Potassium

Part of the solid compound of FirePro® consists of potassium. Potassium is a chemical element (a very soft metal with a silvery lustre).

• History and name
Potassium was first isolated by Davy in 1807 through the electrolysis of molten potassium hydroxide (KOH), from which the name potassium is derived (see also alkali). At roughly the same time (1807 – 1808) Gay-Lussac and Louis Jacques Thenard obtained the element through the reduction of molten potassium carbonate with iron filings in an iron crucible.

• Occurrence
With 2.59% potassium occupies seventh place in the list of most common elements in the earth’s crust. In seawater it has an average concentration of 0.380 g per kg. It occurs in very many minerals and vegetable and living organisms (plants, animals, humans, etc, contain organic potassium salts).

• Properties
Potassium is an alkali metal. Apart from an inert gas configuration, the elements of this group, the alkali metals, have a single s electron that can easily be split off. Potassium consequently has a very simple, ionic chemistry.

• Physiological significance in the human body
While it is mainly sodium salts (in particular ordinary kitchen salt) that are dissolved in tissue fluid, no sodium is found in the cells, but potassium salts. The amount of potassium in the body is connected to the amount of sodium. Potassium has an important part to play in living organisms. Important sources of potassium in food are: vegetables, fruit, potatoes, meat, bread and milk. An adult needs approx. 3,500 mg of potassium per day.
Health, Safety & the Environment

FirePro® Aerosol does not damage property, may be used in the design concentrations in the presence of humans, and is environmentally and ecologically friendly.

FirePro® Aerosol is:
- Non Toxic (at design concentration)
- Non Conductive
- Non Oxygen Depleting
- Non Corrosive

FirePro® Has:
- Global Warming Potential (GWP) = 0
- Ozone Depletion Potential (ODP) = 0
- Negligible Atmospheric Life Time (solid active particles decay at a rate of 3% per minute)

And:
- Does not affect the operation of equipment, in particular, electrical in nature.

Independent Test Reports from reputable Accredited Bodies and Institutions exist, supporting the above.
**FirePro® SBK COMPOUND**

**NON PYROTECHNIC – Patented Technology**

- Compact – strong solid
- Potassium salts  
  (Key compound - \( \text{K}_2\text{CO}_3 \))
- Certified Life Time 15 Years
- Superior and stable performance
- Self-activation temperature 300 °C
- Non Toxic
- No chemical reaction with cooling material
- Principle of Activation:
  a. Thermal Energy
  b. Electrical Energy
- Transformation of Solid to Gaseous Aerosol phase

**Main Advantages of FirePro®**

- Tremendous space saving, ie., the space required is only a fraction of the space needed for cylinders etc.
- Far easier installation - no piping, pressure cylinders, special supports or valves are required, thus reducing installation time and labour costs considerably.
- No pressure venting of enclosures necessary.
- Easy maintenance without the need for pressure testing, weighing, pressure/leak detection, filling, etc.
- Cost effectiveness - FirePro® systems are less expensive compared to most other gaseous systems making these more attractive to the end user.
- Employ the latest generation in SBK solid non-pyrotechnic compound.
- FirePro does not produce harmful toxic compounds or acidic fumes.
- Simple design calculations.
FirePro
Fire Extinguishing Aerosol Systems

FP-1200S  FP-2000S  FP-3000S  FP-5700S

Thermocord
Electrical Wire

Electrical Housing
Thermocord Housing

Cover Plate
Inflator

Solid Aerosol Forming Compound (SFK)

Metal Housing
Cooling Material
Sealing

End Plate Discharge Outlet
Fire Extinguishing Aerosol
The FirePro® Principle

FIRE
Formation of radicals
( O⁺, H⁺, OH⁺ ) during the chemical chain reactions of fire

Aerosol Phase I:
( before extinguishing process )
Inert gases ( N₂, H₂O, CO₂ )
carrying solid, micro-sized particles ( K₂CO₃ )

Aerosol Phase II:
( during extinguishing process )
Formation of K⁺ radicals by the disassociation of K₂CO₃

FIRE IS EXTINGUISHED
Reactions between radicals lead to the formation of stable compounds ( KOH, K₂CO₃ )
## Comparisons between various fire fighting agents

<table>
<thead>
<tr>
<th></th>
<th>EFFECT ON HUMANS</th>
<th>EFFECT ON PROPERTY</th>
<th>EFFECT ON ENVIRONMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foam and Water</strong></td>
<td>When used in fixed systems it is necessary to have protection for humans</td>
<td>It may be corrosive due to large concentration of water and residue is harmful to delicate electronics</td>
<td>Residue can be difficult to dispose and foam can be poisonous</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>Water is generally accepted as being not dangerous to humans when fighting fires</td>
<td>Can cause extensive damage to property</td>
<td>Can release harmful fumes and substances on extinguishment</td>
</tr>
<tr>
<td><strong>CO₂</strong></td>
<td>Highly dangerous to humans in fire fighting concentrations in enclosed spaces</td>
<td>Extinguishes fire cleanly but cooling effect causes condensation mist harmful to electronics</td>
<td>In general more CO₂ is released from other sources</td>
</tr>
<tr>
<td><strong>Inert gases</strong></td>
<td>May lead to inadequate oxygen supply to the brain when used alone</td>
<td>No damage caused</td>
<td>Naturally occurring components so do not pose a threat</td>
</tr>
<tr>
<td><strong>Halon Habcarbons</strong></td>
<td>Can be used in human presence but has been banned due to ozone depletion issues</td>
<td>No damage caused</td>
<td>Harmful to the environment</td>
</tr>
<tr>
<td><strong>FirePro</strong></td>
<td>Can be used in human presence in designed concentration</td>
<td>No damage caused</td>
<td>Friendly to environment</td>
</tr>
</tbody>
</table>
Comparison of the required quantity of:

FIRE PRO

vs

Traditional gaseous extinguishing agents

This characteristic allows great economy of space, and new methods of use.
Applications

The range of FirePro® products is wide and versatile to suit any application:

- Industry & Commerce, Banks, Offices
- Substations
- Server Rooms, Control Rooms, Data Centers
- Electrical Cabinets/Panels
- Transformer Rooms
- Warehouses, Archives
- DG Storage
- Public Transport
- Transport Vehicles
- Marine industry
- Oil Platforms
- Railways
- Wind turbines
Small Volumetric Enclosures

Source/Localised Extinguishing

• Panel/Enclosure Protection
• Multiple Panel Enclosure Protection
• Special Applications/Projects
Medium Volumetric Enclosures

- Computer/Server Rooms
- Data Centers
- Electrical Rooms
- Control Rooms
- Special Applications/Projects
Large Volumetric Enclosures

- Substations/Control Room Protection
- Warehousing Protection
- Storage Areas
- Archives
Special Applications

- Vehicle Protection
- Heavy Machinery
- Railway Projects
- Marine Applications
- Offshore Oil Platforms
- Wind Turbine Protection
- Museums
- Historical Buildings

FirePro®
Fire Suppression Systems
Wind Turbine Power Generation Protection
National and International Standards, Approval Notified Bodies and Listing Authorities on the “Condensed Aerosol Technology”

**ISO – INTERNATIONAL STANDARDS ORGANISATION**
ISO 15779:2011 – Condensed Aerosol Fire Extinguishing Systems - physical properties and system design

**IMO - INTERNATIONAL MARITIME ORGANISATION**
MSC/Circ.1270 4th June 2008 (revised MSC/Circ.1007 26 June 2001)

**CEN - EUROPEAN COMMITTEE FOR STANDARDISATION**
CEN/TR 15276-1/2, 2009
Before identified as: prEN 15276-1 and prEN 15276-2

**U.S. EPA – UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
Significant New Alternatives Policy (SNAP) Program

**NFPA - NATIONAL FIRE PROTECTION ASSOCIATION**
NFPA 2010 - Standard for Fixed Aerosol Fire Extinguishing Systems

**UL - UNDERWRITERS LABORATORIES INC.**
UL 2127 - Standard for Inert Gas Clean Agent Extinguishing System Units
UL 2775 - Standard for Fixed Condensed Aerosol Extinguishing System Units

**KIWA (NETHERLANDS, EU)**
BRL-K23001/02 October 20th 2003 edition

**BSI - LICENSED**
KM 547633

**CE Mark**

**KFI (Korea)** Korea Fire Institute of Industry and Technology

National Emergency Management Agency Notice No. 2012-160 (31/12/2012)
**FirePro**

Advantages/Characteristics

- Most Number of Certificates, Listings, Approvals Test Reports
- Non Pyrotechnic – Patented Technology
- Electrical and Thermal Activation – Solid to Gaseous Aerosol Phase
- Extinguishes Fire Chemically Without Removing Oxygen
- ‘Total Flooding’ Approach
- Easy Design Calculation
- Environmental & Eco Friendly
- No Corrosion
- No Effect On Equipment Operation
- Safe, Non Toxic
- No Pipework, Pressure Cylinders, No Filling
- Highly Space Saving, Much Lower Installation/Maintenance Costs/Time
- Solutions For Most Applications
- Worldwide Installations In Over 75 Countries