



BSI Standards Publication

Textiles and textile products — Organic fluorine

Part 2: Determination of volatile compounds by
extraction method using gas chromatography

National foreword

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The UK participation in its preparation was entrusted to Technical Committee TCI/100, Co-ordination of activities in textiles and clothing.

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Published by BSI Standards Limited 2022

ISBN 978 0 539 05824 6

ICS 59.080.01

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2022.

Amendments/corrigenda issued since publication

Date	Text affected
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English Version

**Textiles and textile products - Organic fluorine - Part 2:
Determination of volatile compounds by extraction
method using gas chromatography**

Textiles et produits textiles - Fluor organique - Partie 2
: Détermination de composés volatils par une méthode
d'extraction utilisant la chromatographie en phase
gazeuse

Textilien und textile Erzeugnisse - Organisches Fluor -
Teil 2: Bestimmung des Gehaltes an flüchtigen
Verbindungen durch Extraktionsverfahren mittels
Gaschromatographie

This European Standard was approved by CEN on 24 July 2022.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

European foreword.....	3
Introduction	4
1 Scope	11
2 Normative references	11
3 Terms and definitions	11
4 Principle of method	11
5 Reagents	12
6 Equipment	12
7 Sampling.....	13
7.1 General.....	13
7.2 Sampling based on area	13
7.3 Sampling based on mass.....	13
7.4 Preparation of test specimen.....	13
8 Procedure.....	13
8.1 Preparation of stock solutions	13
8.2 Preparation of internal standard solution.....	13
8.3 Preparation of calibration solutions.....	13
8.4 Extraction.....	14
8.5 Analysis.....	14
9 Expression of results.....	14
9.1 Calibration	14
9.2 Calculation of the results.....	15
9.3 Calculation of the sums of certain PFAS.....	15
9.4 Limit of detection (LoD) and limit of quantification (LoQ)	15
9.5 Reliability of the method.....	16
10 Test report.....	16
Annex A (normative) Usable ions and LOQ for PFAS analysis by GC.....	17
A.1 Using GC-MS/MS.....	17
A.2 Using GC-MS/PCI.....	19
A.3 Using GC-MS/EI	20
Annex B (informative) Interferences with GC.....	21
Annex C (informative) Non-regulated PFAS	22
Annex D (informative) Chromatographic conditions.....	23
D.1 GC-MS/PCI.....	23
D.2 GC-MS/EI.....	24
Bibliography	25

European foreword

This document (EN 17681-2:2022) has been prepared by Technical Committee CEN/TC 248 “Textiles and textile products”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2023, and conflicting national standards shall be withdrawn at the latest by March 2023.

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Introduction

In the European Union, according to Regulation (EU) 2019/1021 on persistent organic pollutants (POP), Article 3, Clause 1, in connection with Annex I amended by Commission Delegated Regulation (EU) 2020/784, the manufacturing, placing on the market and use of perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds, whether on their own, in mixtures or in articles, is prohibited. This is in addition to the existing prohibition of perfluorooctane sulfonic acid and its derivatives (PFOS).

According to Article 4 Clause 1. (b) this does not apply in the case of a substance present as an unintentional trace contaminant, as specified in the relevant entries of Annex I in substances, mixtures or articles.

Annex I Part A, describing perfluorooctane sulfonic acid and its derivatives (PFOS), contains the specific exemption (Point 2) to concentrations of PFOS in semi-finished products or articles, or parts thereof, if the concentration of PFOS is lower than 0,1 % mass fraction calculated with reference to the mass of structurally or micro-structurally distinct parts that contain PFOS or, for textiles or other coated materials, if the amount of PFOS is lower than 1 µg/m² of the coated material. PFOS compounds have the formula C₈F₁₇SO₂X where X = OH, Metal salt (O-M⁺), halide, amide and other derivatives, including polymers.

In Annex I Part A, describing perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds, contains the specific exemption (Point 1) to concentrations of PFOA or any of its salts equal to or below 0,025 mg/kg (0,000 002 5 % mass fraction) where they are present in substances, mixtures or articles. In addition, (Point 2) Article 4(1) applies to concentrations of any individual PFOA-related compound or a combination of PFOA-related compounds equal to or below 1 mg/kg (0,000 1 % mass fraction) where they are present in substances, mixtures or articles.

PFOA, its salts and PFOA-related compounds means the following:

- i) perfluorooctanoic acid, including any of its branched isomers;
- ii) its salts;
- iii) PFOA-related compounds which, for the purposes of the Convention, are any substances that degrade to PFOA, including any substances (including salts and polymers) having a linear or branched perfluoroheptyl group with the moiety (C₇F₁₅)C as one of the structural elements.

The following compounds are not included as PFOA-related compounds:

- iv) C₈F₁₇-X, where X = F, Cl, Br;
- v) fluoropolymers that are covered by CF₃[CF₂]_n-R', where R' = any group, n > 16;
- vi) perfluoroalkyl carboxylic acids (including their salts, esters, halides and anhydrides) with ≥ 8 perfluorinated carbons;
- vii) perfluoroalkane sulfonic acids and perfluoro phosphonic acids (including their salts, esters, halides and anhydrides) with ≥ 9 perfluorinated carbons;
- viii) perfluorooctane sulfonic acid and its derivatives (PFOS), as listed in Annex I.

As a further exemption in Annex I Part A (Point 5 c) the manufacturing, placing on the market and use of PFOA, its salts and PFOA-related compounds is allowed in textiles for oil and water repellency for the protection of workers from dangerous liquids that comprise risks to their health and safety, until 4 July 2023.

Commission Regulation (EU) 2021/1297 amending Regulation (EC) No 1907/2006 (REACH), Annex XVII [7] restricts perfluorocarboxylic acids containing 9 to 14 carbon atoms in the chain (C9-C14 PFCAs), their salts and C9-C14 PFCA-related substances from 25 February 2023.

This restriction concerns the following substances:

Linear and branched perfluorocarboxylic acids of the formula $C_nF_{2n+1}-C(=O)OH$ where $n = 8, 9, 10, 11, 12$, or 13 (C9-C14 PFCAs), including their salts, and any combinations thereof;

Any C9-C14 PFCA-related substance having a perfluoro group with the formula $C_nF_{2n+1}-$ directly attached to another carbon atom, where $n = 8, 9, 10, 11, 12$, or 13 , including their salts and any combinations thereof;

Any C9-C14 PFCA-related substance having a perfluoro group with the formula $C_nF_{2n+1}-$ that it is not directly attached to another carbon atom, where $n = 9, 10, 11, 12, 13$ or 14 as one of the structural elements, including their salts and any combinations thereof.

The following substances are excluded from this designation:

$C_nF_{2n+1}-X$, where $X = F, Cl$, or Br

where $n = 9, 10, 11, 12, 13$ or 14 , including any combinations thereof,

$C_nF_{2n+1}-C(=O)OX'$ where $n > 13$ and $X' =$ any group, including salts.

Several per- and poly-fluorinated alkylated substances (PFAS), which are not restricted under the POP Regulation have been added as Substances of Very High Concern (SVHC) to the Candidate List according to Regulation (EC) No 1907/2006 (REACH), Article 59.

Per- and poly-fluorinated compounds from C4 – C14 (PFAS) occur, for example, in soil and water repellent finishes within textiles or can be introduced as contaminants (for example from water sources). Categories of PFAS are shown in Table 1. Table 2 lists classes of regulated compounds (i.e. listed in a Regulation) including acids, telomers, sulfonates and sulfonamidalcohols. Compounds of concern (i.e. not listed yet in a Regulation) are shown in the informative Annex C.

Table 1 — Categories of PFAS

Type of PFAS	Sub-group	Applications		Category
		Use	Sources of contamination ^a	
PFAS salts	K ⁺ , Li ⁺ , diethanolamine (DEA) salt analysed as acids	Surfactant for alkaline cleaners	Surfactant in fire-fighting foam, emulsifier in floor polish, mist suppressant for metal plating baths, surfactant for etching acids for circuit boards, pesticide active ingredient for ant bait traps	A
	Amines	-	Mist suppressant for metal plating baths	B
	Ammonium salts analysed as acids	-	Emulsifier for fluoropolymer production	C
	Amphoterics	Water/solvent repellence for leather/paper	-	D
PFAS substances	Carboxylates	-	Antistatic agent in photographic paper	E
	Amides	-	Pesticide active ingredient	F
	Oxazolidinones	-	Waterproofing casts (electronics)	G
PFAS polymers/oligomers	Alcohols, silanes, alkoxylates, fatty acid esters, adipates, urethanes, polyesters, acrylates	Soil and water repellence for carpets, fabrics, upholstery, apparel, leather, metal, glass	-	H
	Copolymers, phosphate esters	Water repellence for carpets, fabrics, upholstery, apparel, leather, metal, glass	Soil/oil/water repellence for plates, food containers, bags, wraps, folding cartons, containers, carbonless forms, masking papers	I
^a These substances are not relevant in the manufacturing process of textiles but it is possible to find them as contaminants.				

Table 2 — Regulated PFAS

No.	Substance	CAS Registry Number® (CAS RN®) ¹	Applicable test method		EU regulation ^a	PFAS category (Table 1)
			EN 17681-1	EN 17681-2		
Perfluorinated carboxylic acids						
1	PFHxA	Perfluoro-n-hexanoic acid	x		under evaluation (REACH)	A and C
2 ^b	PFOA	Perfluoro-n-octanoic acid	x		POP and REACH (SVHC)	A and C
2.2 ^b	APFO	Perfluoro-n-octanoic acid salts				C
	Na-PFO	- Ammonium pentadecafluorooctanoate				A
	K-PFO	- Sodium perfluorooctanoate	x		POP	A
	Ag-PFO	- Potassium perfluorooctanoate				A
	F-PFO	- Silver perfluorooctanoate - Perfluorooctanoyl fluoride				A
3 ^b	8:2 FTS	1H,1H,2H,2H-Perfluorodecanesulfonic acid	x		POP	A
4 ^b	Me-PFOA	Methyl perfluorooctanoate		x	POP	H
5 ^b	Et-PFOA	Ethyl perfluorooctanoate		x	POP	H
6	PFNA	Perfluoro-n-nonanoic acid	x		REACH Annex XVII and SVHC	
6.2	NH ₄ -PFN Na-PFN	Perfluoro-n-nonanoic acid salts - Ammonium perfluorononanoate - Sodium perfluorononanoate	x		REACH Annex XVII and SVHC	

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