TOYOTA ENGINEERING STANDARDS

HIGH STRENGTH COLD ROLLED STEEL SHEETS

高張力冷間圧延鋼板

TS G3105G

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DATE	SYM	REVISION RECORD (An asterisk "*" in this standard denotes change from previous issue.)
08 - 94	5	Revised (Changed material codes.)
05 - 83	-	Issued

Note: The new standards should be applied immediately to all engineering related activities. In the case of revision, the old standard which has been issued before this revision should be removed and destroyed in proper manner (such as shredding or burning) to avoid possible use of obsolete standards information.

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HIGH STRENGTH COLD ROLLED STEEL SHEETS

1. Scope

This standard covers the quality of high strength cold rolled steel sheets which comprise automotive parts.

Remark: In this standard, units and numerical values given in { } are based on the customary units system, and are given for reference.

* 2. Material Codes

Material codes of high strength cold rolled steel sheets are as shown in Table 1.

Table 1 Codes

Material code	Previous codes (Reference)	Equivalent standard (Reference) JIS G 3135	Remark
SCP340	SCP35	SPFC340	For drawing
SCP340BH	SCP35BH	SPFC340H	Bake-hardening type for drawing
SCP390	SCP40	SPFC390	Commercial type
SCP440	SCP45	SPFC440	
SCP490	SCP50	SPFC490	
SCP590	SCP60	SPFC590	
SCP590DU	SCP60DU	SPFC590Y	Low yield point material
SCP780DU	SCP80DU	SPFC780Y	
SCP980DU	—	SPFC980Y	
SCP1180DU	—	—	
SCP340HR	—	—	Materials with high Lankford values
SCP390HR	SCP40HR	—	
SCP440HR	SCP45HR	—	

Remarks: 1. SCP590 is solid solution and precipitation strengthening type and SCP590DU is dual phase steel type.

2. When specifically designating the dual phase type steel sheet, indicate "DU" following the numerical figure in the code. This code is used mainly for differentiating material division when ordering. The dual phase type steel, however, may sometimes be included even if without specific designation.

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3. Mechanical Properties

Mechanical properties of high strength cold rolled steel sheets shall be in accordance with Table 2.

Table 2 Mechanical Properties

Material code	Yield point or 0.2 % yield strength (MPa) {kgf/mm²}	Tensile strength (MPa) {kgf/mm²}	Total elongation (%) Thickness 0.6 mm and over to 1.0 mm excl.	Total elongation (%) Thickness 1.0 mm min.	Lankford value, r	BH (1) (MPa) {kgf/mm²}	Test specimen (3)
SCP340	175 to 275 {18 to 28}	340 {35} min.	34 min.	35 min.	—	—	No. 5, perpendicular to rolling direction
SCP340BH						30 {3} min.	
SCP390	215 to 315 {22 to 32}	390 {40} min.	30 min.	31 min.		—	
SCP440	265 to (370) {27 to (38)}	440 {45} min.	26 min.	27 min.			
SCP490	295 to 440 {30 to 45}	490 {50} min.	23 min.	24 min.			
SCP590	390 to 540 {40 to 55}	590 {60} min.	17 min.	18 min.			
SCP590DU	315 to 460 {32 to 47}		18 min.	19 min.			
SCP780DU	410 to 560 {42 to 57}	780 {80} min.	13 min.	14 min.			
SCP980DU	590 to 930 {60 to 95}	980 {100} min.	—(2)	8 min.			
SCP1180DU	830 to 1180 {85 to 120}	1180 {120} min.		6 min.			
SCP340HR	155 to 255 {16 to 26}	340 {35} min.	35 min.	36 min.	1.5 min.		
SCP390HR	175 to 275 {18 to 28}	390 {40} min.	34 min.	35 min.			
SCP440HR	215 to 315 {22 to 32}	440 {45} min.	30 min.	31 min.	1.4 min.		

Notes: (1) Rise in yield point or 0.2 % proof stress resulting from aging treatment (170 ℃ × 20 min) after the application of 2 % permanent set.

(2) The minimum thickness of SCP980DU and SCP1180DU that can be manufactured is 1.0 mm.

(3) Use No. 5 test specimen specified in TSG2204G.

Remarks: 1. σ2 %BH of SCP590 and SCP590DU are nearly equivalent. Strength of the products press-formed from the two, therefore, are also nearly equivalent.

2. As for the values in notes (1), testing on individual lot may be omitted if this characteristic is found to be guaranteed by effective control over the constituent elements and the process itself.

3. Lankford value $\overline{r} = \frac{1}{4}(r_{0°} + r_{90°} + 2r_{45°})$

4. Standard Dimension

Standard thickness of high strength cold rolled steel sheets shall be as follows.

Standard thickness: 0.60, 0.65, 0.70, 0.75, 0.80, 0.90, 1.00, 1.20, 1.40, 1.60 (mm)

Remark: Check with divisions/sections concerned since the availability of some of the high strength cold rolled steel sheets (certain strength level) may be limited in terms of thickness and coil width.

5. Tolerance on Thickness
Tolerance on thickness of high strength cold rolled steel sheets shall be in accordance with Table 3.

Table 3 Tolerance on Thickness

Unit: mm

Classification of application according to tensile strength	Thickness \ Width	Below 630	630 and over to 1000 excl.	1000 and over to 1250 excl.	1250 and over to 1600 excl.	1600 and over
Those with the standard lower limit of tensile strength below 780 MPa {80 kgf/mm²}	0.60 and over to 0.80 excl.	±0.06			±0.07	±0.08
	0.80 and over to 1.00 excl.	±0.07		±0.08	±0.09	±0.10
	1.00 and over to 1.25 excl.	±0.08		±0.09	±0.10	±0.12
	1.25 and over to 1.60 excl.	±0.09	±0.10	±0.11	±0.12	±0.14
	1.60 and over to 2.00 excl.	±0.10	±0.11	±0.12	±0.14	±0.16
Those with the standard lower limit of tensile strength 780 MPa {80 kgf/mm²} or over	0.80 and over to 1.00 excl.	±0.09			±0.10	—
	1.00 and over to 1.25 excl.	±0.10			±0.12	—
	1.25 and over to 1.40 incl.	±0.12			±0.15	—

Remark: Thickness of mill-edged steel sheets shall be measured at any location at least 25 mm inside from both edges of the sheet. With the cut-edged sheet, however, thickness shall be measured at any location at least 15 mm inside from both edges of the sheet.

6. Others
Specifications for the surface quality, internal defect, test method, etc. for high strength cold rolled steel sheets shall be in accordance with TSG3100G.

Applicable Standards

TSG2204G Test Pieces for Tensile Test for Metallic Materials
TSG3100G Cold Rolled Steel Sheets

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