMATIC FIRE SUPPRESSION SYSTEMS

Operating Manual:

Firetrace® Indirect Low Pressure Integrated High Throughput Bi-Directional Fire Suppression System for Engine Compartment

Please read this manual thoroughly before carrying out the installation of this system

Firetrace® systems shall only be installed by trained engineers

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Stops fires where they start

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1 - Introduction

This manual is written for the fire protection professional that designs, installs and maintains Firetrace Ltd Indirect Low Pressure Integrated High-Throughput Bi-Directional system, this system must be designed, installed, inspected, tested, maintained, and recharged by a competent and trained engineer.

Safety Precautions

The following safety precautions must always be followed

- Read and understand this Manual and the other documents referenced herein.
- The valve discharge ports must be sealed with the plugs provided at all times and only removed when the system is connected into the discharge pipeline.
- PPE suitable to the local environment shall be worn when installing a Firetrace® System. Wear safety glasses when working with pressurised cylinders and charging equipment.
- Make sure the Integrated Ball Valve (accessed by removing the top gauge of the cylinder valve) is in the closed (horizontal) position, the safety caps have been installed, and the detection tubing has been removed from the cylinder valve, before removing the cylinder from the installation and before performing any servicing, leak tests or system changing.
- Follow all the safety procedures included on the cylinder labels and within this manual.
- Never assume that a cylinder is empty. Treat all cylinders as if they are fully charged.

Any questions concerning the information contained within this manual shall be addressed to:

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2 - System Overview

The Firetrace Indirect Low Pressure Integrated High Throughput Bi-Directional (FTILPINTHTBI) Fire Suppression System is designed for local applications within engine areas using ABC Dry Powder. In addition to the main engine compartment the system can also be extended to cover adjacent battery / hydraulic compartments

Other Firetrace systems are available for the bespoke protection of remote electrical voids.

The System uses linear heat detection tubing that can detect a fire, or a temperature above that of normal operation. The tubing offers detection along its entire length ensuring fast and accurate activation throughout the risk areas. In addition to the discharge nozzles the Firetrace system also uses patented "bi-directional" technology. This means that a percentage of the extinguishant is deployed directly from the activation burst hole ensuring that it immediately tackles the source of ignition. This unique function provides the ability to protect small or concealed areas without the need for additional diffusers.
Using high quality ABC Dry powder, the system is compatible with all potential fire classes including, diesel, electrical, Hybrid, Hydrogen and CNG.

The Firetrace system is designed to cover all principal risk areas within the engine compartment and the nozzle placement ensures that extinguishant is deployed over all identified hazards. The additional benefit of deployment from the tubing burst means that all areas are covered even if they were not initially identified as a primary risk.

The Firetrace system operates pneumatically and does not require energy from the vehicle nor operator to operate.

Each installed system is equipped with detection tubing, discharge piping, and nozzles. The pre-designed concept minimizes the amount of engineering involved in the application design. When the discharge piping and nozzles are installed within the limitations stated in this Manual, no hydraulic calculations are required to determine pressure drop, agent flow, or discharge time.

The hazard being protected can be any size, shape, or volume provided that the hazard being protected is within the limitations described in this Manual. When installed, each extinguisher is a self-contained unit, meaning that it is equipped with its own automatic (non-electric) detection system. This system, when actuated, automatically releases the suppression agent into the hazard area.

These extinguisher units can be combined to protect a larger size hazard, and can be simultaneously actuated or a delayed discharge can be incorporated.

Upon actuation, an optional pressure switch can be used to indicate discharge, shutdown ventilation, close all openings, shut-off electrical power, etc. as may be required.

Dry powder is stored in a steel cylinder pressurized with nitrogen to 12bar at 21°C (174psig at 68°F). Each cylinder is equipped with a straight dip tube and must only be mounted in a vertical (upright) position.

Each cylinder is equipped with a plated brass valve, a pressure gauge to monitor cylinder pressure, an integrated quarter turn ball valve with pressure gauge to monitor Firetrace® tubing pressure with an optional status indicator module (SIMI). The integrated ball valve must be kept in closed position at all times when the cylinder is not in service.

The system utilizes Firetrace flexible tubing that is attached to the top of the cylinder valve. This tubing is pressurised with nitrogen to maintain the cylinder valve in the closed position. This tubing acts as a continuous linear thermal detector that ruptures to create a diffuser upon direct flame impingement or at high temperatures associated with fire conditions. Once the detection tubing is ruptured, the cylinder valve automatically opens, allowing the dry powder to flow through the discharge piping and through the Firetrace tubing, distributing the extinguishing agent through the nozzles into the protected area.

Firetrace® FTILPINTHTBI Systems consist of the following major components:

1. Cylinder/Valve Assembly
2. Cylinder Mounting Bracket
3. Firetrace detection/actuating/discharge tubing and fittings
4. Discharge Nozzles
5. Pressure Switch (Optional)
6. Discharge piping and Fittings

For a more comprehensive list of technical illustrations and part numbers, please see section 6.

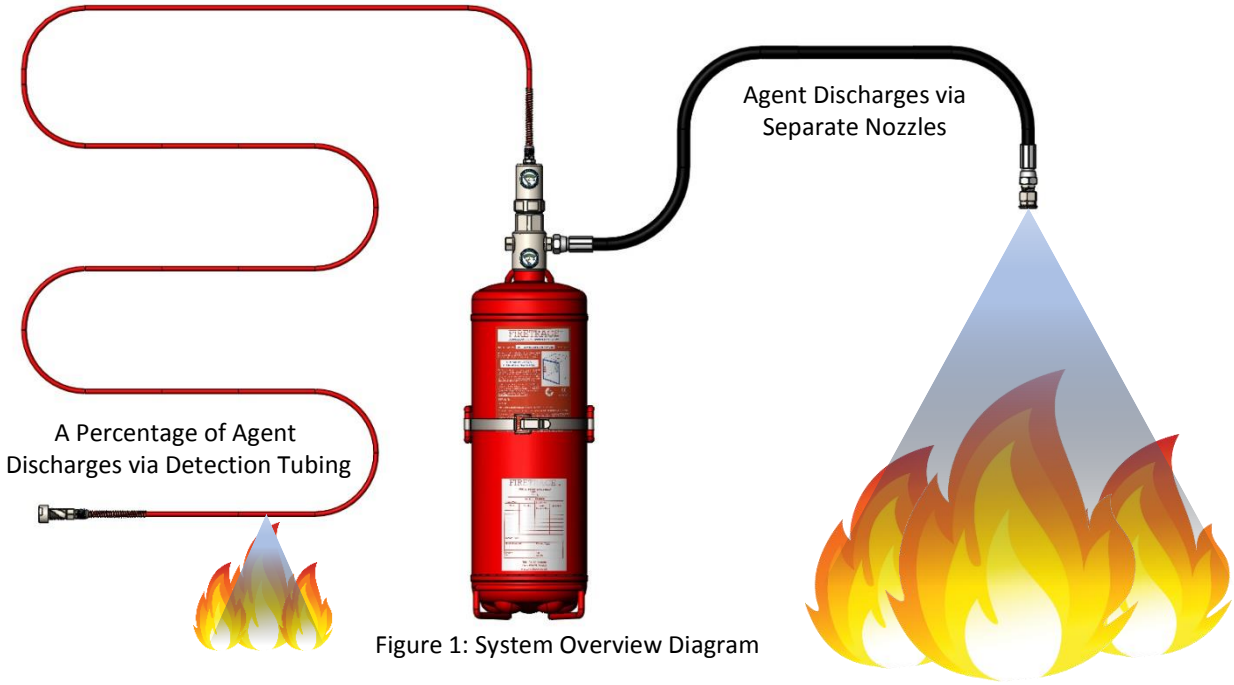


Figure 1: System Overview Diagram

ABC Dry Powder Extinguishing Agent

ABC dry powder has been treated to be water repellent and capable of being fluidized and free flowing so that it can be discharged through hoses and piping under the influence of an expellant gas. When discharged, dry powder will drift through the air and settle on surrounding surfaces.

Following a discharge, the exposed areas must be cleaned off within 24 hours. Dry powder can be cleaned up by one of the following methods; wiping, vacuuming, blowing off with an airline or pressure washing the exposed areas. In some cases, the powder can be scraped off a surface if that surface was hot at the time of discharge.

For hazard information, decomposition information, and physical properties of ABC Powder please refer to the Material Safety Data sheet included with this manual.

3 - System Design and Limitations

The FTILPINTHTBI Fire Suppression System design limitations were established and tested by Firetrace Ltd. The units are certified by SP Technical Institute of Sweden.

These units were subjected to numerous performance tests to verify their suitability and to establish design limitations for:

7. Hazard Volume
8. Operating Temperature Range
9. Nozzle Placement
10. Nozzle Quantity
11. Maximum Length/Size of Piping and Number of Fittings

Firetrace systems are pre-designed to minimise the amount on engineering required when evaluating a design for specific application. As long the discharge piping, nozzles and Firetrace tubing is installed within the limits prescribed in this manual then no further calculations are required for pressure drop, flow rates, or discharge time. When any additional limitations to hazard volume, area coverage, maximum height, design concentration, agent quantity, detector arrangement, etc., are also met, the system installation can be understood to comply with the design requirements. Therefore, no discharge tests or concentration measurements should be required.

Storage and Operating Temperatures

Firetrace® cylinders are designed to be stored and operated at the ambient temperature range of -20°C and +60°C (-4°F and +140°F)

System Operating Pressure

The normal operating pressure for Firetrace® Systems is 12bar at 20°C (174psig at 68°F).

All Firetrace® systems are designed for an operating temperature range of -20°C to +60°C. Table 1 shows the cylinder gauge pressure-temperature relationship based on a charging pressure of 12bar at 20°C.

Cylinder Pressure			
°C	**°F**	**bar**	**psig**
-20	-4	10.2	148.2
-10	14	10.6	154.7
0	32	11.1	161.1
10	50	11.5	167.5
20	68	12	174
30	86	12.4	180.4
40	104	12.9	186.9
50	122	13.3	193.3
60	140	13.8	199.8

Table 1: Cylinder Pressure-Temperature Relationship

Nozzle and Discharge Pipe Requirements

Specially designed High Throughput Powder Diffusers are used with the FTILPINTHTBI System, this type of nozzle decreases discharge time and increases the spread of dry powder. The baseline engine compartment must be designed using at least 3 nozzles to suit hazard configuration of a $4m^3$ engine compartment.

A standard nozzle layout would include nozzles being installed at the top of the engine compartment roof facing downwards in a pendant position. One nozzle shall be located above the exhaust manifold in the region where oil is most likely to spill. Another nozzle shall be in the region of prominent hazards.

Each cylinder valve is equipped with 3 discharge ports (DP). All three discharge ports are to be used onto the engine compartment.

Discharge Piping Specifications

FTILPINTHTBI Systems shall use flexible discharge hoses for the ABC Dry Chemical distribution system. The following tubing shall be used;

Hose Fittings	Nominal Braid Dia(mm)	Nominal Hose O.D.(mm)	Max. Working Pressure		Min Burst Pressure		Min. Bend Radius		Weight Kg/m
			Bar	PSI	Bar	PSI	mm	IN"	
3/8"	15.3	17.4	180	2610	720	10440	130	5.118	0.337

Liner: Synthetic oil resistant rubber
Reinforcement: One high tensile steel wire braid
Cover: Anti-Abrasive synthetic rubber, resistant to oils, fuels and atmospheric conditions
Working Temp: -40°C to 135°C (-40°F to 275°F)
Intermittent Temp: 40°C to 140°C (-40°F to 284°F)

Firetrace Detection/Actuating/Discharge Tubing

For the FTILPINTHTBI System, the Firetrace® tubing is used as a combination for heat detection, system activation and system discharge.

The detection/actuation/discharge tubing is heat sensitive and in a fire situation is designed to rupture at any point along the tube upon direct flame impingement or at high temperatures associated with fire conditions. The Firetrace® detection tubing will burst when subjected to temperatures above 120°C (248°F) and form a diffuser where a percentage of the Dry powder will be deployed.

The maximum length of Firetrace® detection tubing that can be used for FTILPINTHTBI Systems is 20m.

4 - Firetrace Installation Instructions

This section provides installation instructions covering components and limitations described in Section 2 and Section 3 of this manual.

All components shall be installed to facilitate proper inspection, testing, recharging, and any other required service or maintenance as may be necessary. Equipment must not be subjected to severe weather conditions or mechanical, chemical, or other damage which could render the equipment inoperative. The equipment must be installed in accordance with instructions in this Manual.

Cylinder/Valve and Bracket Assemblies

Cylinders shall be located as close as possible to the protected enclosure. In some cases, the cylinder can be mounted inside the protected enclosure. The assemblies shall be located in a readily accessible location to allow for ease of inspection, service, and maintenance. The cylinders shall be located in an environment protected from the weather and where the temperature range is between -20°C and +60°C (-4°F and +140°F).

The cylinder and bracket shall be mounted in the vertical plane and in no circumstance, must the cylinder be positioned at an angle of more than 45° from vertical. The cylinder valve must be facing up and oriented so that the pressure gauge is facing out and away from the mounting wall to facilitate visual inspection.

Mount the cylinder where it will not be subjected to accidental damage or movement. Suitable protection must be installed where necessary to prevent damage or movement.

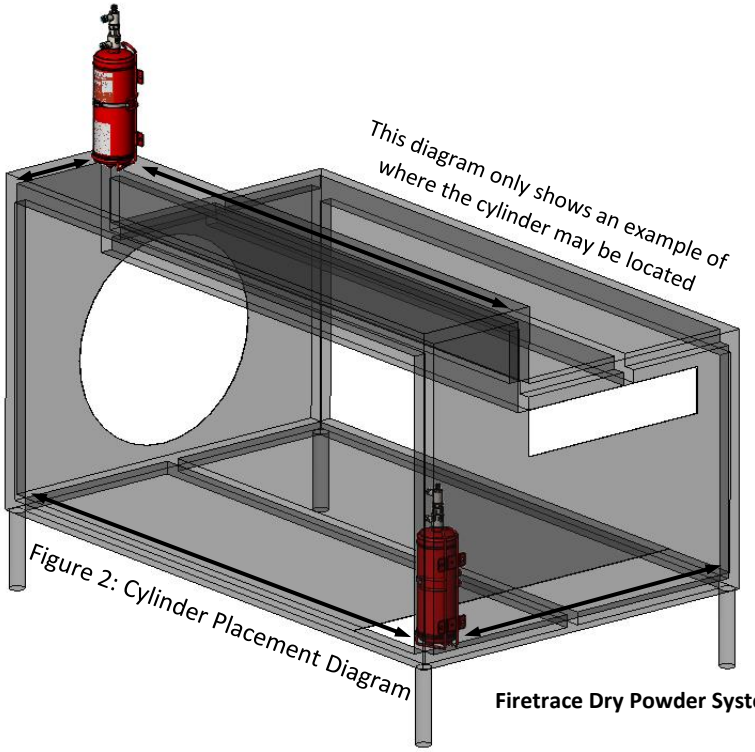
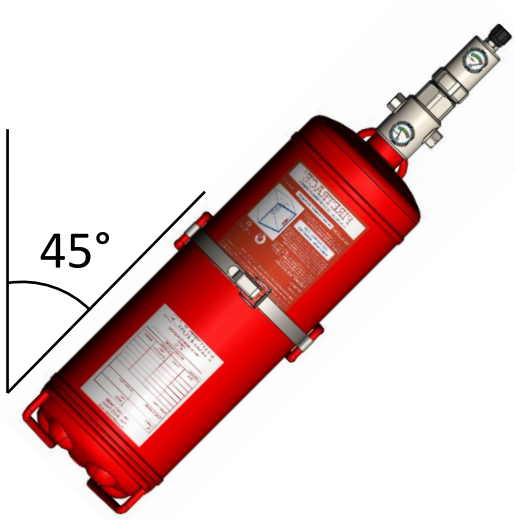


Figure 2: Cylinder Placement Diagram



It is recommended wherever possible that Firetrace cylinders be mounted vertically. Where vertical positioning is not possible the system can be mounted within 45° of vertical.

Firetrace Dry Powder Systems are not suitable for horizontal mounting

1. Securely mount the cylinder bracket to structural support using 4 or more mounting holes.
2. Position the cylinder in the bracket with the cylinder pressure gauge facing out. Secure the cylinder in place using the bracket latch.

Discharge Piping and Nozzles

1. It is advised that a risk assessment is be carried out to determine appropriate discharge pipework and nozzle positioning.
2. Locate the nozzle(s) placement once a risk assessment has been carried out, ensuring design is within limitations and guidelines described in section 3.
3. Determine the routing of the discharge piping and verify that the pipe length from each discharge port does not exceed limitations and guidelines described in section 3.
4. Remove the safety fittings from the valve discharge ports as required. Secure the male 3/8 BSP fittings into each discharge port.
5. Install the discharge piping and fittings between the cylinder and nozzle(s). Secure pipework with the appropriate fittings as required.

For a more comprehensive list of Discharge Pipe Fittings, refer to section 6

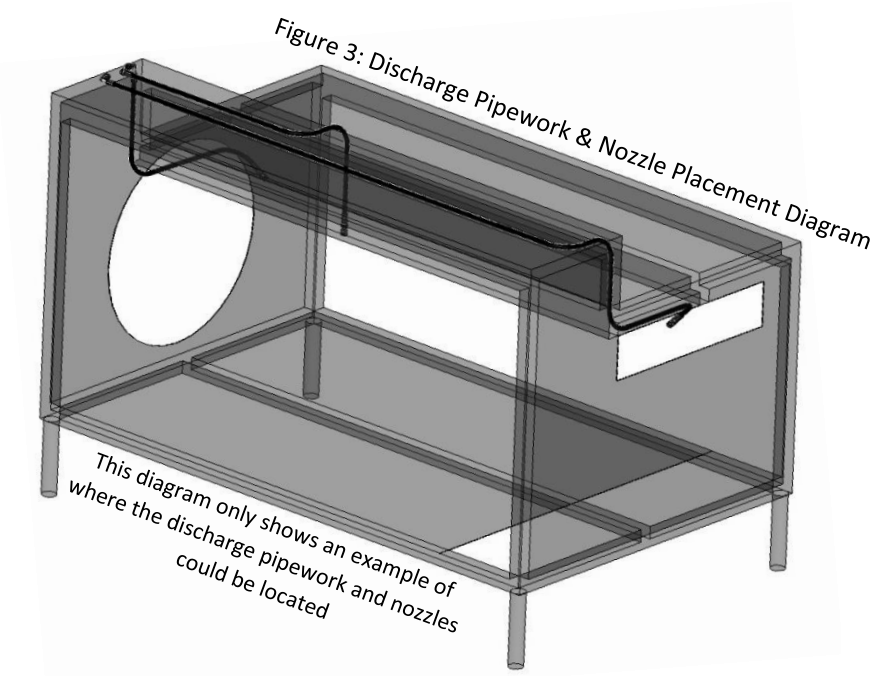


Figure 3: Discharge Pipework & Nozzle Placement Diagram

Discharge Line Tees and Angles

Changes in direction of flow cause separation of expellant gas and dry chemical. To provide proper distribution of dry chemical when using a tee fitting special attention must be given to the method in which an approach is made after a change in direction. A single tee fitting shall be used per discharge piping.

Firetrace® Detection/Actuation/Discharge Tubing

The Firetrace® Automatic Detection tubing is the key part of the system and acts not only as the detector, actuator but also as the delivery method for a percentage of the ABC Powder.

The correct installation of the tubing is important to achieve optimum performance from the system. The tubing must be mechanically protected outside the identified risk area and shall remain accessible to allow future servicing.

The tubing will activate at approximately 120°C and care must be taken to avoid attaching the tubing where temperatures above this are achieved during normal operation. It is recommended that the tube is a minimum of 150mm away from exceptionally hot surfaces or fitted with additional protection to avoid false activation.

The tubing shall be placed as close as possible to high risk areas as long as they do not reach ambient temperature higher than 120°C (248°F). For example, a minimum distance from a turbo charger shall be 150mm (6 inches) to avoid premature tubing activation. See diagram below for a Firetrace detection tubing installation example.

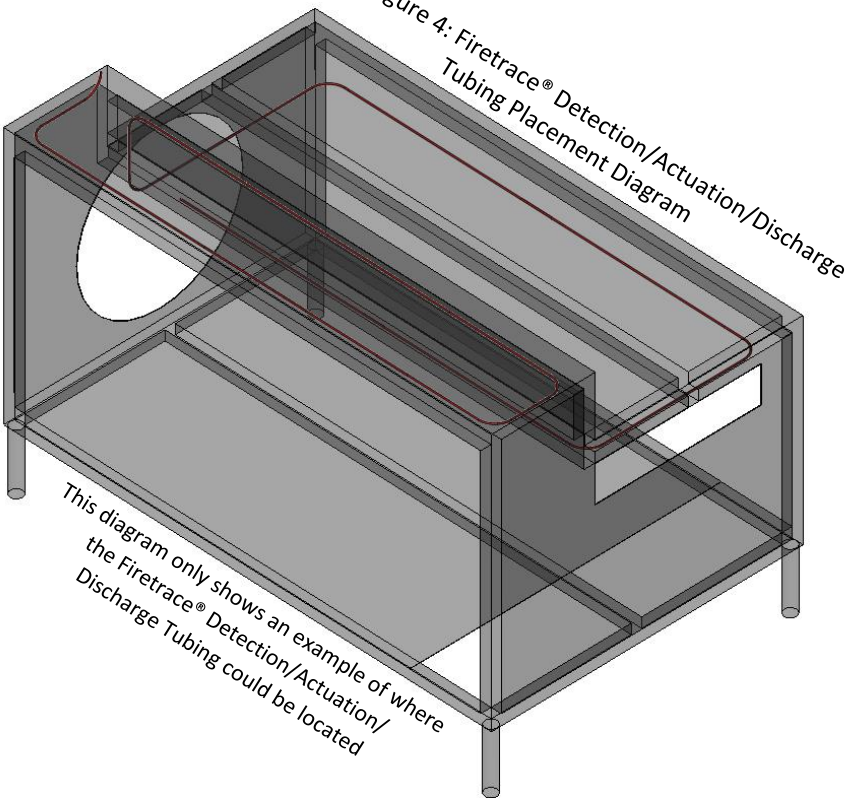


Figure 4: Firetrace® Detection/Actuation/Discharge Tubing Placement Diagram

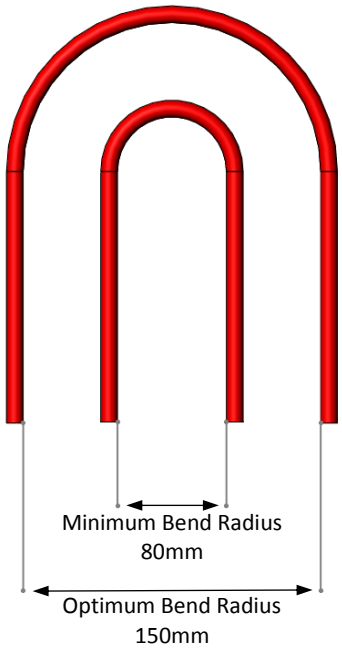
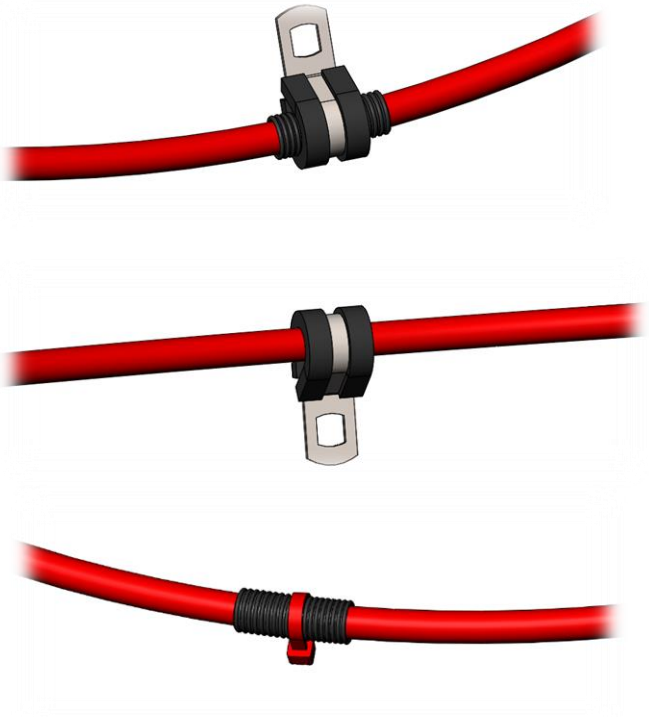


Figure 5: Minimum and Optimum Bend Radius

- The Firetrace® detection tubing needs to be adequately fixed to retain its position.
- The tubing is a soft polymer and is susceptible to wear / chaffing when repeatedly rubbed against a hard or sharp surface.
- The tubing shall be protected using nylon Kopex at all fixing points and where it passes through holes.
- The Firetrace® tubing acts as the detector, actuator and provides delivery for a percentage of the extinguishant. It is imperative that the tubing is not kinked or crushed and the above minimum bending radius must be adhered to.
- If the tubing is kinked or damaged in anyway then the Firetrace® tubing in that section must be replaced.

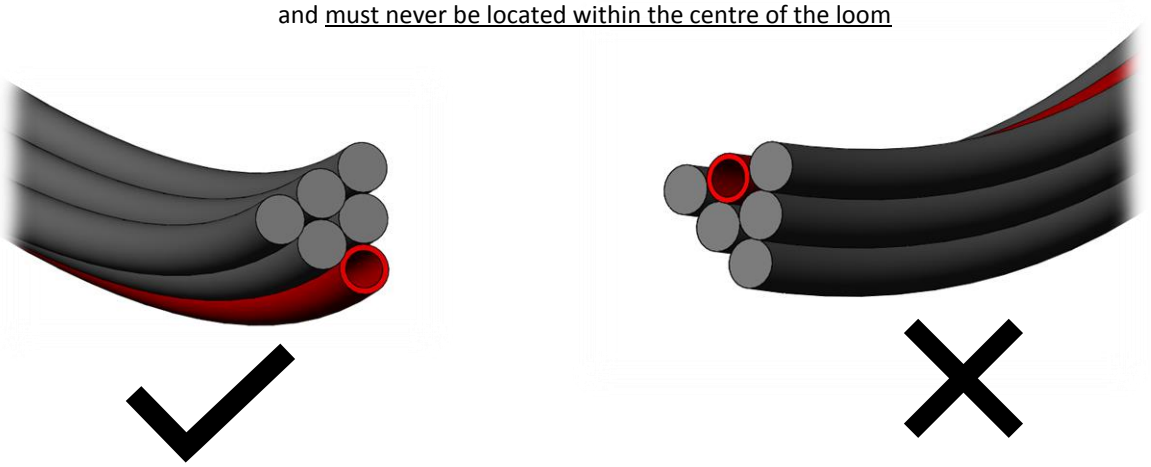
- It is important that the detection tubing is exposed within the risk area. Kopex or other conduit sleeves shall be kept to a minimum length (approx. 15mm (0.6”) either side of fixings) or where the tubing comes into contact with other surfaces.
- Always leave a small loop of tubing to the cylinder. Whilst this shall also be secured it must be releasable to allow future servicing of the cylinder.
- It is important that fixings are not concealed as access is required during future servicing. When systems are installed during construction of the vehicle care should be taken not to fix the tubing anywhere that will not be accessible following installation of the engine & body parts.

The following models show both “Tyrap” and “P clip” methods of fixing all of which are acceptable:



8mm Firetrace Tubing shall be supported at maximum intervals of 200mm

When the tubing is installed with a group of other cables/pipes it must be positioned on the underside of the loom and must never be located within the centre of the loom



Connecting the Firetrace® Tubing to fittings

All compression fittings must be secured in the following manner.

a) Cut the tube end ensuring the cut is clean and free from burrs. Check that no debris or swarf has been left in the tube.

b) Place the nut over the end of the tube with its threaded section towards the end you wish to create the flare on.

c) Push the tube firmly over the flaring tool ensuring the end of the tube bottoms. Be careful not to kink the tube during this process.

d) The nut shall be tightened finger tight and then using an appropriate spanner tightened firmly using only your hands, over tightening can crush the flare.

e) Slacken off the assembly and inspect the end to ensure flare has formed correctly, this flare can now be used to connect the tube to the system

Method used to create Flare

1. Tubing must be cut square.

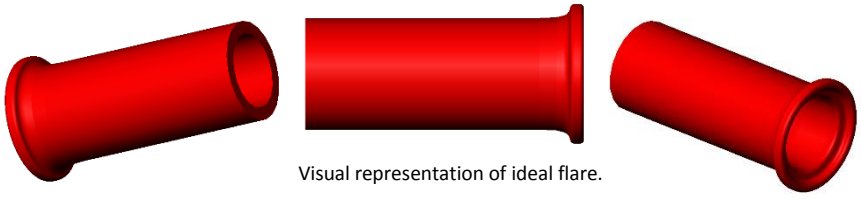
The use of a Tube Cutter (Part Number: FT0127) is recommended to achieve an accurate cut

2. Insert tubing through the spring nut/nut.

3. Offer the tubing to the flaring tool, so that the end of the tube stops against the face of the flaring tool, tighten the nut hand tight.

4. Whilst holding the flaring tool handle, use an appropriate size spanner (14mm spanner for 8mm tube) tighten the nut spanner tight, the recommended torque is 5.7nm.

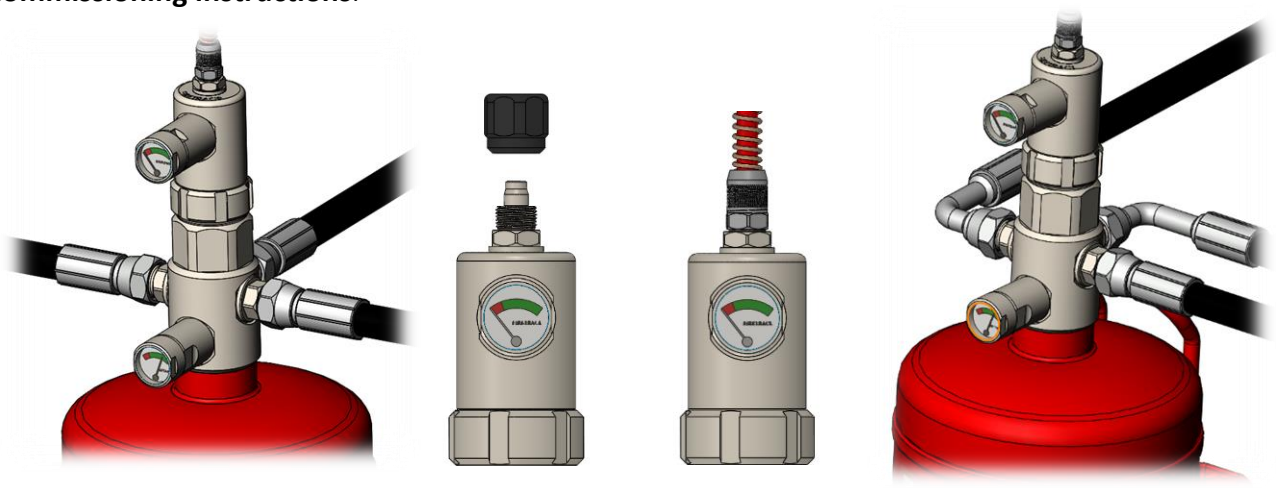
5. Undo the nut and inspect the end to ensure the flare has formed correctly. The tubing is now ready to be connected to the system.



Visual representation of ideal flare.

For a more comprehensive list of Firetrace® Tube Fittings, refer to section 6

Commissioning Instructions.



Locate cylinder and firmly secure with the bracket provided as specified in section 4.

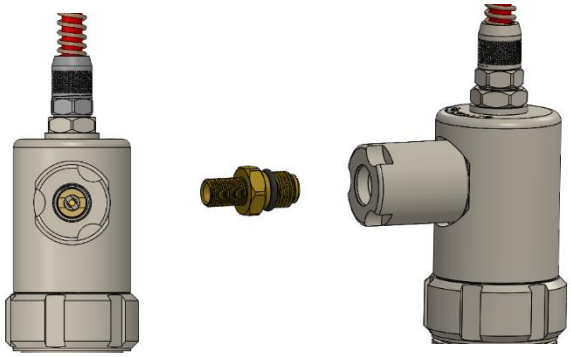
Install detection tubing, discharge pipework and any accessories according to the procedure in section 4.

Remove black transportation cap from the top of the cylinder. Connect the Firetrace® detection tubing to the top of the cylinder valve, tighten spring nut/nut using the appropriate sized spanner then secure the Firetrace® detection tube with appropriate methods of fastening.

Remove the gauge from the top section of the cylinder valve, this reveals the integrated ballvalve which will be in the off position (horizontal position).

A regulator and calibrated pressure gauge shall be used to pressurise the detection tubing with dry nitrogen through the filling adapter (FT0172), pressurise to 12bar (174psi)

It is recommended to have a portable dry nitrogen cylinder or Firetrace Nitrogen Fill Kit (FSCK) for on-site use.



Remove the filling adapter and thread the pressure gauge & o-ring into its place to verify that the tubing is pressurised to at least 12bar (174psi)
(pressure may have to be adjusted for temperatures higher or lower than 20°C (68°F)).

Using tape, mark the location of the needle on the pressure gauge *(High Green)* and **leave system for a minimum of ten minutes per metre of Trace detection tube**.

In the event of a leak go back to section 4 and check the installation of all fittings and accessories

If the ball valve is opened abruptly, activation of the cylinder valve may occur, causing the system to discharge.

After confirming that there is no leakage within the detection tubing, remove the gauge from the top section of the cylinder valve and using the key provided SLOWLY rotate the ball valve counter clockwise to the "ON" position (vertical position)

The system is now live

An optional Pressure Switch Adapter can be fitted in either gauge adapters otherwise the gauges can be returned.

Please note that the system will not operate with the isolator valve in the closed position, an optional status indicator module (FTSIMI) can be used to determine whether the valve is isolated or activated.

Service and Maintenance for ABC Dry Chemical Systems

The Firetrace® systems can operate in a harsh environment and are occasionally subjected to high temperatures and extreme vibration. It is essential that the systems are regularly serviced to ensure their correct operation.

To comply with British Standard BS 5306 (section three) the following maintenance tasks shall be carried out periodically.

The British standard recommends that each system is visually inspected every 3 months and then fully serviced at a maximum interval as specified by the manufacturer.

All ABC Dry Powder systems require discharge testing at maximum 5 year intervals.

The following checks shall be carried out on a 3 month inspection.

- Check the pressure gauge is reading high-green.
- Ensure physical changes of protected areas haven't affected cylinder suitability.
- Check external surface of the cylinder for evidence of rust or corrosion
- Report any potential problems immediately.

In the event of activation of the system, a replacement should be obtained from Firetrace® Ltd
Firetrace® Ltd recommends a visual inspection of a Firetrace® system at least every three months.

Firetrace Ltd recommends that all powder systems are fully serviced every
6 Months by a competent engineer.

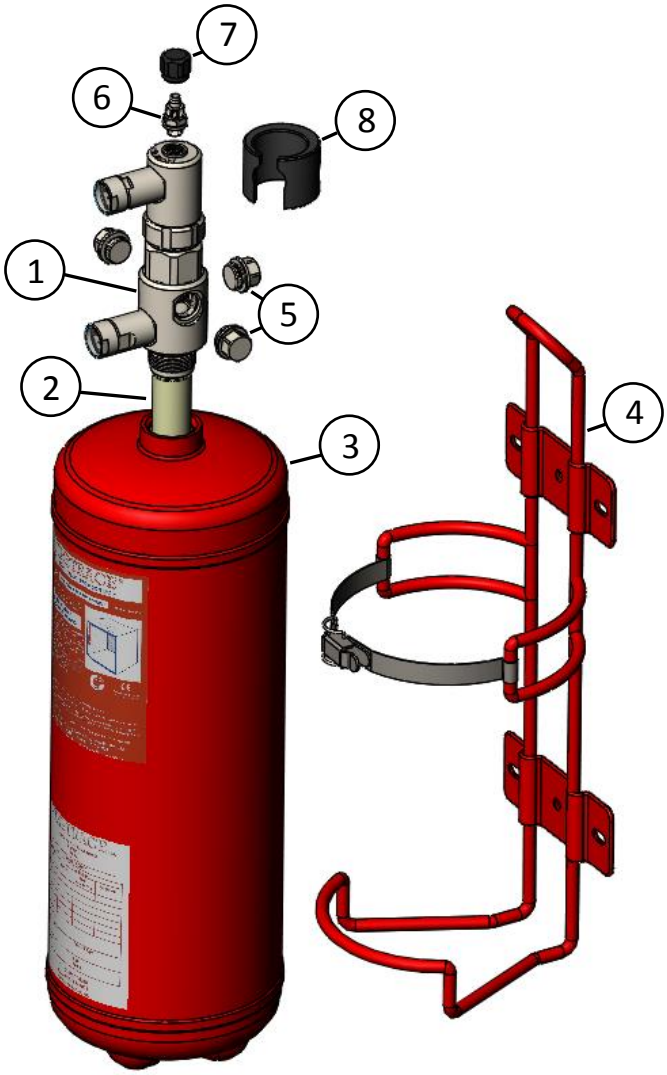
<u>If there's no visible sign of pressure drop then;</u>

- ✓ Check date of manufacture and record when discharge test is required (5 years from new date on cylinder).
- ✓ Check external condition of cylinder. Replace if there is any sign of damage or wear.
- ✓ Check gauge is facing upwards (if applicable) and that cylinder is installed as upright as possible. Where necessary reposition cylinder, or highlight any required modifications for return visit.
- ✓ Remove cylinder gauge and ensure correct operation. Clean and lubricate O ring and refit the gauge.
  (Due to possible pressure seepage, the gauge must be replaced as soon as possible.)
- ✓ Remove pressure switch (if applicable) and ensure correct operation. Clean and lubricate pressure switch O ring and refit switch.
  (Due to possible pressure seepage, the pressure switch must be replaced as soon as possible.)
- ✓ Remove Cylinder from bracket and agitate powder contents. (Cylinder shall be inverted to achieve this. A noticeable movement of the contents will be apparent. A rubber mallet can be utilised to achieve this.)
- ✓ Inspect engine compartment and ensure Firetrace® detection tubing is correctly installed and protecting entire risk area. Check for signs of wear/damage and tighten or replace fixings as necessary.
- ✓ Record details and date of service on cylinder label. Replace cylinder into bracket and ensure it is secured by clamp / Tyrap.

<u>If there is notable sign of pressure drop then the system must be replaced</u>

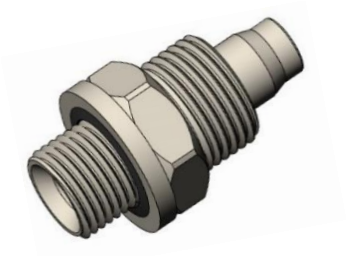
System Component List

ITEM NO.	PART NO.	DESCRIPTION
1	FTILPINTHBIV	Indirect Low Pressure High-Throughput Integrated Bi-Directional Valve
2	FT0438/6-HT	Diptube High-Throughput 426mm White
3	FT0133-P	Steel Cylinder 6kg/Litre with ABC Powder
4	FT0150	6kg Bracket with Stainless Steel Strap
5	FTILPINTHTBI/8	ILP High-Throughput Bi-Directional M18x1 Plug
6	FT1511-8/6-1/8-S	1/8" BSP Fitting for 8mm
7	FT0322/8	Plastic Black Cap for 8mm
8	FTSIMI	Optional Status Indicator Module



Detection Line Parts List

PART NUMBER	DESCRIPTION
FT1511-8/6-1/8S	Male-Tube/Trace 8mm Trace 1/8" Male – 8mm Special
FT1723-8/6-SS	Anti-Kink Spring Nut 8mm Stainless Steel
FT0269/1/M	Banjo Tee Assembly for Valve Male
FT0118/8	End of Line – 12bar 8mm *(optional)*
FT0253/8	8mm Blank/Stop End



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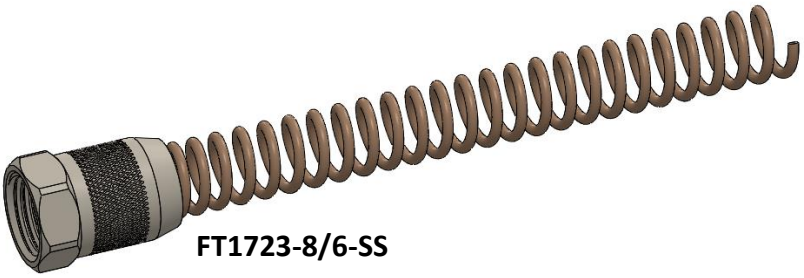

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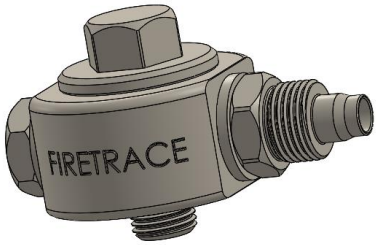
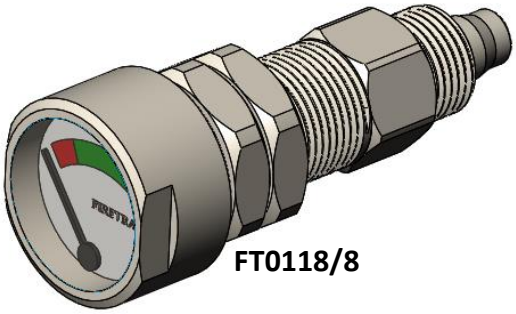


FT0269/1/M



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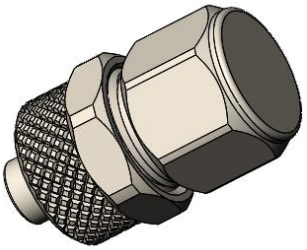
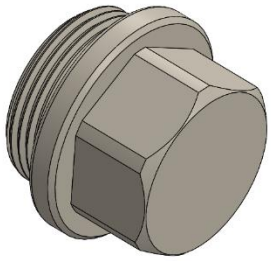


FT0253/8

Discharge Line Parts List

PART NUMBER	DESCRIPTION
FTILPINTHTBI/8	ILP High-Throughput Bi-Directional M18x1 Plug
FT0284/HT	High-Throughput Diffuser 3/8" BSP
FTILPINTHTBI/11	ILP High-Throughput Bi-Directional Valve M18x1 – 3/8" Adapter
FT0260/11	1m 3/8" Flexi Hose 90° Female to Straight Female
FT0260/12	3m 3/8" Flexi Hose 90° Female to Straight Female
FT0260/13	4m 3/8" Flexi Hose 90° Female to Straight Female
FT1210-10	3/8" Tee 10mm 10mm-10mm



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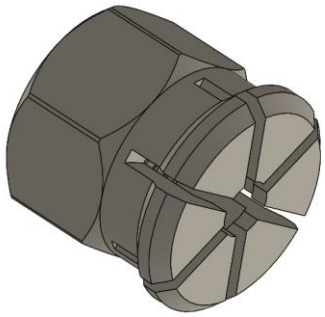
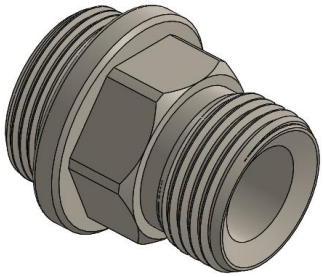
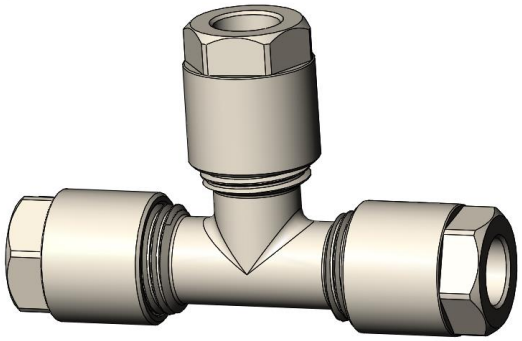


FT0284/HT



FTILPINTHTBI/11

FT0260/11 - FT0260/12 - FT0260/13



FT1210-10

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

1.1. Product identifier

Trade name : ABC FAVORIT X 90

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

1.2.1. Relevant identified uses

Use of the substance/mixture : Fire extinguishing agent
ABC-powder

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Supplier
RÜHL FEUERLÖSCHMITTEL GmbH
Hugenottenstr. 105
61381 Friedrichsdorf - (Deutschland)
T +49 6172 733 225 - F +49 6172 733 132

Email competent person
sds@kft.de

1.4. Emergency telephone number

Emergency number : GIZ-Nord, Göttingen
Germany
+49 551 19240

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Not classified

2.2. Label elements

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

No labelling applicable

2.3. Other hazards

Other hazards not contributing to the classification : Repeated dermal contact with material can lead to defatting of the skin. Drying up of the skin.

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable

3.2. Mixture

Comments : Blend based on :
ammonium salts

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
ammonium dihydrogenorthophosphate	(CAS No) 7722-76-1 (EC no) 231-764-5 (REACH-no) 01-2119488166-29	75 - 100	Not classified

Full text of H-statements: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : In case of doubt or persistent symptoms, consult always a physician.

First-aid measures after inhalation	:	Move the affected person away from the contaminated area and into the fresh air.
First-aid measures after skin contact	:	Wash with plenty of soap and water.
First-aid measures after eye contact	:	Rinse cautiously with water for several minutes. Consult an ophtalmologist if irritation persists.
First-aid measures after ingestion	:	Rinse mouth. Go into open air and ventilate suspected area. If you feel unwell, seek medical advice.

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

No additional information available

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

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	:	The product is not flammable. Use extinguishing media appropriate for surrounding fire.
Unsuitable extinguishing media	:	No information available.

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition products in case of fire	:	Carbon dioxide. Carbon monoxide. Toxic fumes may be released.

5.3. Advice for firefighters

Protection during firefighting	:	Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Protective equipment	:	Concerning personal protective equipment to use, see section 8.
Measures in case of dust release	:	Provide adequate ventilation to minimize dust concentrations.

6.1.2. For emergency responders

Protective equipment	:	Concerning personal protective equipment to use, see section 8.
Emergency procedures	:	Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

For containment	:	Minimize generation of dust.
Methods for cleaning up	:	Collect spillage. In case of important spillage : Recover mechanically the product.

6.4. Reference to other sections

See Heading 7. See Heading 8. See Heading 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	:	Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Avoid dust formation. Do not breathe dust. Avoid contact with skin, eyes and clothing.
Hygiene measures	:	Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reuse.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions	:	Keep only in original container. Store in a dry place.
Incompatible materials	:	Strong alkalis. BC-powder.
Prohibitions on mixed storage	:	Keep away from food, drink and animal feeding stuffs.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

No additional information available

8.2. Exposure controls

Appropriate engineering controls	:	Ensure good ventilation of the work station. Avoid dust formation.

Hand protection	:	Chemical resistant PVC gloves (to European standard EN 374 or equivalent)
Respiratory protection	:	Long term exposure. If dust are formed : (FFP2)

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Solid
Appearance	:	Dust.
Colour	:	white.
Odour	:	No data available
Odour threshold	:	No data available
pH	:	Not applicable
pH solution	:	4 - 4,5 (10%)
Relative evaporation rate (butylacetate=1)	:	No data available
Melting point	:	> 200 °C
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	Not applicable
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	No data available
Vapour pressure	:	Not applicable
Relative vapour density at 20 °C	:	Not applicable
Relative density	:	No data available
Density	:	1,8 g/cm³ 20 °C
Solubility	:	No data available
Log Pow	:	No data available
Viscosity, kinematic	:	Not applicable
Viscosity, dynamic	:	Not applicable
Explosive properties	:	No data available
Oxidising properties	:	Non oxidizing.
Explosive limits	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available.

10.2. Chemical stability

No decomposition if stored normally.

10.3. Possibility of hazardous reactions

No dangerous reactions known.

10.4. Conditions to avoid

No additional information available.

10.5. Incompatible materials

Strong alkalis. BC-powder.

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 toxicological effects

Acute toxicity : Not classified (Based on available data, the classification criteria are not met)

ammonium dihydrogenorthophosphate (7722-76-1)	
LD50 oral rat	> 2000 mg/kg
LD50 dermal rat	> 5000 mg/kg
LC50 inhalation rat (mg/l)	> 5 mg/l/4h Dust

Skin corrosion/irritation	:	Not classified (Based on available data, the classification criteria are not met) pH: Not applicable
Serious eye damage/irritation	:	Not classified (Based on available data, the classification criteria are not met) pH: Not applicable
Respiratory or skin sensitisation	:	Not classified (Based on available data, the classification criteria are not met)
Germ cell mutagenicity	:	Not classified (Based on available data, the classification criteria are not met)
Carcinogenicity	:	Not classified (Based on available data, the classification criteria are not met)
Reproductive toxicity	:	Not classified (Based on available data, the classification criteria are not met)
Specific target organ toxicity (single exposure)	:	Not classified (Based on available data, the classification criteria are not met)
Specific target organ toxicity (repeated exposure)	:	Not classified (Based on available data, the classification criteria are not met)
Aspiration hazard	:	Not classified (Based on available data, the classification criteria are not met)

SECTION 12: Ecological information

12.1. Toxicity

ammonium dihydrogenorthophosphate (7722-76-1)	
LC50 fish 1	> 85,9 mg/l Oncorhynchus mykiss (Rainbow trout)
EC50 Daphnia 1	1790 mg/l daphnia
EC50 72h algae (1)	> 97,1 mg/l

12.2. Persistence and degradability

ammonium dihydrogenorthophosphate (7722-76-1)	
Persistence and degradability	Not applicable.

12.3. Bioaccumulative potential

ammonium dihydrogenorthophosphate (7722-76-1)	
Log Pow	Not applicable
Log Kow	Not applicable

12.4. Mobility in soil

No additional information available

12.5. Results of PBT and vPvB assessment

No additional information available

12.6. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations	:	Dispose in a safe manner in accordance with local/national regulations.
European List of Waste (LoW) code	:	16 05 09 - discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08

SECTION 14: Transport information

In accordance with ADR / RID / IMDG / IATA / ADN

ADR	IMDG	IATA	ADN	RID
14.1. UN number				
Not regulated for transport				
14.2. UN proper shipping name				
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
14.3. Transport hazard class(es)				
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
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 the environment : 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

- Overland transport

Transport regulations (ADR) : Not applicable

- Transport by sea

Transport regulations (IMDG) : Not applicable

- Air transport

Transport regulations (IATA) : Not applicable

- Inland waterway transport

Transport regulations (ADN) : Not applicable

- Rail transport

Transport regulations (RID) : Not applicable

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the 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

Contains no REACH substances with Annex XVII restrictions

Contains no substance on the REACH candidate list

Contains no REACH Annex XIV substances

15.1.2. National regulations

No additional information available

15.2. Chemical safety assessment

A safety data sheet is not required for this product under Article 31 of REACH. This Product Safety Information Sheet has been created on a voluntary basis

No chemical safety assessment has been carried out

SECTION 16: Other information

Abbreviations and acronyms:

LD50	Median lethal dose
ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
IMDG	International Maritime Dangerous Goods
IATA	International Air Transport Association
RID	Regulations concerning the International Carriage of Dangerous Goods by Rai
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
vPvB	Very Persistent and Very Bioaccumulative
PBT	Persistent Bioaccumulative Toxic
GHS	Globally Harmonised System of Classification and Labelling of Chemicals
CAS	Chemical Abstract Service

Data sources : 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, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

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