

**FOAM PROPORTIONING AND DELIVERY**  
**EQUIPMENT**

**Learning Objective:**

Explaining the various components of foam delivery systems and application techniques.

**Prerequisites:**

Students should have knowledge of

- Fire Behavior and Extinguishment
- Foam Concentrate Technology

**Instructional Format:**

Students will be shown techniques and procedures on the proper choice, use, and application to be used involving various methods of delivery equipment. This will be done through lecture and practical evolutions.

**Materials and Equipment:**

Student handouts, slides and equipment.

**Student Goal:**

Upon completion of this course, students should be able to demonstrate proper foam selection and application techniques.

## **FIRE FIGHTING FOAM CONCENTRATES**

- Can be delivered through
  - Water supply under pressure
  - Proportioner
  - Delivery device
  - Foam concentrate source

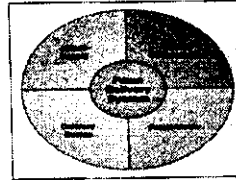


Figure 3.1 The four components that make up a foam system: water supply, proportioner, delivery device, and foam concentrate.

## **FOAM DELIVERY SYSTEM**

There are four components that make up a foam system. (Fig 3.1)



Figure 3.2 In-line foam eductors are available in a variety of styles.



Figure 3.3 Portable self-educating foam nozzles (such as the one pictured) are connected to a water supply and draw foam concentrate from the foam concentrate source near the nozzle.

## **FOAM PROPORTIONING DEVICES**

These devices operate on one of two basic principles

- Injection
- Induction

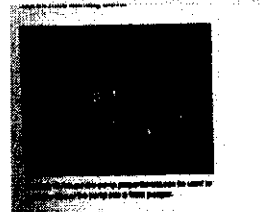


Figure 3.4 Portable foam proportioners (such as the one pictured) are connected to a water supply and draw foam concentrate from the foam concentrate source near the nozzle.

## **PORTABLE FOAM EDUCTORS**

- In-line foam eductors (Fig 3.2)
- Self-educating hand line foam nozzles (Fig. 3.9)
- Self-educating master stream foam nozzles (Fig 3.10)
- Portable around the pump proportioners (Fig. 3.13)

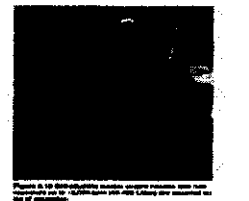


Figure 3.5 Portable foam eductors (such as the one pictured) are connected to a water supply and draw foam concentrate from the foam concentrate source near the nozzle.

Denote advantages, disadvantages in application as well as proper ratios of each and things to be aware of in use

# Venturi Process

Rated Flow (Fig. 3.3)

Concentrate Lift Restrictions (Fig. 3.4)

Check Valve

Filter (Fig. 3.5)

Concentrate Ratio

Proportioning Accuracy

Back Pressure (Fig. 3.6)

Nozzles

Transit Time

Eductor Testing

Care and Maintenance

Explain these.

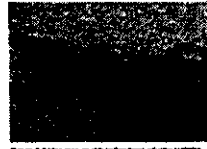


Figure 3.3 Showings are with the hose eductor handle. This is to apply the 100 spray 2000 L/min and use the rest of the 100 L of 100 spray 2000 L/min.

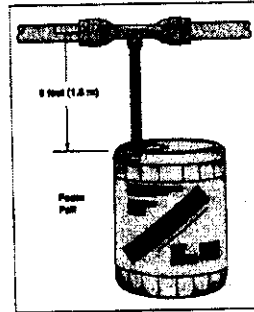


Figure 3.4 The in-line eductor should be no more than 10 feet (3.0 m) above the concentrate container.



Figure 3.5 Flow pickup tubes are equipped with filter to prevent impurities or sediment from entering and clogging the pickup tubes.

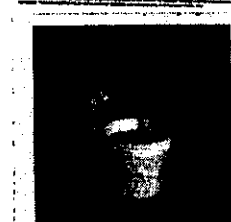
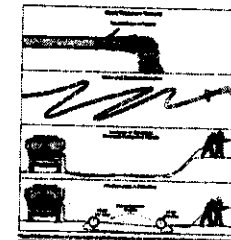


Figure 3.7 Filter should be used to prevent or limit the back pressure of the eductor.



Figure 3.8 Following each use, thoroughly flush the eductor, nozzle, and hose with water to prevent clogging of parts.

# APPARATUS MOUNTED AND FIXED SYSTEM PROPORTIONERS

These devices include

- installed in-line eductors
- around the pump proportioner
- bypass type balanced pressure proportioner
- variable flow-demand type balanced pressure proportioner
- bladder tank balanced pressure proportioner

Explain Each



Figure 2.14 Diagram of a pump proportioner. The pump proportioner is a device that is installed in the water supply line to the fire engine. It is used to proportionally mix water and foam concentrate. The pump proportioner is a device that is installed in the water supply line to the fire engine. It is used to proportionally mix water and foam concentrate.

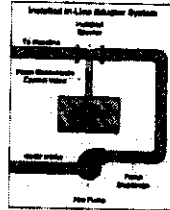


Figure 2.15 Diagram of an installed in-line eductor system. The eductor is a device that is installed in the water supply line to the fire engine. It is used to proportionally mix water and foam concentrate.



Figure 2.16 Diagram of a bypass type balanced pressure proportioner. The bypass type balanced pressure proportioner is a device that is installed in the water supply line to the fire engine. It is used to proportionally mix water and foam concentrate.



Figure 2.17 Diagram of a pump proportioner. The pump proportioner is a device that is installed in the water supply line to the fire engine. It is used to proportionally mix water and foam concentrate.

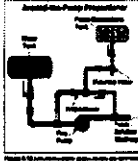


Figure 2.18 Diagram of a bladder tank pressure proportioner. The bladder tank pressure proportioner is a device that is installed in the water supply line to the fire engine. It is used to proportionally mix water and foam concentrate.

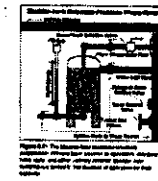
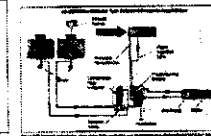
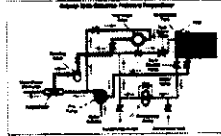


Figure 2.19 Diagram of a pump proportioner. The pump proportioner is a device that is installed in the water supply line to the fire engine. It is used to proportionally mix water and foam concentrate.

**Batch Mixing**

- What is batch mixing
- Proper techniques & Method
- Proper mixing proportions

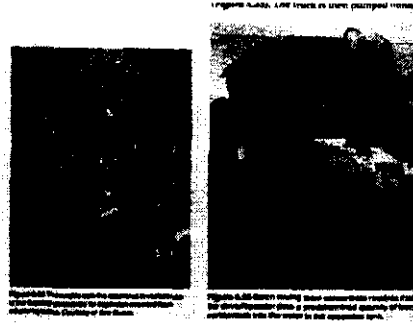
**Premixing**

- Fire extinguishing equipment that uses stored pressure for discharge energy

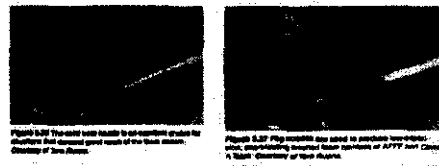
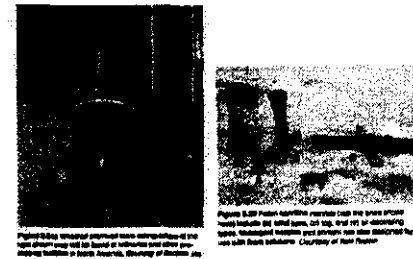
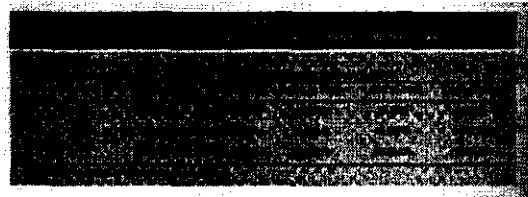
**Portable Foam Application Devices**

- types to be found & usage
  - Hand line Nozzles
    - Solid bore nozzles
    - Fog nozzles
    - Air-aspirating foam nozzles
    - Multi-agent nozzles

Discuss proper techniques  
Problems that may arise



Explain



### Master Stream foam Appliances

- Used for large -scale flammable & combustible liquid emergencies beyond the scope of those that can be handled using hand lines.
  - Manning foam monitors
  - Automatic oscillating foam monitors
  - Remote controlled monitors

### Medium and High-Expansion Foam Generating Devices

- Where are they found and purpose

### High-Energy Foam Generating Systems

- Definition- introduction of compressed air into the foam solution before discharge into hose line
- Tactical advantages

### Notes

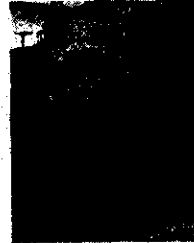


Figure 6.11: A foam monitor in operation, showing the foam being generated. The image is dark and grainy, with some white speckles visible.

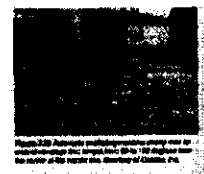


Figure 6.12: A foam monitor in operation, showing the foam being generated. The image is dark and grainy, with some white speckles visible.

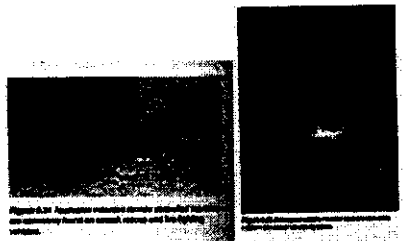


Figure 6.13: Two side-by-side dark, grainy photographs. The left one shows a foam monitor in operation, and the right one shows a close-up of the foam being generated. Both images are mostly black with some white speckles.



Figure 6.14: A foam monitor in operation, showing the foam being generated. The image is dark and grainy, with some white speckles visible.

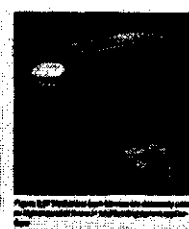


Figure 6.15: A foam monitor in operation, showing the foam being generated. The image is dark and grainy, with some white speckles visible.

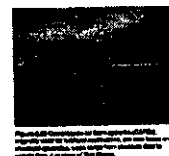


Figure 6.16: A foam monitor in operation, showing the foam being generated. The image is dark and grainy, with some white speckles visible.

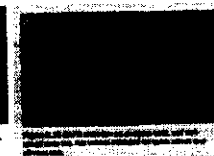


Figure 6.17: A foam monitor in operation, showing the foam being generated. The image is dark and grainy, with some white speckles visible.

## **Summation**

To effectively use the foam concentrate, fire and emergency services personnel must learn the characteristics of the proportioner and nozzle that they employ and practice using them during simulated fire and liquid spill situations

### **References:**

Principles of foam fire fighting, 2<sup>nd</sup> edition  
Essentials of fire fighting, 4<sup>th</sup> edition  
Hazardous Materials- managing the incident  
Fire Stream Management Handbook, Fire Engineering