Foam Lines

Combat Support Products
Division Of Cottrell Associates, Inc.

NATIONAL FOAM
Factory Agents Since 1988

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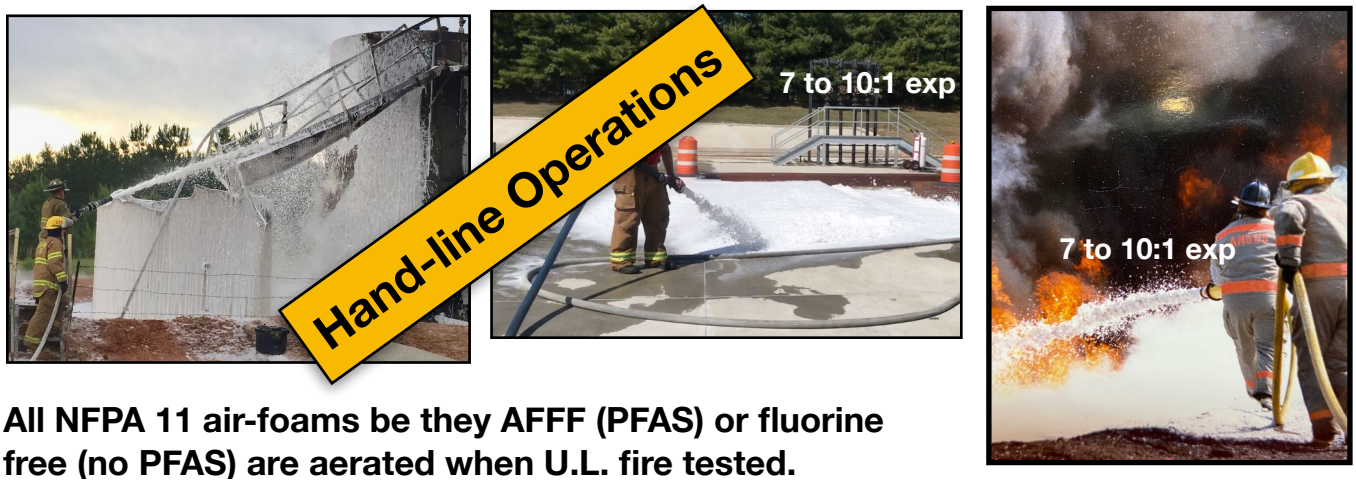
Fire Dept. Foam Nozzles - Finished Foam Quality

Foam quality is important when using new, synthetic fluorine free foams (SFFF)…



All NFPA 11 air-foams be they AFFF (PFAS) or fluorine free (no PFAS) are aerated when U.L. fire tested.

With AFFF or fluoroprotein foam, the fluorinated surfactant component (PFAS film former) does the heavy lifting in terms of speed of knockdown and fuel tolerance when dealing with hydrocarbon fuels.

One can plunge fluorinated foam into a diesel spill or storage tank and results are predictably good, as fluorinated foams cannot be contaminated with fuel. In either case, best results are achieved when foam is expanded (aerated) about five to ten to one. Ten gallons of solution aerated aerated 7:1 ratio makes seventy gallons of finished foam.

AFFF's sudsy later becomes a reservoir for the water film forming component to refresh itself through fairly fast drainage. Drainage is as beer head drops, beer level raises. For spill firefighting one wants light beer. For haz-mat vapor security one wants a stout brew. Light foams and stout foams are controlled to a large extent by aeration. AFFF applied with a spray nozzle (light) will dispatch a hydrocarbon spill fire fairly fast as long as the rate at which it is applied is greater than its consumption by the fire. This rate, or density is known as application rate. As long as application rate exceeds consumption rate the fire will eventually go out for lack of air (smother).

For most in the municipal fire service, flammable liquid fires are a once in a career event. Un-ignited spills are much more frequent and is the likely place for foam use.

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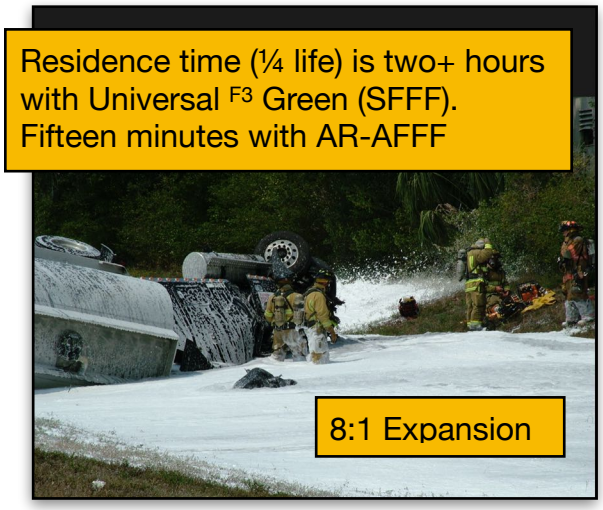
Vapor Suppression



Vapor suppression Is Critical

Vapor suppression is a critical scene security issue and has little to do with application rates. Application rates do not apply to un-ignited events.

The following is reply text to a HazMat Chief in a large metro. fire department, regarding foam nozzle selection for their pending synthetic fluorine free foam change-out.

Good Morning - Yes, aerated foam is indicated for SFFF's.

Universal F3 Green use synthetic surfactants. Just about any low expansion nozzle attachment will get you 5 to 8:1 expansion; some higher yet. Akron, Elkhart and TFT make fine aerator attachments for structural firefighting nozzles. Training tip: When using SFFF apply foam to ALL fuels as if they were alcohol.

Nozzle discharge velocity bears on foam quality. Like a kid's bubble wand, if pulled through the air too fast the bubble forms and snaps as a result of sheer. Since the advent of 75 psi structural nozzles, foam quality, in general has improved because lower solution exit velocity allows more bubbles to survive the sheer.

Systems nozzles I've tested with haz-mat screens make high quality, homogeneous finished foam with solution exit velocity in the +/- 50 psi range (+\- 88 fps). I confirmed the theory in foam quality tests in the late 1980s for fuming acid applications - results are still valid for un-ignited haz-mat applications.

With that said, if dedicated foam nozzles are your intent, be sure you select a 75 psi (105 fps) nozzle with an aerator. Lower velocity insures bubbles survive shear. Keep in mind the velocity measurement is at nozzle exit, not base nozzle pressure. With lower pressure, be ready for about a 10% reach reduction. Remember … with fluorine gone, finished foam quality and application technique is important.

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Proportioning Accuracy

The MOST critical component in quality foam production is proportioning accuracy. The film forming component in a decent AR-AFFF is very forgiving in terms of proportioning accuracy in fire tests we conducted. As a result, slightly lean proportioning was forgivable in combat. Not as forgivable with synthetic fluorine free foams since the heavy lifters (fluorosurfactants) are no longer present. Most popular foam eductors pretty much proportioned alcohol resistant foams lean. National Foam's eductors (line proportioners) are UL listed accuracy at a fixed %. When I tested them, the metered versions on adjustable units to include Akron and Elkhart couldn't achieve acceptable UL proportioning particularly with the very viscous, high performing AR-AFFFs,

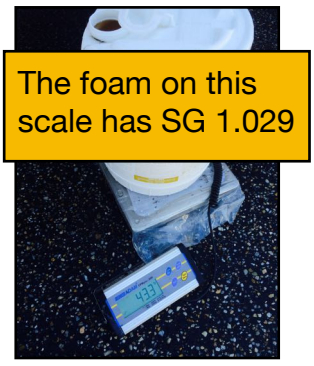
It is why, when asked by TFT I created a foam eductor scope document that required at least 1% rich when testing with water. Near 1% rich is allowable. This allowed close to UL performance at 1 and 3% using Universal Gold which was a FDNY requirement when changing to U-Gold back in 2010. Although 6% was spot on with water, it was slightly lean with Universal Gold.

Universal ^{F3}Green 3% has significantly less viscosity than Universal Gold and will be fine with systems and eductors that give close to UL proportioning accuracy at 3%.

That said, I'd test proportioning accuracy of your proportioning devices. before going further. If lean, even the best aerator will not make the grade.

A 95 gpm eductor will drink 2.85 gal (23.65 lb) water in sixty seconds. A 125 eductor will drink 3.75 gal (31.1 lb) water and slightly less if AR-SFFF or AR-AFFF. Therefore, eductor engineering must allow for foam viscosity. If you hit the water numbers you will probably not hit them with most AR foams. Foam concentrate specific gravity is 1.014 to1.025.


PASSED


The foam on this scale has SG 1.029


FAILED with AR-AFFF