

21st May 2020

Mr. Will Turner
Jacobs Consulting,
Electrical Engineer- APAC B&I – Energy and Information East Coast

Ref – **Various electrical risks Mongolia FirePro aerosol fire suppression systems.**

Technical information-

Each risk has its own challenge for traditional high-pressure gaseous fire suppression system to be installed safely.

Why FirePro fire suppression systems.

- On discharge the fire suppression gas is a white gas & is potassium carbonate (K_2CO_3) 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 & 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 deg C or an electrical current to allow it to discharge.
- It cannot leak or lose pressure like other HP gases.
- It is not pressurised & does not require hydro testing.
- There is no pipework.
- The generators only require visual inspection.
- They are the only aerosol with a tested life span of 15 years.
- FirePro is not a pyrotechnic, unlike Stat-X & has been tested to UL2775 for explosive risks & passed.
- FirePro generators discharge at a low 10-20kpa.
- Does not require fan integrity testing on an annual basis.
- Does not require vent reliefs. After discharge it creates less than 1kpa in pressure to the risk.
- Is environmentally friendly with zero ODP & GWP.



Certification & Listings –

- FirePro is Certified to UL2775 -Standard for Fixed Condensed Aerosol Extinguishing System Units for A,B & C (non- conductivity) class & 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).
- FirePro is Certified to AS4487-2013 - Condensed Aerosol Extinguishing Systems Standard - by Global-Mark a NATA accredited Jaz Anz approved Certifier. – (FirePro is the only Certified & Listed aerosol fire suppression system Certified & Listed to AS4487-2013).
- FirePro is listed to AS5062 – 2016 - Fire Protection for Mobile and Transportable Equipment – by Global-Mark (FirePro is the only Certified & Listed aerosol fire suppression system Certified AS5062 -2006).
- FirePro is listed by CSIRO – Activfire – Listing to AS4487-2013 - Condensed aerosol extinguishing systems.
- Independent test reports including Electrical Conductivity testing for up to 75kva & 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.
- **The 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.**
- **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 and can be used in:
 - Zone 1 and 2 with presence of gases of IIA, IIB and IIC hazard groups
 - Zone 21 and 22 with presence of dusts of IIIA, IIIB and IIIC hazard groups
 - The UL test demonstrated and proved that the FirePro Aerosol Generators actuated inside an explosive atmosphere did not initiate any explosion, the aerosol actually provided an inert atmosphere.

Fan Integrity Testing, Structural integrity & Vent Relief is not required either at

FirePro.

Fire suppression systems backed by **research**,
committed to **people** and the **environment**



installation or annual maintenance to AS1851 –

AS4487-2013 section 7.6: paragraph 2 – “Due to the specific characteristics of the extinction process of condensed aerosols that primarily produce particulates, no method is known to evaluate the hold time in real installations, other than real discharge which is not practical. For this reason, a specific test is required for each aerosol formulation to determine the maximum leakage area to volume ratio that provides for the minimum hold time declared by the manufacturer. The approach for determining hold time is detailed in Appendix E, Paragraph E7.

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 -

- AS per the MSDS provided & managed by ChemWatch - 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.

Cabinet protection –

BTA thermal actuator – 180 or 93deg C - Does not require power. Life span 8 years.

We fix a BTA thermal detector with a SS bracket to the generator which will discharge the generator at an environmental temperature of 182degC. There are no batteries or power required. There is only visible maintenance required.

Should you require a shutdown of the generator, external alarm, remote notification after discharge we can provide a thermo fuse with cable to provide a set of non-voltage contacts.

These can be installed by your clients own technical staff.

FPC-5 Thermal actuator -180deg C – Battery operated.

Comes with 2 small self-contained batteries that are monitored with LED for low supply when battery change is required. Linear detection can also be added to this actuator for greater risk coverage.



BTA Thermal device



FPC-5 Thermal device

SCOPE OF WORKS & DESIGN CALCULATION-

1. Risk in cabinet – Service hoist MCC – 1137-MCC-2101 Drawing # -1137-65-G2-8029

a. SA1 & SA2-

Design calculation each cabinet-

- Volume 1.35cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 147 grams
- Total concentration recommended – 200 grams -135%.
- Leakage allowance - .1SqM.
- Generators - 1 x 200g generators
- Dimensions – 84mmD x150mmL 1.6kg. + BTA.

b. SA3

Design calculation each cabinet-

- Volume 1.89cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 206 grams
- Total concentration recommended – 500 grams -242%.
- Leakage Allowance -.1SqM
- Generators - 1 x 500g generators
- Dimensions – 84mmD x260mmL 3kg. + BTA.

Supply BOM Sydney –



Brisbane 2A Staple Street, SEVENTEEN MILE ROCKS QLD 4073
P: +61 7 3715-5644 F: +61 7 3715-8450

Sydney 2/110 Bonds Road, RIVER WOOD NSW 2210
P: +61 2 9153-7578 F: +61 2 9533-7159

Email: info@fsequip.com.au
ABN: 61 644 250 587

QUOTE

#Q301146

DATE: 21/5/2020

Bill To:	Deliver To:
Jacobs Consulting	Mr Will Turner Jacobs Consulting Ph: 0730267100 32 Cordelia St South Brisbane QLD 4101

Quote Expires	Memo
19/6/2020	Service Hoist 1137-MCC-2101 cabinet protection

Item No.	Description	Quantity
FP-0200S	200g SS Aerosol Generator	2
FP-0500S	500g SS Aerosol Generator	1
FP-06200	HD SS Bracket to suit 100 - 500	3
FP-06920	Dust Seals - 500-100 Pack 10	1
Misc	SS warning sign cabinets	3
FP-08964	Sign - System Warning SS - AS4487 General	1
FP-L-BTA182	Bulb Thermal Actuator - 182deg C, Long Adaptor to suit 1200 to 5700	3

2. Risk in cabinet – Production hoist MCC – 1137-MCC-2201 Drawing # -1137-65-G2-8031

a. SA1 & SA2 -

Design calculation each cabinet-

- Volume .81cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 89 grams
- Total concentration recommended – 100 grams -112%
- Leakage allowance - .1 SqM.
- Generators - 1 x 100g generators
- Dimensions – 84mmD x120mmL 1.2kg. + BTA.

b. SA3 & SA4 -



Design calculation each cabinet-

- Volume 1.35cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 147 grams
- Total concentration recommended – 200 grams -135%.
- Leakage Allowance - .1SqM
- Generators - 1 x 200g generators

c. SA5

Design calculation-

- Volume 1.9cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 207 grams
- Total concentration recommended – 500 grams -241%.
- Leakage allowance - .1SqM
- Generators - 1 x 500g generators

Supply BOM Sydney –



Brisbane 2A Staple Street, SEVENTEEN MILE ROCKS QLD 4073
P: +61 7 3715-5644 F: +61 7 3715-6450

Sydney 2/110 Bonds Road, RIVER WOOD NSW 2210
P: +61 2 9153-7578 F: +61 2 9533-7159

Email: info@fsequip.com.au
ABN: 61 644 250 587

QUOTE

#Q301147

DATE: 21/5/2020

Bill To: Jacobs Consulting	Deliver To: Mr Will Turner Jacobs Consulting Ph: 0730267100 32 Cordelia St South Brisbane QLD 4101
--------------------------------------	---

Quote Expires 19/6/2020	Memo Production Hoist 1137-MCC-2201 cabinet protection
-----------------------------------	--

Item No.	Description	Quantity
FP-0100S	100g SS Aerosol Generator	2
FP-0200S	200g SS Aerosol Generator	2
FP-0500S	500g SS Aerosol Generator	1
FP-06200	HD SS Bracket to suit 100 - 500	5
FP-06920	Dust Seals - 500-100 Pack 10	1
FP-08962	Sign - System Warning Vinyl - Cabinets	3
FP-L-BTA182	Bulb Thermal Actuator - 182deg C, Long Adaptor to suit 1200 to 5700	5

3. Risk in cabinet – Auxiliary hoist MCC – 1137-MCC-2201 Drawing # - 1137-65-G2-8063

a. SA1 & SA2 -

Design calculation each cabinet-

- Volume 1.36cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 148 grams
- Total concentration recommended – 200 grams -134%
- Leakage allowance - .1 SqM.
- Generators - 1 x 200g generators

- Dimensions – 84mmD x200mmL 2kg. + BTA.

Supply BOM Sydney –



Brisbane 2A Staple Street, SEVENTEEN MILE ROCKS QLD 4073
 P: +61 7 3715-5644 F: +61 7 3715-8450

Sydney 2/110 Bonds Road, RIVERWOOD NSW 2210
 P: +61 2 9153-7578 F: +61 2 9533-7159

Email: info@fsequip.com.au
 ABN: 61 644 250 587

QUOTE

#Q301156

DATE: 28/5/2020

Bill To: Jacobs Consulting	Deliver To: Mr Will Turner Jacobs Consulting Ph: 0730267100 32 Cordelia St South Brisbane QLD 4101
--------------------------------------	---

Quote Expires 26/6/2020	Memo Production Hoist 1137-65-G2-8063 S1 & S2 cabinet protection
-----------------------------------	--

Item No.	Description	Quantity
FP-0200S	200g SS Aerosol Generator	2
FP-06200	HD SS Bracket to suit 100 - 500	2
FP-06920	Dust Seals - 500-100 Pack 10	1
Misc	SS warning sign cabinets	2
FP-08964	Sign - System Warning Traffolyte - AS4487 General	1
FP-L-BTA182	Bulb Thermal Actuator - 182deg C , Long Adaptor to suit 1200 to 5700	2

4. Risk in cabinet – Auxiliary hoist VFD – 1137-ZFD-2300 Drawing # -1137-65-G2-8016

a. ACU & INU -

Design calculation each cabinet-

- Volume .77cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 84 grams
- Total concentration recommended – 100 grams -118%
- Leakage allowance - .1 SqM.
- Generators - 1 x 100g generators

b. ICU & DCU – (considered same dimensions for the calculation)

Design calculation each cabinet-

- Volume .51cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 56 grams

- Total concentration recommended – 80 grams -118%
- Leakage allowance - .1 SqM.
- Generators - 1 x 80g generator
- c. **ISU** –

Design calculation each cabinet-

- Volume 1.03cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 112 grams
- Total concentration recommended – 200 grams -177%
- Leakage allowance - .1 SqM.
- Generators - 1 x 200g generator

Supply BOM-



Brisbane 2A Staple Street, SEVENTEEN MILE ROCKS QLD 4073
P: +61 7 3715-5644 F: +61 7 3715-8450

Sydney 2/110 Bonds Road, RIVERWOOD NSW 2210
P: +61 2 9153-7578 F: +61 2 9533-7159

Email: info@fsequip.com.au
ABN: 61 644 250 587

QUOTE

#Q301157

DATE: 28/5/2020

Bill To:	Deliver To:
Jacobs Consulting	Mr Will Turner Jacobs Consulting Ph: 0730267100 32 Cordelia St South Brisbane QLD 4101

Quote Expires	Memo
26/6/2020	Auxiliary Hoist – 1137-ZFD-2300 Drawing # -1137-65-G2-8016 protection

Item No.	Description	Quantity
FP-0200S	200g SS Aerosol Generator	1
FP-0100S	100g SS Aerosol Generator	2
FP-0080S	80g SS Aerosol Generator	2
FP-06200	HD SS Bracket to suit 100 - 500	5
FP-06920	Dust Seals - 500-100 Pack 10	1
Misc	SS warning Sign Cabinets	5
FP-08964	Sign - System Warning SS - AS4487 General	2
FP-L-BTA182	Bulb Thermal Actuator - 182deg C, Long Adaptor to suit 1200 to 5700	5

5. Risk in cabinet – Skip Loading Station – 1822-MCC-2401 Drawing # - 1822-65-G2-8000

a. **PO1, PO3, PO4, PO5-7,** -

Design calculation each cabinet-

- Volume 1.45cu mtrs.



- Certification - UL2775/AS4487 certification design calculation.
 - Design concentration 158 grams
 - Total concentration recommended – 200 grams -126%
 - Leakage allowance - .1 SqM.
 - Generators - 1 x 200g generators
- b. **PO2** -

Design calculation each cabinet-

- Volume .72cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 79 grams
- Total concentration recommended – 80 grams -101%
- Leakage allowance - .1 SqM.
- Generators - 1 x 80g generators

c. **PO4 &PO6.1**

Design calculation each cabinet-

- Volume .36cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 39 grams
- Total concentration recommended – 40 grams -101%
- Leakage allowance - .1 SqM.
- Generators - 1 x 40g generators

d. **PO8 &PO9**

Design calculation each cabinet-

- Volume 2.17cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration- 237grams
- Total concentration recommended – 500grams -211%
- Leakage allowance - .1 SqM.
- Generators - 1 x 500g generators

e. **PO10**

Design calculation each cabinet-

- Volume 1.81cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration- 197grams
- Total concentration recommended – 200grams -101%
- Leakage allowance - .1 SqM.
- Generators - 1 x 200g generators

Supply BOM Sydney-



Brisbane 2A Staple Street, SEVENTEEN MILE ROCKS QLD 4073
P: +61 7 3715-5644 F: +61 7 3715-8450

Sydney 2/110 Bonds Road, RIVER WOOD NSW 2210
P: +61 2 9153-7578 F: +61 2 9533-7159

Email: info@fsequip.com.au

ABN: 61 644 250 587

QUOTE

#Q301158

DATE: 28/5/2020

Bill To:	Deliver To:
Jacobs Consulting	Mr Will Turner Jacobs Consulting Ph: 0730267100 32 Cordelia St South Brisbane QLD 4101

Quote Expires	Memo
26/6/2020	Skip Loading Station -1822-MCC-2401 Dr awing # - 1822-65-G2-8000 Cabinet protection

Item No.	Description	Quantity
FP-0200S	200g SS Aerosol Generator	7
FP-0500S	500g SS Aerosol Generator	1
FP-0080S	80g SS Aerosol Generator	1
FP-0040S	40g SS Aerosol Generator	2
FP-06200	HD SS Bracket to suit 100 - 500	8
FP-06920	Dust Seals - 500-100 Pack 10	1
Misc	SS warning signs cabinets	5
FP-08964	Sign - System Warning SS - AS4487 General	2
FP-L-BTA182	Bulb Thermal Actuator - 182deg C, Long Adaptor to suit 1200 to 5700	11

6. Risk in cabinet – Jaw Crusher – 1813-ESS-2001-MC Drawing # - 1813-65-K2-1858 – Note - Front elevation only have assumed 600mm width & 2.26M height of cabinets

a. AO1 -

Design calculation each cabinet-

- Volume .81cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration 89 grams
- Total concentration recommended – 100 grams -112%
- Leakage allowance - .1 SqM.
- Generators - 1 x 100g generators

b. AO2 -

Design calculation each cabinet-

- Volume 54 mtrs.
- Certification - UL2775/AS4487 certification design calculation.

- Design concentration 59grams
- Total concentration recommended – 80 grams -135%
- Leakage allowance - .1 SqM.
- Generators - 1 x 80g generators

c. AO3 & AO4 -

Design calculation each cabinet-

- Volume 1.08cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.
- Design concentration- 118grams
- Total concentration recommended – 200 grams -168%
- Leakage allowance - .1 SqM.
- Generators - 1 x 200g generators

Supply BOM Sydney-



Brisbane 2A Staple Street, SEVENTEEN MILE ROCKS QLD 4073
 P: +61 7 3715-5644 F: +61 7 3715-8450

Sydney 2/110 Bonds Road, RIVERWOOD NSW 2210
 P: +61 2 9153-7578 F: +61 2 9533-7159

Email: info@fsequip.com.au
 ABN: 61 644 250 587

QUOTE
 #Q301159

DATE: 28/5/2020

Bill To: Jacobs Consulting	Deliver To: Mr Will Turner Jacobs Consulting Ph: 0730267100 32 Cordelia St South Brisbane QLD 4101
--------------------------------------	---

Quote Expires 26/6/2020	Memo Jaw Crusher – 1813-ESS-2001-MC Drawing # - 1813-65-K2-1858 protection
-----------------------------------	--

Item No.	Description	Quantity
FP-0200S	200g SS Aerosol Generator	2
FP-0100S	100g SS Aerosol Generator	1
FP-0080S	80g SS Aerosol Generator	1
FP-06200	HD SS Bracket to suit 100 - 500	3
FP-06920	Dust Seals - 500-100 Pack 10	1
Misc	SS warning label 1 per cabinet	4
FP-08964	Sign - System Warning SS - AS4487 General	1
FP-L-BTA182	Bulb Thermal Actuator - 182deg C, Long Adaptor to suit 1200 to 5700	4

7. Service hoist Upper Switchrooms total flood system - (contains ACS6000 VSD).
 Switchroom plan (1137-65-K2-1101) Elevation (1137-65-K2-1106)

Design calculation each level total flood-

- Volume 126.58cu mtrs.

- Certification - UL2775/AS4487 certification design calculation.
- Design concentration- 13,823grams
- Total concentration recommended – 17,100 grams -123%
- Leakage allowance - .3 SqM.
- Generators - 3 x 5700g generators
- Stream 8mtrs 300x300x300mm 23kg each.

Pre-engineered design-

The design of this system is to locate all 3 x generators along the rear block/concrete wall.

The FP-C5 thermal actuator will be mounted on each generator..

From each generator have 4 -5 mtrs of cable connected.

These will be pre- made fitted with deutsch plugs that will connect to the FP-C5 & a J-box over the switchroom cabinets.

4mtrs of linear will connect to the J-box in either direction over the switchboards.

When 180degC is detected all generators will activate together as a total flood system.

Supply BOM Sydney –



Brisbane 2A Staple Street, SEVENTEEN MILE ROCKS QLD 4073
P: +61 7 3715-5644 F: +61 7 3715-8450

Sydney 2/110 Bonds Road, RIVERWOOD NSW 2210
P: +61 2 9153-7578 F: +61 2 9533-7159

Email: info@fsequip.com.au

ABN: 61 644 250 587

QUOTE

#Q301161

DATE: 28/5/2020

Bill To:	Deliver To:
Jacobs Consulting	Mr Will Turner Jacobs Consulting Ph: 0730267100 32 Cordelia St South Brisbane QLD 4101

Quote Expires	Memo
26/6/2020	Service Hoist upper & Lower switch room total flood supression

Item No.	Description	Quantity
FP-5700S	5700g SS Aerosol Generator, Electric Actuation	3
FP-06100	HD SS Bracket to suit 1200 - 5700	3
FP-06920	Dust Seals - 500-100 Pack 10	1
FP-08964	Sign - System Warning SS - AS4487 General	3
FP-C5132	FPC-5 V2 Controller c/w LHD Cable gland, to suit FP1200/2000/3000/5700	3
FP-09510-04	Linear Heat Detection 180deg C Cable x 4m c/w DT Plugs and P-clips	3

8. Production Hoist Upper & Lower Switchroom - (contains ACS6000 VSD). Switchroom plan (1137-65-K2-1201) Elevation (1137-65-K2-1206)

Design calculation upper level total flood-

- Volume 243cu mtrs.
- Certification - UL2775/AS4487 certification design calculation.

- Design concentration- 26,536grams
- Total concentration recommended – 28,500 grams -107%
- Leakage allowance - .5 SqM.
- Generators - 5 x 5700g generators
- Stream 8mtrs 300x300x300mm 23kg each.

Pre-engineered design-

The design of this system is to locate all 5 x generators together. These should be mounted if possible, on the ceiling facing down & to the ends of the switchrooms.

The FP-C5 thermal detection recommended.

From each generator have 4 mtrs of lineal detection cable connected. These will be premade fitted with deutsch plugs that will connect to the FP-C5. When 180degC is detected all generators should activate together. Obviously, the ongoing recommendation is to use a FIP.

Supply Price & BOM for upper switchroom-



Brisbane 2A Staple Street, SEVENTEEN MILE ROCKS QLD 4073
P: +61 7 3715-5644 F: +61 7 3715-8450

Sydney 2/110 Bonds Road, RIVER WOOD NSW 2210
P: +61 2 9153-7578 F: +61 2 9533-7159

Email: info@fsequip.com.au
ABN: 61 644 250 587

QUOTE

#Q301162

DATE: 28/5/2020

Bill To: Jacobs Consulting	Deliver To: Mr Will Turner Jacobs Consulting Ph: 0730267100 32 Cordelia St South Brisbane QLD 4101
--------------------------------------	---

Quote Expires 26/6/2020	Memo Production Hoist upper s witch room total flood suppression
-----------------------------------	--

Item No.	Description	Quantity
FP-5700S	5700g SS Aerosol Generator, Electric Actuation	5
FP-06100	HD SS Bracket to suit 1200 - 5700	5
FP-06920	Dust Seals - 500-100 P ack 10	1
FP-08964	Sign - System Warning SS - AS4487 General	3
FP-C5132	FPC-5 V2 Controller c/w LHD Cable gland, to suit FP1200/2000/3000/5700	5
FP-09510-04	Linear Heat Detection 180deg C Cab le x 4m c/w DT Plugs and P-clips	5