
Toxicity testing of fire effluents —

Part 6:

Guidance for regulators and specifiers on the assessment of toxic hazard in fires in buildings and transport

Essais de toxicité des effluents du feu —

Partie 6: Directives destinées aux législateurs et aux spécificateurs pour l'évaluation du risque de toxicité des incendies dans les bâtiments et dans le transport



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 Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.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 9122-6, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 92, *Fire tests on building materials, components and structures*, Subcommittee SC 3, *Toxic hazards in fire*.

This document is being issued in the type 2 Technical Report series of publications (according to subclause G.4.2.2 of part 1 of the ISO/IEC Directives) as a "prospective standard for provisional application" in the field of toxicity testing of fire effluents because there is an urgent need for guidance on how standards in this field should be used to meet an identified need.

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International Organization for Standardization
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Printed in Switzerland

This document is not to be regarded as an "International Standard". It is proposed for provisional application so that information and experience of its use in practice may be gathered. Comments on the content of this document should be sent to the ISO Central Secretariat.

A review of this type 2 Technical Report will be carried out not later than two years after its publication with the options of: extension for another two years; conversion into an International Standard; or withdrawal.

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

- *Part 1: General*
- *Part 2: Guidelines for biological assays to determine the acute inhalation toxicity of fire effluents (basic principles, criteria and methodology)*
- *Part 3: Methods for the analysis of gases and vapours in fire effluents*
- *Part 4: The fire model (furnaces and combustion apparatus used in small-scale testing)*
- *Part 5: Prediction of toxic effects of fire effluents*
- *Part 6: Guidance for regulators and specifiers on the assessment of toxic hazards in fires in buildings and transport*

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

Toxicity testing of fire effluents —

Part 6:

Guidance for regulators and specifiers on the assessment of toxic hazard in fires in buildings and transport

1 Scope

This part of ISO/TR 9122 is intended to provide guidance for the regulator and specifier on the assessment of toxic hazards in fires in buildings and transport. This is done by describing a series of logical steps to assess a particular fire scenario.

2 Background

The life threat hazard from fires continues to be a source of concern in many countries^[1]. Of major concern is exposure to toxic gases which together with heat and visual obscuration from smoke are responsible for the majority of deaths and serious injury in fires. The increasing use of novel materials and innovative design in buildings and transport vehicles and their contents, can create new potential hazards as well as new opportunities for the reduction of hazard. There is therefore a great need for effective methods for the assessment of life threat hazard and its regulation. This has stimulated wide ranging research over many years whose aim has been to understand the nature and biological effects of fire effluent atmospheres and provide guidance on the mitigation of their effects.

2.1 Regulatory use of data from small-scale toxicity tests

The initial thrust internationally was to develop a small-scale test for toxic potency of materials which could be used by regulators, specifiers and fire safety practitioners in much the same way as other small-scale fire tests have been used for the control of materials. This perceived need for small-scale toxic

potency tests arose from concern about the increasing incidence of fire deaths resulting from smoke exposure. There was a feeling that the most important factor in toxic hazard was the toxic potency of combustion products and that modern materials evolved products which had a much greater toxic potency than traditional materials. This fear was increased by the discovery of a small number of materials evolving products with an unusually high toxic potency in small-scale tests. These concerns led to pressure for small-scale tests to measure the toxic potency of combustion products so that materials could be ranked and on that basis, "bad" materials could be identified. Experience with these tests over many years coupled with a growing understanding from research of the life threatening properties of "real" fires has resulted in the general consensus that such small-scale test data independent of other fire performance data, are insufficient for assessing life threat hazard. Also, examples of unusually high toxic potency have proven to be rare and in most fires the major toxic effects are known to be caused by a small number of well known products. It follows that attempts to regulate on the basis of toxic potency values alone such as those required to be submitted by the State of New York (U. Pitt test^[2]), or to specify materials based upon unrealistic tests such as the NES713^[3] or controls based solely upon elemental composition of synthetic materials^[4] may be considered counterproductive.

The main limitations of small-scale tests are:

- a) the tests do not address the problem of the rate of fire growth and toxic product generation which are essential in toxic hazard assessment;