

# GENERAL GUIDELINES AND RECOMMENDATIONS FOR FOAM STORAGE



The effective life of foam concentrates can be optimised by proper storing and handling. These guidelines and recommendations need to be followed for having effective life and performance of HD Fire-Fighting Foams.

## SHELF LIFE

HD Fire Protect offers a range of superior quality foam concentrates that are specially formulated to ensure exceptional storage stability as well as firefighting performance.

A shelf-life of at least ten years can be expected if the foam is stored properly according to mentioned recommendations.

To ensure satisfactory performance foam should be sampled at least annually as recommended in NFPA 11, Section 8-2, "At least annually, an inspection shall be made of foam concentrates and their tanks or storage containers for evidence of excessive slogging or deterioration. Samples of concentrates shall be sent to the manufacturer or qualified laboratory for quality condition testing."

## SHIPPING CONTAINERS

Foam concentrate may be stored in its original shipping containers. It is available in 20/30 litre black/blue plastic drums, 200 litre (55 US gal) black/blue plastic drums, and 1000 litre IBCs. All containers comply with UL 162 (7<sup>th</sup> Edition) and UN recommendations. However, these should be regularly inspected to verify their condition. In the unlikely event of leakage, the foam should be decanted into another clean drum, sealed and tested to ensure it is still in satisfactory condition. The maximum safe stacking height for 20/30 litres plastic drums is two high without pallets or 4 high with pallets (2 high per pallet); for 210 litre plastic drums is 2 high (with or without pallets), and for IBCs is 2 high. Plastic drums should not be stored in direct sunlight.

## STORAGE TANKS

Foam concentrates are suitable for transferring into bulk storage tanks for long-term storage.

### Materials of construction

Foam concentrates have a neutral pH and generally, no corrosion problems will occur with metals or plastics (Except where noted below).

Storage tanks should be fabricated from or be lined with the following materials:

- Mild Steel (uncoated): Generally, not recommended for synthetic detergent based foam concentrates. Ferrous metal ions can adversely affect the foam concentrate leading to reduced firefighting performance. Suitable for use with natural Protein-based foam concentrates, although there may be some slight initial etching which will not affect the tank or contents. Natural protein-based foam concentrates quickly inhibit this process by forming a thin protective layer on the surface of the mild steel.
- Mild Steel (coated): Surface preparation and coating should be performed by qualified personnel.
- Stainless Steel (304 and higher) is acceptable.
- Tanks with welded construction should have all joints treated to ensure consistent properties close to welds. There may be very slight pitting which will not affect tank or contents.
- Glass Reinforced Plastic (GRP): Fibreglass is accepted. But it is not recommended for foam systems involving pressure displacement.
- High-Density Polyethylene (HDPE).

- Polypropylene: The use of zinc, galvanized materials, and aluminum in storage tanks, pipe work, and machinery handling foam concentrates should be avoided. In the event that foam is being replenished into an existing system where zinc or galvanized materials were used in original construction, it is advised that some means are provided by which the system can be flushed through with water and drained after use.

Foam containers, drums or totes should always be kept in closed condition during storage.

**Gaskets, seals, and bladders may be fabricated from all commonly-used elastomers, as given below:**

- Ethylene Propylene Diene Monomer (EPDM) or Ethylene Propylene Rubber (EPR) (e.g. AP Rubber).
- Butyl rubber (modified isobutylene) (e.g. Bucar, Polysarbutyl, Buna N, Nitrophyl).
- Silicone (e.g. GE Silicone, Rhodorsil).
- Fluoroelastomer (e.g. Viton).
- Nitrile Rubber (butadiene acrylonitrile copolymer).

Fittings in foam concentrate pumps and valves may be made from brass, bronze, and stainless steel.

### PIPE WORK

The choice of pipe work materials depends on the anticipated contact time with the foam concentrate. For continuous contact, the same materials of construction apply as for storage tanks (see above). PVC, copper, brass, and bronze pipes are also acceptable for continuous contact. For intermittent contact, normal pipe work materials are satisfactory subject to normal engineering criteria.

Inlet pipe work should be located at the base of the tank to avoid excessive foaming during filling. Outlet pipe work should be located above the base of the

tank to prevent clogging in the event of any minor sediment that might have formed or other foreign materials in the tank.

Pipe work systems should be designed to prevent water and other liquids accidentally entering the tank and foam concentrate accidentally escaping from the tank.

Foam concentrates are suitable for decanting into small containers. Agitation and air intrusion should be kept to a minimum if foam concentrate pumps are used.

### EVAPORATION

If foam concentrate is allowed to evaporate freely, the water and solvent in the concentrate will evaporate. With HD ARAFFF foam concentrates this may cause a skin of polymer to form on the surface of the concentrate which could plug proportioning orifices.

To minimise evaporation losses, the concentrate tank should be sealed and a pressure vacuum vent installed to break the seal when the concentrate is required. Evaporation will also be reduced by keeping the concentrate tank full. However, an ullage of 5 to 10% of the tank volume (e.g. expansion dome) should be maintained to allow for differences in thermal expansion coefficients between the tank materials of construction and the foam concentrate. If it is not possible to seal the tank, air ventilation may be provided by breathers fitted with cowls. Alternatively, a nitrogen system comprising a nitrogen atmosphere maintained above the concentrate at a pressure fractionally above atmospheric pressure will reduce evaporation and ensure that leaks are nitrogen loss rather than oxygen gain. A layer of hollow plastic spheres, either polypropylene or polyethylene, may be floated on the surface of the concentrate to reduce evaporation.

Mineral oil can be added on the surface of the foam to prevent water evaporation. Pour sufficient Mineral oil slowly to form 4-6 mm

layer on the foam surface. The oil should be added at different points of the tank so that the oil is uniformly spread over the surface of the foam concentrate.

### **FLUSHING**

Storage tanks, pipe work, and pumps that have been filled with foam concentrate or solution should be flushed with clean water and drained after use. The need for flushing storage tanks falls into two areas:

When changing foam concentrate stored in an existing tank, or after commissioning: The foam system should be drained off of any foam concentrate previously contained in it (or water used for hydrostatic tests), cleaned, and dried prior to filling it with the final charge of foam concentrate. Particular care should be taken when changing synthetic foam types. Drain off system - open all valves. Fill foam tank with water and allow draining of water. Repeat. Back flush through outlet using sufficient water as calculated to completely fill and overflow the tank twice. Allow to drain. Purge out all water, check to see foaming has ceased. If not continue to cycle through process until foaming has diminished. Set valves correctly. Fill slowly with foam concentrate to minimize frothing and formation of air pockets. Charge foam line to furthest designated valve so that foam concentrate is present in all pipes where it is required. Drain foam concentrate from all pipes where drying out could occur and rinse through with pressure hose reel or similar.

In normal usage of system: This presumes it has been designed to avoid "dead-legs" in the system and drainage/flushing points are included to facilitate preventative maintenance. Judicious use of high pressure water regularly will enable pipe work to be flushed and drained to dry so preventing any drying out of foam concentrate which would lead to the deposition of any solid material. Drain and flush until foaming diminishes. Avoid ullage greater than 10%. Use of a transparent bottle filled to half level and shaken

regularly will assist in judging the cessation of frothing.

When using natural protein-based foam concentrates or HD AR-AFFF in locations where drained areas may be heated (pipe work, recently operated pumps), flushing should be carried out immediately after use to prevent deposition of solid material due to localised drying-out.

### **BUNDING**

In some instances there may be a need for bulk foam concentrate stocks to be banded or diked. This will depend on the circumstances of a particular site, and the relevant environmental enforcing authority should be consulted.

### **COMPATIBILITY**

Foam concentrates must not be diluted or contaminated by foreign materials or other types or brands of foam concentrate. Such mixing may lead to physico-chemical changes in the product and a reduction in or loss of firefighting capability. This is recognised by NFPA 11, Section 2-4.1, "Different types and brands of concentrates and solutions might be incompatible and shall not be mixed in storage". Consult the manufacturer for guidance.

### **TEMPERATURE**

The maximum storage temperature is 49°C (120°F) although temperatures up to 60°C (140°F) are acceptable for short periods. If ambient temperatures exceed 35°C (95°F) then storage vessels should be kept under shed or indoor locations.

The Freezing Point and Lowest Use Temperatures (LUT) at which foam concentrates will proportion correctly are available on the product data sheets. If ambient temperature is below the LUT or freezing point then storage vessels should be fitted with insulation lagging. Do not add freezing point depressants such as ethylene glycol or any proprietary brands of antifreeze. Repeated freezing and thawing have no adverse effect on the

performance of most foam concentrates. However, it should be noted that foam concentrates expand on solidification and, like water turning into ice, may damage a completely rigid container. In accordance with UL 162 (7th Edition) foam concentrate shipping containers are marked with the minimum and maximum storage temperatures.

Details of UL Listings and FM approvals are available on the product data sheets.

#### **INSPECTIONS**

Foam concentrates need to be inspected in accordance with NFPA 11 and/or applicable local standards. An annual inspection is typically sufficient. Please contact the manufacturer in case of any queries.

#### **NOTICE :**

Although all care has been taken to ensure correctness of data, however HD Fire Protect takes no responsibility or the liability of any kind for any accidents, loss, damage or deterioration arising directly or indirectly by referring these guidelines. The information provided by us are to the best of our knowledge and belief, and are general guidelines only. Site handling and installation control is beyond our reach. Hence we give no guarantee for result and take no liability for damages, loss or penalties whatsoever, resulting from our suggestion, information, recommendation or damages due to our product. Product development is a continuous programme of HD FIRE PROTECT PVT. LTD. and hence the right to modify any specification without prior notice is reserved with the company.

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