Rio Tinto

Fire Mitigation Standards

FirePro Aerosol Systems

Technical Information

Rev.3

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Fire Safety Equipment

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Rio Tinto - Fire Mitigation Standards

FirePro Aerosol Systems - Technical Information.

Table of Contents

Rio Tinto - Fire Mitigation Standards
FirePro Aerosol Systems - Technical Information.

PRODUCT DESCRIPTION

FirePro Fire Suppression Systems.

- **Modularity**, FirePro has discreet components that operate as a system. Each component can be handled and installed easily. Not the issues that surround gas systems with large heavy cylinders, and imposing pipe networks.
- On discharge the fire suppression gas is a white gas and is predominantly potassium carbonate (K2CO3) which is a commonly used base in organic chemistry.
- FirePro aerosol inhibits the chain chemical reaction present in fire, by removing flame free radicals, it extinguishers fire, **without removing oxygen.**
- Should there be a discharge and staff are caught within the risk, oxygen will still be present within the risk.
- FirePro is very stable. It requires an environmental heat of 300^{o} C or an electrical current to discharge.
- It cannot leak or lose pressure like other HP gases.
- It is not pressurised and does not require hydro testing.
- There is no pipework.
- The generators only require visual inspection.
- They e the only aerosol with a tested life span of 15 years.
- FirePro has been tested for explosive risks.
- FirePro generators discharge at a low 10-20kpa.
- Does not require fan integrity testing on an annual basis.
- Does not require vent relief. After discharge it creates less than 1kpa in pressure to the risk.
- FirePro generators have a certified 15 year life span. No other aerosol has this life span or a certified life span. New replacement generators can be phased in over time after the 15 years.

Safety Integrity Level – (SIL is an indicator of the probability that the actuator will fail to perform properly). Safety Integrity Level (SIL) of FirePro Condensed Aerosol Generators.

- SIL 2 with Hardware Fault Tolerance = 0
- SIL 3 with Hardware Fault Tolerance = 1

Toxicity - Effect on humans - There are no Occupational Exposure Limits.

Environmental –

- Ozone Depletion Potential O.D.P. - Zero
- Global Warming Potential G.W.P. - Zero
- Atmospheric Lifetime A.L.T. - Low
- No Dept. of Environment Australia requirement for reporting or a special license for installation or maintenance as a fire system.

Logistics and Manufacturing

The product is manufactured in Europe and has been available in Australia for approximately 15 years, FirePro Generators are able to travel by airfreight(at a cost) so urgent replacement is available.

Rio Tinto - Fire Mitigation Standards
FirePro Aerosol Systems - Technical Information.

PRODUCT RISK ASSESSMENT – Rio Tinto

FirePro Condensed aerosol Systems underwent a complete Risk Assessment process with Rio Tinto prior to the installation of the systems at Hope Downs 1.

This risk assessment is included as Appendix C

PRODUCT APPROVALS – FirePro Aerosol Systems

- **Certified to AS4487-2013** - Condensed Aerosol Extinguishing Systems.
- **AcitivFire Listed** by CSIRO.
- **Certified to AS5062 – 2016** - Fire Protection for Mobile and Transportable Equipment.
- **Certified for Marine** applications.
- Independent test reports including Electrical Conductivity testing for up to 75kva and installed in transformer rooms to 132kva.
- The National Aerospace Laboratory (NLR) completed testing of the FirePro generators in 2008. This test is for corrosive effect of the aerosol particulate on electronic switchgear.
- **Certified to UL2775** -Standard for Fixed Condensed Aerosol Extinguishing System Units for A,B & E (non- conductivity) class and explosive area risks (UN1075 class 2.1).(These requirements cover the construction and operation of fixed condensed aerosol extinguishing system units inclusive of aerosol generating extinguishing system units and aerosol generating automatic extinguisher units intended for total flooding applications when installed, inspected, tested, and maintained in accordance with the Standard for Fixed Aerosol Fire Extinguishing Systems, NFPA 2010).
- **Explosive Environments**. FirePro has been tested, as per UL 2775, for use in explosive atmospheres UL2775, Section 26 “Pyrotechnic Reaction Containment Test”. FirePro has also been specifically certified under ATEX guide lines for hazardous environments. The UL test demonstrated and proved that the FirePro Aerosol Generators actuated inside an explosive atmosphere did not initiate any explosion, the aerosol provided an inert atmosphere.
- **Safety Integrity Level –** (SIL is an indicator of the probability that the actuator will fail to perform properly). Safety Integrity Level (SIL) of FirePro Condensed Aerosol Generators.
    - SIL 2 with Hardware Fault Tolerance = 0
    - SIL 3 with Hardware Fault Tolerance = 1
- **Approved under US SNAP Program** for normally occupied risks. Significant New Alternatives Policy(SNAP) was established under Section 612 of the Clean Air Act to identify and evaluate substitutes for ozone-depleting substances. The program looks at overall risks to human health and the environment of existing and new substitutes, and promotes the use of acceptable substances.

SAFETY DATA SHEETS

FirePro is safe for humans. FirePro® aerosol is non-toxic (laboratory tests show no harmful effects on water, air climatic conditions, animals, plants, micro-organisms). Reduced Visibility will occur when activated, the FirePro® condensed aerosol generators reduce visibility both during and after discharge period. On activation a white gas is emitted from the units – this is really particles, and has an atmospheric life of approx. 20 minutes after which it will fall to earth as dust.

Extract from Safety Data Sheet

Hazards Identification	
☺ Hazards for humans related to the SBK solid compound have not been found.	
☺ Hazards for humans related to the aerosol released by the solid compound have not been established.	
☺ Signs and symptoms related to the aerosol phase are only referred to acute exposure and/or chronic overexposures, while in real life the exposure will be very short (i.e. in the event of an accidental discharge when people were not evacuated on time).	
Signs and Symptoms	
Eye Contact	At normal contact no injury
Inhalation	Not a likely route of entry
Skin Contact	At normal contact no injury
Ingestion	At normal contact no injury
Chronic Overexposure	At normal contact no injury
Medical Conditions Generally Aggravated by Exposure	None known
Environment	None established

See Appendix G Post Activation – Safety Data Sheet
Appendix H Pre-Activation – Safety Data Sheet

Note : the Aerosol compound changes chemical state during activation, therefore, pre-activation and post-activation Safety Data Sheets are required.

APPLICATIONS

FirePro has been successfully installed in some of the largest industrial facilities around the world. In Australia we have installations with Rio Tinto, BHP, and Roy Hill Mining, and Glencore protecting control rooms and electrical assets. Mobile plant and Marine applications from cranes, compressors, generator sets, to commercial vessels, and the Sydney Harbour Ferries. FirePro is used as the temporary fire suppression systems used by Austal to cover the CO2 systems installed on the Pacific Fleet vessels.

System is suitable for:

- **Land Based applications** – Transformer Rooms, Sub Stations, Control Rooms, Power Generation facilities, Battery Storage Systems…
- **Mobile Plant applications** – Light Vehicles, Heavy Vehicles, Cranes, Mobile Compressors, Train Engines…
- **Marine Applications** – Vessels of all kinds, Barges, Tug Boats, Dredges, Cranes, Ferries…

Installation and Maintenance Benefits:

- They can cover any type of risk small or large, mobile plant, fixed land assets or marine risks.
- Much lower weight and Space required for Installation. No big tanks required.
- The generators come with a bracket that then is mounted.
- There is no pipe work or nozzles required.
- No hydrostatic testing is required at 5, 10 year intervals.
- The discharge pressure is 6-10kpa, so structural integrity and vent relief are not required.
- Due to the light discharge pressure does not force the gas out of the opening in the risk.

In the design calculations we calculate the gas required to overcome any possible loss. This is as required as part of AS4487 or AS 5062. Added to this is a 30% Safety Factor.

Maintenance is completed as per AS1851 or AS 5062. However, the generators themselves need nothing more than visual inspection.

No ongoing fan integrity testing is required.

Installations completed at Rio Tinto Facilities

Hope Downs 1 – Substations and Control Rooms

Hope Downs 1 – Substations and Control Rooms

Yandi – Substations and Control Rooms

West Angeles – Substations and Control Rooms

Speno Track Recording and Maintenance Machines.

Rio Tinto - Fire Mitigation Standards
FirePro Aerosol Systems - Technical Information.

TECHNICAL DATA SHEETS

Model	Gross Weight	Net Weight	Activation Modes	Dimensions	Drawings	Data Sheet
FP-0020S	310	20	Bulb Thermal Activator(BTA)	165 x 30mm diam.	DRAWING	DATASHEET
FP-0020SE	310	20	Electrical	165 x 30mm diam.	DRAWING	DATASHEET
FP-0040S	610	40	Electrical – or – (BTA)	140 x 50mm diam.	DRAWING	DATASHEET
FP-0080S	870	80	Electrical – or – (BTA)	190 x 50mm diam.	DRAWING	DATASHEET
FP-0100S	1,370	100	Electrical – or – (BTA)	160 x 88mm diam.	DRAWING	DATASHEET
FP-0200S	1,840	200	Electrical – or – (BTA)	190 x 88mm diam.	DRAWING	DATASHEET
FP-0500S	3,340	500	Electrical – or – (BTA)	290 x 88mm diam.	DRAWING	DATASHEET
FP-1200	10,900	1,200	Electrical – or – (BTA)	216 x 300 x 170mm	DRAWING	DATASHEET
FP- 2000	15,500	2,000	Electrical – or – (BTA)	300 x 300 x 185mm	DRAWING	DATASHEET
FP-3000	16,300	3,000	Electrical – or – (BTA)	300 x 300 x 185mm	DRAWING	DATASHEET
FP-5700	26,400	5,700	Electrical – or – (BTA)	300 x 300 x 290mm	DRAWING	DATASHEET

A full product Brochure is included as Appendix B

ENVIRONMENTAL AND TOXICITY REPORTS AND LISTINGS

FirePro Condensed Aerosol units are constructed from environmentally friendly materials and the manufacturer has achieved ISO 14001 certification for Environmental Management.

The product itself is environmentally friendly:

- Ozone Depletion Potential O.D.P. - Zero
- Global Warming Potential G.W.P. - Zero
- Atmospheric Lifetime A.L.T. - Low
- No Dept. of Environment Australia requirement for reporting or a special license for installation or maintenance as a fire system.
- Approved under US SNAP Program. Significant New Alternatives Policy(SNAP) was established under Section 612 of the Clean Air Act to identify and evaluate substitutes for ozone-depleting substances. The program looks at overall risks to human health and the environment of existing and new substitutes, and promotes the use of acceptable substances.

Rio Tinto - Fire Mitigation Standards

FirePro Aerosol Systems - Technical Information.

LOCAL AGENTS AND DISTRIBUTORS

ABOUT US - Fire Safety Equipment is an Australian owned company that has been operating since 1999. A wholesaler of high quality fire extinguishing equipment, including fire extinguishers, fire suppression systems, services and maintenance equipment. The company operates warehouses located in Brisbane, Sydney and Auckland, with distributors located across Australia, New Zealand and the Pacific Islands.

OUR PRODUCTS

Ozone Friendly – Cost Effective. FirePro uses no high pressure cylinders, no pipework, does not require expensive maintenance procedures and is suitable for all types of risk. FirePro is certified to Australian Standards.

Amerex Corporation is largest manufacturer fire extinguishers. With pre-engineered fire suppression systems for vehicles, cooking operations and other industrial applications, Amerex has a reputation for excellence.

Ecco Portable Fire Equipment provide a range of quality and economical products that include portable and mobile wheeled fire extinguishers. All products are made in China and are certified to Australian Standards.

Solberg provides firefighting foam and custom-designed foam suppression systems and hardware. Offering traditional firefighting foam and environmentally sustainable foam, Solberg leads the industry in innovation.

We only supply Certified products and work closely with leading certification bodies.

Our Partners Include

- Rio Tinto
- Glencore Australia
- BHP
- Mount Isa Mines
- Downer EDI Mining
- Woodside Petroleum
- Hancock Prospecting
- Alinta Energy
- Perilya Mines
- CBH Resources
- Exxon Mobil
- DP World
- Australian Defence Force
- Atlas Copco
- Chevron
- Speno Rail Maint.
- Pacific Tug
- JJ Richards & Sons
- Territory Generation

Some Projects we have completed: Click on Image for more Information

Port Cranes

Battery Storage Installations

Speno Maintenance Trains

Sub-Station & Control Rooms

Our Distributors and located nationally to provide alternatives for our Partners, and Include:

Wormald	**FireSafe Resources**	**Mercury FireSafety**	**Fire Systems Services**

CONTACT DETAILS – TECHNICAL REPRESENTATIVES

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Appendix A FirePro – General Brochure

The FirePro Principle

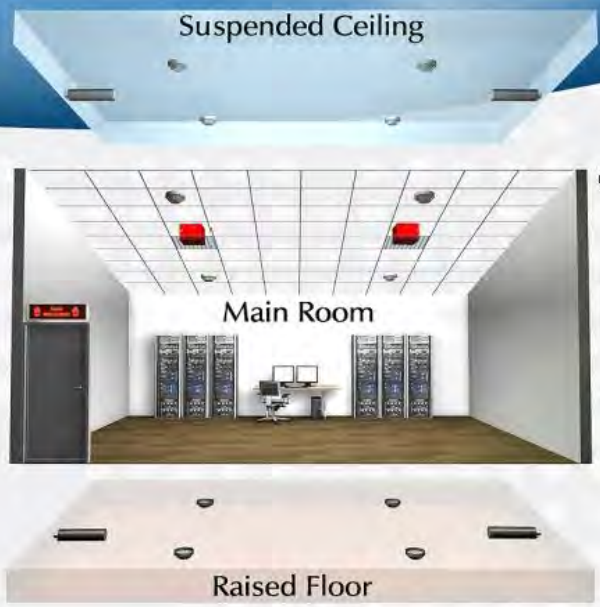
Environment Friendly

Condensed Aerosol, extinguishes fire by inhibiting the chain chemical reaction present in the fire on a molecular level removing the flame free radicals without depleting the oxygen.

The environment friendly materials used are the result of many years of research and development

Environment Considerations

Atmospheric Lifetime = Negligible
Ozone Depletion Potential = 0
Global Warming Potential = 0
No Oxygen Depletion
ISO 14001 Certified
Non-Toxic
HFC Free
CFC Free



Classes of Fire

FP-1200S

Gross Weight(gr): 10900
Net Weight(gr): 1200
Dimensions(mm): 216 x 300 x 167

FP-2000S

Gross Weight(gr): 15900
Net Weight(gr): 2000
Dimensions(mm): 300 x 300 x 185

System Design

The FIREPRO Fire Extinguishing Aerosol Systems are designed for total flooding protection in compliance with all the relevant Standards: ISO 15779, UL 2775, NFPA 2010, CEN/TR 15276, AS5062 and AS4487. The Systems' electrical and electronic control units and accessories are engineered and fully certified for their compatibility and provide circuit monitoring. FirePro Aerosol Generators and FirePro Control Panels are listed independently and certified as an integrated system.

FP-3000S

Gross Weight(gr): 16700
Net Weight(gr): 3000
Dimensions(mm): 300 x 300 x 185

FP-5700S

Gross Weight(gr): 26800
Net Weight(gr): 5700
Dimensions(mm): 300 x 300 x 300

FP-0500S

Gross Weight(gr): 3340
Net Weight(gr): 500
Dimensions(mm): 260 x 84

FP-0200S

Gross Weight(gr): 1840
Net Weight(gr): 200
Dimensions(mm): 150 x 84

FP-0020SE

Gross Weight(gr): 310
Net Weight(gr): 20
Dimensions(mm): 165 x 32

FP-0080S

Gross Weight(gr): 870
Net Weight(gr): 80
Dimensions(mm): 185 x 51

FP-0100S

Gross Weight(gr): 1370
Net Weight(gr): 100
Dimensions(mm): 120 x 84

FP-0040S

Gross Weight(gr): 610
Net Weight(gr): 40
Dimensions(mm): 140 x 51

FirePro.

INDUSTRIES:

- National Electricity Authorities
- Petrochemical Oil & Gas
- Manufacturing Industries
- Telecommunications
- Marine Industry
- Mining Industry
- Railway Industry

And more ...

APPLICATIONS:

- Data Centres
- Control Rooms
- Server Rooms
- Plant Rooms
- Electrical Panels & Substations
- Engine rooms
- Mining Vehicles
- Wind Turbines
- Warehouses & Archives

And more ...

ADVANTAGES:

- No distribution piping, manifold or nozzles required.
- Space and weight saving.
- Easy installation and retrofitting.
- Easy to transport.
- Offers local total flooding protection capability, which combats and restricts the fire at its source.
- Easily connected to existing conventional fire detection and activation systems.
- Negligible maintenance costs during their life time compared to other conventional systems.
- No special handling or licenses for compressed gas cylinders.
- No system pressurization or room integrity tests.
- Operating temperatures ranging from -50°C to +150°C with humidity of up to 98%.

Distribution Network

Certified, Listed, Approved by:

Europe
Albania
Belgium
Bulgaria
Croatia
Cyprus
Czech. Republic
Denmark
Estonia
Finland
France
Greece
Hungary
Iceland
Ireland
Italy
Kosovo
Luxembourg
Malta
Netherlands
Norway
Poland
Portugal
Romania
Serbia
Spain
Sweden
Switzerland
United Kingdom

America
Argentina
Brazil
Canada
Chile
Uruguay
U.S.A

Middle East & Gulf
Bahrain
Iran
Iraq
Israel
Jordan
Kingdom of Saudi Arabia
Lebanon
Oman
Qatar
Syria
UAE

Asia & Australasia
Australia
Bangladesh
Georgia
Hong Kong
India
Indonesia
Malaysia
New Zealand
Philippines
Singapore
South Korea
Sri Lanka
Taiwan
Thailand
Turkey
Vietnam

Africa
Egypt
Kenya
Morocco
Nigeria
South Africa
Sudan
Tunisia

UL LISTED
ULC LISTED
kiwa certified
GUIDELINE K23101 FIRE SAFETY
NLR
RINA 1861
KFI
ABS
BUREAU VERITAS 1828
BUREAU VERITAS
ACTIVFIRE LISTED
KEMA
mca Maritime and Coastguard Agency
DNV ISO 9001 ISO 14001

And more ...

Available Australia wide

For more information, please contact:

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Appendix B FirePro – Product Catalogue

FP-20SE
Product Code: 10135
Product Description: **FirePro Fire Extinguishing Generator FP-20SE.**
Features:

FP-20T
Product Code: 10620
Product Description: **FirePro Fire Extinguishing Generator FP-20T.**
Features:

FP-20TH
Product Code: 10649
Product Description: **FirePro Fire Extinguishing Generator FP-20TH.**
Features:
- This model can be activated by a Built Thermal Actuator only and discharges through one outlet only (bottom)

TECHNICAL INFORMATION

Model	FP-20SE / FP-20T / FP-20TH*
Activation mechanism	Electrical (min. 1.5V DC, 0.8A in 3-4 sec) *FP-20TH Thermal Activation Only
Current intensity to be tested	Maximum 5 mA
Weight (gross)	310 g (excluding bracket)
Mass of FPC compound	20 g
Operational discharge time	5 - 10 seconds
Discharge length	1 m
Dimensions (Height : Diameter)	170 mm : 32 mm (incl. connector housing)
Fire Class	A, B, C, F

Operating temperatures: -54°C to +54°C | Generators are provided complete with brackets

FirePro.

FP-40S
Product Code: 10136
Product Description: **FirePro Fire Extinguishing Generator FP-40S.**
Features:

FP-40T
Product Code: 10609
Product Description: **FirePro Fire Extinguishing Generator FP-40T.**
Features:

TECHNICAL INFORMATION

Model	FP-40S / FP-40T
Activation mechanism	Thermal Electrical (min 1.5V DC, 0.8A in 3-4 sec)
Activator type	Heating element with 2.3 ohm resistance
Current intensity to be tested	Maximum 5 mA
Weight (gross)	610 g (excluding bracket)
Mass of FPC compound	40 g
Operational discharge time	5 - 10 seconds
Discharge length	1 m
Dimensions (Height : Diameter)	145 mm : 51 mm (incl. connector housing)
Fire class	A, B, C, F

Operating temperatures: -54°C to +54°C | Generators are provided complete with brackets

FirePro.

Rio Tinto - Fire Mitigation Standards

FirePro Aerosol Systems - Technical Information.

FP-80S

Product Code: 10138

Product Description: **FirePro Fire Extinguishing Generator FP-80S.**

Features:

- UL, KIWA, BSI, ActivFire Approved
- This model discharges through two sets of outlets (top & bottom)

FP-80T

Product Code: 10617

Product Description: **FirePro Fire Extinguishing Generator FP-80T.**

Features:

- KIWA Approved
- Under Process to be UL, BSI, ActivFire Approved
- This model discharges through one outlet only (bottom)

TECHNICAL INFORMATION

Model	FP-80S / FP-80T
Activation mechanism	Thermal Electrical (min 1.5V DC, 0.8A in 3-4 sec)
Activator type	Heating element with 2.3 ohm resistance
Current intensity to be tested	Maximum 5 mA
Weight (gross)	870 g (excluding bracket)
Mass of FPC compound	80 g
Operational discharge time	5 - 10 seconds
Discharge length	2 m
Dimensions (Height : Diameter)	190 mm x 51 mm (incl. connector housing)
Fire class	A, B, C, F

Operating temperatures: -54°C to +54°C | Generators are provided complete with brackets

FP-100S

Product Code: 10140

Product Description: **FirePro Fire Extinguishing Generator FP-100S.**

Features:

- UL, KIWA, BSI, ActivFire Approved

TECHNICAL INFORMATION

Model	FP-100S
Activation mechanism	Thermal Electrical (min 1.5V DC, 0.8A in 3-4 sec)
Activator type	Heating element with 2.3 ohm resistance
Current intensity to be tested	Maximum 5 mA
Weight (gross)	1370 g (excluding bracket)
Mass of FPC compound	100 g
Operational discharge time	5 - 10 seconds
Discharge length	1 m
Dimensions (Height : Diameter)	155 mm : 84 mm (incl. connector housing)
Fire class	A, B, C, F

Operating temperatures: -54°C to +54°C | Generators are provided complete with brackets

Rio Tinto - Fire Mitigation Standards

FirePro Aerosol Systems - Technical Information.

FP-200S

Product Code: 10142

Product Description: **FirePro**
Fire Extinguishing Generator FP-200S.

Features:

- UL, IRWA, BS, ActiveFire Approved

TECHNICAL INFORMATION

Model	FP-200S
Activation mechanism	Thermal Electrical (min 1.5V DC, 0.8A in 3-4 sec)
Activator type	Heating element with 2.3 ohm resistance
Current intensity to be tested	Maximum 5 mA
Weight (gross)	1840 g (excluding bracket)
Mass of FPC compound	200 g
Operational discharge time	5 - 10 seconds
Discharge length	2 m
Dimensions (Height : Diameter)	185 mm : 84 mm (incl. connector housing)
Fire class	A, B, C, F

Operating temperatures: -54°C to +54°C | Generators are provided complete with brackets

FP-500S

Product Code: 10145

Product Description: **FirePro**
Fire Extinguishing Generator FP-500S.

Features:

- UL, IRWA, BS, ActiveFire Approved

TECHNICAL INFORMATION

Model	FP-500S
Activation mechanism	Thermal Electrical (min 1.5V DC, 0.8A in 3-4 sec)
Activator type	Heating element with 2.3 ohm resistance
Current intensity to be tested	Maximum 5 mA
Weight (gross)	3340 g (excluding bracket)
Mass of FPC compound	500 g
Operational discharge time	5 - 10 seconds
Discharge length	3 m
Dimensions (Height : Diameter)	295 mm : 84 mm (incl. connector housing)
Fire class	A, B, C, F

Operating temperatures: -54°C to +54°C | Generators are provided complete with brackets

Rio Tinto - Fire Mitigation Standards

FirePro Aerosol Systems - Technical Information.

■ FP-1200
Product Code: 10147
Product Description: **FirePro Fire Extinguishing Generator FP-1200.**
Features:
- UL, KIWA, BSI ActiveFire Approved
- Carbon Steel casing Red coated

■ FP-1200T
Product Code: 10316
Product Description: **FirePro Fire Extinguishing Generator FP-1200T.**
Features:
- Under Process to be UL, KIWA, BSI ActiveFire Approved
- This model can be activated by a Bulb Thermal Activator
- Carbon-Steel casing Red-coated

■ FP-1200S
Product Code: 10395
Product Description: **FirePro Fire Extinguishing Generator FP-1200S.**
Features:
- UL, KIWA, BSI ActiveFire Approved
- Stainless steel casing

■ FP-1200TS
Product Code: 10622
Product Description: **FirePro Fire Extinguishing Generator FP-1200TS.**
Features:
- Under Process to be UL, KIWA, BSI ActiveFire Approved
- This model can be activated by a Bulb Thermal Activator
- Stainless steel casing

TECHNICAL INFORMATION

Model	FP-1200 / FP-1200S / FP-1200T / FP-1200TS
Activation mechanism	Thermal Electrical (min 1.5V DC, 0.8A in 3-4 sec)
Activator type	Heating element with 2.3 ohm resistance
Current intensity to be tested	Maximum 5 mA
Weight (gross)	10900 g (excluding bracket)
Mass of FPC compound	1200 g
Operational discharge time	10 - 15 seconds
Discharge length	3.5 m
Dimensions	216 mm x 300 mm x 167 mm
Fire class	A, B, C, F

Operating temperatures: -54°C to +54°C | Generators are provided complete with brackets

■ FP-2000
Product Code: 10149
Product Description: **FirePro Fire Extinguishing Generator FP-2000.**
Features:
- UL, KIWA, BSI ActiveFire Approved
- Carbon Steel casing Red-coated

■ FP-2000T
Product Code: 10317
Product Description: **FirePro Fire Extinguishing Generator FP-2000T.**
Features:
- Under Process to be UL, KIWA, BSI ActiveFire Approved
- This model can be activated by a Bulb Thermal Activator
- Carbon-Steel casing Red-coated

■ FP-2000S
Product Code: 10392
Product Description: **FirePro Fire Extinguishing Generator FP-2000S.**
Features:
- UL, KIWA, BSI ActiveFire Approved
- Stainless steel casing

■ FP-2000TS
Product Code: 10623
Product Description: **FirePro Fire Extinguishing Generator FP-2000TS.**
Features:
- Under Process to be UL, KIWA, BSI ActiveFire Approved
- This model can be activated by a Bulb Thermal Activator
- Stainless steel casing

TECHNICAL INFORMATION

Model	FP-2000 / FP-2000S / FP-2000T / FP-2000TS
Activation mechanism	Thermal Electrical (min 1.5V DC, 0.8A in 3-4 sec)
Activator type	Heating element with 2.3 ohm resistance
Current intensity to be tested	Maximum 5 mA
Weight (gross)	15500 g (excluding bracket)
Mass of FPC compound	2000 g
Operational discharge time	10 - 15 seconds
Discharge length	3.5 m
Dimensions	300 mm x 300 mm x 185 mm
Fire class	A, B, C, F

Operating temperatures: -54°C to +54°C | Generators are provided complete with brackets

Rio Tinto - Fire Mitigation Standards

FirePro Aerosol Systems - Technical Information.

FP-3000

Product Code: 10150
Product Description: **FirePro Fire Extinguishing Generator FP-3000.**
Features:
- UL, KIWA, BSI, ActivFire Approved
- Carbon Steel casing Red coated

FP-3000T

Product Code: 10318
Product Description: **FirePro Fire Extinguishing Generator FP-3000T.**
Features:
- Under Process to be UL, KIWA, BSI, ActivFire Approved
- This model can be activated by a Bulb Thermal Activator
- Carbon Steel casing Red coated

FP-3000S

Product Code: 10393
Product Description: **FirePro Fire Extinguishing Generator FP-3000S.**
Features:
- UL, KIWA, BSI, ActivFire Approved
- Stainless steel casing

FP-3000TS

Product Code: 10624
Product Description: **FirePro Fire Extinguishing Generator FP-3000TS.**
Features:
- Under Process to be UL, KIWA, BSI, ActivFire Approved
- This model can be activated by a Bulb Thermal Activator
- Stainless steel casing

TECHNICAL INFORMATION

Model	FP-3000 / FP-3000S / FP-3000T / FP-3000TS
Activation mechanism	Thermal Electrical (min 1.5V DC, 0.8A in 3-4 sec)
Activator type	Heating element with 2.3 ohm resistance
Current intensity to be tested	Maximum 5 mA
Weight (gross)	16300 g (excluding bracket)
Mass of FPC compound	3000 g
Operational discharge time	15 - 20 seconds
Discharge length	4 m
Dimensions	300 mm x 300 mm x 185 mm
Fire class	A, B, C, F

Operating temperatures: -54°C to +54°C | Generators are provided complete with brackets

FP-5700

Product Code: 10151
Product Description: **FirePro Fire Extinguishing Generator FP-5700.**
Features:
- UL, KIWA, BSI, ActivFire Approved
- Carbon Steel casing Red coated

FP-5700T

Product Code: 10319
Product Description: **FirePro Fire Extinguishing Generator FP-5700T.**
Features:
- Under Process to be UL, KIWA, BSI, ActivFire Approved
- This model can be activated by a Bulb Thermal Activator
- Carbon Steel casing Red coated

FP-5700S

Product Code: 10394
Product Description: **FirePro Fire Extinguishing Generator FP-5700S.**
Features:
- UL, KIWA, BSI, ActivFire Approved
- Stainless steel casing

FP-5700TS

Product Code: 10625
Product Description: **FirePro Fire Extinguishing Generator FP-5700TS.**
Features:
- Under Process to be UL, KIWA, BSI, ActivFire Approved
- This model can be activated by a Bulb Thermal Activator
- Stainless steel casing

TECHNICAL INFORMATION

Model	FP-5700 / FP-5700S / FP-5700T / FP-5700TS
Activation mechanism	Thermal Electrical (min 1.5V DC, 0.8A in 3-4 sec)
Activator type	Heating element with 2.3 ohm resistance
Current intensity to be tested	Maximum 5 mA
Weight (gross)	26400 g (excluding bracket)
Mass of FPC compound	5700 g
Operational discharge time	15 - 20 seconds
Discharge length	8 m
Dimensions	300 mm x 300 mm x 300 mm
Fire class	A, B, C, F

Operating temperatures: -54°C to +54°C | Generators are provided complete with brackets

Appendix C Rio Tinto Risk Assessment – Hope Downs 1

Rio Tinto

HSEQ Qualitative Risk Analysis (Level 2) - Scoping and Planning Tool

Workshop Topic	Change of Fire Suppression System in Sub Stations
Date	07.07.14
Work Area Description	Sub Stations at Hope Downs
Team Members	Terry Mellor, Rob Stewart, Tony Morris, Cameron Raudino, Ray Mergard (Amerex), Todd Butler (Mercury Fire Safety)
Facilitator	Brett Pascoe

What Has "Triggered" the risk assessment:	Hawcroft Consulting recently completed a Critical Risk Audit (CRA) of the Hope Downs 1 Operations. Part of this was reviewing the high potential fire risk areas. The report identified that 10 of our substations have inadequate protection due to relying on detections only system. The remaining 4 substations have gaseous fire suppression systems installed (FM 200). Hawcroft have recommended that the 10 unprotected substations have fire suppression systems installed. The Firepro Aerosol Suppressant system has been recommended as the preferred product over the currently used FM200 Gaseous Suppression.
Objectives:	To assess the operational and functional risk of installing the Firepro Aerosol Suppressant system into Electrical Sub Station instead of the currently used FM200 Gaseous Fire Suppression System.
Scope & Boundaries:	Includes, Compatability with existing infrastructure, effectiveness of fire suppression, health and safety exposures, environmental exposures, security of supply, environmental exposures, cost benefit realisation
Stakeholders and Risk Assessment Team: Who will be in the risk assessment team?	Terry Mellor, Rob Stewart, Tony Morris, Ray Mergard (Amerex), Todd Butler (Mercury Fire Safety)
Timing:	Monday 7th July, 12:30 - 16:30
Venue: Where will the risk assessment be conducted?	Sante et Securite, Central Park Lvl 7, Perth
Input Information: Describe the key information likely to be required to complete the risk assessment e.g. incident reports, procedures etc.	MSDS sheets for Firepro product and FM200 product. FirePro CEA (draft) Du Pont website (FAQs for FM200) FirePro Website Australian Department of Environment website. National Industrial Chemicals Notification and Assessment Scheme - Full Public report HFC-227ea dated 6 May,1994
Describe any key Regulations and procedures that need to be considered: eg. Legislation and Regulations, Standards, Management plans, Codes of Practice, Manufacturer Instructions	AS4487-20013 for Condensed Aerosol Fire Extinguishing Systems ASISO14520-1 for Gaseous fire-extinguishing systems
Does the team have an understanding of the Risk Management Process? What training or information may be required.	

RioTinto

Sub Stations at Hope Downs

Mandatory Business Defined	Mandatory Rio Tinto Defined	Mandatory Rio Tinto Defined	Mandatory Rio Tinto Defined	Mandatory Free Text	Mandatory Rio Tinto Defined	Mandatory Rio Tinto Defined
RISK HEADER				**RISK SCENARIO**		
Risk ID	Work Area Description	Hazard Type	Hazard Description (Sub-Type)	Operational Status	Scenario Description	Consequence Category	Consequence Sub-Category
P01	Electrical Substations	Substances	Heptafluoropropane	Emergency Conditions	Person in substation at time of fire suppressant discharge during maintenance/installation/other works	Personnel safety	Cardiac arrest
P02		Substances	Heptafluoropropane	Emergency Conditions	Person in substation at time of fire suppressant (FM200) fire condition discharge	Personnel safety	Asphyxiation
P03		Sound / Vibration	Noise (Impact)	Emergency Conditions	Person in substation at time of fire suppressant (FM200) discharge	Health impact	Nervous System and Sense Organs
P04		Thermal/Fire/Explosion	Contact - Cold Gas	Planned Maintenance	Person in substation and in the line-of-fire at time of suppressant (FM200) discharge	Personnel safety	Burns
P05		Pressure	Pneumatic	Planned Maintenance	FM200 Cylinder or component rupture/failure resulting in instantaneous gas release and cylinder fragmentation	Personnel safety	Crushing / internal injuries
P06		Natural environment /ecosystem	Ecosystem Change	Normal Operation	Gaseous discharge of FM200 produces global warming substances which are reportable to EPA.	Environmental impact	Contamination - Air
P07		Natural environment /ecosystem	Ecosystem Change	Normal Operation	Gaseous discharge of product produces global warming substances which are reportable to EPA	Compliance impact	Court order (potential)
P08		Thermal/Fire/Explosion	Fire - Surface - Fixed Plant	Normal Operation	Fire is not extinguished by FM200 due to non-integrity of the building or cabinet structure.	Production volumes	Quantity / output
P09		Thermal/Fire/Explosion	Fire - Surface - Fixed Plant	Planned Maintenance	During re-fit of the sub-stations FM200 is non-operational, leaving an unprotected fire risk	Production volumes	Quantity / output
P10		Thermal/Fire/Explosion	Fire - Surface - Fixed Plant	Normal Operation	Loss of power to substation renders automated discharge of FM200 ineffective	Production volumes	Quantity / output
P11		Thermal/Fire/Explosion	Fire - Surface - Fixed Plant	Normal Operation	Unable to source immediate supply of replacement cartridges for FirePro. This same risk exposure is in place for the FM200 system currently installed	Production volumes	Quantity / output
P12		Thermal/Fire/Explosion	Fire - Surface - Fixed Plant	Unplanned Maintenance	Delay to maintenance of FirePro due to lack of qualified personnel	Operating cost	Miscellaneous Expenses
P13		Social / Cultural	Economic / Community & Social Governance Capital	Commissioning & Ramp Up	Fire suppression systems do not meet current Australian and International standards	Compliance impact	Contract / service agreement
P14		Substances	Potassium	Normal Operation	Discharge of fire suppression system reduces visibility	Personnel safety	Abrasions

RioTinto

Mandatory Rio Tinto Defined	Mandatory Business Defined			Optional Rio Tinto Defined	Optional Free Text	Mandatory Rio Tinto Defined
RISK HE/				CURRENT RISK - mandatory data capture		
Risk ID	Reference Source	Scenario Owner Position	Next Review Date	Cause Description	Cause Comments	Control Type Description
P01	B1 Particulates & Gas Vapour Exposure			Procedures-Not used/not followed	Accidental discharge exposing personnel to FM200 ; Activation through dust/electrical, maintenance activities etc	3 Engineering Controls
P02	B1 Particulates & Gas Vapour Exposure			Equipment difficulty-Design	Personnel are unable to remove themselves from the discharge area during fire	3 Engineering Controls
P03	B2 Hearing Conservation			Equipment difficulty-Design	Discharge of gas under pressure generates noise at >68db. This combined the audible alarms can potential leave people in the area disorientated,	3 Engineering Controls
P04	M3 Hazard ID & Risk Management			Equipment difficulty-Design	Discharge of gas (FM200) with personnel in the line-of-fire.	4 Administrative Controls
P05	M3 Hazard ID & Risk Management			Equipment difficulty-Equipment / parts defective	Cylinder and/or component degradation or misuse / mishandling	4 Administrative Controls
P06	E4 Greenhouse Gas Emissions			Procedures-Not used/not followed	FM200 chemical make-up has a global warming effect 2900 times greater than carbon dioxide. FM 200 has a 40 - 50 year lifespan of activity in the atmosphere.	4 Administrative Controls
P07	M2 Legal & Other Requirements			Procedures-Not used/not followed	Chemical make-up has global warming substances. Repeated discharges resulting in government/DOE investigation and possible fines	4 Administrative Controls
P08	M12 Disaster Management & Recovery			Equipment difficulty-Design	FM200 is not contained effectively within the required area.	4 Administrative Controls
P09	M3 Hazard ID & Risk Management			Equipment difficulty-Design	During re-fits, FM200 is taken off-line to enable redesign.	4 Administrative Controls
P10	M3 Hazard ID & Risk Management			Natural disaster / sabotage	Lightening strike, loss of mains power, loss of back-up power, critical failure of FIP	3 Engineering Controls
P11	M3 Hazard ID & Risk Management			Management system	No spares held on site or in Perth, sole provider in Australia unable to supply	
P12	M3 Hazard ID & Risk Management			Training-Understanding needs improvement	Qualified personnel not available due to flights, accommodation, climatic events, availability (prior commitments)	
P13	M3 Hazard ID & Risk Management			Equipment difficulty-Design	Insurance company does not accept site fire suppression system as being adequate	
P14	M3 Hazard ID & Risk Management			Equipment difficulty-Design	Discharge of fire suppression system reduces visibility	

	Mandatory Free Text	Optional Free Text	Mandatory Rio Tinto Defined	Mandatory Rio Tinto Defined
RISK HE/				
Risk ID	Control Comments	Impact Description	Consequence	Likelihood
P01	Dual protection to activate, alarmed (visuala nd audio), emergency services, emergency procedures, training, access restrictions (inductions), dual egress doors, licensed, trained, competent personnel	Where concentrations may be greater than 5% then cardiac effects can result	3-Serious	D-Unlikely
P02	Dual protection to activate, alarmed (visual nd audio), emergency services, emergency procedures, training, access restrictions (inductions), dual egress doors,	FM200 at temperature, creates the by-product, Hydrogen Chloride gas and carbon monoxide. When inhaled, Hydrochloric acid results from the lungs	4-Major	E-Rare
P03	Dual protection to activate, alarmed (visual and audio), emergency services, emergency procedures, training, access restrictions (inductions), dual egress doors,	Causing disorientation and confusion resulting in personal injury	2-Medium	D-Unlikely
P04	PPE(Gloves) , procedures, risk assessments, SWP, competent, trained, licensed personnel, engineering	Frostbite burns	3-Serious	E-Rare
P05	Inspection and testing regime, replacement program, OEM procedures, correct storage / secure; training, accreditation, licenses	Explosive risk resulting in penetrating injury, pressure waveform injuries, crush injuries	4-Major	E-Rare
P06	Inspection and testing regime, replacement program, OEM procedures, correct storage / secure; training, accreditation, licenses, legislated reporting requirements and possible fines, CMS	The global warming substances will be active for a period of 40 - 50 years.	3-Serious	C-Possible
P07	Inspection and testing regime, replacement program, OEM procedures, correct storage / secure; training, accreditation, licenses, legislated reporting requirements and possible fines, CMS	Fine, compliance, increased contract management system requirements resulting from legislative body, community reputation	3-Serious	C-Possible
P08	Asset integrity testing, changes/modifications to assets, policy and procedures for access	Loss of substations for up to 12 months for rebuild, 3 months to enact a contingency	4-Major	D-Unlikely
P09	Manual fire notification process in enacted (Personnel on watch/standby). Fire extinguishers located adjacent to works area.	Loss of substations for up to 12 months for rebuild, 3 months to enact a contingency	4-Major	E-Rare
P10	Manual activation, back-up power, fire extinguishers,	Loss of substations for up to 12 months for rebuild, 3 months to enact a contingency	4-Major	E-Rare
P11	Nil	Loss of substations for up to 12 months for rebuild, 3 months to enact a contingency	4-Major	E-Rare
P12	Nil	Unprotected / reduced protection to substations until personnel can be sourced resulting in	4-Major	E-Rare
P13	Both FM200 and FirePro meet and certified to required Australian and International standards. AS4487 (2013) & UL 2775, and	Increased insurance costs. Reduced coverage. Negative shareholder perception/publicity	1-Minor	E-Rare
P14	FM200 is clear therefore there is no reduction in visibility.	Minimal impact	1-Minor	E-Rare

RioTinto

To record Predicted Risk unhide columns AF-AH

Optional Free Text		Optional Free Text
RISK HE		IMPROVEMENT ACTIONS - proposed new controls
Risk ID	Risk Comments	Action Description
P01	Discharges are known to occur but although medical treatments are not known to have occurred there is an expectation that this could occur.	Install aerosol fire suppressant (eg FirePro)
P02	This is not known to have occurred but remains a potential fatality risk.	Install aerosol fire suppressant (eg FirePro)
P03	The MRC injury from disorientation is believed to be a medical treatment type injury from sprains, cuts and contusions.	Install aerosol fire suppressant (eg FirePro)
P04	As FM200 is a compressed gas, it is extremely cold when discharged. Exposure of bare skin to the gas being discharged can result in frostbite type injuries. As people will most likely remove themselves	Install aerosol fire suppressant (eg FirePro).
P05	FM200 is supplied in high pressure vessels (bottles) that can deteriorate or be damaged over time. These bottles have been known to fail with explosive force resulting fatality within industry but it is unknown to have occurred with mining.	Install aerosol fire suppressant (eg FirePro).
P06	There is no opportunity to mitigate the damage from the gas being discharged therefore it is considered as having a long term environmental effect. As the volume of gas being release is limited it has been considered as having a MRC of Serious. Accidental discharges are known to occur.	Install aerosol fire suppressant (eg FirePro).
P07	As FM200 discharges are reportable to the EPA and accidental discharges are known to have occurred. It is concievable that moderate fines and conditions will result from multiple accidental discharges during the life of an operation.	Install aerosol fire suppressant (eg FirePro).
P08	The substations at Hope Downs 1 are known to have problems maintaining holding the required levels of FM200 (5.8% v/v) for 20 minutes due to the pressurised release of the gas and area containment.	Install aerosol fire suppressant (eg FirePro)
P09	Although manual fire watch activities are usually activated when fire suppression equipment is taken off line, this relies on people to ensure that the watch is maintained effectively. It is considered that this control is not 100% reliable and therefore the the potential for	Install aerosol fire suppressant (eg FirePro)
P10	Lightening strike and power surge have the potential to start electrical fires in the substations whilst knocking out the FM200 activation circuitry in very rare circumstances	Install aerosol fire suppressant (e.g. FirePro)
P11	Unprotected substations until supply can be sourced (potentially 7 days). Manned fire watch would need to be in place increasing cost and also risk of fire due to human element being less effective than engineered control.	Perth-based warehouse to hold supplies. Site to hold a critical spares list. SLA to be developed with supplier. Addition of replacement parts to be added to BOM's.
P12	Unprotected substations until qualified people can be mobilised. Manned fire watch would need to be in place increasing cost and also risk of fire due to human element being less effective than engineered control.	Training to accredit site-based electricians to install/maintain FirePro product
P13	Both Fm200 and FirePro are certified against Aus and Internal standards and if correctly installed will be accepted by the Insurance companies	Ensure that FirePro instalation is in compliance with appropriate Aus Standards
P14	No risk with FM200 regarding visibility.	FirePro has a white particulate causing a "white-out" reducing or eliminating visibility. Additional safety equipment (pre-evacuation warnings - visual and audio; system over-ride and delays; dual risk detection system as per AS4487 2013) provided in the installation will minimise potential exposure

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RISK HE	Justification for Improvement action				
Risk ID		Predicted Consequence	Predicted Likelihood	Action Owner Position	Action Status / Comments
P01	FirePro does not present the risk of cardiac arrest as Heptafluoropropane is not part of the chemical make-up.	1-Minor	E-Rare		
P02	FirePro does not contain Heptafluoropropane. Therefore Hydrogen Chloride will not result when exposed to heat.	1-Minor	E-Rare		
P03	The low pressure discharge of FirePro means that there is minimal generated noise.	1-Minor	E-Rare		
P04	FirePro is a non-refrigerant-based system, does not utilise compressed gas, no maintenance is required	1-Minor	E-Rare		
P05	FirePro is a low pressure discharge system that does not require large high pressure bottles.	1-Minor	E-Rare		
P06	FirePro has zero global warming products and has a minimal life span of less than one day	1-Minor	E-Rare		
P07	FirePro does not contain global warming chemicals and is not reportable to the EPA when discharged.	1-Minor	E-Rare		
P08	As FirePro has a low pressure discharge rate of approx 2-6kpa the suppression chemical remains in the area longer and is less affected but area containment or area changes (modifications).	2-Medium	D-Unlikely		
P09	FirePro is not affected by internal changes to the structure of the building, no additional FirePro would be required. At worst case where an additional opening is created, additional FirePro units can be	2-Medium	E-Rare		
P10	FirePro automatically activates at 300 degrees Celsius and does not need to rely on electrical activation for discharge	2-Medium	E-Rare		
P11	Contingency for supply of componentry and consumables should be guaranteed. More than one supply avenue is desireable.	2-Medium	D-Unlikely		
P12	Maintaining site based capacity to maintain fire suppression systems will ensure that the integraty of the system is maintainable during unforseen issues getting Perth Based maintainers to site	2-Medium	D-Unlikely		
P13		1-Minor	E-Rare		
P14		2-Medium	D-Unlikely		

Appendix D UL (Underwriters Laboratory) Certification

CERTIFICATE OF COMPLIANCE

Certificate Number 20160920-EX6960
Report Reference EX6960-20110729
Issue Date 2016-SEPTEMBER-20

Issued to: FIREPRO SYSTEMS LTD
6, KOUMANDARIAS STREET
& SPYROU ARAOUZOU
TONIA COURT NO. 2, 1ST FLOOR 3036
54080 LIMASSOL CYPRUS

This is to certify that representative samples of Fixed Condensed Aerosol Extinguishing System Units

Pre-Engineered, FirePro Aerosol Generating Fire Extinguishing System Units, Models FP-20SE, FP-20T, FP-40S, FP-40T, FP-80S, FP-80T, FP-100S, FP-200S, FP-500S, FP-1200, FP-1200S, FP-1200T, FP-1200TS, FP-2000, FP-2000S, FP-2000T, FP-2000TS, FP-3000, FP-3000S, FP-3000T, FP-3000TS, FP-4200T, FP-4200TS, FP-5700, FP-5700S, FP-5700T, and FP-5700TS with 20, 40, 80, 100, 200, 500, 1200, 2000, 3000, 4200, and 5700 grams respectively. The units have operating temperatures of -65°F (-54°C) to 130°F (54°C). The units are designed for total flooding protection against Class A, ordinary combustibles, Class B flammable liquid fires, with or without Class C involvement, occurring within an enclosure.

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 2775, Fixed Condensed Aerosol Extinguishing System Units
Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program
UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at http://ul.com/aboutul/locations/

Page 1 of 3

CERTIFICATE OF COMPLIANCE

Certificate Number	20160920-EX6960
Report Reference	EX6960-20110729
Issue Date	2016-SEPTEMBER-20
Issued to:	FIREPRO SYSTEMS LTD 6, KOUMANDARIAS STREET & SPYROU ARAOUZOU TONIA COURT NO. 2, 1ST FLOOR 3036 54080 LIMASSOL CYPRUS
This is to certify that representative samples of	Aerosol-Generating Fire Extinguishing System Units See Addendum page Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	ULC/ORD-C2775-12, Fixed Condensed Aerosol Extinguishing System Units
Additional Information:	See the ULC Online Certification Directory at www.ulc.ca for additional information

Only those products bearing the ULC Listing Mark should be considered as being covered by ULC's Listing and Follow-Up Service.

The ULC Listing Mark generally includes the following elements: the symbol ULC in a circle: (ULC) with the word "LISTED"; a control number (may be alphanumeric) assigned by ULC; and the product category name (product identifier) as indicated in the appropriate ULC Directory.

To confirm the status, validate the above information via the online directory.

Look for the ULC Listing Mark on the product.

Joseph Hozey, General Manager, Director of Sales - Canada

UNDERWRITERS LABORATORIES OF CANADA, INC.

Any information and documentation involving ULC Mark services are provided on behalf of Underwriters Laboratories of Canada Inc. (ULC) or any authorized licensee of ULC. For questions, please contact a local ULC Customer Service Representative at http://ul.com/aboutul/locations/

CERTIFICATE OF COMPLIANCE

Certificate Number	20160920-EX6960
Report Reference	EX6960-20110729
Issue Date	2016-SEPTEMBER-20

This is to certify that representative samples of the product as specified on this certificate were tested according to the current ULC requirements.

Pre-Engineered, FirePro Aerosol Generating Fire Extinguishing System Units, Models FP-20SE, FP-20T, FP-40S, FP-40T, FP-80S, FP-80T, FP-100S, FP-200S, FP-500S, FP-1200, FP-1200S, FP-1200T, FP-1200TS, FP-2000, FP-2000S, FP-2000T, FP-2000TS, FP-3000, FP-3000S, FP-3000T, FP-3000TS, FP-4200T, FP-4200TS, FP-5700, FP-5700S, FP-5700T, and FP-5700TS with 20, 40, 80, 100, 200, 500, 1200, 2000, 3000, 4200, and 5700 grams respectively. The units have operating temperatures of -65 F (-54ı C) to 130 F (54ı C). The units are designed for total flooding protection against Class A, ordinary combustibles, Class B flammable liquid fires, with or without Class C involvement, occurring within an enclosure.

Joseph Hosey, General Manager, Director of Sales - Canada

UNDERWRITERS LABORATORIES OF CANADA, INC.

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Page 3 of 3

Appendix E Global-Mark Certificates

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Certificate of Approval

This certificate confirms that the company below complies with the following standard(s):

Company Name	Fire Safety Equipment Pty Ltd	*Client ID*	103334
Company Other Name		*Type of Certification*	Product Certification; System 5
Certification Standard	AS 4487-2013 : Condensed aerosol fire extinguishing systems - Requirements for system design installation and commissioning and test methods for components		
Scheme	No Scheme		
Certification Review Date	13/10/2015	*Certification Expiry Date*	13/10/2020
Certificate Issue Date	8/12/2015	*Certificate Last Update Date*	9/04/2017

APPROVED COMPANY/SITE ADDRESS(ES):
2A Staple Street Seventeen Mile Rocks 4073 QLD Australia

This certification remains valid until the above mentioned expiry date and subject to the organisation's continued compliance with the certification standard, and Global-Mark's Terms and Conditions. This Certificate of Approval remains the property of Global-Mark Pty Ltd, Company Number: ACN 108-087-654. The use of the Accreditation Mark indicates accreditation by the Joint Accreditation System of Australia and New Zealand in respect to those activities covered by JAS-ANZ accreditation. Refer to www.jas-anz.org/register for verification.

Certification Manager

Unique Certificate Code: 2237621S149F9864CA2S80FB00244E13
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Model(s) on which the Global-Mark logo may be applied by the certificate holder as a declaration of compliance by the certificate holder:
In placing the authorised mark on the product, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein. In issuing this Certificate of Approval Global-Mark has relied on the expertise of external bodies (laboratories, and technical experts).

Model Identification	Model Name	Brand Name	Product Description/Attributes	Date Approved
B122030BRKT, B122030BRKT/A	B122030BRKT, B122030BRKT/A	FirePro	Mounting bracket for 1200, 2000 & 3000 gr models	13/10/2016
BS7BRKT / BS7BRKTC	BS7BRKT / BS7BRKTC	FirePro	Mounting braket for 4200 and 5700 gr models	13/10/2016
C1-2-SABS/C1-2-SRBR / C1-2-SRB / C1-2-SAS / C-1-2SLI	C1-2-SABS/C1-2-SRBR / C1-2-SRB / C1-2-SAS / C-1-2SLI	FirePro	Mounting bracket for 100, 200 & 500 gr models	13/10/2016
C20BR	C20BR	FirePro	Mounting bracket for 20 gr model	13/10/2015
C4080BRS1 / C4080BRS2 / C4-80BR	C4080BRS1 / C4080BRS2 / C4-80BR	FirePro	Mounting bracket, for 40 gr and 80 gr models	13/10/2016
FP-100S	FP-100S	FirePro	Condensed Aerosol Generator: Generator Wt: 1840gr, Aerosol agent Wt: 100gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-1200	FP-1200	FirePro	Condensed Aerosol Generator: Generator Wt: 10900gr, Aerosol agent Wt: 1200gr, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-1200S	FP-1200S	FirePro	Condensed Aerosol Generator: Generator Wt: 10900gr, Aerosol agent Wt: 1200gr, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-1200T	FP-1200T	FirePro	Condensed Aerosol Generator: Generator Wt: 10900gr, Aerosol agent Wt: 1200gr, Thermal Activation, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-1200TS	FP-1200TS	FirePro	Condensed Aerosol Generator: Generator Wt: 10900gr, Aerosol agent Wt: 1200gr, Thermal Activation, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-2000	FP-2000	FirePro	Condensed Aerosol Generator: Generator Wt: 15900gr, Aerosol agent Wt: 2000gr, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-2000S	FP-2000S	FirePro	Condensed Aerosol Generator: Generator Wt: 15900gr, Aerosol agent Wt: 2000gr, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-2000T	FP-2000T	FirePro	Condensed Aerosol Generator: Generator Wt: 15900gr, Aerosol agent Wt: 2000gr, Thermal activation, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-2000TS	FP-2000TS	FirePro	Condensed Aerosol Generator: Generator Wt: 15900gr, Aerosol agent Wt: 2000gr, Thermal activation, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-200S	FP-200S	FirePro	Condensed Aerosol Generator: Generator Wt: 1840gr, Aerosol agent Wt: 200gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015

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Model Identification	Model Name	Brand Name	Product Description/Attributes	Date Approved
FP-20SE	FP-20SE	FirePro	Condensed Aerosol Generator: Generator Wt: 310gr, Aerosol agent Wt: 20gr, Stainless steel housing, Discharge time: 5 - 10 Secs, Two direction outlet, Fire Class: A, B, E	13/10/2015
FP-20T	FP-20T	FirePro	Condensed Aerosol Generator: Generator Wt: 310gr, Aerosol agent Wt: 20gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-3000	FP-3000	FirePro	Condensed Aerosol Generator: Generator Wt: 16700gr, Aerosol agent Wt: 3000gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-3000S	FP-3000S	FirePro	Condensed Aerosol Generator: Generator Wt: 16700gr, Aerosol agent Wt: 3000gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-3000T	FP-3000T	FirePro	Condensed Aerosol Generator: Generator Wt: 16700gr, Aerosol agent Wt: 3000gr, Thermal activation, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-3000TS	FP-3000TS	FirePro	Condensed Aerosol Generator: Generator Wt: 16700gr, Aerosol agent Wt: 3000gr, Thermal activation, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-40S	FP-40S	FirePro	Condensed Aerosol Generator: Generator Wt: 610gr, Aerosol agent Wt: 40gr, Discharge time: 5 - 10 Secs, Two direction outlet, Fire Class: A, B, E	13/10/2015
FP-40T	FP-40T	FirePro	Condensed Aerosol Generator: Generator Wt: 610gr, Aerosol agent Wt: 40gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-4200T	FP-4200T	FirePro	Condensed Aerosol Generator: Generator Wt: 25000gr, Aerosol agent Wt: 4200gr, Thermal activation, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-4200TS	FP-4200TS	FirePro	Condensed Aerosol Generator: Generator Wt: 25000gr, Aerosol agent Wt: 4200gr, Thermal activation, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-500S	FP-500S	FirePro	Condensed Aerosol Generator: Generator Wt: 3340gr, Aerosol agent Wt: 500gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-5700	FP-5700	FirePro	Condensed Aerosol Generator: Generator Wt: 26400gr, Aerosol agent Wt: 5700gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-5700	FP-5700	FirePro	Condensed Aerosol Generator: Generator Wt: 26400gr, Aerosol agent Wt: 5700gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-5700	FP-5700	FirePro	Condensed Aerosol Generator: Generator Wt: 26400gr, Aerosol agent Wt: 5700gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-5700S	FP-5700S	FirePro	Condensed Aerosol Generator: Generator Wt: 26400gr, Aerosol agent Wt: 5700gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-80S	FP-80S	FirePro	Condensed Aerosol Generator: Generator Wt: 870gr, Aerosol agent Wt: 80gr, Discharge time: 5 - 10 Secs, Two direction outlet, Fire Class: A, B, E	13/10/2015
FP-80T	FP-80T	FirePro	Condensed Aerosol Generator: Generator Wt: 870gr, Aerosol agent Wt: 80gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016

Comments:
Compliance applies to Clause 6 of AS4487.

Certification Manager

Page 3 of 4

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End of the document

Certification Manager

Page 4 of 4

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Certificate of Approval

This certificate confirms that the company below complies with the following standard(s):

Company Name	Fire Safety Equipment Pty Ltd	*Client ID*	103334
Company Other Name		*Type of Certification*	Product Certification; System 5
Certification Standard	AS 5062-2016 : Fire protection for mobile and transportable equipment		
Scheme	Global-Mark Product Conformance Scheme		
Certification Review Date	13/10/2015	*Certification Expiry Date*	13/10/2020
Certificate Issue Date	12/11/2015	*Certificate Last Update Date*	13/06/2018

APPROVED COMPANY/SITE ADDRESS(ES):
2A Staple Street Seventeen Mile Rocks 4073 QLD Australia
Factory: 6 Koumandarias Street Spyrou Araouzou 3010 Limassol Cyprus

This certification remains valid until the above mentioned expiry date and subject to the organisation's continued compliance with the certification standard, and Global-Mark's Terms and Conditions. This Certificate of Approval remains the property of Global-Mark Pty Ltd, Company Number: ACN.108-087-654. The use of the Accreditation Mark indicates accreditation by the Joint Accreditation System of Australia and New Zealand in respect to those activities covered by JAS-ANZ accreditation. Refer to www.jas-anz.org/register for verification.

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Unique Certificate Code: BA03285EF8D5C530CA2582AA00493899

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JAS-ANZ

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Model(s) on which the Global-Mark logo may be applied by the certificate holder as a declaration of compliance by the certificate holder:
In placing the authorised mark on the product, the certificate holder makes a declaration of compliance with the certification standard(s) and confirms that the product is identical to the product certified herein. In issuing this Certificate of Approval Global-Mark has relied on the expertise of external bodies (laboratories, and technical experts).

Model Identification	Model Name	Brand Name	Product Description/Attributes	Date Approved
B122030BRKT, B122030BRKT/A	B122030BRKT, B122030BRKT/A	FirePro	Mounting bracket for 1200, 2000 & 3000 gr models	13/10/2016
B57BRKT / B57BRKTC	B57BRKT / B57BRKTC	FirePro	Mounting braket for 4200 and 5700 gr models	13/10/2016
C1-2-5ABS/C1-2-5RBR / C1-2-5RB / C1-2-5AS / C-1-2SU	C1-2-5ABS/C1-2-5RBR / C1-2-5RB / C1-2-5AS / C-1-2SU	FirePro	Mounting bracket for 100, 200 & 500 gr models	13/10/2016
C20BR	C20BR	FirePro	Mounting bracket for 20 gr model	13/10/2015
C4080BRS1 / C4080BRS2 / C4-80BR	C4080BRS1 / C4080BRS2 / C4-80BR	FirePro	Mounting bracket, for 40 gr and 80 gr models	13/10/2016
FP-100S	FP-100S	FirePro	Condensed Aerosol Generator: Generator Wt: 1840gr, Aerosol agent Wt: 100gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-1200	FP-1200	FirePro	Condensed Aerosol Generator: Generator Wt: 10900gr, Aerosol agent Wt: 1200gr, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-1200S	FP-1200S	FirePro	Condensed Aerosol Generator: Generator Wt: 10900gr, Aerosol agent Wt: 1200gr, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-1200T	FP-1200T	FirePro	Condensed Aerosol Generator: Generator Wt: 10900gr, Aerosol agent Wt: 1200gr, Thermal Activation, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-1200TS	FP-1200TS	FirePro	Condensed Aerosol Generator: Generator Wt: 10900gr, Aerosol agent Wt: 1200gr, Thermal Activation, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-2000	FP-2000	FirePro	Condensed Aerosol Generator: Generator Wt: 15900gr, Aerosol agent Wt: 2000gr, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-2000S	FP-2000S	FirePro	Condensed Aerosol Generator: Generator Wt: 15900gr, Aerosol agent Wt: 2000gr, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-2000T	FP-2000T	FirePro	Condensed Aerosol Generator: Generator Wt: 15900gr, Aerosol agent Wt: 2000gr, Thermal activation, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-2000TS	FP-2000TS	FirePro	Condensed Aerosol Generator: Generator Wt: 15900gr, Aerosol agent Wt: 2000gr, Thermal activation, Discharge time: 10 - 15 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-200S	FP-200S	FirePro	Condensed Aerosol Generator: Generator Wt: 1840gr, Aerosol agent Wt: 200gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015

Certification Manager

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Model Identification	Model Name	Brand Name	Product Description/Attributes	Date Approved
FP-20SE	FP-20SE	FirePro	Condensed Aerosol Generator: Generator Wt: 310gr, Aerosol agent Wt: 20gr, Stainless steel housing, Discharge time: 5 - 10 Secs, Two direction outlet, Fire Class: A, B, E	13/10/2015
FP-20T	FP-20T	FirePro	Condensed Aerosol Generator: Generator Wt: 310gr, Aerosol agent Wt: 20gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-3000	FP-3000	FirePro	Condensed Aerosol Generator: Generator Wt: 16700gr, Aerosol agent Wt: 3000gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-3000S	FP-3000S	FirePro	Condensed Aerosol Generator: Generator Wt: 16700gr, Aerosol agent Wt: 3000gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-3000T	FP-3000T	FirePro	Condensed Aerosol Generator: Generator Wt: 16700gr, Aerosol agent Wt: 3000gr, Thermal activation, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-3000TS	FP-3000TS	FirePro	Condensed Aerosol Generator: Generator Wt: 16700gr, Aerosol agent Wt: 3000gr, Thermal activation, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-40S	FP-40S	FirePro	Condensed Aerosol Generator: Generator Wt: 610gr, Aerosol agent Wt: 40gr, Discharge time: 5 - 10 Secs, Two direction outlet, Fire Class: A, B, E	13/10/2015
FP-40T	FP-40T	FirePro	Condensed Aerosol Generator: Generator Wt: 610gr, Aerosol agent Wt: 40gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-4200T	FP-4200T	FirePro	Condensed Aerosol Generator: Generator Wt: 25000gr, Aerosol agent Wt: 4200gr, Thermal activation, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-4200TS	FP-4200TS	FirePro	Condensed Aerosol Generator: Generator Wt: 25000gr, Aerosol agent Wt: 4200gr, Thermal activation, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
FP-500S	FP-500S	FirePro	Condensed Aerosol Generator: Generator Wt: 3340gr, Aerosol agent Wt: 500gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-5700	FP-5700	FirePro	Condensed Aerosol Generator: Generator Wt: 26400gr, Aerosol agent Wt: 5700gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-5700	FP-5700	FirePro	Condensed Aerosol Generator: Generator Wt: 26400gr, Aerosol agent Wt: 5700gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-5700	FP-5700	FirePro	Condensed Aerosol Generator: Generator Wt: 26400gr, Aerosol agent Wt: 5700gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-5700S	FP-5700S	FirePro	Condensed Aerosol Generator: Generator Wt: 26400gr, Aerosol agent Wt: 5700gr, Discharge time: 15 - 20 Secs, One direction outlet, Fire Class: A, B, E	13/10/2015
FP-80S	FP-80S	FirePro	Condensed Aerosol Generator: Generator Wt: 870gr, Aerosol agent Wt: 80gr, Discharge time: 5 - 10 Secs, Two direction outlet, Fire Class: A, B, E	13/10/2015
FP-80T	FP-80T	FirePro	Condensed Aerosol Generator: Generator Wt: 870gr, Aerosol agent Wt: 80gr, Discharge time: 5 - 10 Secs, One direction outlet, Fire Class: A, B, E	13/10/2016
Model 08451	Model 08451	Fire Safety Equipment	Control panel - Manual Rev 1.3	12/06/2018

Comments:
Compliance applies to Clause 6.3.3.5 Aerosol.

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Page 3 of 4

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Page 4 of 4

Appendix F ActivFire Listing

CSIRO

ACTIVFIRE®
ACTIVE FIRE PROTECTION – PRODUCT CERTIFICATION

CSIRO Verification Services
Clayton, Victoria, Australia
+61 (0)3 9545 2777
http://www.activfire.gov.au/

Certificate of Conformity

Certificate num.	Registration date	Version		Valid until	
afp - 2286	13-Feb-2009	Number 16	Issue date 14-Apr-2019	30-Apr-2020	Page 1 of 3

Product designation

FirePro®, FP Series, aerosol fire extinguishing system

(Refer to the Schedule/enclosures for further specified details)

Agent/distributor

Fire Safety Equipment Pty Ltd
2A Staple Street, SEVENTEEN MILE ROCKS, QLD, AUSTRALIA, 4073

Registrant

FirePro Systems Ltd
8 Faleas Str., Agios Athanasios Industrial Area, LIMASSOL, CYPRUS, CY-4101

Producer

FirePro Systems Ltd
8 Faleas Str., Agios Athanasios Industrial Area, LIMASSOL, CYPRUS, CY-4101

Conformance criteria and evaluation

The FirePro®, FP Series, aerosol fire extinguishing system has been evaluated and verified as conforming with the relevant requirements of the following criteria.

1. Australian Standard AS 4487-2013, 'Condensed aerosol fire extinguishing systems—Requirements for system design, installation and commissioning and test methods for components'.
2. Underwriters Laboratories Standard UL 2775, 'Outline of Investigation for Fixed Condensed Aerosol Extinguishing System Units'.
3. Underwriters Laboratories - Evaluation and listing, 'UL listing'.

Limitations/conditions of conformance

Limitations/conditions of conformance, where identified on this certificate, are derived from qualifications from evaluation(s) for conformity and/or other related technical documentation. All details with respect to design, assembly and installation instructions and restrictions should be checked against the producer's current technical manual/data sheets and the requirements of the Authority having Jurisdiction.

(Limitations/conditions of conformance continue)

This certification is issued within the scope of CSIRO Verification Services – Rules governing ActivFire Scheme and is valid only for the product(s) as submitted for evaluation and verification of conformity, subject to the following conditions.

- Reference to details, limitations and requirements, where documented as a schedule/enclosure with this certificate.
- The Registrant is responsible for their attestation of conformity and ensuring that on-going production complies with the conformance criteria defined in this certificate.
- This certificate will not be valid if any changes or modifications are made to the product which have not been notified and validated by CSIRO Verification Services.
- This certificate is subject to periodical re-validation upon verification that all requirements, as determined by the conformity assessment body, continue to be satisfactorily met by the Registrant.
- This certificate may only be reproduced in its published form, without modification and inclusive of all schedules/enclosures.
- Any changes, errors or omissions, must be submitted in writing and if necessary or requested, substantiated with relevant evidence.
- Any representations, such as advertising or other marketing related activities or articles shall reflect the correct contents of this certificate and conform with all relevant trade practices .and consumer protection legislation and regulations.
- Any terms or conditions of use as applicable to content and documentation as published or accessed through web sites administered by the CSIRO Verification Services.

Issued by

David Whittaker
Executive Officer – ActivFire Scheme

ACTIVFIRE CERTIFIED®

Schedule to
Certificate of Conformity

Certificate num.	Registration date	Version		Valid until	
afp - 2286	13-Feb-2009	Number 16	Issue date 14-Apr-2019	30-Apr-2020	Page **2** of **3**

Specified limitations/conditions, determined from the evaluation for conformity, include the following.

i. System design, installation and maintenance shall be in accordance with the producer's design, installation, operation and maintenance instruction manual (refer Schedule of relevant articles), including detailed instructions for correct usage and maintenance and the requirements of AS 4487-2013 and authorities having jurisdiction

ii. Detection, actuation and control systems shall be designed and installed in accordance with the requirements of AS 4487-2013 Appendix A and authorities having jurisdiction.

iii. This system is intended to be used in un-occupiable and normally unoccupied areas. For occupied areas full and relevant instructions for human evacuation shall be incorporated into the design.

iv. This system is designed for total flooding protection against NFPA 10 Class A, ordinary combustibles, Class B flammable liquid fires, with or without Class C involvement, occurring within an enclosure.

Producer's description

FirePro®, FP Series, aerosol fire extinguishing system is a pre-engineered compact, non-stored pressure, electrically-actuated fixed fire protection system which extinguishes fire by using an extremely fine low settling-rate chemical particulate plus inert gases. The particulate particles are induced into the fire and quickly cause complete chemical inhibition of the fire's radical-forming chain reactions. This rapidly extinguishes the flaming combustion of most fuels. FirePro®, FP Series, aerosol fire extinguishing system is designed for the suppression of Class A, B and C fires and for prevention of explosions of gas and dust/air mixtures. The electrical initiation of the FirePro®, FP Series, aerosol fire extinguishing system is by means of an electrically activation ignition device located inside the generator. Any extinguishing system control panel is likely to be capable of activating one or several FirePro® units simultaneously.

The supplied equipment of FirePro®, FP Series, aerosol fire extinguishing system includes, mounting brackets, and all necessary fasteners to attach these to the generator.

Technical specification

The following details are a representative extract of the technical specification for the FirePro®, FP Series, aerosol fire extinguishing system and may be subject to change. Complete and current details should be determined from the designated producer's technical manual/data sheets.

Schedule of variant designations

The following is a schedule of validated variant designations of the certified/listed equipment.

Model	Mass of generator	Mass of aerosol-forming elements	Discharge time	Mounting bracket part num.
FP-20SE	310 g	20 g	5 to 10 seconds	C20BR
FP-20T				
FP-40S	610 g	40 g	5 to 10 seconds	C4080BRS1 / C4080BRS2/C4-80RBR
FP-40T				
FP-80S	870 g	80 g	5 to 10 seconds	
FP-80T				
FP-100S	1370 g	100 g	5 to 10 seconds	C1-2-5ABS / C1-2-5RBR
FP-200S	1840 g	200 g	5 to 10 seconds	
FP-500S	3340 g	500 g	5 to 10 seconds	
FP-1200	10900 g	1200 g	15 to 20 seconds	B122030BRKT
FP-1200S				
FP-1200T				
FP-1200TS				
FP-2000	15500 g	2000 g	15 to 20 seconds	
FP-2000S				
FP-2000T				
FP-2000TS				

Schedule to

Certificate of Conformity

Certificate num.	Registration date	Version		Valid until	
afp - 2286	13-Feb-2009	Number 16	Issue date 14-Apr-2019	30-Apr-2020	Page **3** of **3**

Model	Mass of generator	Mass of aerosol-forming elements	Discharge time	Mounting bracket part num.
FP-3000	16300 g	3000 g	15 to 20 seconds	B122030BRKT
FP-3000S				
FP-3000T				
FP-3000TS				
FP-4200T	25000g	4200g	15 to 20 seconds	B57BRKT
FP-4200TS				
FP-5700	26400 g	5700 g	15 to 20 seconds	
FP-5700S				
FP-5700T				
FP-5700TS				

Operating temperature: -54° to 54°C (-65° to 130°F)

Classifications (NFPA 10):

Class A, ordinary combustibles
Class B, flammable liquid fires, with or without Class C involvement, occurring within an enclosure

Operational lifespan: 15 years

Supplementary information

Schedule of relevant articles

The following schedule is an extract of articles significant and/or related as evidence of conformity.

Reference		Title / description	Date issued (or date validated)	Source
Ident. type	Ident.			
File ref.	FWSA.EX6960	FWSA.EX6960, Fixed Condensed Aerosol Extinguishing System Units (ul_w3_FWSA_EX6960_v_2017-01-26.pdf)	1-Jan-2017	Underwriters Laboratories Inc., US; Certifications Directory
Cert. of Compliance	20160920-EX6960	Fixed Condensed Aerosol Extinguishing System Units Pre-Engineered, FirePro Aerosol Generating Fire Extinguishing System Units, Models FP-20SE, FP-20T, FP-40S, FP-40T, FP-80S, FP-80T, FP-100S, FP-200S, FP-500S, FP-1200, FP-1200S, FP-1200T, FP-1200TS, FP-2000, FP-2000S, FP-2000T, FP-2000TS, FP-3000, FP-3000S, FP-3000T, FP-3000TS, FP-4200T, FP-4200TS, FP-5700, FP-5700S, FP-5700T, and FP-5700TS with 20, 40, 80, 100, 200, 500, 1200, 2000, 3000, 4200, and 5700 grams respectively. (ul_CoC_20160920-EX6960_i_2016-09-20.pdf)	20-Sep-2016	Underwriters Laboratories Inc., US
Manual No.	EX6960 Version 1.0 Revision 6.0	FirePro® Design, Installation and Maintenance Manual	Nov-2016	FirePro Systems Ltd, CY

Appendix G British Standards – Marine Approval

bsi.

By Royal Charter

EC Type Examination Certificate

This is to certify that:

FirePro Systems Ltd
6 Koumandarias Street & Spyrou
Araouzou Tonia Court No.2
Limassol
3036
Cyprus

Holds Certificate Number: BSI/A.1/3.46/560436

In respect of:

MED/3.46 - Equivalent fixed gas fire extinguishing systems for machinery spaces (aerosol systems).
Product Description - Aerosol Fire Extinguishing Units with dry condensed extinguishing agent, Fire Class A & B Models - FP20S, FP20SE, FP40S, FP80S, FP100S, FP200S, FP500S, FP1200, FP1200S, FP2000, FP2000S, FP3000, FP3000S, FP5700 & FP5700S.
Specified standard: IMO MSC/Circ 1270 incl Corr.1 as amended.

On the basis that BSI carried out the relevant EC type examination procedures for the equipment identified above which was found to be in compliance with the Marine Equipment Directive (MED) 2014/90/EU, subject to any conditions in the schedule attached hereto. The attached schedule of approval forms part of this certificate.

For and on behalf of BSI, a Notified Body for the above Directive (Notified Body Number 0086):

Chris Lewis - Certification Director, Product Certification

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

0086/yy

Page: 1 of 13

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EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Product Specification

The products listed below are to be installed with an actuation system/panel where manual activation is achieved as defined in MSC1/Circ 1270 chapter 17 and as per the FirePro User/Installation manual. The actuation system/panel is excluded from this certification.

FP20S :	Aerosol generating fire extinguishing system unit with 20g dry condensed extinguishing agent, Fire Class A & B
FP20SE :	Aerosol generating fire extinguishing system unit with 20g dry condensed extinguishing agent, Fire Class A & B
FP40S :	Aerosol generating fire extinguishing system unit with 40g dry condensed extinguishing agent, Fire Class A & B
FP80S :	Aerosol generating fire extinguishing system unit with 80g dry condensed extinguishing agent, Fire Class A & B
FP100S :	Aerosol generating fire extinguishing system unit with 100g dry condensed extinguishing agent, Fire Class A & B
FP200S :	Aerosol generating fire extinguishing system unit with 200g dry condensed extinguishing agent, Fire Class A & B
FP500S :	Aerosol generating fire extinguishing system unit with 500g dry condensed extinguishing agent, Fire Class A & B
FP1200/FP1200S :	Aerosol generating fire extinguishing system unit with 1200g dry condensed extinguishing agent, Fire Class A & B
FP2000/FP2000S :	Aerosol generating fire extinguishing system unit with 2000g dry condensed extinguishing agent, Fire Class A & B
FP3000/FP3000S :	Aerosol generating fire extinguishing system unit with 3000g dry condensed extinguishing agent, Fire Class A & B
FP5700/FP5700S :	Aerosol generating fire extinguishing system unit with 5700g dry condensed extinguishing agent, Fire Class A & B

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

Page: 2 of 13

EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Approval Documentation that forms part of this certification:

Drawing No.	Rev/Issue	Date	Title
C20EASS	1	27/05/2014	FP20SE – General Assembly Drawing
C40ASS	1	27/05/2014	FP40S – General Assembly Drawing
C80ASS	1	27/05/2014	FP80S – General Assembly Drawing
C1AS	4	27/05/2014	FP100S – General Assembly Drawings
C2AS	4	27/05/2014	FP200S – General Assembly Drawings
C5AS	4	27/05/2014	FP500S – General Assembly Drawings
B12AS	0	05/01/2016	FP1200 – General Assembly Drawing
B12EH	0	01/01/2008	FP1200 – External Housing Construction Drawing
B12IH	0	05/01/2016	FP1200 – Internal Housing Construction Drawing
B12IAS	0	05/01/2016	FP1200 – Internal Assembly Drawing
B20AS	0	05/01/2016	FP2000 – General Assembly Drawing
B20IAS	0	05/01/2016	FP2000 – Internal Assembly Drawing
B30AS	0	05/01/2016	FP3000 – General Assembly Drawing
B30IAS	0	05/01/2016	FP3000 – Internal Assembly Drawing
B2030EH	1	01/01/2008	FP2000 & FP3000 – External Housing Construction Drawing
B2030IH	0	05/01/2016	FP2000 & FP3000 – Internal Housing Construction Drawing
B122020BRKT	0	01/01/2008	FP1200 – Mounting Bracket - OBSOLETE
B122030BRKT	1	01/08/2012	FP1200/FP2000/FP3000 – Mounting Bracket
B57EH	1	01/10/2008	FP 5700 – External Housing Construction Drawing
B57IH	0	05/01/2016	FP5700 – Internal Housing Construction Drawing
B57IAS	0	05/01/2016	FP5700 – Internal Assembly Drawing
B57BRKT	2	02/10/2014	FP5700 – Mounting Bracket
AELACT	0	01/01/2008	Electrical Activators for all Models where fitted

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Approval Documentation that forms part of this certification (continued):

Drawing No.	Rev/Issue	Date	Title
B122030BRKT	1	01/08/2012	FP1200S, FP2000S, FP3000S – Mild Steel Mounting Bracket
B12EHBC	1	01/08/2012	FP1200S – External Housing Bottom Cover
B12EHSW	1	01/08/2012	FP1200S – External Housing Side Walls
B12EHTC	1	01/08/2012	FP1200S – External Housing Top Cover
B203057EHBC	1	02/10/2014	FP2000S, FP3000S, FP5700S – External Housing Bottom Cover
B203057EHTC	1	01/08/2012	FP2000S, FP3000S, FP5700S – External Housing Top Cover
B2030EHSW	2	01/08/2012	FP2000S, FP3000S – External Housing Side Walls
B57BRKT	2	02/10/2014	FP5700S – Mounting Bracket
B57EHSW	2	01/08/2012	FP5000S – External Housing Side Wall

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

Page: 4 of 13

EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Approval Documentation that forms part of this certification (continued):

Supporting Document	Rev/Issue	Date	Title
Technical Dossier	0	22/07/2010	SMO Ref 7498123– Electronic copy of the Technical file covering all models listed on page 1
Technical Dossier	1	Feb 2012	Updated to include minor changes to some drawings, Efectis Witness Test Report and Updated KIWA Certificate
Technical Dossier	2	Aug 2012	Updated to include Model FP20SE, Previous Technical Dossier included the information for this model, no change to the Technical Dossier.
Technical Dossier	3	Aug 2013	SMO Ref 8030440 - Updated to include variant Models FP1200S, FP2000S, FP3000S & FP5700S. The only difference being the external housing being made from Stainless Steel, no other change to the product.
Technical Dossier	5	Jan 2015	SMO Ref 8198682 – Drawing update to reflect name change of raw material from SBK Compound to FPC Compound. No other change, material identical just name change. Manuals updated.
Technical Dossier	10	Jan 2017	SMO Ref 8636065 –Drawing Updated, some new drawing added, UL approval & KIWA New certificates added. No change to MED products. Includes Product Risk Assessment
Manuals	5	01/10/2011	Information, Instruction & User Manual
	5	Revised 26/08/2013	Information, Instruction & User Manual – Updated to include models FP1200S, FP2000S, FP3000S & FP5700S
	5	Revised 20/01/2015	Information, Instruction & User Manual – updated to replace the thermocord activation mode with bulb thermal activation, bi-metallic thermal activation, linear heat cable (Non MED).
	6	Revised 24/06/2016	Revised to include FP 20T/40T/80T & FP 4200T models.
	2	14/02/2012	Annex 1 Marine Manual to be read in conjunction with the above manual
	2	Revised 20/01/2015	Annex 1 Marine Manual – Update to revise some of the efficiency coefficient values
	3	Revised 24/06/2016	Updated to reference the main Information, Instruction & User Manual Rev 6.

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

Page: 5 of 13

EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Approval Documentation that forms part of this certification (continued):

Supporting Document	Rev/Issue	Date	Title
Reports & Certificates	-	-	KIWA Certificate K21477/08 01/04/2010 UL Test Report, Project Ref 05CA05359, File EX6960 USCG Report CG-D-03-06 Russian Maritime Register of Shipping, Type approval Certificate Ref 10.80012.180 dated 11/06/2010 for MCS 1270 * Hughes Associates INC Analysis Report dated Nov 2004 & 15/01/2009 **
	-	06/08/2010	Technical Dossier Assessment Report 2411/7498123
	-	Aug 2011	K21477/08 01/08/2011
		26/01/2012	Cone Calorimeter Tests of IMO MSC Circ 1270 Class A Plastic Materials – Hughes Associates Inc
	-	Jan 2012	Efectis Test Report R1134, Fire test - Wood Cribs & Plastic Sheets
		12/09/2011	KIWA, EMC Test Report 126076-EMC
		11/01/2013	KIWA Certificate K21477/12 UK
		19/11/2014	KIWA Certificate K21774/14 UK – Using FPC Compound.
		23/12/2016	KIWA Certificate K21774/17 UK – update to include FP 20T/40T/80T & FP 4200T models

* *The Russian Maritime Register of Shipping has made an independent evaluation of the test reports owned by FirePro and according to their opinion it satisfied the requirements of the MSC.1/Circ.1270. Since the Certification list is reporting all the approval documents received so far by FirePro, the Russian Registry Type Approval was included in the above list.*

** *The Hughes Report is that at the time MCA requested FirePro to run additional tests, the opinion of FirePro was that they had already run the additional tests as part of the listing with various accredited Institutes, such as UL. Therefore FirePro asked Hughes Associates, the largest in the world Fire Risk Assessment Company, to carry out an evaluation and provide their independent opinion on this issue. Mr.L.Borghetti (Hughes Europe) was the chairman of the CEN,ISO and IMO technical committees on the aerosol technology and therefore he is in position to give a competent opinion on the issue.*

The conclusion of Hughes Analysis Report is:" FirePro was participating and contributing to the research and test campaign headed by USCG, having the scope to develop the information necessary for the revision of the existing IMO MSC/Circ.1007 (now IMO MSC/Circ.1270). The FirePro Aerosol Extinguishing Systems passed all the tests and requirements stated by the revised IMO MSC/Circ.1270 as reported by the USCG, the polymeric Sheet Test has been witnessed as passed by the listing issued by the Underwriters Laboratories.

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

Page: 6 of 13

EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Design Calculation.
Agent

The quantity (mass) of aerosol agent to be used should be determined as follows:

$$W = \frac{V \times q\ (g)}{f}$$

where

W = Agent mass (g) (Total mass required to protect the specific volume)
V = Volume of enclosure (m3) (Protected volume)
q = Design application density (gr/m3) (net mass of agent per unit volume (g/m3) required by the system designer for the fire protection application)
f = Efficiency coefficient of generator's model (%) (net mass of agent delivered by a generator model (size))

q = 120 gr/m3
Efficiency coefficients (related to each generator model (size)):

FP-20S/SE= 60%	FP-500S = 66%
FP-40S= 61%	FP-1200 = 63%
FP-80S= 59%	FP-2000 = 60%
FP-100S = 61%	FP-3000 = 61%
FP-200S = 59%	FP-5700 = 59%

The total number of generators (N) to be used is derived by the following formula

$$N = \frac{W\ (\text{total agent mass})}{\text{nominal mass (initial mass of the solid compound) of each generator model (size)}}$$

Example: FP2000 = 2000 grams of nominal mass
FP5700 = 5700 grams of nominal mass
Note: If different generator models (size) should be selected, the total mass of extinguishant (solid compound) shall not be less than the quantity required (W).

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

Page: 7 of 13

EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Technical Specification

Model	**FP-20S / FP20SE**
Type	Cold
Activation mechanism FP20S ♦	thermal activation
Activation mechanism FP20SE ♦	electrical (6 - 36 V D/C 0.8 A in 3 - 4 sec)
Current intensity to be tested	maximum 5 mA
Weight gross	310 g
Weight net extinguishing agent	20 g
Operational discharge time	5 - 10 seconds
Discharge outlet	2
Discharge length	0.6 m
Size	165 mm x 32 mm (incl. connector housing)
Self activation temperature	300°C

Model	**FP-40S**
Type	Cold
Activation mechanism ♦	thermal activation / electrical (6 - 36 V D/C 0.8 A in 3 - 4 sec)
Activator type	heating element with 2.3 ohm resistance
Current intensity to be tested	maximum 5 mA
Weight gross	610 g
Weight net extinguishing agent	40 g
Operational discharge time	5 - 10 seconds
Discharge outlets	2
Discharge length	1.2 m
Size	140 mm x 51 mm
Self activation temperature	300°C

♦ See Product Specification note on Page 2

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Technical Specification

Model	**FP-80S**
Type	Cold
Activation mechanism ♦	thermal activation / electrical (6 - 36 V D/C 0.8 A in 3 - 4 sec)
Activator type	heating element with 2.3 ohm resistance
Current intensity to be tested	maximum 5 mA
Weight gross	870 g
Weight net extinguishing agent	80 g
Operational discharge time	5 - 10 seconds
Discharge outlets	2
Discharge length	2 m
Size	185 mm x 51 mm (incl. connector housing)
Self activation temperature	300°C

Model	**FP-100S**
Type	Cold
Activation mechanism ♦	thermal activation / electrical (6 – 36 V D/C 0.8 A in 3 – 4 sec)
Activator type	Heating element with 2.3 ohm resistance
Current intensity to be tested	Maximum 5 mA
Weight gross	1370 g
Weight net extinguishing agent	100 g
Operational discharge time	5 - 10 seconds
Nozzle	optional
Discharge outlet	1
Discharge length	1 m
Size	155 mm x 84 mm (incl. connector housing)
Self activation temperature	300°C

♦ See Product Specification note on Page 2

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

Page: 9 of 13

EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Technical Specification

Model	**FP-200S**
Type	Cold
Activation mechanism ♦	thermal activation / electrical (6 - 36 V D/C 0.8 A in 3 - 4 sec)
Activator type	heating element with 2.3 ohm resistance
Current intensity to be tested	maximum 5 mA
Weight gross	1840 g
Weight net extinguishing agent	200 g
Operational discharge time	5 - 10 seconds
Nozzle	Optional
Discharge outlet	1
Discharge length	2 m
Size	185 mm x 84 mm (incl. connector housing)
Self activation temperature	300°C

Model	**FP-500S**
Type	Cold
Activation mechanism ♦	thermal activation / electrical (6 - 36 V D/C 0.8 A in 3 - 4 sec)
Activator type	heating element with 2.3 ohm resistance
Current intensity to be tested	maximum 5 mA
Weight gross	3340 g
Weight net extinguishing agent	500 g
Operational discharge time	5 - 10 seconds
Discharge outlet	1
Discharge length	2.5 m
Size	295 mm x 84 mm (incl. connector housing)
Self activation temperature	300°C

♦ See Product Specification note on Page 2

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

Page: 10 of 13

EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Technical Specification

Model	**FP-1200 / FP1200S**
Type	Cold
Activation mechanism ♦	thermal activation / electrical (6 - 36 V D/C 0.8 A in 3 - 4 sec)
Activator type	heating element 2.3 ohm resistance
Current intensity to be tested	maximum 5 mA
Weight gross	10900 g (excl bracket)
Weight net extinguishing agent	1200 g
Operational discharge time	10 -15 seconds
Discharge outlet	1
Discharge length	3.5 m
Size	216 mm x 300 mm x 167 mm
Self activation temperature	300°C

Model	**FP-2000 / FP2000S**
Type	Cold
Activation mechanism ♦	thermal activation / electrical (6 - 36 V D/C 0.8 A in 3-4 sec)
Activator type	heating element 2.3 ohm resistance
Current intensity to be tested	maximum 5 mA
Weight gross	15500 g
Weight net extinguishing agent	2000 g
Operational discharge time	10 - 15 seconds
Discharge outlet	1
Discharge length	3.5 m
Size	300 mm x 300 mm x 185 mm
Self activation temperature	300°C

♦ See Product Specification note on Page 2

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Technical Specification

Model	**FP-3000 / FP3000S**
Type	Cold
Activation mechanism ♦	thermal activation / electrical (6 - 36 V D/C 0.8 A in 3-4 sec)
Activator type	heating element 2.3 ohm resistance
Current intensity to be tested	maximum 5 mA
Weight gross	16300 g
Weight net extinguishing agent	3000 g
Operational discharge time	15 - 20 seconds
Discharge outlet	1
Discharge length	4 m
Size	300 mm x 300 mm x 185 mm
Self activation temperature	300°C

Model	**FP-5700 / FP5700S**
Type	Cold
Activation mechanism ♦	thermal activation / electrical (6 - 36 V D/C 0.8 A in 3-4 sec)
Activator type	heating element 2.3 ohm resistance
Current intensity to be tested	maximum 5 mA
Weight gross	26400 g
Weight net extinguishing agent	5700 g
Operational discharge time	15 - 20 seconds
Discharge outlet	1
Discharge length	8 m
Size	300 mm x 300 mm x 300 mm
Self activation temperature	300°C

♦ See Product Specification note on Page 2

First Issued: 2010-08-20 Latest Issue: 2017-11-16 Expiry Date: 2022-11-15

EC Type Examination Certificate

No. BSI/A.1/3.46/560436

Schedule of Approval

Conditions of Certification

i) This BSI/A.1/3.46/560436 issue 6 certificate remains valid unless cancelled or revoked, provided the conditions listed below are complied with and the equipment remains satisfactory in service

ii) The equipment detailed on page 1 on this certificate is to be manufactured in accordance with Conformity to Type Based on Quality Assurance of the Production Process (Module D) of the Marine Equipment Directive.

iii) The certificate will not be valid if the manufacturer makes any changes or modifications to the approved equipment, which have not been notified to, and agreed with the notified body named on this certificate.

iv) Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply

v) Detailed User instructions are to be provided with each product.

vi) The activation system supplied shall comply with all the requirements of MSC.1/Circ.1270, in particular clauses 12.1, 14 and 17"

vii) Production tests are to be conducted in accordance with the applicable requirements of the IMO Resolutions and applicable standards and be recorded by the manufacturer in accordance with the approved Conformity to Type Based on Quality Assurance of the Production Process (Module D) of the Marine Equipment Directive.

viii) Each item, batch or lot of the equipment is to have the "Mark of Conformity" affixed and be issued with a "Declaration of Conformity".

First Issued: 2010-08-20 **Latest Issue: 2017-11-16** **Expiry Date: 2022-11-15**

Page: 13 of 13

Appendix H Certificate - Safety Integrity Level (SIL) Rating

TÜV INTER CERT SAAR

CERTIFICATE

Certificate no. **14-SIL-0010101-01-TIC**

WE HEREBY CERTIFY THAT

Product description **FIRE EXTINGUISHING AEROSOL GENERATOR SYSTEM**

Models **SERIES FP – FirePro & SERIES FBN FireBan**

Manufacturer **FirePro Systems Limited**
6 koumandarias & Spyrou Araouzou Street, Tonia Court No.2, 6th Floor 3036 Limassol - CYPRUS

IS IN COMPLIANCE WITH THE REQUIREMENTS OF THE STANDARDS

IEC 61508 Parts 1÷7:2010

AS RESULT OF THE ASSESSMENT ACCORDING TO THE PROVISION SET OUT IN THE ABOVE-MENTIONED STANDARDS

Summary Report no. **RR-0617-SIL-TIC-PC-0010009-15-01**

Expiry date **01.08.2020** ***First issuing*** **12.06.2014**

Note

This certificate is issued upon the request of the manufacturer as voluntary certification; it does not include production surveillance. This certificate is valid for the product assessed, as referred in the following annex. This certificate does not allow the manufacturer to use the safety mark of TÜV INTERCERT.

Reggio Emilia, 02.08.2017

Eng. Andrea Vivi
TÜV INTERCERT Certification Body

Page 1 of 2

TÜV INTERCERT S.r.l. · Group of TÜV Saarland · Via Cecati 1/1 · 42123 Reggio Emilia ITALY
www.tuvintercert.it

CERTIFICATE ▪ CERTIFICATO ▪ ZERTIFIKAT ▪ SERTİFİKA ▪ CERTIFICADO ▪ گواهینامه ▪ ΠΙΣΤΟΠΟ

TÜV INTERCERT SAAR

CERTIFICATE

ANNEX to Certificate no. 14-SIL-0010101-01-TIC

Product included for similarity without retest and additional assessment

SERIES FP	SERIES FBN	Housing Steel Shape	Activation	SERIES FP	SERIES FBN	Housing Steel Shape	Activation
FP-20SE	FBN-20SE	Cylinder	Electrical	FP-2000	FBN-2000	Box	Electrical
FP-20T	FBN-20T	Cylinder	Electrical	FP-2000T	FBN-2000T	Box	Electrical / Thermal
FP-20TH	FBN-20TH	Cylinder	Electrical / Thermal	FP-2000S	FBN-2000S	Box	Electrical
FP-40S	FBN-40S	Cylinder	Electrical	FP-2000TS	FBN-2000TS	Box	Electrical / Thermal
FP-40T	FBN-40T	Cylinder	Electrical / Thermal	FP-3000	FBN-3000	Box	Electrical
FP-80S	FBN-80S	Cylinder	Electrical	FP-3000T	FBN-3000T	Box	Electrical / Thermal
FP-80T	FBN-80T	Cylinder	Electrical / Thermal	FP-3000S	FBN-3000S	Box	Electrical
FP-100S	FBN-100S	Cylinder	Electrical / Thermal	FP-3000TS	FBN-3000TS	Box	Electrical / Thermal
FP-200S	FBN-200S	Cylinder	Electrical / Thermal	FP-4200T	FBN-4200T	Box	Electrical
FP-500S	FBN-500S	Cylinder	Electrical / Thermal	FP-4200TS	FBN-4200TS	Box	Electrical / Thermal
FP-1200	FBN-1200	Box	Electrical	FP-5700	FBN-5700	Box	Electrical
FP-1200T	FBN-1200T	Box	Electrical / Thermal	FP-5700T	FBN-5700T	Box	Electrical / Thermal
FP-1200S	FBN-1200S	Box	Electrical	FP-5700S	FBN-5700S	Box	Electrical
FP-1200TS	FBN-1200TS	Box	Electrical / Thermal	FP-5700TS	FBN-5700TS	Box	Electrical / Thermal

Parameter assessed

Type	A	**HFT**	0
SFF	> 90%	**DC**	0 %
PFD*avg*	4.39×10^{-4}	**Mode of operation**	Low Demand Mode
Safety functions	Valve will move to the designed safe position within the specified time. (safe position)		

Architectural constraints	**Route 1_H:**	Applied	**Route 2_H:**	Applied
	The product can be used in: • single channel configuration: up to SIL 2 without external diagnostic tests • double channel configuration: up to SIL 3			

Remarks:

- For further details, including environmental conditions, limitations of use, lifetime, failure rates traceability, mean repair times, common cause factors and systematic capability constraints, make reference to Safety Manual FP000SM Rev. 1.

END OF CERTIFICATE

Reggio Emilia, 02.08.2017

Eng. Andrea Vivi
TÜV INTERCERT Certification Body

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Appendix I FirePro Post Activation – Safety Data Sheet

FirePro Aerosol Generators- Post Activation

Fire Safety Equipment Pty Ltd

Chemwatch Hazard Alert Code: **0**

Chemwatch: **5252-51**
Version No: **4.1.1.1**
Safety Data Sheet according to WHS and ADG requirements

Issue Date: **23/06/2017**
Print Date: **15/02/2018**
L.GHS.AUS.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	FirePro Aerosol Generators- Post Activation
Synonyms	Celanova FirePro Post Activation
Proper shipping name	AVIATION REGULATED SOLID, N.O.S. Not subject to this Code (see SP 106)
Other means of identification	Not Available

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

Relevant identified uses	Fire extinguishing aerosol released into an indoor burning area.

Details of the supplier of the safety data sheet

Registered company name	**Fire Safety Equipment Pty Ltd**
Address	2A Staple Street Seventeen Mile Rocks QLD 4073 Australia
Telephone	+61 7 3715 5644
Fax	+61 7 3715 8450
Website	www.fsequip.com.au
Email	ray@fsequip.com.au

Emergency telephone number

Association / Organisation	**Not Available**
Emergency telephone numbers	+61 7 3715 5644 Mon-Fri 8am - 5pm
Other emergency telephone numbers	Not Available

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

Poisons Schedule	Not Applicable
Classification	Not Applicable

Label elements

Hazard pictogram(s)	Not Applicable
SIGNAL WORD	**NOT APPLICABLE**

Hazard statement(s)

Not Applicable

Precautionary statement(s) Prevention

Not Applicable

Precautionary statement(s) Response

Not Applicable

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

Not Applicable

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
		Particulate component
584-08-7	47-49	potassium carbonate
7757-79-1	2-3	potassium nitrate
Not Available	<1	other elements
		Gas component
7727-37-9.	21-22	nitrogen
124-38-9	13-14	carbon dioxide
7732-18-5	10-12	water
Not Available	1-2	other gases, as
630-08-0		carbon monoxide
74-82-8		methane
1333-74-0		hydrogen

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact	If this product comes in contact with eyes: ▸ Wash out immediately with water. ▸ If irritation continues, seek medical attention. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin or hair contact occurs: ▸ Flush skin and hair with running water (and soap if available). ▸ Seek medical attention in event of irritation.
Inhalation	▸ If dust is inhaled, remove from contaminated area. ▸ Encourage patient to blow nose to ensure clear passage of breathing. ▸ If irritation or discomfort persists seek medical attention.
Ingestion	▸ Not considered a normal route of entry. ▸ If swallowed do **NOT** induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

▸ Generally not applicable.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▸ Generally not applicable.

Advice for firefighters

Fire Fighting	‣ Generally not applicable.
Fire/Explosion Hazard	‣ Generally not applicable.
HAZCHEM	2Z

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	‣ Generally not applicable.
Major Spills	‣ Generally not applicable.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	‣ Generally not applicable.
Other information	‣ Generally not applicable.

Conditions for safe storage, including any incompatibilities

Suitable container	Material is contained in a stainless steel fire fighting container.
Storage incompatibility	‣ Generally not applicable.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Australia Exposure Standards	nitrogen	Nitrogen	Not Available	Not Available	Not Available	Asphyxiant
Australia Exposure Standards	carbon dioxide	Carbon dioxide in coal mines	22500 mg/m3 / 12500 ppm	54000 mg/m3 / 30000 ppm	Not Available	Not Available
Australia Exposure Standards	carbon dioxide	Carbon dioxide	9000 mg/m3 / 5000 ppm	54000 mg/m3 / 30000 ppm	Not Available	Not Available
Australia Exposure Standards	carbon monoxide	Carbon monoxide	34 mg/m3 / 30 ppm	Not Available	Not Available	Not Available
Australia Exposure Standards	methane	Methane	Not Available	Not Available	Not Available	Not Available
Australia Exposure Standards	hydrogen	Hydrogen	Not Available	Not Available	Not Available	Asphyxiant

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
potassium carbonate	Potassium carbonate	0.55 mg/m3	6 mg/m3	370 mg/m3
potassium nitrate	Potassium nitrate	9 mg/m3	100 mg/m3	600 mg/m3
nitrogen	Nitrogen	7.96E+05 ppm	8.32E+05 ppm	8.69E+05 ppm
carbon dioxide	Carbon dioxide	30,000 ppm	40,000 ppm	50,000 ppm
carbon monoxide	Carbon monoxide	75 ppm	Not Available	Not Available
methane	Methane	65000 ppm	230000 ppm	400000 ppm
hydrogen	Hydrogen	65000 ppm	230000 ppm	400000 ppm

Ingredient	Original IDLH	Revised IDLH
potassium carbonate	Not Available	Not Available
potassium nitrate	Not Available	Not Available
other elements	Not Available	Not Available
nitrogen	Not Available	Not Available
carbon dioxide	40000 ppm	Not Available
water	Not Available	Not Available
other gases, as	Not Available	Not Available
carbon monoxide	1200 ppm	Not Available
methane	Not Available	Not Available
hydrogen	Not Available	Not Available

MATERIAL DATA

None assigned. Refer to individual constituents.

Exposure controls

Appropriate engineering controls	Before entering a room with the material in aerosol phase vent properly to avoid unnecessary exposure.
Personal protection	
Eye and face protection	‣ Generally not applicable.
Skin protection	See Hand protection below
Hands/feet protection	‣ Generally not applicable.
Body protection	See Other protection below
Other protection	‣ Generally not applicable.
Thermal hazards	Not Available

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:
"Forsberg Clothing Performance Index".
The effect(s) of the following substance(s) are taken into account in the ***computer-generated*** selection:
FirePro Aerosol Generators- Post Activation

Material	CPI
BUTYL	C
NATURAL RUBBER	C
NEOPRENE	C
PVA	C
VITON	C

* CPI - Chemwatch Performance Index
A: Best Selection
B: Satisfactory, may degrade after 4 hours continuous immersion
C: Poor to Dangerous Choice for other than short term immersion
NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation -
* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Aerosol white particulate gas.		
Physical state	Manufactured	**Relative density (Water = 1)**	Not Applicable

Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	Not Applicable
pH (as supplied)	Not Applicable	**Decomposition temperature**	Not Applicable
Melting point / freezing point (°C)	Not Applicable	**Viscosity (cSt)**	Not Applicable
Initial boiling point and boiling range (°C)	Not Applicable	**Molecular weight (g/mol)**	Not Applicable
Flash point (°C)	Not Applicable	**Taste**	Not Available
Evaporation rate	Not Applicable	**Explosive properties**	Not Available
Flammability	Not Applicable	**Oxidising properties**	Not Available
Upper Explosive Limit (%)	Not Applicable	**Surface Tension (dyn/cm or mN/m)**	Not Applicable
Lower Explosive Limit (%)	Not Applicable	**Volatile Component (%vol)**	Not Applicable
Vapour pressure (kPa)	Not Applicable	**Gas group**	Not Available
Solubility in water (g/L)	Not Applicable	**pH as a solution (1%)**	Not Applicable
Vapour density (Air = 1)	Not Applicable	**VOC g/L**	Not Applicable

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	▸ Generally not applicable.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	Not normally a hazard due to physical form of product. |Inhalation will have harmful effects as the product is released into a smoke filled burning indoor area that should be evacuated. Do not enter without breathing apparatus.|Exposure to product will be very short term, the potassium carbonate will dissipate to atmosphere within 20 mins of discharge.
Ingestion	Not normally a hazard due to physical form of product.
Skin Contact	Not normally a hazard due to physical form of product. The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
Eye	Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).
Chronic	Long-term exposure to the product is not thought to produce chronic effects adverse to health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course.

FirePro Aerosol Generators- Post Activation	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
potassium carbonate	**TOXICITY**	**IRRITATION**
	Dermal (rabbit) LD50: >2000 mg/kg[1]	Not Available
	Oral (rat) LD50: 1870 mg/kg[2]	
potassium nitrate	**TOXICITY**	**IRRITATION**

	dermal (rat) LD50: >5000 mg/kg[1]	Not Available
	Oral (rat) LD50: >2000 mg/kg[1]	
nitrogen	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
carbon dioxide	**TOXICITY**	**IRRITATION**
	Inhalation (mouse) LC50: 180.5 mg/l/2H[2]	Not Available
water	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
carbon monoxide	**TOXICITY**	**IRRITATION**
	Inhalation (rat) LC50: 1.9 mg/l/4H[2]	Not Available
methane	**TOXICITY**	**IRRITATION**
	Inhalation (rat) LC50: 84.684 mg/l/15 min[1]	Not Available
hydrogen	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*	

POTASSIUM CARBONATE	Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.
CARBON MONOXIDE	- central nervous system effects
WATER & HYDROGEN	No significant acute toxicological data identified in literature search.

Acute Toxicity	⊘	**Carcinogenicity**	⊘
Skin Irritation/Corrosion	⊘	**Reproductivity**	⊘
Serious Eye Damage/Irritation	⊘	**STOT - Single Exposure**	⊘
Respiratory or Skin sensitisation	⊘	**STOT - Repeated Exposure**	⊘
Mutagenicity	⊘	**Aspiration Hazard**	⊘

Legend: ✗ *– Data available but does not fill the criteria for classification*
✓ *– Data available to make classification*
⊘ *– Data Not Available to make classification*

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

FirePro Aerosol Generators- Post Activation	**ENDPOINT**	**TEST DURATION (HR)**	**SPECIES**	**VALUE**	**SOURCE**
	Not Available	Not Available	Not Available	Not Available	Not Available
potassium carbonate	**ENDPOINT**	**TEST DURATION (HR)**	**SPECIES**	**VALUE**	**SOURCE**
	LC50	96	Fish	68mg/L	2
	EC50	48	Crustacea	200mg/L	2

	NOEC	96	Fish	33mg/L	2

potassium nitrate	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	22.5mg/L	4

nitrogen	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available

carbon dioxide	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available

water	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available

carbon monoxide	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available

methane	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available

hydrogen	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available

Legend:	*Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
potassium nitrate	LOW	LOW
carbon dioxide	LOW	LOW
water	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
potassium nitrate	LOW (LogKOW = 0.209)
carbon dioxide	LOW (LogKOW = 0.83)
water	LOW (LogKOW = -1.38)
methane	LOW (LogKOW = 1.09)

Mobility in soil

Ingredient	Mobility
potassium nitrate	LOW (KOC = 14.3)
carbon dioxide	HIGH (KOC = 1.498)
water	LOW (KOC = 14.3)

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	▸ Generally not applicable.

SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO
HAZCHEM	2Z

Land transport (ADG)

UN number	3335
UN proper shipping name	AVIATION REGULATED SOLID, N.O.S. Not subject to this Code (see SP 106)
Transport hazard class(es)	Class: 9 Subrisk: Not Applicable
Packing group	Not Applicable
Environmental hazard	Not Applicable
Special precautions for user	Special provisions: 106 274 276 Limited quantity: 0

Air transport (ICAO-IATA / DGR)

UN number	3335
UN proper shipping name	Aviation regulated solid, n.o.s. *
Transport hazard class(es)	ICAO/IATA Class: 9 ICAO / IATA Subrisk: Not Applicable ERG Code: 9A
Packing group	Not Applicable
Environmental hazard	Not Applicable
Special precautions for user	Special provisions: A27 Cargo Only Packing Instructions: 956 Cargo Only Maximum Qty / Pack: 400 kg Passenger and Cargo Packing Instructions: 956 Passenger and Cargo Maximum Qty / Pack: 100 kg Passenger and Cargo Limited Quantity Packing Instructions: Y956 Passenger and Cargo Limited Maximum Qty / Pack: 30 kg G

Sea transport (IMDG-Code / GGVSee)

UN number	3335
UN proper shipping name	AVIATION REGULATED SOLID, N.O.S.
Transport hazard class(es)	IMDG Class: 9 IMDG Subrisk: Not Applicable
Packing group	Not Applicable
Environmental hazard	Not Applicable
Special precautions for user	EMS Number: Not Applicable Special provisions: 960

Limited Quantities	Not Applicable

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION

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

POTASSIUM CARBONATE(584-08-7) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Hazardous Substances Information System - Consolidated Lists
Australia Inventory of Chemical Substances (AICS)

POTASSIUM NITRATE(7757-79-1) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Inventory of Chemical Substances (AICS)

NITROGEN(7727-37-9.) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Exposure Standards
Australia Inventory of Chemical Substances (AICS)

CARBON DIOXIDE(124-38-9) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Exposure Standards
Australia Inventory of Chemical Substances (AICS)
Australia Hazardous Substances Information System - Consolidated Lists

WATER(7732-18-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Inventory of Chemical Substances (AICS)

CARBON MONOXIDE(630-08-0) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Exposure Standards
Australia Inventory of Chemical Substances (AICS)
Australia Hazardous Substances Information System - Consolidated Lists
International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List Passenger and Cargo Aircraft

METHANE(74-82-8) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Exposure Standards
Australia Inventory of Chemical Substances (AICS)
Australia Hazardous Substances Information System - Consolidated Lists

HYDROGEN(1333-74-0) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Exposure Standards
Australia Inventory of Chemical Substances (AICS)
Australia Hazardous Substances Information System - Consolidated Lists

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (hydrogen; nitrogen; potassium carbonate; carbon dioxide; water; carbon monoxide; potassium nitrate; methane)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	N (hydrogen; nitrogen)
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	N (nitrogen)
USA - TSCA	Y
Legend:	*Y = All ingredients are on the inventory* *N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)*

SECTION 16 OTHER INFORMATION

Other information

Ingredients with multiple cas numbers

Name	CAS No
potassium carbonate	584-08-7, 6381-79-9, 30095-94-4

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
PC—STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit。
IDLH: Immediately Dangerous to Life or Health Concentrations
OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index

Appendix J FirePro Pre Activation – Safety Data Sheet

FirePro Aerosol Generators – Pre Activation

Fire Safety Equipment Pty Ltd

Chemwatch Hazard Alert Code: 2

Chemwatch: **4697-26**
Version No: **4.1.1.1**
Safety Data Sheet according to WHS and ADG requirements

Issue Date: **22/06/2017**
Print Date: **15/02/2018**
L.GHS.AUS.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	FirePro Aerosol Generators – Pre Activation
Synonyms	FP Generator aerosol generating fire extinguisher
Proper shipping name	AVIATION REGULATED SOLID, N.O.S. Not subject to this Code (see SP 106) (contains potassium nitrate)
Other means of identification	Not Available

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

Relevant identified uses	Upon activation the material is transformed into a rapidly expanding fire extinguishing aerosol. Note: The MSDS Hazard statements apply to the ingredients before they react during the products use. The ingredients are contained within a sealed unit and present no hazard unless they leak from a damaged unit.

Details of the supplier of the safety data sheet

Registered company name	**Fire Safety Equipment Pty Ltd**
Address	2A Staple Street Seventeen Mile Rocks QLD 4073 Australia
Telephone	+61 7 3715 5644
Fax	+61 7 3715 8450
Website	www.fsequip.com.au
Email	ray@fsequip.com.au

Emergency telephone number

Association / Organisation	**Not Available**
Emergency telephone numbers	+61 7 3715 5644 Mon-Fri 8am - 5pm
Other emergency telephone numbers	Not Available

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

Poisons Schedule	Not Applicable
Classification [1]	Acute Toxicity (Oral) Category 4, Skin Corrosion/Irritation Category 2, Eye Irritation Category 2A, Skin Sensitizer Category 1, Acute Aquatic Hazard Category 3, Chronic Aquatic Hazard Category 3
Legend:	*1. Classified by Chemwatch; 2. Classification drawn from HSIS ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI*

Label elements

Hazard pictogram(s)	
SIGNAL WORD	WARNING

Hazard statement(s)

H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H317	May cause an allergic skin reaction.
H412	Harmful to aquatic life with long lasting effects.

Precautionary statement(s) Prevention

P280	Wear protective gloves/protective clothing/eye protection/face protection.
P261	Avoid breathing dust/fumes.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P272	Contaminated work clothing should not be allowed out of the workplace.

Precautionary statement(s) Response

P362	Take off contaminated clothing and wash before reuse.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do Continue rinsing.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P337+P313	If eye irritation persists: Get medical advice/attention.
P301+P312	IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
P330	Rinse mouth.

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
7757-79-1	77	potassium nitrate
25068-38-6	18	bisphenol A/ diglycidyl ether polymer, high molecular weight
584-08-7	4	potassium carbonate
7439-95-4	1	magnesium

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact	If this product comes in contact with the eyes: • Wash out immediately with fresh running water. • Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. • Seek medical attention without delay; if pain persists or recurs seek medical attention. • Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin contact occurs: • Immediately remove all contaminated clothing, including footwear. • Flush skin and hair with running water (and soap if available). • Seek medical attention in event of irritation.
Inhalation	• If dust is inhaled, remove from contaminated area. • Encourage patient to blow nose to ensure clear passage of breathing. • If irritation or discomfort persists seek medical attention.

Ingestion	▸ If swallowed do **NOT** induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

Symptoms of vasodilation and reflex tachycardia may present following organic nitrate overdose; most organic nitrates are extensively metabolised by hydrolysis to inorganic nitrites. Organic nitrates and nitrites are readily absorbed through the skin, lungs, mucosa and gastro-intestinal tract.

The toxicity of nitrates and nitrites result from their vasodilating properties and their propensity to form methaemoglobin.

- Most produce a peak effect within 30 minutes.
- Clinical signs of cyanosis appear before other symptoms because of the dark pigmentation of methaemoglobin.
- Initial attention should be directed towards improving oxygen delivery, with assisted ventilation, if necessary. Hyperbaric oxygen has not demonstrated conclusive benefits.
- Institute cardiac monitoring, especially in patients with coronary artery or pulmonary disease.
- Hypotension should respond to Trendelenburg's position and intravenous fluids; otherwise dopamine may be needed.
- Naloxone, glucose and thiamine should be given if a multiple ingestion is suspected.
- Decontaminate using Ipecac Syrup for alert patients or lavage for obtunded patients who present within 2-4 hours of ingestion.
- Symptomatic patients with methaemoglobin levels over 30% should receive methylene blue.(Cyanosis alone, is not an indication for treatment). The usual dose is 1-2 mg/kg of a 1% solution (10 mg/ml) IV over 5 minutes; repeat, using the same dose if symptoms of hypoxia fail to subside within 1 hour.

[*Ellenhorn and Barceloux: Medical Toxicology*]

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Methaemoglobin in blood	1.5% of haemoglobin	During or end of shift	B,NS,SQ

B: Background levels occur in specimens collected from subjects **NOT** exposed

NS: Non-specific determinant;also observed after exposure to other materials

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

FOR **SMALL FIRE:**

- USE FLOODING QUANTITIES OF WATER.
- **DO NOT** use dry chemical, CO2, foam or halogenated-type extinguishers.

FOR **LARGE FIRE**

- Flood fire area with water from a protected position

|Note: In normal use the ingredients react to form a fire extinguishing agent.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▸ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous

Advice for firefighters

Fire Fighting	▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ May be violently or explosively reactive. ▸ Wear breathing apparatus plus protective gloves. ▸ Prevent, by any means available, spillage from entering drains or water course. ▸ Fight fire from a safe distance, with adequate cover. ▸ Extinguishers should be used only by trained personnel. ▸ Use water delivered as a fine spray to control fire and cool adjacent area. ▸ Avoid spraying water onto liquid pools. ▸ **DO NOT** approach containers suspected to be hot. ▸ Cool fire exposed containers with water spray from a protected location. ▸ If safe to do so, remove containers from path of fire. ▸ If fire gets out of control withdraw personnel and warn against entry. ▸ Equipment should be thoroughly decontaminated after use.

Fire/Explosion Hazard	▸ Combustible solid which burns but propagates flame with difficulty; it is estimated that most organic dusts are combustible (circa 70%) - according to the circumstances under which the combustion process occurs, such materials may cause fires and / or dust explosions. ▸ Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions). ▸ Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust (420 micron or less) may burn rapidly and fiercely if ignited - particles exceeding this limit will generally not form flammable dust clouds; once initiated, however, larger particles up to 1400 microns diameter will contribute to the propagation of an explosion. ▸ In the same way as gases and vapours, dusts in the form of a cloud are only ignitable over a range of concentrations; in principle, the concepts of lower explosive limit (LEL) and upper explosive limit (UEL) are applicable to dust clouds but only the LEL is of practical use; - this is because of the inherent difficulty of achieving homogeneous dust clouds at high temperatures (for dusts the LEL is often called the "Minimum Explosible Concentration", MEC). ▸ When processed with flammable liquids/vapors/mists,ignitable (hybrid) mixtures may be formed with combustible dusts. Ignitable mixtures will increase the rate of explosion pressure rise and the Minimum Ignition Energy (the minimum amount of energy required to ignite dust clouds - MIE) will be lower than the pure dust in air mixture. The Lower Explosive Limit (LEL) of the vapour/dust mixture will be lower than the individual LELs for the vapors/mists or dusts. ▸ A dust explosion may release of large quantities of gaseous products; this in turn creates a subsequent pressure rise of explosive force capable of damaging plant and buildings and injuring people. ▸ Usually the initial or primary explosion takes place in a confined space such as plant or machinery, and can be of sufficient force to damage or rupture the plant. If the shock wave from the primary explosion enters the surrounding area, it will disturb any settled dust layers, forming a second dust cloud, and often initiate a much larger secondary explosion. All large scale explosions have resulted from chain reactions of this type. ▸ Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport. ▸ Build-up of electrostatic charge may be prevented by bonding and grounding. ▸ Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting. ▸ All movable parts coming in contact with this material should have a speed of less than 1-meter/sec. ▸ A sudden release of statically charged materials from storage or process equipment, particularly at elevated temperatures and/ or pressure, may result in ignition especially in the absence of an apparent ignition source. ▸ One important effect of the particulate nature of powders is that the surface area and surface structure (and often moisture content) can vary widely from sample to sample, depending of how the powder was manufactured and handled; this means that it is virtually impossible to use flammability data published in the literature for dusts (in contrast to that published for gases and vapours). ▸ Autoignition temperatures are often quoted for dust clouds (minimum ignition temperature (MIT)) and dust layers (layer ignition temperature (LIT)); LIT generally falls as the thickness of the layer increases. Combustion products include: carbon monoxide (CO) carbon dioxide (CO_2) aldehydes nitrogen oxides (NOx) other pyrolysis products typical of burning organic material.
HAZCHEM	2Z

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	▸ Clean up all spills immediately. ▸ No smoking, naked lights, ignition sources. ▸ Avoid all contact with any organic matter including fuel, solvents, sawdust, paper or cloth and other incompatible materials, as ignition may result. ▸ Avoid breathing dust or vapours and all contact with skin and eyes. ▸ Control personal contact with the substance, by using protective equipment. ▸ Contain and absorb spill with dry sand, earth, inert material or vermiculite. ▸ **DO NOT** use sawdust as fire may result. ▸ Scoop up solid residues and seal in labelled drums for disposal.

	▸ Neutralise/decontaminate area.
Major Spills	▸ Clear area of personnel and move upwind. ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ May be violently or explosively reactive. ▸ Wear breathing apparatus and protective gloves. ▸ Prevent, by any means available, spillage from entering drains or water courses. ▸ No smoking, flames or ignition sources. ▸ Increase ventilation. ▸ Contain spill with sand, earth or other clean, inert materials. ▸ **NEVER USE** organic absorbents such as sawdust, paper or cloth ▸ Use spark-free and explosion-proof equipment. ▸ Collect any recoverable product into labelled containers for possible recycling. ▸ Avoid contamination with organic matter to prevent subsequent fire and explosion. ▸ **DO NOT** mix fresh with recovered material. ▸ Collect residues and seal in labelled drums for disposal. ▸ Wash area and prevent runoff into drains. ▸ Decontaminate equipment and launder protective clothing before storage and re-use. ▸ If contamination of drains or waterways occurs advise emergency services.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	▸ Avoid personal contact and inhalation of dust, mist or vapours. ▸ Provide adequate ventilation. ▸ Always wear protective equipment and wash off any spillage from clothing. ▸ Keep material away from light, heat, flammables or combustibles. ▸ Keep cool, dry and away from incompatible materials. ▸ Avoid physical damage to containers. ▸ **DO NOT** repack or return unused portions to original containers. Withdraw only sufficient amounts for immediate use. ▸ Use only minimum quantity required. ▸ Avoid using solutions of peroxides in volatile solvents. Solvent evaporation should be controlled to avoid dangerous concentration of the peroxide. ▸ Do NOT allow peroxides to contact iron or compounds of iron, cobalt, or copper, metal oxide salts, acids or bases. ▸ Do NOT use metal spatulas to handle peroxides ▸ Do NOT use glass containers with screw cap lids or glass stoppers. ▸ Store peroxides at the lowest possible temperature, consistent with their solubility and freezing point. ▸ CAUTION: Do NOT store liquids or solutions of peroxides at a temperature below that at which the peroxide freezes or precipitates. Peroxides in this form are extremely shock and heat-sensitive. Refrigerated storage of peroxides must ONLY be in explosion-proof units. ▸ The hazards and consequences of fires and explosions during synthesis and use of peroxides is widely recognised; spontaneous or induced decomposition may culminate in a variety of ways, ranging from moderate gassing to spontaneous ignition or explosion. The heat released from spontaneous decomposition of an energy-rich compound causes a rise in the surrounding temperature; the temperature will rise until thermal balance is established or until the material heats to decomposition. ▸ The most effective means for minimising the consequences of an accident is to limit quantities to a practical minimum. Even gram-scale explosions can be serious. Once ignited the burning of peroxides cannot be controlled and the area should be evacuated. ▸ Unless there is compelling reason to do otherwise, peroxide concentration should be limited to 10% (or less with vigorous reactants). Peroxide concentration is rarely as high as 1% in the reaction mixture of polymerisation or other free-radical reactions. ▸ Peroxides should be added slowly and cautiously to the reaction medium. This should be completed prior to heating and with good agitation. ▸ Addition of peroxide to the hot monomer is extremely dangerous. A violent reaction (e.g., fire or explosion) can result from inadvertent mixing of promoters (frequently used with peroxides in polymerisation systems) with full-strength peroxide ▸ Organic peroxides are very sensitive to contamination (especially heavy-metal compounds, metal oxide salts, alkaline materials including amines, strong acids, and many varieties of dust and dirt). This can initiate rapid, uncontrolled decomposition of peroxides and possible generation of intense heat, fire or explosion The consequences of accidental contamination from returning withdrawn material to the storage container can be disastrous. ▸ When handling **NEVER** smoke, eat or drink. ▸ Always wash hands with soap and water after handling. ▸ Use only good occupational work practice. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions) ▸ Minimise airborne dust and eliminate all ignition sources. Keep away from heat, hot surfaces, sparks, and flame. ▸ Establish good housekeeping practices.

	‣ Remove dust accumulations on a regular basis by vacuuming or gentle sweeping to avoid creating dust clouds. ‣ Use continuous suction at points of dust generation to capture and minimise the accumulation of dusts. Particular attention should be given to overhead and hidden horizontal surfaces to minimise the probability of a "secondary" explosion. According to NFPA Standard 654, dust layers 1/32 in.(0.8 mm) thick can be sufficient to warrant immediate cleaning of the area. ‣ Do not use air hoses for cleaning. ‣ Minimise dry sweeping to avoid generation of dust clouds. Vacuum dust-accumulating surfaces and remove to a chemical disposal area. Vacuums with explosion-proof motors should be used. ‣ Control sources of static electricity. Dusts or their packages may accumulate static charges, and static discharge can be a source of ignition. ‣ Solids handling systems must be designed in accordance with applicable standards (e.g. NFPA including 654 and 77) and other national guidance. ‣ Do not empty directly into flammable solvents or in the presence of flammable vapors. ‣ The operator, the packaging container and all equipment must be grounded with electrical bonding and grounding systems. Plastic bags and plastics cannot be grounded, and antistatic bags do not completely protect against development of static charges. Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source. ‣ Do NOT cut, drill, grind or weld such containers. ‣ In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.
Other information	‣ Store in original containers. ‣ Keep containers securely sealed as supplied. ‣ Store in a cool, well ventilated area. ‣ Keep dry. ‣ Store under cover and away from sunlight. ‣ Store away from flammable or combustible materials, debris and waste. Contact may cause fire or violent reaction. ‣ Store away from incompatible materials and foodstuff containers. ‣ **DO NOT** stack on wooden floors or pallets. ‣ Protect containers from physical damage. ‣ Check regularly for leaks. ‣ Observe manufacturer's storage and handling recommendations contained within this SDS.

Conditions for safe storage, including any incompatibilities

Suitable container	Material is contained in special fire fighting unit.
Storage incompatibility	‣ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
potassium nitrate	Potassium nitrate	9 mg/m3	100 mg/m3	600 mg/m3
bisphenol A/ diglycidyl ether polymer, high molecular weight	Epoxy resin includes EPON 1001, 1007, 820, ERL-2795	90 mg/m3	990 mg/m3	5,900 mg/m3
potassium carbonate	Potassium carbonate	0.55 mg/m3	6 mg/m3	370 mg/m3
magnesium	Magnesium	18 mg/m3	200 mg/m3	1,200 mg/m3

Ingredient	Original IDLH	Revised IDLH
potassium nitrate	Not Available	Not Available
bisphenol A/ diglycidyl ether polymer, high molecular weight	Not Available	Not Available
potassium carbonate	Not Available	Not Available
magnesium	Not Available	Not Available

MATERIAL DATA

None assigned. Refer to individual constituents.

Exposure controls

Appropriate engineering controls

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
The basic types of engineering controls are:
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
Employers may need to use multiple types of controls to prevent employee overexposure.

General exhaust is adequate under normal operating conditions. If risk of overexposure exists, wear SAA approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapours, degreasing etc., evaporating from tank (in still air)	0.25-0.5 m/s (50-100 f/min)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood - local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.
Before entering a room with the material in aerosol phase vent properly to avoid unnecessary exposure.

Personal protection

Eye and face protection	None under normal operating conditions.
Skin protection	See Hand protection below
Hands/feet protection	None under normal operating conditions.
Body protection	See Other protection below
Other protection	None under normal operating conditions.
Thermal hazards	Not Available

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Off-white odourless powder; insoluble in water.		
Physical state	Manufactured	**Relative density (Water =**	Not Applicable

		1)	
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Applicable
pH (as supplied)	Not Applicable	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Applicable
Initial boiling point and boiling range (°C)	Not Applicable	Molecular weight (g/mol)	Not Available
Flash point (°C)	Not Applicable	Taste	Not Available
Evaporation rate	Not Applicable	Explosive properties	Not Available
Flammability	Not Applicable	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Applicable	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Applicable	Volatile Component (%vol)	Not Applicable
Vapour pressure (kPa)	Not Applicable	Gas group	Not Available
Solubility in water (g/L)	Immiscible	pH as a solution (1%)	Not Applicable
Vapour density (Air = 1)	Not Applicable	VOC g/L	Not Applicable

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	‣ Unstable in the presence of incompatible materials. ‣ Product is considered stable under normal handling conditions. ‣ Prolonged exposure to heat. ‣ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	Not normally a hazard due to physical form of product. Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system. Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled. If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.
Ingestion	Not normally a hazard due to physical form of product. Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual. The substance and/or its metabolites may bind to haemoglobin inhibiting normal uptake of oxygen. This condition, known as "methaemoglobinemia", is a form of oxygen starvation (anoxia). Symptoms include cyanosis (a bluish discolouration skin and mucous membranes) and breathing difficulties. Symptoms may not be evident until several hours after exposure. At about 15% concentration of blood methaemoglobin there is observable cyanosis of the lips, nose and earlobes. Symptoms may be absent although euphoria, flushed face and headache are commonly experienced. At 25-40%,

	cyanosis is marked but little disability occurs other than that produced on physical exertion. At 40-60%, symptoms include weakness, dizziness, lightheadedness, increasingly severe headache, ataxia, rapid shallow respiration, drowsiness, nausea, vomiting, confusion, lethargy and stupor. Above 60% symptoms include dyspnea, respiratory depression, tachycardia or bradycardia, and convulsions. Levels exceeding 70% may be fatal.
Skin Contact	Not normally a hazard due to physical form of product. The material produces moderate skin irritation; evidence exists, or practical experience predicts, that the material either ▸ produces moderate inflammation of the skin in a substantial number of individuals following direct contact, and/or ▸ produces significant, but moderate, inflammation when applied to the healthy intact skin of animals (for up to four hours), such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis. The material may accentuate any pre-existing dermatitis condition Open cuts, abraded or irritated skin should not be exposed to this material
Eye	Not normally a hazard due to physical form of product. Evidence exists, or practical experience predicts, that the material may cause severe eye irritation in a substantial number of individuals and/or may produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Eye contact may cause significant inflammation with pain. Corneal injury may occur; permanent impairment of vision may result unless treatment is prompt and adequate. Repeated or prolonged exposure to irritants may cause inflammation characterised by a temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.
Chronic	Practical experience shows that skin contact with the material is capable either of inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals. Limited evidence shows that inhalation of the material is capable of inducing a sensitisation reaction in a significant number of individuals at a greater frequency than would be expected from the response of a normal population. Pulmonary sensitisation, resulting in hyperactive airway dysfunction and pulmonary allergy may be accompanied by fatigue, malaise and aching. Significant symptoms of exposure may persist for extended periods, even after exposure ceases. Symptoms can be activated by a variety of nonspecific environmental stimuli such as automobile exhaust, perfumes and passive smoking. Exposure to the material may cause concerns for human fertility, on the basis that similar materials provide some evidence of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects, but which are not a secondary non-specific consequence of other toxic effects. . Long term exposure to high dust concentrations may cause changes in lung function (i.e. pneumoconiosis) caused by particles less than 0.5 micron penetrating and remaining in the lung. A prime symptom is breathlessness. Lung shadows show on X-ray.

	TOXICITY	IRRITATION
FirePro Aerosol Generators – Pre Activation	Not Available	Not Available
potassium nitrate	dermal (rat) LD50: >5000 mg/kg[1]	Not Available
	Oral (rat) LD50: >2000 mg/kg[1]	
bisphenol A/ diglycidyl ether polymer, high molecular weight	dermal (rat) LD50: >1200 mg/kg[2]	Eye (rabbit): 100 mg - mild
	Oral (rat) LD50: >1000 mg/kg[2]	
potassium carbonate	Dermal (rabbit) LD50: >2000 mg/kg[1]	Not Available
	Oral (rat) LD50: 1870 mg/kg[2]	
magnesium	Oral (rat) LD50: >2000 mg/kg[1]	Not Available
Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*	

BISPHENOL A/ DIGLYCIDYL ETHER POLYMER, HIGH MOLECULAR WEIGHT	The following information refers to contact allergens as a group and may not be specific to this product. Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for

	contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested. The chemical structure of hydroxylated diphenylalkanes or bisphenols consists of two phenolic rings joined together through a bridging carbon. This class of endocrine disruptors that mimic oestrogens is widely used in industry, particularly in plastics Bisphenol A (BPA) and some related compounds exhibit oestrogenic activity in human breast cancer cell line MCF-7, but there were remarkable differences in activity. Several derivatives of BPA exhibited significant thyroid hormonal activity towards rat pituitary cell line GH3, which releases growth hormone in a thyroid hormone-dependent manner. However, BPA and several other derivatives did not show such activity. Results suggest that the 4-hydroxyl group of the A-phenyl ring and the B-phenyl ring of BPA derivatives are required for these hormonal activities, and substituents at the 3,5-positions of the phenyl rings and the bridging alkyl moiety markedly influence the activities. Bisphenols promoted cell proliferation and increased the synthesis and secretion of cell type-specific proteins. When ranked by proliferative potency, the longer the alkyl substituent at the bridging carbon, the lower the concentration needed for maximal cell yield; the most active compound contained two propyl chains at the bridging carbon. Bisphenols with two hydroxyl groups in the para position and an angular configuration are suitable for appropriate hydrogen bonding to the acceptor site of the oestrogen receptor. The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. In mice, dermal application of bisphenol A diglycidyl ether (BADGE) (1, 10, or 100 mg/kg) for 13 weeks produced mild to moderate chronic active dermatitis. At the high dose, spongiosis and epidermal micro abscess formation were observed. In rats, dermal application of BADGE (10, 100, or 1000 mg/kg) for 13 weeks resulted in a decrease in body weight at the high dose. The no-observable effect level (NOEL) for dermal exposure was 100 mg/kg for both sexes. In a separate study, application of BADGE (same doses) five times per week for ~13 weeks not only caused a decrease in body weight but also produced chronic dermatitis at all dose levels in males and at >100 mg/kg in females (as well as in a satellite group of females given 1000 mg/kg). **Reproductive and Developmental Toxicity**: BADGE (50, 540, or 750 mg/kg) administered to rats via gavage for 14 weeks (P1) or 12 weeks (P2) produced decreased body weight in all males at the mid dose and in both males and females at the high dose, but had no reproductive effects. The NOEL for reproductive effects was 750 mg/kg. **Carcinogenicity:** IARC concluded that "there is limited evidence for the carcinogenicity of bisphenol A diglycidyl ether in experimental animals." Its overall evaluation was "Bisphenol A diglycidyl ether is not classifiable as to its carcinogenicity to humans (Group 3). In a lifetime tumourigenicity study in which 90-day-old C3H mice received three dermal applications per week of BADGE (undiluted dose) for 23 months, only one out of 32 animals developed a papilloma after 16 months. A retest, in which skin paintings were done for 27 months, however, produced no tumours (Weil et al., 1963). In another lifetime skin-painting study, BADGE (dose n.p.) was also reported to be noncarcinogenic to the skin of C3H mice; it was, however, weakly carcinogenic to the skin of C57BL/6 mice (Holland et al., 1979; cited by Canter et al., 1986). In a two-year bioassay, female Fisher 344 rats dermally exposed to BADGE (1, 100, or 1000 mg/kg) showed no evidence of dermal carcinogenicity but did have low incidences of tumours in the oral cavity (U.S. EPA, 1997). **Genotoxicity**: In S. typhimurium strains TA100 and TA1535, BADGE (10-10,000 ug/plate) was mutagenic with and without S9; negative results were obtained in TA98 and TA1537 (Canter et al., 1986; Pullin, 1977). In a spot test, BADGE (0.05 or 10.00 mg) failed to show mutagenicity in strains TA98 and TA100 (Wade et al., 1979). Negative results were also obtained in the body fluid test using urine of female BDF and ICR mice (1000 mg/kg BADGE), the mouse host-mediated assay (1000 mg/kg), micronucleus test (1000 mg/kg), and dominant lethal assay (~3000 mg/kg). **Immunotoxicity:** Intracutaneous injection of diluted BADGE (0.1 mL) three times per week on alternate days (total of 8 injections) followed by a three-week incubation period and a challenge dose produced sensitisation in 19 of 20 guinea pigs - **Consumer exposure** to BADGE is almost exclusively from migration of BADGE from can coatings into food. Using a worst-case scenario that assumes BADGE migrates at the same level into all types of food, the estimated per capita daily intake for a 60-kg individual is approximately 0.16 ug/kg body weight/day. A review of one- and two-generation reproduction studies and developmental investigations found no evidence of reproductive or endocrine toxicity, the upper ranges of dosing being determined by maternal toxicity. The lack of endocrine toxicity in the reproductive and developmental toxicological tests is supported by negative results from both in vivo and in vitro assays designed specifically to detect oestrogenic and androgenic properties of BADGE. An examination of data from sub-chronic and chronic toxicological studies support a NOAEL of 50 mg/ kg/body weight day from the 90-day study, and a NOAEL of 15 mg/kg body weigh/day (male rats) from the 2-year carcinogenicity study. Both NOAELS are considered appropriate for risk assessment. Comparing the estimated daily human intake of 0.16 ug/kg body weight/day with the NOAELS of 50 and 15 mg/kg body weight/day shows human exposure to BADGE from can coatings is between 250,000 and 100,000-fold lower than the NOAELs from the most sensitive toxicology tests. These large margins of safety together with lack of reproductive, developmental, endocrine and carcinogenic effects supports the continued use of BADGE for use in articles intended to come into contact with foodstuffs. for RTECS No: SL 6475000: (liquid grade) Equivocal tumourigen by RTECS criteria Somnolence, dyspnea, peritonitis
POTASSIUM CARBONATE	Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to

	hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

Acute Toxicity	✔	**Carcinogenicity**	⊘
Skin Irritation/Corrosion	✔	**Reproductivity**	⊘
Serious Eye Damage/Irritation	✔	**STOT - Single Exposure**	⊘
Respiratory or Skin sensitisation	✔	**STOT - Repeated Exposure**	⊘
Mutagenicity	⊘	**Aspiration Hazard**	⊘

Legend: ✘ *– Data available but does not fill the criteria for classification*
✔ *– Data available to make classification*
⊘ *– Data Not Available to make classification*

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

FirePro Aerosol Generators – Pre Activation

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
Not Available	Not Available	Not Available	Not Available	Not Available

potassium nitrate

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	22.5mg/L	4

bisphenol A/ diglycidyl ether polymer, high molecular weight

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	1.2mg/L	2
EC50	72	Algae or other aquatic plants	9.4mg/L	2
NOEC	72	Algae or other aquatic plants	2.4mg/L	2

potassium carbonate

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	68mg/L	2
EC50	48	Crustacea	200mg/L	2
NOEC	96	Fish	33mg/L	2

magnesium

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	541mg/L	2
EC50	72	Algae or other aquatic plants	>20mg/L	2
NOEC	72	Algae or other aquatic plants	>25.5mg/L	2

Legend: *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
potassium nitrate	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
potassium nitrate	LOW (LogKOW = 0.209)

Mobility in soil

Ingredient	Mobility
potassium nitrate	LOW (KOC = 14.3)

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	▸ Recycle wherever possible or consult manufacturer for recycling options. ▸ Consult State Land Waste Management Authority for disposal. ▸ Bury residue in an authorised landfill. ▸ Recycle containers if possible, or dispose of in an authorised landfill.

SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO
HAZCHEM	2Z

Land transport (ADG)

UN number	3335
UN proper shipping name	AVIATION REGULATED SOLID, N.O.S. Not subject to this Code (see SP 106) (contains potassium nitrate)
Transport hazard class(es)	Class: 9 Subrisk: Not Applicable
Packing group	Not Applicable
Environmental hazard	Not Applicable
Special precautions for user	Special provisions: 106 274 276 Limited quantity: 0

Air transport (ICAO-IATA / DGR)

UN number	3335
UN proper shipping name	Aviation regulated solid, n.o.s. * (contains potassium nitrate)
Transport hazard class(es)	ICAO/IATA Class: 9 ICAO / IATA Subrisk: Not Applicable ERG Code: 9A
Packing group	Not Applicable
Environmental hazard	Not Applicable
Special precautions for user	Special provisions: A27 Cargo Only Packing Instructions: 956 Cargo Only Maximum Qty / Pack: 400 kg Passenger and Cargo Packing Instructions: 956 Passenger and Cargo Maximum Qty / Pack: 100 kg Passenger and Cargo Limited Quantity Packing Instructions: Y956 Passenger and Cargo Limited Maximum Qty / Pack: 30 kg G

Sea transport (IMDG-Code / GGVSee)

UN number	3335
UN proper shipping name	AVIATION REGULATED SOLID, N.O.S. (contains potassium nitrate)
Transport hazard class(es)	IMDG Class: 9 IMDG Subrisk: Not Applicable
Packing group	Not Applicable
Environmental hazard	Not Applicable
Special precautions for user	EMS Number: Not Applicable Special provisions: 960 Limited Quantities: Not Applicable

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION

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

POTASSIUM NITRATE(7757-79-1) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Inventory of Chemical Substances (AICS)

BISPHENOL A/ DIGLYCIDYL ETHER POLYMER, HIGH MOLECULAR WEIGHT(25068-38-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Hazardous Substances Information System - Consolidated Lists | Australia Inventory of Chemical Substances (AICS)

POTASSIUM CARBONATE(584-08-7) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Hazardous Substances Information System - Consolidated Lists | Australia Inventory of Chemical Substances (AICS)

MAGNESIUM(7439-95-4) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Hazardous Substances Information System - Consolidated Lists | Australia Inventory of Chemical Substances (AICS)

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (potassium carbonate; bisphenol A/ diglycidyl ether polymer, high molecular weight; magnesium; potassium nitrate)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	N (bisphenol A/ diglycidyl ether polymer, high molecular weight; magnesium)
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	*Y = All ingredients are on the inventory* *N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)*

SECTION 16 OTHER INFORMATION

Other information

Ingredients with multiple cas numbers

Name	CAS No
potassium carbonate	584-08-7, 6381-79-9, 30095-94-4

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are

Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
PC—STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit。
IDLH: Immediately Dangerous to Life or Health Concentrations
OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index

Appendix K Residue from FirePro Discharge

FirePro. Reinventing Fire Suppression

FirePro solid particles in the aerosol phase

Residue from FirePro Discharge

The FirePro Aerosol phase consists of a gas phase with micro sized solid particles in suspension.

Analysis by a laser beam diffraction test on the particles, have shown the following correlation between the gaseous and solid components:

52 % solid micro sized particles	inorganic potassium salts, mainly potassium nitrate, which is primarily converted into potassium carbonate
48 % gaseous particles	mainly water vapor, nitrogen and minor percentage of carbon dioxide

The distribution of the solid particles, as per their diameter's size (in µm), is represented here:

Size of the particle's diameter in µm	%
< 1	52
1 - 2	19
2 - 5	17
> 5	12

The **solid aerosol-forming compound FPC** is the originator of the condensed extinguishing aerosol (generated by the FPC activation). Upon actuation the solid aerosol-forming compound FPC will undergo a combustion reaction generating the fire extinguishing condensed aerosol.

Compound	Chemical Formula	CAS #	% by Weight
Gas			
Carbon Dioxide	CO_2	124-38-9	13%-14%
Nitrogen	N_2	7727-37-9	21%-22%
Water Vapor	H_2O	7732-18-5	10%-12%
Carbon Monoxide Methane Hydrogen	CO CH4 H2		1%-2%
Particulate			
Potassium Carbonate	K_2CO3	584-08-7	47%-49%
Potassium Nitrate	KNO3	7757-79-1	2%-3%
Potassium Chloride	KCl	7447-40-7	< 1%
Other elements	See KEMA report	-	< 1 %

The FirePro® aerosol-forming compound is not based on halogen compounds that react with the fire. It does not produce any corrosive halogen acid by-products in its reaction with the fire. Potassium carbonate creates stability in neurons to help maintain equilibrium.

Potassium nitrate when burned with the free radicals of a fire's flame, produces potassium carbonate.

The residue is non-toxic and non-corrosive (see separate NRL report), it is hydroscopic in nature on discharge as a result of the aerosol process so will attract moisture. The chemical nature of the residues (potassium salts) is slightly alkaline PH is approx. 8.

Cleanup after a fire incident will be determined by the extent of the damage involved in the event.

Within the risk the generators are designed that the size of the generators and positioning creates the appropriate stream length. It is this stream length that both ensures maximum fire knock down and minimizing any potassium carbonate mark that could be left on surface directly in front of the generator.

Any residue left by the generators is easily cleaned away.

The stream created by the externally mounted generators used as a room flooding system will not affect the internal componentry and switchgear within the electrical cabinets.

Should there be a false discharge:

Note a false discharge can only occur when both detection zones are in alarm and activation initiated from the fire indicator panel OR environmental temperature has reached 300 deg C.

- VENTILATE the room immediately after discharge. This reduces the aerosol concentration.
- This absorption of moisture occurs after a short time and as this process occurs the aerosol solid particles change to an light oily substance
- CLEAN as soon as possible all exposed surfaces using cloths, special moisture removing fluid or spray.

Appendix L Residue from FirePro Discharge – Environmental Impact

FirePro solid particles in the aerosol phase

Residue from FirePro Discharge

Environmentally friendly fire-extinguishing technology condensed aerosol fire-extinguishing technology was developed as a result of the Montreal Protocol 1994, which banned ozone-depleting substances, such as Halon1301 and other halocarbon and chlorofluorocarbon-based gases. Manufactured under ISO 14001, FirePro's EPA SNAP listed-products are CFC-free and HFC-free, with zero ODP (ozone-depletion potential) and zero GWP (global-warming potential). Marked with the Green Label

FirePro® aerosol is non-toxic (laboratory tests show no harmful effects on water, air climatic conditions, animals, plants, micro-organisms). On activation a white gas is emitted from the units – this is really particles, and has an atmospheric life of approx. 20 minutes after which it will fall to earth as dust.

The FirePro Aerosol phase consists of a gas phase with micro sized solid particles in suspension. Analysis by a laser beam diffraction test on the particles, have shown composition of the gas and solid components:

52 % solid micro sized particles	inorganic potassium salts, mainly potassium nitrate, which is primarily converted into potassium carbonate. All particles are less than 5micons in diameter. In comparison human hair is approx. 100 microns in diameter.
48 % gaseous particles	mainly water vapor, nitrogen and minor % of carbon dioxide

The **solid aerosol-forming compound FPC** is the originator of the condensed extinguishing aerosol. Upon activation the solid aerosol-forming compound FPC will undergo a combustion reaction generating the fire extinguishing condensed aerosol.

Compound		Chemical Formula	% by Weight
GAS	Carbon Dioxide	CO_2	13%-14%
	Nitrogen	N_2	21%-22%
	Water Vapor	H_2O	10%-12%
	Carbon Monoxide	CO	
	Methane	CH4	1%-2%
	Hydrogen	H2	
PARTICLES	Potassium Carbonate	K_2CO_3	47%-49%
	Potassium Nitrate	KNO3	2%-3%
	Potassium Chloride	KCl	< 1%
	Other elements		< 1 %

Residue of Particulate matter after discharge of FirePro Aerosol Generators is approximately 10-15% of the aerosol weight of the generator. Example - 100g FirePro Generator will leave 10-15g of dust like residue distributed around the risk area. Where the risk area is ventilated during the aerosol phase the particles will be distributed by the prevailing wind conditions.

The residue is non-toxic and non-corrosive; it is hydroscopic in nature on discharge as a result of the aerosol process so will attract moisture. The chemical nature of the residues (potassium salts) is slightly alkaline PH is approx. 8.

FirePro® consists of inorganic potassium salts. Under normal circumstances these salts will not cause any damage to human beings or animals. The concentrations of heavy metals and other trace elements are negligible.

Upon activation our products pose no threat to the atmosphere when the extinguishing aerosol is produced. This is evident is the physical and chemical characteristics of our products which bear the Green Label, SNAP Listed (Significant New Alternative Policy) of EPA (USA) and Ozone-Friendly–NO-CFCs logos.

Effect on Water Supplies eco systems and potable drinking water unless large quantities of the particles have been deposited on water supplies there will be no discernible effect on water bodies. The PH of 8 would have an impact but this would not normally be measurable, and the particle sizes which are less than 5 microns are so small that any concentration outside of a contained area where the discharge occurred would be extremely unlikely. Without such concentration the quality of eco water and potable drinking water will be unaffected.

FirePro solid particles in the aerosol phase

Residue from FirePro Discharge

Known health impact associated with direct exposure to the discharged aerosol. FirePro® aerosol-forming compound is not based on halogen compounds that react with the fire. It does not produce any corrosive halogen acid by-products in its reaction with the fire. Potassium carbonate creates stability in neurons to help maintain equilibrium. There are no known Occupational Exposure Limits.

Hazards Identification		
☺	Hazards for humans related to the SBK solid compound have not been found.	
☺	Hazards for humans related to the aerosol released by the solid compound have not been established.	
☺	Signs and symptoms related to the aerosol are only referred to acute exposure and/or chronic overexposures.	
Signs and Symptoms		
☺	Eye Contact	At normal contact no injury
☺	Inhalation	Not a likely route of entry
☺	Skin Contact	At normal contact no injury
☺	Ingestion	At normal contact no injury
☺	Chronic Overexposure	At normal contact no injury
☺	Medical Conditions Generally Aggravated by Exposure	None known
☺	Environment	None established
Exposure Controls and Personal Protection		
☺	Respiratory Protection	At normal contact not needed
☺	Hand Protection	At normal contact not needed
☺	Eye Protection	At normal contact not needed
☺	Skin and Body Protection	At normal contact not needed

Recommended decontamination - areas exposed to the residue in any concentration, should be cleaned and the dust particles removed. Removal if the dust particles can be achieved by vacuum, broom or other equipment in sensitive areas. This level of concentration would only be inside the discharge area. The distribution of the particles would be over a large area as the discharge is carried by the prevailing wind unless contained.