

Quality of Caution Plates

1. Scope

This Standard specifies the quality of plates indicating the contents of attention or caution notes concerning the inspection, maintenance and handling of automobiles (excluding motorcycles), (hereafter referred to as caution plates). This does not, however, apply to those with export specifications.

Notes: 1. It is advisable to apply this standard to the quality of caution markings directly placed on parts.

2. In this standard, units and numerical values given in { } are conventional unit, shown for reference.

2. Purpose

This Standard is directed towards standardizing methods to ensure proper quality of caution plates and test procedures thereof.

3. Classification

Grades of quality for caution plates shall be classified as indicated **Table 1**. The application of grade classification, however, shall be as agreed to by the parties concerned.

4. Construction and Attaching Method

A caution plate shall consist of a base unit (polyvinyl chloride, polyester, aluminum, etc.) and a letter or symbol (hereafter referred to as markings) printed or transferred on the element, and such a caution plate shall be adhered to the vehicle with an adhesive agent or some other specified method.

5. Quality

The quality of a caution plate shall satisfy the additional performance requirements listed in **Table 3**, when tested by the procedures set forth in **7**, and in accordance with the basic performance requirements listed in **Table 2** and the additional performance requirements listed in **Table 3** as necessary. Evaluation items may be added or deleted according to agreements between the parties concerned.

Table 1

Grade	Classification by installation locations
C1	Those installed in passenger and luggage compartments, with high luminous and thermal loads.
C2	Those installed in passenger and luggage compartments, with high luminous load and relatively low thermal load.
C3	Those installed in passenger and luggage compartments, with relatively low luminous and thermal loads.
E1	Those installed in engine compartments, with high thermal load.
E2	Those installed in engine compartments, with relatively low thermal load.
O1	Those installed in places other than the above (outer body panels, chassis, under carriage, floor, etc.), with high luminous load.
O2	Those installed in places other than the above (outer body panels, chassis, under carriage, floor, etc.), with low luminous load.

Table 2. Basic performance requirements

Evaluation item		Specified performance	Test items classified by grades						Test procedure s		
			C1	C2	C3	E1	E2	O1		O2	
Appearance		No printing blurs, unclearness, disuniformity in colour and gloss, separations, prominent scratches, etc . shall be found on the base unit or markings.	○	○	○	○	○	○	○	7.1	
Storage stability		(1) Lateral and longitudinal dimensional variation rate shall be -3 to +1%. (2) No edge peeling or adhesive backing separation shall occur.	○	○	○	○	○	○	○	7.2	
Weather resistance	W3 method	(1) The discolouration and fading of the base element and markings shall be grey scale 4th class or greater. (2) No printing blurs, unclearness, disuniformity in colour and gloss, deformations, creases, swellings, separations, cracks, prominent scratches, etc. shall be found in the base unit or markings.						○		7.3	
	W1 method								○		
	F3 method		○	○							
	F1 method				○	○	○				
Thermal resistance	A method	(1) The discolouration and fading of the base element and markings shall be grey scale 4th class or greater. (2) No printing blurs, unclearness, disuniformity in colour and gloss, deformations, creases, swellings, separations, cracks, prominent scratches, etc. shall be found in the base unit or markings.	○			○				7.4	
	B method			○	○		○	○	○		
Cold and heat repetition resistance	A method		○			○				7.5	
	B method			○	○		○	○	○		
Humidity resistance				○	○	○	○	○	○	○	7.6
High temperature water resistance							○	○	○	○	7.7
Salt water resistance							○	○	○	○	7.8
Resistance to rust prevention agents							○	○			7.9
Oil resistance							○	○			7.10
Resistance to guard wax remover									○	○	7.11
Wear resistance	A method			○	○	○					7.12
	B method						○	○	○	○	

Table 3. Additional performance requirements

Performance Evaluation item		Specified performance	Test procedure
Attaching durability	A method	Base unit shall be dividable into 5 pieces.	7.13
	B method	1/3 or more area of a marking shall be transferred onto the adhesion object.	
	C method	The clasp shall not be broken, when the base element is broken.	
Acid resistance		(1) The discolouration and fading of the base element and markings shall be grey scale 4th class or greater.	7.14
Resistance against brake fluid		(2) No printing blurs, unclearness, disuniformity in colour and gloss, deformations, creases, swellings, separations, cracks, prominent scratches, etc. shall be found on the base unit or markings.	7.15

6. General test conditions

6.1 Standard test conditions

Standard test conditions shall be, as a rule, in accordance with **JIS Z 8703** (Standard Atmospheric Conditions for Testing), Standard Temperature and Humidity 3rd Class (temperature, $20 \pm 5^\circ\text{C}$; relative humidity $65 \pm 5\%$). Date, temperature and humidity shall be mentioned in the test result document.

6.2 Preparation of Test Pieces

- (1) Test pieces shall be, as a rule, whole products. If a product is too large, it may be divided into pieces with markings to be included in each piece.
- (2) Unless otherwise specified, test pieces shall be attached to objects in the manner actually used on vehicles. Test pieces shall be left adhered under the standard conditions specified in **6.1** for 24 hours before testing.

6.3 Number of test pieces

More than three test pieces, as a rule, shall be tested at one time.

7. Test procedures

7.1 Appearance test

The appearance of any loose product shall be searched for by visual inspection. Printing blurs, unclearness, disuniformity in colour and gloss, separations, prominent scratches, etc. shall be compared with the limit sample agreed to by the parties concerned.

7.2 Storage Stability Test

(1) Apparatus

Air circulation type gear oven

Scale (capable of measuring down to 0.1 mm)

Glass plate

- (2) **Test pieces:** Test pieces shall be attached with adhesive backing.

(3) Test procedures

- (a) Draw marker lines longitudinally and laterally (1), and measure the initial marker line spacing.

- (b) Adjust the temperature of the gear oven, on which the glass plate is placed horizontally, to $80 \pm 2^\circ\text{C}$.

- (c) Place the test piece on the glass plate, with the adhesive backing facing downward, and leave the test piece alone for 24 hours.

- (d) After cooling the test piece down to room temperature, measure the marker line spacing, and check if there is any peeling of edges or separation of adhesive backing.

Note (1) "Longitudinal" means the front to rear direction when the marking is placed in such a manner that it can be seen properly, while "lateral" means the right and leftward direction.

(4) Recording of test results

- (a) The presence or absence of edge peeling or adhesive backing separation shall be recorded.
- (b) Longitudinal and lateral dimensional variation rates shall be expressed in %.

Dimensional variation rates shall be obtained by the following equation.

Dimensional variation.

$$\text{rate (\%)} = \frac{l_1 - l_0}{l_0} \times 100$$

where l_0 : initial marker line spacing

l_1 : dimension after test (mm)

7.3 Weather Resistance Test

(1) Equipment

Sunshine weather meter (or ultraviolet carbon weather meter) Fade meter and grey scale [those specified in **JIS L 0804** (Grey Scale for Assessing Change in Colour)]

(2) Test procedure

The tester shown on **Table 4** shall be conducted under the conditions listed in **Table 5** for specified exposure. After taking the test piece out and leaving it alone at the room temperature for drying, changes in appearance such as printing blurs, disuniformity in colour and gloss, deformations,

creases, swellings, cracks, prominent scratches, etc., if any, shall be compared with the limit sample agreed to by the parties concerned.

(3) Recording of test results

- (a) The presence or absence of changes in appearance shall be recorded.
- (b) Discolouration and fading shall be judged by **Table 6**, and expressed in scale.

Table 4. Classification of test methods

Classification	Tester	Exposure Duration	Remarks
W3	Sunshine weather meter	300	The sunshine weather meter is recommended, but the ultraviolet carbon weather meter may be used depending on availability.
	Ultraviolet carbon weather meter	600	
W1	Sunshine weather meter	100	
	Ultraviolet carbon weather meter	200	
F3	Fade meter	300	
F1		100	

Table 5. Operating conditions for weather resistance test equipment

Equipment	Sunshine weather meter (or ultraviolet carbon weather meter)	Fade meter
Operating conditions		
Black panel temperature	$63 \pm 3^{\circ}\text{C}$	$63 \pm 3^{\circ}\text{C}$
Rain fall condition	12 minutes during 60 minute radiation	—
Nozzle diameter	1 mm	
Nozzle hydraulic pressure	$80 \sim 130\text{kPa}$ { $0.82 \sim 1.33\text{kgf/cm}^2$ }	

Table 6. Criteria for discolouration and fading

Scale	Criteria
1	Grey scale No.1 or greater.
2	Grey scale No.2 or so.
3	Grey scale No.3 or so.
4	Grey scale No.4 or so.
5	Grey scale No.5 or so.

7.4 Thermal resistance test

- (1) **Equipment:** Air circulation type gear oven and grey scale for discolouration and fading.
- (2) **Test procedure**
- (a) **Method A:** Heat the test piece in an oven set at $100 \pm 2^{\circ}\text{C}$ for 240 hours, remove and cool to room temperature. Check for changes in appearance and degrees of discolouration and fading.
- (b) **Method B:** The same test and evaluation methods except for a change in temperature to $80 \pm 2^{\circ}\text{C}$.
- (3) **Recording of test results**
in accordance with 7.3 (3).

7.5 Cold and hot repetition resistance test

- (1) **Equipment:** Air circulation type low temperature constant bath, air circulation type gear oven, and grey scale for discolouration and fading.
- (2) **Test methods**
- (a) **Method A:** One cycle shall consist of $-30 \pm 2^{\circ}\text{C} \times 2 \text{ hrs} \rightarrow \text{room temperature} \times 30 \text{ min}$. After repeating this cycle 5 times, check for any change in appearance, and degrees of discolouration and fading.
- (b) **Method B:** The same test and evaluation methods except for a change in temperature to 80°C .
- (3) **Recording test results** Record test data in accordance with 7.3 (3).

7.6 Humidity resistance test

- (1) **Equipment** A constant temperature and humidity bath and grey scale for discolouration and fading.
- (2) **Test procedure** Place the test piece in a constant temperature and humidity bath set at $49 \pm 1^\circ\text{C}$ temperature and 95% humidity or higher, with the marking surface facing downward and leave for 96 hours. Remove and wipe the marking surface with a clean dry cloth. Leave at room temperature and dry. Check for any change in appearance, and degrees of discolouration and fading.
- (3) **Recording test results** Record test data in accordance with 7.3 (3).

7.7 High temperature water resistance test

- (1) **Equipment** A gas burner, beaker, and grey scale for discolouration and fading.
- (2) **Test procedure** Dip the test piece in tap water set at 90°C or higher for 15 minutes. Remove and wipe the marking surface with a clean dry cloth. After leaving at room temperature, check for any change in appearance and degrees of discolouration and fading.
- (3) **Recording test results** In accordance with 7.3 (3).

7.8 Salt water resistance test

- (1) **Equipment** A beaker and grey scale for discolouration and fading.
- (2) **Test procedure** After dipping the test piece in salt water (NaCl 3% solution) of the room temperature for 96 hours, remove and gently wash with running water. Wipe the marking surface with a dry cloth, and leave at room temperature to dry. Check for any change in appearance, and degrees of discolouration and fading.
- (3) **Indication of test results** In accordance with 7.3 (3).

7.9 Test resistance to rust preventive agents

- (1) **Equipment** A grey scale for discolouration and fading.
- (2) **Test procedure** Spray engine compartment rust prevention agent⁽²⁾ uniformly onto the test piece, and leave horizontally at room temperature for 1

hour. Wipe the marking surface with a clean, dry cloth, and check for changes in appearance, and degrees of discolouration and fading.

Note (2): The engine compartment rust prevention agent shall be as agreed to by the parties concerned.

- (3) **Recording test results** In accordance with 7.3 (3).

7.10 Oil Resistance Test

- (1) **Equipment** An air circulation type gear oven and grey scale for discolouration and fading.
- (2) **Test procedure** Apply engine oil⁽³⁾ on the entire surface at room temperature, and leave horizontally in an oven set at $80 \pm 2^\circ\text{C}$ for 24 hours. After cooling at room temperature, wipe the marking surface with a clean, dry cloth. Check for changes in appearance, and degrees of discolouration and fading.

Note (3): The engine oil shall be as agreed by parties concerned.

- (3) **Recording test results** In accordance with 7.3 (3)

7.11 Resistance test against guard wax remover

- (1) **Equipment** A constant temperature water bath and grey scale for discolouration and fading.
- (2) **Test procedure** Dip the test piece in guard wax remover solution⁽⁴⁾ at $40 \pm 1^\circ\text{C}$ for 30 minutes. Leave at room temperature for 2 hours. Remove and check for changes in appearance, and degrees of discolouration and fading.

Note (4): The guard wax remover solution shall be as agreed to by the parties concerned.

- (3) **Recording test results** Record test data in accordance with 7.3 (3).

7.12 Wear Resistance test

- (1) **Equipment** Friction test equipment type II as specified in JIS L 0823 (Apparatus for Testing of Colour Fastness to Rubbing) and grey scale for discolouration and fading.
- (2) **Test procedure**
 - (a) **Method A:** Place a friction test white cotton cloth⁽⁶⁾ saturated with seat cleaner⁽⁵⁾ over the tip of the friction element, and fix the test piece to the test bench. Apply the load $2.0\text{N}\{204\text{gf}\}$ to the

test piece and repeat the loading with reciprocating motion over the test piece for 100 times at the velocity of 30 times/min. Check for changes in appearance, and degrees of discolouration and fading.

Notes (5): The seat cleaner shall be as agreed to by the parties concerned

(6): The friction test white cotton cloth shall be the cotton (No.3) specified in JIS L 0803.

- (b) Method B:** Place a friction test white cotton cloth⁽⁶⁾ saturated with gasoline⁽⁷⁾ over the tip of the friction element, and fix the test piece to the test bench. Apply the load 2.0N{204gf} to the test piece and repeat the loading with reciprocating motion over the test piece for 100 times at the velocity of 30 times/min. Check for changes in appearance, and degrees of discolouration and fading.

Note (7): The gasoline shall be the No.1 specified in JIS K 2233.

7.13 Attaching durability test

(1) Test procedure

- (a) Method A:** (fragile type): Separate the base element at room temperature with a fine tool, and check if the base element can be divided into 5 pieces or more.
- (b) Method B:** (letter transfer type): Separate the base element at room temperature with a fine tool, and check if more than 1/2 of the marking is transferred to the adhesion object.
- (c) Method C:** (rivet type): Separate the base element at room temperature with an appropriate tool (pliers, etc.), and check if the clasp stays unbroken when the base metal breaks.

- (2) Recording test results** Record the test procedure and test results.

7.14 Acid resistance test

- (1) Equipment** A grey scale for discolouration and fading.
- (2) Test procedure** Apply sulfuric acid (specific gravity 1.26 to 1.28) to the entire surface of the

test piece at room temperature. After 24 hours, wash gently with running water, and wipe the marking surface with a clean dry cloth. Check for changes in appearance, and degrees of discolouration and fading.

- (3) Recording test results** Record test data in accordance with 7.3(3).

7.15 Brake Fluid Resistance Test

- (1) Equipment** An air circulation type gear oven and grey scale for discolouration and fading.
- (2) Test procedure** Apply brake fluid⁽⁸⁾ to the entire surface of the test piece, and place in an oven set at $80 \pm 2^{\circ}\text{C}$ for 24 hours. After cooling to room temperature, wipe the marking surface with a clean dry cloth. Check for changes in appearance, degrees of discolouration and fading.

Note (8) – The brake fluid shall be the 3rd class specified in JIS K 2233.

- (3) Recording test results** Record test data in accordance with 7.3(3).

Explanatory note on JASO B002-89 Quality of caution plates

Supplemental descriptions are provided for items which require additional explanations (the order of numbering is the same as in the Text).

1. Scope

In some cases, cautions are marked directly on the main body of each part, but such cautions are excluded from this Standard due to differences in construction, attaching methods, etc. Concerning this exclusion, it was suggested that such cautions should be covered by this standard since their primary purpose was the same as those included in this Standard, and the same quality standards should be applied to all types of cautions. However, it was concluded that cautions attached to vehicles for export be excluded from this Standard because of the difficulties involved in the accurate determination of effects caused by differences in the environments of different export destinations.

4. Classification

Caution plates are attached to various portions of a vehicle, and environmental conditions such as heat, light, water, etc. differ greatly. Therefore, vehicle portions are roughly divided into three, i.e., passenger compartment, engine compartment and others (outer body panels, chassis, under carriage, floor, etc.). A more detailed classification is shown in **Table 1**, based on heat and light intensity. It was decided to let the practical applications be specified in agreements to be concluded between the parties concerned, since thermal and luminous conditions were apt to vary even in the same portion, depending on the type of vehicle.

5. Quality

Some caution plates are required to meet special performance requirements depending on the kind, attaching location, etc.(e.g., acid resistance of caution plates for batteries). If, however, such particular performance requirements were to be included in the classification of quality, the classification would become too complicated and inconvenient for practical use. The classification of grades is shown in **Table 1**, and performance requirements are classified into basic requirements for common items (**Table 2**) and additional requirements for special caution plates (**Table 3**). Materials and manufacturing methods are diversified, and some special caution plates need more requirements besides the basic and additional performance requirements listed in **Tables 2 and 3**. Some do not require certain items listed in these tables. In this respect, a sentence is added stating the: "Evaluation items may be added or deleted according to the agreement between the parties concerned".

As regards the strength of adhesion for adhesive type caution plates, no provision is set forth, since it does not exhibit a vital problem as long as no harmful defects in use are found through various tests.

7. Test procedures

7.2 Storage stability test

This provision is set forth since caution plates may shrink during storage depending on manufacturing methods, if their base elements are made of plastic film.

7.3 Weather Resistance Test

Test conditions are specified in **JIS D 0205** (General Rules of Weatherability of Automobiles).

7.4 Thermal Resistance Test

Test temperatures of 100°C and 80°C are selected, taking account of environmental temperatures in which caution plates may be exposed, as well as to simplify the test.

Heating durations are provided, taking account of thermal deterioration and thermal aging.

7.5 Cold and hot repetition resistance test

The test should begin at a cold temperature, since in the case of plastic film plates, evaluation may be impeded due to the relaxation of molding strains, if the test is started at a high temperature.

If a test is interrupted, it is advisable to shut out light and maintain the test piece at room temperature so as to avoid aging.

7.6 Humidity resistance test

In accordance with **JASO M 312** (Testing Method for Molded Plastic Parts for Automobiles).

7.7 High temperature water resistance test

This provision is established, to consider

commercial, hot water washing of vehicle.

7.8 Salt Water Resistance Test

In accordance with **JIS K 5400** (General Testing Method for Coatings).

7.9 Resistance test against rust prevention agents

This provision is established, to consider the effects of agents used for coating the inside of engine compartments for rust prevention.

7.10 Oil resistance test

This provision is established, to consider the effects of engine oils that are frequently changed or supplied in the engine compartment.

7.13 Attaching durability test

This provision is established, to consider caution plates permanently attached to vehicles. It is provided here that any attempt to remove such a caution plate, shall render the plate broken and no longer usable.

7.14 Acid resistance test

This provision is established, to consider the effects of battery fluid adhesion.

Overseas regulations related to the attaching durability are as follows.

40CFR Part 86 § 86.07-35 [^] Emission Labels [^]: applicable to 1979 year models and newer.

California Motor Vehicle Tune-up Label Specification: applicable to 1979 year models and newer.

ADR 27 A [^] Vehicle Emission Control [^] § 2.2: applicable from July 1, 1976.

	Marking location	Attaching method	Quality
40CFR Par 86 § 86.076-35	A location that may be seen easily in engine compartment. It shall be attached to a location which does not allow easy removal from the vehicle.	Welded plate or some other permanent attaching method.	Plastic or metal
California Motor Vehicle Tune-up Label Specification	In addition to the above: It shall be attached to a location without obstructions by parts other than flexible parts.	The same as above.	It shall endure environmental conditions of engine compartment during its expected life.
ADR 27A	A location that may be seen easily in engine compartment.	Permanent attaching method.	Permanent attaching.