PHOS-CHEK®

Fire Retardant, Class A Foam & Gel

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Class A Foam Mixing and Application Equipment

Adding Phos-Chek Class A foam concentrate to water:

There are many methods of adding Phos-Chek Class A foam concentrate to water. The different methods have pros and cons that should be considered by your department in order to find the best system to meet your needs.

Batch Mixing:

Manually adding a calculated quantity of foam concentrate to a known quantity of water in a storage container or tank.

Advantages:

- *unlimited hose lengths and choice of hose lines*
- *minimal investment*

Disadvantages:

- *tank and pump corrosion*
- *bubble generation in tank*
- *removes lubricants*

Manually regulated proportioning system:

A proportioning system that requires operator adjustment to maintain the mix ratio when there is a change of flow or pressure through the proportioner.

Adjustable in-line eductor:

Eductors are used in-line in the hose lay or hard piped behind the pump panel for dedicated foam discharge. Eductors continually meter small amounts of concentrate into the hose line. Water is forced through the eductor venturi by water pump discharge pressure creating a vacuum that causes foam concentrate to be drawn into the eductor at the mix ratio determined by the metering orifice setting. The flow rate of the discharge nozzle should be the same as the eductor. This should be taken into account when using adjustable flow rate nozzles with eductor systems.

Adjustable in-line eductor (cont.)

Advantages:

- *no moving parts*
- *common to most structural engines (must be able to meter below 1% use rate)*

Disadvantages:

- *limited hoselays and elevation losses*
- *high inlet pressures (200 psi)*
- *matching of nozzle to specific flows*

Around the pump metering system:

These devices are connected across the pump and use a siphon injector to move concentrate into the water supply. A metering device in the pick-up tube is used to control the amount of concentrate. A small flow of water from the water pump discharge passes through the eductor creating a vacuum that causes foam concentrate to be drawn into the eductor and discharged into the pump intake. Adjustment by the operator is required to compensate for changes in water flow and pressure.

Advantages:

- *Unlimited hose lengths*
- *easily adjusted mix ratios*
- *no moving parts*

Disadvantages:

- *Tank, pump and plumbing corrosion*
- *removes lubricants*
- *excessive foam concentrate use*

Automatically regulated proportioning system:

A system that automatically adjusts to maintain the desired mix ratio. These automatic adjustments are made based on changes in water flow, pressure, or solution conductivity. Some of these systems are able to proportion foam concentrate into single or multiple discharge outlets without adjustment.

Automatically regulated proportioning system (cont):

Balanced pressure bladder tank system:

This system uses a small diversion of water to pressurize a bladder that contains foam concentrate. The concentrate passes through a metering valve before it enters the water stream on the low pressure side of a pressure differential valve or venturi. As water flow and differences in pressure occur, foam concentrate flow adjusts automatically.

Balanced pressure pump system:

A system that senses water pressure and activates a pilot operated relief or diaphragm valve. The pressure of the pumped concentrate is automatically regulated and supplied through a venturi in the water line.

Electronically controlled direct injection system:

The electronically controlled proportioner adds concentrate based on measured water flow or solution conductivity. An inline sensor(s) signals a microprocessor that automatically commands a pump to deliver concentrate into the water stream at the desired mix ratio.

Water powered injection system:

In a water powered injection system, a water motor drives a concentrate pump. The speed of the concentrate pump is directly proportional to the water flow through the system and automatically delivers concentrate at the desired mix ratio.

Advantages:

- *systems will maintain the desired mix ratio over a wide variety of pressures and flows*
- *unlimited use of hose lengths and choices is possible*
- *concentrate is kept away from pump and water tank*
- *multiple hose lines, nozzles and applicators may be used simultaneously*
- *simple pump operator procedures*

Disadvantages:

- *requires an outside power source (water, electrical, hydraulic or four cycle engine) to drive concentrate injection*
- *requires investment and installation for truck mounted units*

Phos-Chek Class A foam generation and discharge:

Class A foam can be applied with any discharge device. Discharge systems (both low and high energy) are discussed in the following paragraphs. The user should choose the most appropriate device to meet the objective of each application.

Low energy foam systems:

Non-aspirating type nozzles:
Class A foam solution can be applied with any type of non-aspirating nozzle such as straight bore and combination. When using adjustable flow rate nozzles with manually regulated proportioning systems, changing the nozzle flow rate requires adjustment to the proportioner. These type of nozzles produce a wet foam that is most effectively used for direct and indirect attack and overhaul. Application is made using standard water only techniques at typical concentrations of 0.2 to 0.5%.

Aspirating type nozzles:
Aspirating nozzles entrain air into the foam solution stream. Such nozzles generally produce higher expansion ratios than non-aspirating nozzles. Many designs are available to users who are pursuing the desired foam expansion at the greatest discharge distance. In general, nozzles designed for greater discharge distance produce relatively low expansion ratio foam while those designed for increased expansion ratios have shorter discharge distances.

Low expansion nozzles (expansion up to 20:1)
Low expansion nozzles produce wet or fluid foam that is most effectively used for exposure protection, direct attack and overhaul.

Medium expansion nozzles (expansion 20:1 to 200:1)
These nozzles have larger diameter foam tubes than low expansion nozzles and often employ a screen at the end of the tube. They are limited to relatively short discharge distances. Medium expansion foam is useful in blanketing operations. It is most effectively used for overhaul and exposure protection.

High expansion generators (expansion 200:1 to 1000:1)
The use of high expansion generators is generally limited to fires in confined spaces. The theory of these type of applications is to fill a burning cavity with foam and smother the fire (coal mine fires, shipboard compartment fires, basement fires, etc.)

High Energy Foam System:

Compressed Air Foam Systems (CAFS):

CAFS is a foam generation and delivery system that combines air under pressure with foam solution to create foam in the hose or mixing chamber. CAFS consists of a pressurized air source, a source of foam solution (water pump and proportioner), and a means to apply the foam (hose and nozzle). CAFS allows the operator to control the three elements of foam production: water, foam concentrate, and air.

CAFS generated foam can be used for interior and exterior attack (both direct or indirect), exposure protection, and overhaul. The type of foam can be controlled by varying the mix ratio of concentrate to water, the ratio of air flow to solution flow, or both. Typical CAFS mix ratios are 0.2 to 0.5% foam concentrate and 0.5 to 3.0 scfm/gal. – min of solution flow.

CAFS has the capability of increasing the discharge distance of low expansion foam at any given water flow rate. This is due to the energy provided by the compressed air.

Typically a full flow ball valve or smooth bore nozzle is used to discharge CAFS foam. The larger the discharge opening, the drier the foam. Other nozzle types such as a combination nozzle will remove air from the foam resulting in a wetter discharge with reduced range. Variable pattern nozzles allow CAFS foam to be discharged in protective fog patterns.