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Guidance for assessing the validity of physical fire models for obtaining fire effluent toxicity data for fire hazard and risk assessment —

Part 1: Criteria

Lignes directrices pour évaluer la validité des modèles de feu physiques pour l'obtention de données sur les effluents du feu en vue de l'évaluation des risques et dangers —

Partie 1: Critères

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Foreword

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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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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 16312-1:2010), of which it constitutes a minor revision with the normative references and bibliography having been updated.

A list of all parts in the ISO 16312-series can be found on the ISO website.

Introduction

Providing the desired degree of life safety for an occupancy increasingly involves an explicit fire hazard or risk assessment. This assessment includes such components as the following:

— information on the room/building properties;

— the nature of the occupancy;

— the nature of the occupants;

— the types of potential fires;

— the outcomes to be avoided, etc.

This type of determination also requires information on the potential for harm due to the effluent produced in the fire. Because of the prohibitive cost of real-scale product testing under the wide range of fire conditions, most estimates of the potential harm from the fire effluent depend on data generated from a physical fire model, a reduced-scale test apparatus and procedure for its use.

The role of a physical fire model for generating accurate toxic effluent composition is to recreate the essential features of the complex thermal and reactive chemical environment in full-scale fires. These environments vary with the physical characteristics of the fire scenario and with time during the course of the fire, and close representation of some phenomena occurring in full-scale fires can be difficult or even not possible on a small-scale. The accuracy of the physical fire model, then, depends on two features:

a) degree to which the combustion conditions in the bench-scale apparatus mirror those in the fire stage being replicated;

b) degree to which the yields of the important combustion products obtained from burning of the commercial product at full scale are replicated by the yields from burning specimens of the product in the small-scale model. This measure is generally performed for a small set of products, and the derived accuracy is then presumed to extend to other test subjects. At least one methodology for effecting this comparison has been developed.[11]

This document provides guidance for accuracy assessment with and without the use of laboratory animals. Generally, accurate estimation of the toxic potency of the effluent can be obtained from analysis of a small number of gases (the *N*-gas hypothesis), as described in ISO 13571. This is especially true for product formulations similar to those for which the *N*-gas model has been confirmed. There are, however, cases where unusual toxicants have been generated in bench-scale apparatus. Thus, for novel commercial product formulations, confidence in the accuracy of the toxic potency measurement in the bench-scale device can be improved by a confirming bioassay and correlation with real-scale fire tests.