

Design

**INVOICE FOR ISSUE OF
TOYOTA ENGINEERING STANDARD**

NO. : TS G3200G

TITLE : CARBON STEELS FOR MACHINE STRUCTURAL USE

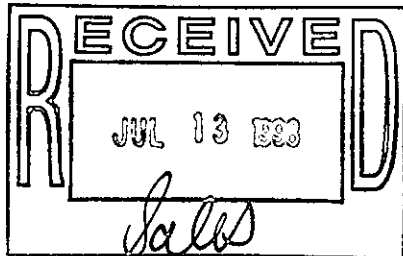
CLASS : **C**

PUBLICATION RECORD.

(Asterisk mark "*" in this standard denotes the changed portion from previous issue.) :

Revised

Added S48F



Date: '98. 6. 10
Engineering Information
Management Dept.
Engineering Administration Div.
TOYOTA MOTOR CORPORATION



NOTE: In the case of revision, the old standard which has been issued before should be discarded in proper manner (such as shredding or fire) to avoid possible use of obsolete standards information.

TOYOTA MOTOR MANUFACTURING
NORTH AMERICA INC.
PURCHASING PRODUCTION PREPARATION 3

TOYOTA ENGINEERING STANDARD
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ORIGINAL



TOYOTA ENGINEERING STANDARD

TS G3200G

CLASS

C

CARBON STEELS FOR MACHINE STRUCTURAL USE

1. Scope

This standard covers carbon steels for machine structural use for automotive parts.

2. Classification and Codes

The classification and codes of carbon steels for machine structural use and comparable standards are as shown in Table 1.

Table 1

Code	Comparable standard (reference)	
	JIS	SAE (approximation)
S 6	—	1006
S 8	—	1008
S10	S10C	1010
S12	S12C	1012
S15	S15C	1015
S17	S17C	1017
S20	S20C	1020
S22	S22C	1023
S25	S25C	1025
S28	S28C	1029
S30	S30C	1030
S33	S33C	—
S35	S35C	1035
S38	S38C	1038
S40	S40C	1040

Prepared and Written by :

Metallic Material Dept.

Material Engineering Div. I

Engineering Administration Div.

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Established / 5th

Revised :

Jun. 1998

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Table 1 (Continued)

Code	Comparable standard (reference)	
	JIS	SAE (approximation)
S43	S43C	1043
S45	S45C	1045
S48	S48C	1049
S50	S50C	1050
S53	S53C	
S55	S55C	1055
S58	S58C	
S15-G	—	—
S48F	—	—

- Remarks:
1. Figures making up codes denote approximate values (two decimal places) of carbon content (%).
 2. S15-G represents crude steel with crystals of almost the same size for carburization (GC: 2.1 and over to 5.0 excl.).
 3. For new use of S48F for parts, secure approval by the division in charge of material.

3. Method of Manufacture

Carbon steels for machine structural use shall be made by forging (hot rolling) killed steel ingots. The steel shall, as a rule, be rolled or forged from steel ingot with a forging ratio of not less than 4S.

4. Chemical Composition

The chemical composition of carbon steels for machine structural use shall be as shown in Table 2.

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Established / 5th

Revised :

Jun. 1998



TOYOTA ENGINEERING STANDARD

TS G3200G

Table 2

Unit: %

Classification	C	Si	Mn	P	S
S 6	0.04 to 0.08	0.15 to 0.35	0.25 to 0.50	0.030 max.	0.035 max.
S 8	0.06 to 0.10				
S10	0.08 to 0.13				
S12	0.10 to 0.15		0.30 to 0.60		
S15	0.13 to 0.18				
S17	0.15 to 0.20				
S20	0.18 to 0.23				
S22	0.20 to 0.25				
S25	0.22 to 0.28				
S28	0.25 to 0.31		0.60 to 0.90		
S30	0.27 to 0.33				
S33	0.30 to 0.36				
S35	0.32 to 0.38				
S38	0.35 to 0.41				
S40	0.37 to 0.43				
S43	0.40 to 0.46		0.60 to 1.10		
S45	0.42 to 0.48				
S48	0.45 to 0.51				
S50	0.47 to 0.53				
S53	0.50 to 0.56				
S55	0.52 to 0.58				
S58	0.55 to 0.61	0.40 to 0.60	0.60 to 1.10		
S48F	0.45 to 0.51				

- Remarks: 1. As for impurities, Cr, Ni, and Cu contents for each class shall not exceed 0.25%, 0.20%, and 0.30%, respectively.
2. The major chemical composition of S15-G is the same as that of S15, given in Table 2.

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Established / 5th Jun. 1998 Revised :



TOYOTA ENGINEERING STANDARD

TS G3200G

5. General Quality.

The quality of carbon steel products for machine structural use, such as flaws, cleanness, and grain size number, shall comply with TSG3000G.

6. Shape, Dimensions, and Dimensional Deviation

The shape, dimensions, and dimensional deviation of carbon steel products for machine structural use shall comply with TSG3000G.

7. Test Methods

The test methods for carbon steel products for machine structural use shall be as follows:

- (1) Chemical composition
Comply with TSG1000G and TSG2902G.
- (2) General quality
Comply with the method specified in Section 13 of TSG3000G.

8. Inspection

The inspection of carbon steel products for machine structural use shall comply with separately specified inspection standards.

Applicable Standards

TSG1000G General Rule for Chemical Analysis of Steel Materials
 TSG2902G Method of Spark Test for Steels
 TSG3000G General Quality of Steels for Machine Structural Use

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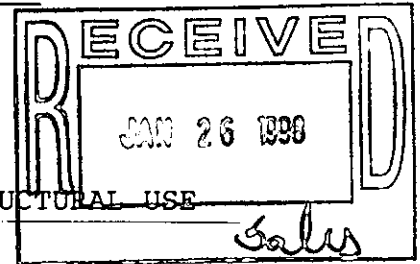
Established / 5th

Revised :

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TITLE : CARBON STEELS FOR MACHINE STRUCTURAL USE

CLASS : **C**

PUBLICATION RECORD

(Asterisk mark "*" in this standard denotes the changed portion from previous issue.) :

Revised

(Changed revision record 1st to 4th .
(Due to Toyota's internal rule)
* Omitted)

TOYOTA MOTOR MANUFACTURING
NORTH AMERICA, INC.
PURCHASING TECHNICAL SUPPORT
TOYOTA ENGINEERING STANDARD
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ISSUED 1-22-98

Date: **'97.12.17**
Engineering Information
Management Dept.
Engineering Administration Div.
TOYOTA MOTOR CORPORATION

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S30	S30C	1030
S33	S33C	—
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S38	S38C	1038
S40	S40C	1040

Prepared and Written by :

Metallic Material Dept.

Material Engineering Div. I

Engineering Administration Div.
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Established / **4 th**

Revised :

Dec. 1997

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S48	S48C	1049
S50	S50C	1050
S53	S53C	
S55	S55C	1055
S58	S58C	
S15-G	—	—

Remarks: 1. Figures making up codes denote approximate values (two decimal places) of carbon content (%).

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Established / 4th Revised :
Dec. 1997



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Table 2

Unit: %

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S15	0.13 to 0.18				
S17	0.15 to 0.20		0.30 to 0.60		
S20	0.18 to 0.23				
S22	0.20 to 0.25				
S25	0.22 to 0.28				
S28	0.25 to 0.31				
S30	0.27 to 0.33		0.60 to 0.90		
S33	0.30 to 0.36				
S35	0.32 to 0.38				
S38	0.35 to 0.41				
S40	0.37 to 0.43				
S43	0.40 to 0.46				
S45	0.42 to 0.48				
S48	0.45 to 0.51				
S50	0.47 to 0.53				
S53	0.50 to 0.56				
S55	0.52 to 0.58				
S58	0.55 to 0.61				

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