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Universal Green 3% AR-F3 Facts:

U-Green has a Underwriters Laboratory type III listing for use on Hydrocarbons and Type II on polar solvents, both at 3% proportioning using fresh or sea water.

Type III applications include those one would use on a fuel storage tank fire where over the top application is required.



Type II applications include those that one would use on foam destructive fuels such as polar solvents or some acids. Using bank-in (back-splash) off the side of wreckage or roll-on using nozzle velocity to push foam onto a fuel spill or fire somewhat gently.



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Universal Green™
Alcohol Resistant Fluorine Free Foam



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Universal Green 3% AR-F3 Facts:

Universal Green 3x3 has no systems viscosity restrictions.



Universal Gold have a few onboard A/B foam system restrictions



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Universal Green™
Alcohol Resistant Fluorine Free Foam



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Universal Green 3% AR-F3 Facts:

Must be used with aerating nozzles at minimum of 10:1 expansion on hydrocarbons to include E-10 gasoline/ethanol blends and polar solvents (alcohols).



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Universal Green 3% AR-F3 Application Rates

Application rate is foam/water solution flow per square foot of fire. A 1000 sq.ft. gasoline (hydrocarbon) fire requires 160 gpm solution to achieve extinguishment (0.16 gpm / sq. ft.).

A 1000 sq. ft. isopropyl alcohol (IPA) requires 280 gpm (0.28 gpm / sq. ft.)

A 1000 sq. ft. ethanol fire requires 100 gpm (0.10 gpm / sq. ft.)

Fifty square foot U.L.162 fire test pan.



Hydrocarbon Fire Listings

Spill at 0.10 gpm / sq. ft. - needs 5 gpm (AFFF)

Spill at 0.16 gpm / sq. ft. - needs 8 gpm (F3)

Fuel In Depth (tank fire)

0.16 gpm / sq. ft. - needs 8 gpm (AFFF)

0.16 gpm / sq. ft. - needs 8 gpm (F3)

Alcohols AR-AFFF

0.20 gpm / sq. ft. needs 10 gpm - IPA

AR-F3

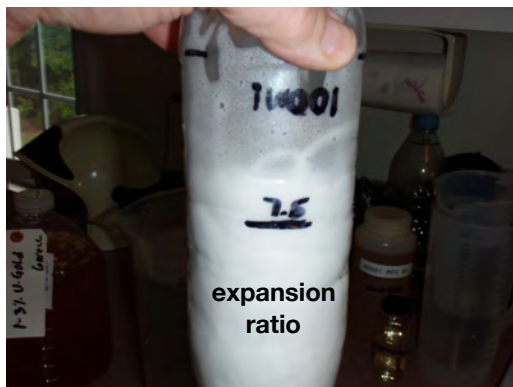
0.28 gpm / sq. ft. - needs 14 gpm - IPA



Universal Green 3% AR-F3 Facts:

Quarter life is two + hours with fresh water. One + hour with sea water.

100 ml. 3% solution shaken to full expansion - Time it takes to drain 25% solution



U Gold +/-23 min

U Green +120 min





Universal Green™
Alcohol Resistant Fluorine Free Foam



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Universal Green 3% AR-F3 Facts:

You can train with it with no fluorine complications.



Doubles as a class A wetter at ½ to 1%. Per NFPA 18

Freeze - thaw stable.

Twenty-five year shelf life (sealed, factory packaging)



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AFFF Fluorine Debate 1960's through 2002



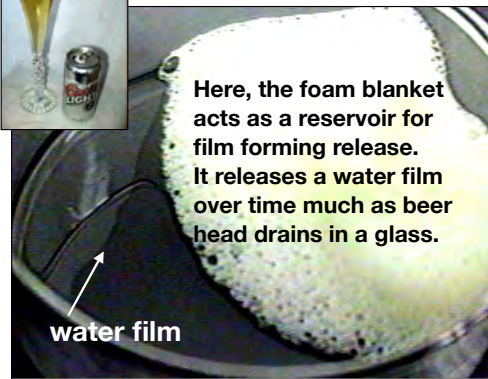
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Background Story - Cancer Links

Environmental folks identified pre 2003, PFAS compounds, PFOS & PFOA fluorosurfactants used for film forming in AFFF and AR-AFFF firefighting foam as bad actors and in most cases, rightly so. These long carbon chain (C8) compounds have been detected in water wells near chemical manufacturing sites and military fire training facilities.

National Foam AFFF products never contained PFOS or added PFOA compounds

Small amounts of PFAS fluorosurfactants added to water decreased its surface tension characteristics such that it allows water to skim across jet fuel, diesel and gasoline, extinguishing fire as it spreads. It was truly a game changer in the liquid fuel firefighting world.



Here, the foam blanket acts as a reservoir for film forming release. It releases a water film over time much as beer head drains in a glass.

water film

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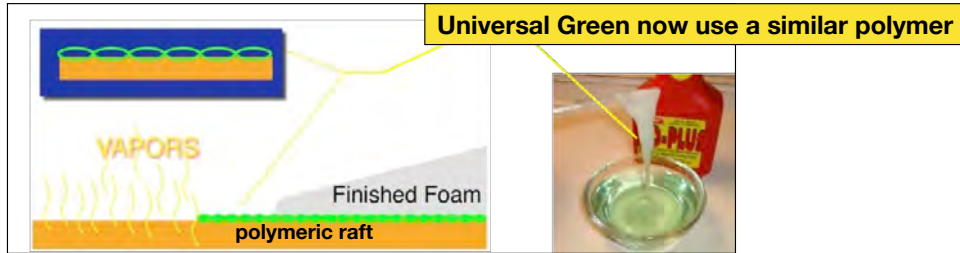


AFFF Fluorine Debate 1970's



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National Foam patented an alcohol resistant variant by adding a sugar based ingredient. When foam solution drained on a polar solvent (alcohol) it created a polymeric membrane that separated the water in the AFFF foam blanket from the foam destructive solvent beneath. Another game changer in fighting stubborn polar solvent fires.



National Foam soon sold rights to the 3M company and others allowing them to produce alcohol type AFFF concentrates (ATC). National's AR products are still known as Universal Foams.

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AFFF Fluorine Debate 2019



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C8 Chemistry vs. C6

AFFF - Film Forming Fluorosurfactants PFAS

PFAS is a catch-all acronym that encompasses most things relating to fluorosurfactants, which include: AFFFs, food contact paper, textile coatings, non-stick cookware, etc. PFOS and PFOA are the known bad actors in the PFAS range of chemicals.



PFOS and PFOA is said to be persistent, bioaccumulative and toxic (PBT). Some eight carbon chain film forming chemistry that include PFOS and PFOA is said to be cancer linked and long term environmentally persistent, it is **no longer manufactured.**

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AFFF Fluorine Debate 2019



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C8 Chemistry vs. C6

AFFF - Film Forming Fluorosurfactants PFAS



Six carbon chain chemistry (C6) has replaced eight carbon chemistry (C8) and is considered non-biocumulative and significantly less environmentally persistent. **Is OK for now.**

Some science suggests there are trace amounts of bioaccumulative components in C6 chemistry, which is why ALL PFAS compounds regardless of origin are being painted in some circles with a suspect brush; and is why National Foam patented an effective alcohol resistant, fluorine free (F3) replacement foam.



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AFFF Fluorine Debate 2019



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Regardless of the outcome of science debates there are those who would prefer to remove all fluorosurfactant, PFAS compounds from firefighting foam. In fact, there are some states in the process of legislating the extinction of PFAS firefighting foams.

Class A Foam And Wetting Agents (emulsifiers)

To be clear, Class A foams are not in the fluorine fight. Their wetting and foaming ability rely on hydrocarbon surfactant foamers. Some to include National's Knockdown Class A foam have U.L. Wetting Agent listings which allow limited use on simple hydrocarbon oil based fuels such as diesel. Definitely not for use on gasoline / alcohol blends, particularly where fuel has soaked into the earth. Agent application requires the mixing of detergent solution with fuel using an otherwise unsafe plunging technique where fuel has depth and is not running. Note: Most wetting agents do not foam...

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ECONOMY OF USE

Municipal Fire Service



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ECONOMY OF USE - TWO HOUR EVENT

Aerated (10:1) Foam Reapplication At Quarter Life

20ft. x 25ft. (500 sq. ft.) un-ignited spill - 100 GPM - 1 Minute To Cover

3% Proportioning	One Minute Applications	Foam Used Gal.	Foam \$ Per Gal.	Water Used Gal.	Cost \$
All AFFF Mil. Spec.	24	72	32	2328	2304
5 min 1/4 life					
Brand X AR-AFFF	10	30	36	970	1080
12 min 1/4 life					
Brand Y AR-AFFF	10	30	36	970	1080
12 min 1/4 life					
NF U-Gold AR-AFFF	5	15	45	485	675
25 min 1/4 life					
NF U-Green AR F3	1	3	45	97	135
120 min 1/4 life					

Example assumes a 500 sq. ft., un-ignited gasoline spill using a 100 gpm, aerating (10:1) nozzle for security at foam's quarter life during a two hour event. **Safety Note: Reapply foam when gas detector indicates flammable range vapor or material's odor returns.**

About 80% of fire department foam use is in securing hazardous spills. Here increased quarter life can contribute to significant savings in terms of foam replacement cost as well as lowering the environment impact of water use, which is always in short supply at highway crashes.

In the event of unexpected ignition, Universal Green AR-F3 has a U.L. pedigree showing it a fairly strong AFFF replacement.

See the table for cost comparisons where foam is reapplied at quarter life.

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AFFF Fluorine Debate

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Q. Will Airport AFFF Foam, MIL-PRF-24385F(SH) Be Affected?

a - No, not at present (February 2019). The Federal Aviation Administration (FAA) still mandates all FAA controlled airports use a C6 Mil Spec AFFF.

However, FAA reauthorization legislation, HR 302 of Oct. 2018 includes wording that will allow airport fire departments to substitute MIL-PRF-24385F(SH) with an approved foam (U.L / NFPA 403) or perhaps a fluorine free (F3) agent, qualified by ICAO within three years of HR 302 becoming law, which could be 2021-2.



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AFFF Fluorine Debate

2019



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Q. What are ICAO (International Civil Aviation Organization) Foam Standards Why Should I Care?

- a. European aviation firefighting performance products are guided by International Civil Aviation Organization (ICAO) regs.

In the U.S., NFPA 403 Standard for Aircraft Rescue and Firefighting is the airport firefighting guidance document. NFPA does not approve or test but rather sets performance standards, which are tested under Underwriters Laboratory 162 Standard for Foam Equipment and liquid Concentrates and or as is now, the U.S. Navy MIL-PRF-24385F(SH) AFFF Mil Spec. formulation. At this point in time it is not clear what firefighting performance standard FAA will adopt and or how NFPA 403 will figure in the immediate future in terms of alternate ICAO certifications or F3 (fluorine free) foams.



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AFFF Fluorine Debate

2019



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Q. Does National Foam have a replacement for use by the U.S. aviation community?



a - Yes, National Foam have a F3 aviation replacement product which is quite different than our F3 alcohol resistant, Fire Department product and is now being sold under our sister company's brand, Angus, in the European Union (EU) and United Kingdom (UK). Should it or another formulation be approved for use in the States by FAA and NFPA 403, it will be available under the National Foam brand through authorized dealer channels.

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Finish



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UniversalGreen™
Alcohol Resistant Fluorine Free Foam

Now available at stocking National Foam Dealers



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