



**Insurance Services Office (ISO)
FSRS Equivalency List
Credit Recognition**

COMPETITIVE COMPARISON

Spill Control - The Economics of F-500 Encapsulator Agent vs. Foam

The *NFPA 11- Standard for Low, Medium and High Expansion Foam* (Table 5.8.2.2.) states foams must be applied to a non-diked hydrocarbon spill for a minimum of 15 minutes at an application rate of 0.10 gpm/ft² or 3%. A “non-diked spill” describes a real world spill situation where the fuel spreads freely, not confined by walls or barriers.

As an example, assume 8 gallons of gasoline has spilled on the highway. Eight gallons equates to an 800 sq. ft. spill.

F-500 EA - Volume-based Spill Control

Encapsulation Ratio:

1 part **F-500 Encapsulator Agent**
8 parts **Class B Fuel**
40 parts **Water**

The firefighter would set the F-500 EA eductor to 3% and encapsulate the spill in about 30 seconds with an 80 gpm nozzle and hand line. The entire 8-gallons of fuel will be nonflammable and nonignitable and can be left to evaporate on the roadway, if permitted by local regulations. The remaining solution is not slippery and traffic can proceed.

AFFF/AR-AFFF Area-based Spill Control

Foam will need to be applied for 15 minutes, per the NFPA foam standard. Foam is area-based, meaning the more the fuel spreads out, the more foam is needed. At 3%, using an 80 gpm nozzle, 1,200 gallons of water will be applied and 36 gallons of AFFF foam. With ethanol or an ethanol-blended fuel, the more expensive AR-AFFF is required at 6%. If the foam blanket breaks down while the fuel temperature is still high, additional foam will need to be applied. Absorbent will need to be applied and then cleaned up as a hazardous material.

The cost of F-500 Encapsulator Agent is slightly more than AFFF, but less expensive than AR-AFFF, which is applied at 6%, doubling the amount used. Only one gallon of F-500 EA was required compared to 36 gallons of AFFF or 72 gallons of AR-AFFF. The spill would more than likely be a gasoline/ethanol-blended fuel, such as E10, in which case, the more expensive AR-AFFF foam would have been required at double the application rate (6%). In a remote highway setting, the pumper truck using foam would need to be carrying 1,200 gallons or more of water.

F-500 EA would mitigate this spill with exactly 1-gallon of F-500 EA. Being area-based, more foam would be required if the spill spread out, but for this example, F-500 EA would save \$695 over AFFF and \$3215 for an AR-AFFF Class B spill, such as E10 gas.

Comparison of Agents Required to Mitigate 800 sq. ft. Spill

	Mitigation Method	Spill (ft ²)	Min. Appl Rate (gpm/ft ²)	Gpm	Time to Mitigate Spill	Solution (gallons)	Proportion in Water	Agent Required (gallons)
F-500 EA	Encapsulation	Volume-based	Volume-based	80	30 secs	40	3%	1
AFFF	Blanket	800	0.10	80	15 mins **	1,200	3%	36
AR-AFFF	Blanket	800	0.15*	120	15 mins **	1,800	6%	108

* Typical manufacturer recommended application rates for AR-AFFF 3x6 on polar solvent fires

** Per *NFPA 11- Standard for Low, Medium and High Expansion Foam* (Table 5.8.2.2.)

Cost Savings Using F-500 EA to Mitigate 800 sq. ft. Spill

	Mitigation Method	Agent Required (gals)	Agent Cost/Gallon	Total Cost of Agent	Savings with F-500 EA
F-500 Encapsulator Agent	Encapsulation	1	\$25	\$25	—
AFFF	Blanket	36	\$20	\$720	\$695
AR-AFFF	Blanket	108	\$30	\$3,240	\$3,215

What Are the Costs of a Fuel Spill Clean-up?

We compare how much agent is used at the site of a highway fuel spill because much less F-500 Encapsulator Agent is required, compared to foam. The fact is, F-500 EA and foam are two completely different agents. Twenty years ago, foam was the only tool firefighters had to control fuel spills. The goal was to get the fire out and keep it out. The fire may be extinguished, but foam blankets in the heat and the fuel can autoignite if the foam blanket is broken. Reapplication is often necessary. After the fire is out, firefighters are left with a slippery mess. Above all, the fuel is still flammable.

F-500 EA accomplishes two things in one step. F-500 EA extinguishes any Class B fire quickly, whether it is nonpolar gasoline or diesel fuel or polar ethanol-blended fuels, and F-500 EA encapsulates the fuel, rendering it nonflammable and nonignitable.

Highway Fuel Spill Comparison

Foam - AFFF or AR-AFFF

- Must apply expensive AR-AFFF for ethanol-blended fuel spills
- Must apply for 15 minutes (per NFPA 11)
- Foam traps heat - fuel can autoignite
- Must reapply foam if blanket fails
- More agent means more water applied - potential diking required
- Run-off could lead to fines
- Additional water trucks are probably required
- Remaining foam and fuel must be cleaned up
- Foam and fuel are slippery - potential injuries
- Absorbent must be applied
- Flammable absorbent must be safely cleaned up
- Absorbent must be removed as hazardous material
- Absorbent must be properly disposed of, usually at the expense of the fire department
- Traffic is impeded for a long period of time
- Firefighters are on-site longer and prone to fatigue accidents

Costs of Using Foam

- Foam Costs - Much more foam agent is used
- Water Costs - Much more water is used
- Man hours - More time on scene
- Workman's Comp Claims - More time on scene and slippery conditions can lead to fatigue and accidents
- Mutual Aid - HAZMAT teams may need to be called
- Absorbent - Absorbent costs, plus man hours
- Absorbent Removal - Hazardous material removal and disposal

F-500 Encapsulator Agent

- F-500 EA will extinguish and encapsulate any type of Class B fuel
- Total Encapsulation: 8-gallons of fuel requires 1-gallon of F-500 EA and 40-gallons of water
- F-500 EA has excellent burn back resistance
- Less agent is needed, compared to foam
- Fuel is nonflammable and nonignitable
- Remaining solution is not slippery
- Solution can be left to evaporate, if local regulations permit - no clean-up required
- Traffic can proceed through the wet solution
- Firefighters are available for the next call

Costs of Using F-500 EA

- F-500 EA Costs - Insignificant amount is used
- Water Costs - Very little water is used
- Man hours - Much less time on scene
- Fuel and F-500 EA can evaporate
- Traffic can proceed



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