TECHNICAL REPORT

ISO/TR 9705-2

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Reaction-to-fire tests — Full-scale room tests for surface products —

Part 2: Technical background and guidance

Essais de réaction au feu — Essais dans une pièce en vraie grandeur pour les matériaux de revêtement intérieur —

Partie 2: Données techniques et lignes directrices

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Contents

Page

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 3.

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.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this part of ISO/TR 9705 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 9705-2 was prepared by Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 1, *Fire initiation and growth*.

ISO 9705 consists of the following parts, under the general title *Reaction-to-fire tests — Full-scale room tests for surface products*:

— *Part 1: Full-scale test for surface products* (currently published as ISO 9705:1993*, Fire tests — Full-scale room test for surface products*)

— *Part 2: Technical background and guidance* [Technical Report]

Introduction

ISO 9705:1993 specifies a test method simulating a fire that starts under well-ventilated conditions, in a corner of a small room with a single open doorway.

The method is intended to evaluate the contribution to fire growth provided by a surface product using a specified ignition source. The method provides data for a specified ignition source for the early stages of a fire from ignition up to flashover. ISO 9705:1993 also describes different measurement techniques inside and outside the room. This part of ISO 9705 gives background information and support to the potential users of the test. It gives the user of the test technical information on the ignition source, heat fluxes in the room from the burner, heat balance in the room during a fire, aspects of smoke production and toxic gas species production, as well as aspects of modelling the results of these tests. It gives the user the information necessary to select the testing procedure for specific projects or regulations.

Reaction-to-fire tests — Full-scale room tests for surface products —

Part 2:
Technical background and guidance

1 Scope

This part of ISO 9705 provides guidance on ISO 9705:1993. It describes the technical background of the test and gives information which may be used for determining a testing procedure for a specific scenario, or how results can be utilized in a total hazard analysis for the specified scenario.

2 Characteristics of the ignition sources

2.1 Standard ignition source

The standard ignition source consists of a sandbox burner with dimensions of 0,17 m × 0,17 m. This source is used in reference [1] (see Bibliography). An important characteristic of the ignition source is its heat transfer towards the material. Figures 1 and 2 show a detailed mapped overview of the total heat flux towards the specimen and the gas temperatures. The measurements are performed in an open wall configuration, at an energy release rate level of 100 kW [2]. These values will slightly change when the burner is located in a room environment. Figures 3 and 4 give the contours of a constant heat flux of 10 kW/m^2 at different heat outputs of the burner and also where areas of total heat flux are higher than a given value.

2.2 Alternative ignition source

One of the alternative heat sources is a box burner, with dimensions of 0,3 m × 0,3 m. It is described in ASTM E603-98 [3]. Figures 5 and 6 give a detailed mapping of heat fluxes and gas temperatures for a burner energy release rate of 160 kW [2]. Other heat sources may be more appropriate (see annex B of ISO 9705:1993). Figure 7 gives results of heat fluxes towards the specimen for a heat source level of 40 kW and 160 kW, with different gases (natural gases and a mixture of natural gas and toluene) [4]. Figures 8 and 9 show a comparison of different burner sizes for contours of constant heat flux of 10 kW/m^2, at an energy release rate of 100 kW in an open corner and for areas exposed to a certain irradiant heat flux [4].

Finally, an example is given of the difference between the total heat flux produced by a burner in a corner and a wall position. Table 1 gives an overview of the total heat flux towards the floor and the total heat flux to the wall at 0,9 m and 1,5 m height for energy release rates of 40 kW and 160 kW using the alternative ignition source of ISO 9705:1993. Results show that, for the corner position, heat flux levels are higher in almost all cases.