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Estimation of the lethal toxic potency of fire effluents

Détermination du pouvoir toxique létal des effluents du feu

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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 documents 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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 92, *Fire safety*, Subcommittee SC 3, *Fire threat to people and environment*.

This third edition cancels and replaces the second edition (ISO 13344:2004), which has been technically revised. The following changes have been made:

— ISO 19702 has been added as a normative reference and citations added in 6.2.3 and 9.2.2;

— the first paragraph in 4.3 has been deleted;

— the note in 13.2 has been deleted.

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Introduction

The pyrolysis or combustion of every combustible material produces a fire effluent atmosphere, which, in sufficiently high concentration, is toxic. It is, therefore, desirable to establish a standard test method for the estimation of the toxic potency of such fire effluents.

It is further desirable, in view of worldwide resistance to the exposure of animals in standard tests, that this method should not make mandatory the use of such animals in its procedures. The mandatory portion of this standard test does not, therefore, specify the use of animal exposures. It only refers to animal exposure data already reported in the literature, with calculations being employed to express test results as they would have been obtained had animals actually been employed.

For those cases in which confirmation of test results using animal exposures can be justifiably permitted, an optional procedure to do so is presented in Annex A.

The two parameters calculated using this standard are the FED (Fractional Effective Dose) and the LC_{50}. When either of these is used in performing a hazard analysis, certain information must accompany the term to avoid confusion. In the case of the FED, that is the toxicological effect on which the FED is based and the animal species for which the FED has been determined. In the case of the LC_{50}, that information is the length of the exposure and the animal species for which the LC_{50} has been determined.

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Estimation of the lethal toxic potency of fire effluents

1 Scope

This International Standard provides a means for estimating the lethal toxic potency of the fire effluent produced from a material while exposed to the specific combustion conditions of a physical fire model. The lethal toxic potency values are specifically related to the fire model selected, the exposure scenario and the material evaluated.

Lethal toxic potency values associated with 30-min exposures of rats are predicted using calculations which employ combustion atmosphere analytical data for carbon monoxide (CO), carbon dioxide (CO_2), oxygen (O_2) (vitiation) and, if present, hydrogen cyanide (HCN), hydrogen chloride (HCl), hydrogen bromide (HBr), hydrogen fluoride (HF), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), acrolein and formaldehyde. The chemical composition of the test specimen may suggest additional combustion products to be quantified and included. If the fire effluent toxic potency cannot be attributed to the toxicants analysed (Annex A), this is an indication that other toxicants or factors must be considered.

This International Standard is applicable to the estimation of the lethal toxic potency of fire effluent atmospheres produced from materials, products or assemblies under controlled laboratory conditions and should not be used in isolation to describe or appraise the toxic hazard or risk of materials, products or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire hazard assessment that takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use; see ISO 19706.

The intended use of fire safety-engineering calculations is for life-safety prediction for people and is most frequently for time intervals somewhat shorter than 30 min. This extrapolation across species and exposure intervals is outside the scope of this International Standard.

This International Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this International Standard to establish appropriate safety and health practices.

2 Normative references

The following referenced documents are indispensable for the application 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 13571, *Life-threatening components of fire — Guidelines for the estimation of time to compromised tenability in fires*

ISO 13943:2008, *Fire safety — Vocabulary*

ISO 19701, *Methods for sampling and analysis of fire effluents*

ISO 19702, *Guidance for sampling and analysis of toxic gases and vapours in fire effluents using Fourier transform infrared (FTIR) spectroscopy*

ISO 19706, *Guidelines for assessing the fire threat to people*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13943:2008 apply.

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