

First edition
2009-08-01

Fire resistance tests — Guidelines for the design and conduct of non-furnace-based large-scale tests and simulation

Essais de résistance au feu — Lignes directrices pour la conception et la conduite d'essais et de simulations à large échelle non basés sur les fours



Reference number
ISO/TR 15658:2009(E)

AVA Documents
Document Sharing Hub
© ISO 2009

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2009

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions.....	1
4 Test design requirements	2
4.1 General.....	2
4.2 Ambient environmental conditions.....	2
4.3 Size of the test assembly	3
4.4 Construction of the test assembly	4
4.5 Test specimen	5
4.6 Selection of heating conditions	6
4.7 Selection of ventilation conditions	7
4.8 Selection of exhaust conditions.....	7
4.9 Selection of decay conditions (if controlled)	8
5 Test conditions	8
5.1 Ambient conditions	8
5.2 Test conditions — Thermal.....	9
5.3 Test conditions — Pressure	9
5.4 Test conditions — Mechanical	10
5.5 Timing of the test	10
5.6 Output measurements.....	10
5.7 Data recording and storage	11
6 Test procedure	11
6.1 Ignition	11
6.2 Safety procedures.....	11
6.3 Monitoring	11
6.4 Observations	12
6.5 Termination and extinguishing	12
6.6 Post-test analysis	12
7 Test report	12
7.1 Stating the objective.....	12
7.2 Characterization of the experimental conditions	12
7.3 Expression of the results	12
7.4 Description of the test specimen	13
7.5 Reporting — Electronic media	13
7.6 Expression of the validity or field of application of the result.....	13
Bibliography	14

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.

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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 15658 was prepared by Technical Committee ISO/TC 92, *Fire Safety*, Subcommittee SC 2, *Fire Containment*.

Introduction

The fire engineering community have often had to resort to non-furnace-based tests in order to establish certain characteristics of the fire behaviour of products, or constructions that cannot be obtained using standard methods. The reasons for these are many, including:

- a) size of the test element;
- b) interaction between components or elements;
- c) fire loads and heating rates;
- d) achievement of realistic levels of restraint;
- e) realistic oxygen availability.

Fire modelling is also being increasingly used to resolve the complex problems that many modern buildings produce. Currently, modelling is often limited by a lack of data and large-scale “natural” tests are increasingly being used to establish the missing information, and, by using the protocol described in this Technical Report, the quality, comparability and validity of the information/data should be significantly improved.

Unfortunately, the design of such tests is often controlled by the availability of space, equipment, cost, environment, etc. and these sometimes compromise the scientific value of the experiment and make the results hard to compare with other experiments performed in other laboratories or countries. This lack of comparability has in the past prevented the value of the findings from being maximized.

When an experiment has been set-up without adequate consideration of the objectives and the test parameters, it is difficult to apply a scientifically valid field of application to the result. As a consequence, the data of findings are frequently wrongly applied to constructions subsequent to the test.

The objective of this Technical Report is to harmonize the approach to the design, performance and reporting of such experiments, in order to increase the possibility of comparing information and also to develop meaningful fields of application of the results. It is not the objective of this Technical Report to inhibit the development of ad-hoc or natural tests, but more to encourage their development, while at the same time increasing their scientific value.

Fire resistance tests — Guidelines for the design and conduct of non-furnace-based large-scale tests and simulation

CAUTION — The attention of all persons concerned with managing and carrying out this fire resistance test is drawn to the fact that fire testing may be hazardous and that there is a possibility that toxic and/or harmful smoke and gases can be evolved during the test. Mechanical and operational hazards may also arise during the construction of the test elements of structures, their testing and disposal of test residues.

An assessment of all potential hazards and risks to health shall be made and safety precautions shall be identified and provided. Written safety instructions shall be issued. Appropriate training shall be given to relevant personnel. Laboratory personnel shall ensure that they follow written safety instructions at all times.

1 Scope

This Technical Report specifies procedures for the design, performance and reporting of fire tests which are not performed using standardized test equipment, such as furnaces or test chambers, and which are primarily duration- or time-based.

It is applicable to all “natural” fire tests, which set out to evaluate the behaviour of structural frames, rooms (or a suite of rooms forming part of a building), with respect to fully developed fire conditions, regardless of whether or not the heat input is by means of natural sources, e.g. cribs or burners. It is not applicable to “reaction-to-fire” large-scale tests, which are primarily designed to evaluate materials and for which the heating rate is slower and the maximum rate of heat release is lower than that which would occur at full development.

In the context of this Technical Report “large” means tests in which the flame has a width of 1 m or more.

This Technical Report is intended for use by the designers of fire tests (laboratories, regulatory authorities and researchers) and for those responsible for disseminating the information and applying the results in practice.

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 13943, *Fire safety — Vocabulary*

3 Terms and definitions

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