Australian Standard™

Fire hazard testing

Part 9.1: Surface spread of flame—General 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.
This Standard was published on 22 June 2006.

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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This Standard was issued in draft form for comment as DR 06192.

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First published as AS 60695.9.1—2006.

Published by Standards Australia GPO Box 476, Sydney, NSW 2001, Australia

ISBN 0 7337 7546 2

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 60695-9-1, Ed 2.0 (2005), *Fire hazard testing - Part 9-1: Surface spread of flame - General 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 60695-9-1' should read 'AS 60695.9.1'.

(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

Fires are responsible for creating hazards to life and property as a result of the generation of heat (thermal hazard), and also toxic effluent, corrosive effluent and smoke (non-thermal hazard). Fire hazard increases with the burning area leading in some cases to flash-over and a fully developed fire. This is a typical fire scenario in buildings.

The surface spread of flame beyond the area of ignition occurs as a result of the creation of a pyrolysis front on the surface of the material, ahead of the flame front, arising from the heating by the flame and external heat sources. The pyrolysis front is the boundary between pyrolysed material and unpyrolysed material on the surface of the material. Combustible vapours are generated within the region of pyrolysed material which mix with air and ignite, creating the flame front.

The surface spread of flame rate is the distance travelled by the flame front divided by the time required to travel that distance. The surface spread of flame rate depends on the heat supplied externally and/or by the flame of the burning material ahead of the burning zone and on the ease of ignition. The ease of ignition is a function of the minimum ignition temperature, thickness, density, specific heat, and thermal conductivity of the material. The heat supplied by the flame depends on the heat release rate, specimen orientation, air flow rate and air flow direction relative to the surface spread of flame direction. In general, materials show one of the following types of surface spread of flame behaviour:

a) non-propagation: there is no flame propagation beyond the area of ignition;

b) decelerating propagation: flame propagation stops before reaching the end of the surface of the material; and

c) propagation: flame propagates beyond the area of ignition and eventually affects the entire surface of the material.

Properties of the materials that are used to describe the surface spread of flame behaviour are associated with surface preheating and pyrolysis, generation of vapours, mixing of the vapours with air, ignition, combustion of the mixture and generation of heat and combustion products. Flame retardants and surface treatments are used to modify the surface spread of flame behaviour. Factors that need to be considered for the assessment of the surface spread of flame behaviour of materials are

a) the fire scenario (surface orientation, ventilation, ignition source, etc.);

b) measurement techniques (see 5.5); and

c) the use and interpretation of results obtained.

STANDARDS AUSTRALIA

Australian Standard

Fire hazard testing
Part 9.1: Surface spread of flame—General guidance

1 Scope

This part of IEC 60695 provides guidance for the assessment of surface spread of flame for electrotechnical products and the materials from which they are formed.

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 60695-4:2005, *Fire hazard testing – Part 4: Terminology concerning fire tests*

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

ISO/IEC Guide 51:1999, *Safety aspects – Guidelines for their inclusion in standards*

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

ISO 2592:2000, *Determination of flash and fire points – Cleveland open cup method*

3 Terms and definitions

For the purpose of this document, the following definitions apply, some of which are taken from ISO/IEC 13943 and IEC 60695-4.

3.1
combustion
exothermic reaction of a substance with an oxidizer

NOTE Combustion generally emits effluent accompanied by flames and/or visible light.

[ISO/IEC 13943, definition 23]

3.2
damaged area
total of those surface areas which have been affected permanently by fire under specified conditions

NOTE 1 It is expressed in square metres.

NOTE 2 Users of this term should specify the types of damage to be considered. This could include, for example, loss of material, deformation, softening, melting, charring, combustion, pyrolysis or chemical attack.

[ISO/IEC 13943, definition 27]