



**F-500** ENCAPSULATOR  
TECHNOLOGY



**MULTI-PURPOSE FIRE SUPPRESSION AGENT**

*FOR CLASS A, CLASS B, AND CLASS D TYPE FIRES*







## ENCAPSULATOR TECHNOLOGY

HCT's F-500 Encapsulator Agent's engineered advantage is based on the high performance, three-dimensional firefighting capabilities of micelle encapsulation. This combination of attributes provides for quick knockdown and rapid heat reduction, providing permanent burnback resistance. F-500 encapsulates hydrocarbon liquids and vapors rendering fuel non-flammable and non-ignitable while interrupting free radical coalescence, inhibiting the formation of toxic soot and smoke. All of this leads to enhanced firefighting performance with increased life safety and reduced property damage, while minimizing water use and the subsequent water damage and runoff created.

### **Class A Applications:**

*Effective on all Class A ordinary combustibles*

- Wood / structure and wildland fires
- Pulp and paper mills and recycling centers
- Cotton and synthetic fiber production and products
- Coal and power generation facilities
- Rubber tire manufacturing and recycling plants

### **Class B Applications:**

*Effective on Class B Polar and Non-Polar Solvents*

- Gasoline and diesel fuels
- Jet A, JP4/JP5/JP8 aviation fuels
- Acetone, Heptane, and other non-polar solvents
- Crude oils and refining byproducts

*Proven to be very effective extinguishing Polar Solvents*

- Ethanol and ethanol blended fuels (E-10, E-85, etc.)
- Industrial alcohols and solvents

### **Class D Applications:**

*Effective extinguishing Class D metal fires*

- Magnesium for aviation and automotive applications
- Aluminum, Titanium, and other combustible metal fires



*Due to the lack of an appropriate Encapsulator Agent test protocol, F-500 is a cULus Classified Wetting Agent for use on Class A and Class B fires.*

*F-500 has been tested and found to comply with the applicable requirements in the Standard for Foam Equipment and Liquid Concentrates, UL 162, and the NFPA Standard for Wetting Agents, NFPA 18, in both the United States and Canada.*



*F-500 has been approved by MPA Dresden as liquid fire extinguishing concentrate for both Class A and Class B fuels.*

*F-500 has been examined following the applicable requirements of the standards DIN EN 1568 and DIN EN 3.*

*F-500 is environmentally safe, nontoxic, non-corrosive, 100% biodegradable, and requires no specialized equipment, making it a clear choice for fire suppression and spill control operations.*





# F-500 Encapsulator Technology

## Your Most Versatile Firefighting Tool

### **Fire Suppression**

F-500 is a multipurpose agent that makes firefighting more effective on a broad range of Class A, Class B, and Class D fires. F-500 has been shown to be especially effective at extinguishing the most challenging types of fires - structure fires, car fires, tire and rubber fires, industrial Class A and Class B fires; and at rapidly cooling and extinguishing Class D metal fires.

F-500 is applied using common firefighting nozzles and eductors and requires no special equipment. F-500 can be premixed and stored in the apparatus tank as well as proportioned and applied with apparatus-mounted eductors, proportioners, and CAFS.

### **Cooling and Exposure Protection**

F-500's ability to rapidly cool metal superstructures makes it ideal for lowering the temperature of surrounding objects, creating a safer fire scene. Rapid cooling of the fire and surrounding infrastructure below the auto-ignition point of the fuel provides permanent burnback resistance.

### **Fuel Neutralization**

When applied at the proper ratio, F-500's chemical encapsulation of hydrocarbon fuels renders flammable liquids non-flammable. This encapsulation process provides permanent burnback resistance. During cleanup and subsequent disposal of the hazardous material, the fuel remains encapsulated, non-flammable, and non-ignitable, providing increased firefighter and public safety.<sup>1</sup>

F-500 has been proven to remove the threat of ignition during highway fuel spills, refinery spills, and industrial spills, and to neutralize hydrocarbon fuel spills providing for safer handling and disposal.

### **Explosive Vapor Reduction and Encapsulation**

F-500's chemical encapsulation of the hydrocarbon molecule occurs not only in the liquid state, making it the clear choice for spill control, but also encapsulates the vapors reducing explosion potential below the lower explosive limit (LEL). This has practical application value when dealing with confined space rescue in hazardous atmospheres, and when dealing with hazard mitigation during fire ground operations.

<sup>1</sup> Always dispose in accordance with local laws and regulations







## The Science of F-500

The traditional approaches for fire suppression eliminate heat through steam conversion (plain water) or eliminate the oxygen leg of the fire tetrahedron and/or temporarily interrupt vapors through the formation and maintenance of a foam blanket (Class A and Class B foam). In contrast,

F-500 simultaneously attacks the heat, fuel, and free radical legs of the fire tetrahedron providing rapid knockdown and extinguishment while also providing the additional benefit of minimizing smoke and soot.

### Surface Tension Reduction

Like many wetting agents and foams, F-500 reduces the surface tension of water from 72 dynes/cm to less than 33 dynes/cm. This reduced surface tension provides several benefits. First, it allows F-500 to spread rapidly over the fuel area and penetrate surfaces quickly. Second, it provides for smaller droplets which means more surface area per volume of water coming out of the nozzle. This allows more of the F-500 molecules to contact the fire and heat source which provides the benefits discussed below.

### Rapid Cooling

While plain water provides cooling through steam conversion, creating scalding steam, and foam products form an insulating blanket that traps heat, F-500 does neither of these. In contrast, one of the most unique and appreciated features of F-500 is its ability to provide for rapid cooling by thermally conducting heat into the internal portion of the water droplet, consuming much more heat energy without the creation of scalding steam. Independent testing has proven that an F-500 solution absorbs as much as six to ten times the heat that plain water can through steam conversion. F-500's rapid cooling extends to surrounding objects, preventing re-ignition, allowing access to shutoff valves, and aiding rescue efforts.

### Fuel Encapsulation and Neutralization

F-500's unique molecular design allows for the formation of micelles, or "chemical cocoons," around hydrocarbon fuel molecules. By bonding with the hydrocarbon molecules, F-500 effectively surrounds and permanently neutralizes the fuel and its vapors, rendering them non-flammable and non-ignitable.

### Interrupts Free Radical Chain Reaction

Free radicals are uncharged molecular fragments with high energy. Free radicals collide with Class A or Class B fuel sources at high speeds releasing heat and more free radicals. This sets up a chain reaction that propagates the combustion process. F-500, because of its high molecular weight, acts as an inhibitor to the chain reaction by absorbing the energy released during these collisions. As the energy of combustion is reduced, the fire is more easily extinguished.

Also, as free radicals coalesce they form soot and smoke. F-500 interrupts free radical chain reactions, preventing them from coalescing. Independent testing has proven that F-500 in practical application reduces the toxic levels of combustion byproducts. F-500's ability to greatly reduce smoke and soot provides increased visibility and improved safety for firefighters.

	Wetting Agents	Foam	F-500
Reduces Surface Tension	✓	✓	✓
Forms Foam Blanket		✓	
Encapsulates & Neutralizes Hydrocarbon Fuels			✓
Rapid Heat Reduction			✓
Interrupts Free Radical Chain Reaction			✓





## **F-500 Environmentally Responsive Agent**

**Non-Corrosive, Non-Toxic, Non-Hazardous and Biodegradable**

### **ISO 9001 Registration – Accredited by FM Global**



F-500 is manufactured in compliance with HCT's ISO 9001 Quality System, which ensures customer and end user confidence in consistent, reproducible, traceable, and reliable quality processes from production to shipment - 100% of the time.

### **Non-Corrosive**

When applying F-500, no special equipment is required for fixed or hand-held systems. F-500 is not corrosive to metal or rubber products, providing many benefits to the end user.

Test results show that:

- *F-500 has no more of a corrosive effect on equipment than plain water.*
- *F-500 is 30 times less corrosive than several AFFF products tested.*
- *F-500 actually acts as a lubricant and cleaning agent to equipment.*

F-500 exhibits equal performance in both fresh and salt water, regardless of the application / proportioning rate; however, salt water solutions are more corrosive by nature.

### **Non-Toxic and Non-Skin Sensitizing**

F-500 was found to be non-sensitizing when tested in accordance with OECD-406.

### **Non Hazardous**

F-500 contains no ingredients reportable under Superfund Amendments and Reauthorization Act (SARA) Title III, Section 313 of 40 CFR-372 or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as of July 1, 1995. F-500 is discarded as non-hazardous waste under RCRA CFR261.

### **Fully Biodegradable**

Testing shows that F-500 is 100% fully biodegradable. As with any substance, care should be taken to prevent uncontrolled discharge from entering ground water, surface water, or storm drains. With advance notice, F-500 can be treated by local biological wastewater treatment plants.

The lower the Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), the lower the demand for oxygen and the better for the aquatic ecosystem. F-500's BOD is 87% less and COD is 80% less than that of several AR-AFFF products.

### **EPA NCP Product Schedule Listed**

F-500 is listed on the National Contingency Plan Product Schedule of the US Environmental Protection Agency as a surface washing agent.

F-500 EA is on the U.S. Environmental Protection Agency's NCP Product Schedule. This listing does NOT mean that EPA approves, recommends, licenses, certifies, or authorizes the use of F-500 EA on an oil discharge. This listing means only that data have been submitted to EPA as required by Subpart J of the National Contingency Plan, 40 CFR Section 300.915.







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