Pre-Engineered ILP
Automatic Suppression Unit

Designed for use with:

Purple K Dry Chemical Powder

DESIGN, INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

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FOREWARD

General

This manual is written for the fire protection professional that designs, installs, and maintains Firetrace Pre-Engineered ILP Automatic Suppression Units with Purple K Dry Chemical Powder. It is intended to communicate details and procedures required for proper design, installation, operation, and maintenance.

Firetrace assumes no responsibility for the design or function of any systems other than those addressed in this manual. The technical data contained herein is limited strictly for informational purposes only.

Pre-Engineered ILP Automatic Suppression Units with Dry Chemical Powder are to be designed, installed, inspected, tested, maintained, and recharged by qualified trained personnel in accordance with the following:

- All instructions, limitations, etc. contained in this manual, DIOM 800012
- All information contained on the agent cylinder nameplate(s)
- NFPA 17: Standard for Dry Chemical Extinguishing Systems
- Local authority having jurisdiction

Safety Messages

The following notations are used throughout this manual. Always read and obey all safety messages. They are essential to the safe use of the equipment described in this manual.

DANGER

Identifies immediate hazards and provides specific instructions or procedures, which if not correctly followed COULD result in severe personal injury or death.

WARNING

Identifies specific instructions or procedures, which if not correctly followed, COULD result in severe personal injury or death.

CAUTION

Identifies specific instructions or procedures, which if not correctly followed, COULD result in minor personal injury or equipment or property damage.

Safety Precautions

Safety precautions are essential when any electrical or mechanical equipment is involved. These precautions should be followed when handling, servicing, and recharging Firetrace Pre-Engineered ILP Automatic Suppression Units and equipment. The following safety precautions should always be followed:

- Read and understand this entire manual and any other documents referenced herein.
- Secure the manual near the Firetrace fire suppression unit after installation.
- Periodic checks by trained personnel are required to ensure safe operation.
- All Firetrace Pre-Engineered ILP Automatic Suppression Units are factory equipped with discharge port plugs. The discharge port plugs are only to be removed when the Firetrace ILP Unit is connected into the discharge piping or when performing charging, testing, or salvaging operations in accordance with the procedures contained in this manual.
- Ensure the lever on the Firetrace ILP Unit ball valve is in the “OFF” position when not connected into the discharge piping or when performing charging, testing, or salvaging operations in accordance with the procedures contained in this manual.
- Never assume that a cylinder is empty. Treat all cylinders as if they are fully charged.
- Wear safety glasses when working with pressurized cylinders and charging equipment.
- Follow all safety procedures included on the cylinder nameplate and in this manual.

Questions regarding the information contained in this manual can be addressed to:

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Section 1: General Information

1.1 Introduction

The Firetrace Pre-Engineered ILP Automatic Suppression Units with Purple K Dry Chemical Powder are units designed for total flooding applications in accordance with NFPA 17: Standard for Dry Chemical Extinguishing Systems.

The pre-engineered concept of automatic fire suppression systems minimizes the amount of engineering involved in system 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 by a Firetrace Pre-Engineered ILP Automatic Suppression Unit can be any size, shape, or volume; provided that the protected enclosure is within the limitations described in this manual. Once fully installed, the Firetrace Pre-Engineered ILP Automatic Suppression Unit becomes a self-contained unit, meaning that it is equipped with all the components necessary to detect and suppress Class B and C fires.

Local authorities having jurisdiction should be consulted as to the acceptability for particular hazards and requirements covering installation.

1.2 Purple K Dry Chemical Powder

Firetrace Pre-Engineered ILP Automatic Suppression Units utilize potassium bicarbonate, more commonly known as Purple K Dry Chemical Powder.

Purple K Dry Chemical Powder is Potassium Bicarbonate (>90% by weight), with the addition of Attapulgite Clay (>4% by weight), Mica (>2% by weight), Oxazine Dye (<0.2% by weight) and is made hydrophobic by Methyl Hydrogen Polysiloxane (<0.5% by weight). Purple K Dry Chemical Powder is a finely divided powder that has been treated to be a water repellent. Under the influence of an expellant gas, Purple K Dry Chemical Powder is capable of being fluidized and free flowing in order to be discharged through a discharge piping network.

Purple K Dry Chemical Powder is included in NFPA 17. It has been evaluated and approved for use in occupied areas provided the proper safety precautions have been taken.

1.2.1 Cleanliness

Purple K Dry Chemical Powder can be cleaned up by one of the following methods; wiping, vacuuming, or washing the exposed areas.

In the presence of moisture, Purple K Dry Chemical Powder can stain or corrode some types of metal surface. To minimize possible staining or corrosion, the exposed areas should be cleaned immediately.

1.2.2 Agent Properties

For hazard information, decomposition information, and physical properties of Purple K Dry Chemical Powder, please refer to the Safety Data Sheet located in Appendix C.

Section 2: System Description

2.1 General Description

Firetrace Pre-Engineered ILP Automatic Suppression Units are intended to be designed and installed to protect hazards within the limitations as stated in this manual ONLY. The authority having jurisdiction should follow the information specified by this manual, NFPA 17: Standard for Dry Chemical Fire Extinguishing Systems, and any other applicable standards.

Firetrace Pre-Engineered ILP Automatic Suppression Units consists of the following major components:

- Cylinder/Valve Assembly
- Cylinder Mounting Bracket
- Firetrace Detection Tubing (FDT) and fittings (no substitute)
- Pressure Switch
- Discharge Hoses and Fittings (furnished by others)

Once installed, the Pre-Engineered ILP Automatic Suppression Unit becomes a self-contained, self-actuating unit that does not require an external source of power.

The unit utilizes a UL recognized component (per UL standard 521) Linear Heat Detector (See Certificate of Compliance 20140705-S35465) known as Firetrace Automatic Fire Detection Tubing. When pressurized with dry nitrogen, it will allow the fire suppression valve to remain in the closed position. The tubing acts as a continuous linear thermal detector that ruptures upon direct flame impingement or at a temperature of 383°F (195°C). Once the detection tubing is ruptured, the valve automatically opens, allowing the Purple K Dry Chemical Powder to flow through the discharge piping, distributing the extinguishing agent through the nozzle(s) into the protected enclosure.

Firetrace Pre-Engineered ILP Automatic Suppression Units are designed for use in total flooding and engine compartment applications only, where the hazard is normally unoccupied. Firetrace Pre-Engineered ILP Automatic Suppression Units can be used, but are not limited, to protect the following:

- Engine Compartments
- Airport Ground Support Equipment
- Flammable chemicals storage cabinets
- CNC & VMC machining centers
- Pump enclosures
- Generator enclosures
- Many other applications

Purple K Dry Chemical Powder should not be used where the following materials may be present:

- Pyrotechnic chemicals containing their own oxygen supply
- Reactive metals
- Metal hydrides
- Chemicals capable of undergoing autothermal decompositions
- Deep seated or burrowing fires in ordinary combustibles where point of combustion cannot be reached

For hazards beyond the scope described above, it is recommended that the designer consult with Firetrace, NFPA 17, and the local authority having jurisdiction as to the suitability on the use of Purple K Dry Chemical Powder for a particular hazard, for personnel exposure effects, and for installation requirements.

2.2 Cylinders

Purple K Dry Chemical Powder is stored in the pre-engineered unit cylinders. The steel cylinders are available in the following nominal capacities: 5lb, 10lb and 20lb. Refer to Table 1 – Cylinder Specifications, Figure 1 – Unit Assembly and Table 2 – Unit Assembly Dimensions for additional details.

Table 1 – Cylinder Specifications

Nominal Size	Volume		Cylinder Specification	Cylinder Working Pressure		Cylinder Test Pressure	
	in3	cm3		psig	bar	psig	bar
5lb	145	2376	DOT-4BA360 TC-4BAM25	360	25	720	50
10lb	300	4916	DOT-4BA360 TC-4BAM25	360	25	720	50
20lb	676	11077	DOT-4BW360 TC-4BWM25	360	25	720	50
10lb	300	4916	PED 2014/68/EU	360	25	667	46
20lb	676	11077	PED 2014/68/EU	360	25	667	46

Figure 1 – Unit Assembly

Table 2 – Unit Assembly Dimensions

Unit Assembly Part Number	Agent		Dimension "A"		Dimension "B"		Dimension "C"	
	lb	kg	in	cm	in	cm	in	cm
940518	5	2.27	16.6	42.2	13.5	34.3	4.3	10.9
941018	10	4.54	16.7	42.4	13.7	34.8	6.3	16.0
942018	20	9.07	24.1	61.2	21.0	53.3	7.1	18.0
941058	10	4.54	19.03	48.33	15.22	38.66	5.91	15.01
942058	20	9.07	24.70	62.74	20.89	53.06	7.28	18.49

2.3 Cylinder Valves

Each cylinder is equipped with a black anodized aluminum valve. The cylinder valves are pressure differential type valves. A piston in the valve bore is equipped with a seal that keeps the Purple K Dry Chemical Powder under pressure within the cylinder. A small hole in the piston allows cylinder pressure to equalize on both sides of the piston. Since the surface area above the piston is greater than the surface area below the piston, the net force seals the piston against the primary valve seal. When the pressure above the piston is relieved by any means, there is only cylinder pressure acting against the piston seal and the piston slides to its fully open position, allowing for agent discharge.

The valve is equipped with a pressure gauge to monitor cylinder pressure and a quarter turn ball valve that interfaces with the Firetrace Detection Tubing. The ball valve must be kept closed at all times when the cylinder is not in service.

The 940518, 941018, 941058, 942058, and 942018 unit assemblies are equipped with a medium ILP valve containing two 1/2 in NPT discharge ports. Refer to Figure 2 – Cylinder Valve for additional valve information.

NOTE: All Firetrace Purple K Dry Chemical Powder ILP Units utilize a straight siphon tube. All Firetrace Purple K Dry Chemical Powder ILP Units are to be installed only in a vertical (valve on top) position.

Figure 2 – Cylinder Valve

CAUTION

All cylinder valves are factory equipped with discharge port plugs. The discharge port plugs SHALL be installed in the valve discharge ports at all times, unless the discharge ports are connected to the discharge hosing.

2.4 Firetrace Detection Tubing

The Firetrace Detection Tubing is a linear, pneumatic, fire detection device that responds to a combination of the heat and radiant energy from a fire. The tubing is a UL recognized component per UL Standard 521 (see Certificate of Compliance 20140705-S35465). The Firetrace detection tubing performs two functions: heat detection and system activation. One end of the tubing is installed to the top of the cylinder valve. The tubing is then installed throughout the enclosure and finally pressurized with nitrogen.

The Firetrace detection tubing is heat sensitive and in a fire situation, is designed to rupture at any point along its length upon direct flame impingement or when the temperature reaches between 383°F [195°C] The rupture of the tubing releases the nitrogen pressure causing the unit to actuate. The actuation results in a complete discharge of the Purple K Dry Chemical Powder through the discharge piping and is distributed by the nozzle(s) throughout the protected enclosure. Refer to Table 3 - Firetrace Detection Tubing Properties and Table 4 – Firetrace Detection Tube Part Numbers and Table 35 - Firetrace Detection Tubing for additional information.

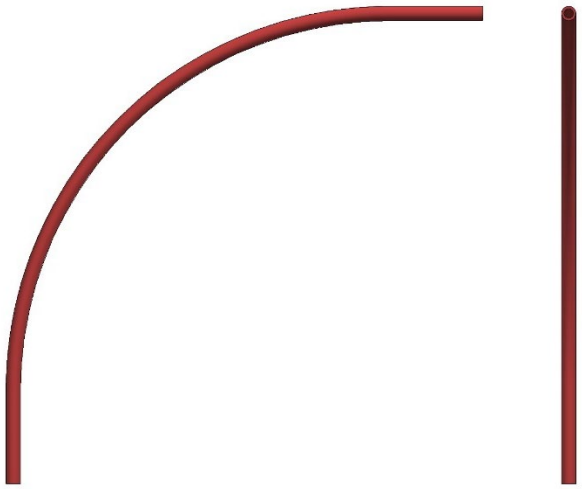


Figure 3: Firetrace Detection Tubing

The detection line can be mounted along the wall of the enclosures using heavy duty mounting clips. See Figure 4: Detection Line Heavy-Duty Mounting Clips for additional information. The heavy duty clips can be mounted to the enclosure using ¼-20 hardware.

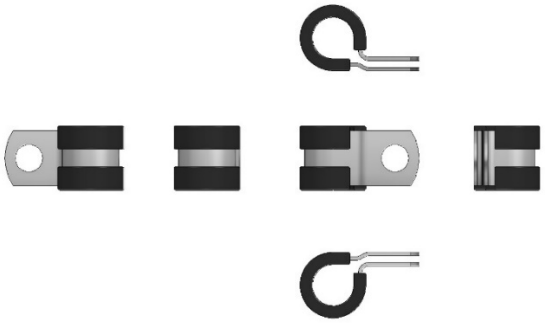


Figure 4: Detection Line Heavy-Duty Mounting Clips

The End of Line Adapter for the detection line can be used to attach pressure monitoring accessories and pressurize the detection line. See Section 2.10 and Table 37 - End of Line Accessories for additional information.

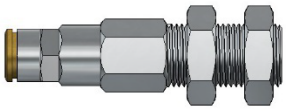


Figure 5: End of Line Adapter for Detection Line

Table 3 - Firetrace Detection Tubing Properties

Hydrostatic Burst Pressure	Minimum Burst Pressure	1100 psig [75 bar]
	Typical Burst Pressure	1300 psig [88 bar]
Electrical Properties	Volume Resistivity	1014 (per DIN 53481)
	Dielectric Strength	40k V/mm (per DIN 53481)

Table 4 – Firetrace Detection Tube Part Numbers

Firetrace Detection Tubing Part Number	Description
204025	Firetrace Detection Tubing, 4/6 mm, 25 ft
204050	Firetrace Detection Tubing, 4/6 mm, 50 ft
204100	Firetrace Detection Tubing, 4/6 mm, 100 ft
204328	Firetrace Detection Tubing, 4/6 mm, 328 ft

2.4.1.1 Pressure Gauge

Verify that the threaded connection of the pressure gauge contains a lubricated O-ring. The pressure gauge is then installed into the inner threads of the end of line adapter. Hand tighten until the O-ring is completely inside.

Figure 6: Pressure Gauge

NOTE: The pressure gauge must be installed with its included O-ring to ensure a proper seal.

2.4.1.2 Pressure Switch

Verify that the threaded connection of the pressure switch contains a lubricated O-ring. Insert the pressure switch washer into the inner threads of the end of line adapter. Install the pressure switch into the inner threads of the end of line adapter and hand tighten. If the fire detection tubing is pressurized when installing the pressure switch, an audible “click” will be heard indicating the activation of the pressure switch. See Section 2.10 for further details.

NOTE: The pressure switch washer must be installed into the inner threads of the end of line adapter. Without properly installing the pressure switch washer, the pressure switch will not be active.

NOTE: The pressure switch must be installed with its included O-ring to ensure a proper seal.

2.4.1.3 Plug

Verify that that threaded connection of the plug contains a lubricated O-ring. Install the plug into the inner threads of the end of line adapter. Hand tighten until the O-ring is completely inside. See Table 37 - End of Line Accessories for additional information.

NOTE: The plug must be installed with its included O-ring to ensure a proper seal.

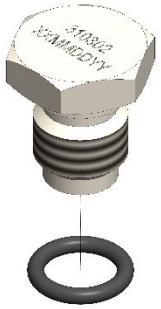


Figure 7: End of Line Plug

2.5 Manual Release

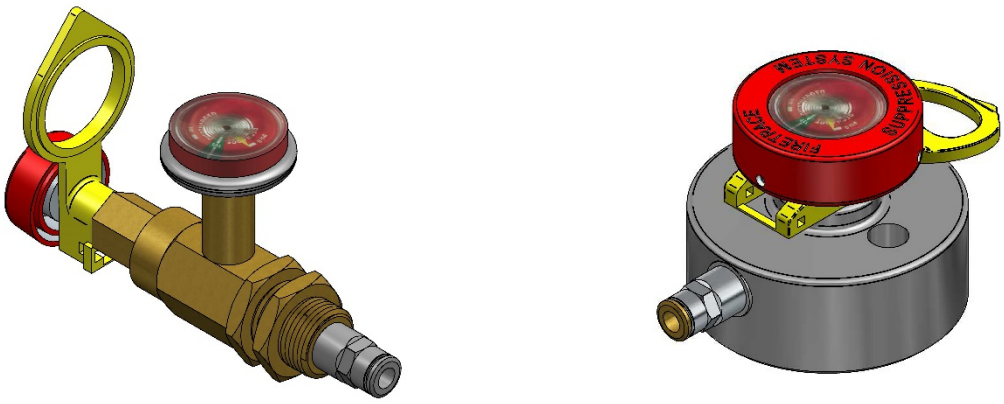
The manual release is used as an optional part of the system detection line network. The manual release is used to manually release the nitrogen pressure in the tubing, causing the system to actuate. The actuation results in a complete discharge of the unit assembly. A manual release functions in the same way as a pulling a fire alarm. Remove the pull tab and depress the plunger to puncture the burst disc holding pressure in the detection line.

The tube fitting on the body of the manual release allows for easy installation onto the system detection line network. The pull tab on the plunger prevents accidental activation of the manual release. The port on the body of the manual release is used to pressurize the tubing and allows for installation of a pressure gauge to monitor system pressure, refer to Figure 8: Manual Releases

and Table 5 – Manual Release Part Numbers for additional information.

The manual release can be rebuilt after activation using a rebuild kit. The rebuild kit for the standard manual consists of a pull tie, pull tab, and burst disc with nut. The standard manual release can be mounted using the accessory bracket. The 2nd Gen Manual release can be mounted to the wall of the equipment using 1/4”-20 bolts.

CAUTION
Do not remove the pull tab until ready to actuate system discharge.



Standard Manual Release **2nd Gen Manual Release**

Figure 8: Manual Releases

Table 5 – Manual Release Part Numbers

Manual Release Part Numbers	Description
600058	Manual Release, 360psig
601012*	2nd Gen Manual Release, 360psig

*2nd Gen Manual Release will be available late 2nd quarter 2019

2.6 Cylinder Mounting Bracket

The cylinder mounting brackets are manufactured of high strength steel with a primed and powder coated paint finish. These heavy-duty mounting brackets provide greater stability against vibration when compared to the standard cylinder mounting bracket.

The heavy-duty mounting brackets are equipped with band clamps designed to fit properly around the cylinder. The heavy-duty mounting bracket must be secured to a surface appropriate for retaining the weight of the cylinder in the event of a discharge. This precaution is intended to safely support the weight of the cylinder and the reaction force of the Purple K Dry Chemical Powder discharge.

All cylinders must be mounted vertically only, with the valve up. Refer to and Table 6 – Mounting Bracket Dimensions for cylinder mounting bracket dimensions.

2.7 Accessory Mounting Bracket

The accessory mounting bracket is used to mount discharge nozzles, end of line adapters, and the standard manual release. This bracket is made from steel and is powder coated with a black corrosion resistant finish. The bracket is “L” shaped and has mounting provisions for the end of line adapter on one leg and for the discharge nozzles and standard manual release on the other.

2.8 Recommended Mounting Hardware

We recommend 3/8-16 UNC, GRADE 5 hardware to mount the cylinder mounting brackets and ¼-20 UNC hardware to mount our accessory brackets.

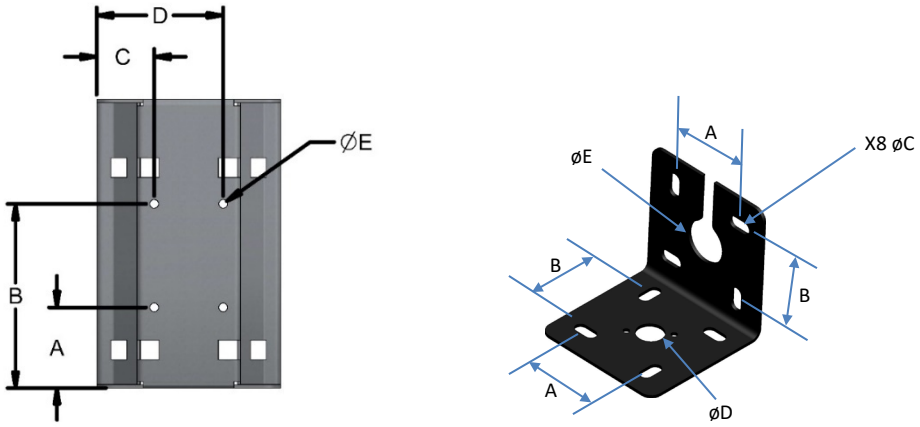


Figure 9 – Mounting Bracket Bolt Pattern

Table 6 – Mounting Bracket Dimensions

Assembly Part Number	Dimension "A"		Dimension "B"		Dimension "C"		Dimension "D"		Dimension "E"	
	in	cm	in	cm	in	cm	in	cm	in	cm
111403	4.1	10.4	8.1	20.6	2.1	5.3	3.8	9.7	.39	.99
111402	3.5	8.9	8.0	20.3	2.5	6.4	5.5	14.0	.39	.99
111502	3.0	7.6	10.0	25.4	2.5	6.4	5.5	14.0	.39	.99
120305	1.75	4.45	1.75	4.45	.26	.66	.58	1.5	.90	2.3

NOTE: The heavy-duty mounting bracket assembly includes the clamps necessary for strapping the unit into the bracket.

2.9 Discharge Network

The discharge network must comply with the latest edition of NFPA 17 and can include flexible hose and fittings. Compliant hose and fittings are optionally available from Firetrace, but all hose and fittings must meet the minimum specifications.

2.9.1 Flexible Hoses and Fittings

Flexible hoses and flexible hose fittings are available as an optional part for the system discharge network. Flexible hoses and flexible hose fittings shall be in accordance with the latest edition of NFPA 17 or the local authority having jurisdiction. Temperature and pressure rating of the flexible hoses and flexible hose fittings shall not be exceeded.

2.9.1.1 Flexible Hoses

The flexible hoses are constructed with synthetic, high tensile textile cord reinforcement. Both ends are fitted with swivel adapters for easy installation. The flexible hoses have a maximum operating pressure of 300psig [20.7bar] and a minimum bend radius of 4in [10.2cm]. All unit assemblies use 1/2in flexible hoses. Refer to , Table 7 – Flexible Hose Part Numbers for additional information.

NOTE: When using flexible hoses for the discharge network, the total length of piping shall not exceed the maximum length found in Section 3.6.

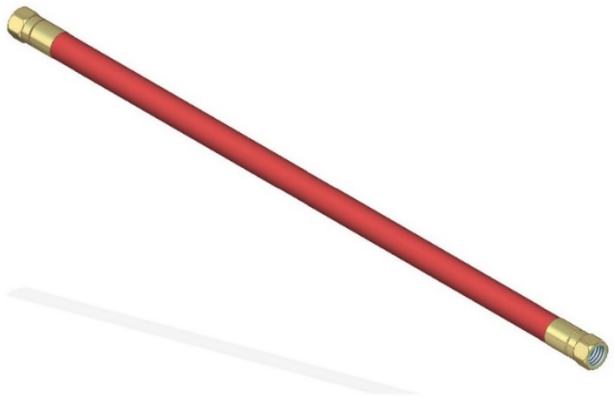


Figure 10: Flexible Hoses

Table 7 – Flexible Hose Part Numbers

Flexible Hose Part Number	Description
202820	1/2 in Flexible Hose, 1 ft
201820	1/2 in Flexible Hose, 2 ft
201821	1/2 in Flexible Hose, 4 ft
201822	1/2 in Flexible Hose, 6 ft
201823	1/2 in Flexible Hose, 8 ft
201824	1/2 in Flexible Hose, 10 ft

2.9.1.2 Flexible Hose Fittings

The flexible hose fittings are constructed of zinc plated steel. The flexible hose fittings allow for easy installation between the Firetrace Purple K Dry Chemical Powder ILP Units, the flexible hoses, and the system nozzles. The flexible hose fittings have a minimum burst rating of 3000psig [206.8bar]. Refer to Table 8 – Flexible Hose Fitting Part Numbers for all Unit Assemblies for additional information.

NOTE: This is an optional component.

NOTE: Brass fittings are also optional as long as they meet the minimum requirements of NFPA 17

Figure 11 – Flexible Hose Fittings

Table 8 – Flexible Hose Fitting Part Numbers for all Unit Assemblies

Flexible Hose Fitting Part Number	Description
850022	Fitting, 1/2 in Hose to Valve Union
820230	Fitting, 1/2in Hose to Valve Elbow
850023	Fitting, 1/2 in Hose Union
850024	Fitting, 1/2 in Hose Elbow
850025	Fitting, 1/2 in Hose Tee
850026	Fitting, 1/2 in Hose to Nozzle Union Bulkhead
850027	Fitting, 1/2 in Hose to Nozzle Elbow Bulkhead

2.9.1.3 Flexible Hose Mounting Clips

To mount the flexible hose inside the enclosure heavy duty mounting clips are available and should be used every 18 to 24 inches to secure hosing. See Table 38 - Installation Accessories for additional information.

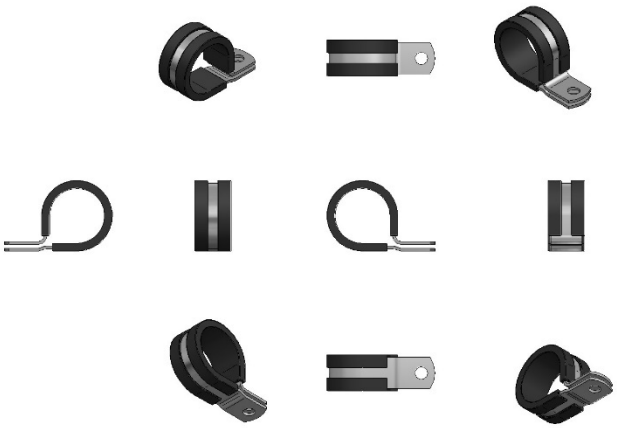


Figure 12: Discharge Hose Mounting Clips

2.9.2 Nozzles

Discharge nozzles are made of brass with female pipe threads. Nozzles are available in one size for use with Firetrace ILP Purple K Dry Chemical Powder Units. The discharge nozzle has a ½ in NPT threaded connection. The 940518, 941018, 941058, 942058, and 942018 assemblies use this nozzle, Figure 13 – Discharge Nozzle. The Firetrace ILP Purple K Dry Chemical Powder units can be designed using 2, 4 or 6 nozzles. The coverage for each nozzle must not exceed its maximum length and area of coverage. Refer to Section 3 for nozzle coverage information.

NOTE: Do not use Teflon tape or pipe compound when installing nozzles. Refer to NFPA 17.
NOTE: The nozzles are made of brass. Use a wrench with non-marring teeth and tighten until snug. Do not overtighten.

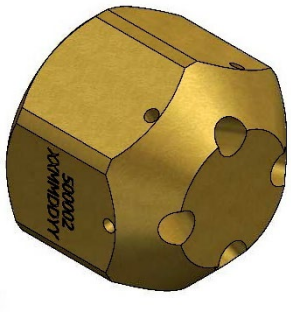


Figure 13 – Discharge Nozzle

Table 9 – Nozzle Part Number

Nozzle Part Number	Connection Size	Unit Assembly
500002	½ in NPT	All
500100	9/16-18 UNF-2B	All

2.9.2.1 Nozzle Fittings

The nozzle fittings are constructed of zinc plated steel. The nozzle fittings allow for easy installation between the Firetrace Purple K Dry Chemical Powder ILP Units, the flexible hoses, and the system nozzles. The nozzle fittings have a minimum burst rating of 3000psig [206.8bar]. Refer to Table 10 – Nozzle Fitting Part Numbers for all Unit Assemblies and Figure 11 - Nozzle Fittings for additional information.

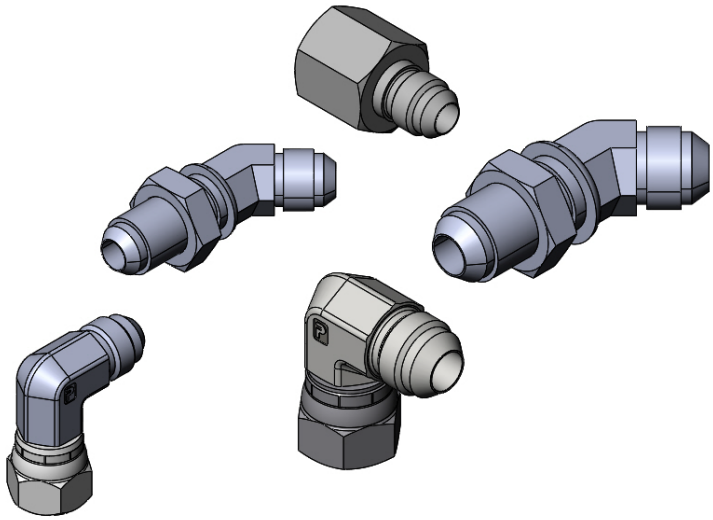


Figure 14 - Nozzle Fittings

Table 10 - Nozzle Fitting Part Numbers for all Unit Assemblies

Flexible Hose Fitting Part Number	Description
850100	Fitting, Reducer, -8 FJIC x -6 MJIC, Steel, Zinc Plated
850101	Fitting, Bulkhead Union, 45 Elbow, -8 MJIC, Locknut, Steel, Zinc Plated
850102	Fitting, Bulkhead Union, 45 Elbow, -6 MJIC, Locknut, Steel, Zinc Plated
850103	Fitting, 90 Elbow, -8 FJIC Swivel x -8 MJIC, Steel, Zinc Plated
850104	Fitting, 90 Elbow, -6 FJIC Swivel x -6 MJIC Steel, Zinc Plated

2.9.2.2 **Nozzle Cap**

The nozzle cap is molded of nitrile rubber. The nozzle cap keeps debris entering the nozzle and potentially clogging the nozzles during discharge. Refer to Figure 12: Nozzle Cap and Table 11 - Nozzle Cap Part Number for additional information.

Figure 15: Nozzle Cap

Table 11 - Nozzle Cap Part Number

Part Number	Description
510100	Nozzle, Cap, Small, NBR, Red

2.9.2.3 Nozzle Bracket

The nozzle bracket is constructed of black anodized aluminum. The nozzle bracket allows for easy installation of the system nozzles. Refer to Figure 13: Nozzle Bracket and Table 12 - Nozzle Bracket Part Number for additional information.

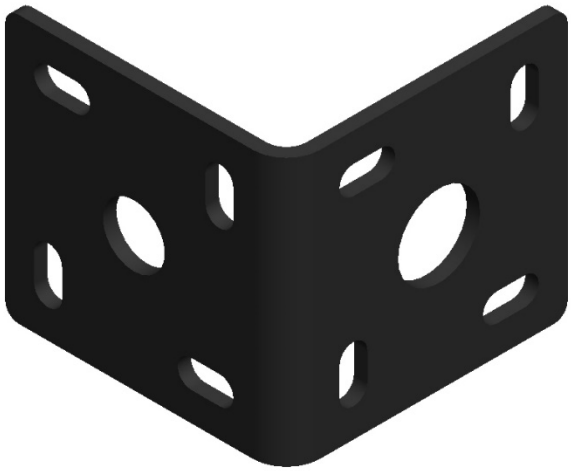


Figure 16: Nozzle Bracket

Table 12 - Nozzle Bracket Part Number

Part Number	Description
120301	Nozzle Bracket, 1/2IN and 3/8IN, BLK ANODIZE

2.10 Pressure Switches

2.10.1 Pressure Switch Assembly

The pressure switch assembly is available as an optional part for the system detection network. The fitting on the exterior of the pressure switch assembly enclosure allows for the detection tubing to be easily installed into the assembly.

The pressure switch assembly is used to monitor system pressure, system discharge, or it can be used to energize or de-energize electrically operated equipment. If the detection network to which the pressure switch is attached loses pressure and reaches a pressure of 135 ± 10psig [9.3 ± 0.7bar] or below, the switch contacts will operate. Refer to Figure 14 – Pressure Switch Assembly, Table 13 - Pressure Switch Assembly Part Number, Figure 15 – Pressure Switch Assembly Wiring Schematic, and Table 14 - Pressure Switch Assembly Properties for additional information.

The pressure switch is single pole, double throw (SPDT) and can be wired in either the normally open (NO) or normally closed (NC) configuration, where the normal condition is at atmospheric pressure. When the unit is pressurized, the contacts switch over.

When the pressure switch is used on a standard supervisory input circuit, there will be no distinction between a wiring fault and device actuation. The pressure switch shall be installed onto a circuit suitable for unit supervision in accordance with NFPA 70 National Electric Code and NFPA 72 National Fire Alarm and Signaling Code.

This device is only to be utilized when accepted by the authority having jurisdiction. All other uses of this switch should be approved by the authority having jurisdiction.

NOTE: All detection devices and auxiliary alarm and control devices must be electrically compatible with each other. They must be approved by the authority having jurisdiction.

NOTE: Firetrace recommends that all units be equipped with a pressure switch and connected into a notification or shutdown device, in the event of a discharge.

Figure 17 – Pressure Switch Assembly

Table 13 - Pressure Switch Assembly Part Number

Pressure Switch Part Number	Description
400441	Pressure Switch Assembly

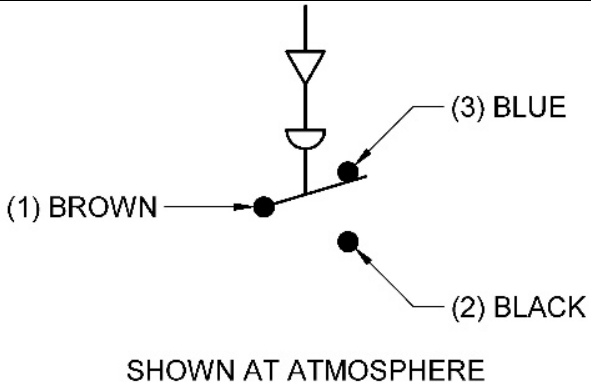


Figure 18 – Pressure Switch Assembly Wiring Schematic

Table 14 - Pressure Switch Assembly Properties

Electrical Rating		Temperature Range
28VDC – 15A		-20°F to 150°F [-28.9°C to 65.6°C]
NO (1 and 3): 120VAC – 10A 240VAC – 5A	NC (1 and 2): 120VAC – 25A 240VAC – 5A	

NOTE: All detection devices and auxiliary alarm and control devices must be electrically compatible with each other. They must be approved by the authority having jurisdiction.

NOTE: Firetrace recommends that all units be equipped with a pressure switch and connected into a notification or shutdown device, in the event of a discharge.

2.10.2 End of Line Pressure Switch

The end of line pressure switch is available as an optional part for the system detection network. The thread on the end of the pressure switch allows for easy installation into the threads of the end of line adapter. The provided washer ensures that the pressure switch will fully depress the Schrader core installed within the end of line adapter. The provided O-ring ensures that there will be an adequate seal between the pressure switch and the end of line adapter.

The end of line pressure switch is used to monitor system pressure, system discharge, or it can be used to energize or de-energize electrically operated equipment. If the detection network to which the pressure switch is attached loses pressure and reaches a pressure of 135 ± 10psig [9.3 ± 0.7bar] or below, the switch contacts will operate. Refer to Figure 16 – End of Line Pressure Switch, Table 15 - End of Line Pressure Switch Part Number, Figure 17 – End of Line Pressure Switch Wiring Schematic, and Table 16 - End of Line Pressure Switch Properties for additional information.

The pressure switch is single pole, double throw (SPDT) and can be wired in either the normally open (NO) or normally closed (NC) configuration, where the normal condition is at atmospheric pressure. When the unit is pressurized, the contacts switch over.

When the pressure switch is used on a standard supervisory input circuit, there will be no distinction between a wiring fault and device actuation. The pressure switch shall be installed onto a circuit suitable for unit supervision in accordance with NFPA 70 National Electric Code and NFPA 72 National Fire Alarm and Signaling Code.

This device is only to be utilized when accepted by the authority having jurisdiction. All other uses of this switch should be approved by the authority having jurisdiction.

NOTE: All detection devices and auxiliary alarm and control devices must be electrically compatible with each other. They must be approved by the authority having jurisdiction.

NOTE: Firetrace recommends that all units be equipped with a pressure switch and connected into a notification or shutdown device, in the event of a discharge.

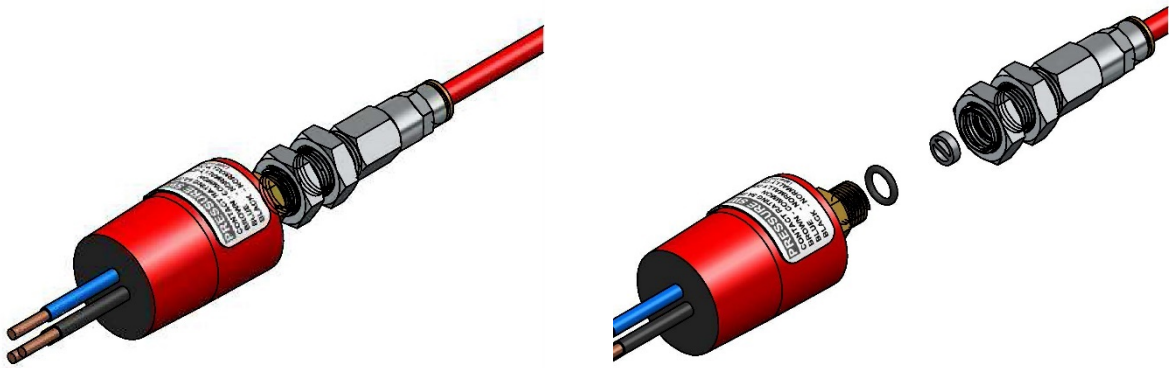


Figure 19 – End of Line Pressure Switch

Table 15 - End of Line Pressure Switch Part Number

Pressure Switch Part Number	Description
400004	End of Line Pressure Switch

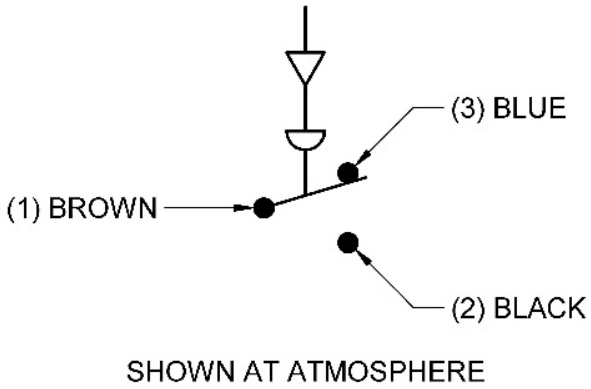


Figure 20 – End of Line Pressure Switch Wiring Schematic

Table 16 - End of Line Pressure Switch Properties

Electrical Rating		Temperature Range
28VDC – 15A		-20°F to 150°F [-28.9°C to 65.6°C]
NO (1 and 3): 120VAC – 10A 240VAC – 5A	NC (1 and 2): 120VAC – 25A 240VAC – 5A	

2.10.3 Valve Mounted Pressure Switch

The valve mounted pressure switch is an optional part of the unit assembly. It is factory installed into the pressure switch port of the cylinder valve. The valve mounted pressure switch is used to monitor unit pressure, unit actuation, or it can be used to energize or de-energize electrically operated equipment. If the unit to which the pressure switch is attached loses pressure and reaches a pressure of 135 ± 10psig [9.3 ± 0.7bar] or below, the switch contacts will operate. Refer to Figure 18 – Valve Mounted Pressure Switch, Table 17 - Valve Mounted Pressure Switch Part Number, Figure 19 – Valve Mounted Pressure Switch Wiring Schematic, and Table 18 - Pressure Switch Properties for additional information.

The pressure switch is single pole, double throw (SPDT) and can be wired in either the normally open (NO) or normally closed (NC) configuration, where the normal condition is at atmospheric pressure. When the unit is pressurized, the contacts switch over.

When the pressure switch is used on a standard supervisory input circuit, there will be no distinction between a wiring fault and device actuation. The pressure switch shall be installed onto a circuit suitable for unit supervision in accordance with NFPA 70 National Electric Code and NFPA 72 National Fire Alarm and Signaling Code.

This device is only to be utilized when accepted by the authority having jurisdiction. All other uses of this switch should be approved by the authority having jurisdiction.

NOTE: All detection devices and auxiliary alarm and control devices must be electrically compatible with each other. They must be approved by the authority having jurisdiction.

NOTE: Firetrace recommends that all units be equipped with a pressure switch and connected into a notification or shutdown device, in the event of a discharge.

CAUTION

Never use the pressure switch as a handle to transport the unit.

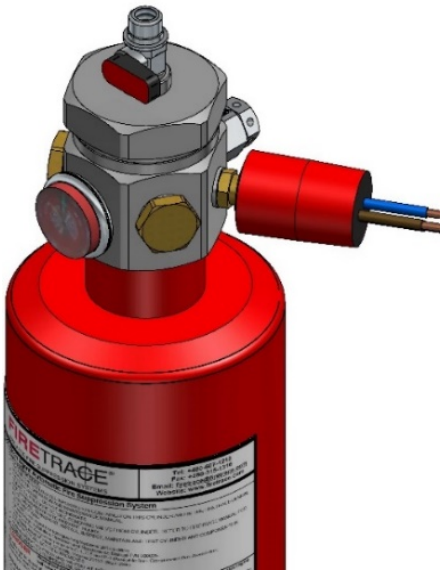


Figure 21 – Valve Mounted Pressure Switch

Table 17 - Valve Mounted Pressure Switch Part Number

Pressure Switch Part Number	Description
400001	Valve Mounted Pressure Switch

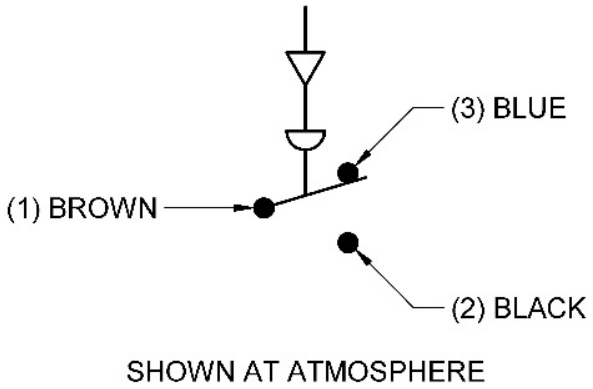


Figure 22 – Valve Mounted Pressure Switch Wiring Schematic

Table 18 - Pressure Switch Properties

Electrical Rating		Temperature Range
28VDC – 15A		-20°F to 150°F [-28.9°C to 65.6°C]
NO (1 and 3): 120VAC – 10A 240VAC – 5A	NC (1 and 2): 120VAC – 25A 240VAC – 5A	

2.11 Time Delay

The time delay assembly is available as an optional part for the system detection network. The time delay is to be used when the rundown time of the equipment like a fan will impede a suppression system's ability to operate effectively. The electronic time delay assembly is available in a 12 VDC configuration.

The electronic time delay assembly is used to detect the release of pressure in the detection circuit and delay the actuation of the suppression system by a preset time. Refer to Figure 20 - Electronic Time Delay Assembly, Table 19 - Electronic Time Delay Assembly Part Number, and DIOM 800071-A Electronic Time Delay for more detail.

The electronic time delay assembly shall be installed in accordance with NFPA 70 National Electric Code and NFPA 72 National Fire Alarm and Signaling Code.

NOTE: All detection devices and auxiliary alarm and control devices must be electrically compatible with each other. They must be approved by the authority having jurisdiction.

NOTE: Detection networks equipped with an electronic time delay assembly, require the use of a power supply.

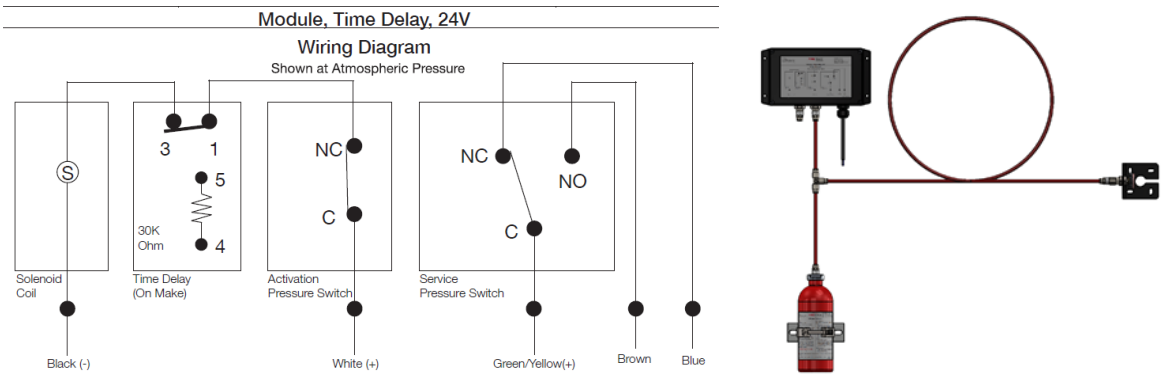


Figure 23 - Electronic Time Delay Assembly and Wiring Diagram

Table 19 - Electronic Time Delay Assembly Part Number

Electronic Time Delay Part Number	Description
600445	Electronic Time Delay Assembly

2.12 Indication and Activation Kit

The indication and activation kit is available as an optional part for the system fire detection network. The kit consists of a notification module and a system interface module. The notification module provides indication for “Fire/Activation” (Red LED and Audible Alarm), “Service” (Yellow LED), and “Power” (Green LED). The notification module can also be equipped with a system activation switch. The system interface module is equipped with a fitting that allows for the detection tubing to be easily installed into the system interface module.

When equipped with a system activation switch, the indication and activation kit is used to release pressure from the detection tubing, resulting in actuation of the Firetrace Purple K Dry Chemical ILP Unit. Refer to and for additional information.

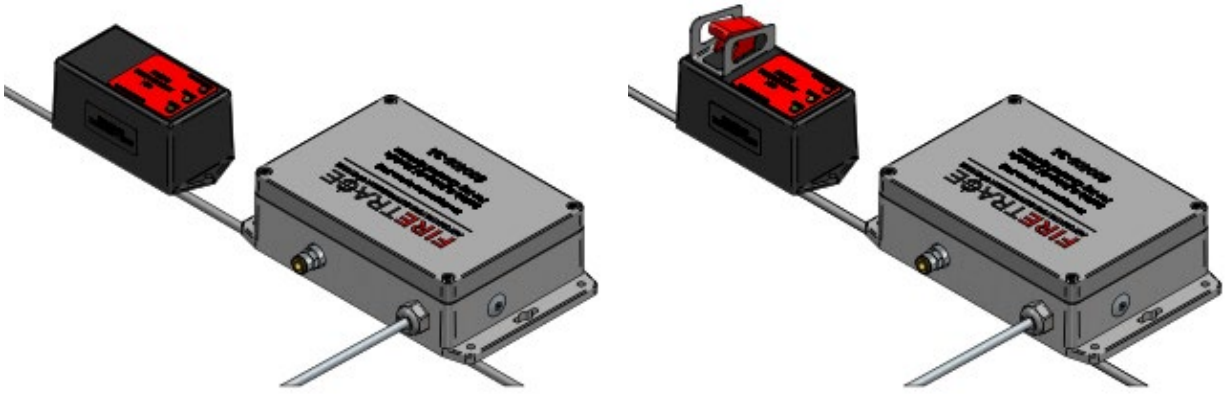
The indication and activation kit is available in 12 VDC or 24 VDC configurations.

NOTE: The indication and activation kit require the use of a 2-amp fuse. Fuse is not included as part of the kit.

The indication and activation kit shall be installed in accordance with NFPA 70 National Electric Code and NFPA 72 National Fire Alarm and Signaling Code.

NOTE: All detection devices and auxiliary alarm and control devices must be electrically compatible with each other. They must be approved by the authority having jurisdiction.

NOTE: Detection networks equipped with an indication and activation kit require the use of a 2-amp fuse.



Indication Only **Indication and Activation**

Figure 24 - Indication and Activation Kit

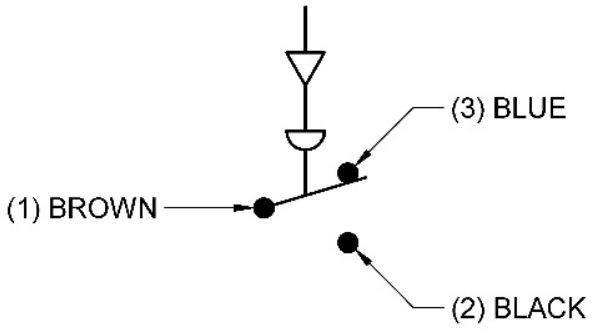


Figure 25 - Activation Wiring Schematic

Table 20 - Indication and Activation Kit Part Numbers

Indication and Activation Kit Part Number	Description
600410-12	12 VDC Indication Kit, 195psig, Bottom Cable
600420-12	12 VDC Indication and Activation Kit, 195psig, Bottom Cable
600410-24	24 VDC Indication Kit, 195psig, Bottom Cable
600420-24	24 VDC Indication and Activation Kit, 195psig, Bottom Cable

Section 3: Design

3.1 Introduction

The Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Unit design limitations were established and tested by Firetrace.

These units were subjected to numerous performance and fire tests, in order to verify the suitability of the fire suppression units and to establish design limitations for the following parameters:

- Operating specifications
- Percentage of unclosable openings
- Discharge hose and fittings limitations
- Nozzle height
- Firetrace detection tubing limitations
- Enclosure size
- Nozzle area coverage
- Nozzle placement
- Firetrace detection tubing placement

The Pre-Engineered concept minimizes the amount of engineering required when evaluating a design for a specific application. Provided that the discharge hosing and nozzles are installed within the limits outlined in this manual, no calculations are required for pressure drop, flow rates, or discharge time. When the additional limitations (enclosure volume, area coverage, maximum height, design concentration, agent quantity, detection tubing placement) are also met, the system installation can be understood to comply with the design requirements of NFPA 17. Therefore, no discharge tests or concentration measurements are required for evaluating a system design.

Systems shall be installed and maintained in accordance with NFPA 17, all applicable codes and regulations, and this manual**.** It is important that the limitations stated in this manual are followed.

CAUTION

Purple K Dry Chemical Powder shall NOT be used on fires involving the following materials:

- **Pyrotechnic chemicals containing their own oxygen supply.**
- **Reactive metals.**
- **Metal hydrides.**
- **Chemicals capable of undergoing autothermal decomposition.**
- **Deep seated or burrowing fires in ordinary combustible where point of combustion cannot be reached.**

3.2 Operating Specifications

3.2.1 Temperature Range

Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Units and equipment are designed to be stored and operated at the ambient temperature range of -40°F to 160°F [-40.0°C to 71.1°C].

3.2.2 Operating Pressure

The normal operating pressure for Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Units is 360psig at 70°F [24.8bar at 21.1°C].

Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Units are designed for an operating temperature range of -40°F to 160°F [-40.0°C to 71.1°C]. , shows the pressure gauge reading based on a charging pressure of 360psig at 70°F [24.8bar at 21.1°C].

Table 21 - Pressure-Temperature Relationship

Temperature		Pressure	
°F	°C	psig	bar
-40	-40	286	19.7
-30	-34.4	292	20.1
-20	-28.9	299	20.6
-10	-23.3	306	21.1
0	-17.8	312	21.5
10	-12.2	319	22.0
20	-6.7	326	22.5
30	-1.1	333	22.9
40	4.4	340	23.4
50	10.0	346	23.9
60	15.5	353	24.3
70	21.1	360	24.8
80	26.7	367	25.3
90	32.2	374	25.8
100	37.8	380	26.2
110	43.3	387	26.7
120	48.9	394	27.2
130	54.4	401	27.6
140	60	409	28.2
150	65.5	415	28.6
160	71.1	421	29.0

3.3 Design Procedure

In addition to the applicable requirements specified in NFPA 17, the following steps should be used to design a system utilizing a Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Unit:

a. Conduct a survey and analysis of the hazard to be protected.
b. Determine the length, width, and height of the enclosure and calculate the volume. All these parameters must be within the dimensional limitations specified in this manual.
c. Determine the anticipated minimum and maximum ambient temperatures within the enclosure.
d. Determine the minimum design concentration required for the hazard.
e. Determine the integrity of the enclosure and if any openings must be closed at the time of agent discharge.
    i. If the enclosure is sealed, partially sealed, or has unclosable openings less than 5%, use Section 3.4 to complete the design procedure.
    ii. If the enclosure has unclosable openings greater than 5% use Section 3.5 to complete the design

procedure.

f. Determine the cylinder size required, based on enclosure volume limitations and enclosure size.
g. Determine the quantity of nozzles required, based on the size and configuration of the enclosure.
h. Determine the location where the Firetrace Purple K Dry Chemical Powder ILP Unit and nozzles will be installed.
i. Determine the routing and quantity of discharge hoses required. Discharge hose and fittings used in the design must be within the limitations specified in this manual.
j. Determine the arrangement and placement of the Firetrace detection tubing. Tubing parameters must be within the limitations specified in this manual.
k. Determine any auxiliary equipment required to ensure proper protection of the enclosure. To include pressure switch and/or time delay
l. Prepare system drawings, bill of materials, and any additional documentation deemed necessary, following the applicable sections of NFPA 17.

3.4 Protected Enclosure

Firetrace Pre-Engineered Purple K Dry Chemical Powder Automatic Suppression Units are designed to protect an enclosure of any size or shape, provided that the enclosure parameters do not exceed the limitations stated in this manual. See Section 3.5 for specific about protecting engine compartments.

3.4.1 Enclosure Size

All unit assemblies are capable of protecting 77.5ft³ [2.19m³] for every pound of agent. Refer to for additional information.

Table 22 - Enclosure Size Limitations

Unit Assembly	Max Area Coverage		Maximum Height		Maximum Total Volume Coverage	
	ft²	m²	ft	m	ft³	m³
940518	43	4	9	2.74	387	11
941018/941058	86	8	9	2.74	775	22
942018/942058	172	16	9	2.74	1550	44

3.4.2 Ventilation and Unclosable Openings

Openings in the protected enclosure must be less than 5% of the total surface area of the enclosure. When the unit is discharged into an enclosure, normal gaps and openings under doorways must be taken into consideration for proper system performance. Doors and normal vents that are required in the enclosure must be closed prior to, or at the time of unit discharge. Doors or closures that normally swing to a closed position and are not held open do not require a system generated mechanism to operate. Doors and closures, including ventilation, which are held open while operating must have devices installed to close at the start or prior to unit discharge. All doors should be closed, and ventilation fans shut down prior to discharge.

In the event of a discharge, the protected enclosure must have sufficient structural strength and integrity to contain the agent discharge. If the pressure difference across the enclosure boundaries presents a threat to the hazard enclosure, venting shall be provided to prevent excessive pressures.

3.4.3 Unclosable Opening Percentage

The total area of unclosable openings shall not exceed 5% of the total surface area of the enclosure. If greater than 5% use section 3.5 to calculate the unclosable opening percentage, the following equation should be used:

$$UO = \frac{A_{TS}}{A_{UO}} * 100$$

where: UO = unclosable opening percentage
A_{TS} = total surface area (ft^2)
A_{UO} = total unclosable openings area (ft^2)

3.4.4 Unclosable Opening Compensation

Unclosable openings having an area in excess of 1 percent of the total enclosure area and not exceeding 5 percent shall be compensated for by the provision of additional Purple K Dry Chemical Powder. Compensation shall be accomplished by the use of supplemental Purple K Dry Chemical Powder in the proportion of not less than 0.5 lb/ft^2 (2.44 kg/m^2) of unclosed opening, applied through the regular distribution system.

3.5 Engine Compartment Size

The Firetrace Pre-Engineered Purple K Dry Chemical ILP Automatic Suppression Units are designed to enable the system to protect an engine compartment ranging from 35ft^3 to 212ft^3 [1m^3 to 6m^3], provided the engine compartment does not exceed the stated limitations. Refer to for additional information.

The hazards for this compartment include but are not limited to fuel lines, hydraulics, accumulated fluids and/or debris, ignition points such as turbos, exhaust manifolds, etc. The compartments can also contain exhaust manifolds, belly pans, hydraulic pumps, battery compartments, etc. as well.

Table 23 - Engine Compartment Size Limitations

Model	Purple-K Dry Chemical	Discharge Ports Used (DP)	Nozzles Per DP	Total Number of Nozzles Per Unit
940518	5lb (2.27kg)	2	1	2
			2	4
941018 941058	10lb (4.54kg)	2	1	2
			2	4
			3	6
942018 942058	20lb (9.07kg)	2	2	4
			3	6

3.6 Discharge Network

3.6.1 Discharge Hose and Hose Fitting Limitations

Changes in direction of flow can result in separation of the expellant gas and the Purple K Dry Chemical Powder. To provide proper distribution of the Purple K Dry Chemical Powder upon splitting the stream, special attention must be given to the method in which an approach is made to a tee after a change in direction. Refer to Table 24 and Figure 27 for more information.

Table 24 - Discharge Hose Limitations

Unit Assembly	Discharge Ports Used	Nozzles per Discharge Port	Total Nozzles Used	Maximum Elbows per Discharge Port	Maximum Tees per Discharge Port	Maximum Length of Discharge Hose per Port	
						ft	m
940518	2	1	2	2	0	20	6.1
	2	2	4	3	1	16	4.9
941018/941058	2	1	2	2	0	24	7.3
	2	2	4	3	1	20	6.1
942018/942058	2	1	2	2	0	26	7.9
	2	2	4	3	1	24	7.3
	2	3	6	4	2	20	6.1

3.6.2 Discharge Hose and Hose Fitting Specifications

All Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Units shall use discharge hoses for the agent distribution system. See Table 25 for specifications of the discharge hosing and hose fittings to be used with Firetrace Purple K Powder Dry Chemical ILP Units. Refer to NFPA 17 for alternate discharge network options.

Table 25 – Discharge Hose Fitting Specifications

Material	Connection Type	Minimum Pressure Rating
Brass	FJIC-08 Swivel	3000psig

3.6.3 6-Nozzle Hose Layout and Limitations

Discharge hose length limitations are critical to an even dispersal of agent. The total hose length for each discharge port shall not exceed 20ft but hose configurations can vary. Examples of allowable hose length configurations are provided in Table 26 – Nozzle Area Coverage Limitations and illustrated in Figure 23: Discharge Hose Network Layout. Tee fittings are located between Hose Lengths A, B and C and between C, D1, and D2.

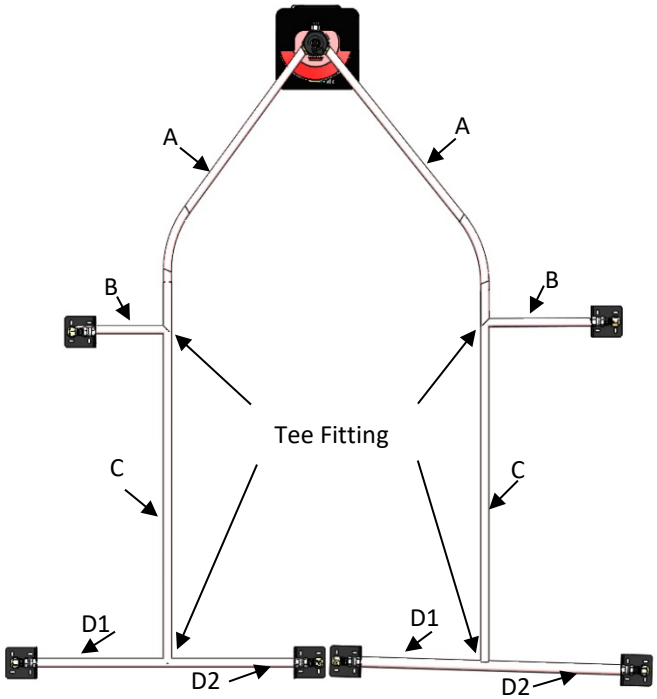


Figure 26 - Discharge Hose Network Layout

Table 26 - Nozzle Area Coverage Limitations

Length A (ft)	Length B (ft)	Length C (ft)	Length D1(ft)	Length D2(ft)	Max Hose Length per DP (A+B+C+D1+D2)
6	8	2	2	2	20
4	10	2	2	2	20
8	6	2	2	2	20

WARNING

All Discharge Line Tee fittings must be situated so that the flow exits the Tee in the same plane as to minimize the flow separation of Dry Chemical and Gas, as well as limit the effects of gravity on the agent split.

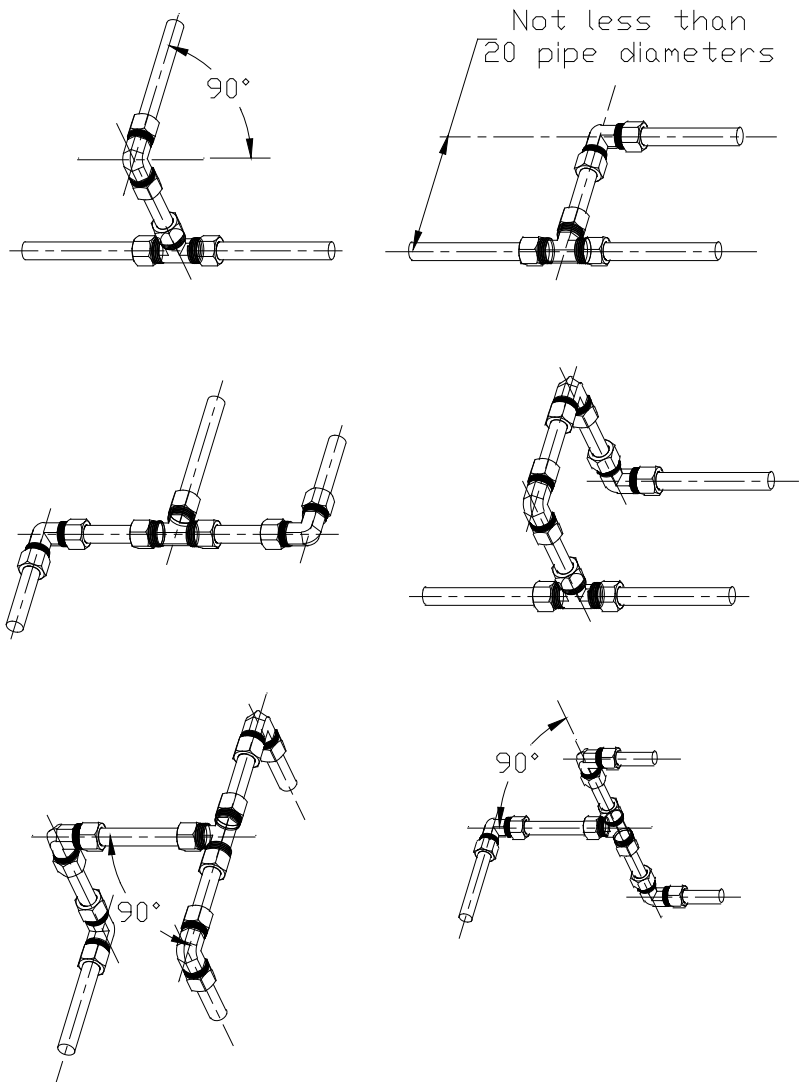


Figure 27 - Typical Tee Fitting Configuration Guideline

3.6.4 Nozzle Area Coverage

The 940518, 941018, and 941058 assemblies can be installed using 2 or 4 nozzles to suit the hazard configuration. The 942058 and 942018 assemblies can be installed using 2, 4, or 6 nozzles to suit the hazard configuration. below shows the nozzle area coverage limitations for Firetrace Pre-Engineered Purple K Powder ILP Automatic Suppression Units. The maximum enclosure height for nozzle installation is 9ft [2.74m] for all assemblies.

Each Firetrace ILP unit is equipped with two discharge ports and the number of nozzles required to cover the protected hazard is dependent on the size and shape of the enclosure. See for typical examples of configurations that meet the stated limitations.

When placing the nozzles in an engine compartment aim them at the hazards such as turbochargers, exhausts, fuel and hydraulic lines. For a total flooding application, place the nozzles along the top of the compartment and aim the nozzles straight down in a pendant fashion to cover the entire enclosure area.

Table 27 - Nozzle Area Coverage Limitations

Unit Assembly	Nozzles per Discharge Port	Total Nozzles Used	Maximum Area Coverage per Nozzle	Total Area Coverage per Unit	Maximum Installed Height	Maximum Volume Covered per Unit
940518	1	2	10.76ft² [1m²]	21.52ft² [2.0m²]	9ft [2.74m]	193.68ft³ [5.48m³]
	2	4	10.76ft² [1m²]	43.04ft² [4.0m²]		387.36ft³ [10.97m³]
941018/ 941058	1	2	21.52ft² [2m²]	43.04ft² [4.0m²]	9ft [2.74m]	387.36ft³ [10.97m³]
	2	4	21.52ft² [2m²]	86.08ft² [8.0m²]		774.72ft³ [21.94m³]
942018/ 942058	1	2	43.04ft² [4m²]	86.08ft² [8.0m²]	9ft [2.74m]	774.72ft³ [21.94m³]
	2	4	43.04ft² [4m²]	172.16ft² [16.0m²]		1549.44ft³ [43.88m³]
	2	6	43.04ft² [4m²]	258.24ft² [24.0m²]		2324.16ft³ [65.81m³]

3.7 Firetrace Detection Tubing

Location of the Firetrace detection tubing is critical to the response time in the event of a fire. The Firetrace detection tubing should be installed throughout the enclosure and routed in close proximity to all potential fire sources. The Firetrace detection tubing should not be placed horizontally adjacent to a potential fire source.

In order to protect the overall height of a protected enclosure we recommend; the tubing must be installed in height increments of 3.28ft [1.0m]. In order to protect the overall area of a protected enclosure, the tubing must be installed in passes. The maximum distance between passes is 21.12in [53.8cm]. The maximum distance allowed from any wall to the tubing is 10.56in [26.82cm]. The minimum bend radius shall not exceed 6.0in [15.24cm]. The maximum length of Firetrace detection tubing that can be used for Firetrace Purple K Dry Chemical Powder ILP Units is 120ft [36.58m]. Refer to and below for Firetrace detection tubing limitations and a guideline for typical tubing configurations.

Table 28 - Firetrace Detection Tubing Limitations

Description	Limitation	
Maximum length	120ft	36.58m
Maximum height between layers	3.28ft	1.0m
Maximum distance between passes	21.12 in	53.8cm
Maximum distance from wall	10.56in	26.82cm
Minimum bend radius	6.0in	15.24cm

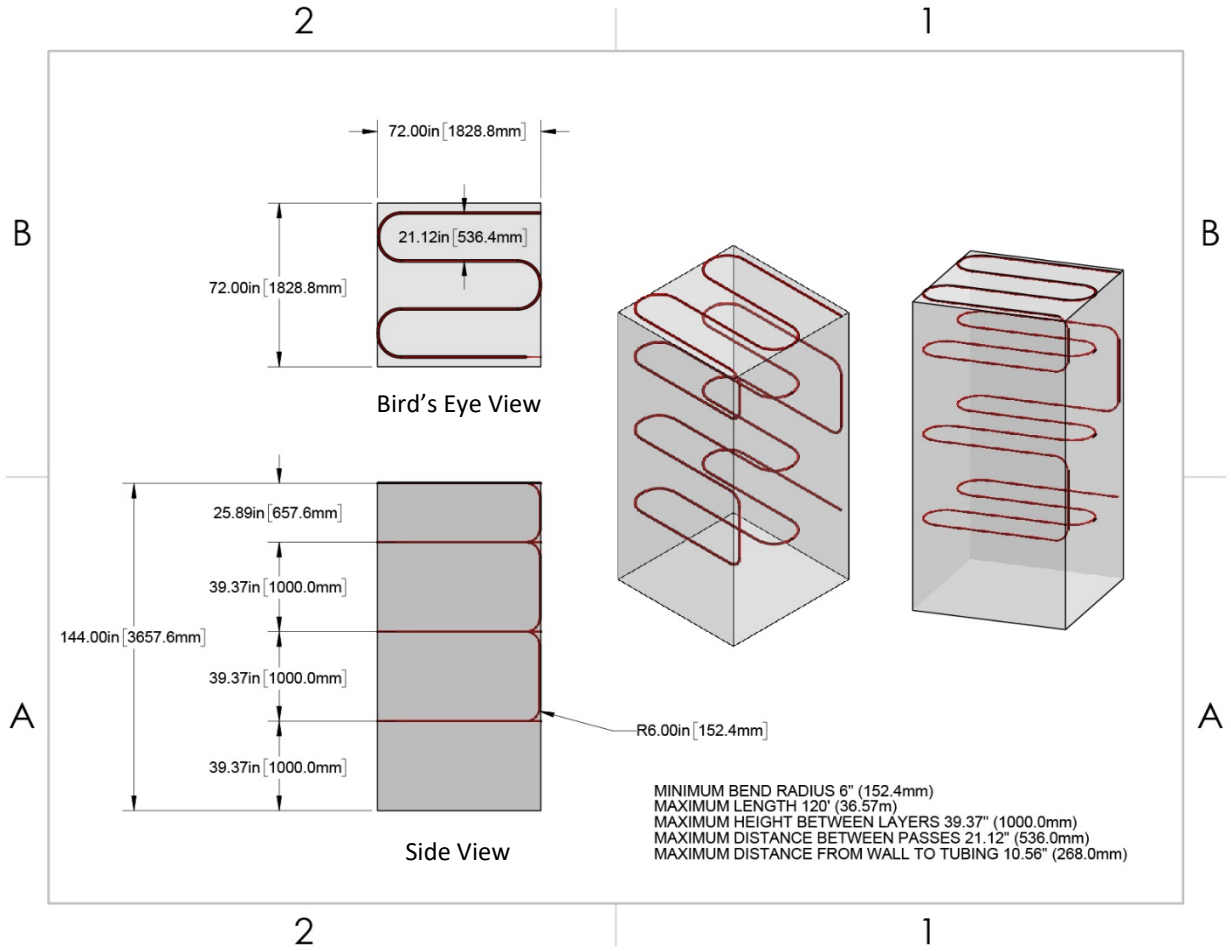


Figure 28 - Tubing Configuration Guideline

Section 4: Installation

4.1 Introduction

This section provides installation instructions for components and limitations described in Section 2 and Section 3 of this manual. All components should 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, mechanical damage, chemical damage, or other damage which could render the equipment inoperative.

Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Suppression Units and equipment must be handled, installed, and serviced only by qualified and trained personnel, in accordance with the instructions contained in this manual and on the cylinder nameplate, as well as NFPA 17 and any other regulations and codes that may apply.

4.1.1 Installation Requirements

You need the system or systems, the mounting hardware, the actuation accessories, the discharge nozzles and hoses, the detection tubing and associated fittings.

The hardware needed to install a Firetrace fire suppression system will depend on the enclosure, but will include standard parts such as nuts, bolts, washers, and zip-ties. While reviewing Section 3 of this manual it would be helpful also consider the tools and hardware required to install all equipment.

We recommend 3/8”-16 Grade 5 hardware and ¼”-20 Grade 5 hardware to mount the cylinder brackets and accessory brackets respectively.

4.2 Firetrace Purple K Dry Chemical Powder ILP Unit

WARNING

Ensure the ball valve, located on the top of the cylinder valve, is maintained in the “OFF” position. Ensure that the discharge port plugs are installed until the unit is mounted and ready for connection to the discharge piping. Review Figure 21.

The Firetrace Purple K Dry Chemical Powder ILP Unit should be located as close as possible to the protected enclosure. In some cases, the unit can be mounted inside the protected enclosure. The unit shall be located in a readily accessible location to allow for ease of inspection, service, and maintenance. The unit shall be located in an environment protected from the weather and where the temperature range is between -40°F to 160°F [-40°C to 71.1°C].

The cylinder and bracket must be mounted in the vertical plane with the cylinder valve on top, and oriented so that the pressure gauge is facing out and away from the mounting wall to facilitate visual inspection. Use four of the cylinder bracket mounting holes to secure the assembly to the enclosure.

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.

The steps below should be followed to ensure proper installation of the Firetrace Purple K Dry Chemical Powder ILP Unit:

1. Install the cylinder mounting bracket to a structural support using at least four mounting holes.
2. Agitate the Purple K Dry Chemical Powder by carefully inverting the unit assembly and gently knocking on the bottom and sides of the cylinder with a rubber mallet. Knock with a rubber mallet 5 to 10 times to ensure proper agitation.
3. Verify the unit pressure is within the operable range.
4. Position the cylinder in the bracket with the pressure gauge facing out.

5. Secure the cylinder in place using the band clamps.

WARNING

Pressurized (charged) cylinders are extremely hazardous and if not handled properly are capable of causing property damage, bodily injury, or death. Always wear safety glasses and ensure the discharge port plugs are properly installed before installing, servicing, or other general handling of ILP Units.

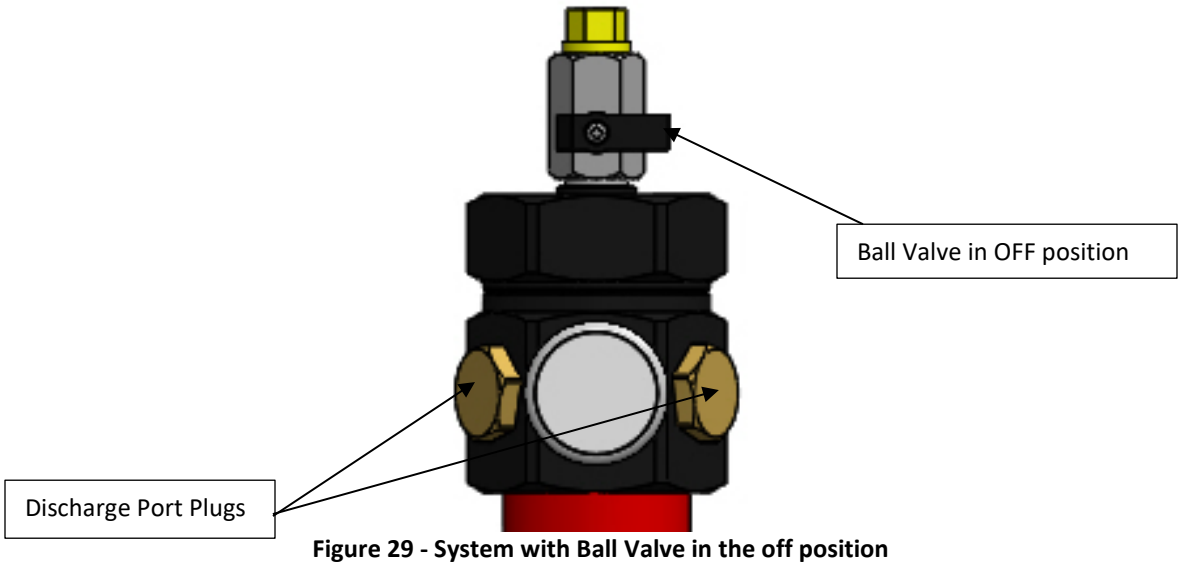


Figure 29 - System with Ball Valve in the off position

4.3 Discharge Network

The steps below should be followed to ensure proper installation of the discharge network:

1. Following the guidelines and limitations outlined in Section 3.6. Two discharge ports are to be used, verify that the hose length from each discharge port does not exceed a 10% imbalance.
2. Following the guidelines and limitations outlined in Section 3, determine whether two, four, or six nozzles will be used and install the nozzles.
3. Remove the discharge port plug(s), as required, and install male connection fittings in the discharge port(s), as required.
4. Install the discharge hosing and fittings between the discharge port(s) and nozzle(s). Secure the discharge network with the appropriate hose clamps at least every two feet.

Secure the discharge network hosing to avoid pinch points like doors that are opened repeatedly by routing the network in a way that provides adequate hosing clearance.

NOTE: Improper installation will not allow for proper discharge.

4.4 Detection Network

4.4.1 Firetrace Detection Tubing

Location and spacing of the tubing is critical to the response time in the event of a fire. The tubing should be placed above the hazard areas being protected. In addition to the guidelines and limitations outlined in Section 3.7, the steps below should be followed to ensure proper installation of the detection network:

1. Secure the Firetrace detection tubing by using the Firetrace supplied p-clip mounting tabs. The p-clip mounting tabs should be placed at 1.5ft [0.46m] intervals.
2. Use the appropriate rubber/plastic grommets when the detection tubing is routed through sharp holes in order to prevent damage to the tubing.
3. If installing an end of line accessory, route the tubing in such a way that the accessory is accessible or visible to service technician or allows for potential wiring into the equipment's power system.

NOTE: Do not kink, bend, or crush Firetrace detection tubing. Damage to the tubing can result in leakage and/or accidental discharge of the Firetrace Purple K Dry Chemical Powder ILP Unit.

4.4.2 Tube Fittings

All detection tube fittings must be secured in the following manner:

1. Cut the tube end utilizing a Firetrace tube cutter, ensuring the cut is clean, square, and free from burrs.
2. Thoroughly clean the tubing, starting from the cut end, to approximately 2in [5.1cm] from the cut end. Remove all dirt, grease, or grime and ensure no debris is left in the tube. This will ensure a proper seal inside the fitting.
3. Slide the tubing into the opening of the fitting, until it reaches the inner wall. Two distinct "clicks" will be felt as the tubing is inserted into the fitting.
4. Lightly pull on the tubing. The brass outer ring should move outward slightly.

NOTE: Any time tubing is removed from fitting, it should be recleaned and recut to ensure proper seal.

NOTE: Secure tubing on both sides of change of direction to prevent side loading.

4.4.3 End of Line Accessories

The end of line adapter, if used as part of the system, is used to install auxiliary accessories to the detection network. One end of the end of line adapter contains a tube fitting. Install the end of line adapter to the end of the Firetrace detection tubing using the instructions outlined in Section 4.4.2. The end of line adapter must have either a pressure gauge, pressure switch, or plug installed to prevent system leakage. See Section 2.10 for details about

these accessories.

NOTE: End of line Adapters are not designed to provide a lasting seal without the use of auxiliary accessories.

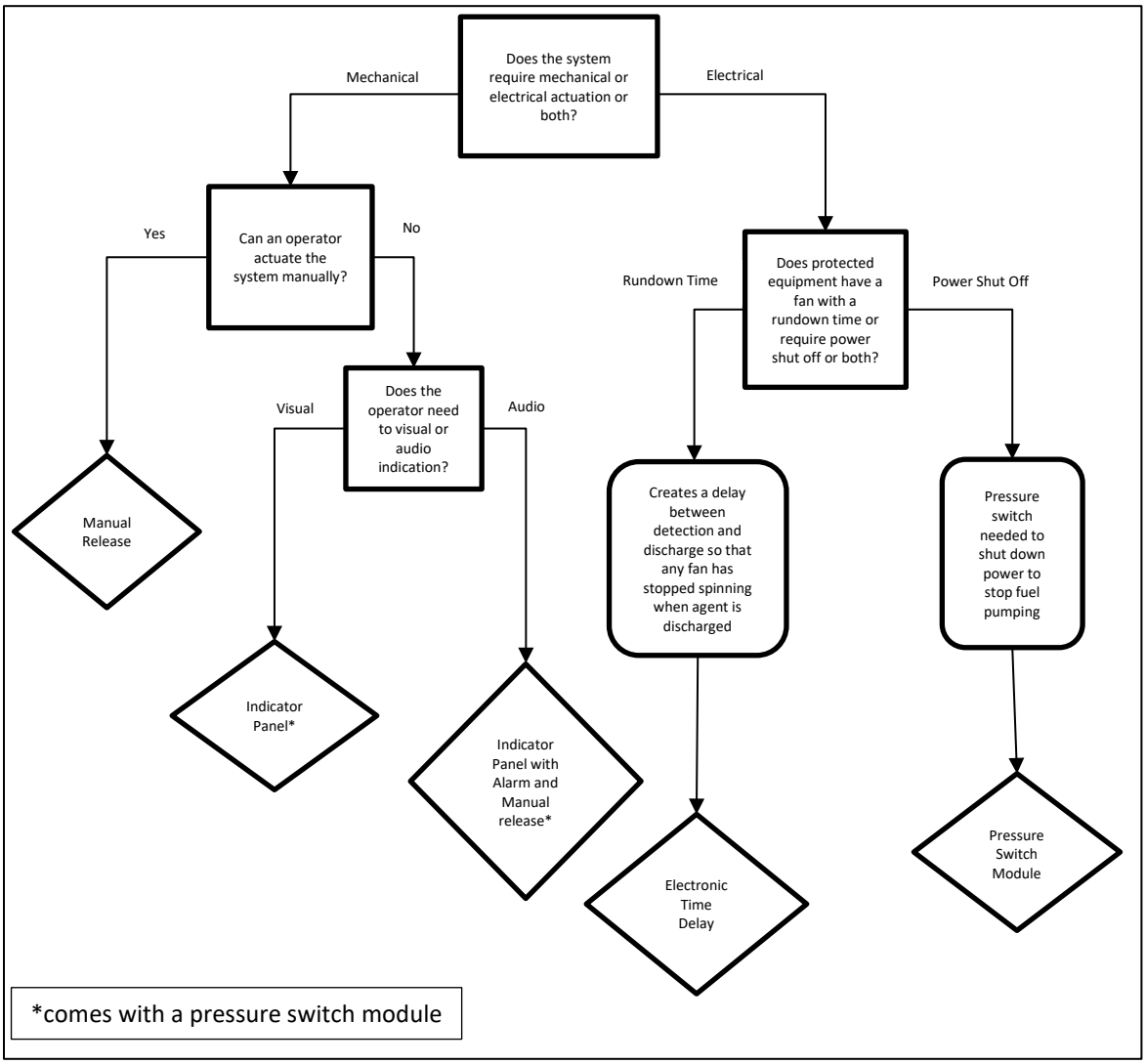


Figure 30 - Actuation Decision Flow Chart

Section 5: Operation

5.1 System Activation

WARNING

Ensure the ball valve, located on the top of the cylinder valve, is maintained in the "OFF" position.

The steps below should be followed to ensure proper system activation of the Firetrace Purple K Dry Chemical Powder ILP Unit:

1. Install the detection tubing throughout the enclosure. Ensure all necessary fittings and accessories are installed in accordance with the procedures specified in Section 4.
2. With the unit ball valve in the closed position, install the tube fitting into the ball valve attached to the top of the cylinder valve.
3. Install one end of the Firetrace detection tubing into the fitting in accordance with the procedures specified in Section 4.
4. Ensure the end of line adapter or manual release is installed in the opposite end of the detection tubing. Verify no accessories are installed in the end of line adapter or manual release.
5. Attach the filling adapter (P/N 600010) to a regulated nitrogen supply.
6. Attach the filling adapter into the end of line adapter or manual release.
7. Pressurize the detection tubing to 360psig [24.8bar].
8. Remove the nitrogen supply and filling adapter from the end of line adapter or manual release.
9. Thread the pressure gauge into the end of line adapter or manual release and verify that the tubing is pressurized to at least 360psig at 70°F [24.8bar at 21.1°C]. (Pressure may have to be adjusted for temperatures higher or lower than 70°F [21.1°C]).
10. With the gauge still installed in the end of line adapter, test for leakage:
    a) Apply a soapy water solution to the cylinder valve connection, end of line adapter connection, and the pressure gauge connection.
    b) Observe for bubble leaks.
    c) After approximately 30 minutes, verify the pressure gauge reading. Any decrease in pressure is an indication of a leak. If the system is determined to contain a leak, refer to Section 4 and verify that installation procedures were properly followed for all fittings and accessories.
11. If the end of line pressure switch is to be installed, remove the pressure gauge from the end of line adapter and install the end of line pressure switch in accordance with the procedures specified in Section 4.
12. After confirming that there is no leakage within the detection tubing, SLOWLY rotate the ball valve lever counterclockwise, to the "ON" position.
13. Tamperproof the Firetrace Puprle K Dry Chemical Powder ILP Unit by removing the ball valve lever face and securing the ball valve lever in the "ON" position with the tamperproof device.
14. If a pressure switch is installed on the system or on the end of line adapter, ensure the proper electrical connections are made, in accordance with NFPA 70 National Electric Code, NFPA 72 National Fire Alarm and Signaling Code, and any other applicable codes and regulations that may apply.
15. The Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Unit is now ready for use.

NOTE: All detection devices and auxiliary alarm and control devices must be electrically compatible with each other. They must be approved by the authority having jurisdiction.

WARNING

Only open the ball valve AFTER the tubing has been pressurized. Opening the ball valve without pressurizing the tubing will cause actuation of the unit, resulting in system discharge.

WARNING

Ball valve must SLOWLY be opened. Opening the ball valve abruptly, may cause actuation of the unit, resulting in system discharge.

Section 6: Maintenance

6.1 General

Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Units must be handled, installed, inspected, and serviced only by qualified and trained personnel in accordance with the instructions contained in this manual, cylinder nameplates, NFPA 2001 and any other codes and regulations that may apply.

A regular program of systematic maintenance must be established for continuous, proper operation of all Firetrace Purple K Dry Chemical Powder ILP units. A periodic maintenance schedule must be followed and an inspection log maintained. At a minimum, the log must record: (1) inspection interval, (2) inspection procedure performed, (3) maintenance performed, if any, as a result of inspection, and (4) name of inspector performing task.

For any deficiencies that are found, appropriate corrective actions shall be taken immediately.

NOTE: Any maintenance requiring depressurization, filling, or pressurization shall only be performed at an authorized Firetrace service location. Service at any other location will void any warranty. Please contact Firetrace directly for a list of authorized Firetrace service locations.

WARNING

Pressurized (charged) cylinders are extremely hazardous and if not handled properly are capable of causing property damage, bodily injury, or death. Always wear safety glasses and ensure the discharge port plugs are properly installed before installing, servicing, or other general handling of ILP Units.

6.2 Maintenance Schedule

6.2.1 Monthly

The following are to be performed on a monthly basis by the owner or designated personnel:

1. Verify the Firetrace Purple K Dry Chemical Powder ILP Unit is in its proper location.
2. Verify the tamperproof device is intact.
3. Confirm the maintenance tag or certificate is in its proper location.
4. Verify that the Firetrace Purple K Dry Chemical Powder ILP Unit shows no physical damage or degradation that might prevent operation.
5. Verify the pressure gauge is in the operable range.
6. Verify nozzle blow off caps (if used) are intact and undamaged.
7. Verify the protected equipment and hazard has not been replaced, modified, or relocated.
8. If a pressure switch is installed:
    a) Check connection for any leakage.
    b) Verify the proper electrical connections are made.

NOTE: All electrical connections are to be in accordance with NFPA 70 National Electric Code and NFPA 72 National Fire Alarm and Signaling Code, and any other applicable codes and regulations.

NOTE: This system consists of components tested within limitations contained in this manual. The designer of this system must be consulted prior to any planned changes to either the system or the area being protected. An authorized Firetrace distributor must be consulted after the system has discharged.

NOTE: Firetrace recommends replacement of the tubing at various intervals, depending on the application and exposure.

6.2.2 Semi-Annual

The semi-annual maintenance is to be performed by an authorized Firetrace distributor. Maintenance should include a repetition of the monthly maintenance as well as verification of the Firetrace Purple K Dry Chemical Powder ILP Unit weight. Additionally, the Purple K Dry Chemical Powder should be agitated. The Firetrace Purple K Dry Chemical Powder ILP unit weight should be verified using the following steps:

1. Remove the tamperproof device from the ball valve lever.
2. Rotate the ball valve lever clockwise, to the "OFF" position.
3. Depressurize the Firetrace detection tubing:
   a) Remove accessory installed into the end of line adapter.
   b) Depress the Schrader core in the end of line adapter or manual release until all pressure is released.
4. Remove the Firetrace detection tubing from the tube fitting attached to the top of the cylinder valve.
5. Remove the discharge piping from the discharge outlet ports.
6. Install the discharge outlet port plugs into both discharge outlet ports. Discharge outlet port plugs are 1/2in NPT male fittings.
7. Remove the cylinder from the cylinder mounting bracket.
8. Weigh the Firetrace Purple K Dry Chemical Powder ILP Unit.
   a) Compare the measured weight with the weight specified on the cylinder labels. If the Firetrace Purple K Dry Chemical Powder ILP Unit shows a loss in agent quantity of more than 5 percent, the unit shall be refilled or replaced.
9. Carefully invert the unit assembly and gently knock on the bottom and sides of the cylinder with a rubber mallet approximately 5 to 10 times.
10. Verify pressure reading on the pressure gauge installed to the Firetrace Purple K Dry Chemical Powder ILP Unit.
    a) If the Firetrace Purple K Dry Chemical Powder ILP Unit shows a pressure loss (adjusted for temperature) of more than 10 percent, the unit shall be refilled or replaced.
11. Reinstall the Firetrace Purple K Dry Chemical Powder ILP Unit and pressurize the detection tubing, see Section 4 and Section 5 for instructions.

NOTE: This system consists of components tested within limitations contained in this manual. The designer of this system must be consulted prior to any planned changes to either the system or the area being protected. An authorized Firetrace distributor must be consulted after the system has discharged.

NOTE: Any maintenance requiring depressurization, filling, or pressurization shall only be performed at an authorized Firetrace service location. Service at any other location will void any warranty. Please contact Firetrace directly for a list of authorized Firetrace service locations.

WARNING

Only depressurize tubing AFTER the ball valve has been closed. Depressurizing the tubing without closing the ball valve will cause actuation of the unit, resulting in system discharge.

WARNING

Only open the ball valve AFTER the tubing has been pressurized. Opening the ball valve without pressurizing the tubing may cause actuation of the unit, resulting in system discharge.

WARNING

Ball valve must SLOWLY be opened. Opening the ball valve abruptly, may cause actuation of the unit, resulting in system discharge.

WARNING

Pressurized (charged) cylinders are extremely hazardous and if not handled properly are capable of causing property damage, bodily injury, or death. Always wear safety glasses and ensure the discharge port plugs are properly installed before installing, servicing, or other general handling of ILP Units.

6.2.3 Six-Year

The six-year maintenance is to be performed by an authorized Firetrace distributor. Maintenance should include a repetition of the monthly and semi-annual maintenance, a complete external visual inspection of the cylinder, per the guidelines detailed in Section 7 of NFPA 2001, and evaluation of the Firetrace detection tubing for damage and pliability.

NOTE: Any maintenance requiring depressurization, filling, or pressurization shall only be performed at an authorized Firetrace service location. Service at any other location will void any warranty. Please contact Firetrace directly for a list of authorized Firetrace service locations.

6.3 Firetrace Detection Tubing Maintenance

Firetrace detection tubing maintenance is to be performed by an authorized Firetrace distributor. Maintenance should include a complete external visual inspection of the tubing during every monthly inspection. The tubing shall show no signs of physical damage or degradation, including but not limited to abrasion, distortion, cuts, dirt accumulation. For any deficiencies that are found, appropriate corrective actions shall be taken immediately.

In addition to a monthly visual inspection, a six-year inspection is to be performed to evaluate the tubing for damage and pliability. If any concerns are noted, replacement of the Firetrace detection tubing is recommended.

After 10 years of continuous use, the Firetrace detection tubing should be replaced in its entirety. However, if all routine maintenance is followed and inspection of the tubing determines the tubing to be in good condition and does not show signs of damage or degradation, the tubing can remain in service.

NOTE: NFPA 17 recommends tubing replacement every 3 years that will be determined at the time of visual inspection

NOTE: If a fire situation is experienced, any sections of tubing that have ruptured or have been damaged during a fire must be replaced. Sections can be replaced by splice connections.

WARNING

To prevent accidental actuation of the unit, only inspect tubing AFTER the ball valve has been closed. Once inspection is complete, ensure tubing is pressurized and remains pressurized and the ball valve is open.

WARNING

Pressurized (charged) cylinders are extremely hazardous and if not handled properly are capable of causing property damage, bodily injury, or death. Always wear safety glasses and ensure the discharge port plugs are properly installed before installing, servicing, or other general handling of ILP Units.

6.4 Purple K Dry Chemical Powder Maintenance

Maintenance of the Purple Dry Chemical K Powder is to be performed by an authorized Firetrace distributor. Prior to installation and during every semi-annual inspection the Purple K Dry Chemical Powder should be agitated using a rubber mallet. Additionally, at least once every 6 years the Purple K Dry Chemical Powder should be examined for caking. If any concerns are noted, replacement of the Purple K Dry Chemical Powder is recommended. The following steps should be followed when agitating the Purple K Dry Chemical Powder:

1. Remove the tamperproof device from the ball valve lever.
2. Rotate the ball valve lever clockwise, to the “OFF” position.
3. Depressurize the Firetrace detection tubing:
    c) Remove accessory installed into the end of line adapter or manual release.
    d) Depress the Schrader core in the end of line adapter or manual release until all pressure is released.
4. Remove the Firetrace detection tubing from the tube fitting attached to the top of the cylinder valve.
5. Remove the discharge piping from the discharge outlet ports.
6. Install the discharge outlet port plugs into both discharge outlet ports.

7. Remove the cylinder from the cylinder mounting bracket.
8. Carefully invert the unit assembly and gently knock on the bottom and sides of the cylinder with a rubber mallet approximately 5 to 10 times.
9. Reinstall the system.

WARNING

Unit should only be agitated AFTER the ball valve has been closed, the tubing depressurized, and the discharge port plugs installed into the discharge ports. Agitating without following these steps may cause actuation of the unit, resulting in system discharge.

WARNING

Pressurized (charged) cylinders are extremely hazardous and if not handled properly are capable of causing property damage, bodily injury, or death. Always wear safety glasses and ensure the discharge port plugs are properly installed before installing, servicing, or other general handling of ILP Units.

6.5 Cylinder Maintenance

Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Units are assembled with cylinders manufactured to DOT-4B specifications, and therefore fall under DOT regulations for retest, prior to any refilling procedures.

Under DOT regulations, cylinders manufactured to DOT-4B specifications are required to be hydrostatically tested and stamped prior to recharge and shipment, if the last hydrostatic test date has expired.

Cylinders requiring hydrostatic testing must be tested in accordance with 49 CFR 173.34. The periodic hydrostatic test must be performed by an authorized tester, having a current identification number issued by the Associated Administrator for Hazardous Material Safety of DOT. The periodic hydrostatic test must also include an internal and external examination, in accordance with CGA pamphlet C-6, C-6.1, C-6.2, and C-6.3, as applicable. The periodic hydrostatic test procedures also require measurement of the volumetric expansion of the container. As a result, only the water jacket volumetric expansion method or the direct expansion method are acceptable.

As an alternate to the periodic hydrostatic test, cylinders may be given a complete external visual inspection, in accordance with 49 CFR 173.34(e)(13). The visual inspection shall be made only by competent persons. A person who performs the visual examination specified in 49 CFR 173.34(e)(13) is not required to have an identification number issued by the Associated Administrator for Hazardous Material Safety of DOT.

below outlines the testing that can be performed to meet DOT regulations.

Table 29 - Cylinder Maintenance

Test Method	First Test Due	Subsequent Test Due	Special Marking
Full hydrostatic test. Including determination of cylinder expansion.	5 years	5 years	Test Date Month/Year
External visual inspection per 49 CFR 173.34(e)(13) AND CGA pamphlet C-6, Section 3.	5 years	5 years	Test date Month/Year followed by “E”

Section 7: Recharge

7.1 General

Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Units must be handled, installed, inspected, and serviced only by qualified and trained personnel in accordance with the instructions contained in this manual, cylinder nameplates, NFPA 17 and any other codes and regulations that may apply.

NOTE: Any maintenance requiring depressurization, filling, or pressurization shall only be performed at an authorized Firetrace service location. Service at any other location will void any warranty. Please contact Firetrace directly for a list of authorized Firetrace service locations.

WARNING

Pressurized (charged) cylinders are extremely hazardous and if not handled properly are capable of causing property damage, bodily injury, or death. Always wear safety glasses and ensure the discharge port plugs are properly installed before installing, servicing, or other general handling of ILP Units.

7.2 Recharge

The steps below should be followed to ensure proper recharge of an empty Firetrace Purple K Dry Chemical Powder ILP Unit:

1. Fill the cylinder with the appropriate amount of agent. Refer to Table 2, for correct agent amount.
2. Clean the threads of the cylinder with a small brush or dry cloth.
3. Thread the siphon tube into the bottom of the valve.
4. Insert bottom end of siphon tube into the cylinder, and thread the valve into the cylinder.
5. With the discharge port plugs in place, use the ball valve attached to the top of the valve to pressurize the Firetrace Purple K Dry Chemical Powder ILP Unit to 360psig at 70°F [24.8bar at 21.1°C].
6. Shake the system thoroughly to ensure the nitrogen is absorbed by the Purple K Dry Chemical Powder.
7. Close the ball valve and leak test the Firetrace Purple K Powder ILP Unit. If a leak detector is unavailable, a 48-hour holding period should be used to evaluate whether there is a leak.
8. The Firetrace Purple K Dry Chemical Powder ILP Unit is now ready to be transported to the installation site.

NOTE: Any maintenance requiring depressurization, filling, or pressurization shall only be performed at an authorized Firetrace service location. Service at any other location will void any warranty. Please contact Firetrace directly for a list of authorized Firetrace service locations.

WARNING

Only depressurize tubing AFTER the ball valve has been closed. Depressurizing the tubing without closing the ball valve may cause actuation of the unit, resulting in system discharge.

WARNING

Ball valve must SLOWLY be opened. Opening the ball valve abruptly, may cause actuation of the unit, resulting in system discharge.

Section 8: Post Discharge

8.1 Ventilation

Before inspecting the enclosure after a Firetrace Purple K Dry Chemical Powder ILP Unit discharge, ventilate the enclosure thoroughly. Purple K Powder will require clean-up operations after unit discharge.

8.2 Remove from Service

An authorized Firetrace distributor must be consulted after a system has discharged. The Firetrace Purple K Powder ILP Unit must be removed and recharged. The Firetrace Purple K Dry Chemical Powder ILP unit should be removed using the following steps:

1. Remove the Firetrace detection tubing from the tube fitting attached to the top of the cylinder valve.
2. Remove the discharge piping from the discharge outlet ports.
3. Install the discharge outlet port plugs into both discharge outlet ports.
4. Remove the cylinder from the cylinder mounting bracket.
5. Have Firetrace Purple K Dry Chemical Powder ILP Unit recharged by a qualified Firetrace service location.

NOTE: Any maintenance requiring depressurization, filling, or pressurization shall only be performed at an authorized Firetrace service location. Service at any other location will void any warranty. Please contact Firetrace directly for a list of authorized Firetrace service locations.

8.3 Recharge

For Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Unit recharge instructions, refer to Section 7.

8.4 Return to Service

Please follow guidelines provided in Section 4 and Section 5 for returning a system to service.

Appendix A – Parts List

Firetrace Purple K Dry Chemical Powder ILP Automatic Suppression Unit Assemblies

Table 30 - Firetrace Purple K Dry Chemical Powder ILP Units

Part Number	Description
940518	Purple K Dry Chemical Powder ILP Suppression Unit (5lb)
941018	Purple K Dry Chemical Powder ILP Suppression Unit (10lb)
942018	Purple K Dry Chemical Powder ILP Suppression Unit (20lb)
941058	Purple K Dry Chemical Powder ILP Suppression Unit CE (4.5kg)
942058	Purple K Dry Chemical Powder ILP Suppression Unit CE (9kg)

Heavy Duty Brackets

Table 31 - Heavy Duty Bracket Assembly

Part Number	Description
111403	Medium Heavy Duty Bracket w/ Clamps
111402	Large Heavy Duty Bracket w/ Clamps
111502	Extra Large Heavy Duty Bracket w/ Clamps

Discharge Network

Table 32 - Discharge Network Flexible Hoses

Part Number	Description
202820	1/2 in Flexible Hose, 1ft
201820	1/2 in Flexible Hose, 2ft
201821	1/2 in Flexible Hose, 4ft
201822	1/2 in Flexible Hose, 6ft
201823	1/2 in Flexible Hose, 8ft
201824	1/2 in Flexible Hose, 10ft

Table 33 - Discharge Network Flexible Hose Fittings

Part Number	Description
850022	Fitting, 1/2in Hose to Valve Union
850023	Fitting, 1/2in Hose Union
850024	Fitting, 1/2in Hose Elbow
850025	Fitting, 1/2in Hose Tee
850026	Fitting, 1/2in Hose to Nozzle Union Bulkhead
850027	Fitting, 1/2in Hose to Nozzle Elbow Bulkhead

Table 34 - Nozzles

Part Number	Description
500002	Medium Dry Chemical Nozzle, 1/2NPT
510019	Medium Blow-Off Cap

Detection Network

Table 35 - Firetrace Detection Tubing

Part Number	Description
204025	Firetrace Detection Tubing, 4/6mm, 25ft
204050	Firetrace Detection Tubing, 4/6mm, 50ft
204100	Firetrace Detection Tubing, 4/6mm, 100ft
204328	Firetrace Detection Tubing, 4/6mm, 328ft

Table 36 - Tube Fittings

Part Number	Description
200157	Fitting, Tube Tee, 4/6mm
200158	Fitting, Tube Union, 4/6mm
200159	Fitting, Tube to Threads Elbow, 4/6mm
200177	Fitting, Tube Tee to Threads, 4/6mm
200178	Fitting, Tube Elbow, 4/6mm
200179	Fitting, Tube to Threads Union, 4/6mm
200203	Fitting, Tube Plug, 4/6mm
200169	In Line Adapter w/ Tube Tee, 4/6mm

Table 37 - End of Line Accessories

Part Number	Description
200168	End of Line Adapter w/ Tube Union, 4/6mm
400365	Pressure Gauge w/ O-Ring, 360psig
310303	End of Line Adapter Plug
400004	End of Line Pressure Switch
600068	Manual Release w/ 360psig Gauge and Tube Union, 4/6mm
601014	2nd Gen Manual Release w/ 360psig Gauge and Tube Union, 4/6mm

Miscellaneous

Table 38 - Installation Accessories

Part Number	Description
200150	Rubber Grommets for Detection Tubing (Qty. 2)
200151	Plastic Grommets for Detection Tubing (Qty. 2)
200171	Mounting tabs for Detection Tubing, 4/6mm (Qty. 12)
201006	Magnetic Mounting Clips for Detection Tubing, 4/6mm (Qty. 6)
201133	Heavy Duty Mounting Clips for Detection Tubing (Qty. 6)
600213	Detection Tubing Charge Kit
600210	Tube Cutter
201132	Tamperproof Device, “ON” position
201137	Tamperproof Device, “OFF” position
120305	Accessory Mounting Brackets

Table 39 - Auxiliary Accessories

Part Number	Description
400001	Valve Mounted Pressure Switch
400441	Pressure Switch Assembly Box
400312	12 VDC Electric Solenoid Assembly
400324	24 VDC Electric Solenoid Assembly
400316	120 VAC Electric Solenoid Assembly
400327	240 VAC Electric Solenoid Assembly
600096	Black Audible Alarm, Battery Operated (requires pressure switch)

Table 40 - Indication and Activation Kits

Part Number	Description
600410-12	12 VDC Indication Kit, 195 psig, Bottom Cable
600420-12	12 VDC Indication and Activation Kit, 195 psig, Bottom Cable
600408-12	12 VDC Indication Kit, 195 psig, Rear Cable
600409-12	12 VDC Indication and Activation Kit, 195 psig, Rear Cable
600410-24	24 VDC Indication Kit, 195 psig, Bottom Cable
600420-24	24 VDC Indication and Activation Kit, 195 psig, Bottom Cable
600408-24	24 VDC Indication Kit, 195 psig, Rear Cable

Appendix B – System Commissioning Form

8435 N. 90th Street, Suite 2, Scottsdale, AZ 85258 USA · +1.480.607.1218 · +1.480.315.1316 · www.firetrace.com

Firetrace Pre-Engineered Purple K Dry Chemical Powder ILP Automatic Suppression Unit

System Commissioning Form

System Serial Number: **Installation Date:**

Installed by: **Company:**

Description	Performed by	Date
Mounting Bracket installed using at least 4 mounting holes.		
Purple K Dry Chemical Powder agitated.		
Cylinder positioned in mounting bracket with the pressure gauge facing out.		
Cylinder secured in place using bracket straps or band clamps.		
Nozzle(s) secured in optimal location.		
Nozzle(s) within limitations outlined in Section 3 of DIOM manual.		
Necessary Discharge port plug(s) removed and adapters installed.		
Discharge hoses installed between discharge port(s) and nozzle(s).		
Discharge hoses secured in place.		
Discharge hoses are within limitations outlined in Section 3 of DIOM manual.		
Tubing and fittings installed and secured throughout the protected enclosure.		
Tube fitting threaded into ball valve attached to the top of the cylinder valve.		
Detection tubing inserted into tube fitting.		
Detection network is within limitations outlined in section 3 of DIOM manual.		
Detection network pressurized to 360psig.		
Pressure gauge or equivalent installed into end of line adapter or manual release.		
Leak check conducted on detection network.		
Ball valve on top of cylinder valve rotated to “ON” position.		
Tamperproof device installed on ball valve lever.		
Electrical connections properly made in accordance with NFPA 70 and NFPA 72.		

Appendix C – SDS

SAFETY DATA SHEET

Section 1. PRODUCT AND COMPANY IDENTIFICATION

Product Name:	Purple K Dry Chemical Fire Extinguisher
Other Identifiers:	Potassium Bicarbonate, KDC, PK
Product Code(s):	CH 515, 517, 542, 553
Model Code(s) for Extinguishers:	410, 413, 415, 416, 452,460, 466, 469, 472, 478, 479, 483, 486, 490, 493, 497, 566, 569, 575, 580, 584,591, 595, 599, 652, 688, 689, 690, 691, 693, 722, 762, 764, 783, A413, V10PK, V13PK, V25PK, VH25PK, V50PK, VS50PK
Recommended Use:	Fire suppression, agriculture, medical Not for human or animal drug use.
Manufacturer:	AMEREX CORPORATION
Internet Address:	www.amerex-fire.com
Address:	7595 Gadsden Highway, P.O. Box 81 Trussville, AL 35173-0081
Company Telephone:	(205) 655-3271
E-mail Address:	info@amerex-fire.com
Emergency Contacts:	Chemtrec 1(800) 424-9300 or (703) 527–3887
Revised:	July 16, 2018

Section 2. HAZARDS IDENTIFICATION

GHS – Classification

Health	Environmental	Physical
Acute Toxicity: Category 5	None	None
Skin Corrosion/Irritation: Category 3	None	None
Skin Sensitization: NO	None	None
Eye: Category 2A	None	Warning
STOT – Category 3	None	Warning
Carcinogen: Category None	None	None

GHS – Label Symbol(s):

If Pressurized: Gas Under Pressure

GHS – Signal Word(s): **Warning**

Other Hazards Not Resulting in Classification: Mica may contain small quantities of quartz (crystalline silica). Prolonged exposure to respirable crystalline silica dust at concentrations exceeding the occupational exposure limits may increase the risk of developing a disabling lung disease known as silicosis. IARC found limited evidence for pulmonary carcinogenicity of crystalline silica in humans. In the case of normal use of this product, exposure to silica should be nil.

The attapulgite clay used in this product has a fiber length of less than 5um; therefore, the clay is not considered to be carcinogenic to animals or humans.

GHS – Hazard Phrases

GHS Hazard	GHS Codes(s)	Code Phrase(s)
Physical	H229	*- Contents under pressure; may explode if heated.
Health	H316 319 335	Causes mild skin irritation. Causes serious eye irritation. May cause respiratory irritation.
Environmental	None	
Precautionary:		
General	P101	If medical advice is needed, have product container or label at hand.
Prevention	P251 261 264 270 280	Do not pierce or burn, even after use. Avoid breathing dust/fumes/gas/mist/vapours/spray. Wash exposed skin thoroughly after handling. Do not eat, drink or smoke when using this product. Wear protective gloves/protective clothing/eye protection/face protection.
Response	P312 321 302+352 304+340 305+351+338 332+313 342+311 337+313	Call a doctor if you feel unwell. Specific treatment (see Section 4. First Aid Measures). IF ON SKIN: Wash with plenty of water. IF INHALED: Remove person to fresh air and keep comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing. If skin irritation occurs: Get medical advice/attention. If experiencing respiratory symptoms: Call a doctor. If eye irritation persists get medical advice/attention.
Storage	P410+403	*- Protect from sunlight. Store in well-ventilated place.
Disposal	P501	Dispose of contents through a licensed disposal company. Contaminated container should be disposed of as unused product.

*- If under pressure

Section 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	EC No.	REACH Reg. No.	CAS-No.	Weight %
Potassium Bicarbonate (potassium hydrogen carbonate)-may contain minor calcium carbonate	206-059-0	01-2119532640-48-0002	298-14-6	>90
Attapulgite clay	601-805-5	Not Available	12174-11-7	>4
Mica-potassium aluminum silicate	NA	Not Available	12001-26-2	>2
Silicone oil methyl hydrogen polysiloxane	NA	Not Available	63148-57-2	<0.5
Violet 23 pigment oxazine dye	228-767-9	Not Available	6358-30-1	<0.2

Adverse health effects and symptoms:	A mild irritant to the respiratory system, eyes, and skin. Symptoms may include coughing, shortness of breath, and irritation of the lungs, eyes, and skin. Ingestion, although unlikely, may cause gastric distress.

Section 4. FIRST AID MEASURES

Eye Exposure:	Causes irritation. Irrigate eyes with water and repeat until pain free. Seek medical attention if irritation continues, or if vision changes occur.
Skin Exposure:	May cause skin irritation. In case of contact, wash with plenty of soap and water. Seek medical attention if irritation persists.
Inhalation:	May cause irritation, along with coughing. If respiratory irritation or distress occurs remove victim to fresh air. Seek medical attention if irritation persists.
Ingestion:	Overdose symptoms may include numbness or tingling in hands or feet, uneven heart rate, paralysis, feeling faint, chest pain or heavy feeling, pain spreading to the arm or shoulder, nausea, sweating, general ill feeling, or seizure (convulsions). If victim is conscious and alert, give 2-3 glasses of water to drink. If conscious, do not induce vomiting. Seek immediate medical attention. Do not leave victim unattended. To prevent aspiration of swallowed product, lay victim on side with head lower than waist.
Medical conditions possibly aggravated by exposure:	Inhalation of product may aggravate existing chronic respiratory problems such as asthma, emphysema, or bronchitis. Skin contact may aggravate existing skin disease. Chronic overexposure may cause pneumoconiosis (“dusty lung” disease).

Section 5. FIRE-FIGHTING MEASURES

Flammable Properties:	Not flammable
Flash Point:	Not determined
Suitable Extinguishing Media:	Non-combustible. Use extinguishing media suitable for surrounding conditions.

Hazardous Combustion Products:	Carbon oxides
Explosion Data:	
Sensitivity to Mechanical Impact:	Not sensitive
Sensitivity to Static Discharge:	Not sensitive
Unusual fire/explosion hazards:	In a fire this material may decompose, releasing oxides of carbon, potassium and nitrogen, and CO2 (see Section 10).
Protective Equipment and Precautions for Firefighters:	As in any fire, wear self-contained breathing apparatus (pressure-demand, NIOSH approved or equivalent), and full protective gear.

Section 6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:	Avoid contact with skin, eyes, and clothing.
Personal Protective Equipment:	Minimum - safety glasses, gloves, and a dust respirator.
Emergency Procedures:	NA
Methods for Containment:	Prevent further leakage or spillage if safe to do so.
Methods for Clean Up:	Avoid dust formation; clean up released material using vacuum or wet sweep and shovel to minimize generation of dust. Bag and transfer to properly labeled containers. Ventilate area and wash spill site after material pickup is complete.
Other:	If product is contaminated, use PPE and containment appropriate to the nature of the most toxic chemical or material in the mixture.

Section 7. HANDLING AND STORAGE

Personal Precautions:	Use appropriate PPE when handling or maintaining equipment, and wash thoroughly after handling (see Section 8).
Conditions for Safe Storage/Handling:	Keep product in original container or extinguisher. Prevent falling. Do not allow near heat sources. Contents may be under pressure – inspect extinguisher consistent with product labeling to ensure container integrity.
Incompatible Products:	Do not mix with other extinguishing agents, particularly ammonium phosphate. Incompatible with strong oxidizing agents and strong acids. Do not store in high humidity.

Hazardous Decomposition Products: No data available.
Hazardous Polymerization: Will not occur

Section 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Chemical Name	OSHA PEL	ACGIH TLV	DFG MAK *	EU BLV
Potassium bicarbonate	PNOC** Total dust, 15 mg/m^3 Respirable fraction, 5 mg/m^3	PNOC Total dust, 10 mg/m^3 Respirable fraction, 3 mg/m^3	PNOC Total dust, 4 mg/m^3 Respirable fraction, 1.5 mg/m^3	NA
Mica	6 mg/m^3	3 mg/m3	-------	NA
Attapulgite Clay	PNOC Total dust, 15 mg/m^3 Respirable fraction, 5 mg/m^3	PNOC Total dust, 10 mg/m^3 Respirable fraction, 3 mg/m^3	PNOC Total dust, 4 mg/m^3 Respirable fraction, 1.5 mg/m^3	NA
Silicone oil	NR***	NR	NR	NA
Violet 23 pigment	NR	NR	NR	NA

*German regulatory limits **PNOC = Particulates not otherwise classified (ACGIH) also known as Particulates not otherwise regulated (OSHA) *** NR = Not Regulated. All values are 8 hour time weighted average concentrations.

Engineering Controls: Showers
Eyewash stations
Ventilation systems

Personal Protective Equipment – PPE Code E:

The need for respiratory protection is not probable during short-term exposure. PPE use during production process must be independently evaluated.




Eye/Face Protection: Tightly fitting safety goggles
Skin and Body Protection: Wear protective gloves/coveralls
Respiratory Protection: If exposure limits are exceeded or irritation is experienced, NIOSH approved respiratory protection should be worn. Use P100 respirators for limited exposure, use air-purifying respirator (APR) with high efficiency particulate air (HEPA) filters for prolonged exposure. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be

Hygiene Measures:	provided in accordance with current safety and health requirements. The need for respiratory protection is not likely for short-term use in well ventilated areas. Good personal hygiene practice is essential, such as avoiding food, tobacco products, or other hand-to-mouth contact when handling. Wash thoroughly after handling.

Section 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Light purple powder, finely divided odorless solid
Molecular Weight:	$KHCO_3$: 100.11 g/mol
Odor:	No information available
Odor Threshold:	No information available
Decomposition Temperature ^oC:	$KHCO_3$: 100 - 110
Freezing Point ^oC:	No information available
Initial Boiling Point ^oC:	No information available
Physical State:	Crystalline Powder
pH:	Approximately 8.2
Flash Point ^oC:	None
Autoignition Temperature ^oC:	None
Boiling Point/Range ^oC:	Not Applicable
Melting Point/Range ^oC:	$KHCO_3$: 100 – 110
Flammability:	Not Flammable
Flammability Limits in Air ^oC:	Upper – Not Flammable; Lower-Not Flammable
Explosive Properties:	None
Oxidizing Properties:	None
Volatile Component (%vol)	Not Applicable
Evaporation Rate:	Not Applicable
MMHG @ 37.8 C :	Not Applicable
Vapor Density:	Not Applicable
Vapor Pressure:	< 1 mm Hg
Specific gravity:	Approximately 2.17; 0.88 in aerated condition
Solubility:	Product is coated, not immediately soluble in water
Partition Coefficient:	No Information Available
Viscosity:	Not Applicable

Section 10. STABILITY AND REACTIVITY

Stability:	Stable under recommended storage and handling conditions.
Reactivity:	None

Incompatibles:	Strong oxidizing agents; Strong acids; Ammonium phosphate, lithium. Protect from moisture
Conditions to Avoid:	Storage or handling near incompatibles.
Hazardous Decomposition Products:	Carbon, nitrogen, and potassium oxides, CO2. Heat of fire may release carbon monoxide.
Possibility of Hazardous Reactions:	None
Hazardous Polymerization	Does not occur

Section 11. TOXICOLOGICAL INFORMATION

Likely Routes of Exposure:	Inhalation, skin and eye contact.
Symptoms:	
Immediate:	
Inhalation:	Irritation, coughing.
Eyes:	Irritation.
Skin:	Irritation.
Delayed:	Symptoms appear to be relatively immediate
Acute Toxicity:	Relatively non-toxic.
Chronic Toxicity:	
Short-term Exposure:	None known.
Long-term Exposure:	As with all dusts, pneumoconiosis, or "dusty lung" disease, may result from chronic exposure.

Acute Toxicity Values - Health

Chemical Name	LD50		LC50 (Inhalation)
	Oral	Dermal	
Potassium bicarbonate	2825 mg/kg (rat)	>2000 mg/kg (rabbit)	4.96 mg/l (rat)
Mica	None	None	None
Attapulgite clay	None	None	None
Silicone oil	None	None	None
Violet 23 pigment	None	None	None

Reproductive Toxicity:	This product's ingredients are not known to have reproductive or teratogenic effects.
Target Organs and Effects (TOST):	Respiratory system (mild irritant). This product is a mild irritant to epithelial tissue, (eyes, mucous membranes, skin) and may aggravate dermatitis. No information was found indicating the product causes sensitization.

Other Toxicity Categories

Chemical Name	Germ Cell Mutagenicity	Carcino-genicity	Repro-ductive	TOST Single Exp	TOST Repeated Exp	Aspiration
Potassium Bicarbonate12	None	None	None	Cat 3	None	None
Attapulgite clay	None	None	None	None	Kidney	None
Mica	None	None	None	None	None	None
Silicone oil	None	None	None	None	None	None
Violet 23 pigment oxazine dye	None	None	None	None	None	None

Section 12. ECOLOGICAL INFORMATION

Ecotoxicity:	Low risk.
Persistence/Degradability:	Degrades rapidly in humid/wet environment.
Probability of rapid biodegradation:	$KHCO_3$ Est: 0.718 (Rapid)
Anaerobic biodegradation probability:	$KHCO_3$ Est: 0.836 (Rapid)
Bioaccummulation potential:	Low.
Bioconcentration factor:	$KHCO_3$: 3.16 L/kg
Bioaccummulation Potential:	Low. Est biotransformation half-life: 0.012 days.
Mobility in soil:	Log Koc: Est -2.062
Log Koa:	Not applicable
Log Kaw:	Not applicable
Fraction sorbed to airborne particulates:	0.886
Atmospheric oxidation half-life:	20.6 days
Level III Fugacity Model:	62% soil, 37% water, <0.1% sediment, air
Other Adverse Ecological Effects:	No other known effects at this time

Aquatic Toxicity Values - Research

Chemical Name	Acute (LC50)	Chronic (LC50)
Potassium bicarbonate	Cat IV; 1300 mg/l (rainbow trout), 96 hr. 630 mg/l (water flea) 48 hr., mortality min. at 94 mg/l 260 mg/l (flathead minnow), mortality min. dose	N/A
Mica	N/A	N/A
Attapulgite clay	N/A	N/A
Silicone oil	N/A	N/A
Violet 23 pigment	N/A	N/A

Aquatic Toxicity Values – Calculated Estimates

Chemical Name	Acute (LC50)	Chronic (LC50)
Potassium bicarbonate	8259 mg/L Fish 96 hr; 3737 mg/l Daphnid 48 hr;	1088 mg/L Gr. Algae 96 hr
Mica	N/A	N/A
Attapulgite clay	N/A	N/A
Silicone oil	N/A	N/A
Violet 23 pigment	N/A	N/A

Section 13. DISPOSAL CONSIDERATIONS

Safe Handling	Use appropriate PPE when handling, and wash thoroughly after handling (see Section 8).
Waste Disposal Considerations	Dispose in accordance with federal, state, and local regulations.
Contaminated Packaging	Dispose in accordance with federal, state, and local regulations.

NOTES:
This product is not a RCRA characteristically hazardous or listed hazardous waste. Dispose of according to state or local laws, which may be more restrictive than federal laws or regulations. Used product may be altered or contaminated, creating different disposal considerations.

Section 14. TRANSPORT INFORMATION

UN Number:	NA
UN Proper Shipping Name:	NA
Transport Hazard Class:	NA
Packing Group:	NA
Marine Pollutant?:	NO
IATA	Not regulated
DOT	Not regulated

NOTES:
This product is not defined as a hazardous material under U.S. Department of Transportation (DOT) 49 CFR 172, or by Transport Canada “Transportation of Dangerous Goods” regulations.

Special Precautions for Shipping:
The transportation information above covers the Purple K dry chemical extinguisher agent as shipped in bulk containers and not when contained in fire extinguishers or fire extinguisher systems. If shipped in a stored pressure-type fire extinguisher, and pressurized with a non-flammable, non-toxic inert expellant gas, the fire extinguisher is considered a hazardous material by the US Department of Transportation and Transport Canada. The proper shipping name shall be FIRE EXTINGUISHER and the UN designation is UN 1044. The DOT hazard class/division is LIMITED QUANTITY when pressurized to less than 241 psig and when shipped via highway or rail. UN Class 2.2. Non-Flammable Gas, when shipping via air. Packing Group – N/A

Section 15. REGULATORY INFORMATION

International Inventory Status: All ingredients are on the following inventories

Country(ies)	Agency	Status
United States of America	TSCA	Yes
Canada	DSL	Yes
Europe	EINECS/ELINCS	Yes
Australia	AICS	Yes
Japan	MITI	Yes
South Korea	KECL	Yes

REACH Title VII Restrictions: No information available

Chemical Name	Dangerous Substances	Organic Solvents	Harmful Substances Whose Names Are to be Indicated on Label	Pollution Release and Transfer Registry (Class II)	Pollution Release and Transfer Registry (Class I)	Poison and Deleterious Substances Control Law
Potassium Bicarbonate	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Component	ISHA – Harmful Substances Prohibited for Manufacturing, Importing, Transferring, or Supplying	ISHA – Harmful Substances Requiring Permission	Toxic Chemical Classification Listing (TCCL) – Toxic Chemicals	Toxic Release Inventory (TRI) – Group I	Toxic Release Inventory (TRI) – Group II
Potassium Bicarbonate 298-14-6 (>93)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Attapulgite clay 298-14-6 (>4)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Mica-potassium aluminum silicate 120001-26-2 (>2)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Silicone oil methyl hydrogen polysiloxane 63148-57-2 (<0.5)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Violet 23 pigment oxazine dye 6358-30-1 (<0.2)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

European Risk and Safety phrases:

EU Classification:	XN	Irritant
R Phrases:	20	Harmful by inhalation.
	36/37	Irritating to eyes, respiratory system.
S Phrases:	22	Do not breath dust.
	24/25	Avoid contact with skin and eyes
	26	In case of contact with eyes, rinse immediately with

plenty of water and seek medical advice.
36 Wear suitable protective clothing.

U.S. Federal Regulatory Information:

SARA 313:
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) - This product does not contain and chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.
None of the chemicals in this product are under SARA reporting requirements or have SARA threshold planning quantities (TPQs) or CERCLA reportable quantities (RQs), or are regulated under TSCA 8(d).

SARA 311/312 Hazard Categories:

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard-*	Yes
Reactive Hazard	No

* - Only applicable if material is in a pressurized extinguisher.

Clean Water/Clean Air Acts:
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42) or Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61) and Section 112 of the Clean Air Act Amendments of 1990.

U.S. State Regulatory Information:

Chemicals in this product are covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: None
California – Permissible Exposure Limits for Chemical Contaminants: None
Florida – Substance List: Mica Dust
Illinois – Toxic Substance List: None
Kansas – Section 302/303 List: None
Massachusetts – Substance List: Mica Dust
Minnesota – List of Hazardous Substances: None
Missouri – Employer Information/Toxic Substance List: None
New Jersey – Right to Know Hazardous Substance List: None
North Dakota – List of Hazardous Chemicals, Reportable Quantities: None
Pennsylvania – Hazardous Substance List: None
Rhode Island – Hazardous Substance List: Mica Dust
Texas – Hazardous Substance List: No
West Virginia – Hazardous Substance List: None

Wisconsin – Toxic and Hazardous Substances: None

California Proposition 65: No component is listed on the California Proposition 65 list.

Other:

Mexico – Grade	No component listed
Canada – WHMIS Hazard Class	No component listed

Section 16. OTHER INFORMATION

This SDS conforms to requirements under U.S., U.K., Canadian, Australian, and EU regulations or standards, and conforms to the proposed 2003 ANSI Z400.1 format.

Issuing Date	17-June-2012
Revision Date	16-July-2018
Revision Notes	None

The information herein is given in good faith but no warranty, expressed or implied, is made.
Updated by William F. Garvin, CIH.