



[CEN/TC 369](#)

Candle fire safety

E-mail of Secretary: friederike.saxe@din.de

Secretariat: DIN

Candle Accessories, working draft, 2019-10-02

Date of document 2019-10-04

Expected action Next Meeting
Due Date 2019-10-23

Background

Dear Experts,

Please find attached a document prepared by Jonas Evaldsson with the following explanatory comments:

“The requirements and test methods included in this first draft version is from ASTM F2601-18 but transferred to the format of a European standard and using European references when possible. The sample preparation and test conditions in the ASTM standard are partly different from what we fixed in other EN standards already. These sections in question are marked yellow.”

The document corresponds to 7.2 in the draft agenda to the upcoming meeting on 2019-10-23/24 in Paris.

Best regards

Dr. Friederike Saxe
Secretary of CEN/TC 369
DIN Standards Committee Safety Design Principles

Candle Accessories – Specification for fire safety

Foreword

This document (TC 369 WI) has been prepared by Technical Committee CEN/TC 369 “Candle fire safety”, the secretariat of which is held by DIN.

This document is a working document.

The requirements and test methods included in this first draft version is from ASTM F2601-18 but transferred to the format of a European standard and using European references when possible.

Introduction

Candles have accompanied mankind for more than 2 000 years serving 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 and as the function as decoration and not only a light source has increased, the cause of fires are often connected to inappropriate candle accessories which have led to consumer concern for these issues.

This document 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 candle accessories.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15493:2019, *Candles - Specification for fire safety*

ASTM D92, *Test Method for Flash and Fire Points by Cleveland Open Cup Tester*

3 Term and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

barrier technology

a functional design element of a candle accessory that minimizes the risk of ignition of the combustible components of the candle accessory as a result of foreseeable misuse or failure of the candle.

[SOURCE: ASTM F2601-18, 3.3.1]

3.2

candle

one or more combustible wicks supported by a material that constitutes a fuel, which is solid or semisolid at room temperature (20 °C to 27 °C) with the main function of sustaining a light-producing flame, including any coatings on and articles or substances in the fuel

[SOURCE: EN 15493:2019, 3.5]

3.3

candle accessory

object designed, intended or marketed for use with a candle

[SOURCE: ASTM F2601-18, 3.2.1]

3.4

candle burner

a candle holder that restricts the free flow of exiting combustion gases.

[SOURCE: ASTM F2601-18, 3.2.2]

Note 1 to entry: Candle burners include, but are not limited to, lanterns, potpourri burners, and food warmers.

3.5

candle holder

candle accessory onto which a candle is placed.

[SOURCE: ASTM F2601-18, 3.2.3]

3.6

candle ring

candle accessory intended to surround the candle with decorative materials in proximity to a candle, including, but not limited to, a continuous ring or loose fill material.

[SOURCE: ASTM F2601-18, 3.2.4]

3.7

container candle

candle that is produced and used in the same container

[SOURCE: EN 15493:2019, 3.6]

Note 1 to entry: The material of the container can be e.g. ceramic, concrete, glass, metal, plastic or any bi-component material for example.

3.8

flame height

base of the flame to the top of the flame

[SOURCE: EN 15493:2019, 3.7]

3.9

food warmer

a vessel intended to hold food that is heated by one or more candles; it is a type of candle burner.

[SOURCE: ASTM F2601-18, 3.2.5]

3.10

potpourri burner

candle burner designed to provide a source of heat to warm a reservoir of extraneous material.

[SOURCE: ASTM F2601-18, 3.2.6]

3.11

shade

a candle accessory placed above the candle, whose function is to modify light from the flame and change the appearance of the candle.

[SOURCE: ASTM F2601-18, 3.2.7]

3.12

topper

vented candle accessory, which is placed directly on top of a container candle, to modify airflow.

[SOURCE: ASTM F2601-18, 3.2.8]

4 Safety requirements

4.1 Flammability

When tested in accordance with 9.1 the accessory shall have a burn time less than or equal to an average of 30 s for three tests per component and the burn time for any one test shall not exceed 60 s. Flames shall not spread over the entire accessory.

The test shall be conducted on all applicable components of the accessory.

Accessories constructed exclusively of noncombustible materials, live plants or fresh cut flowers that remain hydrated during their intended life, birthday candle holders that can hold only one candle and do not contain pyrotechnics and accessories that incorporate barrier technology are exempted from this requirement.

4.2 Candle Burners

When tested in accordance with 9.2 the candle shall exhibit no secondary ignition, the candle shall have no flame height greater than 75 mm and the burner shall not catch fire. Neither the burner nor the candle container shall break or crack as a result of the test.

4.3 Tealight and Taper Candle Holders

This safety requirement applies to candle holders not tested in accordance with 9.2 that are intended to use tealight or taper candles.

When tested in accordance with 9.3 the candle shall exhibit no secondary ignition, the candle shall have no flame height greater than 75 mm and the holder shall not catch on fire. Neither the holder nor the candle container shall break or crack as a result of the test.

4.4 Stability

When tested in accordance with 9.4 the accessory shall not tip over when placed at a minimum $(10 \pm 0,2)^\circ$ incline from horizontal when tested with the candle specified in 9.4.

5 Test equipment and apparatus

5.1 Incline plane (fixed or adjustable) with an angle of $(10 \pm 0,2)^\circ$ from a horizontal level. The plane may use a stop with a maximum height 6.4 mm to help prevent the candle accessory from slipping during this test.

5.2 Measuring device, non-flammable with millimeter grading.

5.3 Stop watch.

5.4 Flame Source, a butane diffusion flame intended to represent a candle flame. The burner tube consists of a stainless steel tube with an outside diameter of nominally 8 mm and a wall thickness of 1 mm. The gas supply system consists of a pressure gauge, flow meter, fine-control valve, and cylinder regulator providing an outlet pressure of 0.4 psi (28.5 mbar). The flow meter supplies butane gas at a constant rate of 45 mL/min at 25°C. Under the specified conditions, the flame height is approximately 35 mm.

An alternative flame source is permissible provided that it can be demonstrated by testing identical specimens with both the alternative flame source and the flame source specified in this test method that the tests using the alternative flame source yields failing results as often as, or more often than tests using the specified flame source. A post mix butane stick lighter has been shown to provide similar results and is an acceptable alternative flame source

5.5 Ring stand/clamp assembly.

5.6 Thermometer.

5.7 Hygrometer.

5.8 Candle holder/glass (if applicable),

6 Sampling

The test shall be carried out on finished accessories representative of those intended to be supplied commercially. Candles used in burning tests shall fulfil requirements in EN 15493:2019 when tested without the accessory.

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. If the accessory is sold together with a candle, it shall be tested in the intended combination. The temperature of the sample shall be (20 ± 5) °C before the test is started.

Condition the accessory before testing for at least 4 h at a temperature between 20 and 30°C and a relative humidity of less than or equal to 55%.

8 General test conditions

The room temperature at which the burning test is to take place shall be (20 ± 5) °C. The room shall be draught free. If during the test the temperature is outside the range, the maximum and/or minimum temperature shall be recorded in the test report.

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

Test the accessory in a burn test area that will be environmentally controlled to between 20 and 30°C and a relative humidity of less than or equal to 70% within 1 h of being removed from the conditioning atmosphere.

Test the accessory in an area with minimal disturbance of the flame source and sufficient size to accommodate the accessory and prevent oxygen starvation of the flame source.

Test the accessory on a surface constructed of a noncombustible material that is cleaned before conducting each test, removing charred and molten materials or other debris from previous tests.

9 Test methods

9.1 Flammability test

Place the candle rings on the test surface such that it lays flat to simulate normal use with no free-flowing air space under the accessory unless that is how the candle ring is designed. Position candle shades and toppers like they would be used on a candle.

Test the accessory in all orientations and configurations that it is designed or advertised to be used in. The accessory fails the performance requirement if it fails in any of the orientations tested.

Ignite and apply the flame source to each unique component, piece, and material on the accessory.

Keep the flame source stationary during the ignition period with the flame source at a downward angle between 15 and 45° from horizontal.

Position the flame source such that its tip is stationary and positioned approximately one half of the normal flame height away from the accessory component to be tested.

NOTE: For example, if the flame source produces a flame approximately 35 mm in height, the tip of the flame source would be positioned approximately 17.5 mm away from the test component. This will put the midpoint of the flame in contact with the edge of the component to be tested.

Remove the flame source from the test component as soon as the test component exhibits sustained flaming combustion or after 60 s, whichever occurs first.

Record the time from when the test component first ignites with sustained flaming combustion until flaming ceases. If the test component fails to ignite, record the burn time as 0 s.

Conduct this procedure on a minimum of three pieces of component. If there are multiple components on the accessory, test all components. If the flame spread encounters an area burned by a previous test, the test is invalid. Replace the accessory and retest the component. Three independent tests on each unique component are required.

Extinguish the flame manually if the accessory does not extinguish within 60 s. Assign a burn time of 0 s for accessory components that do not ignite.

Accessories that are composed of only ceramic, metallic, glass, and other noncombustible materials are exempt from testing. If there is a potentially combustible component associated with the accessory, then test the component. Examples of such components include a paint or coating, a wrapping on a wire, or a decorative component.

Components of accessories that are protected by barrier technology, candle rings constructed exclusively of live plants or fresh cut flowers, or both, that remain hydrated during their intended life are also exempt from testing.

Record and report if the accessory fails to meet any of the requirements in 4.1.

Retesting of the non-compliant component(s) is allowed if one of the three tests per component has a burn time of greater than 60 s and the average burn time is less than or equal to 30 s. Test additional accessories, testing each non-compliant component 10 times. If the component(s) fail any requirement of 4.1, reject the accessory.

9.2 Candle burners test

Place the appropriate test candle(s) in the candle burner.

Use an unscented tealight with a demonstrated average consumption rate greater than or equal to 3.0 g per hour outside a holder or burner and having an open cup flashpoint, as determined in **Test Method D92**, of no greater than 232°C, if the burner only uses a tealight candle.

Test the burner with the largest candle and the maximum number of candles specified on the label of the burner if the burner can be used with multiple candles.

Prepare the reservoir, if applicable:

Fill with the appropriate quantity of specified material, if the burner has a reservoir in which to hold fragrance or other scented material. If not specified in the instructions, use scented wax.

Fill the burner reservoir with enough water to cover the bottom, if the burner is a food warmer. Ensure that the bottom is covered for all subsequent burn cycles.

Test the unit as an ensemble using the candle burning test method specified in 9.3 of EN 15493:2019.

Test three identical burners at least 8 burn cycles each. If the candle reaches end of useful life prior to the 8th burn cycle, continue the test with a new candle until 8 cycles are completed. For burners requiring tealight candles, or candles that reach end of useful life in less than 4 hours, each candle is burned to end of useful life which constitutes a complete cycle. Thus, each burner is tested 8 times.

Record and Report Any Failure if the accessory or candle fails to meet any of the requirements in 4.2.

9.3 Tealight and taper candle holder test

Place the appropriate test candle(s) in the holder.

Use an unscented tealight with a demonstrated average consumption rate greater than or equal to 3.0 g per hour outside a holder or burner and having an open cup flashpoint, as determined in **Test Method D92**, of no greater than 232°C, if the holder only uses a tealight candle.

Test the holder with the largest candle specified on the label of the holder, if not labeled test with a 30 cm taper candle.

Test the holder with the maximum number of candles the holder is intended to hold.

Test the unit as an ensemble using the candle burning test method specified in 9.3 of EN 15493:2019.

Record and Report Any Failure if the accessory fails to meet any of the requirements in 4.3.

9.4 Stability test

Remove any outer wrapping and make the candle accessory ready for use and insert the intended unlit candle(s) into the accessory as follows:

Test accessories designed to hold taper candles (or other types of candles needing support to remain upright), with a 30 cm taper candle.

Test accessories designed to hold freestanding candles, with a pillar candle with a diameter and height of approximately 7.6 by 23 cm. If the accessory is not wide enough to accommodate a 7.6 cm diameter pillar candle, test the accessory with the widest diameter 23 cm tall pillar candle that fits the accessory.

Test accessories that have a warning not to use candles exceeding specified dimensions with candles at the specified size limits. For example, test a taper holder with 15 cm candle not a 30 cm candle, if the taper holder has a warning label stating not to use a candle over 15 cm.

Test accessories designed to hold votive candles or tealights or both with a votive with diameter and height of approximately 4 by 5 cm or a tealight candle or both.

Test accessories that do not bear labeling requirements with the candles specified in the corresponding burn tests in 9.2 and 9.3, or combinations thereof.

Place the prepared candle accessory in the orientation most likely to cause tipping on the incline plane at $(10 \pm 0,2)^\circ$ from horizontal.

Rotate an asymmetric accessory around its vertical axis to determine the stability of the accessory.

Record and report any failure if the accessory fails to meet any of the stability requirements of 4.4.

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) reference to the number and year of publication of this European Standard (EN XXXXX:20XX);
- b) details of the test sample (e. g. identification, dimensions, mass);
- c) any defects identified during sample preparation;
- d) 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) date of the test.

Bibliography

- [1] EN 15493; Candles – Specification for fire safety
- [2] EN XXXXX; Outdoor candles – Product safety labels