

INVOICE FOR ISSUE OF
TOYOTA ENGINEERING STANDARD

NO.: TSM0500G

TITLE: FLAMMABILITY TEST METHOD FOR INTERIOR NONMETALLIC MATERIALS

CLASS: **C1**

PUBLICATION RECORD

This standard has been revised to change the number of test pieces subject to evaluation with the aim of improving the data reliability at high burning rate.

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TOYOTA MOTOR CORPORATION

TOYOTA MOTOR MANUFACTURING
NORTH AMERICA, INC.
PURCHASING/TECHNICAL INFORMATION GROUP

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TOYOTA ENGINEERING STANDARD

TSM0500G

CLASS
C1

FLAMMABILITY TEST METHOD FOR INTERIOR NON-METALLIC MATERIALS

1. Scope
This standard covers the test method for flammability of non-metallic materials used for automobile interior.

2. Flammability Test Method

2.1 Test Apparatus

This shall consist of the metal cabinet and burner shown in Fig. 1 and U-shape clamp shown in Fig. 2.

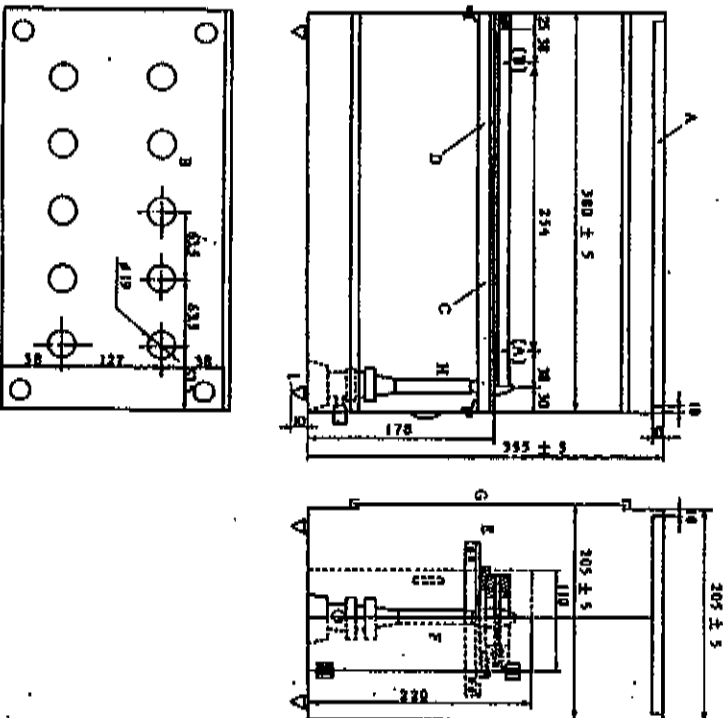


Fig. 1 (Unit: mm)

Prepared and Written by:

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TOYOTA MOTOR CORPORATION

Established/ 10 Revised:

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Remark:

- A: Ventilation clearance
- B: Ventilation hole
- C: test piece (with the material surface facing downward)
- D: guide
- B: guide support (on the door side, remove the portion preventing door movement.)
- F: door
- G: inspection window
- H: burner
- I: ventilation leg

2.1.1 Cabinet

Width shall be 380 ± 5 mm, depth 205 ± 5 mm and height 355 ± 5 mm. Provide on the front a heat-resistant glass window to inspect inside and on one side a door enabling insertion and removal of the test piece and burner. Drill ventilation holes on the top and bottom plates, and place a guide to hold the test piece inside.

2.1.2 Burner

This shall be a Bunsen burner with the bore of 9.5 ± 0.5 mm burning town gas or liquefied propane gas (LPG).

2.1.3 U-Shape Clamp

Use two pieces with dimensions as shown in Fig. 2. Place bench marks (A) and (B) as shown in the same diagram. The clamp shall be made of steel whose surface is provided with corrosion resistant plating.

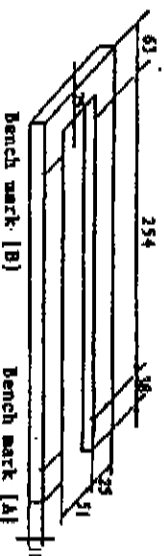


Fig. 2 (Unit: mm)

2.2 Test Method

2.2.1 Test Piece Dimensions

A test piece shall be 350 mm long, 100 mm wide and 12 mm thick. Cut out test pieces from the practical product whenever possible. If it is not possible to cut out this size of rectangular parallelepiped because of the dimensions or shape of the product, determine the possible test piece dimensions in accordance with the provisions in Section 2.2.2.

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2.2.2 Test Piece Cut-Out and Processing Methods

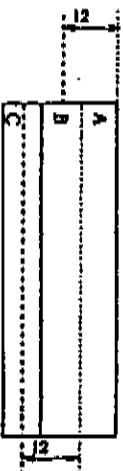
Cut out and process five test pieces according to the following procedures.

- (1) Choose a flat portion of the interior material (if the flat portion does not permit cut-out of test pieces in the dimensions specified in Section 2.2.1 because of the material shape etc., choose a gently curved portion) and cut out pieces in the length and width specified in Section 2.2.1 to the depth of 12 mm. If bonded joints of two different interior materials exist within this depth, obtain test pieces in either of the following methods depending on the method of bonding.

(a) All contact points are bonded with adhesive or the like.

Considering the interior material consisting of two types of material bonded to each other as a single composite, cut out pieces as bonded to the depth of 12 mm from the cabin surface.

(b) None of the contact points are bonded with adhesive or the like. Separately cut out the cabin surface material and the material underneath.



Separately cut out.
(The joint is not bonded.)
Cut out as a single composite.
(Cross section) Cut the material
on this section.

Fig. 3 (Unit:mm)

(Explanation of Fig. 3)

Material A is not bonded to material B. Therefore, cut out test pieces separately from A and B. Material B is within 12 mm from the cabin surface and is bonded to material C at all contact points between them. Thus, test pieces should be cut out from materials B and C as a single composite. In cutting out test pieces, be sure to make cuts to the depth of 12 mm toward the interior of material C as shown in the diagram.

- (2) When it is difficult to cut out test pieces in the specified dimensions because of the dimensions or shape of the product, cut out test pieces from the product according to the following method. Test piece length or width possible to cut out from the product does not meet the specification: if it is possible to cut out to 293 mm or more in length and 25 mm or more in width, cut out from the product. For products whose thickness is less than 12 mm, cut out to the product thickness.

(3) When the product shape does not permit the cutting-out of flat test pieces, it is permissible to use a flat plate consisting of the same materials and construction as the subject interior material. The thickness of this plate shall be equal to or less than that of minimum thickness in the flattest portion of the subject interior material.

(4) If a certain tendency is noted with the direction of expansion of the burning area when the subject interior material is burning, cut out test pieces so that their longitudinal direction equals that direction in which burning proceeds fastest.

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(5) When the interior material has soft fiber or tassels on the surface, before cutting out test pieces, place the material on a flat plane and draw a comb with a row of 7 to 8 round-tipped teeth per 25 mm through it twice.

2.3 Test Conditions

2.3.1 Test Piece Conditioning

- (1) Original state
Leave test pieces in the atmosphere controlled at $20 \pm 5^\circ\text{C}$ and $50 \pm 5\%$ RH for 24 h or longer.
- (2) After heat aging⁽¹⁾
Place test pieces in a hot-air circulation type thermostat adjusted at $70 \pm 2^\circ\text{C}$ ⁽²⁾ and let them stand for 336 h. Take out the test pieces from the thermostat, and leave them in the atmosphere controlled at $20 \pm 5^\circ\text{C}$ and $50 \pm 5\%$ RH for 24 h or longer.

Note: (1)

It is permitted to skip testing under this condition if the quality of a test piece has been guaranteed after heat aging at 70°C for 336 h.

Note: (2)

Exposure at a temperature higher than 70°C for 336 h is permitted if it is not possible to conduct testing at 70°C due to the capability of test equipment or the like.

2.3.2 Installation of Test Piece

Sandwich one of the test pieces prepared in Section 2.3.1 between two U-shape clamps⁽³⁾ shown in Fig. 2 and hold the clamps on the guide in the cabinet shown in Fig. 1.

Note: (3)

When the test piece width is 50 mm or less or when test pieces cannot be horizontally held because of softening and deformation as a result of burning, provide wire to the bottom clamp. The wire shall be heat-resistant and approx. 0.25 mm thick. Wind it around the clamp at an interval of 25 mm perpendicularly to the clamp longitudinal direction as shown in Fig. 4. Orient the test piece front face downward. Example materials for which wire-provided U-shape clamps should be used to prevent abnormal burning include genuine leather, PVC film and leather, fabrics, furs, various types of foam, materials laminated with foams, and rubber. Examples not requiring such clamps include various types of boards and hard resin. If abnormal burning occurs even to these materials, however, wire-provided clamps may be used.

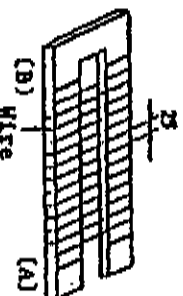


Fig. 4 (Unit:mm)

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Attached Fig. 1

Original State After Heat Aging (Circle either condition applicable)

Combustion test report

Supplier ID No.	
Design list No.	

Date:

Evaluator	Company:		
	Department:		
	Approved	Confirmed	Measured

Test date and conditions

Due date	_____ , 20__		
Test piece humidity- conditioning conditions	Temperature RH	max. _____ °C to min. _____ °C	
	Storage time	max. _____ h to min. _____ h	
burning atmos- phere	Temperature RH	max. _____ °C to min. _____ °C	
		max. _____ h to min. _____ h	
Wire-provided retainer	Used / Not used		

Subject material	
Part name	
Construction Material Plate thickness and weight Others	

NO	Burning distance (mm)	Burning time (s)	Burning rate (mm/min)	NO	Burning distance (mm)	Burning time (s)	Burning rate (mm/min)
1				16			
2				17			
3				18			
4				19			
5				20			
6				21			
7				22			
8				23			
9				24			
10				25			
11				26			
12				27			
13				28			
14				29			
15				30			

Max. burning rate	(Remarks)
mm/min	

Test piece dimensions (outer dimensions only when length is less than 350 mm or width is less than 100 mm.)		
Length	Width	Thickness
mm	mm	mm

(1) Information of subject material

Material	1	TS NO	
	2	Manufacturer	
	3	Grade	
	4	Classification of fire retardant	

(2) Test piece sampling sketch

Sampling position		
Method	1	Product assembly
	2	Original roll, test piece flat plate (Reason)

(3) Subject parts

Vehicle type	Part No.	Part name

(4) Case history of subject material manufacture (processing method, use of material for products of other type)

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(5) Others

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