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National Standard of the P.R.C.

Replacing GB 8410-1994

Flammability of Automotive Interior Materials

(For Approval)

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Foreword

This Standard refers to and quotes from FMVSS 571.302 *Flammability of Automotive Interior Materials*

This revision chiefly concerns the technical requirements of the standard so that the result judgment basis of the standard is more adequate and definite.

This Standard differs from GB 8410-1994 Standard in the following respects:

- The vehicle classification method is modified in compliance with the requirements of GB 3730.1-2001.
- The definition of interior materials is improved, and the scope of the definition of interior materials is extended.
- The technical requirements are modified and the contents represented by results are added, so that the standard is more operable.
- The requirements for test-purpose heat sources are modified to ensure the applicability of the standard under the present conditions in China.
- The test requirements are added for when planished samples cannot be produced if parts are bent.
- The requirements are added for how to prepare samples when the shapes and dimensions of the parts do not meet sampling requirements.
- Sampling requirements are added for when the parts are not of an even thickness.
- Sampling examples with illustrations are added.
- Test methods for slow-burning samples are added.
- The format of the standard is modified in compliance with GB/T 1.1-2000 Standard.

This revision guarantees the consistency of the old and new versions and makes the standard more operable, so that the GB 8410 Standard is more serviceable.

This Standard is a mandatory national standard, more specifically Chapters 3 and 4.

This Standard is proposed by the National Development and Reform Commission.

This Standard is managed by the National Technical Committee of Automobile Standardization.

This Standard is drafted (unit) by the Technical Center of China FAW Group Corporation.

This Standard is drafted (individuals) by Wang Qingguo and Li Jinghua.

This Standard is preceded by the following versions:

- GB 8410-1988 and GB 8410-1994

Flammability of Automotive Interior Materials

1. Scope

This Standard specifies the technical requirements and test methods for the horizontal flammability of automotive interior materials.

This Standard applies to the assessment of automotive interior materials.

As automotive interior parts (positions, layout and application conditions of the parts, ignition sources, etc.) differ considerably from the test conditions specified in this Standard, this Standard does not apply to the assessment of all the actual flammability of automotive interior materials.

2. Terms

2.1 Burning rate

The ratio of the burnt distance measured under this Standard to the time used in burning this distance, in mm/min.

2.2 Composite material

Material comprising layers of similar or different materials fused, adhered or welded tightly together.

2.3 Exclusive material

Homogeneous material.

Different materials connected discontinuously together (as by sewing, high-frequency welding or riveting) shall not be regarded as composite material, and each of the materials is exclusive material.

2.4 Exposed side

The side of the part installed in the automobile and facing the people inside the automobile.

2.5 Interior materials

Any exclusive material or composite material used for automotive interior parts, such as cushions, backrests, seat covers, safety belts, headrests, armrests, movable folding ceiling, all decorative lining boards (including indoor fender, side fender, back fender and ceiling lining), gauge panel, sundries box, indoor shelf or back window board, curtain, floor cover, sun visor, wheel cowl, motor cover, and any other indoor organic material (including buffer devices for cushioning impact in case of collision).

3. Technical requirements

The flammability of interior materials must meet the following technical requirement:

The burning rate is not greater than 100 mm/min.

4. Test method

4.1 Principle

Fit the sample horizontally on a U-shaped support then ignite the free end of the sample on a flame of the specified height in the combustion box. 15 seconds later, determine whether the flame on the sample goes out or at what time it goes out, the burnt distance of the sample, and the time used in burning this distance.

4.2 Test devices and instruments

4.2.1 Combustion box

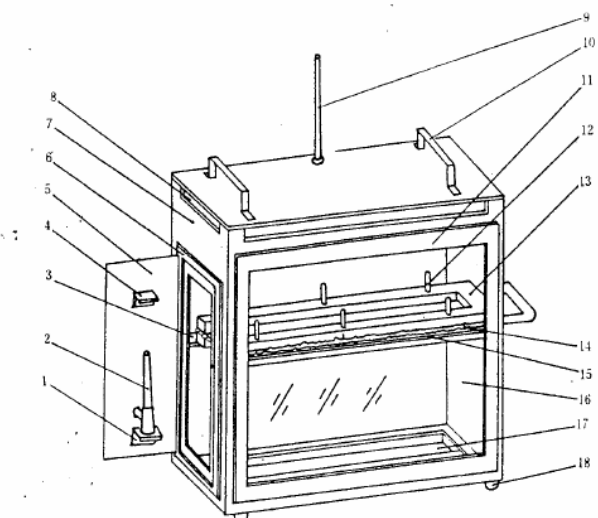
The combustion box is made of steel sheet, as shown in Figure 1 (structure) and Figure 2 (dimensions).

At the front of the combustion box is a heatproof glass observation window, which can cover the front as a whole or serve as a small window for observation.

At the bottom of the combustion box are ten Φ -19mm vent holes, and near the tops of the four walls are 13mm-wide vent slots. The combustion box is supported by four 10 mm-tall legs. At the top right centre of the combustion box is a thermometer opening. The centre is 20 mm from the inside of the back panel.

At one end of the combustion box is a lockable opening, which allows in the support with the sample. At the other end is a small door, above which there is a hole to let in the gas pipe, a base for supporting the gas lamp and a flame height indication board.

At the bottom of the combustion box is a tray for collecting melted drippings (see Figure 3), which is located between two rows of vent holes but does not block them.



1. Gas lamp base; 2. Gas lamp; 3. Sample support guide rail; 4. Flame height indication board; 5. Door; 6. Doorframe; 7. The main body of the combustion box; 8. Vent slot; 9. Thermometer; 10. Combustion box handle; 11. Observation window frame; 12. Support pin; 13. Upper support; 14. Sample; 15. Lower support; 16. Glass observation window; 17. Collection tray; 18. Support legs.

Figure 1: Combustion Box

4.2.2 Sample support

The sample support is a frame made up of two U-shaped corrosion-resistant metal plates. See Figure 4 for dimensions.

The lower board of the support has 6 pins and the upper board of the support has corresponding pinholes to help hold the sample evenly. At the same time, the pins also serve as the starting point (mark 1) and end point (mark 2) of the burning distance.

Another kind of lower board of the support has not only 6 pins but also a Φ -0.25mm 25 mm-long heatproof metal support (Figure 5). This support shall be used for special purposes.

After installation, the bottom side of the sample shall be 178 mm above the bottom plate of the combustion box. The front end of the sample support shall be 22 mm from the inner surface of the combustion box and the two lengthwise outer sides of the test support shall be 50 mm from the inner surface of the combustion box (see Figure 2 and Figure 4).

4.2.3 Gas lamp

The gas lamp provides the fire source for the test. The nozzle of the gas lamp is 9.5 mm in inside diameter, and its valve structure must be easily adjustable and facilitate controlling flame height.

Flame height

When the gas lamp is placed inside the combustion box, the center of its nozzle shall be 19 mm below the centre of the free end of the sample (see Figure 2).

4.2.4 Gas

To ensure the test results are comparable, the flammable gas for the lamp should be liquid gas or any other flammable gas whose caloric value after burning is about 35 MJ/m^3 38 MJ/m^3 , such as natural gas or city gas.

Liquid gas is recommended for referee test.

4.2.5 Metal comb

The metal comb shall be at least 110 mm long, with 7-8 smooth round teeth every 25 mm.

4.2.6 Stopwatch

The stopwatch for time measurement shall be less than 0.5 s in error.

4.2.7 Thermometer

The range of the thermometer shall be at least 150°C , to an accuracy of ± 1 .

Unit: mm

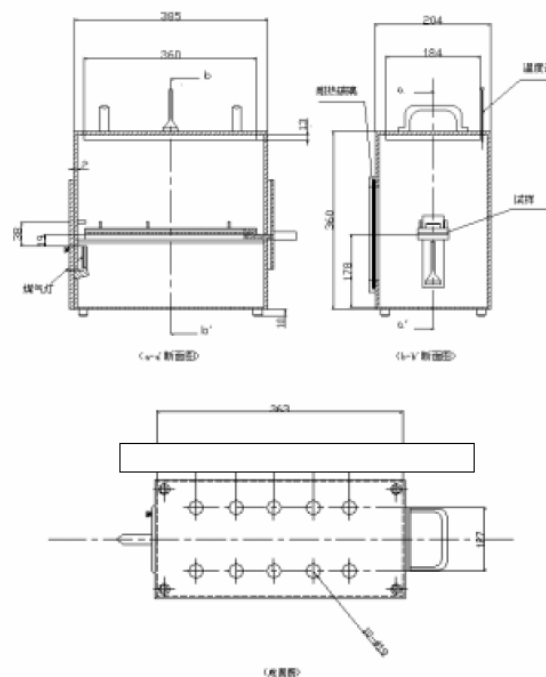


Figure 2: Dimensions of Combustion Box

Unit: mm

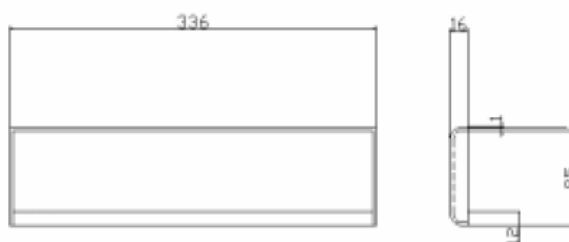


Figure 3: Collection Tray

Unit: mm

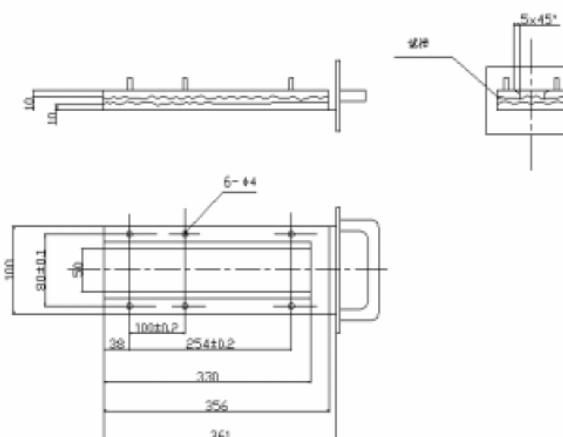


Figure 4: Sample Support

Unit: mm

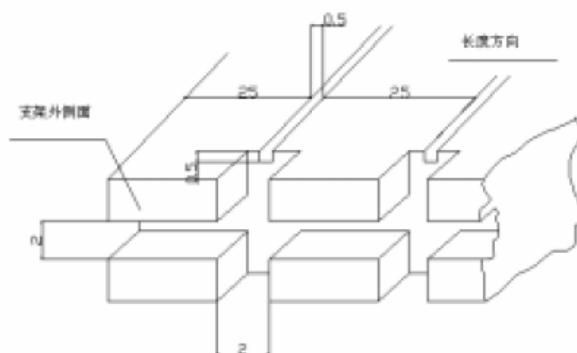


Figure 5: Sectional Diagram of the Lower Support

4.2.8 Steel ruler

The range of the steel ruler shall be at least 400 mm, accurate to ± 1 mm.

4.2.9 Ventilating cabinet

The combustion box shall be placed in a ventilating cabinet. The inner volume of the cabinet shall be 20-110 times that of the combustion box, and none of the length, width or height may be more than 2.5 times greater than either of the other two dimensions.

At points 100 mm from the front and back of the final position of the combustion box, measure the speed of air passing the ventilating cabinet. The speed must be 0.10-0.30 m/s.

4.3 Sample

4.3.1 Shape and dimensions

See Figure 6 for the standard shape and dimensions of the sample. The thickness of the sample shall be that of the parts, but not greater than 13 mm.

Unit: mm

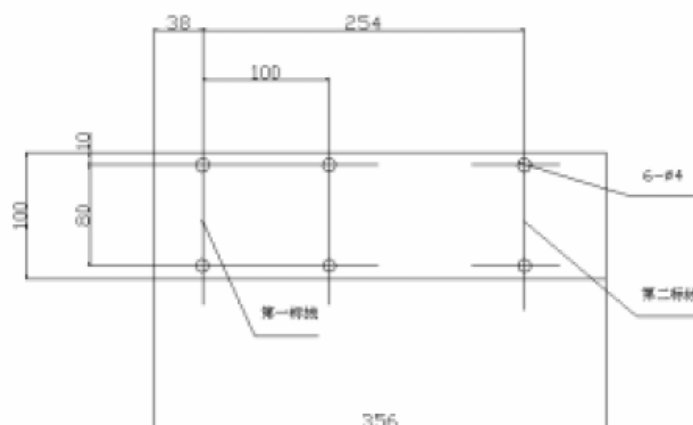


Figure 6: Sample

When comparing the flammability of different materials, the samples must have the same dimensions (length, width and thickness). When sampling, make sure that a cross-section of the sample can be taken all the way along the length.

If the shape and dimensions of the part are insufficient to be made into a standard sample of the specified dimensions, then make a sample of the following minimum dimensions, and keep records:

- If the part is 3-60 mm wide, it shall be at least 356 mm long. In this case, make the width of the sample as close to that of the part as possible.
- If the part is wider than 60 mm, it shall be at least 138 mm long. In this case, the possible burnt distance is equivalent to the distance from Mark 1 to the place where the flame goes out or from Mark 1 to the end of the sample.
- If the part is 3-60 mm wide but shorter than 356 mm or if it is wider than 60 mm but shorter than 138 mm, it shall not be tested under this Standard. Samples narrower than 3 mm shall also not be tested under this Standard.

4.3.2 Sampling

Take at least five samples from the part to be tested. If a material has different burning rates in different directions, then take samples from different directions. Test the five (or more) samples in the combustion box. The sampling methods are as follows:

- If the material is provided at full width, take a sample of full width and a length of at least 500 mm and cut off the materials 100 mm from the edge, and then take samples at regular intervals from the remaining part.
- If the shape and dimensions of the part meet the sampling requirements, cut down a sample from the part.
- If the shape and dimensions of the part do not meet the sampling requirements but it must be tested under this Standard, make a standard sample with the same material, same technique and same structure as the part (356 mm × 100 mm), and let the thickness be the minimum width but not greater than 13 mm. Test results with this sample shall not be used for assessment or certification, and the sample providing the information must be recorded

in the test report.

- d) If the part is thicker than 13 mm, cut a 13 mm-thick sample from the unexposed side including the exposed side, by mechanical means.
- e) If the part is not of uniform width, cut by mechanical means from the unexposed side so that that part has the same width as the narrowest part.
- f) If the part is bent so that it is impossible to take a straight sample, then take the part that is most straight and make the arch rise of the sample not more than 13 mm. If the arch rise of the sample exceeds 13 mm, then make a standard sample with the same material, same technique and same structure as the part (356 mm × 100 mm), and let the thickness be the minimum width but not greater than 13 mm.
- g) Composite material shall be tested in the same way as exclusive material. The sampling methods are the same as above.
- h) If the material is made up of several layers but is not composite material, then take samples from all layers of exclusive materials of a thickness of 13 mm from the exposed side. See Figure 7 for a sampling example.

Unit: mm

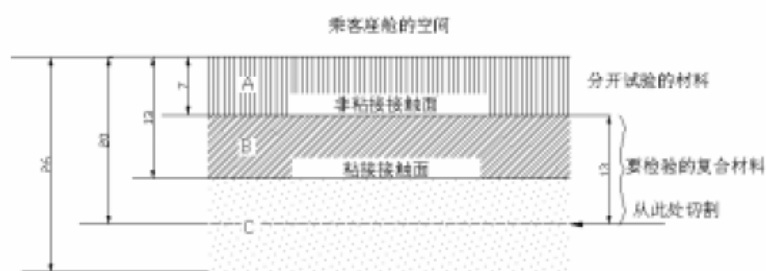


Figure 7: Sampling Example

As shown in Figure 7, materials A and B are not adhered at the interface. Test material A separately. Material is within the thickness of 13 mm and is closely adhered to material C, so materials A & B shall be taken as composite material. Cut 13 mm for the test.

4.3.3 Pretreatment

Before the test, condition the sample for 24-168 hours at a temperature of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and RH 45-55%.

4.4 Test procedure

- 4.4.1 Take out the pretreated sample, put the fluffed or tufted sample on a flat table and use a metal comb as specified in 4.2.5 to comb the sample twice in the opposite direction to the fluff.
- 4.4.2 Ignite the gas lamp when the air inlet of the lamp is closed, adjust the flame to a height of 38 mm with reference to the flame height indication board. Before the first test, the flame must have burned reliably in this state for at least one minute and then gone out.
- 4.4.3 Fix the sample to the sample support with the exposed side facing downward. The two sides and one end of the sample shall be clamped by the U-shaped support, and the free end shall be aligned with the opening of the U-shaped support. If the sample is not wide enough to be clamped by the U-shaped support or if the free end of the sample is so soft and bendable that it will cause unstable burning, the sample must be put on a support with heatproof wires

for the burning test.

- 4.4.4 Push the sample support into the combustion box and put the sample horizontally in the middle of the combustion box. Ignite the gas lamp when the air inlet of the lamp is closed and adjust the flame to a height of 38 mm. Keep the free end of the sample in the flame for 15 seconds, then put out the flame (close the valve of the gas lamp).
- 4.4.5 The flame will burn forward from the free end of the sample. Start timing when the root of the flame passes Mark 1. Observe the flame propagation of the side that burns faster, basing the timing on that side.
- 4.4.6 Stop timing when the flame reaches Mark 2 or if the flame goes out before Mark 2. Timing is also based on the side that burns faster. If the flame goes out before reaching Mark 2, measure the burnt distance from Mark 1 to the place where the flame goes out. The burnt distance means the length of the part of the sample that is burnt on the surface or inside.
- 4.4.7 If the unexposed side of the sample has been cut then timing shall be based on the flame propagation speed of the exposed side.
- 4.4.8 The requirements for the burning rate do not apply to the surface formed by cutting samples.
- 4.4.9 If, after timing begins, the sample burns slowly for a long time, then stop the test when the timer reaches 20 minutes and record the burning time and burnt distance.
- 4.4.10 When conducting a series of tests or repeating tests, make sure that the maximum temperature in the combustion box and sample support does not exceed 30°C before the next test.

4.5 Calculation

The burning rate (V) shall be calculated from the following formula

$$V=60 \times (L/T)$$

Where,

V = burning rate, in mm/min

L = burnt distance, in mm

T = time taken to burn L , in seconds

The maximum burning rates of five or more samples shall be taken to be the test result.

4.6 Result presentation

- 4.6.1 If the sample is exposed to the flame for 15 seconds but does not burn after the fire source is put out, or can burn but goes out before the flame reaches Mark 1, so that no burnt distance is recorded, then the burning rate can be regarded as compliant with the requirements, and the results will be recorded as A-0 mm/min.
- 4.6.2 If, after timing begins, the flame goes out automatically within 60 seconds and the burnt distance is not greater than 50 mm, then the burning rate can also be regarded as compliant with the requirements, and the result will be recorded as B.
- 4.6.3 If, after timing begins, the flame goes out automatically between two Marks, then the sample is an auto-extinguishing sample and does not meet the requirements in 4.6.2. Calculate the burning rate according to 4.5, and the result shall be recorded as C-measured burning rate mm/min.
- 4.6.4 If, after timing begins, the flame reaches Mark 2 or is stopped as described in 4.4.9, then calculate the burning rate according to 4.5, and the result will be recorded as D-measured burning rate mm/min.

4.6.5 If the sample is ignited in the flame in 15 seconds and the flame reaches Mark 1, the sample shall be regarded as not meeting the requirements for burning rate, and the result will be recorded as E.

5. Test report

The test report shall include the following contents:

- a) material type, names and origins of parts, test date, and test staff,
- b) sample color and No.,
- c) material composition,
- d) sample dimensions, thickness of the respective layers of the composite material, direction of the sample in the product,
- e) number of samples,
- f) test result: burnt distance, burning time, burning rate, whether the flammability meets the requirements of the Standard,
- g) whether support wire is used,
- h) records of test conditions different from those specified in this Standard.