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Fire tests for building elements and components — Integrity and insulation performance testing of service installations —

Part 2:
Linear joint (gap) seals

Essais au feu pour les éléments et composants de bâtiment — Essai de performance d'intégrité et d'isolation des installations de service —

Partie 2: Joints d'étanchéité pour interstices linéaires

ICS 13.220.50; 91.140.01

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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 10295-2 was prepared by Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 2, *Fire containment*.

ISO 10295 consists of the following parts, under the general title *Fire tests for building elements and components — Integrity and insulation performance testing of service installations*:

— *Part 1: Penetration seals*

— *Part 2: Linear gap seals*

NOTE There is a document being developed titled*: Part 3: Penetration seals. Guidance on the use of test configurations to establish direct and extended fields of application*, with two subsections: *Single component penetration seals* and *Multi-component penetration seals*.

Introduction

This International Standard describes test methods used to determine the fire resistive nature of joint seals when subjected to the standard fire exposure conditions outlined in ISO 834: Part 1. The test data generated by this standard will permit the classification of these various joint seals based on their intended use and fire endurance under the specified acceptance criteria of this standard.

Joint seals are positioned in joints, voids, gaps, or other discontinuities between or bounded by two or more supporting elements. Normally such openings are denoted as 'linear' because the length is greater than their width defined by a typical ratio of at least 10:1 as in practice. Joints are present in buildings as a result of:

i) design to accommodate various movements induced by thermal differentials, seismicity, and wind loads and exist as a clearance separation;

ii) acceptable dimensional tolerances between two or more building elements, eg between non-loadbearing walls and floors;

iii) inadequate design, inaccurate assembly, repairs or damage to the building.

This standard describes methods of test for evaluating joint seals based on their intended use. The standard also allows for the application of movement prior to and/or during fire testing.

This standard provides the requirements for the test specimen, the test construction, the equipment (including any special apparatus or instrumentation), the procedures and acceptance criteria as they apply to joint seals and their supporting elements.

Fire tests for building elements and components — Integrity and insulation performance testing of service installations — Part 2: Linear joint (gap) seals

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 may be evolved during the test. Mechanical and operational hazards may also arise during the construction of the test elements or 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 standard specifies the heating conditions, methods of test and criteria for the evaluation of the ability of a linear joint seals to maintain the integrity and insulation of a fire separating element at the joint to be sealed. Test results shall register material performance during the fire exposure period and shall not be construed as having determined material suitability for use after that exposure. The purpose of the tests is to assess the integrity and insulation performance of the linear joint seals, including the effects of induced movement in those cases where the joint is designed to accommodate movement and has a width of > 20 mm.

It is not the intention through this test to provide quantitative information on the rate of leakage of smoke and/or gases, or on the transmission or generation of fumes. Such phenomena shall be noted in describing the general behaviour of specimens during test. It is not the intention of this test procedure to evaluate joint seals where special test procedures already exist, e.g. doors, partitions, penetrations, pipes, ducts and cables.

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 834-1, *Fire resistance tests - Elements of building construction — Part 1: General requirements*

ISO 13943: 2000, *Fire Safety – Vocabulary*

3 Terms and definitions

For the purposes of this standard, the definitions given in ISO 13943, *Fire Safety – Vocabulary*, together with the following, apply.

3.1
fire separating elements
floors, walls and other separating elements of construction having a period of fire resistance determined in accordance with ISO 834

3.2
joint
linear void having a length to width ratio of at least 10:1 between or within two juxtaposed elements. Typical locations of joints include floors, the perimeter of floors, walls, ceilings and roofs

3.3
joint seal
system designed to maintain the fire separating function and, where required, to accommodate a specified degree of movement

3.4
maximum joint width
widest opening an installed joint seal is intended to tolerate, as stated by the manufacturer or test sponsor

3.5
minimum joint width
narrowest opening an installed joint seal is intended to tolerate, as stated by the manufacturer or test sponsor

3.6
nominal joint width
specified opening of a joint in practice, to be selected by the test sponsor

3.7
splice
connection or junction within the length of a joint seal

3.8
supporting construction
fire separating elements into which joint seals are installed

3.9
termination
special design details applied at the ends of a joint seal

3.10
test construction
complete assembly of test specimens together with their supporting construction

3.11
test specimen
joint seal of specific materials, design and dimensions

3.12
transition
change in a direction in a joint seals, e.g. from horizontal to vertical in a wall construction, or through 90^{o} at the perimeter of a floor slab

3.13
blockout
recess created, where required, in the supporting construction to allow the installation of the joint seal

4 Symbols and abbreviated terms

Symbols and designations appropriate to this test are given in ISO 834 Part 1.

Symbol	Description
R	Movement Capability Factor
W_{max}	Maximum Joint Width
W_{min}	Minimum Joint Width
W_{nom}	Nominal Joint Width
T	Supporting Element Thickness
d_1	Thickness of Moving Joint Face
d_2	Thickness of Fixed Joint Face
f	Deflection as Function of the Fire Resistance Time

5 Test equipment

5.1 The test equipment specified in ISO 834 Part 1 is applicable to all joint seals tested within the scope of this standard.

5.2 For tests described in this standard the internal dimensions of the test furnace shall be such that a distance of at least 200 mm exists between the side or long edge of a linear joint and the furnace boundary, subject to a minimum internal size of 1 m x 1 m x 1 m.

6 Test conditions

6.1 Heating conditions

The heating conditions shall conform to ISO 834 Part 1.

6.2 Pressure

6.2.1 For vertical test constructions the furnace shall be operated such that a minimum pressure of 20 Pa exists at the top of any test specimen.

6.2.2 In vertical elements, all splices shall be located within the positive pressure zone so that the pressure at the bottom of the splice is a minimum of 13 Pa for the lowest splice in the test construction.

6.2.3 For horizontal test constructions the furnace shall be operated such that a minimum pressure of 20 Pa is established at a position (100 ± 10) mm below the lowest point of the test construction.

6.3 Load

Where applicable a load shall be applied in accordance with the principles of ISO 834 Part 1.

6.4 Movement

Where the seal is > 20 mm wide and is designed to accommodate movement the joint shall be cycled prior to test in accordance with Annex A.

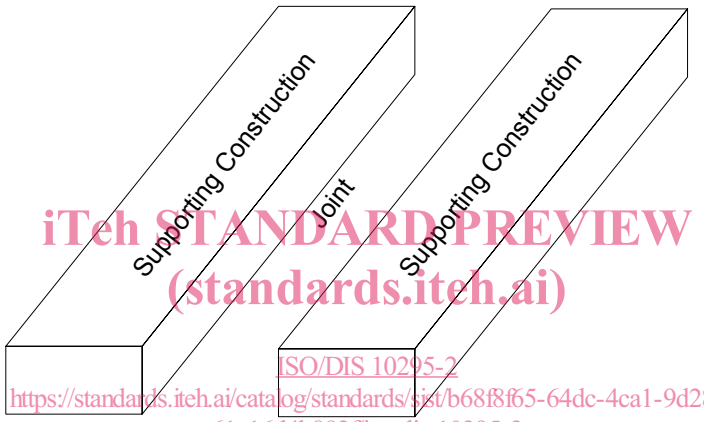
7 Specimen preparation

7.1 Supporting construction

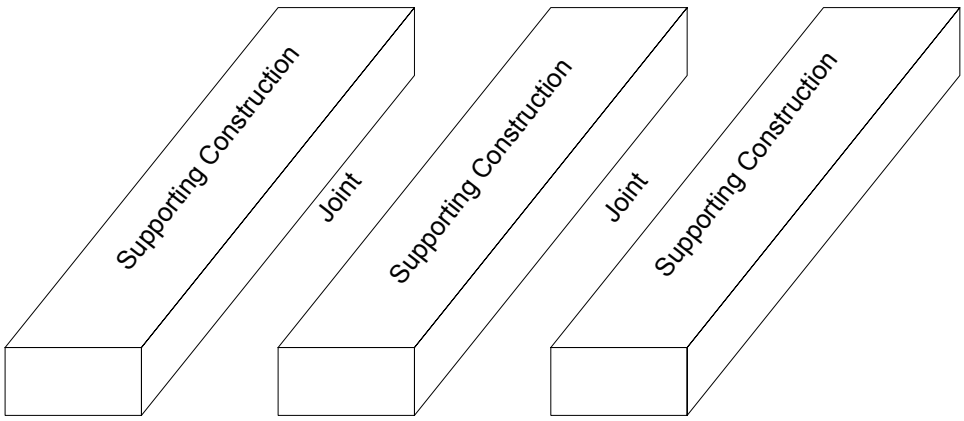
The supporting construction shall be of known fire resistance and representative of that used in practice.

7.2 Test Construction

7.2.1 For the purposes of tests, joints can be formed in slabs or by adjacent discrete members, see Figure 1.



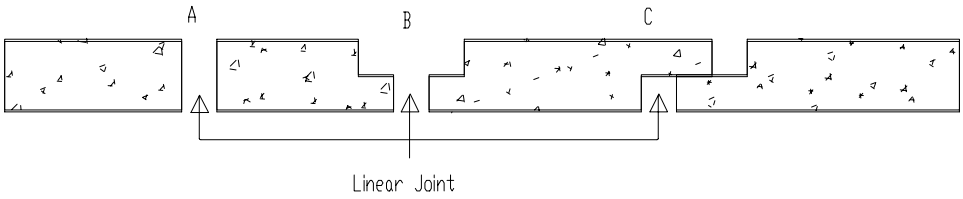
Single Joint



Multiple Joints

Figure 1 — Supporting construction

7.2.2 A test construction may consist of multiple variations: test specimen widths, joint configurations, test specimen configurations, joint face positions, and supporting elements of varying thickness, see Figures 2 and 3.



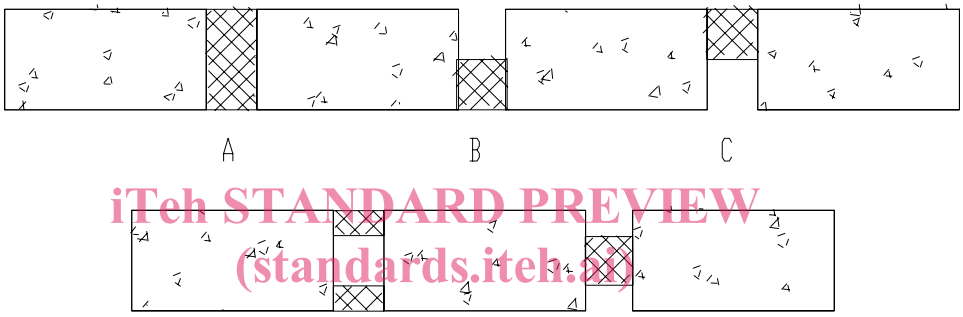
Key

A straight joint (single stage joint)

B joint with blockouts

C offset joint (multi-stage joint)

Figure 2 — Joint configuration



Key

A test specimen fills joint

B test specimen at bottom of joint

C test specimen at top of joint

D test specimen forms one or more air cavities

E test specimen centred in joint

Figure 3 — Test specimen orientation in joint

7.2.3 The minimum width of the supporting elements between joint edges shall be 200 mm.

7.2.4 The minimum distance between a joint edge and an adjacent blockout edge shall be 200 mm, see Figure 4, Note 3.