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R 1182

NON-COMBUSTIBILITY TEST FOR BUILDING MATERIALS

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BRIEF HISTORY

The ISO Recommendation R 1182, *Non-combustibility test for building materials,* was drawn up by Technical Committee ISO/TC 92, *Fire tests on building materials and structures,* the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of a Draft ISO Recommendation.

In October 1968, this Draft ISO Recommendation (No. 1715) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Israel	Spain
Austria	Korea, Rep. of	Sweden
Belgium	Netherlands	Thailand
Brazil	New Zealand	U.A.R.
Denmark	Poland	United Kingdom
Greece	Portugal	U.S.A.
Hungary	Romania	U.S.S.R.
India	South Africa, Rep. of	

Four Member Bodies opposed the approval of the Draft :

France
Germany
Italy
Norway

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in January 1970, to accept it as an ISO RECOMMENDATION.

ISO Recommendation | R 1182 | January 1970

NON-COMBUSTIBILITY TEST FOR BUILDING MATERIALS

1. SCOPE

This ISO Recommendation specifies a test method to determine whether a building material is non-combustible or combustible within the meaning of the definition given in section 7.

2. FIELD OF APPLICATION

The test is intended for building materials whether coated or not, but it is not intended to apply to the coating alone.

NOTES

1. This test may be used for materials for other forms of constructions such as in ships.
2. Doubts have been expressed about the validity of the test as applied to materials less than 50 kg/m^3 in density and further studies are necessary on the subject.

3. SAMPLING

The sample should be sufficiently large to be representative of the material, particularly in the case of non-homogeneous materials.

4. APPARATUS

4.1 *Furnace.* The furnace tube is 150 mm high, consists of refractory material having a density between 1500 and 2000 kg/m^3, and has an inner diameter of 75 mm and an overall wall thickness of 10 to 13 mm. The furnace tube is provided with one or more electrical heating coils and is located within an insulated surround forming the furnace as shown in Figure 1. To the lower end of the furnace is attached a cone-shaped air flow stabilizer, 500 mm long and reducing from a 75 mm internal diameter at the top to a 9 mm internal diameter at the lower end. The stabilizer can be made of steel sheet, approximately 1 mm thick, and should be finished smooth on the inside, particular attention being given to the smoothness and the tightness of the joint with the furnace. At the open top of the furnace a draught shield, which may be made of the same material as the stabilizer cone, should be provided having an internal diameter of 75 mm and a height of 50 mm.

4.2 *Furnace stand.* The furnace is mounted on a stand with a clearance of approximately 250 mm between the floor and the lower end of the flow stabilizer. This clearance must be protected against disturbance by air currents. An adequate protection can be provided by using shields around the stand to a height of approximately 550 mm from the floor.

4.3 *Furnace control.* The electric winding of the furnace should be so arranged that a vertical zone of at least 60 mm length exists at mid-height of the empty furnace with uniform temperature conditions (within a tolerance of ± 5 °C) as measured by a thermocouple located 10 mm from the wall. This may be achieved either by having closer windings at the two ends of the furnace tube or by means of separate windings at the ends controlled independently of the central section. To minimize temperature fluctuations in the furnace it is necessary to use a voltage stabilizer in the circuit, able to maintain voltage within ± 5 % of the nominal value.

4.4 *Temperature measurements.* Temperatures should be measured by means of sheathed thermocouple wires having a combined outside diameter of 1.0 mm with thermo-electric wires of approximately 0.2 mm diameter. The sheath protection provided on the hot junction should have an outside diameter of 1.5 mm and a length of 10 mm (see Fig. 2). The temperature should be measured with a recorder having a measuring range that corresponds with the temperature changes that occur during the tests. Measurement should be made at intervals of not greater than 10 seconds. The temperature measuring equipment should have an accuracy of at least 0.5 %.

4.5 *Location of thermocouples.* Two thermocouples should be used, the furnace thermocouple to measure the furnace temperature and the specimen thermocouple to measure the temperature in the centre of the specimen. The furnace thermocouple should be located with its hot junction 10 mm from the wall of the furnace and at mid-height of the constant temperature zone, by means of small steel spacers, with 2.5 mm diameter holes, attached to the top and bottom edges of the draught shield. The specimen thermocouple should be located with its hot junction in the centre of the specimen and should be inserted from the top through a hole of 2 mm diameter. As the hole remains open, it is necessary to ensure that the thermocouple maintains contact with the material at its bottom.

4.6 *Specimen holder and insertion device.* The specimen is placed in a holder made of nickel-chromium alloy or heat-resisting steel. At the bottom of the holder, a fine metal gauze in heat-resisting steel should be provided as shown in Figure 3. The mass of the holder assembly should not exceed 20 g. The holder is suspended from the lower end of an adjustable tube of heat-resisting steel, having an outside diameter of approximately 6 mm and a bore of 2 mm. The specimen insertion device consists essentially of a metallic sliding rod moving freely in a vertical tube fitted to the side of the furnace. The heat-resisting steel tube with the specimen holder is fixed by a space bar to the sliding rod. The design of the insertion device should be such that the specimen can be introduced into the furnace rapidly and without any shock. The inserted specimen should occupy a specified position in the furnace in the middle of the constant temperature zone and equidistant from the walls.

5. TEST SPECIMENS

5.1 Preparation of specimens

The specimens should be as representative as possible of the average properties of the sample and should be prepared to the size defined in clause 5.2.

If the thickness of the material is less than 50 mm, the specimen must be made of sufficient layers to achieve the thickness required in clause 5.2. The layers should occupy a horizontal position and should be held together firmly by means of fine wire to prevent air gaps between layers. The density of the specimen should be representative of the density of the material.

For composite materials of a thickness such that a number of layers cannot be put together to give a specimen of the specified size as required in clause 5.2, the specimen should be prepared to the required thickness by adjusting the thickness of the different components.

If it is not possible to follow this procedure to prepare the specimen, tests should be performed on the individual components and reported accordingly.

5.2 Number and size

For test purposes, three specimens should be prepared as described in clause 5.1. The nominal dimensions and tolerances for the specimen sizes are as follows :

width and breadth :	40_{-2}^{0} mm
height :	50 ± 3 mm
volume :	80 ± 5 cm ^{3}

5.3 Conditioning

The specimens should be conditioned in a ventilated oven maintained at 60 ± 5 °C for at least 20 hours and cooled to ambient temperature in a desiccator prior to the tests.

6. PROCEDURE

6.1 Apparatus

Before starting the test, it is necessary to ascertain that the whole equipment is in good working order – for example, the stabilizer is clean, the insertion device is working smoothly and the specimen holder occupies the exact position in the furnace.

The equipment should be protected against draughts and not be exposed to direct sunlight or artificial illumination.

The furnace should be heated and the furnace temperature stabilized at 750 ± 10 °C for a minimum period of 10 minutes before the insertion of a specimen.

6.2 Insertion of specimens

The specimen should be placed in the holder described in clause 4.6 and inserted in the furnace taking not more than 5 seconds for this operation.

6.3 Duration of heating

The heating period commences with the insertion of the specimen in the furnace and should be continued for 20 minutes.

6.4 Test observations

A record should be made of the temperature readings from the two thermocouples during the heating period and note taken of the occurrence and duration of any flaming.

6.5 Number of specimens tested

The test is carried out on three specimens, prepared as specified in clauses 5.1 and 5.2. The tests may be limited to less than three if the material has already shown itself to be combustible as defined in clause 7.2.

7. EXPRESSION OF RESULTS

7.1 Non-combustibility

A material should be deemed non-combustible if during the test none of the three specimens

(*a*) causes the temperature readings of the furnace thermocouple to rise by 50 °C or more above the initial furnace temperature;

(*b*) causes the temperature readings of the specimen thermocouple to rise 50 °C or more above the initial furnace temperature;

(*c*) flames for 10 seconds or more. Flamings for durations of less than 10 seconds should be ignored.

7.2 Combustibility

If one of the three criteria is not satisfied for any of the three specimens the material is deemed combustible.

8. TEST REPORT

The test report should include the following information :

(*a*) name of the manufacturer of the material;

(*b*) name or identification mark of the material;

(*c*) description of the material;

(*d*) density of the material;

(*e*) date of supply of the materials and of tests;

(*f*) description of the specimens (only for composite material);

(*g*) test method;

(*h*) test results;

(*i*) designation of the material according to the test criteria specified in section 7;

(*j*) name of testing body.

Dimensions in millimetres

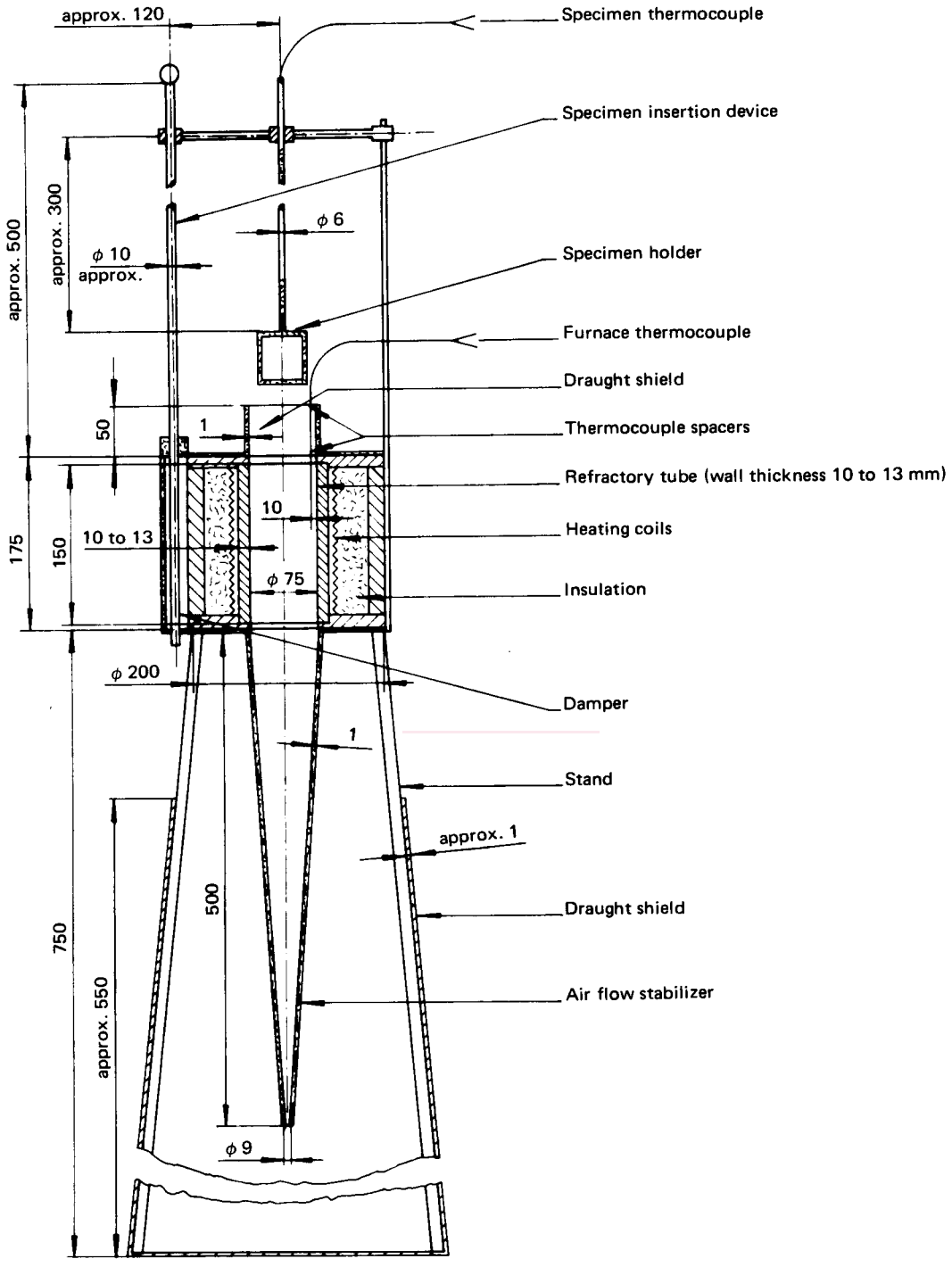
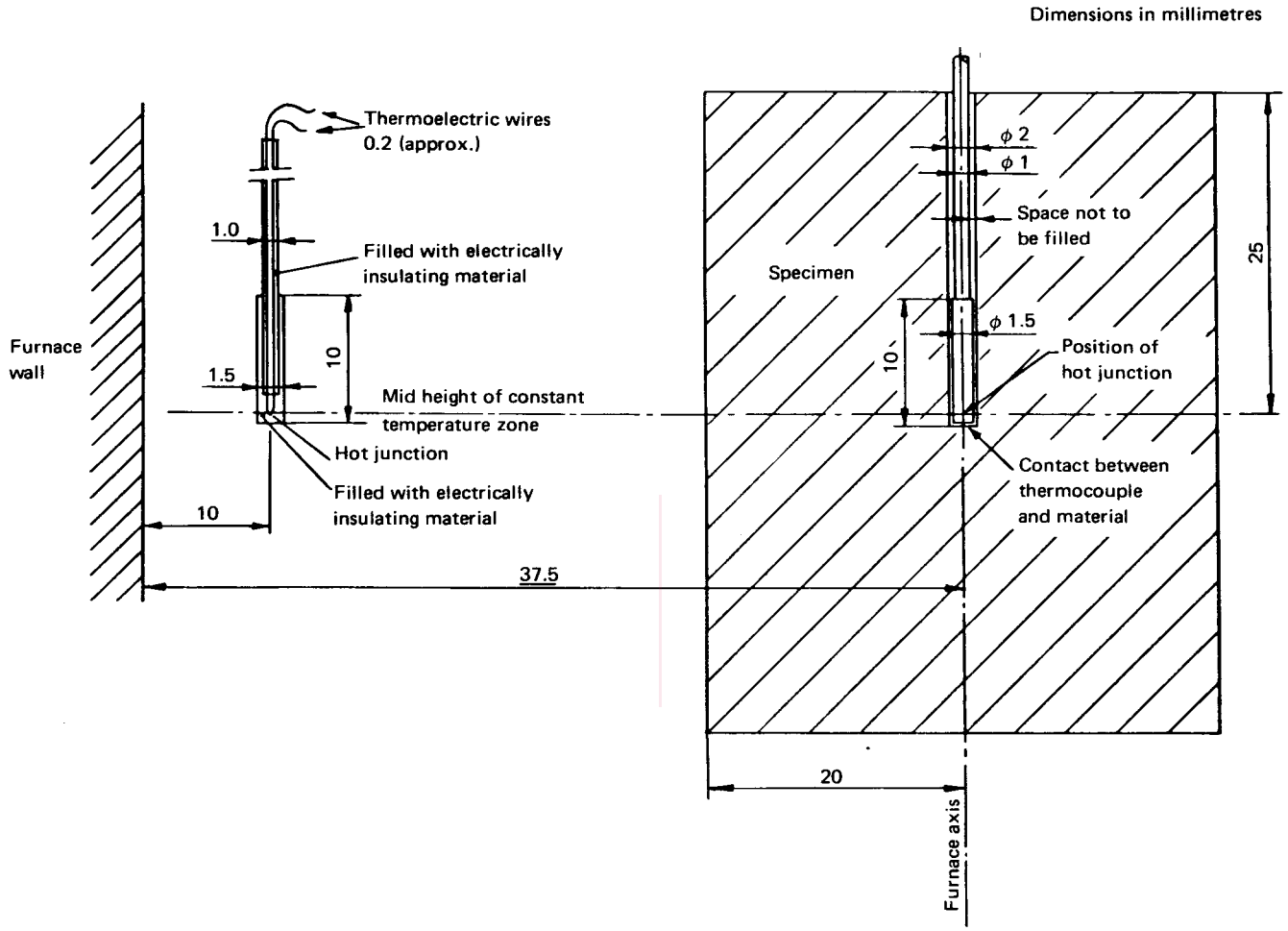


FIG. 1 – **General arrangement : Non-combustibility apparatus**



(*a*) – Furnace thermocouple

(*b*) – Specimen thermocouple
(For section of thermocouple, see (*a*))

FIG. 2 – **Furnace and specimen thermocouples**