F-500EA Fire Extinguishing Solutions

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pyroXfire.com

Ultimate protection against lithium-ion battery fires for marine, mining, vehicle and commercial sectors.

The Superior Technology of F-500 EA

F-500 EA is a high performance, multi-purpose and multi-class extinguishing agent with three-dimensional firefighting capabilities. It is completely fluorine-free & contains no PFOA or PFOS. Rapidly cools a fire and the surrounding structures, with the ability to absorb 6 to 10 times more heat energy than plain water. Encapsulates fuel vapor by forming micelles to simultaneously attack the fuel, heat and free radical legs of fire tetrahedron – resulting in rapid knockdown and extinguishment of fire, whilst minimizing smoke & soot.

Surface Tension Reduction

- Able to spread rapidly over fuel area and penetrate surfaces quickly
- Smaller droplets i.e. more surface area per volume of water

Rapid Cooling

- Thermally conducts heat into internal portion of water droplets
- Absorbs 6 to 10 times more heat through steam conversion

Fuel Encapsulation & Neutralization

- Formation of micelles around hydrocarbon fuel molecules
- Effectively surrounds & permanently neutralizes fuel & vapors

Interrupts Free Radical Chain Reaction

- Inhibits free radical chain reactions with fuel sources, resulting in easier fire extinguishment and coalescing of smoke & soot.

	Dry Chemical	Foam	Inert Gas	Wetting Agents	F-500 EA
Reduces Surface Tension		✔		✔	✔
Forms Foam Blanket		✔			✔
Rapid Cooling					✔
Prevent Reignition					✔
Toxin Reduction					✔
Effective & Practical					✔

Ordinary Combustibles

- cULus listed for Class A fires.
- Excellent for structure, car, tire, plastics, coal and paper fires.

Flammable Liquids & Gases

- cULus listed for Class B fires.
- Excellent for all polar solvents (Gasoline, diesel fuel, heating oil, jet fuel) and all nonpolar solvents (Ethanol and ethanol-blended fuels).

Combustible Metals

- Rapidly removes the extreme heat from combustible metals and will not cause explosion.
- Unsurpassed for extinguishing car fires involving magnesium components.

Lithium-Ion Batteries

- 3% F-500 EA was tested and recommended by Con Edison for transformer fires.
- 3% F-500 EA was tested and recommended by Bosch, Daimler, Dekra and Deutsch ACCUmotive in Germany for Li-ion electric car fires.

Fuel Fire Hazards

Fuel are highly combustible and have significant risk of explosion.
This hazard is ever-present in the petrochemical industry, i.e. fuel spills, overturned tank trucks, fuel tank degassing & cleaning and pipeline devaporization.

F-500 EA vs Fuel Fires

01 F-500 EA reduces surface tension by saturating wet surface areas and increase penetration into fuel pores.

02 F-500 EA rapidly and permanently cools the fire, from 650°C to 53°C in seconds and allowing burnback resistance.

03 F-500 EA encapsulates hydrocarbon liquids & vapors, and renders materials non-flammable.

04 F-500 EA inhibits free radical coalescence, Increasing visibility & air quality.

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Lithium-ion Battery Hazards

Li-ion batteries contain high energy densities and diverse materials. As such, Li-ion battery fire is multi-class and will emit toxic gasses & flammable electrolytes.

To protect against this hazard, fire protection must:

- Suppress the Li-ion battery cell fire
- Prevent thermal runaway & halt further ignition of neighboring cells
- Cool the battery cells to stop heating
- Help ensure safety of people in vicinity

How does Li-ion Fire Start?

Short Circuiting
Can become unstable & short circuit

Overcharging
Overcharging batteries can cause overheating

Trauma
Damages from impacts & collisions can cause it to become unstable

Overheating
High heat can lead to thermal runaway

F-500 EA vs Li-ion Fires

01 **F-500 EA encapsulates the flammable electrolytes, rendering them non-flammable.**

02 **F-500 EA droplets rapidly reduce heat, stopping thermal runaway.**

03 **F-500 EA reduces toxic vapors, including fluoride gasses.**

Reference:
(1) Yuan, S., Chang, C., Zhang, J., Liu, Y., and Qian, X. (2022) "Experimental investigation of a micelle encapsulator F-500 on suppressing lithium-ion phosphate batteries fire and rapid cooling"

Rigorously Tested

1. KIWA (Dutch certification body) test no. 16120045 concluded that F-500 was better able to achieve suppression on lithium-ion batteries than standard powder or foam. It can reliably stop the spread of fire caused by thermal runaways and prevent reignition.

2. A research paper from Beijing Institute of Technology, China (1) concluded that F-500 is highly effective against thermal runaway due to its ability of rapid and permanent heat absorption. 3% F500 EA's cooling ability is 3 times that of water mist.times that of water mist.

3. As stated in NFPA 18A, F-500 EA forms stable, spherical micelles and is able to permanently and sustainably extinguish lithium-ion battery fires.

4. In 2021, F-500 EA successfully completed several testing trials required to achieve the Dutch NTA 8133 standard - the first publication that deals with Li-ion batteries up to 600 Wh.

5. In 2023, a detailed experimental study for battery fire is conducted at the National Institute for Occupational Safety and Health (NIOSH) Pittsburgh, which indicated that water mist with F-500 EA additive is the most effective suppressant among all the agents tested (which included ABC powder other water mists with different flow rates, and type D dry chemical).

Widely Used

1. In 2013 at the Barcelona Formula 1 Grand Prix, Hockenheim Circuit tested and accepted F-500 EA as their only firefighting agent, replacing all foam.

2. In 2016, Jaguar standardized the usage of F-500 EA for Li-ion battery hazard protection.

3. In 2016, Tesla specified F-500 EA and installed the first F-500 EA powered fire suppression system, engineered and designed for battery charging areas at the Tesla Giga Factory in Sparks, NV.

4. In 2022, Port Authority of New York & New Jersey tested and implemented the utilization of F-500 EA for Li-ion battery fire suppression.

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Applications

- Lithium-Ion Batteries
  - EV Vehicles, Charging Stations, EV Showrooms
- Mining Vehicles & Equipment
- Flammable Fuel Spill Control
- Fuel Storage Tanks
- Electric Transformers
- Tyre Factories & Storage
- Rural Firefighting
- Three-Dimensional Fires
- Combustible Dust

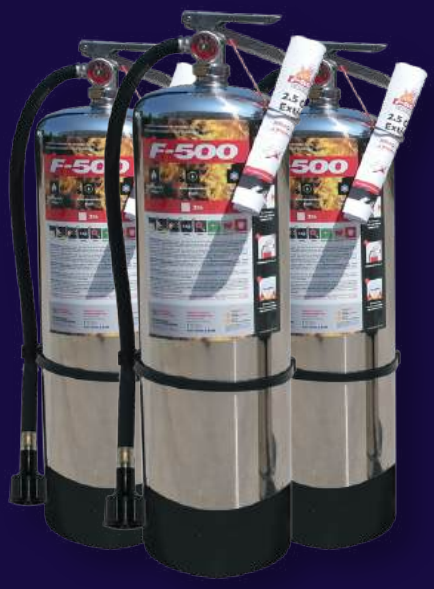
EV Charging Stations | Solar Panels | Electric Buses | Battery Storage Farms | Mining Vehicles | Oil Storage Tanks | Marine Vessels | Tyre Fires

Delivery Systems

Fire Extinguishers

▶ 9 Litres

- Non-Corrosive
- Non-Toxic & Non-Skin Senitizing
- Non-Hazardous
- Fully Biodegradable
- EPA NCP Product Schedule Listed



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