Questions About Class A Foam In Municipal Fire Operations

Brushfires account for only a small percentage of the total alarms our Municipal department encounters. Why should we look into the adoption of Class foam?

Although the new generation of Class A foams were originally developed for forestry firefighting in the mid-1 980s, practical experience and testing has shown that it can be a valuable tool to manually combat other Class A type fuels. Foam application equipment development has reduced the logistical requirements burdened on the pump operator to efficiently supply Class A foam on the fire ground. This has made the technology feasible for municipal fire operations.

Why is Class A foam more effective than plain water on Class A type fires?

Plain water has inherent limitations in cooling and penetrating class A fuels because of a naturally high surface tension. This high surface tension causes water to form into droplets, and consequently, the majority of the droplets roll off of fuels, impeding waters heat absorption potential. Class A foam concentrate treated water (foam solution) has reduced surface tension and allows more surface area of water droplets applied to contact the ordinary combustible surface. This provides increased heat transfer through conduction. Class A foam concentrate is technically known as a Synthetic Detergent Hydrocarbon Surfactant, and when mixed with water at the recommended ratios, is biodegradable. Because it is a Hydrocarbon Surfactant, it also has an affinity for carbons and causes the water (as foam solution) to penetrate wood fuels, aiding in the prevention of rekindles.

Class A foam solution can be aspirated (entrained with air) by application through a fog or air aspirating nozzle, or a Compressed Air Foam System (CAFS). Different quality finished-foam blankets can be formed using these foam generation devices. Forming a low-expansion, quick draining bubble blanket will add to fire suppression proficiency upon direct attack by enabling the foam solution to adhere to horizontal and vertical three-dimensional fuels. Foam bubbles adhering to fuels will cause the foam solution to remain on it where it will penetrate or evaporate, until it is all gone. The net effect of using Class A foam is to efficiently use the available water supply to cling to and cool the fuel. This maximizes waters ability to suppress the fire, rather than ordinarily being wasted by running off of fuel surfaces.

How can Class A foam help our daily fire operations, and can these benefits justify the cost of foam concentrate?

The major percentage of working alarms that municipal departments respond to are Class A fueled fires, and from that standpoint, methodologies that increase fire suppression capabilities on them should be closely investigated because of the potential benefit to the total number of incidents. In simple terms, using Class A foam correctly can provide a tool to increase the effectiveness of the application of water on these hazards. The benefits of adopting Class A foam may include increased firefighter safety, increased fire operation efficiency, and reduced properly damage. In most scenarios, using water more efficiently will mean reduced flame knockdown and total extinguishment times, and as a prime effect, firefighter stress from exposure to heat and toxic products of combustion will be lessened. Rural Departments depending on a labor and equipment intensive water supply can extend the capability of water shuttle operations. Because of faster fire control, less total water may be needed for extinguishment when using Class A foam. This can help reduce total fire and water damage, and thus the environmental and financial impact of fire on the community.

From a cost standpoint, Class A foam concentrate is generally proportioned at 3 tenths to 5 tenths of one percent when used for direct attack. This is only a fraction of the proportioning ratio typically used with Class-B flammable liquid foams (usually 3% and 6%). This low proportioning ratio and its ability to make water a more effective firefighting agent makes usage cost effective. Each individual department should prepare a analysis of required implementation/ operation costs after a thorough review process of Class A foam technology. These costs should then be weighed against the potential benefits to the total fire operation and the community.

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Can Class A foam be utilized for interior structural attack? If so, what are the benefits?

Most municipal Departments have hydranted fire district with good water supplies.

With proper training Class A foam can be utilized very effectively for interior structure attack. At least one reason why Class A foam should be used for interior attack, even though a good water supply may be available, can be better understood through examining plain water application requirements such as the Iowa formula, and by looking at actual interior gpm flows used today. Some have said that water flow formulas developed years ago are no longer valid today because of the increased interior fire loading characteristics of home furnishings manufactured from synthetic materials, whereas all natural fibers were ordinarily found years ago when these formulas were developed. While it is true that these synthetic materials have considerably increased fuel loading, it is also true that many departments have replaced 1-1/2" hose and variable gallonage nozzle with 1-3/4' hose and automatic nozzle to increase application rates. Inasmuch as this larger hose line and nozzle is capable of delivering the higher flows primarily found with 2-1/2" diameter hose line, aggressive interior attacks are normally delivering only 95 to 120 gpm water flow. It is difficult to realistically use higher interior flows because of high nozzle reaction force, the inability of the attack team to advance awkward hose line from the higher pressure required, and because ordinarily, there are limited firefighting personnel found on the responding engine. Realizing that there are practical limits to interior attack flow rates, adding Class A foam concentrate to these water flows can be a justifiable alternative to increase the fire-killing and fuel securing action of interior fire streams. This may help offset higher interior fire loading found in most residential occupancies today.

When talking about Class A foam, the term CAFS often it discussed. Can CAFS be used by municipal fire departments, and do they offer any advantages?

Compressed Air Foam Systems or CAFS, describes a high-energy foam generation system that utilizes an air compress to generate the foam bubbles within the hose line. This system can offer advantages over conventional application equip meet. CAFS are becoming widely recognized as giving quicker flame knockdown, increased fire stream reach, and more finished-foam product variability for a wide range of tactical uses. There are several Municipal fire departments using CAFS for structure attack.

What is needed to produce Class A foams in municipal fire operations?

Most departments have experience with Class-B flammable liquid foams. In much the same way Class B foam concentrates are mixed with water (proportioned), and then aspirated (air-added) to create finished-foam blankets, Class A finished foams are produced in this way also. The major difference in producing Class A foam, is that lower proportioning ratios are required.

What is the typical equipment installation for departments that are using Class A foam?

Foam Concentrate Proportioning Systems: Many are installing variable speed direct injection, discharge side foam concentrate proportioning systems. These systems offer advantages over common eductors and other methods of integrating foam concentrate with the fire stream, creating foam solution. They are available in 12 Volt D.C., are small in size, and usually mounted in a storage or pump compartment. These direct injection foam concentrate proportioning systems allow reliable, easy to control foam production, and keep foam concentrate out of the fire pump and water tank. They are unaffected by changes in suction and discharge pressures within their design specifications. Many apparatus installations include dual foam concentrate tanks, one holding Class A foam concentrate, and the other holding 1% Aqueous Film Forming Foam Concentrate. This allows for suppression of Class A type fuels and also normal hydrocarbon Class-B flammable liquid fires.

Foam Generation Systems: Conventional smooth bore and automatic nozzles are compatible with class A foam, and offer a choice for departments to begin foam application without much change to their existing operating procedures. Nozzles can be swapped or attachments added that aspirate the foam solution and create finished-foam blankets of varying degrees for a variety of tactical uses, such as exposure protection.

Is training required to place Class A foam agents in fire operations?

Training is essential for the successful implementation of Class A foam into fire operations. The benefit of any new firefighting concept is directly proportionate to the knowledge of the user. It is important that the entire department become involved in the education and training process. This could begin with the truck committee gathering all the technical
information available on the subject, through contacting various manufactures and end-users of Class A foam systems. Training and educational manuals and videos should be purchased through nationally recognized training agencies.

Some equipment and foam agent distributors are available to demo their wares. Hosting a live fire demonstration would be an excellent method to introduce the Class A foam concept to the department, and obtain some hands-on use. A qualified instructor that has experience with Class A foam should be placed as instructor-in-charge of the live-fire demonstration.

After the decision has been made to purchase Class A foam equipment that will be installed on new, or retrofitted on existing apparatus, a systematic training program should be formulated and placed into action upon system delivery. This should include but not be limited to:

- Classroom instruction on Class A foam methodology and implementation.
- Pump Operator training in the operation and maintenance of the foam equipment.
- Procedures for handling class A foam concentrate to protect personnel, equipment, and the environment.
- A standard operating procedure to designate when and how Class A foam will be used.
- Hands-on training before actual fire responses.
- Training on new foam application techniques if new nozzles or CAPS will be utilized.

Performing live fire training in a bum building, or preferably, an acquired structure, if class A foam is to be used for structure attack. All training should follow relevant NFPA standards including NFPA 1403, and any other regulations of state and local authorities having jurisdiction.

Fire Departments researching Class A foam should realize that when the technology is used correctly it can present a tangible gain in fire ground operational effectiveness and firefighter safety. However, it is not a “cure-all” for all the problems encountered in fire operations. A successful training program will result in maximizing its benefits, and communicating its limits and capabilities to fire personnel.

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