



**SLOVENSKI STANDARD**  
**SIST ISO/TR 9122-2:1999**  
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Toxicity testing of fire effluents -- Part 2: Guidelines for biological assays to determine the acute inhalation toxicity of fire effluents (basic principles, criteria and methodology)

**iTeh STANDARD PREVIEW**

Essais de toxicité des effluents du feu -- Partie 2: Directives pour les essais biologiques permettant de déterminer la toxicité aiguë par inhalation des effluents du feu (principes de base, critères et méthodologie) [SIST ISO/TR 9122-2:1999](https://standards.iteh.ai/catalog/standards/sist/504b4da8-f3d7-4d18-994d-665f646958de/sist-iso-tr-9122-2-1999)

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**Toxicity testing of fire effluents —****Part 2:**

Guidelines for biological assays to determine the acute inhalation toxicity of fire effluents (basic principles, criteria and methodology)

iTeh STANDARD PREVIEW  
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*Essais de toxicité des effluents du feu —*

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Reference number  
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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 main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 9122-2, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 92, *Fire tests on building materials, components and structures*.

ISO 9122 consists of the following parts, under the general title *Toxicity testing of fire effluents*:

- *Part 1: General*  
[Technical Report]
- *Part 2: Guidelines for biological assays to determine the acute inhalation toxicity of fire effluents (basic principles, criteria and methodology)*  
[Technical Report]
- *Part 3: Methods for the analysis of gases and vapours*

Annex A of this part of ISO 9122 is for information only.

## Introduction

Several small-scale test methods for assessing the inhalation toxicity of the fire effluents of materials and simple composites have been described in the literature. They have been used mostly for research and development purposes.

Such test methods are usually split into three parts: a fire model (generation of fire effluent), analytical methods, and an animal model (biological assay procedure). These test methods differ substantially, especially in the use of various fire models.

ISO/TR 9122-2 considers only the biological assay procedures (animal model). The approach used in this document has been to recommend minimum standards of scientific practice. This principle has been successfully applied in the toxicity assessment of drugs, pesticides and chemicals and, as a consequence, international guidelines harmonizing scientific contributions in toxicity testing have been published.

The guidelines in this Technical Report for the determination of the acute toxicity of fire effluents have been developed from the collective experience of the participating experts and from their consideration of published results as shown in the bibliography (see annex A).

Basic principles of inhalation toxicology (as outlined, for instance, in international guidelines for toxicity testing of chemicals, pesticides or drugs) also apply to the determination of the acute inhalation toxicity of fire effluents. Additionally, criteria have been determined for acceptable biological assays which consider specific effects in combustion toxicology. Some criteria have been defined from the toxicologist's point of view concerning acceptable fire models (see clause 2) and suitable analytical methods. Recommendations for an appropriate selection of suitable methods have been formed by critically reviewing biological assay procedures against these basic principles and special criteria.

The following basic principles and criteria have been selected and are discussed:

- the nature of toxic effects (narcosis, irritancy, etc.);
- the relevance of animal data to humans;
- suitable endpoints of biological assays (lethality and incapacitation);
- characterization of toxic effects (qualitatively and quantitatively);
- reliability, validity, repeatability, reproducibility and sensitivity;
- characterization of doses;
- exposure time period (5 min and 30 min);

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- exposure systems;
- modes of exposure;
- fire models;
- observations and examinations;
- *post mortem* examination;
- data evaluation and reporting;
- good laboratory practice;
- personnel.

Test concepts are recommended and the following conclusions are drawn:

- suitable biological assays are available for the determination of narcotic effects which meet the basic principles and criteria;
- biological assays are available for the determination of sensory irritant effects which meet the basic principles and criteria. The correlation of the effects found in animals with humans is uncertain;
- suitable biological assays are available for the determination of pulmonary irritant effects, which meet the basic principles and criteria;
- suitable biological assays such as the OECD (Organisation for European Community Development) Guidelines [2] are available for the determination of toxic effects other than narcotic or irritant ones, which meet the basic principles and criteria;
- analytical pretests are recommended before tests with animals are performed in order to minimize the use of animals.



## Toxicity testing of fire effluents —

### Part 2:

## Guidelines for biological assays to determine the acute inhalation toxicity of fire effluents (basic principles, criteria and methodology)

### 1 Scope

The main objective of ISO Technical Report 9122-2 is to provide researchers with basic background information on methods suitable to define the acute inhalation toxicity of fire effluents, as generated by fire models (see clause 2).

In producing ISO Technical Report 9122-2, comprehensive and critical reviews have been made of the current state-of-the-art of biological assay methods in combustion toxicology. It is, therefore, hoped that researchers will be encouraged to use common approaches in research, so that data and test results can be more widely used for assessments of comparative toxicity, and also to minimize the overall use of biological assays.

While it has been felt essential to specify minimum standards of scientific practice, the selection of suitable and recommended experimental methods is left to the judgement and responsibility of the scientific experts performing these tests.

The scope of this Technical Report includes

- basic principles of inhalation toxicology applicable for biological assay of fire effluents;
- criteria for acceptable biological assays;
- some criteria on fire models and analytical methods, from the toxicologist's point of view.

This Technical Report does not take into account chronic and long-term effects of fire effluents and their adverse effects, such as heat or oxygen depletion, arising from fire.

This Technical Report is mainly intended to be useful in research and development laboratories. It should be emphasized that the use of toxicity test results alone to classify materials with respect to their fire safety use is inadequate. The integration of toxicity data into a toxic hazard assessment is essential but is presently not well defined and should be the next major goal for combustion toxicology.

### 2 Definitions

For the purposes of this Technical Report, the following definitions apply.

**2.1 acute toxicity:** The effects following a single exposure to, or dose of, a toxicant. The effects may be seen immediately, or after a delay of hours or days.

**2.2 biological assay (or bioassay):** Originally a term reserved for the use of a biological system to detect and/or measure the amount of a biologically active material. In the fire context it refers to the use of animal exposures, rather than chemical analyses, to determine the toxicity of a fire effluent.

**2.3 chronic toxicity:** Toxicity resulting from multiple doses or exposure to a toxicant over an extended period of time.

**2.4 concentration:** The amount of a contaminant in the atmosphere per unit of volume of the atmosphere, usually quoted as mass/volume (milligrams per millilitre or milligrams per cubic metre) or volume/volume (parts per million or per cent).