International Standard

ISO 10840

Plastics — Specifications and guidance for the use of standard fire tests

Plastiques — Spécifications et lignes directrices pour l'utilisation d'essais au feu normalisés

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 4, *Burning behaviour,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 249, *Plastics,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 10840:2008), which has been technically revised.

The main changes are as follows:

— the reference documents have been reviewed and updated;

— the terms and definitions have been reviewed and updated;

— a new subclause 5.5 for fire safety engineering has been added.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Many of the current reaction-to-fire tests were developed, prior to the widespread use of synthetic polymers, to assess products incorporating materials such as wood (in the building industry), paper (in electrical wires and cables), and naturally occurring fibres such as cotton, wool and horsehair (in many textile, furniture and electrical applications). The reaction-to-fire characteristics of these so-cold traditional materials are often very different from those of synthetic materials, especially thermoplastics.

ISO/TC 61/SC 4 recognises the need for guidance for users of fire-test standards commonly applied to materials and products made of, or incorporating, plastics. In 2003, the first edition of ISO 10840 was published, based on the now withdrawn ISO TR 10840:1993 (*Plastics – Burning behaviour – Guidance for development and use of fire test)*, which listed a series of potential problems associated with the reaction-to-fire testing of plastics materials and products. ISO TR 10840, however, provided users of the test methods with no practical assistance on how to cope with the listed difficulties.

This document provides detailed information about how to conduct standard fire tests which are more relatable to the real conditions of plastics products in a variety of applications.

With more concerns expressed about the environmental impact of fires involving plastics, additional guidance has been included in the second edition, and extended in this third edition.

Particular attention is given to the provision of guidance for inexperienced users who need to assess the fire performance of materials or products made of, or incorporating, plastics. This document also provides answers to frequently asked questions concerning fire tests; these cover factors such as cost, duration, complexity, required operator skills, quality of the data produced, relevance to fire hazard assessment as well as test repeatability and reproducibility. This document contains a bibliography of the most frequently used fire tests applied to the materials and products within the scope of ISO/TC 61/SC 4.

The main focus of this document is on reaction-to-fire testing. Fire resistance testing has also been considered, in particular for the use of plastic construction of small ships, to take account of the widespread use of advanced polymer composites and related materials with superior thermo-mechanical stability which can be used in applications where there is a demand for some degree of fire resistance.

This document provides specifications and guidance for use of fire test of plastics based on the fire safety engineering (FSE) using methodologies prescribed in ISO 23932-1[45], IEC 60695-1-11[46] and IEC 60695-1-12[47].

This document also provides guidance on some standard fire tests which give data that is applicable for assessment of the potentially adverse environmental impact of combustion products that can be generated in large-scale fires involving plastics materials and products (see Annex B).

NOTE The term, ‘adverse environmental impact’, covers undesirable direct effects on the environment as well as indirect effects on people of ISO 10840 through environmental exposure.

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Plastics — Specifications and guidance for the use of standard fire tests

1 Scope

This document provides specifications and guidance for the use of standard fire testing for plastics and the products in the following aspects:

— selection of appropriate tests that reflect realistic end-use conditions;

— grouping of the reaction-to-fire characteristics that any given test or tests can measure;

— assessment of tests as to their relevance in areas such as material characterisation, quality control, pre-selection, end-product testing, environmental profiling and design for the environment (DfE);

— definition of potential problems that can arise when plastics are tested in standard fire tests.

This document does not include specification for development or design of new fire-tests for plastics.

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.

ISO 10093, *Plastics — Fire tests — Standard ignition sources*

ISO 13943, *Fire safety — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13943 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
end-product test
fire hazard assessment test on a complete product, piece, part component or sub-assembly

3.2
pre-selection test
combustion characteristic test made on a standardized shape, for the process of assessing and choosing candidate materials, components or subassemblies for making an end product

3.3
spalling
breaking off of fragments or solid articles from a heated surface

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