Fire Fighting Foams & Equipment

Fomtec Technical Advices
FTA No. 50

Health and Environment

General

The foam liquids consists of chemicals that may affect health and environment if handled incorrectly. Basically, you can look at the foam liquid as a cleaning agent or soap. It consists of surfactants, solvents and salts in order to obtain good foam quality suited for fighting fires. It can also include fluorinated surfactants and polymers when it is a film forming foam (often denoted AFFF or AR-AFFF). However, the fear for severe damages should not be exaggerated. With the right equipment and protective gear the risk is minimal. Below is some guidelines for different exposures.

We need to emphasis that it is important to differentiate between foam concentrates and ready-to-use premixes when talking about health and environment for these two types. The content of active ingredients between those are huge, see more below.

Foam Exposure

In the event of a person being subjected to foam liquids, always refer to the safety datasheet for the product to get correct information how to handle it.

Foam exposure can be of two different kinds: (i) foam exposure by the foam concentrate or by the diluted premix (the mixture of water and foam concentrate). The SDS for all Fomtec's products are made for the concentrates and not the premix solution. In the premix the concentrate is heavily diluted with water, normally 1%, 3% or 6% concentrate to 99%, 97% or 94% water respectively. Hence, to concentration of the components in the premix is far less than in the concentrate. As an example – Assume that a foam concentrate designed to be used as 3% is containing 5% of a substance – when diluted in the right proportion the premix (3 parts concentrate and 97 parts water) will only contain 0,15% of this substance.

Eye exposure

Most foam concentrates are labelled with the risk phrase H319 (eye irritant) or H318 (eye damaging). This is due to the surfactants present in the formulation and the concentration of them. It will irritate the eye, just as it does when you get hair shampoo in the eyes. In case of eye exposure, clean the eyes immediately with water and seek medical advice if the irritation persists.

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The premix solution is so diluted that it will not carry any labelling regarding eye exposure. Since it contains surfactants, still it will give some irritation in eyes, but far less than the with the concentrate.

Skin exposure
In case of skin exposure or exposure on clothes in form of spill, the foam should be cleaned off with water and skin can be moisture with lotion. If the foam stays on skin and clothes for longer times, it dries out and thus concentrating the surfactants which may cause skin irritation. Exposed clothes are recommended to be changed as soon as possible for comfort and minimized irritation problems.

Ingestion
It is really unlikely to ingest foam concentrate or premix. When you get it in the mouth it is like getting shampoo in there. It is a very sticky and irritating feeling and you want to get rid of it as soon as possible. Flush the mouth with several cups of water to ease the feeling.

Exposure on equipment
In the case of foam liquid exposure on equipment clean directly with water and dry afterwards to avoid residues. Foam liquids contains components that are conductive and may cause short circuit and also create corrosion when in contact with two different conducting materials by electrochemical processes.

Environmental Impact

The main components in firefighting foam liquids is hydrocarbon surfactants (the same kind used in cleaning agents and detergents), solvents (basically glycols used for foam boosting) and in film forming foam types also fluorinated surfactants and polymer. These are components that in it self have some impact on environment.

All components in a firefighting foam liquid is 100% biodegradable except fluorinated surfactants and polymer present in film forming foams. Film forming foams are normally denoted AFFF, AR-AFFF or AFFF ARC. More of this below.

Fomtec has conducted analysis of the most commonly used ingredients in our foam liquids regarding impact in aquatic environment according to Harmonized Offshore Chemical Notification Format (HOCNF). Some products has also been registered in NEMS. More data on this can be available on request.

Fluoro-surfactants and polymers
The environmental impact of AFFF-type fluoro-surfactants has been extensively studied and a large body of data is available in the peer-reviewed scientific literature. The bulk of this data continues to show that short-chain (C6) AFFF fluoro-surfactants and their likely breakdown products are low in toxicity and not considered to be bioaccumulative or biopersistent according to current regulatory criteria.

In 2014 an independent report was published that assessed several short-chain (C6) fluorinated chemicals with regard to the criteria used to define persistent organic pollutants (POPs). The report assessed these chemicals based on the four criteria that must be met to be considered a POP under the Stockholm. It concludes that none of the chemicals meets the criteria to be considered a POP , and at most they only meet one of the four criterion. Fomtec is only using fluoro-surfactants and polymer based on the above mentioned short-chain (C6) types. More about this can be read at www.fffc.com.

Aquatic toxicity

The hydrocarbon surfactants in a firefighting foam liquid are presumptive to have impact on especially aquatic environment due to their surface active properties. Strangely enough, the hydrocarbon surfactants have the most impact on aquatic life while fluorinated surfactants (when present) have minor impact. Comparative studies between film forming foam concentrates (AFFF-types) and fluorine free foam liquids (FFF-types) shows that the FFF-types have a lot higher aquatic toxicity. This is due to that the amount of active ingredients (especially surfactants) in AFFF-types can be kept low due to the extinction power of the fluoro-surfactants. To achieve high fire performance in FFF-type concentrate the formulation needs to be loaded with active ingredients, mainly surfactants, that are noxious for aquatic life.

Since the foam concentrate is as the name suggest, concentrated, the amount of active ingredients are a lot higher compared to a premix where the concentrate has been mixed with water. Normally mixing ratios are 1%, 3% and 6% but both 2% and 5% exists. This should be considered when assessing risks for foam handling. As a guideline the following calculation can be used when it comes to dilution to premix from concentrate. Each component in the concentrate is diluted the following factor:

- In a 1% foam concentrate the components are diluted by a factor of 100
- In a 2% foam concentrate the components are diluted by a factor of 50
- In a 3% foam concentrate the components are diluted by a factor of 33
- In a 6% foam concentrate the components are diluted by a factor of 17

Recommendation

Always refer to the safety datasheets for the product in case of an incident or accident in order to get correct information and handle it correctly.

Fomtec is cooperating with ChemCare24 that provides guidance for our products when it comes to correct handling in case of incidents. We refer to the safety datasheet for the nearest local office to contact.