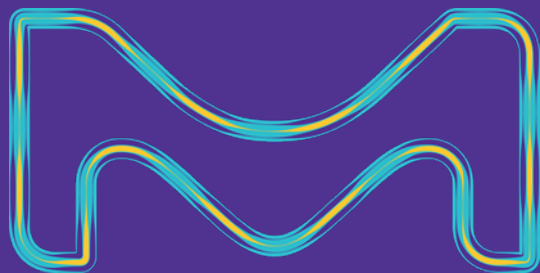


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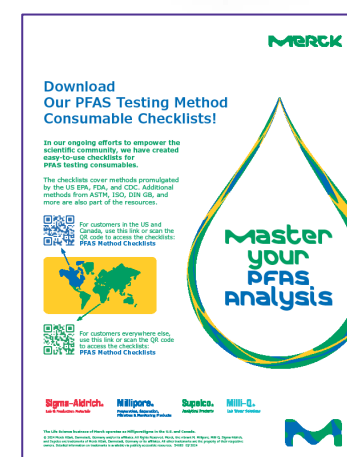
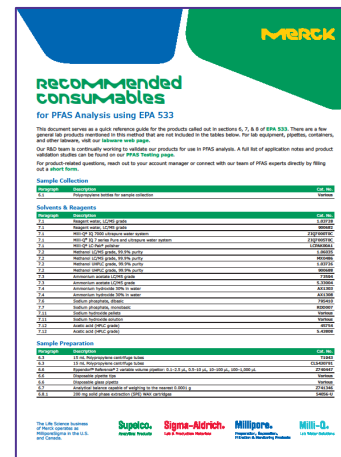
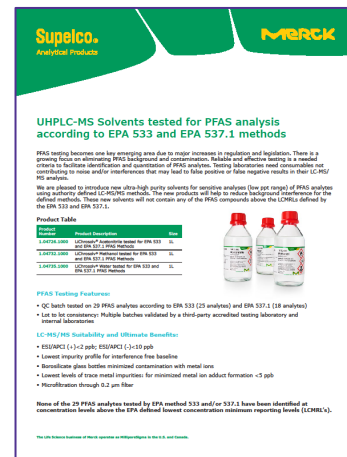
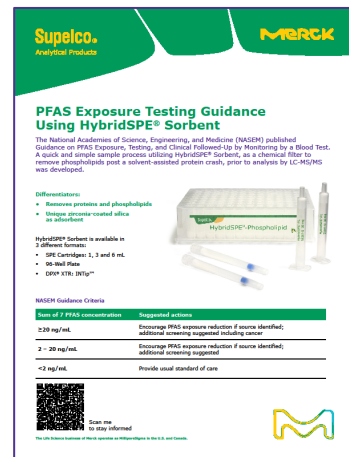
Certified Reference Materials

Supelpak™ – New Resin Material

Consumables list for dedicated PFAS methods

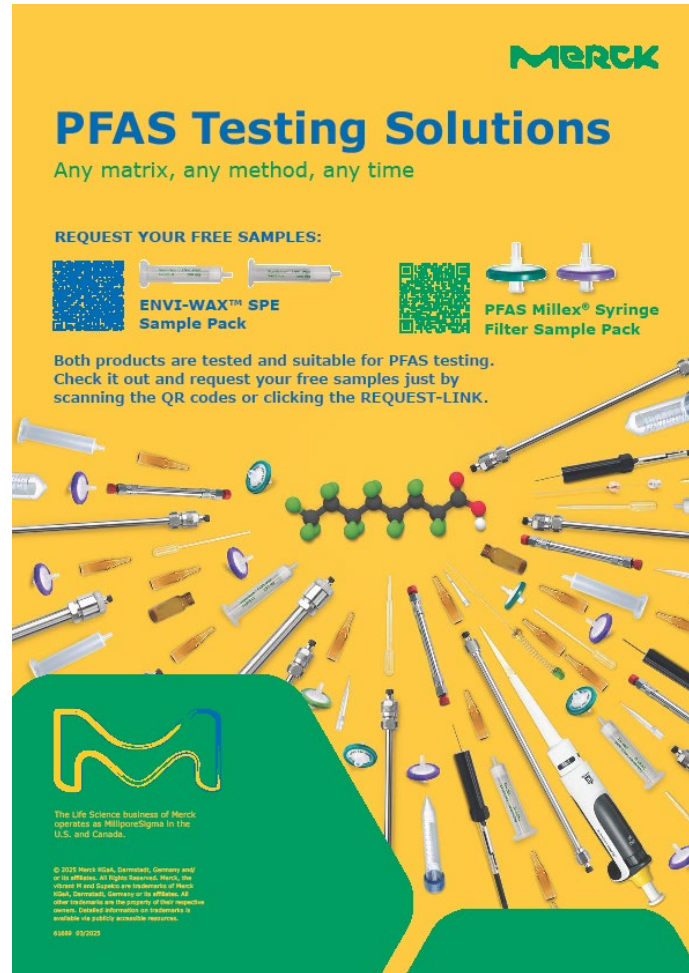
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REQUEST YOUR FREE SAMPLES:



**ENVI-WAX™ SPE
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**PFAS Millex® Syringe
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Both products are tested and suitable for PFAS testing. Check it out and request your free samples just by scanning the QR codes or clicking the REQUEST-LINK.

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MSAR 09/2023

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- ☐ PFAS Millex® syringe filter

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Filtration Solutions for PFAS Testing

Syringe Filters (< 100mL samples)



Product Description	Cat #
Millex® 0.22µm PES	SLGP033N
Millex® 0.45µm PES	SLHP033N
Millex® 1µm glass fiber	SLPBDZ5
Millex® 0.20µm nylon	SLGN033
HPF Millex® 0.20µm nylon	SLGNM25

New: PFAS validated 0.22µm PES Millex®

- Validated for low levels of 42 PFAS compounds (below reporting limit)



Polypropylene Membrane Filters

Pore size	Diameter	Hydrophilic	Hydrophobic
0.2µm	13mm	✓	
	25mm	✓	✓
	47mm	✓	✓
	90mm	✓	✓
0.45µm	13mm	✓	
	25mm	✓	✓
	47mm	✓	✓
	90mm	✓	✓

Filter holder used in the study: [Swinnex Filter Holder, 25 mm, polypropylene](#)
[Wide range of filter holders](#) – glass, polypropylene; 13, 25, 47, 90mm diameter

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PFAS Testing Solutions

PFAS Certified Reference Materials – CoA

Supelco

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Certified Reference Material

Reference material certificate

TraceCERT[®]
Reference material

2H₂H₃3H₃H-Perfluorooctanoic acid

4,4,5,5,6,6,7,7,8,8-Undecafluorooctanoic acid

Product no.:

94743

Lot no.:

BC0M3758

Description of CRM:

Solid neat material

Expiry date:

OCT 2026

Storage:

2-8°C; storage under Argon

Molecular formula:

C₈H₄F₁₁O₂

Chemical mass:

342.11 g/mol

CAS No.:

914637-49-3

Sample

Certified value ± Expanded uncertainty,

$U_{k=2} = k \cdot u_{CRM} (k=2.0)^{[1][2]}$

as mass fraction

2H₂H₃3H₃H-Perfluorooctanoic acid

0.993 g/g ± 0.031 g/g

(99.3 % ± 3.1 %)

Metrological traceability:

Traceable to the SI through an unbroken chain of comparisons via NIST PS1 (Benzoic acid) / NMI CRM 4601-b (3,5-Bis(trifluoromethyl)benzoic acid) [1]
 Details see "Certification process details" on page 2.

Measurement method:

The certified value is established by high-resolution quantitative NMR measurements (qNMR) in accordance with ISO/IEC 17025.[4]

Intended use:

Use this certified reference material (CRM) as calibrant for chromatography or any other analytical technique.

Minimum sample size:

The sample is solid at room temperature. 5 mg is recommended as the minimum sample size. If less material is used, it is recommended to increase the certified uncertainty by a factor of two for half of sample and a factor of four for a quarter of sample.

Instructions for handling and correct uses:

The CRM should be stored in the original bottle. Warm to room temperature before opening. After use the bottle should be tightly closed and protected from excessive moisture and light.

Accreditation:

Sigma-Aldrich Production GmbH is accredited by the Swiss Accreditation Service SAS as reference material producer under no. SRMS 0001 in accordance with international standard ISO 17034.[3]

Certificate issue date:

05 NOV 2024

350 17034
SRMS 0001

A. Rüch

Dr. A. Rüch – CRM Operations

D. P. Zell

Dr. P. Zell – Approval Officer

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Certificate version 01

Health and safety information: Please refer to the Safety Data Sheet for detailed information about the nature of any hazard and appropriate precautions to be taken.

Packaging: Brown glass bottle

Starting material details: Potential raw materials are checked for suitability in terms of purity. Only materials of highest available purity are accepted. 2D-NMR (^1H - ^1H COSY) measurements are applied to guarantee that no impurities underlie the peak of interest. Detection limit usually is below 0.1 %.

Compatibility of candidate substance with solvent and internal qNMR reference is checked ($t=0$ and $t=24$ h comparison).

Certification process details:

In order to guarantee highest reliability of this TraceCERT CRM a multi-component approach was applied whereby the certified value is determined by high-resolution quantitative NMR measurements (qNMR on a 600 MHz NMR spectrometer).¹⁾ The whole workflow follows the ISO 17034 guidelines. The certificate is designed in accordance with ISO Guide 35.¹⁾

The certified values are confirmed by extended analytical data. These data are not covered by the scope of accreditation but determined following best practices in analytical measurements.

The high precision weighing steps are performed in accordance with ISO/IEC 17025¹⁾ using ultra-micro balances certified by DKD and calibrated with OIML Class E2 weights.

Absolute content determination by qNMR is performed using 4-5 separate samples of the candidate substance which are each spiked with an adequate amount of internal reference and then immediately dissolved in deuterated solvent. In most cases 8-22 scans are recorded for every sample with a ^1H relaxation time of ≥ 15 seconds. Quantification of the candidate content is directly calculated from the ^1H -NMR peak areas and the initial mass of the candidate and reference substance.¹⁾ After ANOVA the resulting standard deviation is included into the uncertainty calculation of the certified value. Extensive stability and homogeneity tests are considered for certification.¹⁾

```
graph TD; RT[Reference for Traceability] --> CC[Compatibility Check]; CC --> CRM[Certified Reference Material<br/>(ISO 17034)]; C[Candidate for Certification] --> HPW[High Precision Weighing]; HPW --> HS[Homogeneity Study]; HS --> CD[qNMR<br/>Content Determination]; CD --> CRM; C --> AST[Accelerated Stability Test]; C --> LST[Long Term Stability Test]; C --> AC[Additional Characterization]; AST --> DAR[Data Analysis and Review]; LST --> DAR; AC --> CRM; DAR --> CRM;
```

Homogeneity assessment: Homogeneity of the material is tested by qNMR measurements using 4-5 subsamples which are taken from different positions in the entire bulk material. The recommended minimal sample size is taken for all the homogeneity test samples. Analysis of variance (ANOVA) results are included into the calculation of content uncertainty of the CRM.

Stability assessment: An accelerated stability test is performed with samples which are stored above the recommended storage temperature. The material is tested by qNMR double determination at appropriate time intervals, e.g. 3 months.

The long-term stability test is performed with samples which are stored at the recommended storage temperature and applying qNMR double determination at appropriate time intervals, e.g. 24 months.

Uncertainty evaluation:
The uncertainty contributions are illustrated by the following cause-effect diagram.

Typical relative contributions are:

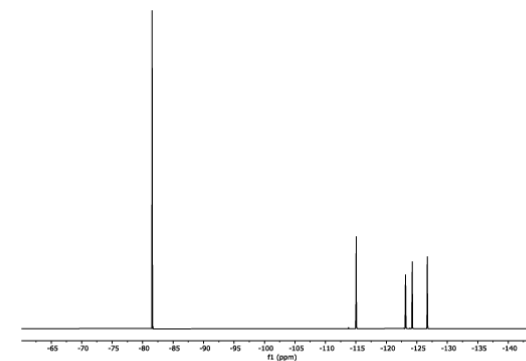
$u(P_{\text{ref}})$	< 0.25 %
$u(M_{\text{ref}})$	< 0.07 %
$u(M_{\text{calc}})$	< 0.07 %
$u(M_{\text{ref}})$	< 0.003 %
$u(R_{\text{recryst}})$	< 0.003 %
u_{hom}	< 0.30 %
u_{stat}	< 0.80 %
u_{stat}	< 1.20 %

The combined standard uncertainty is calculated by combination of the standard uncertainties of the input estimates according to Eurachem/CITAC Guide "Quantifying Uncertainty in Analytical Measurement" and ISO 17034 (11).

Expanded uncertainty is then calculated to a confidence level of 95 %, typically by multiplying with a coverage factor of $k=2.0$.

Indicative values:

¹³F-NMR Spectrum (564.9 MHz, 2H₂H₃,3H,4H-Perfluorooctanoic acid in CD₃CN)



References:

- [1] ISO Guide 35:2017, "Reference materials - Guidance for characterization and assessment of homogeneity and stability"
- [2] Eurachem/CITAC Guide, 3rd Ed. (2012), "Quantifying uncertainty in analytical measurement"
- [3] Eurachem/CITAC Guide, 2nd Ed. (2013), "Metrological traceability in chemical measurement"
- [4] The accredited testing laboratory STS 0490 performs the measurements and weighing steps for the certification of this CRM under ISO/IEC 17025:2017, "General requirements for the competence of testing and calibration laboratories"
- [5] ISO 17034:2016, "General requirements for the competence of reference material producers"
- [6] Weber M, Hellriegel C, Rueck A, Sauermoser R, Wuehrlich J, Accred. Qual. Assur. 18 (2013) 91-98
- [7] ISO Guide 31:2015, "Reference materials - Contents of certificates, labels and accompanying documentation"
- [8] Rigger R, Hellriegel C, Rueck A, Sauermoser R, Morf F, Breitbruck K, Obkircher M, Journal of AOAC International 100(5) (2017) 1365-1375
- [9] Weber M, Hellriegel C, Rueck A, Wuehrlich J, Jenks P, JPA 93 (2014) 102-110

Certificate of analysis revision history:


Certificate version	Date	Reason for version
01	05 NOV 2024	Initial version

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Certificate version 01

PFAS CRM CoA Example