Australian Standard™

Fire hazard testing

Part 7.50: Toxicity of fire effluent—Estimation of toxic potency—Apparatus and test method

This Australian Standard® was prepared by Committee EL-053, Fire hazard testing—Electrotechnical equipment. It was approved on behalf of the Council of Standards Australia on 23 May 2006.
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The following are represented on Committee EL-053:

- Australian Electrical and Electronic Manufacturers Association
- Australian Information Industry Association
- Electrical Compliance Testing Association
- Electrical Regulatory Authorities Council
- Energy Networks Association

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Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through public comment period.

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PREFACE

This Standard was prepared by the Standards Australia Committee EL-053, Fire hazard testing—Electrotechnical equipment.

The objective of this series of standards is to provide the electrotechnology industry and standards writing committees with a series of standards which give guidance on assessing the fire hazard of electrotechnical products.

This Standard is identical with, and has been reproduced from IEC/TR 60695-7-50, Ed 1.0 (2002), *Fire hazard testing - Part 7-50: Toxicity of fire effluent - Estimation of toxic potency—Apparatus and test method.*

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.

(b) In the source text 'IEC/TS 60695-7-50' should read 'AS 60695.7.50'.

(c) A full point should be substituted for a comma when referring to a decimal marker.

(d) Any French text on figures should be ignored.

The terms 'normative' and 'informative' are used to define the application of the annex to which they apply. A normative annex is an integral part of a standard, whereas an informative annex is only for information and guidance.

Any International Standard referenced should be replaced by an equivalent Australian Standard where one is available. The availability of equivalent Australian Standards can be determined either from the Standards Web Shop at www.standards.com.au or from the annual printed catalogue of Australian Standards.

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INTRODUCTION

Over the past ten years, ISO TC 92 SC 3 has been given the task of examining methodologies for reducing the toxic hazard from fire. This work has resulted in a series of guidance documents, ISO/TR 9122. Similarly, IEC TC 89 WG 7 has been given the task of applying the guidance of ISO TC 92 SC 3 in the field of electrotechnical products and has produced the IEC 60695-7 series of standards.

Specifiers, legislators and purchasers of electrotechnical products have tried to ensure a reduction in toxic hazard from fires by utilizing the results of small-scale decomposition tests on materials, allied with chemical analysis of selected products. These analytical results are often used in calculations, frequently allied with the LC_{50} as an indicator of toxic potency, to calculate toxicity indices which are then used either to rank products or to provide go/no-go decisions on their suitability for particular applications.

According to the guidance of ISO TC 92 SC 3, many of the tests used are inappropriate for determining the toxic potency of fire effluent, often due to the flawed nature of the fire model. In addition, ISO advises that measurements of toxic potency should never be used in isolation for specifying products, but that such measurements should form part of an overall hazard analysis (see IEC 60695-7-1).

There is a view that, as a first approximation, all fire atmospheres can be classified as equal in toxic potency, and that minimization of toxic hazard in fire is best accomplished by limiting ignition and fire growth rate, together with minimization of smoke obscuration and facilitation of escape. This view, therefore, has no requirement for toxic potency testing. However, pressure remains from specifiers, legislators and purchasers of electrotechnical products to measure and use toxic potency data from materials products. In addition, it is the view of ISO TC 92 SC 3 that toxic potency data is still required for use in hazard assessment calculations.

Accordingly, IEC TC 89 proposed a work item to develop practical small-scale test for toxic potency which, by virtue of its ability to model defined stages of a real fire, would yield toxic potency data suitable for use in a full hazard assessment. This proposed test method follows the guidance of ISO TC 92 SC 3 in terms of the fire model used, and in methods of measurement of effluent. IEC 60695-7-51 covers the calculation and interpretation of test results, again following the guidance of ISO TC 92 SC 3.

WARNING

A Avoidance of misleading interference

This test method shall be used solely to measure and describe the properties of materials, products or systems in response to heat or flame under controlled laboratory conditions and should not be considered or used by itself for describing or appraising the fire hazard of materials, products or systems under actual fire conditions or as the sole source on which regulations pertaining to toxicity can be based.

B Avoidance of danger to test operators

This test procedure involves combustion processes in which fire hazards may exist from combustion products. To avoid accidental leakage of hazardous combustion products, the entire system (combustion apparatus and exposure system) should be placed in a fume cupboard with an external venting system.

The venting system shall be checked for proper operation before testing and shall discharge into an exhaust system with adequate capacity.

As, in unfavourable circumstances, extremely rapid combustion or explosion can occur when the device is in operation, a protective screen between the operator and the apparatus is recommended and, in addition, care should be taken to ensure that the gas outlet at the end of the quartz furnace tube has as large a diameter as possible.

NOTES

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1 Scope

This technical specification describes a test method for the generation of fire effluent and the identification and measurement of its constituent combustion products. It uses a moving test specimen and a tube furnace at different temperatures and air flow rates as the fire model. This test method is designed to reproduce certain decomposition conditions in a range of fire types characterized in ISO/TR 9122-1.

Stage 1b Non-flaming decomposition (oxidative)

Stage 2 Developing fire (flaming)

Stage 3a Fully developed fire (flaming), relatively low ventilation

The method described in this technical specification is designed to model closely all three of these major fire stages, and also has the potential to model others as necessary. In this test, the measurement of fire effluent is made using material test specimens, which may be taken from end-products, or, if the apparatus and method allow, may be an end-product.

Toxic potency values are only of use in toxic hazard estimations, and must not be used in isolation.

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications in the preparation of its publications.

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.

IEC 60695-1-1:1999, *Fire hazard testing – Part 1-1: Guidance for assessing the fire hazard of electrotechnical products – General guidelines*

IEC 60695-7-2, *Fire hazard testing – Part 7-2: Toxicity of fire effluent – Summary and relevance of test methods*

IEC 60695-7-51, *Fire hazard testing – Part 7-51: Toxicity of fire effluent – Estimation of toxic potency: Calculation and interpretation of test results*

IEC 60754-2:1991, *Test on gases evolved during combustion of electric cables – Part 2: Determination of degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity*

IEC Guide 104:1997, *The preparation of safety publications and the use of basic safety publications and group safety publications*

