

IS 15061 : 2002

भारतीय मानक
स्वचल वाहन — ज्वलनशीलता अपेक्षाएँ

Indian Standard
**AUTOMOTIVE VEHICLES —
FLAMMABILITY REQUIREMENTS**

ICS 13.220.40; 43.040.60

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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Price Group 7

Automotive Basic Standards Sectional Committee, TED 1

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Basic Standards Sectional Committee had been approved by the Transport Engineering Division Council.

This standard specifies the technical requirements of the burning behaviour of materials used in interior construction of M3 category of motor vehicles.

With a view to ensure the safety of the occupants of the vehicle, it is important that the materials used in the construction of the inside of motor vehicles of M3 category satisfy minimum requirements in order to avoid or at least retard development of flames, such that it allows the occupants to evacuate the vehicle in case of fire.

The special requirements for motor vehicles transporting hazardous material will be covered in the separate standard.

For the preparation of this standard considerable assistance has been derived from EEC Directive 95/28/EC January 1996 — Burning behaviour of internal materials.

The composition of the Committee responsible for formulation of this standard is given in Annex D.

AMENDMENT NO. 1 APRIL 2006
TO
IS 15061 : 2002 AUTOMOTIVE VEHICLES —
FLAMMABILITY REQUIREMENTS

(Page 2, clause 3.1) — Substitute the following for the existing clause:

'3.1 The interior materials used in the vehicle to be type approved shall undergo one or more of the tests specified in Annex A, Annex B and Annex C as per 4 and shall comply with the requirements given in 3.2, 3.3 and 3.4.'

(Page 2, clause 3.5.4) — Substitute the following for the existing clause:

'3.5.4 Electric cable; except for wiring cables used in CNG and LPG fuelled vehicles for which, the cables shall conform to flammability test as per 22 of IS 2465 : 1984 Specification for cables for motor vehicles.

3.5.5 Elements for which it is not possible to extract a sample in the prescribed dimensions as specified in A-3.1, B-3.1 and C-3.'

(Page 10, clause B-4.6, second sentence) — Substitute the following for the existing:

'If one or two specimens in any set of three specimens fail to burn to the top marker thread, another set of three specimens shall be tested for that direction or face.'

(TED 6)

Indian Standard
**AUTOMOTIVE VEHICLES —
 FLAMMABILITY REQUIREMENTS**

1 SCOPE

This standard applies to the burning behaviour (ignitability, burning rate and melting behaviour) of interior materials used in motor vehicles of category M3 carrying more than 22 passengers, not being designed for standing passengers and urban use (city buses).

2 DEFINITIONS

For the purpose of this standard following definitions shall apply.

2.1 Type Approval of a Vehicle

The approval of a vehicle type with regard to the burning behaviour of the interior materials used in the passenger compartment.

2.2 Vehicle Type

A category of power-driven vehicles which do not differ in such essential respects as:

2.2.1 The interior materials seats, curtains, separation walls, etc, used in the passenger compartment.

2.2.2 The mass of the interior materials used so far as they have an effect on the performance, described in this standard.

2.2.3 The optional arrangements and/or fittings should not have detrimental effect on the performance.

2.3 Approval of a Component

The approval of a component means an approval for devices such as interior materials, seats, curtain, etc.

2.4 Type of Component

Type of component means components which do not differ in respects, such as:

- a) base material for example wood, plastic, rubber, blended material;
- b) intended use for example seat upholstery, roof lining, etc;
- c) number of layers, in case of composite materials; and
- d) other characteristics in so far as they have an appreciable effect on the performance, described in the standard.

2.5 Passenger Compartment

The space for occupant accommodation (including bar, kitchen, toilet, etc), bounded by:

- the roof,
- the floor,
- the sidewalls,
- the doors,
- the outside glazing,
- the rear compartment bulkhead, or the plane of the rear seatback support,
- at the driver's side of the longitudinal vertical median plane of the vehicle, the vertical transversal plane through the driver's R-point,
- at the opposite side of the longitudinal vertical plane of the vehicle, the front bulkhead.

2.6 Seat

The structure which may or may not be integral with the vehicle structure complete with trim, intended to seat one adult person. The term covers both an individual seat or part of a bench seat intended to seat one adult person.

2.7 Group of Seats

A bench-type seat, or seats which are separate but side by side (that is; with the foremost anchorages of one seat in line with or forward of the rearmost anchorages and in line with or behind the foremost anchorages of another seat) and which accommodate one or more seated adult persons.

2.8 Bench Seat

A structure complete with trim, intended to seat more than one adult person.

2.9 Burning Rate

The quotient of the burnt distance measured and the time taken to burn this distance. It is expressed in mm/min.

2.10 Composite Material

The material composed of several layers of similar or different materials intimately held together at their surfaces by cementing, bonding, cladding, welding, etc.

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When different materials are connected together intermittently (for example, by sewing, high frequency welding, riveting), such materials shall not be considered a composite materials.

2.11 Exposed Face

The side of a material which is facing towards the passenger compartment when the material is mounted in the vehicle.

2.12 Upholstery

The combination of interior padding and surface finish material which together constitute the cushioning of the seat frame.

2.13 Interior Lining(s)

The material(s) that (together) constitute(s) the surface finish and substrate of a roof, wall or floor.

3 PERFORMANCE REQUIREMENTS

3.1 The performance when tested in accordance with the procedures outlined in Annexes A to C shall comply with the requirements given in **3.2** to **3.4**.

3.2 Test to Determine the Horizontal Burning Rate of the Materials

The result of the test, described in Annex A, shall be considered satisfactory if, taking the worst test results into account, the horizontal burning rate is not more than 100 mm/min or if the flame extinguishes before reaching the last measuring point.

3.3 Test to Determine the Vertical Burning Rate of the Materials

The result of the test described in Annex B shall be considered satisfactory if, taking the worst test result into account, the vertical burning rate is not more than 100 mm/min.

3.4 Test to Determine the Melting Behaviour of the Materials

The result of the test, described in Annex C, shall be considered satisfactory if, taking the worst test results into account, no drop is formed which ignites the cotton wool.

3.5 Following materials are not required to be tested as described in the Annexes A to C:

3.5.1 *Parts Made of Metal or Glass*

3.5.2 Each individual seat accessory with a mass of non-metallic material less than 200 g. If the total mass of these accessories exceeds 400 g. of non-metallic material per seat, then each material must be tested.

3.5.3 Elements of which the surface area or the volume does not exceed respectively.

3.5.3.1 One hundred cm² or 40 cm³ for the elements which are connected to an individual seating place.

3.5.3.2 Three hundred cm² or 120 cm³ per seat row and, at a maximum, per linear meter of the interior of the passenger compartment for these elements which are distributed in the vehicle and which are not connected to an individual seating place.

3.5.4 *Electric Cables*

Elements for which it is not possible to extract a sample in the prescribed dimensions as specified in **A-3**, **B-3** and **C-3**.

3.6 Any adhesive agent used to affix the interior material to its supporting structures shall not, as far as possible, exacerbate the burning behavior of the material.

4 SELECTION AND NUMBER OF TEST SPECIMEN

For carrying out the tests as given in Annexes A, B and C, the following criteria shall be adopted.

4.1 For Tests as per Annex A

Five samples from the following materials in the case of an isotropic material or 10 samples in the case of a non-isotropic material (five for each direction) shall be tested:

- a) material(s) used for the upholstery of any seat and its accessories (including the driver's seat);
- b) material(s) used for the interior lining of the roof;
- c) material(s) used for the interior lining of the side and rear walls, including separation walls;
- d) material(s) with thermal and/or acoustic function;
- e) material(s) used for the interior lining of the floor;
- f) material(s) used for the interior lining of luggage-racks, heating and ventilation pipe; and
- g) material(s) used for the luminaires.

4.2 For Tests as per Annex B

Three samples in the case of an isotropic material, or six samples in case of a non-isotropic material, of the material(s) used for curtains and blinds and/or other hanging material(s) shall be tested.

4.3 For Tests as per Annex C

From the following material(s) four samples, for both faces (if they are not identical), shall be tested:

- a) material(s) used for the interior lining of the roof;
- b) material(s) used for the interior lining of the luggage-racks, heating and ventilation pipes situated in the roof; and
- c) material(s) used for the luminaires situated in the luggage-racks and/or roof.

ANNEX A

(Clauses 3.1, 3.2 and 4.1)

TEST TO DETERMINE THE HORIZONTAL BURNING RATE OF MATERIALS**A-1 PRINCIPLE**

A sample is held horizontally in a U-shaped holder and is exposed to the action of a defined low-energy flame for 15 s in a combustion chamber, the flame acting on the free end of the sample. The test determines if and when the flame extinguishes, or the time in which the flame passes a measured distance.

A-2 EQUIPMENT

A-2.1 Combustion chamber (*see* Fig. 1), preferably of stainless steel and having the dimensions given in

Fig. 2. The front of the chamber contains flame-resistant observation window, which may cover the front and which can be constructed as an access panel. The bottom of the chamber has vent holes and the top has a vent slot all around. The combustion chamber is placed on four legs, 10 mm high.

The chamber may have a hole at one end for the introduction of the sample holder containing the sample. In the opposite end, a hole is provided for the gas line. Melted material is caught in a pan (*see* Fig. 3) which is placed on the bottom of the chamber between vent holes without covering any vent hole area.

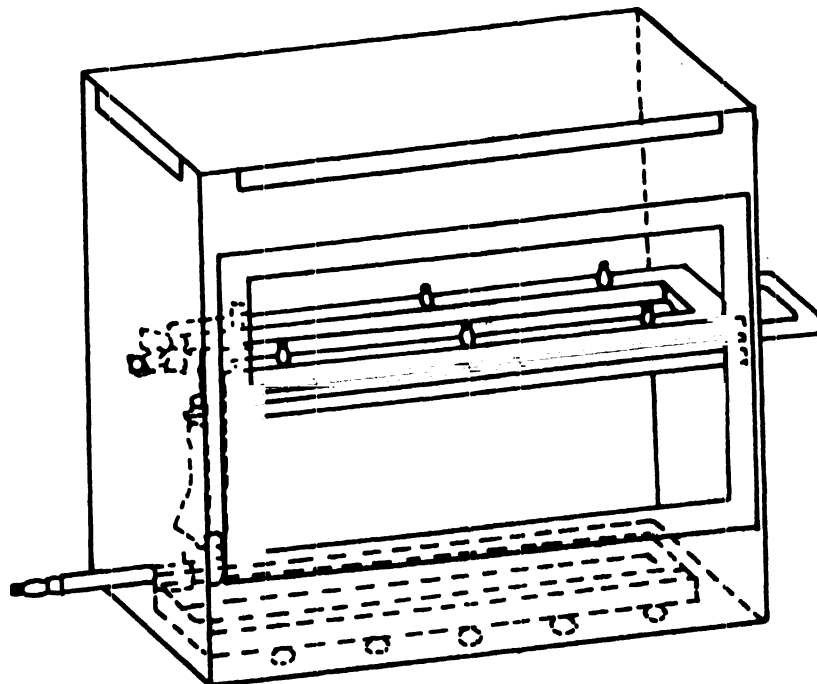


FIG. 1 COMBUSTION CHAMBER WITH SAMPLE HOLDER AND DRIP TRAY

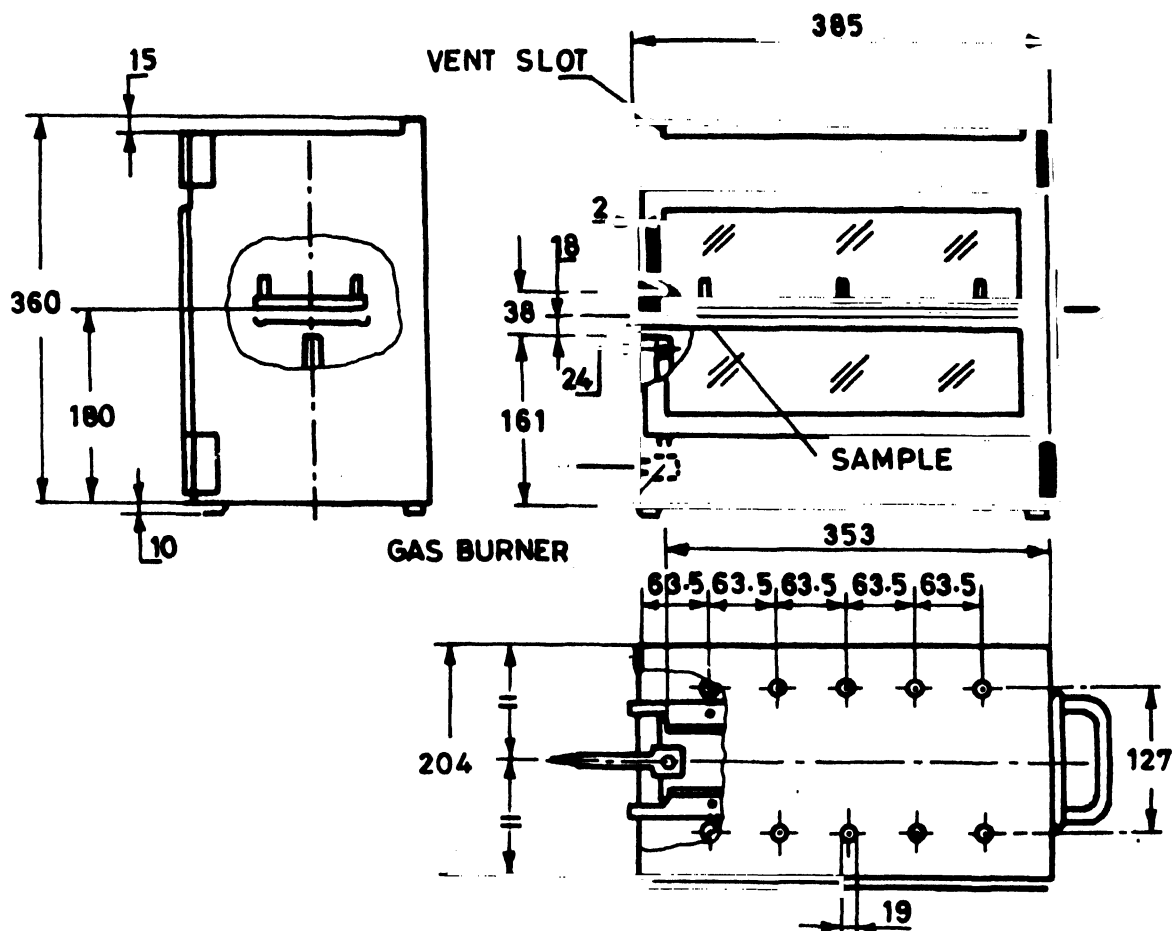


FIG. 2 DIMENSIONS OF COMBUSTION CHAMBER

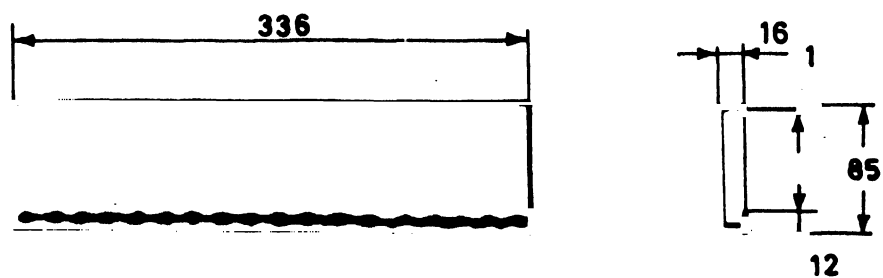


FIG. 3 DRIP PIN

A-2.2 Sample holder, consisting of two U-shaped metal plates or frames of corrosion-proof material. Dimensions are given in Fig. 4.

The lower plate is equipped with pins, the upper one with corresponding holes in order to ensure a consistent holding of the sample. The pins also serve as the measuring points at the beginning and end of the burning distance.

A support shall be provided in the form of 0.25 mm

diameter heat resistant wires spanning the frame at 25 mm intervals over the bottom U-shaped frame (see Fig. 5).

The plane of the lower side of samples shall be 178 mm above the floor plate. The distance of the front edge of the sample holder from the end of the chamber shall be 22 mm; the distance of the longitudinal sides of the sample holder from the sides of the chamber shall be 50 mm (all inside dimensions) (see Fig. 1 and 2).

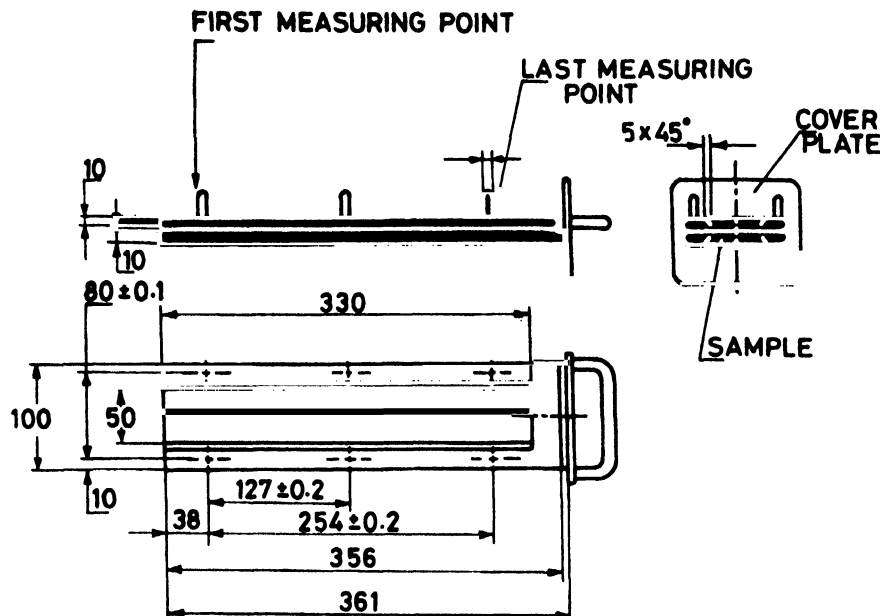


FIG. 4 SAMPLE HOLDER

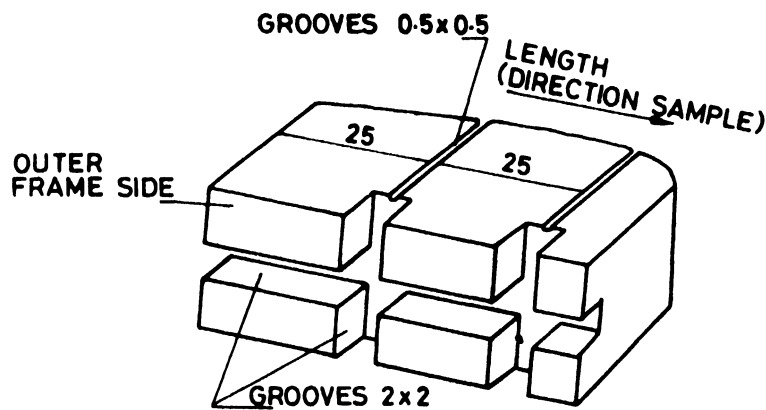


FIG. 5 SECTION OF LOWER U FRAME DESIGN FOR WIRE SUPPORT FACILITY

A-2.3 Gas Burner

It shall have the inside diameter of the 9.5 ± 0.5 mm and shall be placed in the test cabinet so that the center of its nozzle is 19 mm below the center of the bottom edge of the open end of the sample (see Fig. 2).

A-2.4 Test Gas

It shall be supplied to the burner and have a calorific value near 38 MJ/m^3 (for example, natural gas).

A-2.5 Metal Comb

It shall be at least 110 mm in length, with seven to eight smooth rounded teeth per 25 mm.

A-2.6 Stop-Watch

Stop-watch shall be having an accuracy of 0.5 s.

A-2.7 Fume Cupboard

The combustion chamber may be placed in a fume cupboard assembly provided that the internal volume is at least 20 times, but not more than 110 times, greater than the volume of the combustion chamber and provided that no single height, width, or length dimension of the fume cupboard is greater than two and a half times either of the other two dimensions.

Before the test, the vertical velocity of the air through the fume cupboard shall be measured 100 mm in front of and behind the final position where the combustion

chamber will be located. It shall be between 0.10 and 0.30 m/s in order to avoid possible discomfort, by combustion products, to the operator. It is possible to use a fume cupboard with a natural ventilation and an appropriate air velocity.

A-3 SAMPLES

A-3.1 Shape and Dimensions

A-3.1.1 The shape and dimensions of samples are given in Fig. 6. The thickness of the sample corresponds to the thickness of the product to be tested. It shall not be more than 13 mm. The sample shall have a constant section over its entire length.

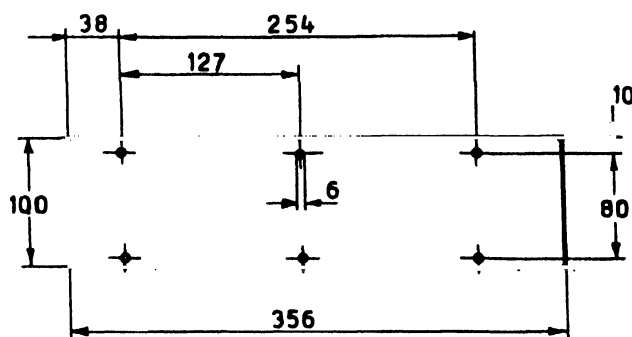


FIG. 6 DIMNESIONS OF SAMPLE

A-3.1.2 If the shape and dimensions of a product do not permit taking a sample of the given size, the following minimum dimensions shall be maintained:

- For samples having a width of 3 to 60 mm, the length shall be 356 mm. In this case the material is tested in the product's width.
- For samples having a width of 60 to 100 mm, the length shall be at least 138 mm. In this case the potential burning distance corresponds to the length of the sample, the measurement starting at the first measuring point.

A-3.2 Sampling

The samples shall be taken from the material under test. In materials having different burning rates in different material directions, each direction has to be tested. The samples are to be taken and placed in the test apparatus so that the highest burning rate will be measured.

When the material is supplied in widths, a length of at least 500 mm shall be cut covering the entire width. From this the samples shall be taken so as to be at least 100 mm from the material edge and equidistant from each other.

Samples shall be taken in the same way from finished products, when the shape of the product permits. When the thickness of the product is more than 13 mm, it

shall be reduced to 13 mm by a mechanical process applied to the side which does not face the occupant compartment. If it is impossible, the test shall be carried out, in accordance with the Technical Service, on the initial width of the material which shall be mentioned in the test report.

Composite materials shall be tested as if they were of uniform construction.

In the case of materials made of super-imposed layers of different composition which are not composite materials, all the layers of material included within a depth of 13 mm from the surface facing towards the passenger compartment shall be tested individually.

A-3.3 Conditioning

The samples shall be conditioned for at least 24 h but not more than 7 days at a temperature of $27 \pm 2^\circ\text{C}$ and a relative humidity of 65 ± 5 percent and shall be maintained under these conditions until immediately prior to testing.

A-3.4 Procedure

A-3.4.1 Place samples with napped or tufted surfaces on a flat surface and comb twice against the nap using the comb (*see A-2.5*).

A-3.4.2 Place the sample in the sample holder (*see A-2.2*) so that the exposed side will be downwards to the flame.

A-3.4.3 Adjust the gas flame to a height of 38 mm using the mark in the chamber, the air intake of the burner being closed. Before starting the first test, the flame shall burn at least for one minute for stabilization.

A-3.4.4 Push the sample holder into the combustion chamber so that the end of the sample is exposed to the flame, and after 15 s cut off the gas flow.

A-3.4.5 The measurement of the burning time starts at the moment when the foot of the flame passes the first measuring point. Observe the flame propagation on the side burning faster than the other (upper or lower side).

A-3.4.6 Measurement of burning time is completed when the flame has come to the last measuring point or when the flame extinguishes before coming to the last measuring point. If the flame does not reach the last measuring point, measure the burnt distance up to the point where the flame extinguished. Burnt distance is the decomposed part of the sample, which is destroyed on its surface or in the interior by burning.

A-3.4.7 So far as the sample does not ignite or does not continue burning after the burner has been extinguished, or when the flame extinguishes before

reaching the first measuring point, so that no burning time is measured, note in the test report that the burning rate is 0 mm/min.

A-3.4.8 When running a series of tests or repeat tests, ensure that the combustion chamber and sample holder have a maximum temperature of 30°C before starting the next test.

A-4 CALCULATION

The burning rate, B ¹⁾, in mm/min, is given by the formula :

$$B = \frac{s}{t} \times 60$$

where

s = the burnt distance, in mm; and

t = the time, in seconds, to burn distance 's'.

¹⁾ The burning rate (B) for each sample is only calculated in the case where the flame reaches the last measuring point or the end of the sample.

ANNEX B

(Clauses 3.1, 3.3 and 4.2)

TEST TO DETERMINE THE VERTICAL BURNING RATE OF MATERIALS

B-1 PRINCIPLE

This test consists of exposing samples, held in a vertical position, to a flame and determining the speed of propagation of the flame over the material to be tested.

B-2 APPARATUS

The apparatus shall consist of:

- specimen holder;
- burner;
- ventilation system to extract gas and combustion products;
- template; and
- marker threads of white mercerized cotton threads having a maximum linear density of 50 tex.

B-2.1 The specimen holder shall consist of a rectangular frame 560 mm high and shall have two rigidly connected parallel rods spaced 150 mm apart on which pins shall be fitted for mounting the test specimen which is located in a plane at least 20 mm from the flame. The mounting pins shall be not greater than 2 mm diameter and at least 27 mm long. The pins shall be located on the parallel rods at locations shown in Fig. 7. The frame shall be fitted onto a suitable support to maintain the rods in a vertical orientation during testing. (For the purpose of locating the specimen on the pins in a plane away from the frame, spacer stubs 2 mm diameter may be provided adjacent to the pins).

B-2.2 A typical burner is described in Fig. 8.

The gas supplied to the burner can be either commercial propane gas or commercial butane gas.

The burner shall be positioned in front of, but below, the specimen such that it lies in a plane passing through the vertical center line of the specimen and perpendicular to its face (*see* Fig. 9), such that the longitudinal axis is inclined upwards at 30° to the vertical towards the lower edge of the specimen. The distance between the tip of the burner and the lower edge of the specimen shall be 20 mm.

B-2.3 The test apparatus may be placed in a fume cupboard assembly provided that the internal volume is at least 20 times, but not more than 110 times, greater than the volume of the test apparatus and provided that no single height, width or length dimension of the fume cupboard is greater than two and a half times either of the other two dimensions. Before the test, the vertical velocity of the air through the fume cupboard shall be measured 100 mm in front of and behind the final position where the test apparatus will be located. It shall be between 0.10 and 0.30 m/s in order to avoid possible discomfort, by combustion products to the operator. It is possible to use a fume cupboard with a natural ventilation and an appropriate air velocity.

B-2.4 A flat rigid template made of suitable material and of a size corresponding to the size of the specimen shall be used. Holes approximately 2 mm diameter shall be drilled in the template and positioned so that the distances between the centre of the holes correspond to the distances between the pins on the

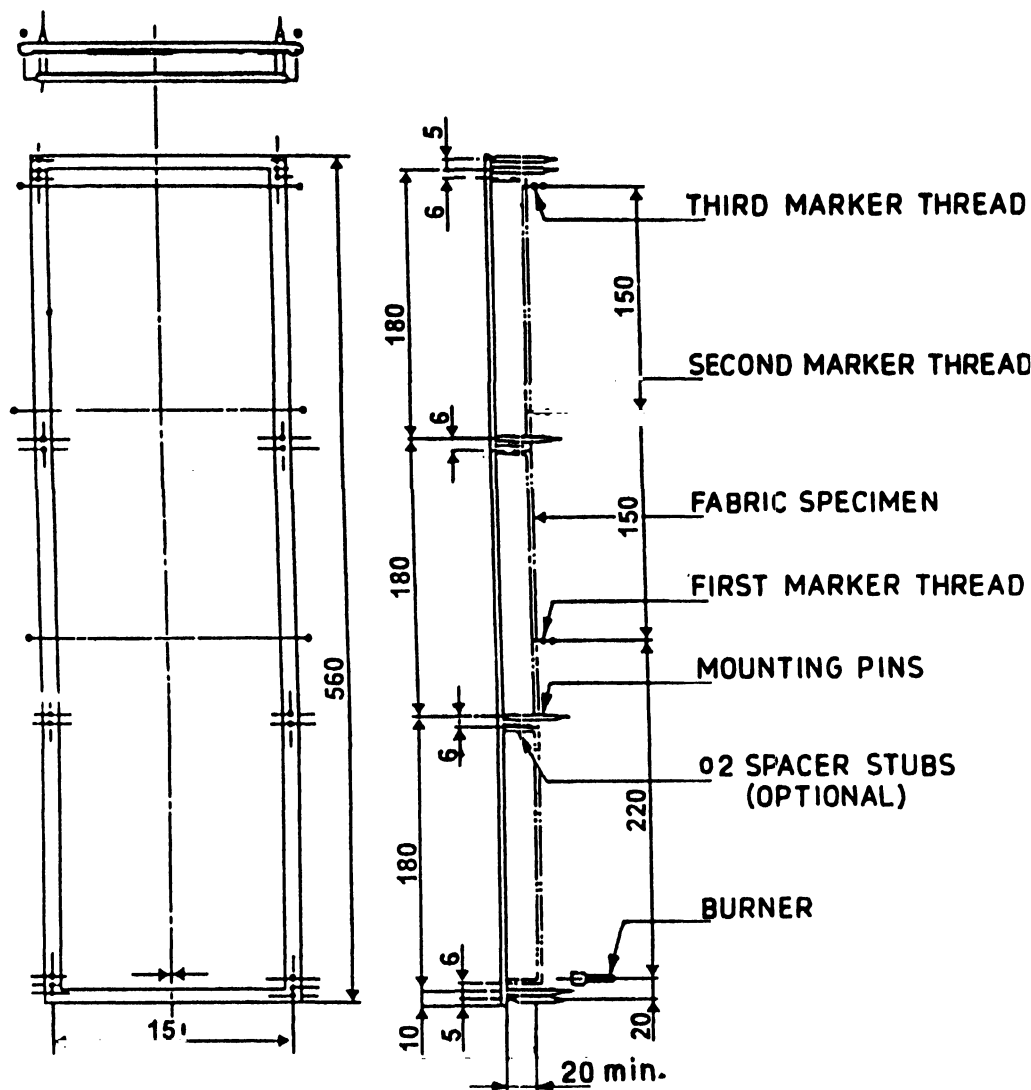


FIG. 7 SPECIMEN HOLDER

frames (see Fig. 7) The holes shall be located equidistant about the vertical centre-lines of the template.

B-3 SAMPLE

B-3.1 The samples dimensions are 560 mm × 170 mm.

B-3.2 The samples shall be conditioned for at least 24 h at a temperature of $27 \pm 2^\circ\text{C}$ and a relative humidity of 65 ± 5 percent and shall be maintained under these conditions until immediately prior to testing.

B-4 PROCEDURE

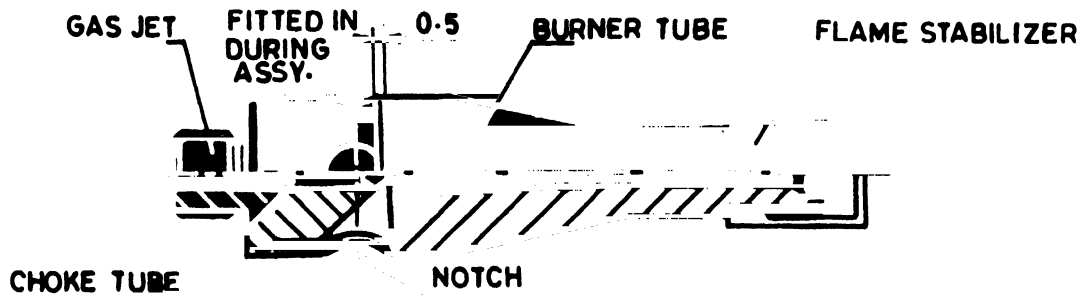
B-4.1 The test shall be carried out in an atmosphere having a temperature between $27 \pm 2^\circ\text{C}$ and relative humidity 65 ± 5 percent.

B-4.2 The burner shall be preheated for 2 min. The

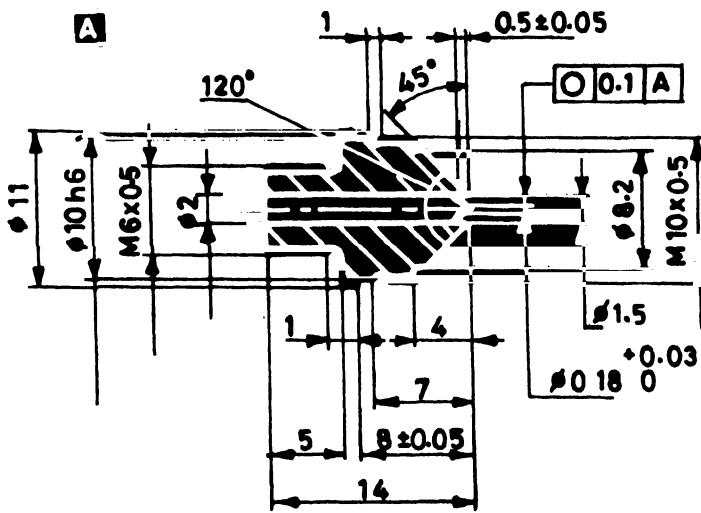
flame height shall be adjusted to 40 ± 2 mm measured as the distance between the top of the burner tube and the tip of the yellow part of the flame when the burner is vertically oriented and the flame is viewed in dim light.

B-4.3 The specimen shall be placed on the pins of the test frame, making certain that the pins pass through the points marked off from the template and that the specimen is at least 20 mm away from the frame. The frame shall be fitted on the support so that the specimen is vertical.

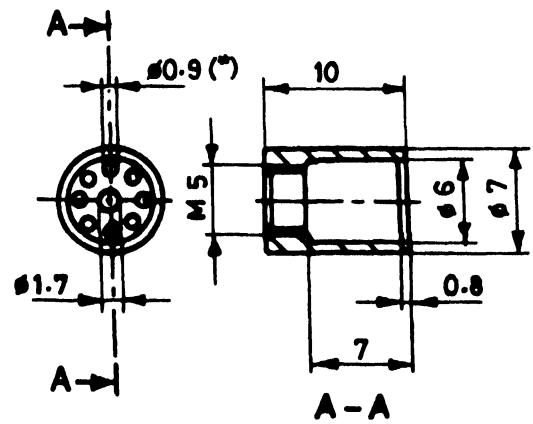
B-4.4 The marker threads shall be attached horizontally in front of the specimen at the locations shown in Fig. 7. At each location, a loop of thread shall be mounted so that the two segments are spaced 1 mm and 5 mm from the plane of the front of the specimen.



a) GAS BURNER ARRANGEMENT

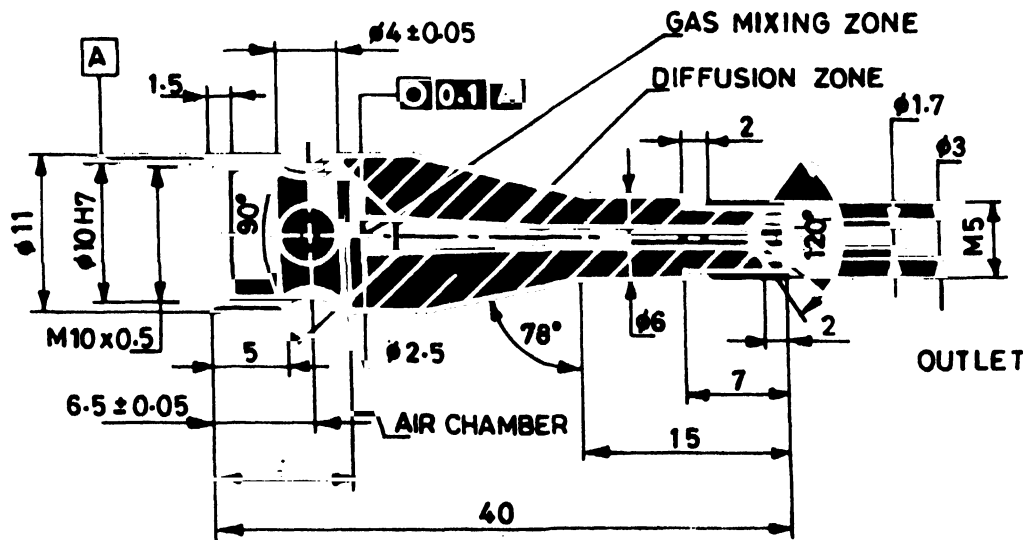


b) GAS JET



(*) PITCH CIRCLE DIAMETER 4.4 mm

c) FLAME STABILIZER



d) BURNER TUBE

FIG. 8 GAS BURNER

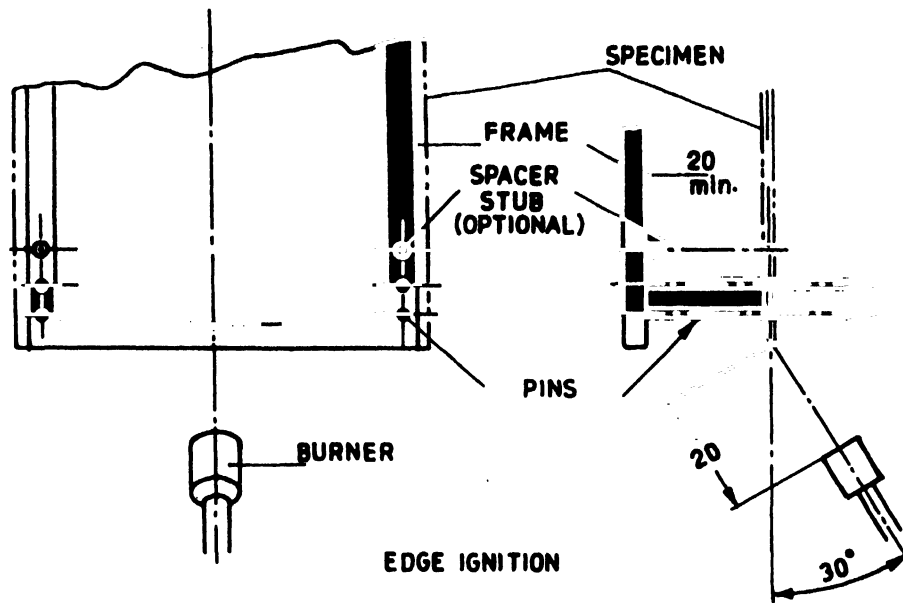


FIG. 9 BURNER IGNITION LOCATION

Each loop shall be attached to a suitable timing device. Sufficient tension shall be imposed to the thread to maintain its position relative to the specimen.

B-4.5 The flame shall be applied to the specimen for 5 s. Ignition shall be deemed to have occurred if flaming of the specimen continues for 5 s after removal of the igniting flame. If ignition does not occur, the flame shall be applied for 15 s to another conditioned specimen.

B-4.6 If any result in any set of three specimens exceeds the minimum result by 50 percent, another set of three specimens shall be tested for that direction or face. If one or two specimens in any set of three specimens fail to burn to the top marker thread, another set of three specimens shall be tested for that direction or face.

B-4.7 The following duration, in seconds, shall be measured:

- a) from the start of the application of the igniting flame to the severance of the first marker thread (t_1);

- b) from the start of the application of the igniting flame to the severance of the second marker thread (t_2); and
- c) from the start of the application of the igniting flame to the severance of the third marker thread (t_3).

B-5 RESULTS

The observed phenomena shall be written down in the test report, to include:

The durations of combustion : t_1 , t_2 and t_3 in seconds;
The corresponding burnt distances: d_1 , d_2 and d_3 in mm.

The burning rate V_1 and the rates, V_2 and V_3 , if applicable, shall be calculated (for each sample if the flame reaches at least the first marker thread) as following:

$$V_1 = \frac{d_1}{t_1} \times 60 \text{ (mm/min)}$$

The highest burning rate of V_1 , V_2 and V_3 shall be taken into account.

ANNEX C

(Clauses 3.1, 3.4 and 4.3)

TEST TO DETERMINE THE MELTING BEHAVIOUR OF MATERIALS

C-1 PRINCIPLE

A sample is placed in a horizontal position and is exposed to an electric radiator. A receptacle is positioned under the specimen to collect the resultant drops. Some cotton wool is put in the receptacle in order to verify if any drop is flaming.

C-2 APPARATUS

The apparatus shall consist of (*see* Fig. 10):

- a) an electric radiator;
- b) a support for the sample with grill;
- c) a receptacle (for resultant drops); and
- d) a support (for the apparatus).

C-2.1 The source of heat is an electric radiator with a useful output of 500 W. The radiating surface must be made of transparent quartz plate with a diameter of 100 ± 5 mm. The radiated heat from the apparatus, measured on a surface which is situated parallel to the surface of the radiator at a distance of 30 mm shall be 3 W/cm^2 .

C-2.2 Calibration

For calibration of the radiator, a heat flux meter (radiometer) of the Gardon (foil) type with a design range not exceeding 10 W/cm^2 shall be used.

The target receiving radiation, and possibly to a small extent convection, shall be flat, circular, not more than 10 mm in diameter and coated with a durable matt black finish. The target shall be contained within a water-cooled body the front face of which shall be of highly polished metal, flat, coinciding with the plane of the target and circular, with a diameter of about 25 mm.

Radiation shall not pass through any window before reaching the target. The instrument shall be robust, simple to set up and use, insensitive to draughts, and stable in calibration. The instrument shall have an accuracy of within ± 3 percent and a repeatability within 0.5 percent.

The calibration of the heat flux meter shall be checked whenever a recalibration of the radiator is carried out, by comparison with an instrument held as a reference standard and not used for any other purpose. The reference standard instrument shall be fully calibrated at yearly intervals in accordance with a national standard.

C-2.2.1 Calibration Check

The irradiance produced by the power input which the initial calibration has shown to correspond to an irradiance of 3 W/m^2 shall be frequently checked (at least once every 50 operating hours) and the apparatus shall be recalibrated if such a check reveals deviation greater than 0.06 W/cm^2 .

C-2.2.2 Calibration Procedure

The apparatus shall be placed in an environment essentially free of air currents (not more than 0.2 m/s).

Place the heat flux meter in the apparatus in the specimen position so that the target of the heat flux meter is located centrally within the radiator surface.

Switch on the electricity supply and establish the power input of the controller required to produce irradiance at the centre of the radiator surface of 3 W/cm^2 . Adjustment to the power unit to record 3 W/cm^2 should be followed by the five-minute period without further adjustment to ensure equilibrium.

C-2.3 The support for the samples shall be a metallic ring (*see* Fig. 10). On top of this support a grill, made of stainless steel wire, is placed with the following dimensions:

- interior diameter : 118 mm,
- dimension of the holes : 2.10 mm^2
- diameter of the steel-wire : 0.70 mm.

C-2.4 The receptacle shall consist of a cylindrical tube with an interior diameter of 118 mm and a depth of 12 mm.

The receptacle shall be filled with cotton wool.

C-2.5 A vertical column shall support the items specified in **C-2.1**, **C-2.3** and **C-2.4**.

The radiator is placed on top of the support in a manner such that the radiating surface is horizontal and the radiation is downwards. A lever/pedal shall be provided in the column to lift the support of the radiator slowly. It shall also be provided with a catch in order to ensure that the radiator can be brought back to its normal position.

In their normal position, the axes of the radiator, the support for the sample and the receptacle must coincide.

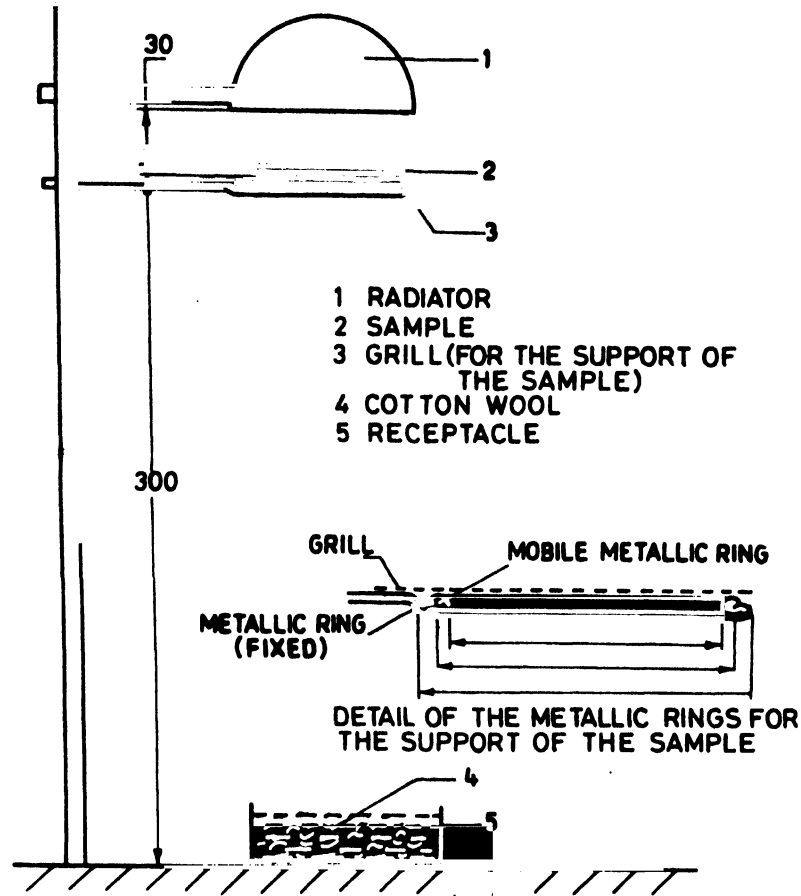


FIG. 10 METALLIC RING AND APPARTUS FOR TESTING

C-3 SAMPLES

The test samples shall measure 70 mm × 70 mm.

Samples shall be taken in the same way from finished products, when the shape of the product permits. When the thickness of the product is more than 13 mm, it shall be reduced to 13 mm by a mechanical process applied to the side which does not face the occupant compartment. If it is impossible, the test shall be carried out, in accordance with the Technical Service, on the initial width of the material which shall be mentioned in the test report.

Composite materials (*see 2.8*) shall be tested as if they were of uniform construction.

In the case of materials made of superimposed layers of different composition which are not composite materials, all the layers of material included within a depth of 13 mm from the surface facing towards the passenger compartment shall be tested individually.

The total mass of the sample to be tested shall be at least 2 g. If the mass of one sample is less, a sufficient number of samples shall be added.

If the two faces of the material differ, both faces must be tested, which means that eight samples are to be tested.

The samples and the cotton wool shall be conditioned for at least 24 h at a temperature of $27 \pm 2^\circ\text{C}$ and a relative humidity of 65 ± 5 percent and shall be maintained under these conditions until immediately prior to testing.

C-4 PROCEDURE

The sample is placed on the support and the latter is so positioned that the distance between the surface of the radiator and the upperside of the sample is 30 mm.

The receptacle, including the cotton wool, is placed beneath the grill of the support at a distance of 300 mm.

The radiator is put aside, so that it can not radiate on the sample, and switched on. When it is on full capacity it is positioned above the sample and timing is started.

If the material melts or deforms, the height of the radiator is modified to maintain the distance of 30 mm.

If the material ignites, the radiator is put aside three seconds afterwards. It is brought back in position when the flame has extinguished and the same procedure is repeated as frequently as necessary during the first five minutes of the test.

After the fifth minute of the test:

- a) If the sample has extinguished (whether or not it has ignited during the first five minutes of the test) leave the radiator in position even if the sample reignites; and

- b) If the material is flaming, await extinction before bringing the radiator into position again.

In either case, the test must be continued for an additional five minutes.

C-5 RESULTS

Observed phenomena shall be noted in the test report, such as :

- a) the fall of drops, if any, whether flaming or not; and
- b) if ignition of the cotton wool has taken place.

ANNEX D

(Foreword)

COMMUTE COMPOSITION

Automotive Basic Standards Sectional Committee, TED 1

<i>Organization</i>	<i>Representative(s)</i>
Automotive Research Association of India, Pune	SHRI B. BHANOT (<i>Chairman</i>) SHRI U.A. KULKARNI (<i>Alternate I</i>) SHRI S.S. SANDHU (<i>Alternate II</i>)
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