FirePro.

Technical Prospectus

Reinventing
Fire Suppression

Technical Prospectus Contents

At FirePro we design, develop and manufacture ecologically friendly total flooding fire suppression systems. Our technology has at its core the patented FirePro fire suppression condensed aerosol forming solid compound (FPC).

Our pre-engineered systems are subjected to robust and rigorous testing to ensure they comply with the relevant international standards and protocols. In the last two decades, FirePro has been commissioned by a diverse portfolio of prestigious clients in more than 110 countries to protect key assets. FirePro HQ, R&D Division and Manufacturing facilities are based in Cyprus, EU.

Sustainable Future. **Today.**

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

Environmentally Conscious

The environmentally friendly potassium based condensed aerosol forming solid compound (FPC) was developed following intense R&D. Our dedication to Green and Sustainable Technologies is attested by the number of International Certifications, Listings and Type Approvals from the most reputable and respected organisations in the world. As a result, our products are manufactured using selective and environmentally friendly materials, that can be recycled at the end of their life cycle.

Zero Ozone Depletion

Condensed aerosol technology gained increasing recognition following the Montreal Protocol which banned substances with negative impact on the environment and Ozone layer. In our effort to contribute towards humanity's sustainable development goals, we focused on Green Technologies.

FirePro is EPA (U.S. Environmental Protection Agency) SNAP Listed (Significant New Alternative Policy) and is considered to be ozone friendly as it contains no CFC's.

EPA SNAP Listed for both Normally Occupied & Unoccupied Spaces

The FirePro fire suppression agent, referred to as Powdered Aerosol E, is EPA-SNAP Listed as an acceptable fire suppressant in total flooding applications in Normally Unoccupied as well as Normally Occupied spaces. This listing effectively further validates the superior green signature footprint. EPA's decisions are published in the U.S. Federal Register at:

- Vol. 71, No. 187/Wednesday, September 27, 2006 - Rules & Regulations
- Vol. 83, No. 193/Thursday, October 4, 2018 - Rules & Regulations

The U.S. Environmental Protection Agency's (EPA) Significant New Alternatives Policy (SNAP) program was established under Section 612 of the Clean Air Act and is tasked with investigating overall risks to human health and the environment. Substitutes are reviewed on the basis of environmental and health risks, including factors such as ozone depletion potential, global warming potential (GWP), toxicity, flammability, and exposure potential.

Zero Global Warming Potential

The FPC condensed aerosol forming solid compound does not contain any substances that contribute to global warming, such as those found in other agents e.g. fluorinated gases* used for industrial applications which are banned or are in the process of being banned according to regulation (EU) No 517/2014 of the European Parliament and Council, due to their negative impact on the environment.

***Note:** *Fluorinated gases ('F-gases') are a family of man-made gases used in a range of industrial applications. Because they do not damage the atmospheric ozone layer, they are often used as substitutes for ozone-depleting substances. However, F-gases are powerful greenhouse gases, with a global warming effect of up to 23,000 times greater than carbon dioxide (CO2), and their emissions are rising rapidly.*

Green Policies

FirePro has been assessed and certified under the GEN (Global Eco-Labelling Network) Green Standard and has been granted the Green Label Certificate.

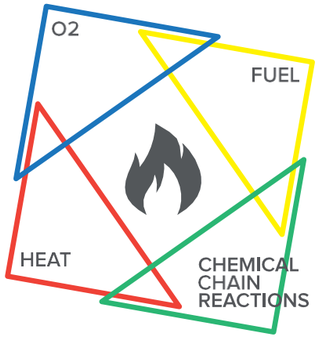
ISO 9001 and ISO 14001 Certified

FirePro products are manufactured in full compliance with all international standards and requirements regarding quality and environmental management procedures. FirePro maintains ISO 9001 certification and ISO 14001 certification issued by DNV.

Our clients can trust that FirePro is committed to actively minimize the environmental impact of its manufacturing processes, products and services, as part of our Corporate Social Responsibility.

Reinventing **Fire Suppression**

FirePro technology inhibits the chain reactions of fire on a molecular level.



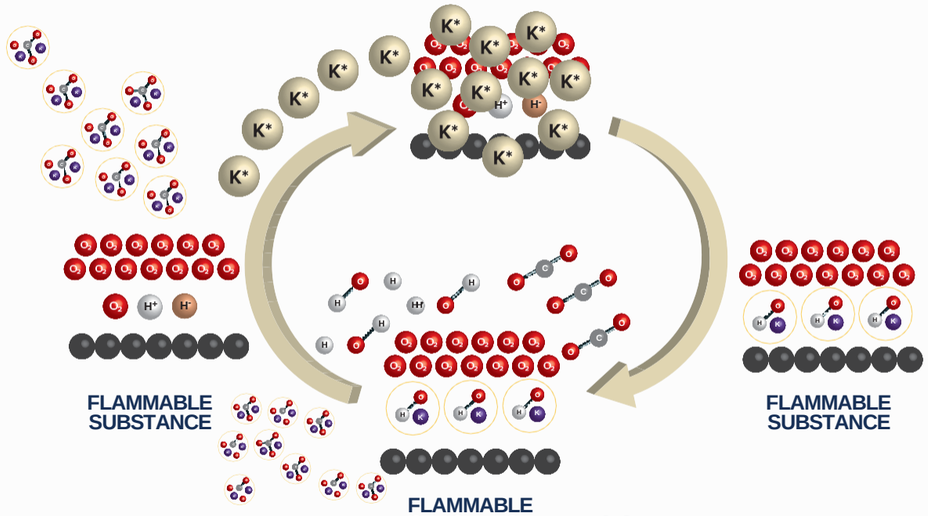
Methods of Fire Suppression

Fire Suppression Method	Description of Method	Commonly used Technologies
Heat Absorption	Fire is suppressed by reducing temperature/heat.	Water based & Gaseous agents
Oxygen Depletion	Fire is suffocated by depleting/displacing oxygen.	Inert gaseous agents
Chemical Inhibition	Fire is suppressed by directly interrupting the chemical chain reactions on a molecular level.	Condensed Aerosols

FirePro Extinguishing Agent Action

1. Fire is a series of chemical chain reactions. The flame free radicals (O^{2-}, H^{+}, OH^{-}) act as chain carriers, sustaining the flame until at least one of the three elements of the fire is completely depleted.

2. In the presence of fire, the potassium carbonate (K2CO3) which is the active agent in the condensed aerosol medium undergoes thermal dissociation, forming unstable potassium free radicals (K*) which act as chemical chain reaction inhibitors.



4. KOH reacts further in the presence of CO2 to form potassium carbonate (K2CO3). The cycle continues until the chemical chain reaction terminates and the fire is extinguished.

3. Chain termination occurs when K* are bound to the flame free radicals by forming stable potassium hydroxide (KOH).

More than one Protection Strategies

FirePro offers pre-engineered, total flooding certified solutions for:
Class A, B, C & F fire hazards. (according to European EN 2 Standard)
Class A, B & C fire hazards (according to NFPA 10 Standard)

DEFINITION OF TOTAL FLOODING ACCORDING TO NFPA 2010:

As per section 3.3.27 of NFPA 2010 Standard for Fixed Aerosol Fire-Extinguishing Systems, a total flooding extinguishing system is a system arranged to discharge an extinguishant/suppressant into an enclosure achieving a uniform distribution.

SCOPE OF APPLICATIONS

I. Large Enclosures

e.g. : Electrical rooms, Transformer rooms, Storage, Generator rooms, Archives.

FirePro condensed aerosol generators, due to their modular nature, provide fire suppression for enclosures of any volume.

The main consideration when using FirePro condensed aerosol generator in total flooding system installations, is the dynamics of aerosol distribution.

To ensure rapid and even distribution of the condensed aerosol in the protected volume, the positioning of the generators requires careful study that considers layout and positioning of objects within.

II. Small Enclosures

e.g. : Electrical Panels / Cabinets

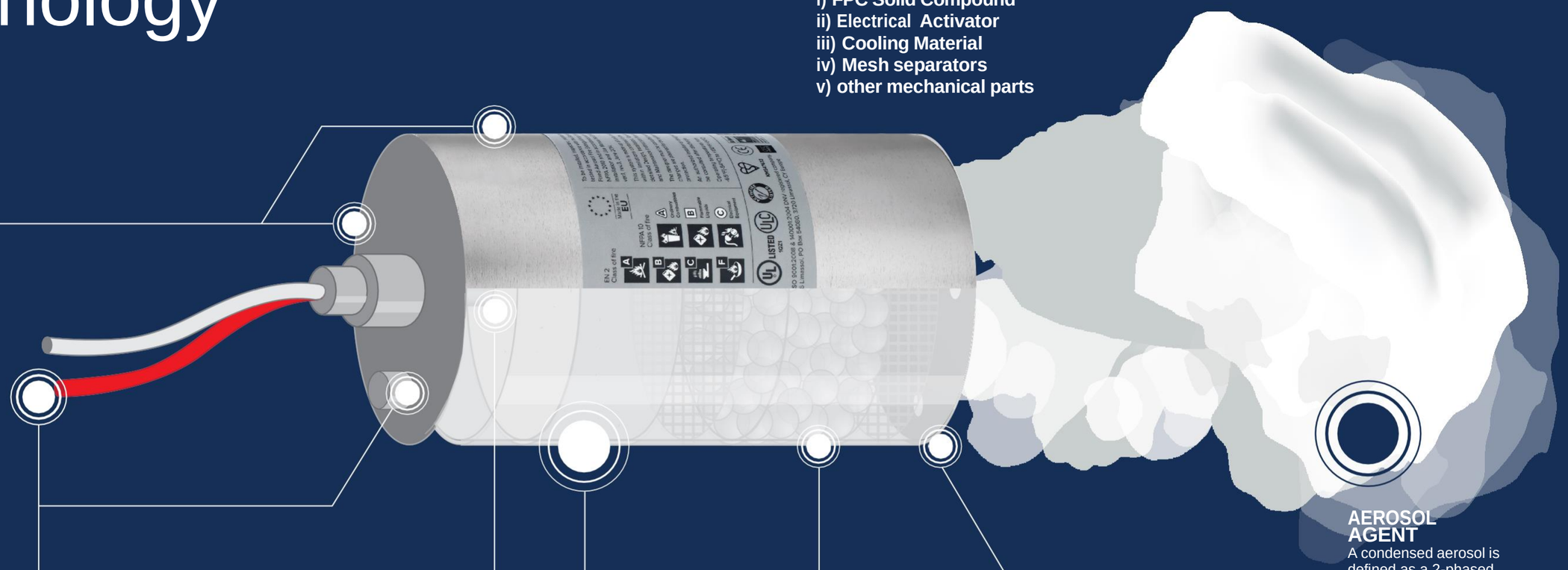
The FirePro range includes probably the smallest existing autonomous and automatic fire extinguishing systems. These are used internally to protect, on a total flooding basis, small enclosures such as electrical panels or other power utilizing devices/equipment.

Small enclosure protection is becoming increasingly important due to the high sensitivity and high asset value of today's equipment. For this reason, it is imperative, that any fire occurring in such applications is suppressed at an early stage, preventing its escalation, and restricting it from causing any further damage.

OUR TECHNOLOGY

FirePro Generator Technology

A FirePro condensed aerosol generator is a metal container that houses:
i) FPC Solid Compound
ii) Electrical Activator
iii) Cooling Material
iv) Mesh separators
v) other mechanical parts



STAINLESS STEEL ENCLOSURE
The generator is a cylindrical enclosure made of durable, sustainable and 100% recyclable stainless steel. It accommodates the activation (electrical & thermal) ports. The generator is fully protected against corrosion.

Note: The box type condensed aerosol generators are produced in both stainless steel and red coated mild steel.

ELECTRICAL ACTUATOR
Upon detection of a fire the releasing panel sends a pulse of electrical energy to the electrical actuator that acts as an electrical heating element to initiate the transformation of the FPC Compound into condensed aerosol.

ACTIVATION PORTS
Each FirePro condensed aerosol generator comes with two types of activation ports (thermal and electrical) thus providing the engineering option to utilize one or more methods of activating the device depending on application.

FPC SOLID COMPOUND
The patented condensed aerosol forming solid compound has a certified lifetime of up to 15 years and found to withstand temperatures of up to +250ºC.

NATURAL CERAMIC COOLANT
High quality alumina ceramic spheres act as both a cooling medium (due to their high conductive nature) but also as a filter that traps coarse aerosol particles.

DISCHARGE PORT
Point from which the condensed aerosol exits the generator.

AEROSOL AGENT
A condensed aerosol is defined as a 2-phased medium consisting of solid particles suspended in a gas. FirePro aerosol consists of Potassium based particles – active agent, suspended in a gas carrier.

Technology **Essential Facts**

- Certified 15-year product life
- Non Pressurized
- Non-Oxygen Depleting
- HFC-free
- CFC-free
- Zero Global Warming Potential
- ODS Listed Alternative
- Zero Ozone Depletion Potential
- Manufactured under ISO 9001 ISO14001
- Minimum Maintenance
- Cost-effective
- Durable & Robust

FirePro offers the following to all relevant stakeholders that define it as the system of choice and earning the respect of the engineering society.

TECHNOLOGY FACTS:

- Full compliance with standards
- Environmentally friendly
- Land & Marine applications
- 15 years certified product life

GREAT FOR THE SPECIFIER:

- Pre-engineered
- Easily retrofitted
- Simple system integration
- Non pressurized system
- Certified for Occupied Areas

GREAT FOR THE INSTALLER:

- Easy to install
- Safe to handle
- Easily transported
- Fewer system components

GREAT FOR THE END USER:

- Low cost of ownership
- Speedy installation process
- Minimal space requirements
- Minimal maintenance requirements

FirePro Generators

FirePro condensed aerosol generators are made using the highest quality materials and are listed/certified by UL, ULC, BSI, KIWA, VdS, LPCB and other Notified Bodies.

RANGE

The FirePro product range includes generators of various sizes, from the smallest FP-20 to the largest FP-5700 (the number in the FP denomination refers to the weight of the FPC solid compound within the condensed aerosol generator). They can be used singularly or in combination to protect both small volumetric enclosures, such as electrical panels and/or large warehouses, power generation plants, and many more.

INTEGRATION

FirePro condensed aerosol generators are integrated by using an advanced range of control & indicating panels and state-of-the-art thermo bulb self-activating devices (otherwise known as stand-alone systems) that operate without electrical power.

FP-20
Gross Weight (g): 310
Mass of FPC Compound (g): 20
Dimensions (mm): H: 165 x Ø: 32

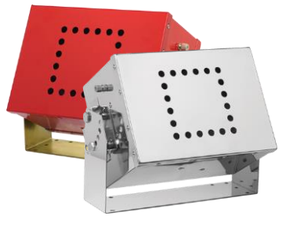
FP-40
Gross Weight (g): 610
Mass of FPC Compound (g): 40
Dimensions (mm): H: 140 / Ø: 51

FP-80
Gross Weight (g): 870
Mass of FPC Compound (g): 80
Dimensions (mm): H: 185 / Ø: 51

FP-100
Gross Weight (g): 1370
Mass of FPC Compound (g): 100
Dimensions (mm): H: 155 / Ø: 84

FP-200
Gross Weight (g): 1840
Mass of FPC Compound (g): 200
Dimensions (mm): H: 185 / Ø: 84

FP-500
Gross Weight (g): 3340
Mass of FPC Compound (g): 500
Dimensions (mm): H: 295 / Ø: 84



FP-1200
Gross Weight (g): 10900
Mass of FPC Compound (g): 1200
Dimensions (mm): 216X300X167

FP-2000
Gross Weight (g): 15500
Mass of FPC Compound (g): 2000
Dimensions (mm): 300X300X185

FP-3000
Gross Weight (g): 16300
Mass of FPC Compound (g): 3000
Dimensions (mm): 300X300X185

FP-4200
Gross Weight (g): 23600
Mass of FPC Compound (g): 4200
Dimensions (mm): 300X300X300

FP-5700
Gross Weight (g): 26400
Mass of FPC Compound (g): 5700
Dimensions (mm): 300X300X300

ATEX Models

Cylindrical Models
FP-100EX
Gross Weight (g): 1830
Mass of FPC Compound (g): 100
Dimensions (mm): H:170 / Ø: 84

FP-200EX, FP-500EX

Box Type Models
FP-1200EX
Gross Weight (g): 17050
Mass of FPC Compound (g): 1200
Dimensions (mm): 365 x 450 x 310

FP-2000EX, FP-3000EX
FP-4200EX, FP-5700EX

Fire Protection **Controllers**

FPC-1

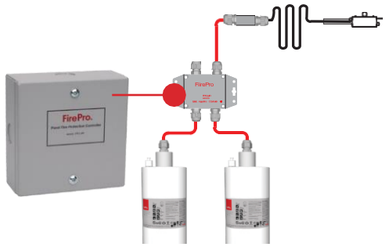
The FirePro FPC-1 Fire Protection Controller provides monitoring, detection and means to initiate the automatic fire suppression process by using the incorporated rate of rise heat sensor or extended linear heat detection cable.
Two outputs are provided to connect to the FirePro condensed aerosol generators and disconnection of any one of the two will signal a fault condition.
Open collector contacts are available to signal fire, fault and state of power conditions to other monitoring equipment. The FPC-1 is powered by 4 batteries 1.5V.

FPC-2V2

The FirePro FPC-2V2 Fire Protection Controller provides monitoring, detection and means to initiate the automatic fire suppression process by using the external detector such as heat, smoke or a linear heat detection cable.
Four outputs are provided for the connection of FirePro condensed aerosol generators and disconnection of any one of these will announce a fault condition.
Volt-free contacts are available to signal fire and fault conditions to monitoring equipment. The FPC-2V2 requires an external 24V DC power supply backed with batteries capable of delivering 3A.

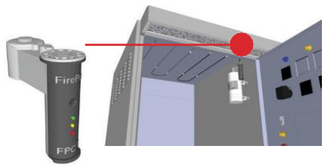
Bulb Thermal Actuator (BTA) - Autonomous actuation device

The FirePro BTA can detect fire and activate a condensed aerosol generator with the use of a bulb thermal sensor of a pre-selected temperature.
. Orange 57°C
. Red 68°C
. Yellow 79°C
. Green 93 °C
. Blue 141 °C
. Mauve 182°C



FPC-4RV3

The FirePro FPC-4RV3 Fire Protection Controller provides detection and means to initiate the automatic fire suppression (with up to two FirePro condensed aerosol generators) process using the external linear heat detector cable.
Volt free contacts are available to signal fire conditions to monitoring equipment. The electrical panel protection module FPC-4RV3 can have primary and secondary power sources, capable each, individually or in combination, of providing the necessary amperage to activate the two condensed aerosol fire suppression units.



FPC-5V2

The FirePro thermal activation protection module FPC-5V2 can detect fire and activate a condensed aerosol generator automatically in electrical cabinets and similar enclosures.

GTN-25

Magnets substitute the bolts necessary for installing the cylindrical FirePro fire condensed aerosol generators.
The GTN-25 magnet can be used with the brackets for all cylindrical condensed aerosol generator models.

Total Flooding Designing a pre-engineered system

Our Design Principles

The primary objective of fire protection is to safeguard human life, valued assets and the environment from the catastrophic effects of fire.

FirePro can be installed in any enclosure of any volume always in compliance with the local fire legislation, standards and norms.
Design calculation methods are described in detail, in the engineering guidelines of the NFPA 2010, ISO 15779, EN 15276 and IMO Circular MSC.1/Circ.1270.

A FirePro total flooding system design, takes into account the following parameters:

- Class of the fire hazard.
- Enclosure volume.
- Internal layout.
- Possible openings of the enclosure.

Correct Positioning of the System CAG

The mass of FirePro FPC solid compound required for total flooding calculation is based on the design parameters. The type and number of FirePro units and other system components are selected to create a fully integrated solution (see page 18).

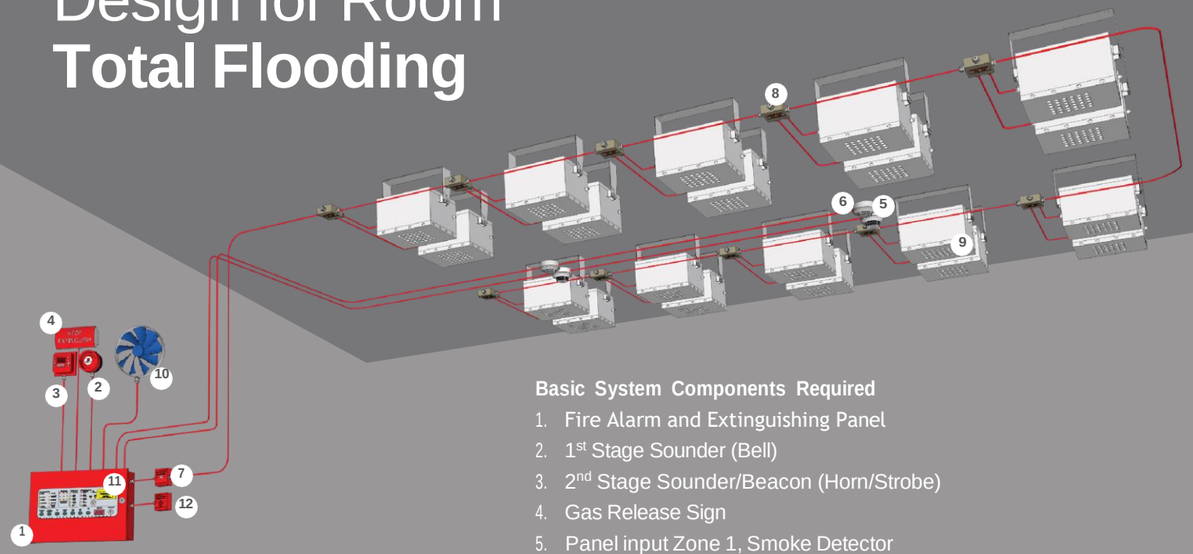
The system's designer is responsible for the positioning of the FirePro generators to ensure the most efficient distribution of the condensed aerosol in order to achieve total flooding (always complying with the guidelines as described in FirePro User Manual).

System Maintenance

Scheduled mandatory maintenance of FirePro systems must be performed by certified and qualified personnel. This process is relatively simple, time and, cost effective. It does not involve any hydrostatic tests or agent refiling procedures, commonly required by other conventional fire suppression systems.

Note: All installations, maintenance and replacement of discharged condensed aerosol generators must be carried out by FirePro certified and authorized personnel only.

Typical System Design for Room **Total Flooding**



Basic System Components Required

1. Fire Alarm and Extinguishing Panel
2. 1st Stage Sounder (Bell)
3. 2nd Stage Sounder/Beacon (Horn/Strobe)
4. Gas Release Sign
5. Panel input Zone 1, Smoke Detector
6. Panel input Zone 2, Heat Detector (RoR)
7. Extinguishant Disablement Switch (System Isolation Switch)
8. Sequential Activator
9. FirePro condensed aerosol generators
10. Emergency Power-Off System
11. Manual Release Button
12. System Abort (Hold) Switch

Designing a FirePro total flooding system is based on the formula illustrated below:

$$m(g) = V(m^3) * d_a\ (g/m^3) * f_a$$

$$m(g) = V(m^3) * EAD\ (g/m^3) * SF * f_a$$

m(g)	*Agent solid mass*
V(m³)	*Protected volume*
d_a (g/m^3)	*Design application density*
d_a (g/m^3)	*EAD * SF*
EAD (g/m^3)	*Extinguishing application density*
SF	*Safety factor (30%)=1.3*
f_a	*Additional design factors*

THE ABOVE DESIGN FORMULAS ARE ACCORDING

Note:

I. FirePro offers system components according to the application (both for Land or Marine environments) in compliance with local and international regulations, standards and norms.

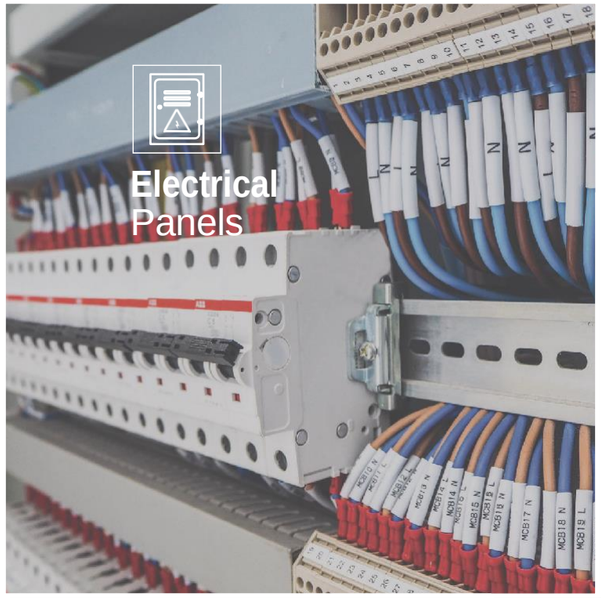
II. Please refer to our product catalogue available online, for the complete list of FirePro system components.

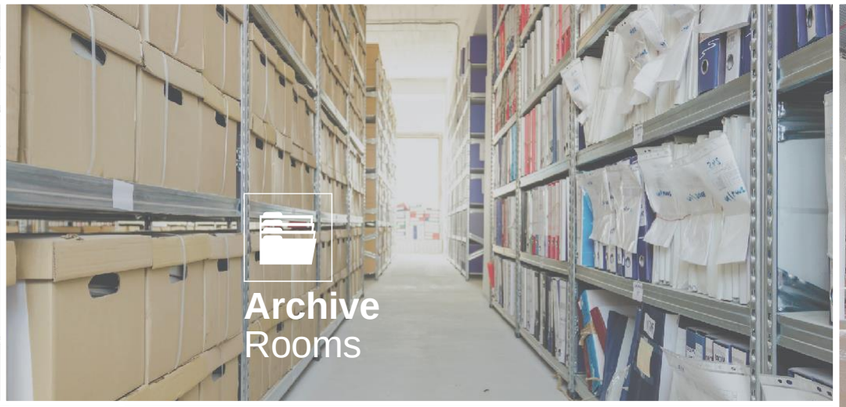
III. FirePro extinguishant control panels can be integrated with the most commonly used addressable fire detection systems, broadly available in the international market.

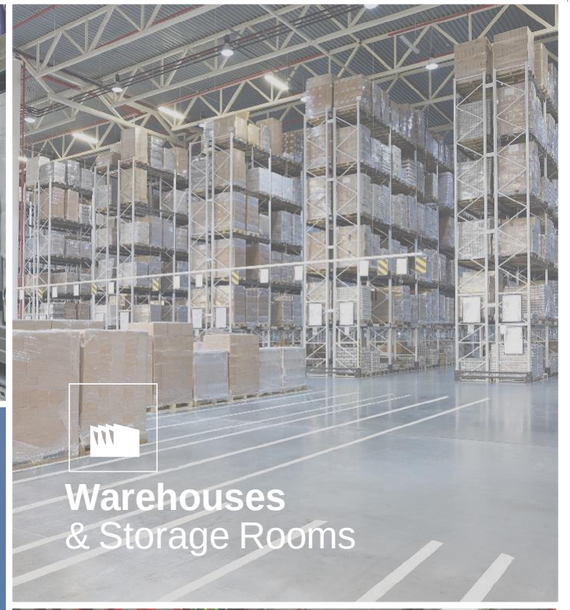
Serving 30+ **Industries**

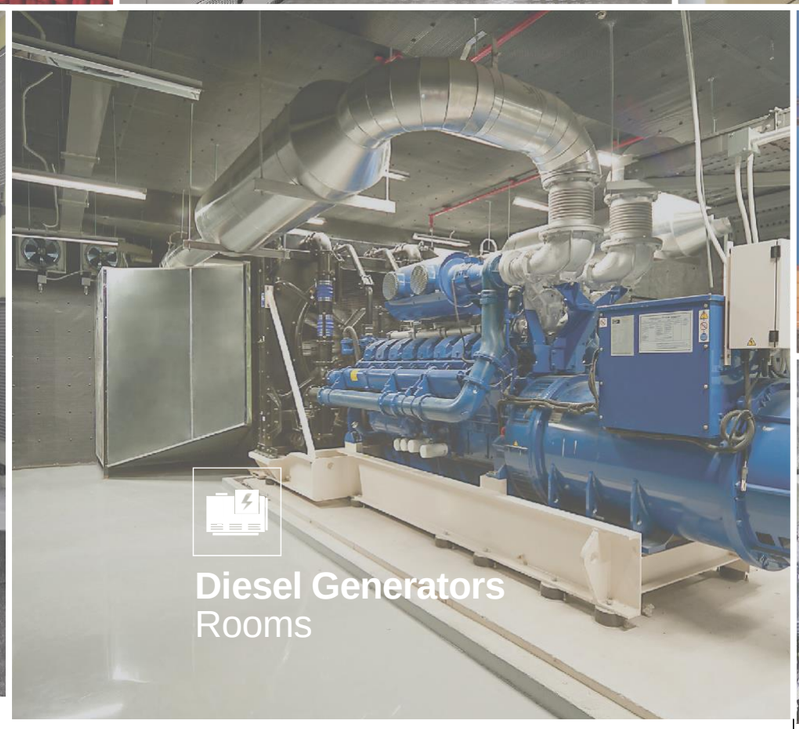
Numerous
Core Applications

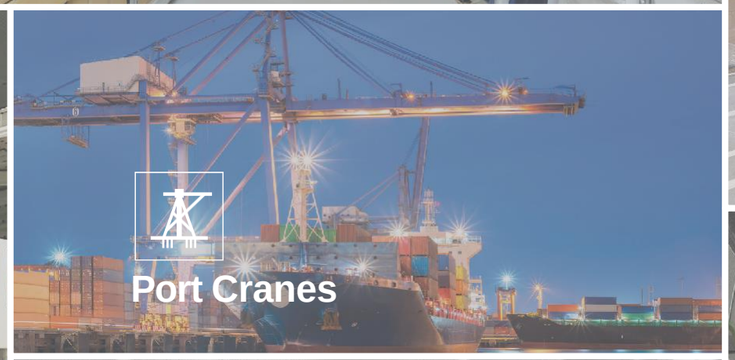
FirePro systems are used in all conventional applications as well as in those that were once considered to be technically or financially challenging by other technologies.

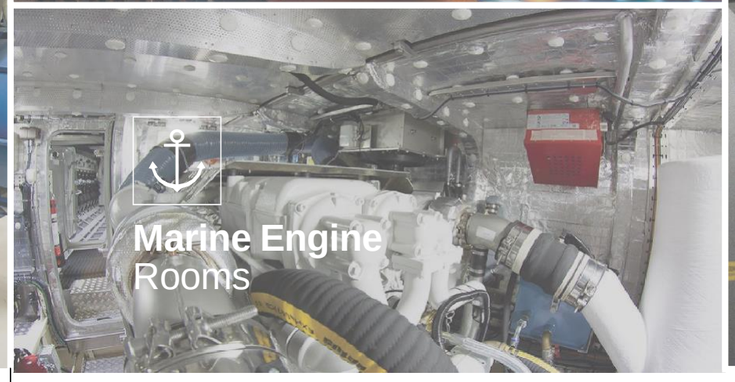


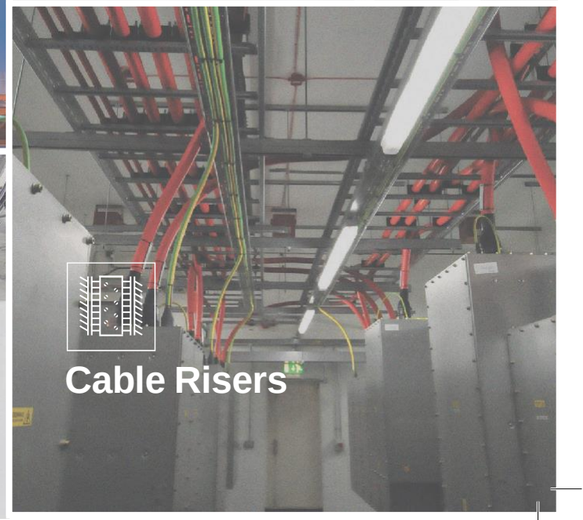












International Certificates & Standards

FirePro complies and constantly seeks to be in line with the most respected national and international certificates, approvals and test requirements in the fire suppression industry.

Condensed Aerosol Technology Standards:

International Organization for Standardization
Standard
ISO 15779

International Maritime Organization
Standard
IMO MSC.1/Circ.1270

European Committee for Standardization
Standard
EN 15276-1 & EN 15276-2

National Fire Protection Association
Standard
NFPA 2010

UL - Underwriters Laboratories INC.
Standard
ANSI/CAN/UL/ULC 2775

KIWA NV
Standard
BRL-K23001

KFI - Korea Fire Institute
Standard
Guideline for the Automatic Condensed Aerosol Fire Extinguisher

LPCB –Loss Prevention Certification Board
Standard
LPS 1656: Issue 1.0

Standards Australia
Standard
AS 4487-2013

FirePro
Listings, Certifications & Approvals
FOR LAND APPLICATIONS:

UL - Underwriters Laboratory
ULC - Underwriters Laboratories of Canada
Certification Protocol
Standard ANSI/CAN/UL/ULC 2775
Condensed Aerosol Extinguishing Units
Reference
FWSA.EX6960
FWSA7.EX6960

BSI - British Standards Institution
Certification Protocol
BS EN-15276 Aerosol Generating Fire Extinguishing System Units
Reference
Kitemark License Number KM 738886

KIWA NV
Certification Protocol
BRL-K23001/06 Aerosol Generating Fire Extinguishing System Units
Reference
Product Certificate K21774

LPCB – Loss Prevention Certification Board
Certification Protocol
LPS 1656:Issue 1.0
Reference
1417a Issue:03
1417b Issue:02

CSIRO - Commonwealth Scientific & Industrial Research
Certification Protocol
AS 4487-2013 & UL 2775 Fixed Condensed Aerosol Extinguishing Units
Reference
ActivFire Certificate of Conformity afp-2286

CNBOP PIB - Scientific & Research Center for Fire Protection
Certification Protocol
EN 15276 Condensed Aerosol Fire Extinguish-ing Systems
Reference
Certificate of Conformity NR. 063/UWB-0098

KFI - Korea Fire Institute
Certification Protocol
Guideline for the Automatic Condensed Aerosol Fire Extinguisher
Reference
Sogong 15-23-1

VDS – Certification Body
Certification Protocol
VdS 2344:2014-07, VdS 2562:2013-03
Reference
G 622001

Global Mark
Certification Protocol
AS 4487-2013 Condensed Aerosol Fire Extinguishing Systems
Reference
FEF98B76945B5795CA
25882A0026592A

FOR MARINE APPLICATIONS:

British Standards Institution
Description
Wheel Mark in Compliance with MED 2014/90/EU
Reference
BSI/MED/3.46/755612 Module B & BSI/MED/PC/755614 Module D

ABS - American Bureau of Shipping
Certification Protocol
IMO MSC.1/Circ.1270 - UL 2775
Reference
Product Design Assessment 19-GE1827109-PDA

BV - Bureau Veritas
Certification Protocol
IMO MSC.1/Circ.1270
Reference
Type Approval Certificate 31670/B0 BV

RINA
Registro Italiano Navale
Certification Protocol
IMO MSC.1/Circ.1270
Reference
Type Approval Certificate FPE096016XG

RS - Russian Maritime Register of Shipping
Certification Protocol
IMO MSC.1/Circ.1270
Reference
Type Approval Certificate 21.00078.279

European Certification Bureau B.V.
Reference
Certificate of Compliance No. 15031995

United Kingdom Maritime & Coastguard Agency
Reference
Certificate of Inspection & Test 25/5/2022

Australian Marine Safety
Reference
TE: AFP 07 09 23 ltr

Danish Maritime Authority
Reference
Type Approval Certificate 199925855

Hellenic Register of Shipping
Reference
4232/9

Netherlands Shipping Inspectorate
Reference
IVW-06KU000141

Icelandic Maritime Administration
Reference
506.001.02

Swedish Maritime Administration
Reference
070202-04-15563

Norwegian Maritime Authority
Reference
200416148-9/556

New Zealand Register of Ships
Reference
CSM 07020-03

“FirePro’s bespoke system solutions, 24/7 service and superior quality are measurable advantages.”

Always agile to any threat, our systems are trusted by industry leaders around the world

CARGOTEC, HYUNDAI, ALJAZEERA, EUROSTAR, GLENCORE, NHS, PERENCO, FIAT, LG, Emirates, BASF, TOYOTA, Coca-Cola, SAMSUNG, HEESEN, DP WORLD, orange, Tetra Pak, BOSCH, H&M, vodafone, ProRail, De Beers, Pfizer, Carrefour, posco, THE UNIVERSITY OF WARWICK, TOTTENHAM HOTSPUR

FirePro.

Global Network

We are proud of our Global Network of carefully selected Distributors. Each one undergoes a rigorous training program to best be prepared for the challenges in our industry. Their technical expertise and dedicated resources ensure that each geographic area of responsibility is served with speed, quality and effectiveness.

EUROPE
Albania
Austria
Belgium
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Italy
Latvia
Lithuania
Luxembourg
Malta
Netherlands
Norway
Poland
Portugal
Romania
Serbia
Slovakia
Spain
Sweden
Switzerland
Turkey
United Kingdom

AMERICAS
Argentina
Bolivia
Brazil
Canada
Chile
Colombia
Guatemala
Mexico
Paraguay
Peru
Uruguay
USA

GULF & MIDDLE EAST
Bahrain
Iraq
Jordan
Kuwait
Lebanon
Oman
Qatar
Saudi Arabia
UAE

ASIA & OCEANIA
Australia
Bangladesh
China
Hong Kong
India
Indonesia
Malaysia
Maldives
Myanmar
New Zealand
Pakistan
Philippines
Singapore
South Korea
Sri Lanka
Taiwan
Thailand
Vietnam

AFRICA
Algeria
Angola
Botswana
Congo
Egypt
Ghana
Kenya
Libya
Mauritania
Mauritius
Morocco
Nigeria
South Africa
Sudan
Tanzania
Tunisia

Global Headquarters,
R&D and Production Facilities
Limassol, Cyprus EU

Find us on:
www.firepro.com

LIMITED PRODUCT WARRANTY
FirePro Systems Limited (“FirePro Systems”) hereby certify that all FirePro Condensed Aerosol Fire Extinguishing Generators (“FirePro Condensed Aerosol Generators”) are built to the industry`s highest engineering and manufacturing standards, are rigorously inspected and are covered by a warranty.

PRODUCT DISCLAIMERS
Except as provided above, FirePro Systems makes no representations or warranties of any kind, whether express or implied, statutory or otherwise for the FirePro Condensed Aerosol Fire Extinguishing generators and systems, including but not limited to warranties of merchantability, fitness for a particular purpose, of title, or of non-infringement of third party rights, including the intellectual property rights of others.

LIMITATION OF LIABILITY
In no event, regardless of cause, shall FirePro Systems be liable for any indirect, special, incidental, punitive or consequential damages of any kind, whether arising under breach of contract, tort (including negligence), strict liability or otherwise, even if advised of the possibility of such damages.

NOTE
FirePro is constantly updating its products and systems to the state of the art and therefore reserves the right to make changes in design, equipment and technology. You cannot therefore base any claims on the data, illustrations or descriptions contained in this literature.

NOTE TO READER
This Technical Prospectus is a point of reference for FirePro channel partners and industry associates. It provides an overview of our technology, its advantages and capabilities, as well as several technical parameters and specifications. For more detailed information on any of the FirePro products and/or the FirePro system components refer to the specific User Manual.

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