INTERNATIONAL STANDARD

ISO 6944-2

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Fire containment — Elements of building construction —

Part 2: Kitchen extract ducts

Endiguement du feu — Éléments de construction —

Partie 2: Conduits de ventilation de la cuisine

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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 6944-2 was prepared by Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 2, *Fire containment*.

ISO 6944 consists of the following parts, under the general title *Fire containment — Elements of building construction*:

— *Part 1: Ventilation ducts*

— *Part 2: Kitchen extract ducts*

Introduction

The purpose of this part of ISO 6944 is to measure the ability of a representative duct or duct assembly that is part of a kitchen extract duct system to resist the spread of fire from one fire compartment to another with the fire attack being from either the inside of the duct or from the outside of the duct. This part of ISO 6944 is applicable to vertical and horizontal ducts, with or without branches, taking into account joints and exhaust openings, as well as suspension devices and penetration points.

The test method representing a fire attack from the inside of the duct first simulates temperatures within a kitchen extract duct during normal operation followed by simulating the temperatures during a fire within the duct. For kitchen extract ducts, the inevitable build-up of grease on the inside surfaces can lead to a severe fire exposure and this is represented in the test method described in this part of ISO 6944. A burner assembly, attached to a horizontal L-shaped combustion chamber, develops the heat required to obtain the temperatures. The combustion chamber is attached to the sample kitchen extract duct assembly. The kitchen extract duct is also L-shaped with both horizontal and vertical components.

The test method representing a fire attack from the outside of the duct exposes the kitchen extract duct to furnace conditions defined in ISO 834-1. The test method includes provisions for assessment of the penetration seal surrounding the kitchen extract as the duct passes through a fire resistive barrier. The test method evaluates the structural integrity of the kitchen extract duct by having the duct restrained within the furnace during the fire exposure.

Fire containment — Elements of building construction —

Part 2:
Kitchen extract ducts

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

It is strongly recommended that the duct assembly be allowed to cool completely after the fire test before dismantling to minimize the possibility of the ignition of combustible 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 part of ISO 6944 establishes a method of test in which kitchen extract ducts are required to provide fire resistance. The requirements are intended to limit the spread of fire from the duct when a fire occurs within the duct and assesses the structural integrity of the duct when a fire occurs in the area surrounding the duct.

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 : General requirements*

ISO 6944–1:2008, *Fire containment — Elements of building construction — Part 1: Ventilation ducts*

ISO 13943, *Fire safety — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6944-1, ISO 13943 and the following apply.

3.1
kitchen extract duct
exhaust duct intended for use in commercial kitchens

3.2
fire-resisting kitchen extract ducts
kitchen extract ducts that have been tested to this part of ISO 6944 and meet the prescribed levels of fire resistance

4 Test equipment

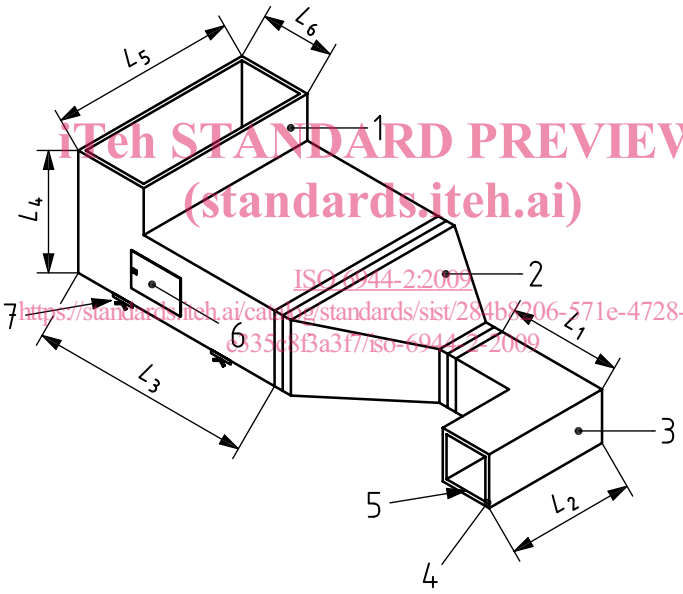
4.1 Fire outside duct

The test equipment specified in ISO 6944-1 for testing duct A shall be used, except that the fan, volume flow-measuring station and the condensing unit are not required.

4.2 Fire inside duct

4.2.1 A gas-fired premix burner assembly shall be used to supply flue gases to the test specimen.

4.2.2 The burner assembly shall be placed at the inlet of an insulated, L-shaped combustion chamber assembly, as illustrated in Figure 1.



Key

1	kitchen extract duct	5	location of burner assembly
2	transition section, where required	6	cleanout access cover
3	combustion chamber	7	supports
4	ceramic fibre insulation on combustion chamber	L_1 to L_6	various governing dimensions

Figure 1 — Test assembly

4.2.2.1 The minimum total length of the L-shaped insulated combustion chamber, $L_1 + L_2$, shall be 3 700 mm.

4.2.2.2 The minimum height and width of the steel duct for the combustion chamber shall be 700 mm by 700 mm.

4.2.2.3 The minimum thickness of the ceramic fibre insulation for the combustion chamber shall be 50 mm. The density of the insulation shall be 120 kg/m^3 ± 30 kg/m^3.

4.2.3 Combustion shall be complete within the combustion chamber assembly. The insulated combustion chamber assembly shall be connected to the kitchen extract duct by means of bolted or clamped flanges. The flanges shall be welded to the combustion chamber and to the kitchen extract duct.

4.2.4 For ducts whose orifice area exceeds 0,75 m^2, the use of flow restrictors at the exhaust end of the kitchen extract duct to adjust the rate of the flue gases to assist in obtaining the required temperatures within the kitchen extract duct is allowed, provided that the exhaust remains at least 75 % open.

5 Test conditions

5.1 Fire outside duct

The test conditions specified in ISO 6944-1 for testing duct A shall be used.

5.2 Fire inside duct

5.2.1 The specimen shall be tested within a laboratory having ventilation capable of maintaining the build-up of carbon monoxide to less than 50 µl/l[1)] throughout the period of any test. The area shall be free of extraneous drafts. The laboratory shall be constructed so that, during any one test, the room temperature in the laboratory does not increase by more than 23 °C above the temperature recorded at the beginning of the test.

5.2.2 The test specimen with respect to moisture content shall be representative of the condition that exists in similar construction in buildings. The condition shall be established by storage in air having 50 % relative humidity at 23 °C.

5.2.3 When conditioning to this level is not possible, the test shall be conducted when the dampest portion of the test specimen has achieved an equilibrium moisture content less than that corresponding to drying in air having 75 % relative humidity at 23 ± 3 °C.

5.2.4 Exception: The requirements of 5.2.3 are not mandatory when

— an equilibrium condition is not achieved within a 12 month conditioning period; or

— construction is such that drying of the interior of the test specimen is prevented by hermetic sealing of the construction materials.

6 Instrumentation

6.1 Fire outside duct

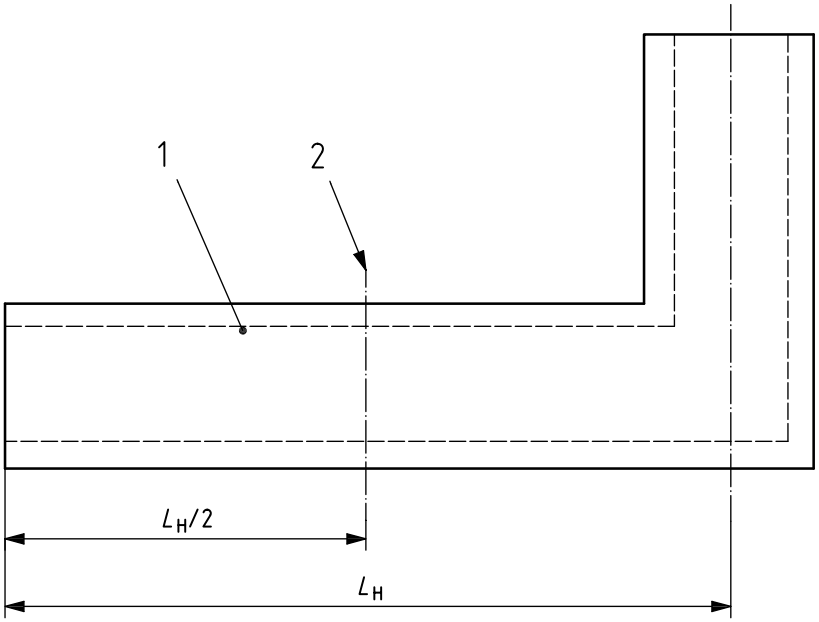
The instrumentation specified in ISO 6944-1 for testing duct A shall be used.

6.2 Fire inside duct

6.2.1 Flue gas temperatures

6.2.1.1 The thermocouples shall be located within the L-shaped kitchen extract duct as illustrated in Figures 2 and 3.

1) Microlitres per litre is the approximate conversion of the derogated unit “ppm.”



Key

1 kitchen extract duct (side view)

2 location of thermocouple grid for measuring flue-gas temperatures

Figure 2 — Thermocouple locations for measuring flue gas temperatures

6.2.1.2 Flue gas temperatures shall be determined by a thermocouple grid as illustrated in Figure 3. The grid shall consist of four thermocouples located inside the kitchen extract duct to measure the flue gas temperature at the mid-length of the horizontal section of the kitchen extract duct assembly; see Figure 2.

6.2.1.3 The thermocouples shall be maximum 1,0 mm, Type K or Type S Inconel-sheathed[2] thermocouples with tips projecting 25 + 1,5 mm from the inner ends of the support tubes as illustrated in Figure 3.

6.2.1.4 The dimension a shall be equal to $D/4$ but not greater than 305 mm.

6.2.1.5 The dimension b shall be equal to $W/4$ but not greater than 305 mm.

6.2.2 Unexposed surface temperatures

6.2.2.1 Fixed locations

6.2.2.1.1 Temperatures on the unexposed surfaces shall be measured using thermocouples and pads in accordance with ISO 834-1.

6.2.2.1.2 A minimum of fourteen thermocouples shall be located on the horizontal section of the test specimen.

6.2.2.1.3 Eight thermocouples shall be symmetrically located around the perimeter of the specimen as shown in Figures 4 and 5. None of the eight thermocouples shall be located over joints in the insulation material. The insulation thickness shall be the minimum at these locations.

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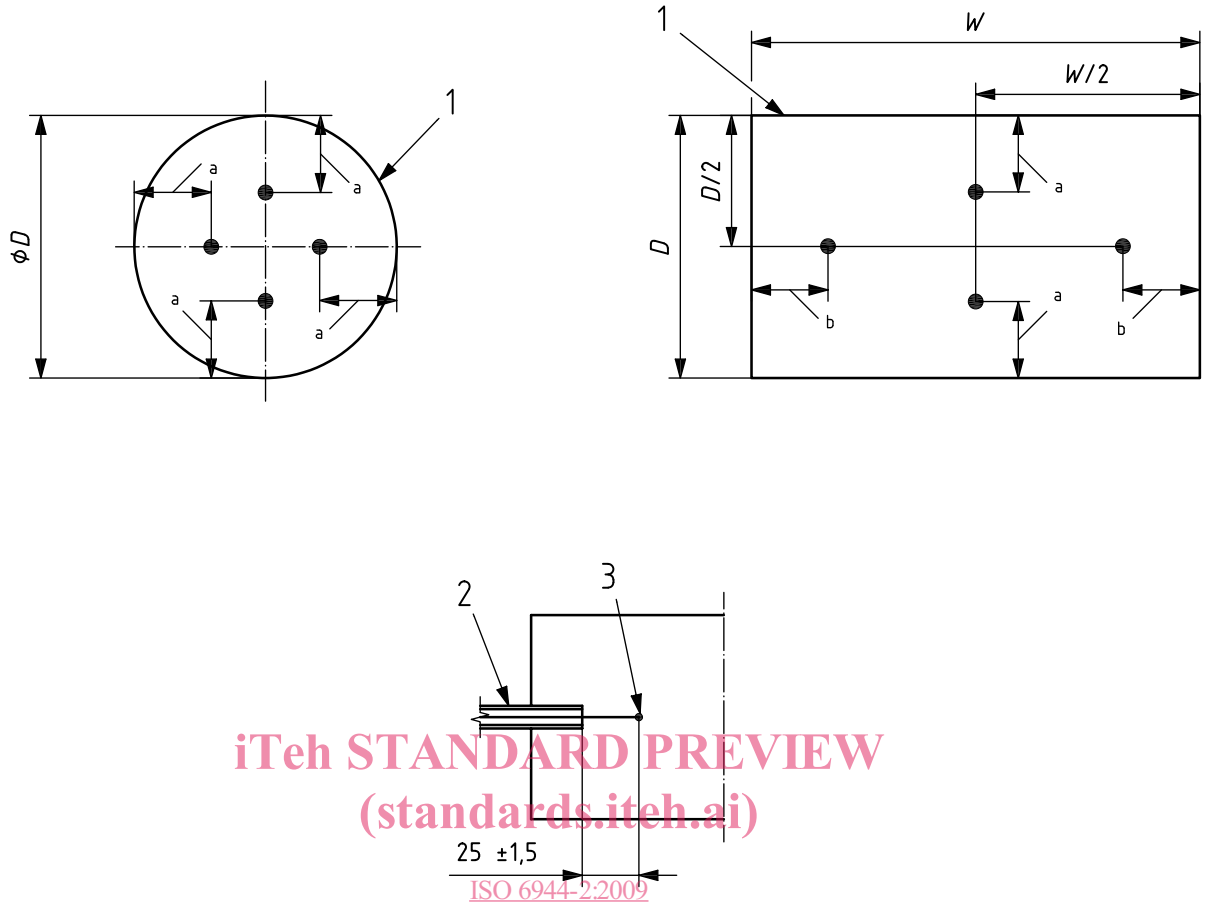
2) Inconel™ is an example of a suitable product available commercially. This information is given for the convenience of users of this part of ISO 6944 and does not constitute an endorsement by ISO of this product.

Dimensions in millimetres



Key

1 kitchen extract duct

2 support tube for thermocouples

3 location of thermocouple tip, represented by "•"

a Dimension a shall be equal to $D/4$ but not greater than 305 mm.

b Dimension b shall be equal to $W/4$ but not greater than 305 mm.

Figure 3 — Thermocouple grid — Flue gas temperatures