

# SVENSK STANDARD

## SS-EN ISO 17881-1:2016



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### **Textil – Bestämning av vissa flamskyddsmedel – Del 1: Bromerande flamskyddsmedel (ISO 17881-1:2016)**

### **Textiles – Determination of certain flame retardants – Part 1: Brominated flame retardants (ISO 17881-1:2016)**

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Europastandarden EN ISO 17881-1:2016 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 17881-1:2016.

The European Standard EN ISO 17881-1:2016 has the status of a Swedish Standard. This document contains the official English version of EN ISO 17881-1:2016.

**Förhållandet till övriga delar under samma huvudtitel - Utdrag ur Förord i ISO 17881-1:2016/  
Relations to other parts under the same general title - Extract from the Foreword of ISO 17881-1:2016**

ISO 17881 consists of the following parts, under the general title *Textiles — Determination of certain flame retardants*:

- Part 1: *Brominated flame retardants*
- Part 2: *Phosphorus flame retardants*

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EUROPEAN STANDARD

**EN ISO 17881-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2016

ICS 59.080.01

English Version

## Textiles - Determination of certain flame retardants - Part 1: Brominated flame retardants (ISO 17881-1:2016)

Textiles - Détermination de certains retardateurs de  
flamme - Partie 1: Retardateurs de flamme bromés  
(ISO 17881-1:2016)

Textilien - Bestimmung einiger Flammschutzmittel -  
Teil 1: Bromierte Flammschutzmittel (ISO 17881-  
1:2016)

This European Standard was approved by CEN on 11 December 2015.

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**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## European foreword

This document (EN ISO 17881-1:2016) has been prepared by Technical Committee ISO/TC 38 “Textiles” in collaboration with 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of an identical text or by endorsement, at the latest by August 2016, and conflicting national standards shall be withdrawn at the latest by August 2016.

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## Endorsement notice

The text of ISO 17881-1:2016 has been approved by CEN as EN ISO 17881-1:2016 without any modification.





# Textiles — Determination of certain flame retardants —

## Part 1: Brominated flame retardants

**WARNING** — This International Standard calls for the use of substances and/or procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage. It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced people.

### 1 Scope

This part of ISO 17881 specifies a test method for determining some brominated flame retardants in textiles by gas chromatography – mass spectrometry (GC-MS).

The method is applicable to all kinds of textile products.

### 2 Principle

The flame retardants are extracted from textile specimen by ultrasonic generator with toluene. The flame retardants in the specimen are identified by GC-MS and quantified by using internal standard method.

### 3 Reagents

Unless otherwise specified, use only reagents of recognized analytical grade.

- 3.1 **Monobromobiphenyl (MonoBB)**, CAS no. 2052-07-5.
- 3.2 **Dibromobiphenyl (DiBB)**, CAS no. 57422-77-2.
- 3.3 **Tribromobiphenyl (TriBB)**, CAS no. 59080-34-1.
- 3.4 **Tetrabromobiphenyl (TetraBB)**, CAS no. 60044-24-8.
- 3.5 **Pentabromo-1,1'-biphenyl (PentaBB)**, CAS no. 59080-39-6.
- 3.6 **Hexabromobiphenyl (HexaBB)**, CAS no. 60044-26-0.
- 3.7 **Heptabromo-1,1'-biphenyl (HeptaBB)**, CAS no. 88700-06-5.
- 3.8 **Octabromobiphenyl (OctaBB)**, CAS no. 67889-00-3.
- 3.9 **Nonabromobiphenyl (NonaBB)**, CAS no. 69278-62-2.
- 3.10 **Decabromobiphenyl (DecaBB)**, CAS no. 13654-09-6.
- 3.11 **Tetrabromodiphenylether (TetraBDE)**, CAS no. 5436-43-1.

**3.12 Pentabromodiphenylether (PentaBDE)**, CAS no.32534-81-9.

**3.13 Hexabromodiphenylether (HexaBDE)**, CAS no. 207122-15-4.

**3.14 Heptabromodiphenylether (HeptaBDE)**, CAS no. 207122-16-5.

**3.15 Octabromodiphenylether (OctaBDE)**, CAS no. 337513-72-1.

**3.16 Decabromodiphenylether (DecaBDE)**, CAS no. 1163-19-5.

**3.17 Hexabromocyclododecane (HBCDD)**, CAS no. 25637-99-4.

**3.18 Decachlorobiphenyl**, CAS no.2051-24-3, internal standard (IS).

**3.19 Toluene.**

NOTE Since brominated flame retardants have many isomers, this method might not cover all of them. Determination of the isomers of flame retardants in [Clause 3](#) can refer to this method according to the principle.

## 4 Apparatus

**4.1 Gas chromatography – mass spectrometry (GC-MS).**

**4.2 Ultrasonic generator**, with a frequency from 35 kHz to 45 kHz.

**4.3 Evaporator device**, with water bath at 50 °C.

**4.4 Brown glass vial**, 40 ml with tight closure.

**4.5 Flask**, 100 ml.

**4.6 Filtration membrane**, 0,45 µm.

**4.7 Balance**, an accuracy of 0,1 mg.

## 5 Procedure

### 5.1 Preparation of standard solutions

#### 5.1.1 Stock standard solution

Prepare 1 000 µg/ml of stock standard solutions with individual flame retardant ([3.1](#) to [3.17](#)) and internal standard ([3.18](#)) in toluene ([3.19](#)).

Some commercial reference material solutions may be available in a different solvent.

#### 5.1.2 Internal standard solution

Prepare 10 µg/ml standard solution of decachlorobiphenyl in toluene.

### 5.1.3 Working solution

Prepare an admixture working solution of 17 flame retardants in internal standard solution (5.1.2) and dilute it to a series of suitable concentrations depending on test needs. Select at least five dilutions of the calibration sets to create calibration curve and perform GC-MS analysis.

## 5.2 Preparation of test specimen

Prepare a representative test specimen of the sample. Cut it into small pieces and weigh (1,00 ± 0,01) g of the pieces with a balance (4.7).

## 5.3 Ultrasonic wave extraction

Put the pieces in a vial with tight closure (4.4) and add 20 ml of toluene. Place the vial in an ultrasonic generator (4.2) and extract the pieces for 30 min at room temperature. Filter and transfer the extract into 100 ml flask (4.5). Add 10 ml of toluene to the residue in the vial and place the vial in the ultrasonic generator to extract the residue for 15 min at room temperature. Filter and merge the extract into the flask (4.5).

Evaporate the extract to near dryness by evaporator device (4.3). Add 2 ml of internal standard solution (5.1.2) to dissolve the residue and then filter by filtration membrane (4.6). The filtrate is ready for determination of flame retardants.

## 5.4 Flame retardants determination

Determine the flame retardants in the solution (5.3) by GC-MS (4.1). The test parameters by GC-MS are given in Annex A as an example. Run a blank to control contamination.

When the flame retardants level is very low, it is necessary to increase the mass of the pieces in order to reach at least three times the detection limit.

When the flame retardant level is beyond the linear detector response range of the equipment, it is necessary to dilute the specimen liquid properly.

## 6 Calculation

Quantify the concentration of each flame retardant by using the calibration curve. The content of each flame retardant is expressed by the mass ratio of flame retardant to test specimen, in µg/g. Calculate the result by using Formula (1).

$$X_i = \frac{(C_i - C_0) \times V}{m} \quad (1)$$

where

$X_i$  is the content of the flame retardant,  $i$ , in the textile specimen, in µg/g;

$C_i$  is the concentration of the flame retardant,  $i$ , in the specimen solution, in µg/ml;

$C_0$  is the concentration of the flame retardant,  $i$ , in the blank solution, in µg/ml;

$V$  is the final volume of the specimen solution, in ml;

$m$  is the mass of the test specimen, in g.