TOYOTA ENGINEERING STANDARD

NO. : **TSM0505G**

TITLE : SMELL QUALITY OF NON-METALLIC MATERIALS

CLASS : **C1**

Established/Revised : Rev.5(May.2006)

This standard has been revised as a consequence of adding the test method to examine the influence on air conditioner smell and the criteria.

Engineering Data Planning Dept.
Engineering Data Control and
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TOYOTA MOTOR CORPORATION

SMELL QUALITY OF NON-METALLIC MATERIALS

1. Scope

This standard covers the smell quality of non-metallic materials that are used for automobile compartment and parts associated with the compartment(1).

Note: (1)
Decisions shall be made upon a discussion among the parties concerned.

2. Classification

Non-metallic materials shall be classified as Table 1 according to the influence on each smell(2).

Table 1

Class	Material code	Influence on smell
1A	TSM0505G-1A	Influence on cabin smell
2A	TSM0505G-2A	Influence on cabin and air conditioner smell
2B	TSM0505G-2B	Influence on cabin smell and large influence on air conditioner smell

Note: (2)
The influence on each smell shall be determined among the parties (design, evaluation) concerned.

3. Quality

The quality of smell shall be tested in accordance with Section 8, and the result shall be summarized according to Section 9 and satisfy Table 2.

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Table 2

Item					Quality		
					1A	2A	2B
Material composition					Material shall not contain the following: (1) Solvent type non-drying sealer[3] (2) Substrate containing phenol binder[4] (3) Backing resin containing melamine resin[5] (4) Substrate of wood containing phenol binder[6] (5) Plywood, light-weight plywood[7] (6) Adhesive containing methyl isobutyl ketone[8] (7) Red sulphur fire retardant[9] (8) Sisal hemp[10] (9) Felt containing phenol binder[11]		
Smell test	Single part only	Dry condition (Initial) (After aging)	Intensity		3 max.		
			Pleasantness/ unpleasantness		-1.5 min.		
			Nature of smell	Stimulating	1 max.		
				Fishy			
		Wet condition (Initial) (After aging)	Intensity		3.5 max.		
			Pleasantness/ unpleasantness		-2.0 min.		
			Nature of smell	Stimulating	1 max.		
				Fishy			
		Water extracting condition	Intensity		To be reported	3 max.	2 max.
			Pleasantness/ unpleasantness			-1.5 min.	-1 min.
			Nature of smell	Stimulating		1 max.	1 max.
				Fishy			
	Combination of parts	(Initial) (After aging)	Intensity		To be reported		
			Pleasantness/ unpleasantness				
			Nature of smell	Stimulating			
				Fishy			
	Indirect material	Dry condition (Initial) (After aging)	Intensity		3 max.		
			Pleasantness/ unpleasantness		-1.5 min.		
			Nature of smell	Stimulating	1 max.		
				Fishy			

Note: (3)
For instance, it is contained in opening trim, back door weather strip, quarter window weather strip, etc.
Note: (4)
For instance, it is contained in molded headlining, sunshade trim, etc.
Note: (5)
For instance, it is contained in seat fabric, etc.
Note: (6)
For instance, it is contained in door trim, package tray, quarter trim, seat back board, etc.

Established/ 5 Revised:
May.2006

Note: (7)
For instance, it is contained in deck board, etc.
Note: (8)
For instance, it is contained in cemedine G284 blue, cemedine G284 blue-1.
Note: (9)
For instance, it is contained in fire retardant for interior parts, etc.
Note: (10)
For instance, it is contained in molded headlining, etc.
Note: (11)
For instance, it is contained in acoustic felt, etc.

4. General Test Conditions

4.1 Test Environment

As a rule, tests shall be conducted in a laboratory at a temperature of 23± 2 ℃ and relative humidity of 50±5 %. If this test environment can not be held for some inevitable reasons, inform the actual test environment.

4.2 Testing Container

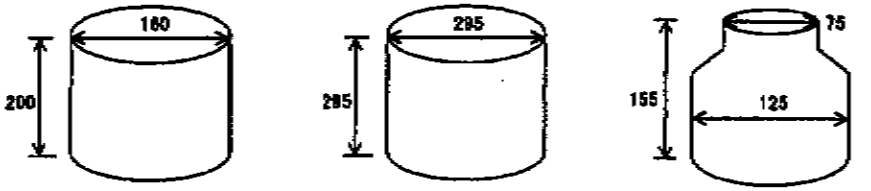
The specification for a testing container shall be as shown in Table 3. Testing container shall preferably be a 4-L can and 2-L glass bottle for single part test and indirect material test, and a 20-L can for combined parts test. However, other types of containers may be used. The specification for typical containers shall be as shown in Fig. 1. Wash the container by the following steps and make sure that there is no smell on it. When reusing the container that was used in the test once, make sure that a lid is not loosened and there remains no smell on it.

Steps for washing the container
(1) Wash the container with unscented liquid detergent.
(2) Rinse the container well with water and then wipe it off.
(3) Wash with acetone.
(4) Leave the container in the laboratory until any smell of the solvent cannot be noticed. Then dry it in a drying machine for 30 min at 110 ℃.
(5) Wash a lid of the container according to the same procedures above.

Table 3 Specification of the Container

Material	Steel, stainless, glass etc. giving off less smell of itself
Capacity (L)	1 to 20
Size	Inside diameter of the opening shall be φ70 mm or more.

Established/ 5 Revised:
May.2006



4-L steel can[12] 20-L stainless can[13] 2-L glass bottle

Fig. 1 Typical Containers for Smell Test (Unit: mm)

Note:(12)
Can supplier: ex. Minesawa Koki
Note:(13)
Can supplier: ex. Iuchi Seieido

5. Test Types

Test types shall be as shown in Table 4.

Table 4 Test Types

Test parts	Dry/wet	Initial smell/smell after aging	Test method
Single part	Dry	Initial smell	Section 8.1
		Smell after aging	
	Wet	Initial smell	Section 8.2
		Smell after aging	
Combined parts	---	Initial smell	Section 8.4
		Smell after aging	
Indirect materials[14]	Dry	Initial smell	Section 8.5
		Smell after aging	

Note:(14)
Indirect materials here shall be materials such as interior painting, sealer, in-process adhesive and so on that are used in the vehicle manufacturing process (O_W, O_T, and O_A).

Established/ 5 Revised:
May.2006

6. Test Preparations

6.1 Selection of Panelists

As a rule, five kinds of standard smells[15] shown in Table 5 shall be used and panelists shall be selected as described as follows. Select persons who gave proper answers to all of the standard smells as panelists. As a rule, panelists are valid for 5 years and new panelists shall be selected after the elapse of five years (or 3 years for those aged 40 or more). Panelists shall be selected as follows.

(1) Assign one tester for each testee.

(2) A tester shall select two smelling papers at random out of the five smelling papers[16] numbered 1 through 5, and dip them by approximately 1 cm from the tip of each paper into the standard smell A. Dip remaining three papers in the contrast solution[17] likewise.

(3) Hand out the five smelling papers to the testees and let them smell the papers. The testees shall smell each paper one by one to check if any smell is noticed. Upon checking, let them hold each smelling paper close to their nose but not too close to touch it.

(4) After smelling the five papers, the testees shall enter the two numbers whose papers they thought had smells on the answer sheet. If the testee fails to notice the smell by one time smelling, let them smell it again.

(5) Repeat the test for the standard smell B, C, D, and E likewise.

Note: (15)
The standard smells used for selecting panelists: ex. sold by Daiichi Yakuhin Sangyo, etc. The standard smells and contrast solutions with a valid expiration date shall be used.

Note: (16)
No-smell, 0.7 cm-wide and 15 cm-long filter papers.

Note: (17)
No-smell liquid paraffin

Table 5 Standard Smells

No.	Name	Structural formula	Concentration (mass/mass%)
A	β-phenylethyl alcohol		$10^{-1.9}$
B	Methylcyclopentenolone		$10^{-1.6}$
C	Isovaleric acid		$10^{-1.9}$
D	γ-undecalacton		$10^{-2.3}$
E	Skatole		$10^{-2.6}$

Established/ 5 Revised:
May.2006

6.2 Smell Level Setting

Dip a smelling paper by approximately 1 cm from the tip into the standard smell C shown in Table 5, and let the testees smell it. Deem the level of smell intensity of C as 3 (easily recognized smell) and the pleasant/unpleasant level as -2 (unpleasant). Level setting shall be required for all testees prior to the test. For improving accuracy of the evaluation, another smell levels may be added by letting the testees smell the standard smell C with a concentration of 10^{-4} and 10^{-6}, respectively, and deem the former as smell intensity 4.5 and pleasant/unpleasant level -3, and the latter as smell intensity 1.5 and pleasant/unpleasant level -1.

7. Sampling Test Piece

7.1 Parts

A test piece shall be taken from parts that were manufactured within the past two weeks and be instantly used for tests. Manufactured parts shall preferably be stored in normal state (23±2 ℃, relative humidity 50±5 %). When a manufacturing site and testing site are far apart, the test piece shall be sealed in a bag which rarely leaks gases (made of polyvinyl fluoride, for example) and be transported. Dimensions of the test piece shall be in accordance with the standards on respective part and material, or drawing. If dimension is not specified, calculate by the equation (1) or using standard dimensions (when using 4-L container) as shown in Table 6. If the calculation result is less than 1 cm^2, test piece dimension shall be 1 cm^2.

$$A1 = A0 \times \frac{T1}{T0} \quad \text{------ (1)}$$

where,

$A1$: surface area of test piece (cm^2)

$A0$: surface area of part (cm^2)

$T1$: capacity of testing container (L); 4 L

$T0$: capacity of vehicle compartment[18] (L); 3000 L as standard

Note: (18)

Capacity of vehicle compartment is also used for calculating the dimension of a part in a luggage space.

Established/ 5 Revised:
May.2006

Table 6 Standard Dimensions of Test Piece (When Using 4-L Container) (Unit: cm)

Portion	Dimensions (longitudinal×lateral×thickness)
Instrument panel	3×3×product thickness
Roof head lining	4×7×product thickness
Seat surface cover	10×10×product thickness
Seat pad	10×10×2
Door trim	4×7×product thickness
Floor carpet	10×10×product thickness
Package tray trim	3×3×product thickness
Dash silencer	4×4×product thickness
Room partition silencer	4×4×product thickness
Luggage mat	2×3.5×product thickness

7.2 Indirect Materials

A test piece taken from indirect materials shall be pretreated as necessary.

7.2.1 Pretreatment

Pretreatment shall be conducted under the same condition as the actual processing history. For example, if the material is subjected to a heat history in the coating process as in the case of body sealer, the test piece shall be heated under the conditions (140 ℃ for 30 min×2 sets for example) equivalent to that heat history, and then used for smell tests. If the history for the same material differs according to the portion to which the material is used, vehicle model, plant, and the like, the material shall be pretreated under the worst conditions in terms of smell[19]. Pretreatment shall be conducted by placing the test piece on a non-smell material (such as aluminum foil) which can withstand the pretreatment conditions.

Note: (19)
Such as lower limit value for processing temperature and processing time.

Established/ Revised:
May.2006

7.2.2 Amount of Test Piece

The amount of test piece shall be in accordance with the standards on respective part and material, or drawing. If the amount is not specified, calculate it by the equation (2). If the calculation result is less than 1 g, the amount of test piece shall be 1 g. However, the amount of paint material shall be calculated in accordance with the method as specified in Section 7.1 (calculation of surface area).

$$BI = B0 \times \frac{T1}{T0} \quad \text{------ (2)}$$

where,
BI: amount of test piece (g)
B0: amount used in vehicle compartment (g)
T1: capacity of testing container (L)
T0: capacity of vehicle compartment (L); 3000 L as standard

8. Smell Test

8.1 Smell Test for Single Part under Dry Condition

8.1.1 Initial Smell

Tests for initial smell shall be conducted by the following steps.

(1) Heating test piece

(a) Place the test piece specified in Section 7.1 in the container specified in Section 4.2 and cover the container with a lid.

(b) Place the container in a drying machine and heat it for 1 h. A heating temperature shall be in accordance with the standards of respective part and material, or drawing. If there is no specification, the temperature shall conform to Fig. 2 or Table 7. For parts which are not described in Fig. 2 nor Table 7, a heating temperature shall be decided through discussion among parties concerned with reference to Table 8.

(c) After heating, take the container out of the drying machine and cool it until it reaches room temperature.

(2) Smell level setting

Smell level shall be set just before smelling. The method for level setting shall conform to Section 6.2.

(3) Smelling

Open the cover of the container by sliding it by 3 to 4 cm and let panelists smell one by one. Then the panelists shall evaluate the smell by filling the evaluation sheet in Attached Table 1 (see Fig. 3). The number of panelists shall be five or more. The number of panelists per container shall be as shown in Table 9. For example, when using a 4-L container, two or more containers and test pieces shall be required per test.

(4) Results evaluation

The results shall be evaluated in accordance with Section 9.

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May.2006

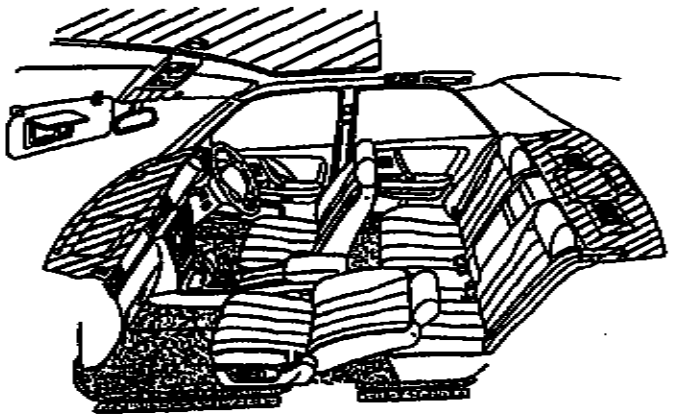

Fig. 2 Heating Temperatures

Table 7 Heating Temperatures

Parts	Heating temperature (℃)
Instrument panel, package tray, sunshade trim	100±2
Pillar garnish, roof head lining, sun visor, lower instrument panel, seat, door trim, room partition silencer, dash silencer	80±2
Carpet, luggage compartment trim, door trim carpet, scuff plate	60±2

Table 8 Heating Temperatures

Portion	Heating temperature (℃)
With direct sunrays	80±2
No direct sunrays	60±2

Table 9 Number of Panelists per Container

Capacity (L)	Number of panelists
1	1
2 to 3	2
4 to 10	3
11 to 20	5

Fig. 3 How to Smell Test Piece

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8.1.2 Smell after Aging

Tests for smell after aging shall be conducted by the following steps.

(1) Pretreatment of test piece

(a) Place the test piece specified in Section 7.1 in the container specified in Section 4.2. At this time, the container shall not be covered.

(b) Place the container in a drying machine[20] and heat it at 80 ℃ for 96 h.

Note: (20)
Air replacement; 3 or more times per hour

(c) After heating, take the container out of the drying machine, cool it until it reaches room temperature, and cover it with a lid.

(2) Heating test piece

(a) Place the container in a drying machine and heat it for 1 h. A heating temperature shall be in accordance with the standards of respective part and material, or drawing. If there is no specification, the temperature shall conform to Fig. 2 or Table 7. For parts which are not described in Fig. 2 nor Table 7, a heating temperature shall be decided through discussion among parties concerned with reference to Table 8.

(b) After heating, take the container out of the drying machine and cool it until it reaches room temperature.

(3) Smell level setting: The same as specified in Section 8.1.1 (2).

(4) Smelling: The same as specified in Section 8.1.1 (3).

(5) Results evaluation: The same as specified in Section 8.1.1 (4).

8.2 Smell Test for Single Part under Wet Condition

8.2.1 Initial Smell

Tests for initial smell shall be conducted by the following steps.

(1) Pretreatment of test piece

(a) Apply distilled water that is equivalent to 5 % of the test piece in weight over the test piece specified in Section 7.1 as uniformly as possible.

(b) Place the test piece in the container specified in Section 4.2 and cover the container with a lid.

(2) Leaving test piece

Leave the container in the laboratory for 1 h under the normal condition with a temperature of 23±2 ℃ and relative humidity of 50±5 %.

(3) Smell level setting: The same as specified in Section 8.1.1 (2).

(4) Smelling: The same as specified in Section 8.1.1 (3).

(5) Results evaluation: The same as specified in Section 8.1.1 (4).

Established/ 5 Revised:
May.2006

8.2.2 Smell after Aging

Tests for smell after aging shall be conducted by the following steps.

(1) Pretreatment of test piece

(a) Place the test piece specified in Section 7.1 in the container specified in Section 4.2. At this time, the container shall not be covered.

(b) Place the container in a drying machine[20] and heat it at 80 ℃ for 96 h.

(c) After heating, take the container out of the drying machine and cool it until it reaches room temperature.

(d) Apply distilled water that is equivalent to 5 % of the test piece in weight over the heated test piece as uniformly as possible.

(e) Place the test piece in the container specified in Section 4.2 and cover the container with a lid.

(2) Leaving test piece: The same as specified in Section 8.2.1 (2).

(3) Smell level setting: The same as specified in Section 8.1.1 (2).

(4) Smelling: The same as specified in Section 8.1.1 (3).

(5) Results evaluation: The same as specified in Section 8.1.1 (4).

8.3 Smell Water Extraction Test for Single Part

8.3.1 Test Outline

(1) Preparation for water extraction: prepare test equipment and samples

(2) Water extraction: heat the sample, sample component that emits smell

(3) Smell test: Prepare bag, make standard smell, pour sample, smell, summarize results

8.3.2 Preparation of Water Extraction

(1) Preparation of test equipment

Fig. 4 shows the test equipment. Table 10 lists the tools and devices necessary for the test. Test equipment, tools and devices other than specified may be used if equivalent performance is guaranteed. However, they must be free from smell, except for reagents.

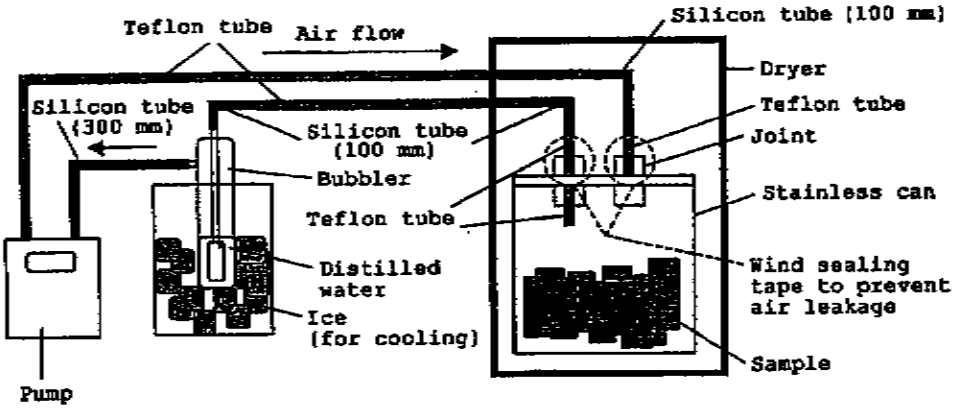


Fig. 4 Test Equipment

Established/ 5 Revised:
May.2006

Table 10 Equipment, Tools/Devices and Reagents Used for Test

	No.	Item	Performance (ex. manufacturer, grade)	Pretreatment
For water extraction	1	Chamber	Stainless can with a lid. The volume shall be 3 to 4 L without considering the sample volume (4-5627-04 manufactured by As One Corporation).	Wash the sample with fragrance-free mild detergent and let it dry naturally.
	2	Joint	Made of fluorocarbon resin capable of attaching a teflon tube with an outside diameter of 8 mm. Tube diameter is 8 mm (7-274-02 manufactured by As One Corporation).	
	3	Bubbler	Made of glass. The glass tube for introducing gas shall be in purified water when 8 mL of purified water is poured (64834-U manufactured by Supelco).	Wash the sample with pure water and apply ultrasonic cleaning for 90 min.
	4	Pump	Usable at a rate of 1 L/min while attached to the test equipment (MP-Σ 100H manufactured by Sibata Scientific Technology Ltd.).	Purging by idling.
	5	Silicon tube	Inside diameter 5 mm×outside diameter 9 mm (manufactured by Tigers Polymer Corporation).	New product.
	6	Teflon tube	Inside diameter 6 mm×outside diameter 8 mm (#9003 manufactured by Nichias Corporation).	
	7	Sealing tape	Made of PTFE (spread sealing tape manufactured by GomunoInaki Co., Ltd.).	
For smell test	8	Acetic acid reagent	Concentration: 99.7 % min.	---
	9	Nitrogen gas	Concentration: 99.999 % min.	
	10	Gas meter	Capable of measuring integrated flow rate (DC-1C manufactured by Shinagawa Corporation).	
	11	Bag	Made of PET with a sleeve outside diameter of 7 mm and a maximum volume of approximately 3 L (Flek-Samplar type F).	
	12	Cap	Made of silicon rubber capable of blocking sleeve of the bag.	

(2) Preparation of sample

Prepare 15 test pieces when using a 4-L container specified in Section 7.1. If the calculation result is less than 1 cm^2, calculated surface area shall be used for the test piece dimension.

Established/ 5 Revised:
May.2006

8.3.3 Water Extraction

(1) Heating of sample

(a) Place the sample specified in Section 8.3.2 (2) in the stainless can shown in Fig. 4.

(b) Heat using the dryer shown in Fig. 4. Heating temperature shall be as shown in Fig. 2 or Table 7. For portions that are not specified in Fig. 2 nor Table 7, the temperature shall be determined with reference to Table 7 by the concerned parties. The heating duration shall be 4 h after the temperature in the dryer reached the specified temperature.

(2) Sampling of component that emits smell

(a) Pour 8 mL of non-smell distilled water in the bubbler shown in Fig. 4 and place the bubbler in the container with ice in it as shown in Fig. 4.

(b) One hour after the temperature in the dryer reached the specified temperature, operate the pump shown in Fig. 4 at a rate of 1 L/min and sample the component that emits smell in the distilled water. Sampling duration shall be 3 h.

(c) Three hours after sampling, stop the pump, remove the bubbler from the test equipment, seal the opening with a sealing tape, etc., and store until the smell test. The maximum storage period shall be 24 h after sampling.

8.3.4 Smell Test

(1) Preparation of bag

Prepare a new bag listed in Table 10 for the test. Use 1 bag for at most 2 panelists, which means 3 bags for 5 panelists.

(2) Preparation of standard smell

Dilute the acetic acid reagent listed in Table 10 with distilled water up to the following concentration and use the solution as standard smell.
When the acetic acid concentration is 0.05 mass%: smell intensity 3, pleasantness/unpleasantness -1.5
When the acetic acid concentration is 0.005 mass%: smell intensity 2, pleasantness/unpleasantness -1

(3) Pouring of sample

Use a syringe and drop 2 mL water in the bubbler where the component that emits smell is sampled into the bag. Fill 2.2 L of N_2 gases and block the sleeve using a silicon rubber cap etc. and leave under room temperature for 6 h. Do the same way for the standard smell too.

(4) Smelling

First, all panelists should smell the standard smell and synchronize the smell levels. Smell the sample and evaluate according to the evaluation sheet shown in Attached Table 1. The number of panelists shall be 5 or more. When smelling, keep the distance between the sleeve of the bag and the panelist's nose to 3 to 4 cm. Lightly press the bag by hand and smell the odor that comes off the bag. It may be good to slightly move the bag in the horizontal direction so that the smell from the bag reaches the panelist nose.

(5) Summary of results

Summarize the results as specified in Section 9.

Established/ 5 Revised:
May.2006

8.4 Smell Test for Combined Parts

Test for combined smell shall be conducted by placing multiple parts in a container. Parts used for test and portions from which the test pieces are taken shall be instrument panel, head lining, door trim, combination of seat and package trim or deck board. If reconsideration seems necessary after considering components of each part, part components of each vehicle, and degree of influence of each part, parties concerned shall have a discussion separately. Dimensions of test piece shall conform to Section 7.1.

8.4.1 Initial Smell

Tests for initial smell shall be conducted by the following steps.

(1) Pretreatment of test piece
  (a) Place the test piece in the container specified in Section 4.2.
  (b) Apply distilled water that is equivalent to 5 % of the test piece in weight over the test piece as uniformly as possible and cover the container with a lid.

(2) Heating test piece
  (a) Place the container in a drying machine and heat it at 60 ℃ for 2 h.
  (b) After heating, take the container out of the drying machine and cool it until it reaches room temperature.

(3) Smell level setting: The same as specified in Section 8.1.1 (2).

(4) Smelling: The same as specified in Section 8.1.1 (3).

(5) Results evaluation: The same as specified in Section 8.1.1 (4).

8.4.2 Smell after Aging

Tests for smell after aging shall be conducted by the following steps.

(1) Pretreatment of test piece
  (a) Place the test piece in the container specified in Section 4.2. At this time, the container shall not be covered.
  (b) Place the container in a drying machine[20] and heat it at 80 ℃ for 96 h.
  (c) After heating, take the container out of the drying machine, cool it until it reaches room temperature, and cover it with a lid.
  (d) Apply distilled water that is equivalent to 5 % of the test piece in weight over the test piece as uniformly as possible and cover the container with a lid.

(2) Heating test piece
  (a) Place the container in a drying machine and heat it at 60 ℃ for 2 h.
  (b) After heating, take the container out of the drying machine and cool it until it reaches room temperature.

(3) Smell level setting: The same as specified in Section 8.1.1 (2).

(4) Smelling: The same as specified in Section 8.1.1 (3).

(5) Results evaluation: The same as specified in Section 8.1.1 (4).

Established/ 5 Revised:
May.2006

8.5 Smell Test for Indirect Materials under Dry Condition

8.5.1 Initial Smell

Tests for initial smell shall be conducted by the following steps.

(1) Heating test piece

(a) Place the test piece specified in Section 7.1 in the container specified in Section 4.2, and cover the container with a lid.

(b) Place the container in a drying machine and heat it for 1 h. A heating temperature shall be in accordance with the standards of respective part and material, or drawing. If there is no specification, the temperature shall conform to Fig. 2. For parts which are not described in Fig. 2, a heating temperature shall be decided through discussion among parties concerned with reference to Table 8.

(c) After heating, take the container out of the drying machine and cool it until it reaches room temperature.

(2) Smell level setting: The same as specified in Section 8.1.1 (2).

(3) Smelling: The same as specified in Section 8.1.1 (3).

(4) Results evaluation: The same as specified in Section 8.1.1 (4).

8.5.2 Smell after Aging

Tests for smell after aging shall be conducted by the following steps.

(1) Pretreatment of test piece

(a) Place the test piece specified in Section 7.1 in the container specified in Section 4.2. At this time, the container shall not be covered.

(b) Place the container in a drying machine[20] and heat it at 80 ℃ for 96 h.

(c) After heating, take the container out of the drying machine, cool it until it reaches room temperature, and cover it with a lid.

(2) Heating test piece

(a) Place the container in a drying machine and heat it for 1 h. A heating temperature shall be in accordance with the standards of respective part and material, or drawing. If there is no specification, the temperature shall conform to Fig. 2. For parts which are not described in Fig. 2, a heating temperature shall be decided through discussion among parties concerned with reference to Table 8.

(b) After heating, take the container out of the drying machine and cool it until it reaches room temperature.

(3) Smell level setting: The same as specified in Section 8.1.1 (2).

(4) Smelling: The same as specified in Section 8.1.1 (3).

(5) Results evaluation: The same as specified in Section 8.1.1 (4).

Established/ 5 Revised:
May.2006

9. Results Evaluation

Intensity, pleasantness/unpleasantness, and sensory nature of smell shall be evaluated by filling in the evaluation sheet shown in Attached Fig. 1. Bodily sensation and material smell shall be evaluated as necessary. The smell intensity and pleasantness/unpleasantness level shall be evaluated in 0.5 units. Use Attached Fig. 2 for evaluating results and the results shall be expressed as the mean value of the panelists engaged in the evaluation. (The mean value shall be calculated to one decimal place by round-off.) Calculate the nature of smell assuming that ◎ is 3, ○ is 2, and △ is 1, and express the result by the mean value of panelists.

Established/ 5 Revised:
May.2006

TOYOTA ENGINEERING STANDARD | TSM0505G

Attached Fig. 1 Smell Sensory Evaluation Sheet

Name		Date of test	Year/Month/Day / /	Test piece	

1. Smell the sample inside the can, and apply round marks to numbers corresponding to the intensity and pleasantness/unpleasantness of the smell.

Intensity
- 5 Stronger than standard smell (intense smell)
- 4 A little stronger than standard smell (strong smell)
- 3 Same as standard smell (easily recognized smell)
- 2 A little weaker than standard smell (weak recognizable smell)
- 1 Weaker than standard smell (barely recognizable smell)
- 0 No smell

Standard smell C 10^{-5}
- Intensity: 3
- Pleasantness/unpleasantness: -2

Pleasantness/unpleasantness
- 3 Very pleasant
- 2 Pleasant
- 1 Rather pleasant
- 0 Neither pleasant nor unpleasant
- -1 Rather unpleasant
- -2 Unpleasant (the same level of unpleasantness as standard smell)
- -3 Very unpleasant

2. Select the appropriate expression, if any, and mark it with its code.

Codes
- ◉ Expression is exact -------- (3)
- ○ It is rather appropriate --- (2)
- △ Somewhat appropriate ------- (1)

①Sensory nature of smell	②Bodily sensation	③Material smell
Sour smell	Biting	Plastic smell
Sweet smell	Nose refreshing	Rubber smell
Burned smell	Makes head drowsy	Vinylchloride/plasticizer smell
Dusty smell	Makes head dizzy	Thinner/solvent smell
Irritating smell	Nauseating	Paint smell
Aromatic smell	Makes one cough	Urethane/mine smell
Fishy smell	Eye irritating	Oily smell
Rotten smell	Throat refreshing	Tar/asphalt smell
		Cloth/felt smell
		Leather smell

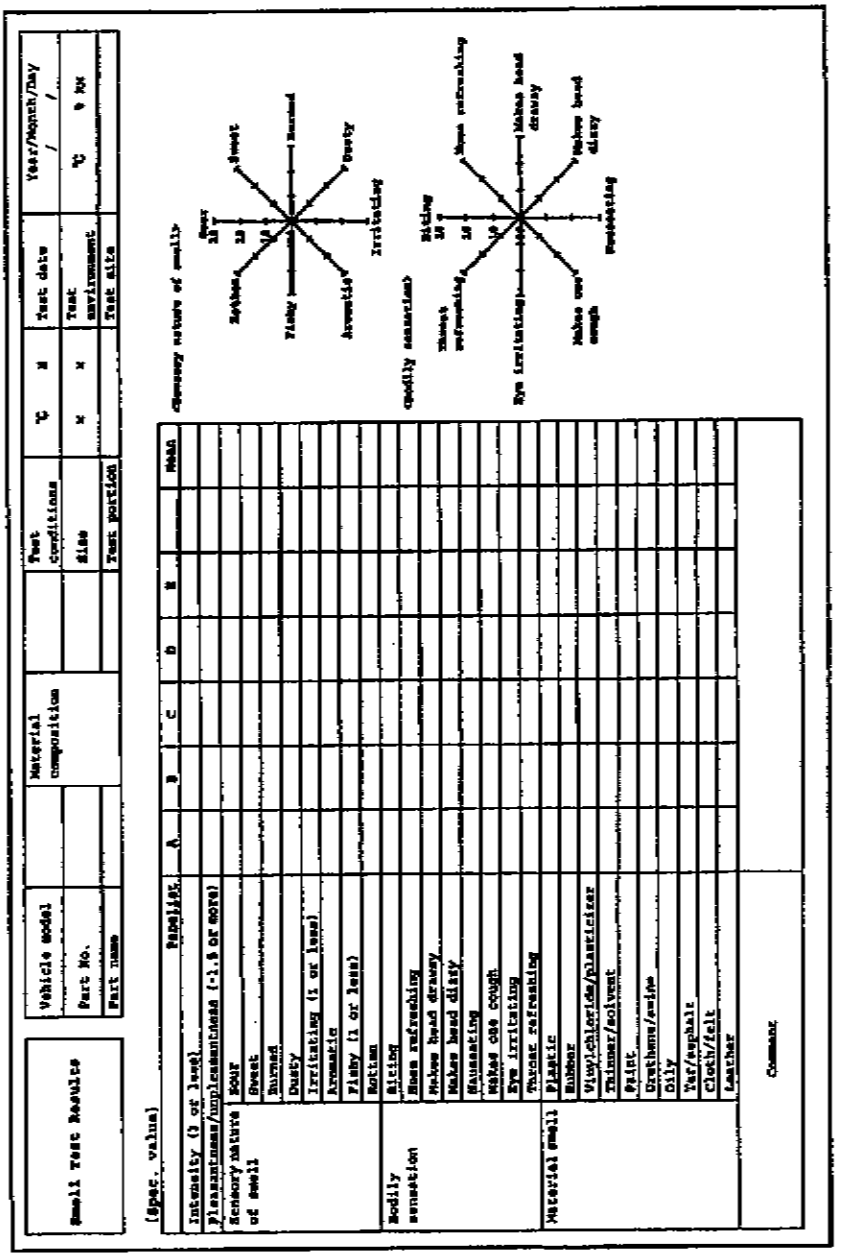
3. Enter freely what you have felt.

Remark:

Sensory nature of smell	Example
Sour smell	Vinegary smell, citrus smell
Sweet smell	Standard smell D, vanilla extract smell
Burned smell	Smell of burned paper or wood
Dusty smell	Smell of dust or powder in the air
Irritating smell	Thinner, formaldehyde, and ammonia smell
Aromatic smell	Naphthalene and thinner smell
Fishy smell	Smoked squid and (unfresh) fishy smell
Rotten smell	Garbage smell

Established/ 5 Revised:
May.2006

Attached Fig. 2



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