

Fire hazard testing —

Part 1-20: Guidance for assessing the fire hazard of electrotechnical products — Ignitability — General guidance

ICS 13.220.40; 29.020

National foreword

This Draft for Development is the UK implementation of IEC/TS 60695-1-20:2008.

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature. It should be applied on this provisional basis, so that information and experience of its practical application can be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the international organization responsible for its conversion to an international standard. A review of this publication will be initiated not later than three years after its publication by the international organization so that a decision can be taken on its status. Notification of the start of the review period will be made in an announcement in the appropriate issue of *Update Standards*.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into an international Standard, to extend the life of the Technical Specification or to withdraw it. Comments should be sent to the Secretary of the responsible BSI Technical Committee at British Standards House, 389 Chiswick High Road, London W4 4AL.

The UK participation in its preparation was entrusted to Technical Committee GEL/89, Fire hazard testing.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Part 1-20: Guidance for assessing the fire hazard of electrotechnical products –
Ignitability – General guidance**

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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 as a result of the production of toxic effluent, corrosive effluent and smoke (non-thermal hazard). Fires start with ignition and then can grow, leading in some cases to flash-over and a fully developed fire. Ignition resistance is therefore one of the most important parameters of a material to be considered in the assessment of fire hazard. If there is no ignition there is no fire.

For most materials (other than metals and other elements), ignition occurs in the gas phase. Ignition occurs when combustible vapour, mixed with air, reaches a high enough temperature for exothermic oxidation reactions to rapidly propagate. The ease of ignition is a function of the chemical nature of the vapour, the fuel/air ratio and the temperature.

In the case of liquids, the combustible vapour is produced by vaporization of the liquid, and the vaporization process is dependent on the temperature and chemical composition of the liquid.

In the case of solids, the combustible vapour is produced by pyrolysis when the temperature of the solid is sufficiently high. The vaporization process is dependent on the temperature and chemical composition of the solid, and also on the thickness, density, specific heat, and thermal conductivity of the solid.

The ease of ignition of a test specimen depends on many variables. Factors that need to be considered for the assessment of ignitability are:

- a) the geometry of the test specimen, including thickness and the presence of edges, corners or joints;
- b) the surface orientation;
- c) the rate and direction of air flow;
- d) the nature and position of the ignition source;
- e) the magnitude and position of any external heat flux; and
- f) whether the combustible material is a solid or a liquid.

In the design of any electrotechnical product, the risk of fire and the potential hazards associated with fire need to be considered. In this respect the objective of component, circuit and equipment design as well as the choice of materials is to reduce to acceptable levels the potential risks of fire even in the event of foreseeable abnormal use, malfunction or failure. IEC 60695-1-10², together with its companion, IEC 60695-1-11², provide guidance on how this is to be accomplished.

The primary aims are to prevent ignition caused by an electrically energized component part, and in the event of ignition, to confine any resulting fire within the bounds of the enclosure of the electrotechnical product.

Secondary aims include the minimization of any flame spread beyond the product's enclosure and the minimization of harmful effects of fire effluents including heat, smoke, and toxic or corrosive combustion products.

Fires involving electrotechnical products can also be initiated from external non-electrical sources. Considerations of this nature are dealt with in the overall risk assessment.

This technical specification gives an overview of ignitability and its relevance to the fire hazard of electrotechnical products.

² Under consideration.

FIRE HAZARD TESTING –

Part 1-20: Guidance for assessing the fire hazard of electrotechnical products – Ignitability – General guidance

1 Scope

IEC 60695-1-20, which is a technical specification provides guidance on the ignitability of electrotechnical products and the materials from which they are formed. It gives guidance on;

- a) the principles of ignitability,
- b) the selection of appropriate test methods, and
- c) the use and interpretation of results.

This technical specification is intended for use by technical committees in preparation of standards in accordance with the principles laid down IEC Guide 104 and ISO/IEC Guide 51.

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications in the preparation of its publications. The requirements, test methods or test conditions of this basic publication will not apply unless specifically referred to or included in the relevant 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 60695-1-10, *Fire hazard testing – Part 1-10: Guidance for assessing the fire hazard of electrotechnical products – General guidelines*³

IEC 60695-1-11, *Fire hazard testing – Part 1-11: Guidance for assessing the fire hazard of electrotechnical products – Fire hazard assessment*³

IEC 60695-1-21, *Fire hazard testing – Part 1-21: Guidance for assessing the fire hazard of electrotechnical products – Ignitability – Summary and relevance of test methods*

IEC 60695-2-11, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products*

IEC 60695-2-12, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability test method for materials*

IEC 60695-2-13, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignitability test method for materials*

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

IEC 60695-8-3, *Fire hazard testing – Part 8-3: Heat release – Heat release of insulating liquids used in electrotechnical products*⁴

³ Under consideration.

⁴ To be published.