Foam Lines® May 2010 – Rev. 1/2022

Warning: AFFF and AR-AFFF's contain PFAS compounds. Check with environmental authorities on safe use and or disposal.
Fluorine Free (F3) = No intentionally added PFAS components.

Firefighting Foam Types & Use (update Feb 2020)

Regular Protein Foam... 1930's - Now obsolete, replaced by fluoroprotein foam. The mechanism of extinguishing liquid fires is shutting off oxygen (smothering).

Very gentle application requirements made applying this rather fragile foam a very dangerous exercise, as firefighters were required to be in extreme close proximity to the fire, employing special aerating nozzles.

Fluoroprotien Foam... Developed in the 1960's. Primarily used for basic hydrocarbon fuel storage protection. The addition of a fluorochemical (PFAS) made for safer application techniques, allowing firefighters to stand-off while forcefully applying foam to ground spills or storage tank fires from a distance. Not for use on ethanol gasoline blends > 10%.

AFFF... Aqueous film forming foam developed by the US Navy in the 1960's. Fluorochemical (PFAS) and synthetic foaming surfactants improved firefighter safety, particularly for naval and civilian firefighters involved in crash rescue firefighting, allowing use of structural firefighting nozzles. **Is now (2022) an environmental issue in many states.**

Before the advent of federally mandated oxygenated gasolines, AFFF's were the dominant class B fire fighting agents for municipal firefighter's use on simple hydrocarbon fuels like crude, diesel, jet fuel, home heating oil and non-oxygenated gasoline.

NOTE: Military specification F24385, an AFFF is currently in use by all FAA regulated crash fire rescue vehicles/ Mil. spec AFFF is not optimal for use on gasoline blended with ethanol. Higher ethanol concentrations disqualify mil. spec AFFF as an agent for modern gasoline fuel spills, ignited on not. There is no alcohol resistant variant of mil. spec. AFFF.

All AFFF's contain PFAS. Civilian airports could go to F3 replacemrnts by end of 2021. F3 foams are fluorine free. See National Foam's Avio Green F3, AFFF replacement.

AR-AFFF & F-3 Alcohol Resistant Foams

State of the art in terms of allowable uses on all manner of hydrocarbon or solvent fuels. Solvents include: ethanol and ethanol blended gasoline, (E-10, E-85 & E-95) acetone, methanol, ethers, esters and some acids. Fluorine Free versions (AR-F3) are available from NF.

AR-AFFF and AR-F3's tend to provide longer residence time in vapor suppression situations where unignited spills are encountered. AR-AFFF and AR-F3 foams are suited for fires and vapor suppression of spills involving E-10 - E-85 and E-95 gasoline blends now found in standard gasoline tanker loads bound for automobile refueling stations.

Municipal fire departments are transitioning to F3, PFAS free foam from AR-AFFF firefighting foams. AR-F3's are alcohol resistant Fluorine Free Foams. **National Foam's Universal F3 Green 3% is an alcohol resistant fluorine free replacement for AR-AFFF's. Residence time goes from minutes to hours.**

Hi Expansion Foam

Became popular in the late 1960 through 70's for use in confined space fire suppression such as mines, tunnels and basements. Application appliances tend to be large and unwieldily. Aboveground use is limited to engineered systems in aircraft hangars, tire warehouses rack storage or hi-cube upholstery storage as may be found in automotive assembly operations. Recently, hi-expansion foams have been found effective in suppressing liquid natural gas events. Hi-ex foams are not indicated for use on class B liquid fuels. No PFAS

Wetting Agents... Encapsulators

Developed in1950's for class A fuels and limited use on class B fires. The mechanism of extinguishing liquid fires is emulsification, which often requires considerably more agent and water than conventional air-foams. These products, based on sound science are are generally accepted as spill mitigation and clean-up agents employing industrial strength detergents. Such detergents are often referred to as anionic and nonionic surfactants, which allow water and oil to temporarily bond. This is the mechanism of degreasers, laundry and dish detergent products. ***Not for use on polar solvents or gasoline alcohol blends …*** *They use no PFAS in their formulations.*

Class A Foam... In the 1980's, water and foaming detergent surfactants were developed for firefighting in wild-land settings. The mechanism of extinguishment was, and is, improved fuel hydration. Uses no PFAS.

Class A's soon became popular for everyday structure fire use, as finished class A foam drains its wetting solution fairly fast, allowing the super-soaking of fuels which normally resist plain water.

Class A fuels pretreated with class A foams tend to be more difficult to ignite, as their level of hydration (humidity) can be raised by topical application of such an agent.

Compressed Air Foams

Same as class A solution with addition of compressed air. Air enhances stream reach and residence time, making it an ideal exposure protection or wild-land fuel pre-treatment.

Do not lower structural firefighting application rates in accommodation of sales and marketing claims.

More at Training Library

http://www.cottrellassociates.com/combat-support-products/training-library.html

Warning: AFFF and AR-AFFF's contain PFAS compounds. Check with environmental authorities on safe use and or disposal.

Fluorine Free (F3) = No intentionally added PFAS components.