

Testing Methods of Chemical Resistance for Synthetic Resin Parts

1. Scope: This standard specifies the testing methods of chemical resistance for synthetic resin parts (hereinafter referred to as "testing method") to be used for automobiles.
2. Classification of Testing Methods: The testing methods shall be classified into four as shown in Table 1, depending on the conditions under which the parts are used and the locations in which they are installed.

Table 1

Testing methods	Applications	Testing Conditions	Required chemical resistance
Method 1	Parts to be used as vessels or the equivalent of them.	Dipping (1)	Chemical resistance to all chemicals used in vessels.
Method 2	Parts to be installed inside the car (or compartment).	Wiping (2)	Gasoline resistance, gas oil resistance, oil resistance (4), synthetic sweat resistance, regent resistance.
Method 3	Parts to be installed outside the car (or compartment).	Spot test (3)	Washer liquid resistance, detergent resistance, undercoat, resistance, gasoline resistance, gas oil resistance, oil resistance, kerosine resistance, acid resistance, protective agent resistance, wax resistance.
Method 4	Parts to be installed in the engine room.		Gasoline resistance, gas oil resistance, oil resistance, kerosine resistance, acid resistance, brake liquid resistance, anti freeze resistance, washer liquid resistance, anti-corrosive resistance.

- Notes: (1) The state in which the chemical is being put in the test specimen used as a vessel, or the state in which the test specimen is put in an suitable vessel filled with the chemical.
- (2) The state in which the surface of the test specimen has been rubbed lightly a 2 ~ 3 times with the gauze moistened with the chemical.
- (3) The state in which the chemical has been dripped on the surface of the test specimen approximately 0.3 ~ 0.5 ml through a squirt, etc.
- (4) The chemicals herein used for oil resistance tests comprise engine oil, gear oil, torque converter oil, grease and kerosene.

3. Conditions of Testing Place:

(1) Room temperature conditions

The room temperature shall be maintained in conditions specified in Class 3 (temperature of $20 \pm 5^{\circ}\text{C}$) of the standard temperature states and class 3 of the standard humidity conditions (relative humidity $65 \pm 20\%$) under JIS Z 8703-1976 (Standard atmospheric conditions for testing).

(2) Standard atmospheric conditions

The standard atmospheric conditions shall be the states specified in Category 2 of the standard temperature and humidity conditions (temperature of $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$, and relative humidity of $0.5 \pm 2\%$) under JIS Z 8703-1976 (Standard atmospheric conditions for testing).

4. Testing Devices, Instruments and other Supplies

- (1) Thermostat bath Temperature can be controlled within $\pm 2^{\circ}\text{C}$
- (2) Wide-mouthed bottle Made of a material unaffected by chemicals
- (3) Reflux condenser
- (4) Chemical balance Capable of weighing to 0.1 mg
- (5) Squirt Made of a material unaffected by chemicals
- (6) Gauze An article on the market for medical use

Remark: Thermostat bath should be used when a test is conducted under high temperature or the test specimen is required to be dried up, while a reflux condenser be used in a test only under high temperature.

5. **Test Specimens:** The test specimens used in the test shall, as a rule, be finished products (*) and shall be perfectly free from dusts which may affect the results of the test. The test specimens should be tested, unless otherwise specified, after leaving it for twenty-four hours in the standard conditions specified in 3. (2). Further details of the specimens are decided by the agreements of parties concerned.

Note (*): The words "finished products" shall mean the complete mold articles inclusive of secondarily processed and compound ones.
The specimens may be cut when their configurations are not apt for tests. (Attention should be paid to the portion to be cut of the test specimen as well as to the state in which it is installed.)

6. **Types and Concentration of Chemicals:** The types and the concentration of the chemicals used in tests are as shown in Table 2.

Table 2

Types of Chemicals		Concentration (wt %)
Gasoline	RN-3 of NES M5052 (Motor gasoline)	100
Gas oil	NDF-2 of NES M5058 (Diesel fuel oils)	
Engine oil	SCF-20W 20 of NES M5051 (Lubricating oil for automobile gasoline engines)	
Gear oil	MP-90 of NES M5054 (Automotive gear oil)	
Torque converter oil	Nissan's specified oil	
Grease	NWB-2 of NES M5065 (Grease for automobiles)	
Kerosene	No. 2 of JIS K2203-1978 (kerosene)	
Acid solution	Class 1 of JIS K8951-1972 (Sulfuric acid)	25 or 3
Brake liquid	NR-3 of NES M5055 (Motor vehicle brake fluids)	100
Synthetic sweat liquid	As specified in 9.6.2 of JIS K5772-1976 (Polyvinylchloride coated fabric)	
Paint film protective agent	As by the agreements of parties concerned	
Anti-freeze	LLC of NES M5059 (Engine antifreezes)	
Wax	As by the agreements of parties concerned	
Washer liquid	As by the agreements of parties concerned	5
Detergent	Neutral or alkaline detergent, details are to be by the agreements of the parties concerned	
Under-coat Agent	As by the agreements of parties concerned	
Anticorrosive	As by the agreements of parties concerned	100

7. **Test Conditions:** The test conditions are prescribed in Table 3.

Table 3

Type of Testing Methods	Temperature	Time (h)	Descriptions
Method 1	Room temperature, or $90 \pm 2^\circ\text{C}$	168	Use a reflux condenser when evaporation of chemicals is expected.
Method 2	Room temperature	4	Number of wiping is 2 ~ 3 times, back and forth.
Method 3			Dripping volume: 0.3 ~ 0.5 ml
Method 4			

8. Procedure

8.1 Method 1

- (1) Put the specified chemical either in a vessel used as a test specimen (*), or in a wide-mouthed bottle in which the test specimen is to be placed, and leave the specimen for specified time at a specified temperature.
- (2) After leaving the specimen, take it out and wash the chemical off with running water until the chemical on its surface is hardly recognizable. However, should it be impossible to remove the chemical with running water, wash it with such chemicals as alcohol, etc. which do not deteriorate the test specimen.
- (3) After washing, dry it up under a room temperature or in a thermostat bath at temperatures which may not affect it on the test specimen.
- (4) After drying up, check the fault caused on the surface of the test specimen (blister, change of colours, thinning, softening and hardening, etc.)

Note: (*) If the main usage of the test specimen is to use it as a vessel and the test is to be performed with the chemical put in it, it is suggested that the test specimen be installed regularly as far as possible.

8.2 Method 2

- (1) Saturate a piece of gauze with the specified chemical.
- (2) Move the gauze back and forth a few times, pushing it lightly on the test specimen so that the surface of the specimen should become wet.
- (3) Leave the test specimen as it is for a specified time at a specified temperature.
- (4) After leaving it, wipe the chemical off the test specimen with a new, clean gauze and see if there is any abnormalities caused on it.

8.3 Methods 3 and 4

- (1) Drip the specified chemical 0.3 ~ 0.5 ml on the surface of the test specimen through a squirt and leave it for a specified time at a specified temperature.
- (2) After leaving it, wipe off the chemical with a new, clean gauze and examine whether there is any abnormalities on it.

9. Indication

- (1) Any changes in appearance, shape and weight shall be indicated in writing, with details to be presented by photographs or by the actual samples.
- (2) Any change of dimensions shall be indicated in a mm unit and that of the weight be in a mg unit down to one place of decimals. Indicating in writing is also necessary when the chemicals is affected by the test specimen.