



BSI Standards Publication

Plastics — Intumescence properties of PVC materials and products — Test method for the measurement of expansion with the cone calorimeter

National foreword

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The UK participation in its preparation was entrusted to Technical Committee PRI/26, Burning behaviour of plastics and rubbers.

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

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Plastics — Intumescence properties of PVC materials and products — Test method for the measurement of expansion with the cone calorimeter

*Plastiques — Propriétés d'intumescence des matériaux et produits
en PVC — Méthode d'essai pour mesurer l'expansion à l'aide d'un
calorimètre à cône*



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Foreword

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This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 4, *Burning behaviour*.

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Introduction

Polyvinyl chloride (PVC) is an example of an intumescent material that leaves much of the original carbon content as a solid residue. The presence of chlorine in PVC exerts its influence in two ways, causing an increase in:

- hydrogenated char formation (meaning that less flammable decomposition products are formed);
- generating HCl, which then acts as a gas phase scavenger slowing down further reactions of flammable products in the gas phase. $[-CH_2-CHCl- \rightarrow -CH=CH- + HCl]$

The expansion formed has two positive effects regarding fire safety:

- it is a barrier between the source of heat and the unaffected polymer material leading to a reduction of its rate of decomposition;
- it reduces the release of flammable gas.

[ISO/TR 20118](#) provides information on fire properties of PVC materials.

The intumescent properties of PVC materials and products are likely, however, to be affected by their exact formulation and by the use of specific chemical species (e.g. intumescent chemicals), as processing aids or other components of the specific material. The aim of this document is to propose a test method to characterize the intumescence properties of PVC materials and products, by using the cone calorimeter heater as defined in standards [ISO 5660-1](#), [ISO 13927](#) and [ISO 17554](#).

In this test method, the expansion of PVC materials and products is determined by the measurement of the height increase of a specimen when exposed to the radiated heat produced by an electrical conical heater. Intumescence is a property given to, or pre-existing in, some materials and used in fire safety as a way to increase fire performance and protect materials or products with regard to either reaction-to-fire or fire resistance.