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Standard Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter)



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Standard Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter), ULC 135

Second Edition, Dated July 1, 2004

Summary of Topics

This revision to ULC 135 dated March 25, 2025 includes clarification of testing requirements for composite materials with discrete layers; 6.1.6 – 6.1.8 and 11.1.

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated February 9, 2024.

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Standard Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter)

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REFERENCE PUBLICATIONS

The documents shown below are referenced in the text of this Standard. Unless otherwise stated elsewhere in this Standard such reference shall be considered to indicate the edition and/or revisions of the document available at the date on which the Committee approved this ULC Standard.

Documents Published by the American Society for Testing and Materials (ASTM)
100 Barr Harbour Drive, PO Box C700, West Conshohocken, PA 19428-2959 U.S.A.
Telephone: (610) 832-9585
www.astm.org

• ASTM E906-99, Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products

• ASTM E1354-03, Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter

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Documents Published by the International Organisation for Standardization (ISO)
1, rue de Varembé, Case postale 56, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 749 01 11
www.iso.ch

• ISO 5657:1997, Reaction to fire tests – Ignitability of building products using a radiant heat source

• ISO 5660-1:2002, Reaction to fire tests – Heat release rate (cone calorimeter method)

• ISO 5660-2:2002, Reaction to fire tests – Smoke Production rate (dynamic measurement)

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• CAN/ULC-S114-05, Standard Method of Test for Determination of Non-combustibility in Building Materials

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PREFACE

This is the Second Edition of the Standard Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter), ULC 135.

This Edition of the Standard has been formally approved by the ULC Standards Committee on Fire Tests.

Only metric SI units of measurement are used in this Standard. If a value for measurement is followed by a value in other units in parentheses, the second value may be approximate. The first stated value is the requirement.

Appendices A, B and C, identified as Informative, are for information purposes only.

In Canada, there are two official languages, English and French. All safety warnings must be in French and English. Attention is drawn to the possibility that some Canadian authorities may require additional markings and/or installation instructions to be in both official languages.

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This Standard is intended to be used for conformity assessment.

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1 SCOPE

1.1 This test method determines combustibility parameters for the assessment of degree of combustibility of building materials by measuring the heat release and smoke production from specimens exposed to radiant heat using the test apparatus, specimen configurations and procedures described.

1.2 This test method determines the amount of heat and smoke that may be contributed to a fire involving products made from the same material as that of the test specimen.

1.3 This test method provides for radiant thermal exposure of a specimen. An external source of ignition is provided by an electric spark.

1.4 This test method is based on the observation that generally, the net heat of combustion of a material is directly related to the quantity of oxygen required for its combustion. This relationship is such that approximately 13.1 x 10^3 kJ of heat are released per 1.0 kg of oxygen consumed.

1.5 *Heat release* is measured from the moment the specimen is subjected to the radiant thermal exposure of a conical heater.

1.6 The primary measurements are oxygen concentration, light obscuration and exhaust flow rate. Provision is also made for measurement of mass-loss rate and time to *sustained flaming*.

1.7 Smoke development is measured by obscuration of light in the combustion product stream.

1.8 This test method is used to evaluate specimens in a horizontal *orientation* under an external *heating flux* exposure of 50 kW/m^2. The specimen, once ignited, is also heated by its own flame.

Note: The test apparatus has provision for testing specimens in a vertical orientation. Discussion on such testing may be found in Appendix C.

2 SIGNIFICANCE

2.1 This test method provides a description of the behaviour of specimens under a specified fire exposure.

2.2 The data, obtained for a specific test, describes the *heat release rate* and *smoke production rate* of the specimen when exposed to the specific environmental conditions and procedures.

2.3 The *heat release rate* is calculated per square metre of effective exposed surface area. If a specimen swells, sags, delaminates, or otherwise deforms so that the exposed surface area changes, the calculated heat release rate corresponds to the effective exposed area, not to the new surface area.

2.4 The *smoke production rate* is determined by measuring the volumetric flow rate of smoke and the *extinction coefficient* of the smoke at the point of measurement.

2.5 The applicability of data from this test method to products in actual use is dependent on test specimens being representative of that product.

2.6 This test method may not be applicable to end-use products that do not have planar, or nearly planar external surfaces.

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