

Plastics — Smoke generation — Determination of the corrosivity of fire effluents —

Part 4: Dynamic decomposition method using a conical radiant heater

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National foreword

This British Standard reproduces verbatim ISO 11907-4:1998 and implements it as the UK national standard.

The UK participation in its preparation was entrusted to Technical Committee PRI/26, Burning behaviour of plastics and rubbers, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the ISO title page, page ii, pages 1 to 18 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Amendments issued since publication

Amd. No.	Date	Comments

This British Standard, having been prepared under the direction of the Sector Board for Materials and Chemicals, was published under the authority of the Standards Board and comes into effect on 15 June 1998

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INTERNATIONAL
STANDARD

ISO
11907-4

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**Plastics — Smoke generation —
Determination of the corrosivity of fire
effluents —**

Part 4:

**Dynamic decomposition method using a
conical radiant heater**

*Plastiques — Production de fumées — Détermination de la corrosivité des
effluents du feu —*

*Partie 4: Méthode de décomposition dynamique utilisant un radiateur
conique*



Foreword

ISO (the International Organization for Standardization) is a world-wide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard 11907-4 was prepared by Technical Committee ISO/TC61, *Plastics*, Subcommittee SC 4, *Burning behaviour*.

ISO 11907 consists of the following parts, under the general title *Plastics — Smoke generation — Determination of the corrosivity of fire effluents*:

- *Part 1: Guidance*;
- *Part 2: Static method*;
- *Part 3: Dynamic decomposition method using a travelling furnace*;
- *Part 4: Dynamic decomposition method using a conical radiant heater*.

Annex A of this part of ISO 11907 is for information only.

Descriptors: Plastics, combustion products, smoke generation, gaseous effluents, smoke, tests, determination, corrosivity, dynamic tests.

WARNINGS

1 Avoidance of misleading inferences

This standard method of test should be used solely to measure and describe the properties of materials, products or systems in response to heat or flame under controlled laboratory conditions and should not be considered or used by itself for describing or appraising the fire hazard of materials, products or systems under actual fire conditions or as the sole source on which regulations pertaining to corrosivity of fire effluents are based.

2 Avoidance of danger to test operators

The test procedures involve high temperatures and combustion products. Therefore, conditions exist for burns, ignition of extraneous objects or clothing, and inhalation of combustion products. Use eye protection, and use protective gloves for insertion and removal of test specimens. Do not touch either the cone heater or the associated fixtures while hot, except with the use of protective gloves.

Vent the combustion products flowing through the exposure chamber through a properly designed exhaust system. Vent the captured combustion products in a smoke hood at the end of a test.

Check the exhaust system for proper operation before testing, and discharge into a building exhaust system with adequate capacity. Make provisions for collecting and venting any combustion products that for whatever reason fail to be collected by the normal exhaust system of the apparatus.

1 Scope

1.1 This part of ISO 11907 specifies a test method for measuring the corrosive effect, by loss of metal from a target, of the combustion effluents of plastic materials or products.

1.2 The test method is intended for the evaluation of materials or products, for additional data to assist in the design of products, and for development and research purposes.

1.3 The method provides corrosion results for plastic materials or product specimens limited to a maximum size of 100 mm × 100 mm in area. The results of this method have not been investigated with respect to correlation to actual fires.

1.4 The method measures the increase in electrical resistance of a metal circuit. Such increase is related to the decrease in conductive cross-sectional area resulting from the metal loss due to corrosion.

1.5 The method should be used to measure and describe the response of materials and/or products to heat and flame under controlled conditions but should not be used to describe or appraise the fire hazard or fire risk of materials under actual fire conditions. However, results of this test may be used as elements of a fire hazard or risk assessment as they relate to a particular end use.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 11907. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 11907 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5660-1:1993, *Fire tests — Reaction to Fire — Part 1: Rate of heat release from building products (Cone calorimeter method)*.

ISO 11907-1:1998, *Plastics — Smoke generation — Determination of the corrosivity of fire effluents — Part 1: Guidance*.

3 Definitions

For the purposes of this part of ISO 11907, the following definitions apply.

3.1 corrosion

the reaction of a metallic material with its environment, resulting in a measurable change of the material and possibly in an impairment of the functioning of a metal part or of an entire system

NOTE In most cases, the reaction is electrochemical. In others, however, it may be chemical (non-electrochemical) or physical.

3.2 corrosion damage

the physical and/or chemical damage or impaired function caused by chemical action

3.3 corrosion by metal loss

the loss of metal on a target, expressed as reduction in thickness of the target metal

3.4 corrosion testing device

equipment used to determine corrosion in this standard

3.5**corrosion target**

the sensor used to determine, under specified test conditions, the degree of corrosion damage

NOTE This sensor can be a product, a component or a reference material used to simulate them.

3.6**irradiance** (at a point on a surface)

the radiant flux incident on an infinitesimally small element of the surface containing the point, divided by the area of that element

NOTE The specimen, once ignited, is also heated by its own flame.

3.7**exposure chamber**

the enclosure in which a target is exposed to combustion products

3.8**environmental chamber**

the enclosure used to expose the targets to high humidity and temperature after the exposure to combustion products

3.9**sustained flaming**

existence of a flame on or over the surface of the specimen for a minimum period of time (over 10 s)

NOTE For flaming of less than 10 s, the flaming is considered transitory or flashing.

3.10**fire effluent**

the totality of gases and/or aerosols (including suspended particles) created by combustion or pyrolysis

3.11**fire model**

a laboratory process, including the apparatus, the environment and the test procedure, intended to represent a certain phase of a fire

3.12**fire scenario**

a detailed description of conditions, including environmental, of one or more stages from before ignition to completion of combustion in an actual fire at a specific location, or in a real-scale simulation

4 Symbols specific to this test method

A_0	Initial electrical resistance of the corrosion target, Ω .
A_1	Electrical resistance of the corrosion target at the end of 1 hour exposure to combustion products, Ω .
A_{24}	Electrical resistance of the corrosion target at the end of 24 hours in the environmental chamber, Ω .
C	Corrosion of a target, nm.
C_1	Corrosion of a target at the end of 1 hour exposure to combustion products, nm.
C_{24}	Corrosion of a target at the end of 24 hours in the environmental chamber, nm.
m	Specimen mass, g.
m_i	Initial specimen mass, g.
m_f	Final specimen mass, g.
m_{70}	70 % of the total mass loss, g.
t_d	Sampling time, s.
q_v	Volumetric sampling rate of combustion products, m^3/s .

5 Principle

5.1 This test method is used to determine the corrosive effect of combustion products from burning plastic materials. Corrosion is determined by the reduction in thickness of the metal on standardized targets, which is directly related to the increase in electrical resistance of the target due to the decrease in conductive cross-sectional area. These targets are not necessarily representative of the intended end use.

5.2 The test is conducted in two parts.

In the first part, two weight loss tests are conducted by exposing the test specimen to a recommended irradiance of 50 kW/m^2 , or to other heating fluxes up to 100 kW/m^2 relevant to particular scenarios. A spark igniter is used to ignite the combustible vapours. The combustible mass loss is determined as the average mass loss of the two tests.