

Candles — Specification for fire safety

Kerzen — Spezifikation für Feuersicherheit

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Foreword

This document (prEN 15493:2006) has been prepared by Technical Committee CEN/BT/TF 164 "Candle safety", the secretariat of which is held by CMC.

This document is currently submitted to the CEN Enquiry.

Introduction

Candles have accompanied mankind for more than 2000 years, beside their liturgical meaning, they served above all as a light source. Closely connected to the development history of the candle are the efforts made to improve its quality and its safety in use. Discussions in the past and present over possible self-forming, harmful emissions and fires caused by unsafe candles and/or inappropriate use during the burning of candles have led to consumers concern for these issues. This European standard helps to ensure a reasonable degree of safety during use, thereby improving personal safety and reducing the risk of fires, deaths and injuries.

1 Scope

This document specifies requirements and test methods for the fire safety of candles intended to be burned indoors.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

prEN WI CSH99018:2005, *Candles – Product safety labels*.

prEN 15426:2005, *Candles – Test method for measuring the soot index*.

3 Terms and definitions

For the purposes of this European Standard, **the following terms and definitions apply.**

3.1

base material

intended fuel source for candle flame

3.2

burning cycle

total length of time the candle is burned during one test cycle, including pause

**3.3
burning period**
total time the candle is burned over the duration of the test (sum of the burning cycles and initial burning cycles)

**3.4
candle**
one or more combustible wicks supported by a material that constitutes a fuel, which is solid, semisolid or quasi-rigid at room temperature (20-27°C). It can also contain additives, which are used for colour, odour, stability, or to modify the burning characteristics; the combined function of which is to sustain a light-producing flame. Including candles with decorative elements

**3.5
container candle**
candle which is produced in and will be burned up in a container

**3.6
decorative elements**
decoration attached to or contained within the candle

**3.7
flame height**
base of flame to the top of the flame (see figure 1)

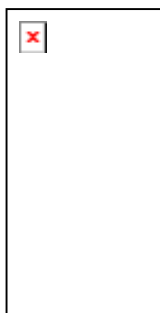


Figure 1 — Flame height

**3.8
flash over**
condition where the base material's vapours ignite over the molten fuel pool

**3.9
molten fuel pool**
portion of the wax or fuel pool of a candle that is in the liquid form when the candle is burning

**3.10
re-ignition**
self-ignition of the wick after it has been extinguished

**3.11
secondary ignition**
self-sustained flame other than that on the intended wick(s) that occurs during candle use, including flashover

**3.12
self-sustained flame**
flame that continues to burn until the fuel source is removed or depleted or requires manual extinguishing

3.13**soot**

substance made up of solid, hydrocarbon enriched particles which come into existence when the burning material in the flame is incompletely burned and which are subsequently released into the atmosphere

3.14**soot index**

index number for the evaluation of the sooting behaviour of candles

3.15**tea light candle**

cylindrical filled candle which is burned up in a container, e.g. made from metal, glass or plastic, which may be suitable to keep vessels containing coffee, tea or other liquids warm, by using a warming stove.

NOTE The mean diameter of a tea light is typically 38 mm, its height 17 mm.

3.16**wax**

crystalline, plastic solid or semi-solid material at 25°C consisting of a mixture of hydrocarbons and/or hydrocarbon derivatives that, typically at temperatures equal to or greater than 40°C, melts and becomes a low viscosity liquid. Waxes may be of mineral (particularly petroleum), vegetable, animal (including insect), or synthetic origin

3.17**wick**

object that delivers fuel to a flame through the process of capillary action

3.18**Free-standing candle**

candle which is intended to be used without a supporting holder.

4 Safety requirements

4.1 Stability

Free-standing candles shall not tip over when tested on a slope of 10° according to 9.2.

4.2 Secondary ignition

No ignition that continues to burn for more than 10 s, of any material other than the intended wick(s), including flash-over, shall occur while burning. Test method see 9.3.

NOTE Wick remaining in the molten fuel pool is considered as a potential source for secondary ignition.

4.3 Flame height

The flame height for all candle types, except tea lights, shall not exceed 75 mm. The flame height for tea lights shall not exceed 30 mm. Test method see 9.4.

NOTE The natural tendency of a candle is for the flame height to vary during the burn life. The maximum allowable flame height requirement in this specification takes into account such variation and anticipates that manufacturers will design candles to ensure that they remain below the maximum flame height requirement throughout the burning period. Furthermore, the manufacturer shall determine the appropriate lower flame height for optimum performance for individual candle types

4.4 Behaviour by self-extinguishing at the end of the burning process

Container candles and candles marketed as self-extinguishing shall, at the end of the burning time, self extinguish and not break the container, not exceed flame heights according to 4.3 or cause secondary ignition according to 4.2.

4.5 Re-ignition after extinguishing

To prevent the risk of re-ignition, the wick shall not continue to glow or smoke for more than 20 seconds after extinguishing. After extinguishing the candle shall not spontaneously re-light. Test method see 9.3.

4.6 Sooting behaviour

When tested in accordance with prEN 15426:2005, the average value of the soot index from 3 tests (samples) shall be less than 1,0 per hour, no individual sample shall exceed 2,0 per hour.

5 Test equipment and apparatus

5.1 **Incline plane** (fixed or adjustable) with an angle of $(10 \pm 0.2)^\circ$ from horizontal level.

5.2 **Measuring device**, non flammable with millimetre grading.

5.3 **Candle extinguisher**, type "snuffer".

6 Sampling

The test will be carried out on finished candles, intended to be supplied commercially. For the test result to represent a specific candle type, a minimum of 3 samples shall be tested. The candle and/or container/jar shall have no defects. Conformity to the requirement shall be verified by visual examination. If any defects are observed do not continue the test. Record whether any defects are verified or not.

7 Sample preparation

Remove any outer wrapping and label material and prepare the sample for use according to the manufacturer's instructions, if any given, e.g. trim the wick. For identification of the sample, measure dimension and weight of the candle. The temperature of the sample shall be $(20 \pm 5)^\circ\text{C}$ before the test is started.

8 General test conditions

The average room temperature at which the burning test is to take place shall be $(20 \pm 5)^\circ\text{C}$. The room shall be draught free.

For testing of floating candles, the temperature of the water shall be $(20 \pm 5)^\circ\text{C}$ when the test is started.

NOTE Draught free means that a candle can burn without noticeable disturbance of the flame. If the flame is flickering this can be verified using a reference candle such as a 22 mm paraffin candle, if this candle is also flickering there is a draught, if not then it is flickering due to the candle design or quality.

9 Test procedures

9.1 General

In the case of candle designs not catered for in the test procedures, the test should be carried out as far as possible as described and deviations from the test procedure shall be recorded in the test report.

9.2 Stability test

Place the prepared, unlit candle on an incline plane (5.1) in the orientation most likely to cause tipping at $(10 \pm 0,2)^\circ$ from level. Rotation around the candle's vertical axis may be necessary to determine the stability of an asymmetrical candle.

9.3 Burning test

Follow the instructions for use, if any. If no instructions are given, the following shall apply;

Place each candle in an upright position on a heat resistant, non flammable surface. Non free-standing candles are placed in a suitable candleholder which does not affect the burning property of the candle. Free-standing candles are placed on a surface that does not affect the burning property. Floating candles are placed in a suitable bowl filled with water.

When testing multiple samples, all candles except floating candles, shall be placed with a distance specified by the manufacturer's instructions, see prEN WI 00160018:2005, Figure 3 (edge to edge). This requirement does not apply to the test method for measuring the soot index in prEN 15426:2005.

The specified distance between samples does not apply to floating candles.

Position the wick in an upright position and light the candle without contaminating the candle by the ignition source.

Burn the candles in cycles according to Table 1. Use a candle extinguisher (5.3) to extinguish candles.

Table 1 — Burning cycles

Type of candle	Burning cycle
Container candles of weight below 40 g	Burn candle continuously until self- extinguishing.
Candles of weight below 40 g	Burn candle continuously until a residual height of 10 mm.
Candles of weight above 40 g	Burn candle 4 hours, pause for minimum 1 h. Continue to burn in cycles until a residual height of 20 mm. Container candles and candles marketed as self-extinguishing shall be burned until self-extinguishing.

Visual observations are made 5 min after ignition, at least at hourly intervals throughout the entire burning cycle, at extinguishing and self-extinguishing, when applicable.

9.4 Flame height

The flame height (whole visible part of the flame, see 3.10) is measured and recorded after 5 min into each burning cycle and at least at hourly intervals. If the flame appears to be higher at other times, it shall also be measured and recorded. Place the measuring device (5.2) carefully as close to the flame as possible without disturbing the flame. Allow the flame to stabilize. Keep the measuring device in place for 5 s and record the maximum value (undisturbed flame).

10 Test report

The test report serves to identify the tested candle and to record the test results.

The test report shall include the following details:

- a) a reference to the number and the year of publication of this European Standard;
- b) details of the test sample (e. g. identification, dimensions, weight, etc.);
- c) any defects identified during sample preparation;
- d) the test results according to this European Standard;
- e) details of any deviation from this European Standard;
- f) name and address of the test facility;
- g) the date of the test.