

TOYOTA ENGINEERING STANDARD

NO. : TSZ6005G

TITLE : INDICATION METHOD OF MATERIAL MARKING FOR PLASTIC PARTS AND RUBBER PARTS

CLASS : C2

Established/Revised : Rev.6(Oct.2004)

This standard has been revised in consequence of the following changes:

- (1) markings have been changed from TPUR to PUR-TP for thermoplastic polyurethane, from ABAK to ABA for Acrylonitrile-butadiene, and from ABA to ABAK for Acrylonitrile-butadiene-acrylate;
- (2) a statement that filler and reinforcement need not be marked for rubber has been added;
- (3) marking rule for plastic has been modified to a rule in which filler and reinforcement for plastic mass shall be expressed at 5 % intervals;
- (4) specifications for binder of felt part have been added; and
- (5) terms have been modified.

Engineering Information
Planning Dept.
Engineering Administration Div.
TOYOTA MOTOR CORPORATION





TOYOTA ENGINEERING STANDARD

TSZ6005G

CLASS

C2

INDICATION METHOD OF MATERIAL MARKING FOR PLASTIC PARTS AND RUBBER PARTS

1. Scope

This standard covers the method for indicating material markings of automobile parts (including accessories) using plastic and rubber materials on a drawing prepared by TOYOTA (including development sub-contractors and suppliers). If a law providing the marking subjects, method and location exists in Japan or other countries (states), the provision shall be observed.

Remark 1:

Material marking shall always be given on the following plastic parts which are provided by the law of the State of Michigan in the U.S.A. (ISO marking may substitute for those provided by the law of the State of Michigan.):

- (1) Radiator reserve tank
- (2) Fuel tank
- (3) Windshield washer tank

Remark 2:

The recycling symbol mark for automobile batteries shall conform to the provision in the applicable law of each country (state).

2. Definitions

(1) Recycling

To reuse waste materials of automobile parts, such as plastics (synthetic resin), rubber, glass, and metal by processing them physically, mechanically or chemically.

(2) Material marking

The marking system composed of material-identifying symbols for plastics or rubber, arrow symbols, etc.

(3) Parts

A unit of a single material, similar material, or different material, which is difficult to separate.

Example 1:

Weather strip in which EPDM rubber made by extrusion and EPDM rubber made by molding are connected shall be taken as one part. (In the case of the similar materials)

Example 2:

Vibration isolating rubber in which rubber and a metal fitting are adhered by vulcanization shall be taken as one part. (In the case of the different kind of materials)

Prepared and Written by:

.....
Organic Material Dept.

.....
Material Engineering Div.2

Engineering Administration Div.

● TOYOTA MOTOR CORPORATION

Established/ 6 Revised:

Oct.2004

NOTES: The recipient of this standard shall undertake the following confidentiality obligations upon the receipt of this standard.
 • The recipient shall discard by shredding or fire, or return to Toyota Motor Corporation if appropriate, the documents contained in this standard when they are no longer necessary due to the termination of the work concerned or the revision of current version of this standard
 • This standard and the technical information related thereto are owned by and under sole control of Toyota Motor Corporation. They shall not be disclosed in whole nor in part to any third party without prior written consent of Toyota Motor Corporation.



(4) Assembly parts

A part in which a multiple number of parts, whether they have part numbers or not, are assembled by a comparatively easy method such as fastening bolts and binding with a tape.

(5) Complex material parts

A part integrally composed of materials of the similar kinds or different kinds.

(6) Mass of plastic or rubber portion

A total mass of a plastic or rubber portion of a part whose materials of different kinds are integrally composed.

Example 1:

Only a mass of a rubber portion is relevant in the case of a part in which rubber and a metal fitting are adhered by vulcanization adhesion.

Example 2:

Only a mass of a plastic portion is relevant in the case of a part in which plastic and a metal fitting are subjected under insert molding.

3. Guideline for Marking

3.1 Applicable Parts

Marking of material symbols that comply with ISO 1043-1, ISO 1043-2, ISO 1629 and ISO 11469 is necessary for parts when a mass of plastic or rubber portion is equal to or greater than 100 g. Marking for parts with a mass of such portion is less than 100 g is also recommended.

3.2 Criterion for Marking

(1) Criterion based on the condition of use

If criteria for marking is specified by laws of each country, such laws shall be conformed. Only in the cases that there are no such laws, marking may be omitted in the following cases (a) to (c). The design department in charge shall decide regarding the marking of each part. When development sub-contractors and suppliers cannot judge on the necessity of marking, they are required to consult with the Toyota design department in charge.

- (a) The part has not enough space available for the marking.
- (b) Marking can cause the parts to malfunction or damage.
- (c) Marking is difficult for technical reasons.

(2) Criterion based on the form of use

- (a) Marking for fibrous plastic parts such as fabric or textile may be omitted. However, marking for roof head lining, door trim, floor carpet is necessary to promote recycling.

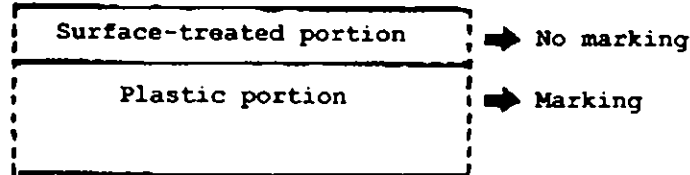
NOTES: The recipient of this standard shall undertake the following confidentiality obligations upon the receipt of this standard.
 • The recipient shall discard by shredding or fire, or return to Toyota Motor Corporation if appropriate, the documents contained in this standard when they are no longer necessary due to the termination of the work concerned or the revision of current version of this standard.
 • This standard and the technical information related thereto are owned by and under sole control of Toyota Motor Corporation. They shall not be disclosed in whole nor in part to any third party without prior written consent of Toyota Motor Corporation.

Established/ 6 Revised:
 Oct. 2004



(b) Marking of surface treatment such as flocking, coating and plating may be omitted.

Example:



(c) Marking for parts that are integrally formed with a vehicle body and difficult to separate may be omitted such as undercoat, PP sheet, asphalt sheet and foamed filler in the pillar.

(d) Marking for intermediate film of laminated glass and plastic parts (materials) used for noise insulation, water proof, and to protect a metallic part of a vehicle body in production may be omitted.

(e) When plastics used for the parts mainly composed of fabric such as hood silencers etc. are the matrix, material marking shall be necessary. However, marking for plastics of binder may be omitted. Whether the plastic material is matrix or binder is determined as follows.

(i) Matrix: Mass of plastics in the part is 20 % min.

(ii) Binder: Mass of plastics in the part is less than 20 %. For felt parts, volume ratio of plastic portion excluding the fabric with respect to the volume of a product when general thickness is 15 mm shall be less than 5 %.

4. Location of Marking

The marking shall be located where it can be legible when the part has been removed from a vehicle or when the assembly parts are disassembled, and where it does not impair the strength and construction of the part.

Remark:

When the marking can impair the strength and construction of the part, the development sub-contractors and suppliers are required to consult with the Toyota design section in charge.

5. Style of Marking

As a rule, the markings should be molded. For extruded parts on which it is difficult to mold the markings, the markings may be printed.

NOTES: The recipient of this standard shall undertake the following confidentiality obligations upon the receipt of this standard.
 *The recipient shall discard by shredding or fire, or return to Toyota Motor Corporation if appropriate, the documents contained in this standard when they are no longer necessary due to the termination of the work concerned or the revision of current version of this standard.
 *This standard and the technical information related thereto are owned by and under sole control of Toyota Motor Corporation. They shall not be disclosed in whole nor in part to any third party without prior written consent of Toyota Motor Corporation.

Established/ 6 Revised:
 Oct.2004



6. Letters, Their Form and Language for Marking

(1) As a rule, Gothic (sans serif) alphabetic letters are preferable for markings.

Example:

A B C D E F G H I J	A B C D E F G H I J
K L M N O P Q R S T	K L M N O P Q R S T
U V W X Y Z	U V W X Y Z
1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0
□ □ □ □ □ □ □ □	□ □ □ □ □ □ □ □
□ □ □ □ □ □ □ □	□ □ □ □ □ □ □ □
	□ □ □ □ □ □ □ □

(2) Size of letter (height)

As a standard, the height of each letter shall be over 3 mm (Table 1).

Table 1 Size of Letter According to JIS (Unit: mm)

3.0	3.25	3.5	3.75	4.0	4.5	5.0	6.0
7.0	8.0	9.5	11.0	12.5	14.0	15.0	---

(3) Language

As a general rule, English shall be used for part (portion) designation: a capital letter for the first letter, and small letters for the rest. The height and form of each letter used for part (portion) designation shall be the same as those of material symbols.

Example:

- (a) Housing >ABS<
- (b) Outer layer >EPDM<

NOTES: The recipient of this standard shall undertake the following confidentiality obligations upon the receipt of this standard.
 *The recipient shall discard by shredding or fire, or return to Toyota Motor Corporation if appropriate, the documents contained in this standard when they are no longer necessary due to the termination of the work concerned or the revision of current version of this standard.
 *This standard and the technical information related thereto are owned by and under sole control of Toyota Motor Corporation. They shall not be disclosed in whole nor in part to any third party without prior written consent of Toyota Motor Corporation.

Established/ 6 Revised:
 Oct.2004



7. Color

The color of molded markings shall be the same as that of the part base material. For printed markings, each character shall be printed in white as a rule. If it is difficult to distinguish white markings from the base color, marking characters may be printed in black. Each designer in charge shall design parts so that their material markings are not defaced during the entire life of vehicles.

8. Marking Method

(1) Homopolymer or copolymer material

Material symbols shall be enclosed by arrows.

Example:

>PP<

>PE-LD<



Symbol to indicate special characteristic

(2) Polymer blend material material

The material symbols for up to three major components are combined (in the descending order of mass, or in the alphabetical order if the two or three components have the same mass; material symbol need not be shown for a component whose content is less than 5 %.) via a plus (+) and enclosed by arrows.

Example:

>PPE+PS<

(3) Complex material parts composed of similar material

Separate markings for each portion is not necessarily required.

Example:

Marking of material only for the molded portion is permitted in the case of weather strip in which EPDM rubber made by extrusion and EPDM rubber made by molding are connected.

(4) Complex material parts composed of different material

Separate markings for each part (portion) is necessary. However, if it is difficult, the name of each part (portion) shall be indicated in English before the material symbol.

Example:

(a) Skin >PVC<, Pad >PUR<

(b) Outer >CR<, Inner >NBR<

(c) Base >SAN-GF20<, Pad >PUR<, Skin >PUR<

NOTES: The recipient of this standard shall undertake the following confidentiality obligations upon the receipt of this standard.
 *The recipient shall discard by shredding or fire, or return to Toyota Motor Corporation if appropriate, the documents contained in this standard when they are no longer necessary due to the termination of the work concerned or the revision of current version of this standard.
 *This standard and the technical information related thereto are owned by and under sole control of Toyota Motor Corporation. They shall not be disclosed in whole nor in part to any third party without prior written consent of Toyota Motor Corporation.

Established/ 6 Revised:

Oct.2004

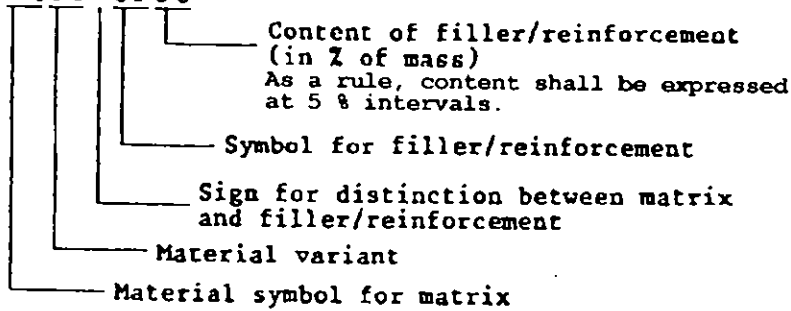


(5) Material with filler or reinforcement
Marking is not necessary for rubber.

Example:

(a) When filler or reinforcement is used alone

>PA66-GF30<



(b) When filler or reinforcement is used in combination

>PP-(MD25+TD10)<

- ① The contents are put in a parenthesis and combined via a symbol (+).
- ② In the descending order of content
- ③ In the alphabetical order when the contents are the same
- ④ The content is expressed at 5 % intervals (If the last digit of the content is 2 or less, round down to the nearest 0 or 5, if the last digit is 3 or more, round up to the nearest 0 or 5. E.g. 12 → 10, 13 → 15.) For a component whose content is less than 5 % material symbol need not be shown.

NOTES: The recipient of this standard shall undertake the following confidentiality obligations upon the receipt of this standard.
*The recipient shall discard by shredding or fire, or return to Toyota Motor Corporation if appropriate, the documents contained in this standard when they are no longer necessary due to the termination of the work concerned or the revision of current version of this standard.
*This standard and the technical information related thereto are owned by and under sole control of Toyota Motor Corporation. They shall not be disclosed in whole nor in part to any third party without prior written consent of Toyota Motor Corporation.

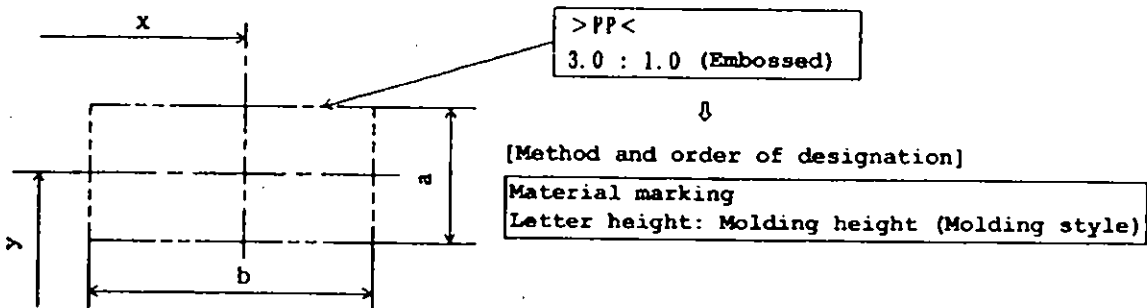
Established/ 6 Revised:
Oct.2004



9. Designation on Drawings

On drawings the marking position shall be shown by a rectangle [measuring (a) in height and (b) in width] of thin chain double-dashed line, and the specific content of the marking shall be designated at the end of a thin solid leader line extended from the rectangle, as illustrated below. When it is necessary to indicate the marking position accurately, the position shall be specified by "x" and/or "y" coordinate.

Example:



Remark:

Molding style shall be specified in () according to Table 2.

Table 2

Designation on drawings	Molding style
Emboss	Material marking is embossed or recessed in the part surface.
Recess	surface.
Print ⁽¹⁾	Material marking is printed on the part surface.

Note: (1)

When color is designated, (Print white) or (Print black) is entered.

NOTES: The recipient of this standard shall undertake the following confidentiality obligations upon the receipt of this standard.
 • The recipient shall discard by shredding or fire, or return to Toyota Motor Corporation if appropriate, the documents contained in this standard when they are no longer necessary due to the termination of the work concerned or the revision of current version of this standard.
 • This standard and the technical information related thereto are owned by and under sole control of Toyota Motor Corporation. They shall not be disclosed in whole nor in part to any third party without prior written consent of Toyota Motor Corporation.

Established/ 6 Revised:
 Oct.2004



10. Indication of Material Marking and Other Information

10.1 Indication of Supplier Name, Manufacturing Date, Mass, Part Number, and Manufacturing Number, etc.

If a law in the relevant country requires the indication of supplier name, manufacturing date, mass, part number, manufacturing number, etc., the requirement must be met.

10.2 Indication of Handling Requirement and Notice

The material marking shall be distinguishable from the indication of handling requirement and safety warnings (molded or labeled).

10.3 Recycling Symbol Mark

Recycling symbol mark shall not be given except required by law.

Example:

Recycling symbol mark



11. Management of Material Marking

If it is not possible to indicate the material marking for parts when a mass of plastic or rubber portion is equal to or greater than 100 g, the design department shall notify the responsible department.

12. Others

If any law regarding the material identification is enforced in relevant countries or states after the issuance of this rule, the provision of the law shall be observed.

Applicable Standards

ISO 1043-1	Plastics--Symbols and Abbreviated Terms--Part 1: Basic Polymers and Their Special Characteristics
ISO 1043-2	Plastics--Symbols and Abbreviated Terms--Part 2: Fillers and Reinforcing Materials
ISO 1629	Rubber and Latices--Nomenclature
ISO 11469	Plastics--Generic Identification and Marking of Plastics Products

NOTES: The recipient of this standard shall undertake the following confidentiality obligations upon the receipt of this standard.
 * The recipient shall discard by shredding or fire, or return to Toyota Motor Corporation if appropriate, the documents contained in this standard when they are no longer necessary due to the termination of the work concerned or the revision of current version of this standard.
 * This standard and the technical information related thereto are owned by and under sole control of Toyota Motor Corporation. They shall not be disclosed in whole nor in part to any third party without prior written consent of Toyota Motor Corporation.

Established/ 6 Revised:

Oct.2004



TOYOTA ENGINEERING STANDARD

TSZ6005G

Attached Table 1 Material Markings of Major Resin Materials, Homopolymer Materials and Copolymer Materials

Name of material	Marking
Ethylene-vinyl acetate	>EVAC<
Denatured polyphenylene oxide, and denatured polyphenylene ether	>PPE+PS<
Cellulose acetate	>CA<
Polystyrene	>PS<
Styrene acrylonitrile	>SAN<
Acrylonitrile butadiene styrene	>ABS<
Polycarbonate	>PC<
Polypropylene	>PP<
Polyoxymethylene	>POM<
Polyamide 6	>PA6<
Polyamide 66	>PA66<
Polyamide 11	>PA11<
Polyamide 12	>PA12<
Polymethyl methacrylate	>PMMA<
Low density polyethylene	>PE-LD<
High density polyethylene	>PE-HD<
Acrylonitrile-ethylene-propylene-diene-styrene [Common name: AES]	>AEPDS<
Polycarbonate+acrylonitrile-butadiene-styrene (in the case of polymer blend material)	>PC+ABS<
Polycarbonate+acrylonitrile-ethylene-propylene-diene-styrene (in the case of polymer blend material)	>PC+AEPDS<
Polybutylene terephthalate	>PBT<
Polyvinylchloride	>PVC<
Unsaturated polyester	>UP<
Phenolic formaldehyde	>PF<
Thermoplastic polyurethane	>PUR-TP<
Silicone resin	>SI<
Polypropylene+polyethylene (in the case of polymer blend material)	>PP+PE<
Polyphenylene ether	>PPE<
Polyphenylene sulfide	>PPS<
Polytetrafluoroethylene	>PTFE<
Polyurethane	>PUR<
Polyethylene terephthalate	>PET<
Polyether sulphone	>PESU<
Epoxy resin	>EP<
Cellulose acetate butyrate	>CAB<
Ethylene propylene resin (in the case of copolymer material)	>E/P<
Melamine formaldehyde	>MF<
Polyamideimide	>PAI<
Polyether ether ketone	>PEEK<
Polyether ketone	>PEK<
Polyimide	>PI<
Ethylene tetrafluoroethylene	>ETFE<
Acrylonitrile-butadiene	>ABA<
Acrylonitrile-butadiene-acrylate	>ABAK<
Styrene-ethylene-butadiene-styrene	>SEBS<
Polyether ester	>PEEST<

Remark:

See ISO 1043-1 for the symbols not mentioned in Attached Table.

NOTES: The recipient of this standard shall undertake the following confidentiality obligations upon the receipt of this standard.
 * The recipient shall discard by shredding or fire, or return to Toyota Motor Corporation if appropriate, the documents contained in this standard when they are no longer necessary due to the termination of the work concerned or the revision of current version of this standard.
 * This standard and the technical information related thereto are owned by and under sole control of Toyota Motor Corporation. They shall not be disclosed in whole nor in part to any third party without prior written consent of Toyota Motor Corporation.

Established/ 6 Revised:

Oct. 2004



TOYOTA ENGINEERING STANDARD

TSZ6005G

Attached Table 2 Rubber Materials and Corresponding Material Markings

Name of material	Marking
Natural rubber	>NR<
Isobutene-isoprene rubber or butyl rubber	>IIR<
Styrene-butadiene rubber	>SBR<
Ethylene-propylene-diene rubber	>EPDM<
Isoprene rubber	>IR<
Butadiene rubber	>BR<
Natural rubber/Styrene-butadiene rubber (in the case of polymer blend material)	>NR+SBR<
Natural rubber/Butadiene rubber (in the case of polymer blend material)	>NR+BR<
Acrylonitrile-butadiene rubber (nitrile rubber)	>NBR<
Hydrogenated nitrile rubber	>HNBR<
Urethane rubber (in the case of ester type)	>AU<
Chloroprene rubber	>CR<
Epichlorohydrin-ethyleneoxide rubber containing allyl glycidyl ether	>GECO<
Epichlorohydrin-ethyleneoxide rubber	>ECO<
Epichlorohydrin rubber	>CO<
Chlorosulfonated polyethylene	>CSM<
Chlorinate Polyethylene	>CM<
Silicone rubber	>VMQ<
Acrylic rubber	>ACM<
Fluoro rubber	>FKM<
Fluorosilicone rubber	>FVMQ<

Remark:

See ISO 1629 for the symbols not mentioned in Attached Table.

NOTES: The recipient of this standard shall undertake the following confidentiality obligations upon the receipt of this standard.
 * The recipient shall discard by shredding or fire, or return to Toyota Motor Corporation if appropriate, the documents contained in this standard when they are no longer necessary due to the termination of the work concerned or the revision of current version of this standard.
 * This standard and the technical information related thereto are owned by and under sole control of Toyota Motor Corporation. They shall not be disclosed in whole nor in part to any third party without prior written consent of Toyota Motor Corporation.

Established/ 6 Revised:

Oct.2004



TOYOTA ENGINEERING STANDARD

TSZ6005G

Attached Table 3 Fillers/Reinforcements and Corresponding Material Markings

Name of material	Marking
Glass fiber	GF
Glass mats (Long-fiber glass)	GM
Glass balls (including hollow balls)	GB
Talcum powder	TD
Mineral powder	MD
Wood dust	WD
Carbon fiber	CF

Remark:

For material symbols other than those shown in above lists, refer to ISO 1043-2.

NOTES: The recipient of this standard shall undertake the following confidentiality obligations upon the receipt of this standard

- The recipient shall discard by shredding or fire, or return to Toyota Motor Corporation if appropriate, the documents contained in this standard when they are no longer necessary due to the termination of the work concerned or the revision of current version of this standard.
- This standard and the technical information related thereto are owned by and under sole control of Toyota Motor Corporation. They shall not be disclosed in whole nor in part to any third party without prior written consent of Toyota Motor Corporation.

Established/ 6 Revised:
Oct.2004