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Fire hazard testing -
Part 5-2: Corrosion damage effects of fire effluent - Summary and relevance of test methods

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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IEC 60695-5-2 has been prepared by IEC technical committee 89: Fire hazard testing. It is an International Standard.

This first edition cancels and replaces the third edition of IEC TS 60695-5-2 published in 2021. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to IEC TS 60695-5-2:

a) 4.4, The nature of the corrosivity measurement, has been added to follow recent technological developments;

b) 5.2, Tests for the determination of halogen acid in combustion gases, has been updated following the recent development of IEC 60754.

The text of this International Standard is based on the following documents:

Draft	Report on voting
89/1672/FDIS	89/1680/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

This International Standard is to be read in conjunction with IEC 60695-5-1.

A list of all parts in the IEC 60695 series, published under the general title *Fire hazard testing*, can be found on the IEC website.

IEC 60695-5 consists of the following parts:

Part 5-1: *Corrosion damage effects of fire effluent - General guidance*

Part 5-2: *Corrosion damage effects of fire effluent - Summary and relevance of test methods*

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,

– withdrawn, or

– revised.

INTRODUCTION

In the design of an 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 the risk of fire to a tolerable level even in the event of reasonably foreseeable (mis)use, malfunction or failure. IEC 60695-1-10 [1][1], IEC 60695-1-11 [2] and IEC 60695-1-12 [3] provide guidance on how this is to be accomplished.

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

The aim of the IEC 60695 series is to save lives and property by reducing the number of fires or reducing the consequences of the fire. This can be accomplished by:

– trying to prevent ignition caused by an electrically energised component part and, in the event of ignition, to confine any resulting fire within the bounds of the enclosure of the electrotechnical product.
– trying to minimise flame spread beyond the product's enclosure and to minimise the harmful effects of fire effluents including heat, smoke, and toxic or corrosive combustion products.

All fire effluents are corrosive to some degree and the level of potential to corrode depends on the nature of the fire, the combination of combustible materials involved in the fire, the nature of the substrate under attack, and the temperature and relative humidity of the environment in which the corrosion is taking place. There is no evidence that fire effluent from electrotechnical products offers greater risk of corrosion damage than the fire effluent from other products such as furnishings, building materials, etc.

The performance of electrical and electronic components can be adversely affected by corrosion damage when subjected to fire effluent. A wide variety of combinations of small quantities of effluent gases, smoke particles, moisture and temperature can provide conditions for electrical component or system failures from breakage, overheating or shorting.

Evaluation of potential corrosion damage is particularly important for high value and safety-related electrotechnical products and installations.

Technical committees responsible for the products will choose the test(s) and specify the level of severity.

The study of corrosion damage requires an interdisciplinary approach involving chemistry, electricity, physics, mechanical engineering, metallurgy and electrochemistry. In the preparation of this document, all of the above have been considered.

IEC 60695-5-1 defines the scope of the guidance and indicates the field of application.

IEC 60695-5-2 provides a summary of test methods including relevance and usefulness.

[1] Numbers in square brackets refer to the bibliography.

1 Scope

This part of IEC 60695 summarises the test methods that are used in the assessment of the corrosivity of fire effluent. It presents a brief summary of test methods in common use, either as international standards, national or industry standards. It includes special observations on their relevance, for electrotechnical products and their materials, to real fire scenarios and gives recommendations on their use.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Fire hazard testing - Part 4: Terminology concerning fire tests*

IEC 60695-5-1, *Fire hazard testing - Part 5-1: Corrosion damage effects of fire effluent - General guidance*

ISO 13943:2017, *Fire safety - Vocabulary*

Bibliography

[1] IEC 60695-1-10, *Fire hazard testing - Part 1-10: Guidance for assessing the fire hazard of electrotechnical products - General guidelines*

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

[3] IEC 60695-1-12, *Fire hazard testing - Part 1-12: Guidance for assessing the fire hazard of electrotechnical products - Fire safety engineering*

[4] IEC 60754-1, *Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content*

[5] IEC 60754-2, *Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity*

[6] IEC 60754-3, *Test on gases evolved during combustion of materials from cables - Part 3: Measurement of low level of halogen content by ion chromatography*

[7] CAN/CSA-C22.2 No. 0.3, *Test Methods for Electrical Wires and Cables*

[8] NF C20-453, *Basic environmental testing procedures. Test methods. Conventional determination of corrosiveness of smoke*

[9] ASTM D 2671, *Sections 89 to 95, Standard Test Methods for Heat-Shrinkable Tubing for Electrical Use: Corrosion testing*

[10] ISO 11907-4, *Plastics - Smoke generation - Determination of the corrosivity of fire effluents - Part 4: Dynamic decomposition method using a conical radiant heater*

[11] ASTM D 5485, *Standard Test Method for Determining the Corrosive Effect of Combustion Products Using the Cone Corrosimeter*

[12] ISO 19706:2011, *Guidelines for assessing the fire threat to people*

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