

Technical Bulletin

NFTB150

IS IT FOAM OR IS IT A WETTING AGENT?

Many fire service professionals are not aware there is a difference between foam, and wetting agents or emulsifiers. Understanding the basic performance parameters and limitations of each will help the user determine the applicability of each agent for the intended use. Foam is generally intended for use on Class B fires only. Wetting agents are applicable to Class A and non water-soluble Class B combustibles.

Foam and wetting agents are not the same, as evidenced by the development of separate NFPA standards.

NFPA-11, Standard for Low, Medium, and High Expansion Foam defines foam as a stable aggregation of bubbles of lower density than oil or water. Foam also exhibits a tenacity for covering horizontal surfaces. It flows freely over a burning liquid surface and forms a tough air-excluding, continuous blanket that seals volatile combustible vapors from access to air.

The basic mechanism foam utilizes for extinguishment is to separate the fuel from oxygen eliminating one leg of the fire tetrahedron, thus interrupting the combustion process. In situations where a fire has been extinguished or ignition has not occurred, foam also serves to provide a visual confirmation that the surface of the fuel has been covered.

NFPA-18, Standard on Wetting Agents defines a wetting agent as a concentrate that when added to water reduces its surface tension and increases its ability to penetrate and spread, extending the efficiency of water and the extinguishment of Class A and Class B fires in ordinary combustibles and flammable or combustible liquids that are not soluble in water.

Wetting agents generally contain a surfactant or emulsifying ingredient which enables them to mix with hydrocarbon fuels (emulsify) similar to oil and water in salad dressing. This is sometimes referred to as "encapsulating" or "locking up" the fuel.

The basic chemistry dilutes the fuel which increases the flash point and reduces the fuel's ability to vaporize at ambient temperatures or when heated. Over time, the fuel and wetting agent will eventually separate. This time frame is dependent on several variables, such as fuel type, fuel temperature, amount of wetting agent, etc. Generally, these agents require diluting the hydrocarbon fuel with about 6% of solution (emulsifying agent plus water) by volume.

This means a fire in a 10,000-gallon fuel oil storage tank would require about 600 gallons of wetting agent solution to effect extinguishment. The oil tank must have sufficient extra capacity to contain the fuel oil and emulsifying agent, since the two must mix.

As with many other pieces of firefighting equipment, Underwriters Laboratories (U.L.) Listings are accepted as a reputable and dependable third party testing agency for the public good. Quite often U.L. Listings are a requirement of bid specifications. Just as the listing criteria for fire hose and ground ladders are different, so too are the listing criteria for foam and wetting agents. In considering the use of wetting agents as a primary agent to extinguish Class B fires, the U.L. test standards should be consulted as a comparison of each agent's ability to perform.

There is a difference in the testing each type of concentrate undergoes to receive U.L. Listing for Class B applications. Foam is tested for five major areas of performance:

- **Rate of Application**
- **Extinguishing Time**
- **Sealability**
- **Burnback Resistance**
- **Foam Quality (Expansion and Drainage)**

Also, foam is typically investigated in combination with specific devices such as proportioning equipment and foam discharge equipment.

Wetting agents are tested for extinguishing only. There is no sealability test, burnback resistance test, or foam quality requirements. Also, wetting agents are not tested for use in combination with proportioning or discharge equipment. The chart on the following page compares the differences in UL testing for Class B applications for foams and wetting agents.

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U.L. CLASS "B" FIRE TEST COMPARISON Wetting Agent and Foam

U.L. Classification	Wetting Agent (GOHR)	Foam Liquid Concentrates (GFGV)	Notes
Test Standard	ANSI/NFPA 18 Standard for Wetting Agents	ANSI/UL 162 Foam Equipment & Liquid Concentrate	Not comparable agents as indicated by separate listings and test criteria
Fire Test Fuel	62.5 gal. Heptane	62.5 gal. Heptane	-
Fire Test Flow and Application Rate on 50 ft ² Fire	10 gpm (0.20 gpm/ft ²)	2 gpm (0.04 gpm/ft ²) (film-forming foam concentrates) 3 gpm (0.06 gpm/ft ²) (all other foam concentrates)	> 3 to 5 times higher application rate for the same test criteria
Fire Test Extinguishing Time Limit	</=5 minutes for full extinguishment @ 0.20 gpm/ft ²	</=3 minutes @ 0.04 gpm/ft ² </=5 minutes @ 0.06 gpm/ft ²	-
Sealability Test	None	2 tests during a 9 minute waiting period at 0.04 gpm/ft ² 2 tests during a 15 minute waiting period at 0.06 gpm/ft ²	Confirms the ability to seal against hot metal and prevent vapor migration
Burnback Resistance Test	None	Required after 9 minutes waiting period at 0.04 gpm/ft ² Required after 15 minutes waiting period at 0.06 gpm/ft ²	Critical for post fire security
Alcohol Resistance	None	Alcohol resistant foam concentrates are tested by ANSI/UL 162 for use on alcohols and other polar solvent fuels	Oxygenated gasoline additives are polar solvents and may require alcohol resistant foam*

*** Where oxygenated additives content exceeds 10% by volume, alcohol-resistant foam concentrates may be recommended. Consult manufacturer or UL listings for specific details. (See also NFPA 11-2016)**