

## 8. How should released fluorinated fire-fighting foams be dealt with?

The environment, and particularly water pollution control, sets high standards for the use of fluorinated fire-fighting foams:

Their use should be limited as much as possible in mobile operations, run off water should be recollected (e.g. by suction vehicle or absorbents) and appropriately disposed of. In cases of doubt, necessary measures should be co-ordinated with the local environment office. In the case of fixed fire-fighting systems, appropriate extinguishing water retention systems should be planned and employed.

### Imprint:

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Editor: Dr. Christoph Schulte, UBA Department: IV 2.3

Design: UBA

Photo: Fabrik chemischer Präparate von  
Dr. Richard Sthamer GmbH & Co. KG  
As of May 2013

# ENVIRONMENTALLY RESPONSIBLE USE OF FLUORINATED FIRE-FIGHTING FOAMS



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## 1. When using fire-fighting foams?

Fire-fighting foams are used in fire-fighting to extinguish flammable liquids (fire category B) and solids which liquefy in case of fire or heat exposure. Fire category B comprises three subgroups:

- ▶ Flammable, water-immiscible liquids and liquefying, flammable chemicals
- ▶ Flammable, water-miscible liquids
- ▶ Thermoplastics, including rubber tyres

Special Foams might also be used on fires of non-liquefying solids (class A fires).

## 2. What are fluorinated fire-fighting foams?

Fluorinated fire-fighting foams contain surface-active poly- or perfluorinated chemicals (PFC), which are also referred to as poly- or perfluorinated surfactants. They are found inter alia in Aqueous Film Forming Foam (AFFF) or Alcohol-Resistant Aqueous Film Forming Foam (AFFF-AR) as well as in Film Forming Fluoroprotein (FFFP) Foam. PFCs are used in fire-fighting foams to either form a thin aqueous film on the surface of flammable liquids or liquefied solids and/or suppress the emulsion of fuel into the foam. This drastically increases the extinguishing performance of foam agents, and additionally prevents re-ignition of the flammable liquid.

Fluorinated and fluorine-free fire-fighting foams are distinguished by their labelling.

Fluorinated-fire-fighting-foams*	Fluorine-free fire-fighting foams*
AFFF - Aqueous Film Forming Foam	P - Protein Foam
AFFF (AR) - AFFF Alcohol-Resistant	P (AR) - P / Alcohol-Resistant
FP - Fluoroprotein Foam	S - Synthetic or multi-purpose Foam
FP (AR) - FP / Alcohol-Resistant	S (AR) - S / Alcohol-Resistant
FFFP - Film Forming Fluoroprotein Foam	
FFFP (AR) - FFFP / Alcohol-Resistant	*See EN 1568 Parts 1 - 4

## 3. When is fire-fighting with fluorinated fire-fighting foam necessary?

The concept of object-related fire protection or risk potential determines the decision on the extinguishing agent to be employed. According to the latest developments in technology, fluorinated fire-fighting foams are required when, taking account of the operational situation (substance properties, storage conditions, condition of installations and possible environmental hazards), an efficient extinguishing effect is likely not achievable with any other foam concentrate type.

When the use of fluorinated fire-fighting foams is unavoidable users are requested to find ways reducing the total discharge into the environment to a minimum.

## 4. When can fluorinated fire-fighting foams be renounced?

Quite a number of applications or cases would allow effectively using non-fluorinated foam agents (so called synthetic foams or Protein foams); for example:

- Class A fire applications like (paper-) warehousing, wood-processing and textile industry,
- fires involving tyres, heating oil, domestic waste landfills as well as -sorting plants and -incineration sites,
- in any case the effective use of non-PFC containing foams can be based on experience or evidence for such use.
- use in fixed systems that are designed to operate with non-PFC type foam agents.

## 5. Which fluorinated compounds are found in fire-fighting foams?

Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) are important poly- or perfluorinated chemicals.

PFOA has no intended use in foams. PFOS in opposite used to have but was phased out several years ago. However still trace amounts can be found in systems or older foams (note: all foams with PFOS contents > 10ppm must be disposed – see also below).

As an alternative to PFOS, partly or polyfluorinated chemicals are employed in fluorinated fire-fighting foams, which are also often called fluorotelomers.

## 6. Why do fluorinated fire-fighting foams endanger humans and the environment?

Degradation of poly- and perfluorinated chemicals in the natural environment is very difficult, if at all possible. Since their introduction they have spread throughout the world. International studies have shown poly- and perfluorinated chemicals to be found in living organisms as well as in water bodies and sediments. Some of the compounds appear worldwide in human blood. For this reason, and because PFOS used in animal experiments has been shown to damage reproduction, PFOS was added to the list of persistent organic pollutants (POPs) of the Stockholm Convention in 2010. The EU bans placing on the market and use of PFOS as substance or as constituent of preparations in concentrations above 10 mg/kg (0.001% by weight)<sup>1</sup>.

Only PFOS-based fire-fighting foams are affected by the ban. It is undisputed, however, that other poly- and perfluorinated chemicals can lead in the long term to problems for humans and the environment.

## 7. What are the consequences for fire-fighting?

It has to be carefully evaluated if fluorinated fire-fighting foams are ultimately required to successfully fight a fire, taking into account the associated hazard potential, substance properties and the condition of installations, (see points 3 and 4).

Training with fluorinated fire-fighting foams needs to be avoided. Instead, environmentally benign foam agents free of PFC's (training foams) must be used. Where training with fluorinated fire-fighting foams cannot be avoided by any means, measures shall be taken in advance to ensure full retention and appropriate disposal of the foam and run off water generated during the training.

Where fixed fire-fighting systems are to be converted to fluorine-free fire-fighting foams, application rates laid down in EN 13 565 Part 2 – Foam extinguishing systems must be considered. Raising the application rates will not in any case maintain an effective fire-fighting. Operators must co-ordinate fire-fighting measures with fire services and specialist engineers.

<sup>1</sup> Commission Regulation (EU) No 757/2010 amending Regulation (EC) No 850/2004