Australian Standard®

# Fire hazard testing

# Part 11.40: Test flames—Confirmatory tests—Guidance



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/TS 60695-11-40, Ed 1.0 (2002), *Fire hazard testing - Part 11-40: Test flames - Confirmatory tests - Guidance.*

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 60695-11-40' should read 'AS 60695.11.40'.

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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.

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# INTRODUCTION

Small-scale, standard flames (see note) are specified for various tests, where sufficient hardware design and use parameters are specified in an effort to ensure consistent flames. Hardware designs and dimensions, material specifications and fuel and air specifications are typical necessary parameters. Experience has shown that the quality of the resulting flames and, therefore, the associated test results, are influenced significantly by subtle variations in the equipment and test technique. Some simple checks on flame qualities, such as flame colour and dimensions, or the melting characteristics of silver wire, are often specified in conjunction with hardware, fuel, air or other normal adjustments.

The need for more precise and quantitative confirmation of flame qualities has been recognized, leading to the introduction of confirmatory tests based on the copper block calorimetry technique. This technical specification is intended to provide guidance for the design of test flame confirmatory tests using copper block calorimetry measurements.

**Table 1 – Existing test flames with confirmatory tests**

| Nominal flame power<br>W | Flame type [a] | Reference IEC 60695- | Approximate overall height<br>mm | Approximate cone height<br>mm | Copper block mass<br>g | Copper block position above burner<br>mm | Time spec. 100 °C to 700 °C<br>s |
|---|---|---|---|---|---|---|---|
| 1 000 | PP-P | 2-4/1 (11-2) | 175 | 55 | 10 | 95 | 45 |
| 500 | M-P | 11-3 | 125 | 40 | 1[illegible] | 55 | 54 |
| 50 | M-P | 11-4 | 20 | – | 1,[illegible]6 | 10 | 44 |
| Needle | B-D | 2-2 (11-5) | 12 | – | 0,58 | 6 | 23,5 |
| [a] PP propane; M methane; B butane; P pre-mixed; D diffusion | | | | | | | |
| NOTE Flame power and height generally less than 2 000 W and 200 mm, respectively. | | | | | | | |

NOTE Readers are encouraged to send test data to the TC 89 Secretary for further study by the author and as valuable feedback for the next revision. The coordinates of the secretary can be found on the IEC website http://www.iec.ch

STANDARDS AUSTRALIA

# Australian Standard

# Fire hazard testing
# Part 11.40: Test flames—Confirmatory tests—Guidance

## 1 Scope

This part of IEC 60695 presents a general characterization of small-scale test flames and associated confirmatory tests based on copper block calorimetry, and defines theoretical modelling for the associated dynamics. Guidance is presented for the selection of critical parameters in confirmatory test designs. A theory is presented to define additional performance parameters for confirmatory tests, enabling a precise implicit mathematical characterization of confirmatory test heating curves.

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

ISO/IEC 13943:2000, *Fire safety – Vocabulary*

## 3 Definitions

For the purpose of this part of IEC 60695, definitions taken from ISO/IEC 13943, together with the following definitions, apply.

**3.1**
**copper block heat content**
theoretical total available thermal energy attributable only to the copper test block temperature, copper heat capacity and mass

**3.2**
**confirmatory test**
calorimetric procedure intended as a diagnostic indicator to reveal anomalous behaviour or conditions in a test flame, burner or associated hardware

**3.3**
**flame stabilizer**
assembly normally fitted to the top of a standard laboratory Bunsen or Tirrill burner intended to mitigate the destabilizing effect of the turbulent mixing of flame gases with the ambient air, by providing an intervening layer of gas having an intermediate velocity between the ambient still air and the faster flame gases