

Reaction to fire tests — Mass loss measurement

ICS 13.220.40; 13.220.50

National foreword

This British Standard was published by BSI. It is the UK implementation of ISO 17554:2005.

The UK participation in its preparation was entrusted to Technical Committee FSH/21, Reaction to fire tests.

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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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 29 June 2007

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ISBN 978 0 580 52954 2

Amendments issued since publication

Amd. No.	Date	Comments

INTERNATIONAL STANDARD

ISO
17554

First edition
2005-07-01

Reaction to fire tests — Mass loss measurement

Essais de réaction au feu — Mesurage de la perte de masse



Reference number
ISO 17554:2005(E)



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Foreword

ISO (the International Organization for Standardization) is a worldwide 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 17554 was prepared by Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 1, *Fire initiation and growth*.

Reaction to fire tests — Mass loss measurement

1 Scope

This International Standard specifies a small-scale method for assessing the mass loss rate of essentially flat specimens exposed in the horizontal orientation to controlled levels of radiant heating with an external igniter under well-ventilated conditions. The mass loss rate is determined by measurement of the specimen mass and is derived numerically. The time to ignition (sustained flaming) is also measured in this test. Mass loss rate can be used as an indirect measure of heat release rate for many products. However some products, e.g. those with high water content, will have mass loss rates that are not so closely linked to heat release rates. Such products need to be tested in accordance with ISO 5660-1 for correct assessment of heat release.

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.

ISO 554:1976, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 13943:2000, *Fire safety — Vocabulary*

ISO/TR 14697:1997, *Fire tests — Guidance on the choice of substrates for building products*

ISO 5660-1, *Reaction-to-fire tests — Heat release, smoke production and mass loss rate — Part 1: Heat release rate (cone calorimeter method)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13943 and the following apply.

3.1

essentially flat surface

surface whose irregularity from a plane does not exceed ± 1 mm

3.2

flashing

existence of flame on or over the surface of the specimen for periods of less than 1 s

3.3

ignition

onset of sustained flaming as defined in 3.9

3.4

irradiance

⟨point on a surface⟩ quotient of the radiant flux incident on an infinitesimal element of surface containing the point, and the area of that element

NOTE Convective heating is negligible in the horizontal specimen orientation. For this reason, the term “irradiance” is used instead of “heat flux” throughout this International Standard, as it best indicates the essentially radiative mode of heat transfer.

3.5

material

single substance or uniformly dispersed mixture

EXAMPLE Metal, stone, timber, concrete, mineral fibre and polymers.

3.6

orientation

plane in which the exposed face of the specimen is located during testing, with either the vertical or horizontal face upwards

3.7

product

material, composite or assembly about which information is required

3.8

specimen

representative piece of the product which is to be tested together with any substrate or treatment

NOTE For certain types of product, for example products that contain an air gap or joints, it is sometimes not possible to prepare specimens that are representative of the end-use conditions (see Clause 7).

3.9

sustained flaming

existence of flame on or over the surface of the specimen for periods of over 10 s

3.10

transitory flaming

existence of flame on or over the surface of the specimen for periods of between 1 s and 10 s

4 Symbols

Symbol	Designation	Unit
A_s	Initially exposed surface area of the specimen	m^2
M	Mass of the specimen	G
m_i	Mass of the specimen at the start of the test	g
m_f	Mass of the specimen at the end of the test	g
m_{10}	Mass of the specimen at 10 % of total mass loss	g
m_{90}	Mass of the specimen at 90 % of total mass loss	g
$\dot{m}$	Mass loss rate of the specimen	$g \cdot s^{-1}$
$\dot{m}_{max}$	Maximum value of the mass loss rate	$g \cdot s^{-1}$
$\dot{m}_{A,10-90}$	Average mass loss rate per unit area between 10 % and 90 % of mass loss	$g \cdot m^2 \cdot s^{-1}$
$\dot{m}_{180}$	Average mass loss rate over the period starting at t_{ig} and ending 180 s later	$g \cdot s^{-1}$
$\dot{m}_{300}$	Average mass loss rate over the period starting at t_{ig} and ending 300 s later	$g \cdot s^{-1}$
T	Time	s
t_{ig}	Time to ignition (onset of sustained flaming)	s
Δt	Sampling time interval	s