

*Los Angeles City Fire Department*

# Training Bulletin # 95

*Date of Issue 10-94*

FLOW MIX MODEL 500

CLASS "A" FOAM PROPORTIONER

- I. INTRODUCTION
- II. APPLICATION SYSTEMS
- III. ASPIRATING SYSTEM
- IV. FLOW-MIX MODEL 500
- V. APPLICATION GUIDELINES
- VI. MAINTENANCE

Advantages of Class "A" Foam

1. Good Wetting Characteristics: A surfactant in the foam allows the water to spread and penetrate more effectively.
2. Increased Cooling: The surface area of foam increases its ability to absorb heat.
3. Vapor Suppression: The foam blanket covers partially burned fuels trapping vapors.
4. Good Insulating Characteristics: Foam is essentially trapped air bubbles, it keeps the fuel cool by insulation.
5. Clinging Characteristic: Foam adheres well to vertical surfaces for good exposure protection by allowing time for the water to penetrate fuels.
6. Degreasing Capability: Foam removes oily substances from fuels allowing the water to penetrate.
7. Water Saving Ability: Foam is three to five times more effective than plain water, thereby, expanding available water supplies.

## II. APPLICATION SYSTEMS

Class "A" Foam can be mixed and applied through a variety of methods.

### Tank Mixing

The easiest way to make Class "A" Foam is through the addition of 2-1/2 gallons of concentrate to a 500 gallon apparatus water tank. This yields a 0.5 % foam/water ratio. The tank mixing method has been a source of some controversy due to the cleansing action of the detergent within the tank and fire pump. Additionally, the tank must be purged after the use of the foam to preclude contaminating subsequent water.

At this time tank mixing is not an approved method and shall not be used. .

### Proportioners

This method involves direct-injection of foam concentrate into the discharge side of proportioning systems. Metering rates are adjustable and proportioning is very accurate. Once the systems are set, very little maintenance or operator intervention is required (Photo 2).

### III. ASPIRATING NOZZLES

The aspirating nozzle (Photos 3 and 4) is a low-energy system, utilizing the energy in the water stream for making foam and may be used with either the tank mixing or proportioner method. A disadvantage with this nozzle is that more of the energy from the water is used to educt air to create foam and less energy is available to project the foam resulting in reduced discharge distances. Foam concentrate is usually mixed at 0.3 to 1.0 % by volume and is expanded at a ratio of up to 20:1.

Aspirating nozzles create foam through the following process:

- The foam solution stream is atomized.
- Air is drawn into the stream, usually by a venturi action, creating a froth.
- The froth is mixed, enhancing and strengthening the bubbles.
- The finished foam is discharged through the nozzle.

NOTE: Aspirating nozzles are not currently used by the LAFD. Standard LAFD nozzles shall be used for Class "A" Foam application.

#### IV. FLOW MIX MODEL 500

The Flow Mix Model 500 Foam Proportioner (Photo 5) is a fully self contained, positive pressure proportioner. It operates totally from the pressure generated by the flow of water through the connected hose line. The Model 500 design incorporates the use of a Differential Pressure Valve that supplies water pressure around a bladder-type tank containing the foam concentrate. Through the use of an adjustable, precision-metering valve and positive water pressure, automatic and extremely high proportioning accuracy is assured. For convenience, during the refilling procedure an easy to use operational selector valve is utilized. Refilling requires approximately two minutes and primary water flow is unaffected during the procedure.

The Flow Mix Model 500, five gallon proportioner works on the principle of line pressure being exerted on a bladder filled with Class "A" Foam. The Model 500 is self powered and can be connected anywhere in the line. The unit operates independent of hose line size, nozzle size or type, and line pressure. **DO NOT EXCEED** maximum operating pressure of 450 psi.

The Flow Mix Model 500 will accurately proportion up to 1 % concentrate into the line at flow rates up to 300 gpm. Flow rates between 300 and 400 gpm will cause proportioning accuracy to drop off slightly. A significant decrease in proportioning accuracy will result when flow rates above 400 gpm are utilized,

The Flow Mix Model 500 can be used with any handline or combination of lines up to 400 gpm. At flow rates above 400 gpm the Metering Valve must be set to a higher percent setting than is actually desired to attain adequate proportioning.

There are three control valves on the Model 500 in addition to the Differential Pressure Valve. They are a Selector Valve, a Metering Valve and a Flush Valve (Photo 6). There is a hand pump on the proportioner for refilling operations. There are two check valves in the hand pump and a check valve in the metering line to the Differential Pressure Valve to prevent back flow.

### Selector Valve

The Selector Valve is a two-port, three-way valve that has three positions, "Refill", "Foam" and "Off." (Photo 7)

- Foam Position

When the Selector Valve is in the "Foam" position, pressure exerted on the bladder starts foam flowing through the Selector Valve, Metering Valve, and down to the Differential Pressure Valve to mix the foam.

- Off Position

In the "Off" position no foam will flow and the water flow in the firefighting line will be unaffected.

- Refill Position

In the "Refill" position, after attaching the portable wand to the hand pump, the unit is ready to be refilled with foaming agent. (Photo 8) By operating the hand pump, foaming agent enters the bladder expelling water from the discharge tube. When approximately five gallons have been pumped, the water from the discharge tube will stop flowing and there will be increased resistance in the hand pump.

CAUTION: Do not force the hand pump. The unit is now full. The refill position is also used when rinsing out the system.

### Metering Valve

The Metering Valve is a precision valve that accurately meters the foam to the Differential Pressure Valve. In the "Off" Position no foaming agent flows. When set from 0 to 1 % the agent is precisely metered into the line. The Metering Valve is calibrated from .2 to 1 in .2 increments. Since air temperature affects the viscosity of the agent, the Metering Valve should be adjusted accordingly (Photo 7) to produce the desired foam consistency, i. e., a lower setting for hotter weather.

### Flush Valve

The Flush Valve is a 1 /4 turn ball valve that has two positions, "Foam" and "Flush".

- Foam Position

The Flush Valve should be kept in this position at all times except when back flushing the system.

- Flush Position

Setting the Flush Valve in the "Flush" position allows the proportioner to be backflushed. Backflushing should be performed at the completion of every proportioner use.

### Line Check Valve

The Line Check Valve prevents back flow into the system.

### Differential Pressure Valve

The Differential Pressure Valve is a precision valve that is operated by water flow. Water pressure is directed through this valve to the space around the bladder inside the tank; therefore, the higher the water flow rate the more pressure is exerted on the foam bladder. The foam entering the Differential Pressure Valve cavitates into the water for the desired foam mixture.

### Drain Cock

To drain the unit of water in freezing weather (a possibility for Strike Teams operating out of the Southern California area), turn the Selector Valve to "Foam " turn the Meter Valve to 1 % or the highest percentage. Open the drain cock (counter clockwise), this allows air into the unit so water will drain (Photo 9).

CAUTION: Always close the drain cock (turning clockwise) before operating unit so the bladder will not rupture.

Operating Initially or After Repairs

1. Connect the refill wand to the hand pump on top of the unit.
2. Dip the wand into the five gallon bucket of Class "A" Foam.
3. Set the Metering Valve to 1 %.
4. Set the Selector Valve to the "Refill" position.
5. Operate the hand pump. When the hand pump becomes difficult to pump, turn the Selector Valve to the "Foam" position. This will allow any air build-up to escape. Return the Selector Valve to the "Refill" position and repeat the above procedure until full.
6. When the unit is full, the hand pump will offer increased resistance. **DO NOT FORCE THE HAND PUMP.**
7. Set the Selector Valve to the "Off" position.
8. Disconnect the refill wand and store in a safe place.

The Model 500 Proportioner is now full of concentrate and ready for operation.

## V. APPLICATION GUIDELINES

### Interior Structure Firefighting

When using Class "A" Foam for interior fire attack appropriate firefighting lines and nozzles shall be used. This will not create the thick foam like the air aspirating nozzles; however, it will still be applying the wetting agent. Care must be taken to avoid over wetting objects that might be salvageable as the water will have increased penetrating action. An initial setting of .2 % foam is recommended. This setting will help reduce water damage and increase the length of time before a refill of the unit becomes necessary.

### Overhaul

Class "A" Foam may be used as an effective overhaul tool, if applied in a judicious manner. Objects that may suffer water damage should be removed prior to heavy foam application. The use of a low energy air aspirating nozzle will produce a heavy foam blanket sealing off the products of combustion and allowing the water to penetrate the fuel as the foam breaks down. The recommended initial setting is 0.3 to 0.5 %.

### Exposure Protection

The 95 gpm air aspirating nozzle will produce a good quality finished foam that will adhere well to vertical surfaces. The foam will provide insulation and wet the surface as moisture is released from the foam. The recommended beginning mixture is 0.3 on the Metering valve. Duration of the foam blanket effect will vary depending on weather conditions. In general, foam will be visible for approximately one-hour in hot weather, up to four-hours in cool weather. As long as foam is visible, the treated fuel will remain wet.

### Brush

Protection of brush will require a rich mixture of foam with a corresponding increase in its ability to cling. The finished foam may be applied with a low energy air aspirating nozzle which will produce a thick, long lasting product. When foam is applied in this manner it will provide a layer of insulation from heat. The recommended initial setting is 0.5 to 0.6 %.

## Duff

When treating Duff, the goal is to penetrate the fuel layer so fire is not carried by untreated fuels below the foam cover or wet top layer. A straight stream nozzle setting with a mixing action achieves the best results. The recommended initial setting is 0.1 to 0.2 %.

## Dumpsters and Rubbish

Finished foam applied with the 95 gpm air aspirating nozzle will provide a foam with body but still wet enough to penetrate. The recommended setting is 0.3 to 0.4%.

## Tires

Finished foam will cool, wet and seal piles of tires. It will provide a quick knockdown with reduced tendency to reflash. The recommended initial setting is 0.3%.

## Auto Fires

Class "A" Foam can be effective on auto fires using standard spray nozzles. It will greatly reduce overhaul; however, it can create a slippery road surface. The recommended initial setting is 0.3 %.

## Cause Determination

The use of Class "A" Foam for fire suppression will adversely impact arson investigations. Instruments used to detect the presence of flammable accelerants will register readings approximately 30 percent lower than readings where Class "A" Foam was not used. One factor that distinguishes the use of Class "A" Foam from wet water is that less water is used. This has a positive effect in our detection efforts when compared to wet water, which is effective only with large quantities of water and effectively eliminates our ability to detect accelerants.

For any system to remain trouble-free, good maintenance is essential. The Flow Mix 500 has been designed to give trouble-free service with minimal attention. After operation it is necessary to back flush the unit. This can be accomplished by placing the Selector Valve on the "Foam" position and the Metering Valve on the 1 % setting and using one of the following methods.

#### Method 1

1. Leave the supply and discharge lines connected to the Differential Pressure Valve. The pump should be engaged supplying positive pressure to the proportioner.
2. Move the Flush Valve to the "Flush" position.
3. Foam solution will flow from the 3/4 inch female coupling. Back flushing should continue until clear water flows from the valve.
4. Return the Flush Valve to the "Foam" position and place the Selector and Metering Valves in the "Off" position.

#### Method 2

1. This method can be used when all supply and discharge lines have been disconnected prior to back flushing.
2. Connect a 3/4 inch garden hose to the female coupling on the flush valve.
3. Move the Flush Valve to the "Flush" position.
4. Foam solution will flow from the Differential Pressure Valve. Back flushing should continue until clear water Flows from the valve.
5. Return the flush Valve to the "Foam" position and place the Selector and Metering Valves in the "Off" position.

The Flow Mix 500 should always be stored with the Selector and Metering Valves in the "Off" position. This will prevent air from getting into the system and allowing a build up of foam crystals to form. The body of the proportioner should be rinsed with clear water. Class "A" Foam is a corrosive substance and must be rinsed from the apparatus. Hose lines must be flushed when operations are completed.

