



北京首钢股份有限公司

BEIJING SHOUGANG CO.,LTD.

# 汽车板 产品手册

AUTOMOTIVE STEEL SHEETS PRODUCTS MANUAL

北京首钢股份有限公司  
Beijing Shougang Co., Ltd.



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# Chapter 1 Products Introduction

## 第一章 产品介绍

### 1.1 汽车用冷轧钢板及钢带 Cold rolled automotive steel sheets and strips

#### 1.1.1 冷轧低碳和超低碳钢板及钢带 Cold rolled low carbon and ultra-low carbon steel sheets and strips

冷轧低碳钢和超低碳钢按用途可分为一般用、冲压用、深冲压用、特深冲压用和超深冲压用，首钢的低碳钢和超低碳钢板，具有良好的冲压性能、焊接性能以及较高的尺寸精度，广泛应用于各种汽车零部件。特别是无间隙原子钢（IF 钢）具有高的 r 值、n 值和断后伸长率，大量用于门内板、行李箱盖板等汽车零部件。用途及特点如下表：

According to application, the cold rolled low carbon steel and ultra-low carbon steel can be divided into common quality, drawing quality, deep drawing quality, extra-deep drawing quality, and supreme extra-deep drawing quality. With excellent drawing and welding performance and relatively high dimensional accuracy, the cold rolled low carbon and ultra-low carbon steel sheets of Shougang have been widely applied in various automotive parts. The interstitial free steel (IF steel) has been greatly used for extremely difficult drawing parts such as inner door pannel, luggage boot cover for its high r value, n value and percent elongation. The applications and features are shown in the following table:

用途 Application	特性 Feature	牌号示例 Grade
一般用: CQ (Commercial purpose)	具有足够的延展性, 适用于简单成形、弯曲或焊接加工 With enough ductility, they are suitable for simple forming, bending or welding.	DC01、SPCC、St12
冲压级: DQ (Drawing)	具有比一般用级较大的延展性, 适用于制造冲压成形及较复杂变形的零部件 With better ductility than the common ones, they are suitable for manufacturing parts through drawing and relatively complicated deforming.	DC03、SPCD、St13
深冲压用: DDQ (Deep drawing)	具有比冲压级更大的延展性, 更均匀的力学性能, 适用于制造深冲压成型及复杂变形的零部件 With better ductility and homogeneity than the drawing ones, they are suitable for manufacturing parts through deep drawing and complicated deforming.	DC04、SPCE、St14
特深冲压用: EDDQ (Extra-deep drawing)	具有比深冲压级更大的延展性, 更为均匀的力学性能, 适用于制造特深冲压成型及更为复杂变形的零部件 With higher ductility and homogeneity than the deep drawing ones, they are suitable for manufacturing parts through extra-deep drawing and more complicated deforming.	DC05、SPCF、St15
超深冲压用: SEDDQ (Supreme extra-deep drawing)	具有比特深冲压级更为优异的力学性能, 适用于制造超深冲压成形及极复杂的变形零部件 With excellent drawing capability than extra deep drawing ones, they are suitable for manufacturing parts through supreme extra-deep drawing and extremely complicated deforming.	DC06、SPCG、St16

#### 1.1.1.1 相近牌号对照表 (Reference list of similar steel grades)

Q/SGZGS 0324-2020				GB/T 5213-2019	EN 10130-2006	DIN 1623.1-1983	JIS G3141:2021	JFSA 2001:2020	ASTMA A1008M-21a	ISO 3574-2012
DC01	St12	SPCC	CS C	DC01	DC01	St12	SPCCT	JSC270C	CS Type C	CR1
DC03	St13	SPCD	CSA CS B	DC03	DC03	RRSt13	SPCD	JSC270D	CS Type A CS Type B	CR2
DC04	St14	SPCE	DSA DS B	DC04	DC04	St14	SPCE	JSC270E	DS Type A DS Type B	CR3
DC05	St15	SPCF	DDS	DC05	DC05	-	SPCF	JSC270F	DDS	CR4
DC06	St16	SPCG	DDS	DC06	DC06	-	SPCG	JSC260G	EDDS	CR5
DC07	St17	-	-	DC07	DC07	-	-	-	-	-

#### 1.1.1.2 力学性能 (Mechanical Properties)

牌号 Steel grade	拉伸试验 <sup>a</sup> Tensile test <sup>a</sup>								下列公称厚度 (mm) 的 r <sub>90</sub> 值 <sup>c</sup> , 不小于 r <sub>90</sub> <sup>c</sup> min.		n <sub>90</sub> 值 不小于 <sup>c</sup> n <sub>90</sub> <sup>c</sup> min.
	屈服强度 Yield Strength Mpa <sup>b</sup>	抗拉强度 Tensile Strength R <sub>m</sub> Mpa	下列公称厚度 (mm) 的断后伸长率, A <sub>80mm</sub> %, ≥ Elongation after fracture, A <sub>80mm</sub> %, ≥						≤ 2.0	> 2.0 ~ 2.5	
			< 0.30	0.30~ < 0.50	0.50~ < 0.70	0.70~ < 1.0	1.0~ < 1.6	≥ 1.6			
DC01 St12	140~280 <sup>d</sup>	270~410	24	26	28	30	32	34	-	-	-
DC03 St13	130~240	270~370	-	30	32	34	35	36	1.3	1.1	-
DC04 St14	130~210	270~350	-	34	36	38	39	40	1.6	1.4	0.18
DC05 St15	120~180	270~330	-	35	38	40	40	41	1.9	1.7	0.20
DC06 St16	110~170	270~330	-	37	39	41	42	43	2.1	1.9	0.22
DC07 St17	100~150	250~310	-	40	42	44	44	44	2.5	2.3	0.23

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm), 试样方向为横向。

<sup>a</sup> No. P6 test piece (L<sub>0</sub> = 80 mm, b<sub>0</sub> = 20 mm) specified in GB/T 228.1-2021 and taken in the transverse direction apply.

<sup>b</sup> 无明显屈服现象时应采用 R<sub>p0.2</sub>, 否则采用 R<sub>eL</sub>。当 0.50mm < 厚度 ≤ 0.70mm, 屈服强度上限值可增加 20 MPa; 当厚度 ≤ 0.50mm 时, 屈服强度上限值可增加 40MPa。

<sup>b</sup> If the yield point is not pronounced, the values apply to the 0.2%- proof strength R<sub>p0.2</sub>, otherwise the lower yield point R<sub>eL</sub> is applied. When the thickness is more than 0.5mm and less than or equal to 0.7mm, the maximum value for yield strength is increased by 20MPa. And when the thickness is less than or equal to 0.5mm, the maximum value for yield strength is increased by 40MPa.

<sup>c</sup> r<sub>90</sub> 值和 n<sub>90</sub> 值的要求仅适用于厚度 ≥ 0.50mm 的产品。厚度大于 2.5mm 时, r<sub>90</sub> 值不作要求。

<sup>c</sup> The requirements for r<sub>90</sub> and n<sub>90</sub> values apply only to products with nominal thickness of not less than 0.50mm. When the products with nominal thickness greater than 2.5mm, the value of r<sub>90</sub> is not required.

<sup>d</sup> DC01、St12 的屈服强度上限值 280MPa 仅适用于产品制造完成之日起的 8 天内。

<sup>d</sup> The upper limit of yield strength of DC01 and St12 is 280MPa, which is only applicable up to 8 days from the date on which the products are made available at the manufacturer's work.







### 1.1.1.3 拉伸应变痕 (Stretcher strain marks)

低碳钢通常会发生时效，导致屈服强度上升，断后延伸率下降，加工过程中产生桔皮，表面粗糙等缺陷，因此，需规定各牌号的拉伸应变痕保证时间。各牌号拉伸应变痕如下表所示。

Aging often occurs on low carbon steel and causes steel yield strength to increase and elongation to decrease, which may lead to the occurrence of defects such as orange peels and coarse surface during processing. Therefore, it is necessary to specify guarantee time for stretcher strain marks of each steel grade. Refer to following table for provisions of tensile strain marks of each steel grade.

牌号 Grade	拉伸应变痕 Tensile Strain Marks
DC01、St12、CSA、CS B、CS C、SPCD	自生产完成之日起 3 个月内使用时不应出现拉伸应变痕。 The products shall be free from stretcher strain marks during forming within 3 months after they are produced.
DC03、DC04、St13、DS A、DS B、St14、DDS、SPCE	自生产完成之日起 6 个月内使用时不应出现拉伸应变痕。 The products shall be free from stretcher strain marks during forming within 6 months after they are produced.
DC05、DC06、DC07、St15、St16、St17、SPCF、SPCG、EDDS	使用时不应出现拉伸应变痕。 The products shall be free from stretcher strain marks during forming.
SPCC	不保证。 No guarantee period.

牌号 Steel grade	拉伸试验 <sup>a</sup> Tensile test <sup>a</sup>									$\bar{r}$ 值 <sup>c,d</sup> ≥	
	屈服强度 <sup>b</sup> Yield Strength MPa, ≤	抗拉强度 Tensile Strength R <sub>m</sub> , MPa, ≥	下列公称厚度 (mm) 的断后伸长率, A <sub>50mm</sub> , %, ≥ Elongation after fracture								
			< 0.25	0.25~ < 0.30	0.30~ < 0.40	0.40~ < 0.60	0.60~ < 1.0	1.0~ < 1.6	≥ 1.6	0.5~1.0	> 1.0~1.6
SPCC	-	270	25	28	31	34	36	37	38	-	-
SPCD	240	270	27	30	33	36	38	39	40	-	-
SPCE	220	270	29	32	35	38	40	41	42	-	-
SPCF	210	270	-	-	37	40	42	43	44	-	-
SPCG	190	270	-	-	-	42	44	45	46	1.5	1.4

<sup>a</sup> 试样为 JIS Z2241 中的 No.5 试样，试样方向为纵向。

<sup>a</sup> No.5 test piece specified in JIS Z2241 and taken in the longitudinal direction apply.

<sup>b</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>，否则采用下屈服强度 R<sub>eL</sub>。当 0.40mm < 厚度 ≤ 0.60mm，屈服强度规定值可增加 20MPa；当厚度 ≤ 0.40mm 时，屈服强度规定值可增加 40MPa。

<sup>b</sup> If the yield point is not pronounced, the values apply to the 0.2%- proof strength R<sub>p0.2</sub>, otherwise the lower yield point R<sub>eL</sub> is applied. When the thickness is more than 0.4mm and less than or equal to 0.6mm, the maximum value for yield strength is increased by 20MPa. And when the thickness is less than or equal to 0.4mm, the maximum value for yield strength is increased by 40MPa.

<sup>c</sup> 当公称厚度 < 0.5mm 或 > 1.6mm 时，r 值不作要求。

<sup>c</sup> No guarantee for r value in case of thickness < 0.5mm or > 1.6mm

<sup>d</sup>  $r = (r_0 + r_{50} + 2r_{45}) / 4$

代号 Designation	屈服强度 <sup>a,b</sup> , MPa Yield Strength	断后伸长率 <sup>a</sup> , A <sub>50mm</sub> , %, ≥ Elongation A <sub>50mm</sub> , %, ≥	$\bar{r}$ 值 <sup>a,c</sup> r Value <sup>a,c</sup>	$\bar{n}$ 值 <sup>a,d</sup> n Value <sup>a,d</sup>
CSA、CS B、CS C	140 ~ 275	30	-	-
DSA、DS B	150 ~ 240	36	1.3 ~ 1.7	0.17 ~ 0.22
DDS	115 ~ 200	38	1.4 ~ 1.8	0.20 ~ 0.25
EDDS	105 ~ 170	40	1.7 ~ 2.1	0.23 ~ 0.27

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P5 试样 (L0=50mm, b0=12.5mm)，试样方向为纵向。

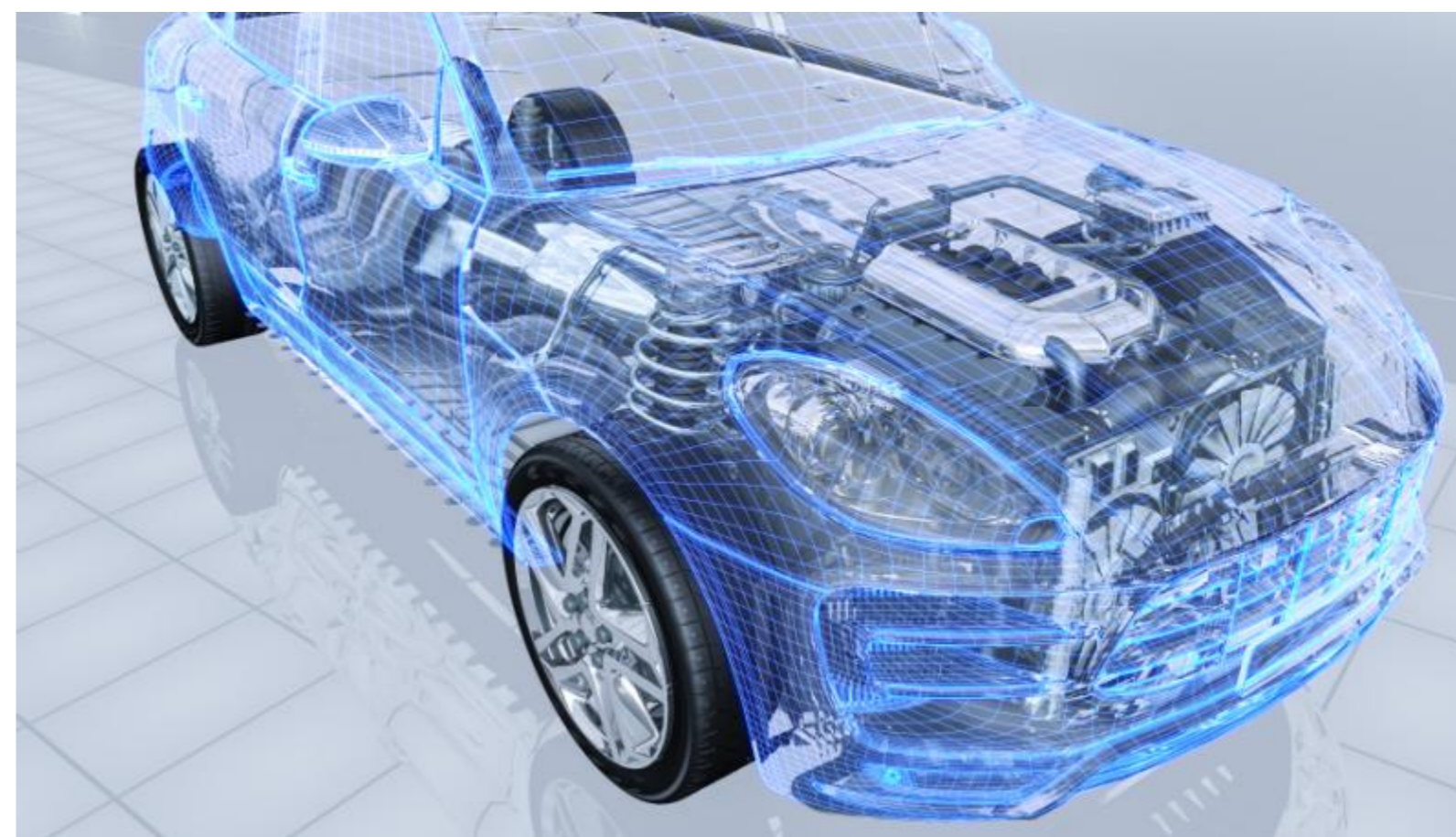
<sup>a</sup> No. P5 test piece (L0=50mm, b0=12.5mm) specified in GB/T 228.1-2021 and taken in the longitudinal direction apply.

<sup>b</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>，否则采用下屈服强度 R<sub>eL</sub>。

<sup>b</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the lower yield strength (R<sub>eL</sub>).

<sup>c</sup>  $r = (r_0 + 2r_{45} + r_{90}) / 4$

<sup>d</sup>  $n = n_{90} + 2n_{45} + n_{14}$



### 1.1.2 冷轧碳素结构钢板及钢带 Cold Rolled Carbon Structural Steel Sheets and Strips

碳素结构钢综合力学性能（强度、延伸率等）及工艺性能（弯曲）良好，尺寸精度高，并且有良好的焊接性能，适用于简单加工的构件。可用于汽车一些结构件，如车厢边框及中底板和各种加强板。

Carbon structural steel is featured with good comprehensive mechanical performance (strength and elongation, etc.) and process performance (bending), high dimensional accuracy and excellent welding performance. They are suitable to manufacturing structural members with simple processing and may be used as some structural parts for automobiles, such as car body frames, middle base panels and various reinforcement panels.

#### 1.1.2.1 相近牌号对照表 (Reference list of similar steel grades)

Q/SGZGS 0325-2020	GB/T 20564.11-2017	DIN 1623:2009-05	DIN 1623:2-1986	JIS G3135:2018	JFSA 2001:2020
SPFC 340	-	-	-	SPFC 340	JSC340W
SPFC 390	CR235S	-	-	SPFC 390	JSC390W
SPFC 440	CR265S	-	-	SPFC 440	JSC440W
SPFC 590	-	-	-	SPFC 590	-
S215G、St 37-2G、St 37-3G	CR205S	S215G	St37-2G、St 37-3G	-	-
S245G、St 44-3G	CR265S	S245G	St44-3G	-	-
S325G、St 52-3G	CR325S	S325G	St52-3G	-	-

#### 1.1.2.2 力学性能 (Mechanical Properties)

牌号 Steel grade	屈服强度 <sup>a,b</sup> Yield Strength MPa	抗拉强度 <sup>a</sup> Tensile Strength R <sub>m</sub> ,MPa, ≥	下列公称厚度 (mm) 的断后伸长率 <sup>a</sup> , A <sub>50mm</sub> %, ≥ Elongation after fracture <sup>a</sup> , A <sub>50mm</sub> %, ≥				
			< 0.8	0.8 ~ < 1.0	1.0 ~ < 1.2	1.2 ~ < 1.6	≥ 1.6
SPFC 340	180 ~ 320	340	33	34	35	36	37
SPFC 390	240 ~ 380	390	29	30	31	32	33
SPFC 440	280 ~ 420	440	26	27	28	29	30
SPFC 590	370 ~ 510	590	16	17	18	19	20

<sup>a</sup> 试样为 JIS Z 2241 中的 No.5 试样，试样方向为横向。  
<sup>a</sup> No.5 test piece specified in JIS Z2241 and taken in the transverse direction apply.  
<sup>b</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>，否则采用下屈服强度 R<sub>eL</sub>。  
<sup>b</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the lower yield strength(R<sub>eL</sub>).

牌号 Steel grade	屈服强度 <sup>a,b</sup> Yield Strength <sup>a,b</sup> MPa, ≥	抗拉强度 <sup>a</sup> Tensile Strength R <sub>m</sub> ,MPa	断后伸长率 <sup>a</sup> Elongation after fracture A <sub>80mm</sub> %, ≥
S215G、St 37-2G、St 37-3G	215	360 ~ 510	20
S245G、St 44-3G	245	430 ~ 580	18
S325G、St 52-3G	325	510 ~ 680	16

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm)，试样方向为横向。  
<sup>a</sup> No. P6 test piece(L<sub>0</sub>=80 mm,b<sub>0</sub>=20mm)specified in GB/T 228.1-2021 and taken in the transverse direction apply.  
<sup>b</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>，否则采用上屈服强度 R<sub>eH</sub>。  
<sup>b</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the upper yield strength(R<sub>eH</sub>).

### 1.1.3 低合金高强度冷轧钢板及钢带 (Cold Rolled High Strength Low Alloy Steel Sheets and Strips)

低合金高强度钢是在低碳钢中添加少量的铌和 / 或钛等合金元素，使碳、氮等元素形成碳化物、氮化物并在铁素体基体上析出，从而提高钢的强度。这种钢具有良好的成形性能和较高的强度，主要用于汽车座椅、横梁等结构件。

High strength low alloy (HSLA) steel is a type of low carbon steel containing small amounts of alloy elements such as niobium and/or titanium, which will be allowed to form carbide and nitride with carbon and nitrogen. And these carbide and nitride can separate out of ferritic matrix to increase steel strength. With excellent formability and relatively high strength, HSLA is mainly used for manufacturing structural parts of automobiles such as chairs and cross beams.

#### 1.1.3.1 相近牌号对照表 (Reference list of similar steel grades)

Q/SGZGS 0326-2020	GB/T 20564.4-2022	EN 10268:2006+A1:2013	ASTM A1008/A1008M-21a	JFSA 2001:2020
HC210LA	-	-	-	-
HC260LA	CR260LA	HC260LA	-	-
HC300LA	CR300LA	HC300LA	HSLAS Grade 310 Class 2	-
HC340LA	CR340LA	HC340LA	HSLAS Grade 340 Class 2	-
HC380LA	CR380LA	HC380LA	HSLAS Grade 380 Class 2	-
HC420LA	CR420LA	HC420LA	HSLAS Grade 410 Class 2	-
HC460LA	-	HC460LA	HSLAS Grade 450 Class 1	-
HC500LA	-	HC500LA	HSLAS Grade 480 Class 2	-
HC550LA	-	-	HSLAS-F Grade 550	-
H420/590LA	-	-	-	JSC590R

#### 1.1.3.2 力学性能 (Mechanical Properties)

牌号 Steel grade	屈服强度 <sup>a</sup> Yield Strength MPa	抗拉强度 Tensile Strength R <sub>m</sub> ,MPa	下列公称厚度的断后伸长率 Elongation after fracture			
			A <sub>80mm</sub> %, ≥			A <sub>50mm</sub> %, ≥
			0.50mm	> 0.50mm ~ 0.70mm	> 0.70mm	
HC210LA	210 ~ 300	310 ~ 410	25	27	29	-
HC260LA	260 ~ 330	350 ~ 430	22	24	26	-
HC300LA	300 ~ 380	380 ~ 480	19	21	23	-
HC340LA	340 ~ 420	410 ~ 510	17	19	21	-
HC380LA	380 ~ 480	440 ~ 580	15	17	19	-
HC420LA	420 ~ 520	470 ~ 600	13	15	17	-
HC460LA	460 ~ 580	510 ~ 660	11	13	15	-
HC500LA	500 ~ 620	550 ~ 710	10	12	14	-
HC550LA	550 ~ 700	≥ 620	7	9	11	-
H420/590LA	420 ~ 560	≥ 590	-	-	-	16

<sup>a</sup> 无明显屈服现象时应采用 R<sub>p0.2</sub>，否则采用 R<sub>eL</sub>。  
<sup>a</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the lower yield strength(R<sub>eL</sub>).  
<sup>b</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm)，试样方向为横向。  
<sup>b</sup> No. P6 test piece(L<sub>0</sub>=80 mm,b<sub>0</sub>=20mm)specified in GB/T 228.1-2021 and taken in the transverse direction apply.  
<sup>c</sup> 试样为 JIS Z2241 中的 No.5 试样，试样方向为横向。  
<sup>c</sup> No.5 test piece specified in JIS Z2241 and taken in the transverse direction apply.





### 1.1.4.2 力学性能 (Mechanical Properties)

牌号 Steel grade	屈服强度 <sup>a</sup> Yield Strength MPa	抗拉强度 Tensile Strength R <sub>m</sub> , MPa	下列公称厚度的断后伸长率, % 不小于 Elongation after fracture			下列公称厚度 (mm) 的 r <sub>90</sub> <sup>d</sup> , ≥				n <sub>90</sub> <sup>d</sup> ≥	BH <sub>2</sub> <sup>e</sup> MPa ≥	
			A <sub>90mm</sub> <sup>b</sup>			A <sub>50mm</sub> <sup>c</sup>	≤ 2.0	> 2.0	≤ 1.5			> 1.5
			0.50mm	> 0.50mm ~ 0.70mm	> 0.70mm							
HC180B	180 ~ 230	290 ~ 360	30	32	34		1.6	1.4	-	0.17	30	
HC220B	220 ~ 270	320 ~ 400	28	30	32		1.5	1.3	-	0.16	30	
HC260B	260 ~ 320	360 ~ 440	25	27	29				-	-	30	
HC300B	300 ~ 360	390 ~ 480	22	24	26				-	-	30	
140H1	140 ~ 230	≥ 270		-		41	-		1.8	1.6	0.20	30
180H1	180 ~ 280	≥ 340		-		35	-		1.6	1.4	0.18	30
180H2	180 ~ 280	≥ 340		32			-		1.6	1.4	0.18	30

<sup>a</sup> 无明显屈服现象时应采用 R<sub>p0.2</sub>, 否则采用 R<sub>el</sub>.

<sup>a</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the lower yield strength (R<sub>el</sub>).

<sup>b</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm), 试样方向为横向。

<sup>b</sup> No. P6 test piece (L<sub>0</sub> = 80 mm, b<sub>0</sub> = 20 mm) specified in GB/T 228.1-2021 and taken in the transverse direction apply.

<sup>c</sup> 试样为 JIS Z2241 中的 No.5 试样, 试样方向为横向。

<sup>c</sup> No.5 test piece specified in JIS Z2241 and taken in the transverse direction apply.

<sup>d</sup> 该要求不适用于厚度超出 0.50mm ~ 2.50mm 的产品。

<sup>d</sup> This requirement does not apply to products with thickness exceeding 0.50mm ~ 2.50mm.

<sup>e</sup> 厚度大于 1.2mm 时, BH<sub>2</sub> 值需另行协商。

<sup>e</sup> When the thickness is greater than 1.2mm, BH<sub>2</sub> values shall be negotiated separately.

### 1.1.4 烘烤硬化高强度冷轧钢板及钢带 (Cold Rolled Bake Hardening Steel Sheets and Strips)

烘烤硬化钢 (BH 钢) 是指采用特定化学成分和生产工艺使钢板中固溶一定的碳原子, 钢板在交货状态下具有低的屈服强度, 冲压完成后, 进行涂漆烘烤时屈服强度增加一定值的一种新型高效汽车用钢。BH 钢可以提高汽车外板的抗凹陷性, 同时又具有良好的成形性能。广泛应用于汽车门外板、发动机盖板等外覆盖件。

Bake hardening steel (BH steel) refers to steel added with some solid solution carbon atoms by adoption of special chemical compositions and production process. It is a new type of high-efficient automotive steel sheets with relatively low yield strength at delivery and increased yield strength by certain extents through coating baking after draw forming. It is featured with good formability and stable bake hardness (BH value), and widely used for manufacturing exposed pannel of automobiles such as door outer pannel and hood outer pannel.

#### 1.1.4.1 相近牌号对照表 (Reference list of similar steel grades)

Q/SGZGS 0326-2020	GB/T 20564.1-2017	EN 10268:2006+A1:2013	ASTM A1008/ A1008M-21a	JFSA 2001:2020	JIS G3135:2018
HC180B	CR180BH	HC180B	BHS Grade 26[180]	-	-
HC220B	CR220BH	HC220B	BHS Grade 31[210]	-	-
HC260B	CR260BH	HC260B	BHS Grade 35[240] BHS Grade 41[280]	-	-
HC300B	CR300BH	HC300B	BHS Grade 44[300]	-	-
140H1	-	-	-	JSC270H	-
180H1	-	-	-	JSC340H	SPFC340H
180H2	-	-	-	-	-

#### 1.1.4.3 拉伸应变痕 (Stretcher Strain Marks)

对于表面质量要求级别为 FC 和 FD 的钢板及钢带, 如储存温度低于 50°C, 自生产完成之日起 3 个月内使用时不应出现拉伸应变痕。

The products, with surface quality FC and FD, shall be free from stretcher strain marks during forming within 3 months after they are produced at the manufacturer's work, if storage temperature is below 50°C.

### 1.1.5 加磷高强度冷轧钢板及钢带 (Cold Rolled High Strength Rephosphorized Steel Sheets and Strips)

加磷高强度钢是指在低碳钢或超低碳钢中特别添加一定量的磷，利用磷的固溶强化作用提高钢的强度，使用这种钢板可使汽车冲压件的厚度适当减薄，能降低汽车的自重，获得良好的经济效益。既可用于制作车门外板、发动机盖板、顶盖等外覆盖件，也可制作横梁、纵梁等加强件和结构件。

High-strength phosphor steel sheets and strips refer to low carbon or ultra-low carbon steel especially added with certain amount of phosphor, which increases steel strength by its solid solution strengthening function. Adoption of such sheets may properly reduce thickness of automotive drawn parts, and consequently lighten the automobile dead weight. They can be used for manufacturing exposed panel such as door outer panel, hood outer panel, roof outer panel, and reinforcements and structural members such as cross beams and longitudinal beams.

#### 1.1.5.1 相近牌号对照表 (Reference list of similar steel grades)

Q/SGZGS 0326-2020	GB/T 20564.3-2017	EN 10268:2006+A1:2013	JFSA 2001:2020	JIS G3135:2018
HC180P	-	HC180P(2006版)	-	-
HC220P	-	HC220P(2006版)	-	-
HC260P	-	HC260P(2006版)	-	-
HC300P	-	HC300P(2006版)	-	-
HC180Y	CR180IF	HC180Y	-	-
HC220Y	CR220IF	HC220Y	-	-
HC260Y	CR260IF	HC260Y	-	-
170P1	-	-	JSC340P	-
210P1	-	-	JSC390P	-
250P1	-	-	JSC440P	-
180P2	-	-	JSC340W	SPFC340
220P2	-	-	JSC390W	SPFC390
260P2	-	-	JSC440W	SPFC440

### 1.1.5.2 力学性能 (Mechanical Properties)

牌号 Steel grade	屈服强度 <sup>a</sup> Yield Strength <sup>a</sup> MPa	抗拉强度 Tensile Strength R <sub>m</sub> ,MPa	下列公称厚度 (mm) 的断后伸长率, %, 不小于 Elongation after fracture, %, min.						下列公称厚度 (mm) 的 r <sub>90</sub> <sup>d</sup> , %				n <sub>90</sub> <sup>d</sup> ≥
			A <sub>30mm</sub> <sup>b</sup>			A <sub>50mm</sub> <sup>c</sup>			≤ 2.0		> 2.0		
			0.50	> 0.50 ~ 0.70	> 0.70	< 1.0	1.0 ~ < 1.6	≥ 1.6	≤ 1.5	> 1.5			
HC180P	180 ~ 230	280 ~ 360	30	32	34	-	-	-	1.6	1.4	-	-	0.17
HC220P	220 ~ 270	320 ~ 400	28	30	32	-	-	-	1.3	1.1	-	-	0.16
HC260P	260 ~ 320	360 ~ 440	25	27	29	-	-	-	-	-	-	-	-
HC300P	300 ~ 360	400 ~ 480	22	24	26	-	-	-	-	-	-	-	-
HC180Y	180 ~ 240	340 ~ 400	30	32	34	-	-	-	1.7	1.5	-	-	0.19
HC220Y	220 ~ 280	360 ~ 420	28	30	32	-	-	-	1.5	1.3	-	-	0.17
HC260Y	260 ~ 320	380 ~ 440	24	26	28	-	-	-	-	-	-	-	-
170P1	170 ~ 260	≥ 340	-	-	-	36	38	40	-	-	1.7	1.5	0.19
210P1	210 ~ 310	≥ 390	-	-	-	32	34	36	-	-	1.6	1.4	0.18
250P1	250 ~ 360	≥ 440	-	-	-	30	32	34	-	-	-	-	-
180P2	180 ~ 280	≥ 340	-	28	30	-	-	-	-	-	-	-	-
220P2	220 ~ 320	≥ 380	-	26	28	-	-	-	-	-	-	-	-
260P2	260 ~ 360	≥ 440	-	24	26	-	-	-	-	-	-	-	-

<sup>a</sup> 无明显屈服现象时应采用 R<sub>p0.2</sub>, 否则采用 R<sub>el</sub>.

<sup>a</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the lower yield strength (R<sub>el</sub>).

<sup>b</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm), 试样方向为横向。

<sup>b</sup> No. P6 test piece (L<sub>0</sub>=80 mm, b<sub>0</sub>=20mm) specified in GB/T 228.1-2021 and taken in the transverse direction apply.

<sup>c</sup> 试样为 JIS Z2241 中的 No.5 试样, 试样方向为横向。

<sup>c</sup> No.5 test piece specified in JIS Z2241 and taken in the transverse direction apply.

<sup>d</sup> 该要求不适用于厚度超出 0.50mm ~ 2.50mm 的产品。

<sup>d</sup> This requirement does not apply to products with thickness exceeding 0.50mm ~ 2.50mm.

### 1.1.5.3 拉伸应变痕 (Stretcher Strain Marks)

对于表面质量要求级别为 FC 和 FD 的钢板及钢带，如储存温度低于 50°C, 自生产完成之日起 3 个月内使用时不应出现拉伸应变痕。

The products, with surface quality FC and FD, shall be free from Stretcher strain marks during forming within 3 months after they are produced at the manufacturer's work, if storage temperature is below 50°C.





### 1.1.6 超细晶各向同性高强外板 Uni-FISH (Ultra-fine grained isotropic high strength outer plate)

超细晶各向同性高强外板是首钢在国内首发的一类高强外板：其利用 IF 钢基体通过细晶强化和析出物的特殊控制形成 PFZ 区，实现了强韧性的最佳匹配。该钢种具有高强度，高成形性，高的各向同性和低波纹度，低的韧脆转变温度等优势。应用于使汽车覆盖件可实现厚度适当减薄，能降低汽车的自重，获得良好的经济效益。可用于制作车门外板、翼子板、发动机盖板、顶盖等外覆盖件。

Uni-FISH steel is a kind of high strength outer plate launched by Shougang in China: it uses IF steel matrix to form PFZ zone through fine grain strengthening and special control of precipitates, so as to realize the best matching of strength and toughness. The steel has the advantages of high strength, high formability, high isotropy, low waviness and low ductile brittle transition temperature. The utility model is applied to make the thickness of the automobile covering parts be appropriately thinned, which can reduce the dead weight of the automobile and obtain good economic benefits. It can be used to make door outer panel, fender, engine cover, top cover and other outer covers.

#### 1.1.6.1 力学性能 (Mechanical Properties)

牌号	下屈服强度 R <sub>el</sub> <sup>b</sup> /MPa	抗拉强度 R <sub>m</sub> /MPa	拉伸试验 <sup>a</sup>					下列公称厚度 (mm) 的 r <sub>90</sub> 值 <sup>c</sup> , 不小于	
			下列公称厚度 (mm) 的断后伸长率 A <sub>80mm</sub> % ≥					≤ 2.0	> 2.0~2.50
			0.30~ < 0.50	0.50~ < 0.70	0.70~ < 1.0	1.0~ < 1.60	≥ 1.60		
Uni-FISH340、UF340	180~250	340~420	30	32	34	35	36	2.0	1.6
Uni-FISH390、UF390	220~300	390~450	28	30	32	33	35	1.8	1.5
Uni-FISH440、UF440	240~320	440~500	26	28	30	32	34	1.6	1.2

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm), 试样方向为横向。

<sup>b</sup> 无明显屈服现象时应采用 R<sub>p0.2</sub>, 否则采用 R<sub>el</sub>。当厚度为 > 0.50mm~0.70mm 时, 屈服强度上限值可增加 20 MPa; 当厚度 ≤ 0.50mm 时, 屈服强度上限值可增加 40MPa。

<sup>c</sup> r<sub>90</sub> 值的要求仅适用于厚度 ≥ 0.50mm 的产品。厚度大于 2.5mm 时, r<sub>90</sub> 值不作要求。

牌号	钢种	镀层	屈服强度 MPa <sup>b</sup>	抗拉强度 R <sub>m</sub> /MPa	拉伸试验 <sup>a</sup>					下列公称厚度 (mm) 的 r <sub>90</sub> 值 <sup>c</sup> , 不小于	
					下列公称厚度 (mm) 的断后伸长率 <sup>d</sup> , A <sub>80mm</sub> % ≥					≤ 2.0	> 2.0~2.50
					0.30~ < 0.50	0.50~ < 0.70	0.70~ < 1.0	1.0~ < 1.60	≥ 1.60		
Uni-FISH340、UF340	D+Z/ZF	180~250	340~420	30	32	34	35	36	1.9	1.5	
Uni-FISH390、UF390	D+Z/ZF	220~300	390~450	28	30	32	33	35	1.7	1.4	
Uni-FISH440、UF440	D+Z/ZF	240~320	440~500	26	28	30	32	34	1.5	1.2	

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm), 试样方向为横向。

<sup>b</sup> 无明显屈服现象时应采用 R<sub>p0.2</sub>, 否则采用 R<sub>el</sub>。当厚度为 > 0.50mm~0.70mm 时, 屈服强度上限值可增加 20 MPa; 当厚度 ≤ 0.50mm 时, 屈服强度上限值可增加 40MPa。

<sup>c</sup> r<sub>90</sub> 值的要求仅适用于厚度 ≥ 0.50mm 的产品。厚度大于 2.5mm 时, r<sub>90</sub> 值不作要求。

<sup>d</sup> 当镀层种类为 ZF 时, 断后伸长率最小值可比表中规定值减小两个单位。

力学性能有效期为制造完成后 6 个月内。

Mechanical properties just for products within 6 months from manufactured.

自生产完成之日起 6 个月内使用时不应出现拉伸应变痕。

The products shall be free from stretcher strain marks during forming within 6 months after they are produced.

#### 1.1.6.2 表面波纹度 (Surface waviness)

波纹度是影响外板涂装质量最重要的表面质量指标, 该产品由于晶粒细小均匀, 为此波纹度可以稳定控制在 Wsa1-5 < 0.28μm。

Waviness is the most important surface quality index affecting the coating quality of outer plate. Because the grain of the product is fine and uniform, the waviness can be stably controlled at wsa1-5 < 0.28μm.

### 1.1.7 先进高强度冷轧钢板及钢带 (Advanced High Strength Steel Sheets and Strips)

#### 1.1.7.1 双相钢 Dual Phase Steel (DP)

双相钢的显微组织以铁素体和马氏体为主, 马氏体以岛状弥散分布在铁素体基体上。双相钢具有低屈强比、无屈服延伸、无室温时效、高的加工硬化性能、良好的均匀伸长率和优良的抗碰撞性能的特点。双相钢是目前结构类零件的首选钢种, 主要应用于结构件、加强件等。

The microstructure of dual phase steels consists of a soft ferrite matrix with a dispersed mainly martensitic phase. It is featured with low yield ratio, no yield elongation, strong work hardening capacity, high strain strengthening index and excellent collision-resistance. It is mainly used for structures and reinforcements etc.

#### 1.1.7.2 增强成形性双相钢

##### Dual Phase Steel with Improved Formability (DH)

增强成形性双相钢的显微组织主要由铁素体和马氏体及少量贝氏体或残余奥氏体组成。与同等抗拉强度的双相钢相比, 具有更高的延伸率和加工硬化指数。该钢种适用于需要深拉伸的零件成形。

The microstructure of DH steel consists mainly of ferrite and martensite and small amounts of bainite and retained austenite. Compared to dual phase steels, they show a higher elongation and stronger work hardening capacity. DH steels are especially suitable for deep drawing parts.

#### 1.1.7.3 相变诱导塑性钢

##### Transformation Induced Plasticity Steel (TRIP)

相变诱导塑性钢 (TRIP 钢) 的显微组织为铁素体、贝氏体和残余奥氏体, 且残余奥氏体的含量不少于 5%。在成形过程中, 组织中的残余奥氏体逐渐转变为硬的马氏体, 从而可以获得较高的抗拉强度和均匀伸长率。

TRIP steels have a fine-grained ferritic-bainitic microstructure with more than 5% embedded retained austenite. During plastic deformation retained austenite transforms to martensite and leads to a strong work hardening (TRIP effect). High tensile strength with high values of the uniform elongation can be achieved.





#### 1.1.7.4 复相钢 Complex Phase Steel (CP)

复相钢的显微组织为以铁素体或贝氏体为基体，并分布有少量马氏体、残余奥氏体或珠光体。与双相钢相比，复相钢具有更高的屈强比和更好的弯曲性能。

Complex phase steels are characterized by a multi phase microstructure containing mostly a ferritic- bainitic matrix whereas martensite, retained austenite and pearlite can be present as additional phases. Compared to dual phase steels they show a higher yield ratio and better bending performance.

#### 1.1.7.5 淬火配分钢 Quenching and Partitioning Steel (QP)

淬火配分钢的显微组织由马氏体 + 铁素体 + 残余奥氏体等多相复合组成。淬火配分钢以马氏体为基体相，利用残余奥氏体在变形过程中的 TRIP 效应，能实现较高的加工硬化能力，因此比同级别超高强钢拥有更高的塑性和成形性能。

QP steels are characterized by a multi phase microstructure containing martensite, ferritic and retained austenite etc.. Due to the hard martensite matrix and the TRIP effect of retained austenite, QP steel can achieve higher ductility and better formability than others HSS .

#### 1.1.7.6 马氏体钢 Martensitic Steel (MS)

马氏体钢的显微组织以马氏体为主，这使其具有抗拉强度高和屈强比高的特点。马氏体钢适合于简单零件的冷冲压和截面相对单一的辊压成形零件，如保险杠、门槛加强板等。

Martensitic steel have a martensitic microstructure, which is the reason for their very high strength and high yield ratio. Drawability is limited, these steel grades are suitable for roll forming parts with simple cross section, such as bumpers, strengthened panel of threshold etc..



#### 1.1.7.7 相近牌号对照表 (Reference list of similar steel grades)

Q/SGZGS 0328-2020	GB/T 20564 系列	EN 10338:2015	VDA239-100:2016
HC250/450DP	CR260/450DP	HCT450X	-
HC290/490DP	CR300/500DP	HCT490X	CR290Y490T-DP
HC340/590DP	CR340/590DP	HCT590X	CR330Y590T-DP
HC380/690DP	-	-	-
HC420/780DP	CR420/780DP	HCT780X	CR440Y780T-DP
HC500/780DP	-	-	-
HC550/980DP	CR550/980DP	HCT980X	CR590Y980T-DP
HC700/980DP	-	-	CR700Y980T-DP
HC820/1180DP	-	-	-
HC330/590DH	HC330/590DH	-	-
HC440/780DH	HC440/780DH	-	CR440Y780T-DH
HC550/980DH	HC550/980DH	-	-
HC700/980DH	HC700/980DH	-	CR700Y980T-DH
HC820/1180DH	-	-	-
HC380/590TR	CR380/590TR	-	-
HC400/690TR	CR400/690TR	HCT690T	-
HC420/780TR	CR420/780TR	HCT780T	-
HC570/780CP	CR500/780CP	HCT780C	CR570Y780T-CP
HC660/780CP	-	-	-
HC780/980CP	CR700/980CP	HCT980C	CR780Y980T-CP
HC900/1180CP	-	HCT1180G2	CR900Y1180T-CP
HC550/980QP	CR550/980QP	-	-
HC600/980QP	CR650/980QP	-	-
HC700/980MS	CR700/980MS	-	-
HC860/1100MS	CR860/1100MS	-	CR860Y1100T-MS
HC950/1180MS	CR950/1180MS	-	-
HC1030/1300MS	CR1030/1300MS	-	CR1030Y1300T-MS
HC380/690DP	-	-	-
HC820/1180DH	-	-	-

### 1.1.7.8 力学性能 (Mechanical Properties)

牌号 Steel grade	拉伸试验 <sup>a</sup>				n 不小于 min.
	屈服强度 <sup>b</sup> Yield Strength <sup>b</sup> MPa	抗拉强度 Tensile Strength R <sub>m</sub> , MPa, ≥	下列公称厚度的断后伸长率, A <sub>80mm</sub> %, 不小于 Elongation after fracture, %, min.		
			≤ 0.70mm	> 0.70mm	
HC250/450DP	250 ~ 320	450	25	27	0.16
HC290/490DP	290 ~ 390	490	22	24	0.15
HC340/590DP	340 ~ 440	590	19	21	0.14
HC380/690DP	380 ~ 500	690	16	18	0.13
HC420/780DP	420 ~ 550	780	13	15	-
HC500/780DP	500 ~ 650	780	8	10	-
HC550/980DP	550 ~ 760	980	8	10	-
HC700/980DP	700 ~ 850	980	6	8	-
HC820/1180DP	820 ~ 1150	1180	-	5	-
HC330/590DH	330 ~ 430	590	24	26	0.16
HC440/780DH	440 ~ 550	780	16	18	0.13
HC550/980DH	550 ~ 700	980	13	15	-
HC700/980DH	700 ~ 850	980	11	13	-
HC800/1180DH	850 ~ 1150	1180	9	11	-
HC380/590TR	380 ~ 480	590	24	26	0.20
HC400/690TR	400 ~ 520	690	22	24	0.19
HC420/780TR	420 ~ 570	780	19	21	0.16
HC570/780CP	570 ~ 720	780	9	11	-
HC660/780CP	660 ~ 820	780	6	8	-
HC780/980CP	780 ~ 950	980	5	7	-
HC900/1180CP	900 ~ 1100	1180	3	5	-
HC550/980QP	550 ~ 800	980	18 <sup>c</sup>	20 <sup>c</sup>	-
HC600/980QP	600 ~ 850	980	13 <sup>c</sup>	15 <sup>c</sup>	-
HC700/980MS	700 ~ 960	980	-	3	-
HC860/1100MS	860 ~ 1100	1100	-	3	-
HC950/1180MS	950 ~ 1200	1180	-	2	-
HC1030/1300MS	1030 ~ 1300	1300	-	2	-
HC380/690DP	380 ~ 500	690	16	18	0.13
HC820/1180DH	850 ~ 1150	1180	9	11	-

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm), 试样方向为纵向。也可采用 JIS Z 2241 中的 No.5 试样, 断后伸长率应不小于表中相应规定值的 110%, 试样方向为横向。通常情况下, 只提供其中一种试样的拉伸性能。

<sup>a</sup> No. P6 test piece (L<sub>0</sub>=80 mm, b<sub>0</sub>=20mm) specified in GB/T 228.1-2021 and taken in the longitudinal direction apply. No.5 test piece specified in JIS Z2241 may also be used, the elongation after fracture should be no less than 110% of the corresponding specified value in the table, and the sample direction should be transverse.

<sup>b</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用 R<sub>eL</sub>.

<sup>b</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the lower yield strength (R<sub>eL</sub>).

<sup>c</sup> 试样为 JIS Z 2241 中的 No.5 试样, 试样方向为横向。

<sup>c</sup> No.5 test piece specified in JIS Z2241 and taken in the transverse direction apply.

### 1.1.8 热冲压钢 Hot Stamping Steel (HS)

热冲压钢通过添加 Cr、B 等微合金元素提高钢板的淬透性, 通过将钢板加热到奥氏体化温度以上, 在模具内完成成形和淬火, 将材料强度提高到 1300MPa 以上, 有效提高零件的抗碰撞性能, 实现车身轻量化, 主要用于防止入侵的安全结构件。

The hardenability of hot stamping steel is improved by adding some micro-alloyed elements such as Cr and B. The steel sheets are heated above the austenitizing temperature, deformed, and quenched in the die, and then the tensile strength can be increased to above 1300MPa. With this kind of mechanical properties, the anti-collision performance of parts is effectively improved and the lightweight of car body is realized. The steel is mainly used as safety structural parts, especially for anti-intrusion components.

#### 1.1.8.1 力学性能 (Mechanical Properties)

交货态力学性能 (Mechanical properties in As-delivery Condition)

牌号 Steel grade	拉伸试验 <sup>a</sup> Tensile testing		
	屈服强度 <sup>b</sup> /MPa Yield Strength	抗拉强度 R <sub>m</sub> /MPa Tensile Strength	断后伸长率 A <sub>80mm</sub> / % ≥ Elongation after fracture
HR350/500HS	≥ 300	≥ 500	≥ 10
HR370/550HS			
HR780/980HS			
CR350/500HS	≥ 280	≥ 380	≥ 12
CR370/550HS			
CR780/980HS			
CR350/500HS+AS	280 ~ 500	380-600	≥ 16
CR370/550HS+AS	320 ~ 650	500-700	≥ 10
CR780/980HS+AS	300 ~ 650	500-900	≥ 10
HR950/1300HS	320 ~ 630	480 ~ 800	13
HR1000/1500HS			
CR950/1300HS	280 ~ 450	≥ 450	20
CR1000/1500HS			
CR950/1300HS+AS	350 ~ 500	500 ~ 700	10
CR1000/1500HS+AS			
HR1200/1800HS	350 ~ 600	500 ~ 700	10
CR1200/1800HS			
CR1200/1800HS+AS			
HR1200/2000HS	350 ~ 700	500 ~ 800	10
CR1200/2000HS			
CR1200/2000HS+AS			

热成形后力学性能 (Mechanical properties after Hot Stamping)

牌号 Steel grade	拉伸试验 <sup>a</sup> Tensile testing			硬度 <sup>c</sup> Hardness	
	屈服强度 <sup>b</sup> MPa Yield Strength	抗拉强度 Rm MPa Tensile Strength	断后伸长率 A <sub>50mm</sub> %, ≥ Elongation after fracture	HV10, ≥	HRC, ≥
HR350/500HS CR350/500HS CR350/500HS+AS	≥ 300	≥ 500	16	160	—
HR370/550HS CR370/550HS CR370/550HS+AS	≥ 370	≥ 550	16	175	—
HR780/980HS CR780/980HS CR780/980HS+AS	≥ 780	≥ 980	6	320	—
HR950/1300HS CR950/1300HS CR950/1300HS+AS	950 ~ 1250	1300 ~ 1700	5	400	40
HR1000/1500HS CR1000/1500HS CR1000/1500HS+AS	1000 ~ 1300	1500 ~ 1800	5	420	—
HR1200/1800HS CR1200/1800HS CR1200/1800HS+AS	≥ 1200	≥ 1800	4	520	—
HR1200/2000HS CR1200/2000HS CR1200/2000HS+AS	≥ 1250	≥ 1900	4	540	—



1.1.9 表面质量 (Surface Quality)

交货状态 Delivery condition	表面质量级别 Surface quality	代号 Symbol	特征 Characteristics
热轧轧制 Hot rolled	普通级表面 Normal	FA	表面允许有深度 (或高度) 不超过钢板及钢带厚度公差之半的麻点、凹面、划痕等轻微、局部的缺欠, 但应保证钢板及钢带允许的最小厚度。 Slight and partial defects such as pits, concaves and scratches with depth (or height) not exceeding the half of thickness tolerances, are permitted, but the thickness of the steel sheet and strip shall fall within the tolerances on thickness.
热轧酸洗 Hot rolled and pickled	较高级表面 Improved	FB	表面允许有不影响成形性的局部缺欠, 如轻微划伤、轻微压痕、轻微麻点、轻微辊印、酸洗黄斑及色差等缺欠存在。 Partial defects such as minor scratches, slight indentation, small pits, small marks and slight colouring, which do not effect formability, are permitted.
冷轧 Cold rolled	较高级表面 Improved	FB	表面允许有少量不影响成形性及涂、镀附着力的缺陷, 如轻微的划伤、压痕、麻点、辊印及氧化色等。 Imperfections such as slight indentation, small marks and pits, minor scratches and slight coloring which do not affect formability or the application of surface coatings, are permitted
	高级表面 Best	FC	产品两面中较好的一面无肉眼可见的明显缺陷, 另一面应至少达到 FB 的要求。 The better surface shall be free from apparent visible imperfections, while the other surface shall at least conform to surface quality FB.
热镀铝硅 Hot-dip aluminum-silicon alloy coating (AS)	较高级表面 Improved	FB	表面允许有缺欠, 例如小铝粒、压印、划伤、凹坑、色泽不均、黑点、条纹、轻微钝化斑、铝起伏等, 该表面通常进行平整 (光整) 处理。 Defects such as small aluminium particles, light indentation, minor scratches, pits, slight coloring, dark spots, stripe marks, slight passivation stains and aluminium flow ripple are permitted. This surface is often obtained by skin passing.
	高级表面 Best	FC	较好的一面允许有小缺欠, 例如光整压印、轻微划伤、细小铝花、铝起伏和轻微钝化斑。另一面至少为表面质量 FB。该表面通常进行平整 (光整) 处理。 Small defects such as skin pass marks, slight scratches, slight aluminium spangle, aluminium flow ripple and light passivation stains are permitted. The other surface shall at least have the characteristics of surface quality FB. This surface is often obtained by skin passing.



### 1.1.10 交货状态 (Delivery Conditions)

(1) 冷轧钢板及钢带以冷轧、退火及平整状态交货；热镀锌钢板及钢带以冷轧、退火、热浸镀及光整状态交货；热轧钢板及钢带以热轧或热轧酸洗状态交货。

(2) 冷轧、热镀锌和热轧酸洗钢板及钢带通常涂油供货，所涂油膜应能用碱水溶液去除。在通常的包装、运输、装卸及储存条件下，供方应保证自制造完成之日起 6 个月内（冷轧、热镀锌）或 3 个月内（热轧酸洗），钢板及钢带表面不生锈。如根据需方要求不涂油供货，则供方不承担产品因不涂油而发生的锈蚀及各种划伤等风险。

(1) The cold rolled products are normally supplied in cold rolled, annealed and skin-passed condition. The AS coated products are normally supplied in cold rolled, annealed, hot-dipped and skin-passed condition. And the hot rolled products are normally delivered with their surface as rolled or pickled.

(2) The cold rolled, AS coated, and pickled hot rolled products are normally delivered oiled. The layer of oil shall be capable of being removed by alkaline solutions. The manufacturer shall ensure that the products will show no corrosion for up to six months(Cold rolled and hot-dip AS)or three months(Hot rolled and pickled) from the date on which the products are made available at the manufacturer' s work under normal conditions of packaging, transportation, handling and storing.If the product is delivered in un-oiled as required by the purchaser, the manufacturer shall not bear the risk of corrosion and scratches caused by un-oiled.



### 1.1.11 尺寸允许偏差 (Tolerances on Dimensions)

#### 1.1.11.1 厚度允许偏差 (Tolerances on Thickness)

单位为毫米 Dimensions in millimeters

规定的最小屈服强度 Specified minimum yield strength Re MPa	公称厚度 Nominal thickness	下列公称宽度下的厚度允许偏差 <sup>a,b</sup> Tolerances on thickness for a nominal width <sup>a,b</sup>					
		普通精度 PT.A Normal tolerances			高级精度 PT.B Advanced tolerances		
		≤ 1200	> 1200 ~ 1500	> 1500	≤ 1200	> 1200 ~ 1500	> 1500
< 260	≤ 0.25	±0.02	±0.03	±0.03	±0.015	±0.020	±0.025
	> 0.25 ~ 0.40	±0.03	±0.04	±0.05	±0.020	±0.025	±0.030
	> 0.40 ~ 0.60	±0.03	±0.04	±0.05	±0.025	±0.030	±0.035
	> 0.60 ~ 0.80	±0.04	±0.05	±0.06	±0.030	±0.035	±0.040
	> 0.80 ~ 1.00	±0.05	±0.06	±0.07	±0.035	±0.040	±0.050
	> 1.00 ~ 1.20	±0.06	±0.07	±0.08	±0.040	±0.050	±0.060
	> 1.20 ~ 1.60	±0.08	±0.09	±0.10	±0.050	±0.060	±0.070
	> 1.60 ~ 2.00	±0.10	±0.11	±0.12	±0.060	±0.070	±0.080
	> 2.00 ~ 2.50	±0.12	±0.13	±0.14	±0.080	±0.090	±0.100
260 ~ < 340	≤ 0.25	±0.03	±0.04	±0.04	±0.020	±0.025	±0.030
	> 0.25 ~ 0.40	±0.04	±0.05	±0.06	±0.025	±0.030	±0.035
	> 0.40 ~ 0.60	±0.04	±0.05	±0.06	±0.030	±0.035	±0.040
	> 0.60 ~ 0.80	±0.05	±0.06	±0.07	±0.035	±0.040	±0.050
	> 0.80 ~ 1.00	±0.06	±0.07	±0.08	±0.040	±0.050	±0.060
	> 1.00 ~ 1.20	±0.07	±0.08	±0.10	±0.050	±0.060	±0.070
	> 1.20 ~ 1.60	±0.09	±0.11	±0.12	±0.060	±0.070	±0.080
	> 1.60 ~ 2.00	±0.12	±0.13	±0.14	±0.070	±0.080	±0.100
	> 2.00 ~ 2.50	±0.14	±0.15	±0.16	±0.100	±0.110	±0.120
340 ~ 420	≤ 0.25	±0.03	±0.04	±0.04	±0.025	±0.030	±0.035
	> 0.25 ~ 0.40	±0.04	±0.05	±0.06	±0.030	±0.035	±0.040
	> 0.40 ~ 0.60	±0.05	±0.06	±0.07	±0.035	±0.040	±0.050
	> 0.60 ~ 0.80	±0.06	±0.07	±0.08	±0.040	±0.050	±0.060
	> 0.80 ~ 1.00	±0.07	±0.08	±0.10	±0.050	±0.060	±0.070
	> 1.00 ~ 1.20	±0.09	±0.10	±0.11	±0.060	±0.070	±0.080
	> 1.20 ~ 1.60	±0.11	±0.12	±0.14	±0.070	±0.080	±0.100
	> 1.60 ~ 2.00	±0.14	±0.15	±0.17	±0.080	±0.100	±0.110
	> 2.00 ~ 2.50	±0.16	±0.18	±0.19	±0.110	±0.120	±0.130
> 420	≤ 0.25	±0.04	±0.05	±0.05	±0.030	±0.035	±0.040
	> 0.25 ~ 0.40	±0.05	±0.06	±0.07	±0.035	±0.040	±0.050
	> 0.40 ~ 0.60	±0.05	±0.07	±0.08	±0.040	±0.050	±0.060
	> 0.60 ~ 0.80	±0.06	±0.08	±0.10	±0.050	±0.060	±0.070
	> 0.80 ~ 1.00	±0.08	±0.10	±0.11	±0.060	±0.070	±0.080
	> 1.00 ~ 1.20	±0.10	±0.11	±0.13	±0.070	±0.080	±0.100
	> 1.20 ~ 1.60	±0.13	±0.14	±0.16	±0.080	±0.100	±0.110
	> 1.60 ~ 2.00	±0.16	±0.17	±0.19	±0.100	±0.110	±0.130
	> 2.00 ~ 2.50	±0.19	±0.20	±0.22	±0.130	±0.140	±0.160
> 2.50 ~ 3.00	±0.22	±0.23	±0.24	±0.160	±0.170	±0.180	

<sup>a</sup> 钢带两端各 10m 内的厚度允许偏差可比规定值超出 50%。

<sup>a</sup>The thickness tolerances within 10m at each end of the steel strip may be increased by a maximum of 50%.

<sup>b</sup> 纵切钢带的厚度允许偏差：应符合纵切前钢带的相关规定。

<sup>b</sup>The thickness tolerances of slit wide strip: it shall comply with the relevant regulations of the steel strip before the slit cut.

单位为毫米 Dimensions in millimeters

规定的最小屈服强度 Specified minimum yield strength Re MPa	公称厚度 Nominal thickness	厚度允许偏差 <sup>a,b</sup> Tolerances on thickness
		超高级精度 PT.C Super tolerances
< 270	0.50 ~ < 0.95	±0.02
	0.95 ~ < 1.40	±0.03
	1.40 ~ < 1.90	±0.04
	1.90 ~ < 2.50	±0.05
	2.50 ~ 3.00	±0.06
270 ~ 380	0.50 ~ < 0.95	±0.03
	0.95 ~ < 1.40	±0.04
	1.40 ~ < 2.50	±0.05
> 380	0.50 ~ < 0.60	±0.03
	0.60 ~ < 0.70	±0.04
	0.70 ~ < 1.10	±0.05
	1.10 ~ < 1.60	±0.06
	1.60 ~ < 2.30	±0.07
	2.30 ~ 3.00	±0.08

<sup>a</sup> 钢带两端各 10m 内的厚度允许偏差可比规定值超出 50%。

<sup>a</sup>The thickness tolerances within 10m at each end of the steel strip may be increased by a maximum of 50%.

<sup>b</sup> 纵切钢带的厚度允许偏差：应符合纵切前钢带的相关规定。

<sup>b</sup>The thickness tolerances of slit wide strip: it shall comply with the relevant regulations of the steel strip before the slit cut.

### 1.1.11.2 宽度允许偏差 (Tolerances on Width)

切边钢板和钢带的宽度允许偏差 (Tolerances on Width of Trimmed sheet and Strip)

单位为毫米 Dimensions in millimeters

公称宽度 Nominal width	宽度允许偏差 Tolerances on width	
	普通精度 PW.A Normal tolerances	高级精度 PW.B Advanced tolerances
≤ 1200	0/+4	0/+2
> 1200 ~ 1500	0/+5	0/+2
> 1500	0/+6	0/+3

纵切钢带的宽度允许偏差 (Tolerances on Width of Slit Wide Strip)

单位为毫米 Dimensions in millimeters

	公称厚度 Nominal thickness	下列公称宽度下的宽度允许偏差 Tolerances on width for a nominal width				
		120 ~ < 125	125 ~ < 250	250 ~ < 400	400 ~ < 600	600 ~ 900
普通精度 PW.A Normal tolerances	< 0.60	0/+0.4	0/+0.5	0/+0.7	0/+1.0	0/+1.5
	0.60 ~ < 1.00	0/+0.5	0/+0.6	0/+0.9	0/+1.2	0/+1.5
	1.00 ~ < 2.00	0/+0.6	0/+0.8	0/+1.1	0/+1.4	0/+2.0
高级精度 PW.B Advanced tolerances	≥ 2.00	0/+0.7	0/+1.0	0/+1.3	0/+1.6	0/+2.0
	< 0.60	0/+0.2	0/+0.2	0/+0.3	0/+0.5	0/+0.6
	0.60 ~ < 1.00	0/+0.2	0/+0.3	0/+0.4	0/+0.6	0/+0.7
	1.00 ~ < 2.00	0/+0.3	0/+0.4	0/+0.5	0/+0.7	0/+0.8
	≥ 2.00	0/+0.4	0/+0.5	0/+0.6	0/+0.8	0/+0.9

### 1.1.11.3 长度允许偏差 (Tolerances on length)

公称长度 Nominal length	长度允许偏差 Tolerances on length	
	普通精度 PL.A Normal tolerances	高级精度 PL.B Advanced tolerances
≤ 2000	0/+6	0/+3
> 2000	0/+0.3% × 公称长度 0/+0.3% of the nominal length	0/+0.15% × 公称长度 0/+0.15% of the nominal length

### 1.1.11.4 不平度 (Tolerances on flatness)

规定的最小屈服强度 Specified minimum yield strength Re MPa	公称宽度 Nominal width mm	下列厚度下的不平度 mm 不大于 Tolerances on flatness for a nominal thickness/mm/max.					
		普通精度 PF.A Normal tolerances			高级精度 PF.B Advanced tolerances		
		< 0.7	0.7 ~ < 1.2	≥ 1.2	< 0.7	0.7 ~ < 1.2	≥ 1.2
< 260	≤ 600	7	6	5	4	3	2
	> 600 ~ 1200	10	8	7	5	4	3
	> 1200 ~ 1500	12	10	8	6	5	4
	> 1500	17	15	13	8	7	6
260 ~ < 340	≤ 600	供需双方协商。Negotiation between supply and demand.					
	> 600 ~ 1200	13	10	8	8	6	5
	> 1200 ~ 1500	15	13	11	9	8	6
	> 1500	20	19	17	12	10	9
≥ 340	780 ~ 2080	供需双方协商。Negotiation between supply and demand.					

### 1.1.11.5 镰刀弯 (Tolerances on edge camber)

产品状态 Product	公称长度 Nominal length	镰刀弯 不大于 Tolerances on camber /max.		测量长度 Measuring length
		普通精度 PS.A Normal tolerances	高级精度 PS.B Advanced tolerances	
钢带 Wide strip	-	5	2	2000
纵切钢带 Slit wide strip	-	2	-	2000
钢板 sheet	≤ 2000	0.25% × 实际长度 0.25% of the actual length	2	实际长度 Actual length
	> 2000	5	2	2000

## 1.2 汽车用热镀锌板及钢带 (Hot Dip Galvanized Steel Sheets and Strips for Automobile)

首钢生产的热镀锌板，镀层附着力强，耐腐蚀能力强，厚度控制准确，尺寸精度高，板形平直，有良好的力学性能，加工性和焊接性。可用于制作汽车内外板以及结构件和加强件。

Hot dip galvanized sheets of Shougang are featured with strong coating adhesiveness, high erosion-resistance, accurately controlled zinc coating thickness, high size precision, flat profile and good mechanical, processing and welding performance. They can be used for making inner, outer, structural parts and reinforcements of automobile.

### 1.2.1 用途及特点 (Applications and Characteristics)

牌号 Steel Grade	用途 Application	特点 Feature
DC51D (+Z, +ZF, +ZM)	一般用 Commercial purpose	低碳钢 Low carbon steel
DC52D (+Z, +ZF, +ZM)	冲压用 Drawing	
DC53D (+Z, +ZF, +ZM)	深冲用 Deep drawing	
DC54D (+Z, +ZF, +ZM)	特深冲用 Extra-deep drawing Ex- tra-deep drawing	超低碳钢 Ultra-low carbon steel
DC56D (+Z, +ZF, +ZM)	超深冲用 Supreme extra-deep drawing	
DC57D (+Z, +ZF, +ZM)		
S220GD (+Z, +ZF, +ZM), S250GD (+Z, +ZF, +ZM), S280GD (+Z, +ZF, +ZM), S320GD (+Z, +ZF, +ZM), S350GD (+Z, +ZF, +ZM), S400GD (+Z, +ZF, +ZM), S500GD (+Z, +ZF, +ZM), S550GD (+Z, +ZF, +ZM)	结构用 Structural parts	碳素钢或低合金钢 Carbon steel or low-alloy steel
H220PD (+Z, +ZF, +ZM), H260PD (+Z, +ZF, +ZM)	冷成形用 Cold forming	加磷高强度钢 High Strength Rephosphorized Steel
HC260LAD (+Z, +ZF, +ZM), HC300LAD (+Z, +ZF, +ZM), HC340LAD (+Z, +ZF, +ZM), HC380LAD (+Z, +ZF, +ZM), HC420LAD (+Z, +ZF, +ZM), H420/590LAD (+Z, +ZF, +ZM), HC460LAD (+Z, +ZF, +ZM), HC500LAD (+Z, +ZF, +ZM), HC550LAD (+Z, +ZF, +ZM)		低合金高强度钢 High-strength low-alloy steel
HC160YD (+Z, +ZF, +ZM), HC180YD (+Z, +ZF, +ZM), HC220YD (+Z, +ZF, +ZM), HC260YD (+Z, +ZF, +ZM), HC300YD (+Z, +ZF, +ZM)		超低碳高强度钢 High-strength ultra-low carbon steel
H180BD (+Z, +ZF, +ZM), H220BD (+Z, +ZF, +ZM), H260BD (+Z, +ZF, +ZM), H300BD (+Z, +ZF, +ZM), H340BD (+Z, +ZF, +ZM)		烘烤硬化高强度钢 High-strength bake hardening steel
HC250/450DPD (+Z, +ZF, +ZM), HC300/500DPD (+Z, +ZF, +ZM), HC340/590DPD (+Z, +ZF, +ZM), HC420/780DPD (+Z, +ZF, +ZM), HC500/780DPD (+Z, +ZF, +ZM), HC550/980DPD (+Z, +ZF, +ZM), HC700/980DPD (+Z, +ZF, +ZM)		双相高强度钢 High-strength dual Phase steel
HC330/590DHD (+Z, +ZM), HC440/780DHD (+Z, +ZM), HC550/980DHD (+Z, +ZM), HC700/980DHD (+Z, +ZM)		增强成形性双相钢 Dual phase steel with improved formability
HC380/590TRD (+Z, +ZF, +ZM), HC400/690TRD (+Z, +ZF, +ZM), HC420/780TRD (+Z, +ZF, +ZM)		相变诱导塑性钢 transformation induced plasticity steel
HC570/780CPD (+Z, +ZF, +ZM), HC780/980CPD (+Z, +ZF, +ZM), HC900/1180CPD (+Z, +ZF, +ZM)		复相钢 Complex phase steel
HC550/980QPD (+Z, +ZF, +ZM), HC600/980QPD (+Z, +ZF, +ZM)		淬火配分钢 Quenching and partitioning

### 1.2.2 相近牌号对照表 (Reference list of similar steel grades)

Q/SGZGS 0329-2020	GB/T 2518-2019	EN 10346:2015	DIN 17162:1-1977	DIN 17162:2-1987	JIS G3302:2022	ASTM A653M-22
DC51D+Z(ZF)	DX51D+Z(ZF)	DX51D+Z(ZF)	St01Z/St02Z	-	SGCC	CS Type C
DC52D+Z(ZF)	DX52D+Z(ZF)	DX52D+Z(ZF)	St03Z	-	SGCD1	CS Type A/B
DC53D+Z(ZF)	DX53D+Z(ZF)	DX53D+Z(ZF)	St04Z/St05Z	-	SGCD2	FS Type A/B
DC54D+Z(ZF)	DX54D+Z(ZF)	DX54D+Z(ZF)	-	-	SGCD3	DDS Type C
DC56D+Z(ZF)	DX56D+Z(ZF)	DX56D+Z(ZF)	St06Z	-	SGCD4	DDS Type A
DC57D+Z(ZF)	DX57D+Z(ZF)	DX57D+Z(ZF)	St07Z	-	-	EDDS
S220GD+Z(ZF)	S220GD+Z(ZF)	S220GD+Z(ZF)	-	-	-	SS 230
S250GD+Z(ZF)	S250GD+Z(ZF)	S250GD+Z(ZF)	-	StE250Z	SGC340	SS 255
S280GD+Z(ZF)	S280GD+Z(ZF)	S280GD+Z(ZF)	-	StE280Z	SGC400	SS 275
S320GD+Z(ZF)	S320GD+Z(ZF)	S320GD+Z(ZF)	-	StE320Z	-	-
S350GD+Z(ZF)	S350GD+Z(ZF)	S350GD+Z(ZF)	-	StE350Z	SGC440	SS 340 class 4
S400GD+Z(ZF)	-	-	-	-	SGC490	-
S500GD+Z(ZF)	-	-	-	-	-	-
S550GD+Z(ZF)	S550GD+Z(ZF)	S550GD+Z(ZF)	-	-	SGC570	SS 550 class 1

Q/SGZGS 0329-2020	GB/T 2518-2019	EN 10346:2015	ASTM A653M-22	EN 10292:2007
HC160YD+Z(ZF)	-	HX160YD+Z(ZF)	-	-
HC180YD+Z(ZF)	HX180YD+Z(ZF)	HX180YD+Z(ZF)	SHS 180	-
HC220YD+Z(ZF)	HX220YD+Z(ZF)	HX220YD+Z(ZF)	SHS 210	-
HC240P1D+Z(ZF)	-	-	SHS 240	-
HC260YD+Z(ZF)	HX260YD+Z(ZF)	HX260YD+Z(ZF)	-	-
HC260LYD+Z(ZF)	-	-	-	-
HC300YD+Z(ZF)	-	HX300YD+Z(ZF)	SHS 300	-
HC220PD+Z(ZF)	-	-	-	HX220PD+Z(ZF)
HC260PD+Z(ZF)	-	-	-	HX260PD+Z(ZF)
HC180BD+Z(ZF)	HX180BD+Z(ZF)	HX180BD+Z(ZF)	BHS 180	-
HC220BD+Z(ZF)	HX220BD+Z(ZF)	HX220BD+Z(ZF)	BHS 210	-
HC260BD+Z(ZF)	HX260BD+Z(ZF)	HX260BD+Z(ZF)	-	-
HC300BD+Z(ZF)	HX300BD+Z(ZF)	HX300BD+Z(ZF)	BHS 300	-
HC340BD+Z(ZF)	-	HX340BD+Z(ZF)	-	-
HC260LAD+Z(ZF)	HX260LAD+Z(ZF)	HX260LAD+Z(ZF)	HSLAS-F275	-
HC300LAD+Z(ZF)	HX300LAD+Z(ZF)	HX300LAD+Z(ZF)	-	-
HC340LAD+Z(ZF)	HX340LAD+Z(ZF)	HX340LAD+Z(ZF)	HSLAS-F340	-
HC380LAD+Z(ZF)	HX380LAD+Z(ZF)	HX380LAD+Z(ZF)	HSLAS-F380 Class 2	-
HC420LAD+Z(ZF)	HX420LAD+Z(ZF)	HX420LAD+Z(ZF)	HSLAS-F410	-
H420/590LAD+Z(ZF)	-	-	-	-
HC460LAD+Z(ZF)	HX460LAD+Z(ZF)	HX460LAD+Z(ZF)	-	-
HC500LAD+Z(ZF)	HX500LAD+Z(ZF)	HX500LAD+Z(ZF)	HSLAS-F480	-
HC550LAD+Z(ZF)	-	-	HSLAS-F550	-



Q/SGZGS 0329-2020	GB/T 2518-2019	EN 10346:2015	VDA 239-100:2016	SAE J2745-2015
HC250/450DPD+Z(ZF)	HC260/450DPD+Z(ZF)	HCT450X	-	DP 440T/250Y
HC300/500DPD+Z(ZF)	HC290/490DPD+Z(ZF)	HCT490X	CR290Y490T-DP	DP 490T/290Y
HC340/590DPD+Z(ZF)	HC330/590DPD+Z(ZF)	HCT590X	CR330Y590T-DP	DP 590T/340Y
HC420/780DPD+Z(ZF)	HC440/780DPD+Z(ZF)	HCT780X	CR440Y780T-DP	DP 780T/420Y
HC500/780DPD+Z(ZF)	HC500/780DPD+Z(ZF)	-	-	-
HC550/980DPD+Z(ZF)	HC590/980DPD+Z(ZF)	HCT980X	CR590Y980T-DP	DP 980T/550Y
HC700/980DPD+Z(ZF)	HC700/980DPD+Z(ZF)	HCT980XG	CR700Y980T-DP	-
HC820/1180DHD+Z	-	-	-	-
HC820/1180DPD+Z(ZF)	HC820/1180DPD+Z(ZF)	-	-	-
HC330/590DHD+Z(ZF)	HC330/590DHD+Z(ZF)	-	-	-
HC440/780DHD+Z(ZF)	HC440/780DHD+Z(ZF)	-	CR440Y780T-DH	-
HC550/980DHD+Z(ZF)	HC550/980DHD+Z(ZF)	-	-	-
HC700/980DHD+Z(ZF)	HC700/980DHD+Z(ZF)	-	CR700Y980T-DH	-
HC380/590TRD+Z(ZF)	HC380/590TRD+Z(ZF)	-	-	TRIP 590T/380Y
HC400/690TRD+Z(ZF)	HC400/690TRD+Z(ZF)	HCT690T	CR400Y690T-TR	TRIP 690T/400Y
HC420/780TRD+Z(ZF)	HC450/780TRD+Z(ZF)	HCT780T	CR450Y780T-TR	TRIP 780T/420Y
HC570/780CPD+Z	HC570/780CPD+Z(ZF)	HCT780C	CR570Y780T-CP	-
HC660/780CPD+Z	-	-	-	-
HC780/980CPD+Z	HC780/980CPD+Z(ZF)	HCT980C	CR780Y980T-CP	-
HC900/1180CPD+Z	-	-	CR900Y1180T-CP	-
HC600/980QPD+Z	-	-	-	-
HC550/980QPD+Z	-	-	-	-
HC590/980Tbfd+Z	-	-	-	-
HC700/980Tbfd+Z	-	-	-	-
HC850/1180Tbfd+Z	-	-	-	-
HC780/980CHD+Z	-	-	-	-
HC900/1180CHD+Z	-	-	-	-

Q/SGZGS 0329-2020	EN 10346:2015	VDA 239-100:2016
DC51D+ZM	DX51D+ZM	-
DC52D+ZM	DX52D+ZM	CR1
DC53D+ZM	DX53D+ZM	CR2
DC54D+ZM	DX54D+ZM	CR3
DC56D+ZM	DX56D+ZM	CR5
DC57D+ZM	DX57D+ZM	-
S220GD+ZM	S220GD+ZM	-
S250GD+ZM	S250GD+ZM	-
S280GD+ZM	S280GD+ZM	-
S320GD+ZM	S320GD+ZM	-
S350GD+ZM	S350GD+ZM	-
S400GD+ZM	-	-

Q/SGZGS 0329-2020	EN 10346:2015	VDA 239-100:2016
S500GD+ZM	-	-
S550GD+ZM	S550GD+ZM	-
HC160YD+ZM	HX160YD+ZM	CR160IF
HC180YD+ZM	HX180YD+ZM	CR180IF
HC220YD+ZM	HX220YD+ZM	CR210IF
HC240P1D+ZM	-	-
HC260YD+ZM	HX260YD+ZM	CR240IF
HC260LYD+ZM	-	-
HC300YD+ZM	HX300YD+ZM	-
HC220PD+ZM	-	-
HC260PD+ZM	-	-
HC180BD+ZM	HX180BD+ZM	CR180BH
HC220BD+ZM	HX220BD+ZM	CR210BH
HC260BD+ZM	HX260BD+ZM	CR240BH CR270BH
HC300BD+ZM	HX300BD+ZM	-
HC340BD+ZM	HX340BD+ZM	-
HC260LAD+ZM	HX260LAD+ZM	CR270LA
HC300LAD+ZM	HX300LAD+ZM	CR300LA
HC340LAD+ZM	HX340LAD+ZM	CR340LA
HC380LAD+ZM	HX380LAD+ZM	CR380LA
HC420LAD+ZM	HX420LAD+ZM	CR420LA
H420/590LAD+ZM	-	-
HC460LAD+ZM	HX460LAD+ZM	CR460LA
HC500LAD+ZM	HX500LAD+ZM	-
HC550LAD+ZM	-	-
HC250/450DPD+ZM	HCT450X+ZM	-
HC300/500DPD+ZM	HCT490X+ZM	CR290Y490T-DP
HC340/590DPD+ZM	HCT590X+ZM	CR330Y590T-DP
HC420/780DPD+ZM	HCT780X+ZM	CR440Y780T-DP
HC500/780DPD+ZM	-	-
HC550/980DPD+ZM	HCT980X+ZM	CR590Y980T-DP
HC700/980DPD+ZM	HCT980XG+ZM	CR700Y980T-DP
HC820/1180DPD+ZM	-	-

Q/SGZGS 0329-2020	GB/T 2518-2019	EN 10346:2015	VDA 239-100:2016	SAE J2745-2015
HC590/980Tbfd+Z	-	-	-	-
HC700/980Tbfd+Z	-	-	-	-
HC850/1180Tbfd+Z	-	-	-	-
HC780/980CHD+Z	-	-	-	-
HC900/1180CHD+Z	-	-	-	-
HC820/1180DHD+Z	-	-	-	-

1.2.3 力学性能 (Mechanical Properties)

牌号 Designation		屈服强度 <sup>a,b</sup> Yield strength MPa	抗拉强度 <sup>a</sup> Tensile strength R <sub>m</sub> , MPa	下列公称厚度 (mm) 的断后伸长率 Elongation <sup>a</sup> , A <sub>80mm</sub> , %, ≥				r <sub>90</sub> 值 a ≥	n <sub>90</sub> 值 a ≥
钢种 Steel grade	镀层种类 Types of coatings			≤ 0.35	> 0.35 ~ 0.50	> 0.50 ~ 0.70	> 0.70		
DC51D <sup>f</sup>	+Z, +ZF, +ZM	-	270 ~ 500	15	18	20	22	-	-
DC52D <sup>f</sup>	+Z, +ZF, +ZM	140 ~ 300 <sup>c</sup>	270 ~ 420	19	22	24	26	-	-
DC53D <sup>g</sup>	+Z, +ZF, +ZM	140 ~ 260	270 ~ 380	23	26	28	30	-	-
DC54D <sup>g</sup>	+Z	120 ~ 220	260 ~ 350	29	32	34	36	1.6 <sup>d</sup>	0.18
	+ZM, +ZF			27	30	32	34	1.4 <sup>d</sup>	
DC56D <sup>g</sup>	+Z	120 ~ 180	260 ~ 350	32	35	37	39	1.9 <sup>d</sup>	0.21
	+ZM, +ZF			30	33	35	37	1.7 <sup>d,e</sup>	0.20 <sup>e</sup>
DC57D <sup>g</sup>	+Z	120 ~ 170	260 ~ 350	34	37	39	41	2.1 <sup>d</sup>	0.22
	+ZM, +ZF			32	35	37	39	1.9 <sup>d,e</sup>	0.21 <sup>e</sup>

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub>=80mm, b<sub>0</sub> = 20mm), 试样方向为纵向。  
<sup>a</sup> No. P6 test piece (L<sub>0</sub>=80 mm, b<sub>0</sub>=20mm) specified in GB/T 228.1-2021 and taken in the longitudinal direction apply.  
<sup>b</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用下屈服强度 R<sub>eL</sub>。  
<sup>b</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the lower yield strength (R<sub>eL</sub>).  
<sup>c</sup> 表面质量为 FB 时, DC52D 的屈服上限为 360MPa。  
<sup>c</sup> When the surface grade is FB, the yield strength upper limit of DC52D is 360MPa.  
<sup>d</sup> 当产品公称厚度大于 1.5mm 时, r<sub>90</sub> 最小值可比表中规定值减小 0.2。当产品公称厚度大于 2.5mm 时, r<sub>90</sub> 的规定不再适用。  
<sup>d</sup> When the nominal thickness of the product is greater than 1.5mm, the r<sub>90</sub> minimum value may be reduced by 0.2 compared to the specified value in the table. When the products with nominal thickness greater than 2.5mm, the value of r<sub>90</sub> is not required.  
<sup>e</sup> 当产品公称厚度大于 0.50mm 且小于等于 0.70mm 时, r<sub>90</sub> 最小值可比表中规定值减小 0.2, n<sub>90</sub> 最小值可比表中规定值减小 0.01; 当产品公称厚度大于 0.35mm 且小于等于 0.50mm 时, r<sub>90</sub> 最小值可比表中规定值减小 0.4, n<sub>90</sub> 最小值可比表中规定值减小 0.03; 当产品公称厚度小于等于 0.35mm 时, r<sub>90</sub> 最小值可比表中规定值减小 0.6, n<sub>90</sub> 最小值可比表中规定值减小 0.04。  
<sup>e</sup> For 0.50mm < nominal thickness ≤ 0.70mm, the minimum r<sub>90</sub>-value reduced by 0.2 and the minimum n<sub>90</sub>-value reduced by 0.01 apply. For 0.35mm < nominal thickness ≤ 0.50mm, the minimum r<sub>90</sub>-value reduced by 0.4 and the minimum n<sub>90</sub>-value reduced by 0.03 apply. For nominal thickness ≤ 0.35mm, the minimum r<sub>90</sub>-value reduced by 0.6 and the minimum n<sub>90</sub>-value reduced by 0.04 apply.  
<sup>f</sup> 力学性能有效期为制造完成后 1 个月内。  
<sup>f</sup> Mechanical properties just for products within 1 months from manufactured.  
<sup>g</sup> 力学性能有效期为制造完成后 6 个月内。  
<sup>g</sup> Mechanical properties just for products within 6 months from manufactured.

牌号 Designation		屈服强度 <sup>a,b</sup> Yield strength MPa, ≥	抗拉强度 <sup>a,c</sup> Tensile strength R <sub>m</sub> , MPa, ≥	下列公称厚度 (mm) 的断后伸长率 <sup>a</sup> , A <sub>80mm</sub> , %, ≥			
钢种 Steel grade	镀层种类 Types of coatings			≤ 0.35	> 0.35 ~ 0.50	> 0.50 ~ 0.70	> 0.70
S220GD	+Z, +ZF, +ZM	220	300	13	16	18	20
S250GD	+Z, +ZF, +ZM	250	330	12	15	17	19
S280GD	+Z, +ZF, +ZM	280	360	11	14	16	18
S320GD	+Z, +ZF, +ZM	320	390	10	13	15	17
S350GD	+Z, +ZF, +ZM	350	420	9	12	14	16
S400GD	+Z, +ZF, +ZM	400	470	8	11	13	15
S500GD	+Z, +ZF, +ZM	500	530	-	-	-	-
S550GD <sup>d</sup>	+Z, +ZF, +ZM	550	550	-	-	-	-

表中力学性能有效期为制造完成后 1 个月内。  
 The mechanical properties are valid for 1 month after the products are manufactured.

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub>=80mm, b<sub>0</sub> = 20mm), 试样方向为纵向。  
<sup>a</sup> No. P6 test piece (L<sub>0</sub>=80 mm, b<sub>0</sub>=20mm) specified in GB/T 228.1-2021 and taken in the longitudinal direction apply.  
<sup>b</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用上屈服强度 R<sub>eH</sub>。  
<sup>b</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the upper yield strength (R<sub>eH</sub>).  
<sup>c</sup> 除 S550GD+Z, S550GD+ZF, S550GD+ZM 外, 其他牌号的抗拉强度可要求 140MPa 的范围值。  
<sup>c</sup> For all grades except S550GD+Z, S550GD+ZF, S550GD+ZM, a range of 140MPa can be expected for tensile strength.  
<sup>d</sup> 对于牌号为 S550GD+Z 的产品, 当产品的厚度不大于 0.70mm 时, 由于厚度减薄效应, 导致伸长率过低, 无法测到屈服强度。此时, 屈服强度用抗拉强度代替。  
<sup>d</sup> For S550GD+Z, when the nominal thickness is no more than 0.70mm, the elongation is too low due to the thickness thinning effect, and the yield strength cannot be measured. In this case, the yield strength is replaced by tensile strength.

牌号 Designation		屈服强度 <sup>a,c</sup> Yield strength MPa	抗拉强度 <sup>a</sup> Tensile strength R <sub>m</sub> , MPa	下列公称厚度 (mm) 的断后伸长率 <sup>a,d</sup> , A <sub>80mm</sub> , %, ≥ Elongation after fracture, A <sub>80mm</sub> , %, ≥				BH <sub>2</sub> <sup>a</sup> MPa, ≥	r <sub>90</sub> <sup>a,e,f</sup> ≥	n <sub>90</sub> <sup>a,f</sup> ≥
钢种 Steel grade	镀层种类 Types of coatings			≤ 0.35	> 0.35 ~ 0.50	> 0.50 ~ 0.70	> 0.70			
HC160YD <sup>h</sup>	+Z, +ZF, +ZM	160 ~ 220	300 ~ 360	30	33	35	37	-	1.9	0.20
HC180YD <sup>h</sup>	+Z, +ZF, +ZM	180 ~ 240	330 ~ 390	27	30	32	34	-	1.7	0.18
HC220YD <sup>h</sup>	+Z, +ZF, +ZM	220 ~ 280	340 ~ 420	25	28	30	32	-	1.5	0.17
HC260YD <sup>h</sup>	+Z, +ZF, +ZM	260 ~ 320	380 ~ 440	23	26	28	30	-	1.4	0.16
HC300YD <sup>h</sup>	+Z, +ZF, +ZM	300 ~ 360	390 ~ 470	20	23	25	27	-	1.3	0.15
HC240P1D <sup>h</sup>	+Z, +ZF, +ZM	240 ~ 360	≥ 440	28 <sup>b</sup>				-	1.1 <sup>g</sup>	-
HC260LYD <sup>h</sup>	+Z, +ZF, +ZM	260 ~ 390	≥ 440	27 <sup>b</sup>				-	-	-
HC220PD <sup>h</sup>	+Z, +ZF, +ZM	220 ~ 280	340 ~ 400	25	28	30	32	-	1.3	0.15
HC260PD <sup>h</sup>	+Z, +ZF, +ZM	260 ~ 320	380 ~ 440	21	24	26	28	-	-	-
HC180BD <sup>i</sup>	+Z, +ZF, +ZM	180 ~ 240	290 ~ 360	27	30	32	34	30	1.5	0.16
HC220BD <sup>i</sup>	+Z, +ZF, +ZM	220 ~ 280	320 ~ 400	25	28	30	32	30	1.2	0.15
HC260BD <sup>i</sup>	+Z, +ZF, +ZM	260 ~ 320	360 ~ 440	21	24	26	28	30	-	-
HC300BD <sup>i</sup>	+Z, +ZF, +ZM	300 ~ 360	400 ~ 480	19	22	24	26	30	-	-
HC340BD <sup>i</sup>	+Z, +ZF, +ZM	340 ~ 400	440 ~ 520	17	20	22	24	30	-	-
HC260LAD <sup>h</sup>	+Z, +ZF, +ZM	260 ~ 330	350 ~ 430	19	22	24	26	-	-	-
HC300LAD <sup>h</sup>	+Z, +ZF, +ZM	300 ~ 380	380 ~ 480	16	19	21	23	-	-	-
HC340LAD <sup>h</sup>	+Z, +ZF, +ZM	340 ~ 420	410 ~ 510	14	17	19	21	-	-	-
HC380LAD <sup>h</sup>	+Z, +ZF, +ZM	380 ~ 480	440 ~ 560	12	15	17	19	-	-	-
HC420LAD <sup>h</sup>	+Z, +ZF, +ZM	420 ~ 520	470 ~ 590	10	13	15	17	-	-	-
H420/590LAD <sup>h</sup>	+Z, +ZF, +ZM	420 ~ 560	≥ 590	16 <sup>b</sup>				-	-	-
HC460LAD <sup>h</sup>	+Z, +ZF, +ZM	460 ~ 560	500 ~ 640	8	11	13	15	-	-	-
HC500LAD <sup>h</sup>	+Z, +ZF, +ZM	500 ~ 620	530 ~ 690	6	9	11	13	-	-	-
HC550LAD <sup>h</sup>	+Z, +ZF, +ZM	550 ~ 650	≥ 610	6	9	11	13	-	-	-

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub>=80mm, b<sub>0</sub> = 20mm), 试样方向为纵向。  
<sup>a</sup> No. P6 test piece (L<sub>0</sub>=80 mm, b<sub>0</sub>=20mm) specified in GB/T 228.1-2021 and taken in the transverse direction apply.  
<sup>b</sup> 试样为 JIS Z 2241 中的 No.5 试样, 试样方向为纵向。  
<sup>b</sup> No.5 test piece specified in JIS Z2241 and taken in the transverse direction apply.  
<sup>c</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用下屈服强度 R<sub>eL</sub>。  
<sup>c</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the lower yield strength (R<sub>eL</sub>).  
<sup>d</sup> 当镀层种类为 ZF 和 ZM 时, 断后伸长率最小值可比表中规定值减小两个单位。  
<sup>d</sup> When coating types is ZF and ZM, the minimum value of elongation reduced by 2 applies.  
<sup>e</sup> 当镀层种类为 ZF 和 ZM 或产品公称厚度大于 1.5mm 且小于 2.0mm 时, r<sub>90</sub> 最小值可比表中规定值减小 0.2; 当产品公称厚度大于等于 2.0mm 时, r<sub>90</sub> 最小值可比表中规定值减小 0.4; 当产品公称厚度大于 2.5mm 时, r<sub>90</sub> 的规定不再适用。  
<sup>e</sup> When the coating type is ZF and ZM or the nominal thickness is greater than 1.5mm and less than 2.0mm, the minimum r<sub>90</sub>-value reduced by 0.2 applies. When the nominal thickness is greater than or equal to 2.0mm, the minimum r<sub>90</sub>-value reduced by 0.4 applies. r<sub>90</sub> no longer applies when the nominal thickness is greater than 2.5mm.  
<sup>f</sup> 当产品公称厚度大于 0.50mm 且小于等于 0.70mm 时, r<sub>90</sub> 最小值可比表中规定值减小 0.2, n<sub>90</sub> 最小值可比表中规定值减小 0.01; 当产品公称厚度大于 0.35mm 且小于等于 0.50mm 时, r<sub>90</sub> 最小值可比表中规定值减小 0.4, n<sub>90</sub> 最小值可比表中规定值减小 0.03; 当产品公称厚度小于等于 0.35mm 时, r<sub>90</sub> 最小值可比表中规定值减小 0.6, n<sub>90</sub> 最小值可比表中规定值减小 0.04。  
<sup>f</sup> For 0.50mm < nominal thickness ≤ 0.70mm, the minimum r<sub>90</sub>-value reduced by 0.2 and the minimum n<sub>90</sub>-value reduced by 0.01 apply. For 0.35mm < nominal thickness ≤ 0.50mm, the minimum r<sub>90</sub>-value reduced by 0.4 and the minimum n<sub>90</sub>-value reduced by 0.03 apply. For nominal thickness ≤ 0.35mm, the minimum r<sub>90</sub>-value reduced by 0.6 and the minimum n<sub>90</sub>-value reduced by 0.04 apply.  
<sup>g</sup> 该要求值为 (r<sub>90</sub>+2r<sub>45</sub>+r<sub>0</sub>)/4。当产品公称厚度大于 1.5mm 时, 最小值可比该值减小 0.2。  
<sup>g</sup> = (r<sub>90</sub>+2r<sub>45</sub>+r<sub>0</sub>)/4, For nominal thickness is greater than 1.5mm, the minimum -value reduced by 0.2 applies.  
<sup>h</sup> 力学性能有效期为制造完成后 6 个月内。  
<sup>h</sup> Mechanical properties just for products within 6 months from manufactured.  
<sup>i</sup> 力学性能有效期为制造完成后 3 个月内。  
<sup>i</sup> Mechanical properties just for products within 3 months from manufactured.

牌号 Designation		屈服强度 <sup>a,b</sup> Yield strength MPa	抗拉强度 <sup>a</sup> Tensile strength R <sub>m</sub> , MPa, ≥	下列公称厚度 (mm) 的断后伸长率 <sup>a,c</sup> , A <sub>80mm</sub> , %, ≥ Elongation after fracture, A <sub>80mm</sub> , %, ≥			n 值 <sup>a</sup> ≥
钢种 Steel grade	镀层种类 Types of coatings			≤ 0.50	> 0.50 ~ 0.70	> 0.70	
HC250/450DPD	+Z, +ZF, +ZM	250 ~ 340	450	23	25	27	0.16
HC300/500DPD	+Z, +ZF, +ZM	290 ~ 370	500	20	22	24	0.15
HC340/590DPD	+Z, +ZF, +ZM	340 ~ 440	590	16	18	20	0.14
HC420/780DPD	+Z, +ZF, +ZM	420 ~ 550	780	10	12	14	-
HC500/780DPD	+Z, +ZF, +ZM	500 ~ 650	780	6	8	10	-
HC550/980DPD	+Z, +ZF, +ZM	550 ~ 760	980	4	6	8	-
HC700/980DPD	+Z, +ZF, +ZM	700 ~ 850	980	4	6	8	-
HC820/1180DPD	+Z, +ZF, +ZM	820 ~ 1150	1180	2	4	6	-
HC330/590DHD	+Z, +ZF	330 ~ 430	590	22	24	26	0.16
HC440/780DHD	+Z, +ZF	440 ~ 550	780	14	16	18	0.13
HC550/980DHD	+Z, +ZF	550 ~ 700	980	11	13	15	-
HC700/980DHD	+Z, +ZF	700 ~ 850	980	9	11	13	-
HC820/1180DHD	+Z	820 ~ 1150	1180	7	9	11	-
HC380/590TRD	+Z, +ZF	380 ~ 480	590	22	24	26	0.20
HC400/690TRD	+Z, +ZF	400 ~ 510	690	20	22	24	0.19
HC420/780TRD	+Z, +ZF	420 ~ 560	780	18	20	22	0.18
H590/980Tbfd	+Z	590 ~ 740	980	10	12	14	-
H700/980Tbfd	+Z	700 ~ 850	980	10	12	14	-
HC850/1180Tbfd	+Z	850 ~ 1150	1180	7	9	11	-
HC780/980CHD	+Z	780 ~ 950	980	6	8	10	-
HC900/1180CHD	+Z	900 ~ 1150	1180	3	5	7	-

表中力学性能有效期为制造完成后 3 个月内。  
Mechanical properties just for products within 3 months from manufactured.

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub>=80mm, b<sub>0</sub> = 20mm), 试样方向为纵向。也可采用 JIS Z2241 规定的 No.5 试样, 断后伸长率的规定值应不小于表列相应规定值的 110%, 试样方向为纵向。通常情况下只提供其中 1 个试样的拉伸性能。

<sup>a</sup> No. P6 test piece (L<sub>0</sub>=80 mm, b<sub>0</sub>=20mm) specified in GB/T 228.1-2021 and taken in the longitudinal direction apply. No.5 test piece specified in JIS Z2241 may also be used, the elongation after fracture should be no less than 110% of the corresponding specified value in the table, and the sample direction should be transverse.

<sup>b</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用下屈服强度 R<sub>eL</sub>。

<sup>b</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the lower yield strength (R<sub>eL</sub>).

<sup>c</sup> 当镀层种类为 ZF 和 ZM 时, 断后伸长率最小值可比表中规定值减小两个单位。

<sup>c</sup> When coating types is ZF and ZM, the minimum value of elongation reduced by 2 applies.

牌号 Designation		屈服强度 <sup>a,b</sup> Yield strength MPa	抗拉强度 <sup>a</sup> Tensile strength R <sub>m</sub> , MPa, ≥	下列公称厚度 (mm) 的断后伸长率 <sup>a</sup> , A <sub>80mm</sub> , %, ≥ Elongation after fracture, A <sub>80mm</sub> , %, ≥		
钢种 Steel grade	镀层种类 Types of coatings			≤ 0.50	> 0.50 ~ 0.70	> 0.70
HC570/780CPD	+Z	570 ~ 720	780	7	9	11
HC660/780CPD	+Z	660 ~ 820	780	6	8	10
HC780/980CPD	+Z	780 ~ 950	980	3	5	7
HC900/1180CPD	+Z	900 ~ 1100	1180	1	3	5

表中力学性能有效期为制造完成后 6 个月内。  
Mechanical properties just for products within 6 months from manufactured.

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub>=80mm, b<sub>0</sub> = 20mm), 试样方向为纵向。

<sup>a</sup> No. P6 test piece (L<sub>0</sub>=80 mm, b<sub>0</sub>=20mm) specified in GB/T 228.1-2021 and taken in the longitudinal direction apply.

<sup>b</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用下屈服强度 R<sub>eL</sub>。

<sup>b</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the lower yield strength (R<sub>eL</sub>).



牌号 Designation		屈服强度 <sup>a,b</sup> Yield strength MPa	抗拉强度 <sup>a</sup> Tensile strength R <sub>m</sub> ,MPa, ≥	下列公称厚度 (mm) 的断后伸长率 <sup>a</sup> ,A <sub>50mm</sub> %, ≥		
钢种 Steel grade	镀层种类 Types of coatings			≤ 0.50	> 0.50 ~ 0.70	> 0.70
HC600/980QPD	+Z	600 ~ 850	980	11	13	15
HC550/980QPD	+Z	550 ~ 800	980	16	18	20

表中力学性能有效期为制造完成后 3 个月内。

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub>=80mm, b<sub>0</sub> = 20mm), 试样方向为纵向。也可采用 JIS Z2241 规定的 No.5 试样, 断后伸长率的规定值应不小于表列相应规定值的 110%, 试样方向为横向。通常情况下只提供其中 1 个试样的拉伸性能。

<sup>a</sup> No. P6 test piece(L<sub>0</sub>=80 mm, b<sub>0</sub>=20mm)specified in GB/T 228.1-2021 and taken in the longitudinal direction apply.No.5 test piece specified in JIS Z2241 may also be used, the elongation after fracture should be no less than 110% of the corresponding specified value in the table, and the sample direction should be transverse.

<sup>b</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用下屈服强度 R<sub>eL</sub>。

<sup>b</sup> If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R<sub>p0.2</sub>), otherwise the yield strength values apply to the lower yield strength(R<sub>eL</sub>).

牌号 Designation		屈服强度 <sup>a,b</sup> Yield strength MPa	抗拉强度 <sup>a</sup> Tensile strength R <sub>m</sub> ,MPa, ≥	下列公称厚度 (mm) 的断后伸长率 <sup>a</sup> ,A <sub>50mm</sub> %, ≥			n 值 <sup>a</sup> ≥
钢种 Steel grade	镀层种类 Types of coatings			≤ 0.50	> 0.50 ~ 0.70	> 0.70	
HC820/1180DHD	+Z	820 ~ 1150	1180	7	9	11	-
HC780/980CHD	+Z	780 ~ 950	980	6	8	10	
HC900/1180CHD	+Z	900 ~ 1150	1180	3	5	7	
H590/980Tbfd	+Z	590 ~ 740	980	10	12	14	
H700/980Tbfd	+Z	700 ~ 850	980	10	12	14	
HC850/1180Tbfd	+Z	850 ~ 1150	1180	7	9	11	

#### 1.2.4 拉伸应变痕 (Stretcher strain marks)

拉伸应变痕的要求仅适用于表面质量级别为 FC 和 FD 的钢板及钢带, 钢板及钢带的拉伸应变痕应符合下表的规定。

The requirements for stretcher strain marks are only applicable to products with surface qualities FC and FD. The specific requirements shall comply with the provisions in the following table.

钢种	拉伸应变痕
无间隙原子钢、高强度无间隙原子钢、加磷高强度钢	应保证在制造完成后 6 个月内使用时不出现拉伸应变痕。
高强度烘烤硬化钢	储存场所的温度在 50°C 以下, 应保证在制造完成后 3 个月内使用时不出现拉伸应变痕
低碳钢	应保证在制造完成后 1 个月内使用时不出现拉伸应变痕。
碳素结构钢 / 低合金钢、高强度低合金钢	不做保证, 建议用户尽早使用。
双相钢、增强成形性双相钢、相变诱导塑性钢、复相钢、淬火配分钢	使用时不应出现拉伸应变痕。

#### 1.2.5 表面质量 (Surface Quality)

表面质量级别 Grade	代号 Code No.	特征 Features
较高级的精整表面 Relatively high-grade finishing surface	FB (O3)	允许有小腐蚀点、暗点、带痕、小的铬酸钝化处理缺陷及小锌粒。 It is allowed for the existence of small erosion spots, dark spots, strip marks, minor chromate treatment defects and small zinc particles.
高级的精整表面 High-grade finishing surface	FC (O4)	不得有腐蚀点, 但在小范围内允许存在轻微压痕、划伤、锌流波纹、轻微的铬酸钝化缺陷另一面应至少保持 FB 表面。 No erosion spot is allowed. However, it is allowed for the existence of light impression, scratches, zinc flow ripple marks, minor chromate treatment defects in small range, while the other side must reach FB requirements at least.
超高级的精整表面 Ultra high-grade finishing surface	FD (O5)	较好的一面必须对缺陷进一步限制, 即不能影响涂装后的外观质量, 并应有均匀良好的镀层, 另一面应至少保持 FB 表面。 One side of relatively good quality must further restrict on defects, namely appearance quality after painting is not affected, and the other side must reach FB requirements at least.

#### 1.2.6 表面结构 (Surface Structure)

镀层种类 Coating variety	表面结构 surface structure	代号 Code No.	特征 Features
Z ZM	普通锌花 Conventional spangle	N	镀层在自然条件下凝固, 得到的肉眼可见的锌花结构。 Spangles condensate on zinc coating under normal conditions after galvanizing.
	小锌花 Small spangle	M	镀层在自然条件下凝固, 并通过适当控制得到的肉眼可见的细小锌花结构。Small spangles condensate on zinc coating under normal conditions after galvanizing. 该表面结构一般进行光整处理。 Surface structure after skin pass treatment.
	无锌花 No spangle	F	镀层在自然条件下凝固, 并通过特殊控制得到的肉眼不可见的细小锌花结构。No spangles condensate on zinc coating under normal conditions after special galvanizing control. 该表面结构一般进行光整处理。 Surface structure after skin pass treatment.
ZF	锌铁合金 Zn-Fe alloy	R	通过对纯锌镀层进行热处理获得的镀层表面结构, 该表面结构通常为灰色无光。 Through the heat treatment of pure coating, the surface structure is usually gray and matte.

#### 1.2.7 镀层重量的可供范围 (Nominal Coating Mass Supply)

镀层形式 Coating form	适用的镀层表面结构 Applicable surface structure	下列镀层种类的公称镀层重量的可供范围/(g/m <sup>2</sup> ) Nominal coating mass range supply		
		纯锌镀层 zinc coating(Z)	锌铁合金镀层 zinc-Fe alloy coating(ZF)	锌铝镁镀层 Zn-Al-Mg Alloy Coating
等厚镀层	N、M、F、R	60 ~ 450	60 ~ 180	60 ~ 450
差厚镀层 <sup>a</sup>	N、M、F	30 ~ 150(单面) Each side	-	-

注 1: 纯锌和锌铁合金 50g/m<sup>2</sup> 镀层的厚度约为 7.1μm, 锌铝镁合金 50g/m<sup>2</sup> 镀层的厚度约为 7.5μm。

Note 1: Coating thickness is 7.1μm, when the coating mass is 50g/m<sup>2</sup> for zinc and zinc-Fe alloy coating. Coating thickness is 7.5μm, when the coating mass is 50g/m<sup>2</sup> for Zn-Al-Mg Alloy coating.

<sup>a</sup> 较厚面与较薄面的镀层重量比值应不大于 3。

Ration of thicker and thinner side coating mass should be less than 3.

### 1.2.8 表面处理 (Surface Treatment)

序号 Serial number	类别 category	代码 Code No.	特征 Features
1	铬酸钝化 Chromate treatment	C	该表面处理可减少产品在运输和储存期间表面产生白锈。铬酸钝化表面可能产生摩擦黑点。 The treatment prevents white rusts formation on product surfaces during transportation and storage. Black spots may appear after friction on chromate treatment surface.
2	无铬钝化 Chromium-free treatment	CN	该表面处理可减少产品在运输和储存期间表面产生白锈。无铬钝化应限制钝化膜中对人体有害的六价铬成分。The treatment prevents white rusts formation on product surfaces during transportation and storage. Chromium-free treatment should restrict hexavalent chromium composition which is harmful to human body.
3	涂油 Oiling	O	该表面处理可减少产品在运输和储存期间表面产生白锈，所涂的防锈油一般不作为后续加工用的轧制油和冲压润滑油。 The treatment prevents white rusts formation on product surfaces during transportation and storage. The anti-rust oil is generally not used as rolling oil and stamping oil in subsequent processing.
4	钝化 + 涂油 Chromate treatment+oiling	CO	该表面处理可进一步减少产品在运输和储存期间表面产生的白锈。 The treatment further prevents white rusts formation on product surfaces during transportation and storage.
5	无铬钝化 + 涂油 Chromium-free treatment+oiling	CON	该表面处理可进一步减少产品在运输和储存期间表面产生白锈。无铬钝化应限制钝化膜中对人体有害的六价铬成分。 The treatment further prevents white rusts formation on product surfaces during transportation and storage. Chromium-free treatment should restrict hexavalent chromium composition which is harmful to human body.
6	无铬耐指纹 Chromium-free anti-fingerprint treatment	AFN	该表面处理可减少产品在运输和储存期间表面产生白锈，可提高电子和电气产品表面的耐汗渍玷污性。无铬耐指纹应限制耐指纹膜中对人体有害的六价铬成分。 The treatment prevents white rusts formed on product surfaces during transportation and storage, and improves perspiration resistance of electronic and electrical product surface. Chromium-free and anti-fingerprint treatment should restrict hexavalent chromium composition which is harmful to human body.
7	自润滑 Self lubrication	SZR	该表面处理可减少产品在运输和储存期间表面产生白锈，同时自润滑膜可较好改善钢板的成形性能。 The surface treatment can reduce the surface corrosion of the product during transportation and storage, and self lubrication of the synovial membrane can improve the formability of the steel sheet.
8	无机固体润滑 Inorganic solid lubrication	L	该表面处理可减少产品在运输和储存期间表面产生白锈，同时固体润滑膜可较好改善钢板的成形性能 The surface treatment can reduce the surface corrosion of the product during transportation and storage, meanwhile, the solid lubricant film can improve the formability of the steel sheet
9	不处理 No treatment	U	该表面处理仅适用于需方订货时明确提出表面不处理的情况，应在合同中注明。表面不处理的产品在运输和储存期间表面较易产生白锈和黑点，需方应慎重选择。 This surface treatment is only applicable to the situation where the demand is noted in the contract. The surface of products without surface treatment is prone to generate white rust and black spots during transportation and storage. When order, please read the feature carefully.

### 1.2.9 交货状态 Delivery conditions

通常情况下，钢板及钢带经热镀锌加光整拉矫或热镀锌加光整后交货。

The products are normally supplied in the hot-dip galvanized and skin-passed condition.

### 1.2.10 尺寸允许偏差 (Tolerances on Dimensions)

#### 1.2.10.1 厚度允许偏差 (Tolerances on Thickness)

单位为毫米 Dimensions in millimeters

规定的最小屈服强度 Re MPa Specified minimum yield strength	公称厚度 Nominal thickness	下列公称宽度下的厚度允许偏差 <sup>a,b,c</sup> Tolerances on thickness for a nominal width					
		普通精度 PT.A Normal tolerances			高级精度 PT.B Advanced tolerances		
		≤ 1200	> 1200 ~ 1500	> 1500	≤ 1200	> 1200 ~ 1500	> 1500
< 260	≤ 0.25	±0.03	±0.04	±0.04	±0.025	±0.030	±0.035
	> 0.25 ~ 0.40	±0.04	±0.05	±0.06	±0.030	±0.035	±0.040
	> 0.40 ~ 0.60	±0.04	±0.05	±0.06	±0.035	±0.040	±0.045
	> 0.60 ~ 0.80	±0.05	±0.06	±0.07	±0.040	±0.045	±0.050
	> 0.80 ~ 1.00	±0.06	±0.07	±0.08	±0.045	±0.050	±0.060
	> 1.00 ~ 1.20	±0.07	±0.08	±0.09	±0.050	±0.060	±0.070
	> 1.20 ~ 1.60	±0.09	±0.10	±0.11	±0.060	±0.070	±0.080
	> 1.60 ~ 2.00	±0.11	±0.12	±0.13	±0.070	±0.080	±0.090
	> 2.00 ~ 2.50	±0.13	±0.14	±0.15	±0.090	±0.100	±0.110
> 2.50 ~ 3.00	±0.16	±0.16	±0.17	±0.110	±0.120	±0.130	
260 ~ < 340 <sup>d</sup>	≤ 0.25	±0.04	±0.05	±0.05	±0.030	±0.035	±0.040
	> 0.25 ~ 0.40	±0.05	±0.06	±0.07	±0.035	±0.040	±0.045
	> 0.40 ~ 0.60	±0.05	±0.06	±0.07	±0.040	±0.045	±0.050
	> 0.60 ~ 0.80	±0.06	±0.07	±0.08	±0.045	±0.050	±0.060
	> 0.80 ~ 1.00	±0.07	±0.08	±0.09	±0.050	±0.060	±0.070
	> 1.00 ~ 1.20	±0.08	±0.09	±0.11	±0.060	±0.070	±0.080
	> 1.20 ~ 1.60	±0.10	±0.12	±0.13	±0.070	±0.080	±0.090
	> 1.60 ~ 2.00	±0.13	±0.14	±0.15	±0.080	±0.090	±0.110
	> 2.00 ~ 2.50	±0.15	±0.16	±0.17	±0.110	±0.120	±0.130
> 2.50 ~ 3.00	±0.18	±0.19	±0.19	±0.130	±0.140	±0.150	
340 ~ 420	≤ 0.25	±0.04	±0.05	±0.05	±0.035	±0.040	±0.045
	> 0.25 ~ 0.40	±0.05	±0.06	±0.07	±0.040	±0.045	±0.050
	> 0.40 ~ 0.60	±0.06	±0.07	±0.08	±0.045	±0.050	±0.060
	> 0.60 ~ 0.80	±0.07	±0.08	±0.09	±0.050	±0.060	±0.070
	> 0.80 ~ 1.00	±0.08	±0.09	±0.11	±0.060	±0.070	±0.080
	> 1.00 ~ 1.20	±0.10	±0.11	±0.12	±0.070	±0.080	±0.090
	> 1.20 ~ 1.60	±0.12	±0.13	±0.15	±0.080	±0.090	±0.110
	> 1.60 ~ 2.00	±0.15	±0.16	±0.18	±0.090	±0.110	±0.120
	> 2.00 ~ 2.50	±0.17	±0.19	±0.20	±0.120	±0.130	±0.140
> 2.50 ~ 3.00	±0.21	±0.21	±0.22	±0.140	±0.150	±0.160	
> 420	≤ 0.25	±0.05	±0.06	±0.06	±0.040	±0.045	±0.050
	> 0.25 ~ 0.40	±0.06	±0.07	±0.08	±0.045	±0.050	±0.060
	> 0.40 ~ 0.60	±0.06	±0.08	±0.09	±0.050	±0.060	±0.070
	> 0.60 ~ 0.80	±0.07	±0.09	±0.11	±0.060	±0.070	±0.080
	> 0.80 ~ 1.00	±0.09	±0.11	±0.12	±0.070	±0.080	±0.090
	> 1.00 ~ 1.20	±0.11	±0.12	±0.14	±0.080	±0.090	±0.110
	> 1.20 ~ 1.60	±0.14	±0.15	±0.17	±0.090	±0.110	±0.120
	> 1.60 ~ 2.00	±0.17	±0.18	±0.20	±0.110	±0.120	±0.140
	> 2.00 ~ 2.50	±0.20	±0.21	±0.23	±0.140	±0.150	±0.170
> 2.50 ~ 3.00	±0.23	±0.24	±0.25	±0.170	±0.180	±0.190	

<sup>a</sup> 双面镀层重量之和不少于一 450g/m<sup>2</sup> 的热镀锌产品厚度允许偏差可比规定值超出 ±0.01mm。

<sup>a</sup>The thickness tolerance of hot-dip coating products with the sum of double-sided coating weight not less than 450g/m<sup>2</sup> can exceed ± 0.01mm.

<sup>b</sup> 钢带两端各 10m 内的厚度允许偏差可比规定值超出 50%。

<sup>b</sup>The thickness tolerances within 10m at each end of the steel strip may be increased by a maximum of 50%.

<sup>c</sup> 纵切钢带的厚度允许偏差：应符合纵切前钢带的相关规定。

<sup>c</sup>The thickness tolerances of slit wide strip: it shall comply with the relevant regulations of the steel strip before the slit cut.

<sup>d</sup> 牌号 DC51D+Z(ZF, ZM)、S400GD+Z(ZF, ZM)、S500GD+Z(ZF, ZM) 和 S550GD+Z(ZF, ZM) 厚度允许偏差应符合此档规定。

<sup>d</sup>DC51D+Z(ZF,ZM), S400GD+Z(ZF,ZM), S500GD+Z(ZF,ZM) and S550GD+Z(ZF,ZM) should comply with this requirement.

规定的最小屈服强度 Specified minimum yield strength Re MPa	公称厚度 Nominal thickness	厚度允许偏差 <sup>a,b,c</sup> Tolerances on thickness
		超高级精度 PT.C Super tolerances
< 270	0.50 ~ < 0.95	±0.03
	0.95 ~ < 1.40	±0.04
	1.40 ~ < 1.90	±0.05
	1.90 ~ < 2.50	±0.06
	2.50 ~ 3.00	±0.07
270 ~ 380 <sup>d</sup>	0.50 ~ < 0.95	±0.04
	0.95 ~ < 1.40	±0.05
	1.40 ~ < 2.50	±0.06
	2.50 ~ 3.00	±0.07
> 380	0.50 ~ < 0.60	±0.04
	0.60 ~ < 0.70	±0.05
	0.70 ~ < 1.10	±0.06
	1.10 ~ < 1.60	±0.07
	1.60 ~ < 2.30	±0.08
	2.30 ~ 3.00	±0.09

<sup>a</sup> 其中双面镀层重量之和不小于 450g/m<sup>2</sup> 的热镀层产品厚度允许偏差可比规定值超出 ±0.01mm。  
<sup>a</sup>The thickness tolerance of hot-dip coating products with the sum of double-sided coating weight not less than 450g/m<sup>2</sup> can exceed ± 0.01mm  
<sup>b</sup> 钢带两端各 10m 内的厚度允许偏差可比规定值超出 50%。  
<sup>b</sup>The thickness tolerances within 10m at each end of the steel strip may be increased by a maximum of 50%.  
<sup>c</sup> 纵切钢带的厚度允许偏差：应符合纵切前钢带的相关规定。  
<sup>c</sup>The thickness tolerances of slit wide strip: it shall comply with the relevant regulations of the steel strip before the slit cut.  
<sup>d</sup> 牌号 DC51D+Z(ZF, ZM)、S400GD+Z(ZF, ZM)、S500GD+Z(ZF, ZM) 和 S550GD+Z(ZF, ZM) 厚度允许偏差应符合此档规定。  
<sup>d</sup>DC51D+Z(ZF,ZM), S400GD+Z(ZF,ZM), S500GD+Z(ZF,ZM) and S550GD+Z(ZF,ZM) should comply with this requirement.

根据需方要求，厚度允许偏差可为：标准公差、1/2 公差、公差带上移、公差带下移、正公差、负公差。

According to requirements from customers, thickness tolerances can be allowed as: standard tolerance, 1/2 tolerance, tolerance zone move-up, tolerance zone move-down, positive and negative tolerance.

### 1.2.10.2 宽度允许偏差 (Tolerances on Width)

切边钢板及钢带的宽度允许偏差符合下表规定，不切边钢板及钢带的宽度允许偏差由供需双方协商。

Tolerances on width of trimmed sheets and strips shall comply with the requirement in the following table. For as-rolled sheets and strips, tolerances on width shall be negotiated by the supplier and the demander.

单位为毫米 Dimensions in millimeters

公称宽度 Nominal Width	宽度允许偏差 Tolerances on width	
	普通精度 PW.A Normal tolerances	高级精度 PW.B Advanced tolerances
≤ 1200	0/+5	0/+2
> 1200 ~ 1500	0/+6	0/+2
> 1500 ~ 1800	0/+7	0/+3
> 1800	0/+8	0/+3

### 纵切钢带的宽度允许偏差 (Tolerances on Width of Slit Wide Strip)

单位为毫米 Dimensions in millimeters

	公称厚度 Nominal thickness	下列公称宽度下的宽度允许偏差 Tolerances on width for a nominal width				
		120 ~ < 125	125 ~ < 250	250 ~ < 400	400 ~ < 600	600 ~ 900
普通精度 PW.A Normal tolerances	< 0.60	0/+0.4	0/+0.5	0/+0.7	0/+1.0	0/+1.5
	0.60 ~ < 1.00	0/+0.5	0/+0.6	0/+0.9	0/+1.2	0/+1.5
	1.00 ~ < 2.00	0/+0.6	0/+0.8	0/+1.1	0/+1.4	0/+2.0
	≥ 2.00	0/+0.7	0/+1.0	0/+1.3	0/+1.6	0/+2.0
高级精度 PW.B Advanced tolerances	< 0.60	0/+0.2	0/+0.2	0/+0.3	0/+0.5	0/+0.6
	0.60 ~ < 1.00	0/+0.2	0/+0.3	0/+0.4	0/+0.6	0/+0.7
	1.00 ~ < 2.00	0/+0.3	0/+0.4	0/+0.5	0/+0.7	0/+0.8
	≥ 2.00	0/+0.4	0/+0.5	0/+0.6	0/+0.8	0/+0.9

### 1.2.10.3 长度允许偏差 (Tolerances on length)

单位为毫米 Dimensions in millimeters

公称长度 Nominal length	长度允许偏差 Tolerances on length	
	普通精度 PL.A Normal tolerances	高级精度 PL.B Advanced tolerances
≤ 2000	0/+6	0/+3
> 2000	0/+0.3% × 公称长度 0/+0.3% of the nominal length	0/+0.15% × 公称长度 0/+0.15% of the nominal length



### 1.2.10.4 不平度 (Tolerances on Flatness)

规定的最小屈服强度 Specified minimum yield strength Re MPa	公称宽度 Nominal width mm	下列厚度下的不平度 mm 不大于 Tolerances on flatness for a nominal thickness/mm/max.				
		普通精度 PF.A Normal tolerances		高级精度 PF.B Advanced tolerances		
		< 0.7	≥ 0.7	< 0.7	0.7 ~ < 1.6	≥ 1.6
Re < 260	< 1200	10	8	5	4	3
	1200 ~ < 1500	12	10	6	5	4
	≥ 1500	17	15	8	7	6
260 ≤ Re < 360 <sup>a</sup>	< 1200	13	10	8	6	5
	1200 ~ < 1500	15	13	9	8	6
	≥ 1500	20	19	12	10	9
≥ 360	800 ~ 2080	供需双方协商 Negotiation between supply and demand				

<sup>a</sup> 牌号 DC51D+Z(ZF, ZM), S400GD+Z(ZF, ZM), S500GD+Z(ZF, ZM) 和 S550GD+Z(ZF, ZM) 钢板不平度应符合此档规定。  
<sup>a</sup>DC51D+Z(ZF,ZM), S400GD+Z(ZF,ZM), S500GD+Z(ZF,ZM) and S550GD+Z(ZF,ZM) should comply with this requirement.

### 1.2.10.5 镰刀弯 (Tolerances on Edge Camber)

产品状态 Product	公称长度 Nominal length	镰刀弯 不大于 Tolerances on camber /max.		测量长度 Measuring length
		普通精度 PS.A Normal tolerances	高级精度 PS.B Advanced tolerances	
钢带 Wide strip	-	5	-	2000
纵切钢带 Slit wide strip	-	2	-	2000
钢板 Sheet	≤ 2000	0.25% × 实际长度 0.25% of the actual length	-	实际长度 Actual length
	> 2000	5	-	2000

<sup>a</sup> 规定的最小屈服强度 ≤ 280MPa 的纵切钢带可作此规定; 当规定的最小屈服强度 > 280MPa 时, 其镰刀弯由供需双方协商。  
<sup>a</sup>The slit wide strip with the minimum yield strength ≤ 280MPa as specified may comply with this; When the specified minimum yield strength > 280MPa, the cambershall be negotiated by both parties.

### 1.3 汽车用热基镀层产品

#### (Hot Dip Galvanized Hot-rolled Steel Sheets and Strips for Automobile)

首钢生产的热基热镀锌钢板, 镀层附着力强, 耐腐蚀能力强, 镀层厚度控制准确, 尺寸精度高, 板形平直, 有良好的力学性能, 加工性和焊接性。可用于制作汽车内板以及结构件、加强件和底盘件。

Hot dip galvanized hot-rolled sheets of Shougang are featured with strong coating adhesiveness, high erosion-resistance, accurately controlled zinc coating thickness, high size precision, flat profile and good mechanical, processing and welding performance. They can be used for making inner parts, structural parts, reinforcements and chassis parts of automobile.

#### 1.3.1 用途及特点 (Applications and Characteristics)

牌号 Steel Grade	用途 Application	特点 Feature
DD51D(+Z, +ZMA) SGHCD(+Z, +ZMA)	一般用 Commercial purpose	低碳钢 Low carbon steel
DD52D(+Z, +ZMA)	冲压用 Drawing	
DD53D(+Z, ZMA)	冲压用 Drawing	
DD54D(+Z, ZMA)	冲压用 Drawing	
S220GD(+Z, +ZMA) S250GD(+Z, +ZMA) S280GD(+Z, +ZMA) S320GD(+Z, +ZMA) S350GD(+Z, +ZMA) S400GD(+Z, +ZMA) S500GD(+Z, +ZMA) S550GD(+Z, +ZMA) SGH340D(+Z, +ZMA) SGH400D(+Z, +ZMA) SGH440D(+Z, +ZMA) SGH490D(+Z, +ZMA) SGH540D(+Z, +ZMA)	结构用 Structural parts	碳素钢或低合金钢 Carbon steel or low-alloy steel
HD300LAD(+Z, +ZMA) HD340LAD(+Z, +ZMA) HD380LAD(+Z, +ZMA) HD420LAD(+Z, +ZMA) HD460LAD(+Z, +ZMA) HD500LAD(+Z, +ZMA) HD550LAD(+Z, +ZMA) HD700LAD(+Z, +ZMA)	冷成形用 Cold forming	低合金高强度钢 High-strength low-alloy steel
HD330/580DPD(+Z, +ZMA)		双相高强度钢 High-strength dual Phase steel
HD300/450FBD(+Z, +ZMA) HD440/580FBD(+Z, +ZMA) HD600/780FBD(+Z, +ZMA)		铁素体 - 贝氏体钢 Ferritic Bainitic Steels
HD660/760CPD(+Z, +ZMA)		复相钢 Complex phase steel
HD700/950CPD(+Z, ZMA)		复相钢 Complex phase steel

1.3.2 相近牌号对照表 (Reference list of similar steel grades)

Q/SGJS 0014-2022	GB/T 2518-2019	EN10346:2015	VDA 239-100
DD51D+Z	DX51D+Z	DX51D+Z	HR0
DD51D+ZMA	-	DX51D+ZMA	
DD52D+Z	DX52D+Z	DX52D+Z	HR2
DD52+ZMA	-	DX52D+ZMA	
DD53D+Z	DX53D+Z	DX53D+Z	-
DD53D+ZMA	-	DX53D+ZMA	
DD54D+Z	DX54D+Z	DX54D+Z	
DD54D+ZMA	-	DX54D+ZMA	
S220GD+Z	S220GD+Z	S220GD+Z	
S220GD+ZMA	-	S220GD+ZMA	
S250GD+Z	S250GD+Z	S250GD+Z	
S250GD+ZMA	-	S250GD+ZMA	
S280GD+Z	S280GD+Z	S280GD+Z	
S280GD+ZMA	-	S280GD+ZMA	
S320GD+Z	S320GD+Z	S320GD+Z	-
S320GD+ZMA	-	S320GD+ZMA	
S350GD+Z	S350GD+Z	S350GD+Z	
S350GD+ZMA	-	S350GD+ZMA	
S400GD+Z	-	-	
S400GD+ZMA	-	-	
S500GD+Z	-	-	
S500GD+ZMA	-	-	
S550GD+Z	S550GD+Z	S550GD+Z	
S550GD+ZMA	-	S550GD+ZMA	
HD300LAD+Z	HX300LAD+Z	HX300LAD+Z	HR300LA
HD300LAD+ZMA	-	HX300LAD+ZMA	
HD340LAD+Z	HX340LAD+Z	HX340LAD+Z	HR340LA
HD340LAD+ZMA	-	HX340LAD+ZMA	
HD380LAD+Z	HX380LAD+Z	HX380LAD+Z	HR380LA
HD380LAD+ZMA	-	HX380LAD+ZMA	
HD420LAD+Z	HX420LAD+Z	HX420LAD+Z	HR420LA
HD420LAD+ZMA	-	HX420LAD+ZMA	
HD460LAD+Z	HX460LAD+Z	HX460LAD+Z	HR460LA
HD460LAD+ZMA	-	HX460LAD+ZMA	
HD500LAD+Z	HX500LAD+Z	HX500LAD+Z	HR500LA
HD500LAD+ZMA	-	HX500LAD+ZMA	
HD550LAD+Z	HD550LAD+Z	-	HR550LA
HD550LAD+ZMA	-	-	
HD700LAD+Z	-	-	HR700LA
HD700LAD+ZMA	-	-	
HD330/580DPD+Z	-	HDT580X+Z	HR330Y580T-DP
HD330/580DPD+ZMA	-	HDT580X+ZMA	
HD300/450FBD+Z	-	HDT450F+Z	HR300Y450T-FB
HD300/450FBD+ZMA	-	HDT450F+ZMA	
HD440/580FBD+Z	-	HDT580F+Z	HR440Y580T-FB
HD440/580FBD+ZMA	-	HDT580F+ZMA	
HD600/780FBD+Z	-	HDT760C+Z	HR600Y780T-FB
HD600/780FBD+ZMA	-	HDT760C+ZMA	
HD660/760CPD+Z	HD660/760CPD+Z	-	HR660Y760T-CP
HD660/760CPD+ZMA	-	-	
HD700/950CPD+Z	-	HDT950C+Z	-
HD700/950CPD+ZMA	-	HDT950C+ZMA	

Q/SGJS 0014-2022	JIS G3302:2022
SGHCD+Z	SGHC
SGHCD+ZMA	-
SGH340D+Z	SGH340
SGH340D+ZMA	-
SGH400D+Z	SGH400
GH400D+ZMA	-
SGH440D+Z	SGH440
SGH440D+ZMA	-
SGH490D+Z	SGH490
SGH490D+ZMA	-
SGH540D+Z	SGH540
SGH540D+ZMA	-

1.3.3 力学性能 (Mechanical Properties)

牌号 Grade		屈服强度 <sup>a,b</sup> MPa Yield strength MPa	抗拉强度 <sup>a</sup> R <sub>m</sub> MPa Tensile strength	断后伸长率 <sup>a,c</sup> A <sub>80mm</sub> %, ≥ Elongation
钢种 Steel grade	镀层种类 Coating species			
DD51D <sup>d</sup>	+Z, +ZMA	-	270 ~ 500	22
DD52D <sup>d</sup>	+Z, +ZMA	140 ~ 300 <sup>e</sup>	270 ~ 420	26
DD53D	+Z, +ZMA	140 ~ 260	270 ~ 380	30
DD54D	+Z, +ZMA	120 ~ 220	260 ~ 350	34

<sup>a</sup> 试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub>=80mm, b<sub>0</sub> = 20mm), 试样方向为横向。  
<sup>b</sup> Using P6(L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm) sample of GB/T 228.1-2021. Sample direction is horizontal.  
<sup>c</sup> 无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用下屈服强度 R<sub>eL</sub>。  
<sup>d</sup> Taking Rp0.2 in case of indistinct yield, otherwise ReL.  
<sup>e</sup> 当镀层种类为 ZMA 时, 断后伸长率最小值可比表中规定值减小两个单位。  
 When coating types is ZF, the minimum value of elongation can reduce two units compare to the table.  
<sup>d</sup> 力学性能有效期为制造完成后 1 个月内。  
 Mechanical properties just for products within 1 months from manufactured.  
<sup>e</sup> 表面质量为 FB 时, DD52D 的屈服上限为 360MPa。  
 The upper limite of yield strength of DC52D is 360 MPa in case of the surface grade is FB.

牌号 Grade		屈服强度 <sup>a,b</sup> MPa, ≥ Yield strength MPa	抗拉强度 <sup>a,c</sup> R <sub>m</sub> , MPa, ≥ Tensile strength	断后伸长率 <sup>a,d</sup> Elongation A <sub>80mm</sub> %, ≥
钢种 Steel grade	镀层种类 Coating species			
S220GD	+Z +ZMA	220	300	20
S250GD	+Z +ZMA	250	330	19
S280GD	+Z +ZMA	280	360	18
S320GD	+Z +ZMA	320	390	17
S350GD	+Z +ZMA	350	420	16
S400GD	+Z +ZMA	400	470	15
S500GD	+Z +ZMA	500	530	-
S550GD	+ZMA	550	550	-

力学性能有效期为制造完成后 1 个月内。  
Mechanical properties just for products within 1 months from manufactured.

<sup>a</sup>试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub>=80mm, b<sub>0</sub> = 20mm), 试样方向为纵向。  
Using P6(L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm) sample of GB/T 228.1-2021. Sample direction is longitudinal.  
<sup>b</sup>无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用上屈服强度 R<sub>eH</sub>。  
Taking Rp0.2 in case of indistinct yield, otherwise ReH  
<sup>c</sup>除 S550GD+Z、S550GD+ZMA 外, 其他牌号的抗拉强度可要求 140MPa 的范围值。  
The tensile strength for other grade can request the range value of 140MPa, except S550GD+Z and S550GD+ZMA.  
<sup>d</sup>当镀层种类为 ZMA 时, 断后伸长率最小值可比表中规定值减小两个单位。  
When coating types is ZMA, the minimum value of elongation can reduce two units compare to the table.

牌号 Grade		屈服强度 <sup>a,b</sup> Yield strength MPa	抗拉强度 <sup>a</sup> R <sub>m</sub> , MPa Tensile strength	断后伸长率 <sup>a,c</sup> Elongation A <sub>80mm</sub> %, ≥	n 值 <sup>a</sup> n <sub>10-20/Ag</sub> ≥
钢种 Steel grade	镀层种类 Coating species				
HD300LAD	+Z +ZMA	300 ~ 380	380 ~ 500	24	0.14
HD340LAD	+Z +ZMA	340 ~ 440	420 ~ 540	22	0.13
HD380LAD	+Z +ZMA	380 ~ 480	450 ~ 570	20	-
HD420LAD	+Z +ZMA	420 ~ 520	480 ~ 600	18	-
HD460LAD	+Z +ZMA	460 ~ 560	520 ~ 640	16	-
HD500LAD	+Z +ZMA	500 ~ 620	560 ~ 700	14	-
HD550LAD	+Z +ZMA	550 ~ 670	610 ~ 750	12	-
HD700LAD	+Z +ZMA	700 ~ 850	750 ~ 950	10	-

<sup>a</sup>试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub>=80mm, b<sub>0</sub> = 20mm), 试样方向为纵向。  
Using P6(L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm) sample of GB/T 228.1-2021. Sample direction is longitudinal.  
<sup>b</sup>无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用下屈服强度 R<sub>eL</sub>。  
Taking Rp0.2 in case of indistinct yield, otherwise ReL.  
<sup>c</sup>当镀层种类为 ZMA 时, 断后伸长率最小值可比表中规定值减小两个单位。  
When coating types is ZF, the minimum value of elongation can reduce two units compare to the table.

牌号 Grade		屈服强度 <sup>a,b</sup> Yield strength MPa	抗拉强度 <sup>a</sup> R <sub>m</sub> , MPa Tensile strength	断后伸长率 <sup>a,c</sup> A <sub>80mm</sub> %, ≥ Elongation	n 值 <sup>a</sup>		BH <sub>2</sub> <sup>a</sup> MPa, ≥
钢种 Steel grade	镀层种类 Coating species				n <sub>4-6</sub> ≥	n <sub>10-20/Ag</sub> ≥	
HD330/580DPD	+Z +ZMA	330 ~ 450	580 ~ 680	19	0.16	0.13	30

<sup>a</sup>试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub>=80mm, b<sub>0</sub> = 20mm), 试样方向为纵向。  
Using P6(L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm) sample of GB/T 228.1-2021. Sample direction is longitudinal.  
<sup>b</sup>无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用下屈服强度 R<sub>eL</sub>。  
Taking Rp0.2 in case of indistinct yield, otherwise ReL.  
<sup>c</sup>当镀层种类为 ZMA 时, 断后伸长率最小值可比表中规定值减小两个单位。  
When coating types is ZF, the minimum value of elongation can reduce two units compare to the table.

牌号 Grade		屈服强度 <sup>a,b</sup> Yield strength MPa	抗拉强度 <sup>a</sup> R <sub>m</sub> , MPa Tensile strength	断后伸长率 <sup>a,c</sup> A <sub>80mm</sub> %, ≥ Elongation	BH <sub>2</sub> <sup>a</sup> MPa, ≥
钢种 Steel grade	镀层种类 Coating species				
HD300/450FBD	+Z +ZMA	300 ~ 400	450 ~ 550	24	30
HD440/580FBD	+Z +ZMA	440 ~ 600	580 ~ 700	15	30
HD600/780FBD	+Z +ZMA	600 ~ 760	780 ~ 920	12	30
HD660/760CPD	+Z +ZMA	660 ~ 820	760 ~ 960	10	30
HD700/950CPD	+Z +ZMA	700 ~ 900	950 ~ 1130	9	30

<sup>a</sup>试样为 GB/T 228.1-2021 中的 P6 试样 (L<sub>0</sub>=80mm, b<sub>0</sub> = 20mm), 试样方向为纵向。  
Using P6(L<sub>0</sub> = 80mm, b<sub>0</sub> = 20mm) sample of GB/T 228.1-2021. Sample direction is longitudinal.  
<sup>b</sup>无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用下屈服强度 R<sub>eL</sub>。  
Taking Rp0.2 in case of indistinct yield, otherwise ReL.  
<sup>c</sup>当镀层种类为 ZMA 时, 断后伸长率最小值可比表中规定值减小两个单位。  
When coating types is ZF, the minimum value of elongation can reduce two units compare to the table.

牌号 Grade		屈服强度 <sup>a,b</sup> Yield strength MPa	抗拉强度 <sup>a,c</sup> R <sub>m</sub> , MPa, ≥ Tensile strength	断后伸长率 <sup>a,d</sup> A <sub>50mm</sub> %, ≥ Elongation
钢种 Steel grade	镀层种类 Coating species			
SGHCD	+Z +ZMA	205	270	-
SGH340D	+Z +ZMA	245	340	20
SGH400D	+Z +ZMA	295	400	18
SGH440D	+Z +ZMA	335	440	
SGH490D	+Z +ZMA	365	490	16
SGH540D	+Z +ZMA	400	540	

<sup>a</sup>试样为 JIS Z 2241 规定的 No.5 试样, 试样方向为纵向。  
Using No.5 sample of JIS Z 2241. Sample direction is longitudinal.  
<sup>b</sup>无明显屈服现象时采用 R<sub>p0.2</sub>, 否则采用上屈服强度 R<sub>eH</sub>。  
Taking Rp0.2 in case of indistinct yield, otherwise ReH.



### 1.3.4 拉伸应变痕 (Tensile Strain Marks)

对于牌号 DD51D (+Z, +ZMA)、DD52D (+Z, +ZMA) 由于这些牌号的钢容易产生拉伸应变痕, 建议用户尽快使用, 如对拉伸应变痕有特殊要求, 应在订货时协商并在合同中注明。

DD51D (+Z, +ZMA)、DD52D (+Z, +ZMA) the customers are suggested to use them as soon as possible because they tend to develop tensile strain marks. Special requirements.

### 1.3.5 表面质量 (Surface Quality)

表面质量级别 Grade	代号 Code No.	特征 Features
普通的精整表面 Common finishing surface	FA	表面允许有缺欠, 例如小锌粒、压印、划伤、凹坑、色泽不均、黑点、条纹、轻微钝化斑、锌起伏等。该表面通常不进行平整(光整)处理。 Defects are allowed on the surface, such as small zinc particles, embossing, scratches, pits, uneven color, black spots, stripes, slight passivation spots, zinc fluctuations, etc. The surface is usually not leveled (finished).
较高级的精整表面 Relatively high-grade finishing surface	FB	允许有小腐蚀点、暗点、带痕、小的铬酸钝化处理缺陷及小锌粒。 It is allowed for the existence of small erosion spots, dark spots, strip marks, minor chromate treatment defects and small zinc particles.
高级的精整表面 High-grade finishing surface	FC	不得有腐蚀点, 但在小范围内允许存在轻微压痕、划伤、锌流波纹、轻微的铬酸钝化缺陷另一面应至少保持 FB 表面。 No erosion spot is allowed. However, it is allowed for the existence of light impression, scratches, zinc flow ripple marks, minor chromate treatment defects in small range, while the other side must reach FB requirements at least.

### 1.3.6 表面结构 (Surface Structure)

镀层种类 Coating variety	表面结构 surface structure	代号 Code No.	特征 Features
Z ZMA	普通锌花 Conventional spangle	N	镀层在自然条件下凝固, 得到的肉眼可见的锌花结构。 Spangles condensate on zinc coating under normal conditions after galvanizing.
	小锌花 Small spangle	M	镀层在自然条件下凝固, 并通过适当控制得到的肉眼可见的细小锌花结构。Small spangles condensate on zinc coating under normal conditions after galvanizing. 该表面结构一般进行光整处理。 Surface structure after skin pass treatment.
	无锌花 No spangle	F	镀层在自然条件下凝固, 并通过特殊控制得到的肉眼不可见的细小锌花结构。No spangles condensate on zinc coating under normal conditions after special galvanizing control. 该表面结构一般进行光整处理。 Surface structure after skin pass treatment.



### 1.3.7 锌层重量的可供范围 Available range of nominal coating mass

镀层形式 Coating form	适用的镀层 表面结构 Applicable surface structure	下列镀层种类的公称镀层重量的可供范围/(g/m <sup>2</sup> ) Nominal coating mass range supply	
		纯锌镀层 (Z) zinc coating	锌铝镁合金镀层 (ZMA) Zn-Al-Mg Alloy Coating
等厚镀层	N、M、F	80 ~ 600	80 ~ 600
差厚镀层 <sup>a</sup>	N、M、F	30 ~ 150 (单面) Each side	-

注 1: 纯锌 50g/m<sup>2</sup> 镀层的厚度约为 7.1μm, 锌铝镁合金 50g/m<sup>2</sup> 镀层的 2 厚度约为 7.3~8.1μm。  
Note 1: Coating thickness is 7.1μm, when the coating mass is 50g/m<sup>2</sup> for zinc and zinc-Fe alloy coating. Coating thickness is 7.3~8.1μm, when the coating mass is 50g/m<sup>2</sup> for Zn-Al-Mg Alloy coating.

<sup>a</sup> 较厚面与较薄面的镀层重量比值应不大于 3。  
Ration of thicker and thinner side coating mass should be less than 3.

### 1.3.8 表面处理 (Surface Treatment)

序号 Serial number	类别 category	代码 Code No.	特征 Features
1	铬酸钝化 Chromate treatment	C	该表面处理可减少产品在运输和储存期间表面产生白锈。铬酸钝化表面可能产生摩擦黑点。 The treatment prevents white rusts formation on product surfaces during transportation and storage. Black spots may appear after friction on chromate treatment surface.
2	无铬钝化 Chromium-free treatment	CN	该表面处理可减少产品在运输和储存期间表面产生白锈。无铬钝化应限制钝化膜中对人体有害的六价铬成分。 The treatment prevents white rusts formation on product surfaces during transportation and storage. Chromium-free treatment should restrict hexavalent chromium composition which is harmful to human body.
3	涂油 Oiling	O	该表面处理可减少产品在运输和储存期间表面产生白锈，所涂的防锈油一般不作为后续加工用的轧制油和冲压润滑油。 The treatment prevents white rusts formation on product surfaces during transportation and storage. The anti-rust oil is generally not used as rolling oil and stamping oil in subsequent processing.
4	钝化 + 涂油 Chromate treatment+oiling	CO	该表面处理可进一步减少产品在运输和储存期间表面产生的白锈。 The treatment further prevents white rusts formation on product surfaces during transportation and storage.
5	无铬钝化 + 涂油 Chromium-free treatment+oiling	CON	该表面处理可进一步减少产品在运输和储存期间表面产生白锈。无铬钝化应限制钝化膜中对人体有害的六价铬成分。 The treatment further prevents white rusts formation on product surfaces during transportation and storage. Chromium-free treatment should restrict hexavalent chromium composition which is harmful to human body.
6	无铬耐指纹 Chromium-free anti-fingerprint treatment	AFN	该表面处理可减少产品在运输和储存期间表面产生白锈，可提高电子和电气产品表面的耐汗渍沾污性。无铬耐指纹应限制耐指纹膜中对人体有害的六价铬成分。 The treatment prevents white rusts formed on product surfaces during transportation and storage, and improves perspiration resistance of electronic and electrical product surface. Chromium-free and anti-fingerprint treatment should restrict hexavalent chromium composition which is harmful to human body.
7	自润滑 Self lubrication	SZR	该表面处理可减少产品在运输和储存期间表面产生白锈，同时自润滑膜可较好改善钢板的成形性能。 The surface treatment reduces surface corrosion of the product during transportation and storage. Self-lubrication of the synovial membrane improves the formability of steel sheet.
8	无机固体润滑 Inorganic solid lubrication	L	该表面处理可减少产品在运输和储存期间表面产生白锈，同时固体润滑膜可较好改善钢板的成形性能。 The surface treatment reduces surface corrosion of the product during transportation and storage. Meanwhile, the solid lubricant film improves the formability of steel sheet.
9	不处理 No treatment	U	该表面处理仅适用于需方订货时明确提出表面不处理的情况，应在合同中注明。表面不处理的产品在运输和储存期间表面较易产生白锈和黑点，需方应慎重选择。 This surface treatment is only applicable to the situation where the demand is noted in the contract. The surface of products without surface treatment is prone to generate white rust and black spots during transportation and storage. When order, please read the feature carefully.

### 1.3.9 交货状态 (Delivery Status)

通常情况下，钢板及钢带经热镀锌加光整拉矫或热镀锌加光整后交货。

Typically, steel sheet and strip are delivered after hot galvanizing and skin pass treatment.

### 1.3.10 尺寸允许偏差 (Tolerances on Dimensions)

#### 1.3.10.1 厚度允许偏差 (Tolerances on Thickness)

规定的最小屈服强度 Re MPa Specified minimum yield strength	公称厚度 Nominal thickness	下列公称宽度下的厚度允许偏差 <sup>a,b,c</sup> Tolerances on thickness for a nominal width					
		普通精度 PT.A Normal tolerances			高级精度 PT.B Advanced tolerances		
		≤ 1200	> 1200~1500	> 1500	≤ 1200	> 1200~1500	> 1500
Re < 260	0.8 ~ 1.00	±0.06	±0.07	±0.08	±0.045	±0.050	±0.060
	> 1.00 ~ 1.20	±0.07	±0.08	±0.09	±0.050	±0.060	±0.070
	> 1.20 ~ 1.60	±0.10	±0.11	±0.12	±0.060	±0.070	±0.080
	> 1.60 ~ 2.00	±0.12	±0.13	±0.14	±0.070	±0.080	±0.090
	> 2.00 ~ 2.50	±0.14	±0.15	±0.16	±0.090	±0.100	±0.110
	> 2.50 ~ 3.00	±0.17	±0.17	±0.18	±0.110	±0.120	±0.130
	> 3.00 ~ 5.00	±0.20	±0.20	±0.21	±0.15	±0.16	±0.17
260 ≤ Re < 360 <sup>d</sup>	> 5.00 ~ 6.00	±0.22	±0.22	±0.23	±0.17	±0.18	±0.19
	0.8 ~ 1.00	±0.07	±0.08	±0.09	±0.050	±0.060	±0.070
	> 1.00 ~ 1.20	±0.08	±0.09	±0.11	±0.060	±0.070	±0.080
	> 1.20 ~ 1.60	±0.11	±0.13	±0.14	±0.070	±0.080	±0.090
	> 1.60 ~ 2.00	±0.14	±0.15	±0.16	±0.080	±0.090	±0.110
	> 2.00 ~ 2.50	±0.16	±0.17	±0.18	±0.110	±0.120	±0.130
	> 2.50 ~ 3.00	±0.19	±0.20	±0.20	±0.130	±0.140	±0.150
360 ≤ Re ≤ 420	> 3.00 ~ 5.00	±0.22	±0.24	±0.25	±0.17	±0.18	±0.19
	> 5.00 ~ 6.00	±0.24	±0.25	±0.26	±0.19	±0.20	±0.21
	0.8 ~ 1.00	±0.08	±0.09	±0.11	±0.060	±0.070	±0.080
	> 1.00 ~ 1.20	±0.10	±0.11	±0.12	±0.070	±0.080	±0.090
	> 1.20 ~ 1.60	±0.13	±0.14	±0.16	±0.080	±0.090	±0.110
	> 1.60 ~ 2.00	±0.16	±0.17	±0.19	±0.090	±0.110	±0.120
	> 2.00 ~ 2.50	±0.18	±0.20	±0.21	±0.120	±0.130	±0.140
420 < Re ≤ 900	> 2.50 ~ 3.00	±0.22	±0.22	±0.23	±0.140	±0.150	±0.160
	> 3.00 ~ 5.00	±0.22	±0.24	±0.25	±0.17	±0.18	±0.19
	> 5.00 ~ 6.00	±0.24	±0.25	±0.26	±0.19	±0.20	±0.21
	0.8 ~ 1.00	±0.09	±0.11	±0.12	±0.070	±0.080	±0.090
	> 1.00 ~ 1.20	±0.11	±0.13	±0.14	±0.080	±0.090	±0.110
	> 1.20 ~ 1.60	±0.15	±0.16	±0.18	±0.090	±0.110	±0.120
	> 1.60 ~ 2.00	±0.18	±0.19	±0.21	±0.110	±0.120	±0.140
> 2.00 ~ 2.50	±0.21	±0.22	±0.24	±0.140	±0.150	±0.170	
> 2.50 ~ 3.00	±0.24	±0.25	±0.26	±0.170	±0.180	±0.190	
> 3.00 ~ 5.00	±0.26	±0.27	±0.28	±0.23	±0.24	±0.26	
> 5.00 ~ 6.00	±0.28	±0.29	±0.30	±0.25	±0.26	±0.28	

<sup>a</sup> 距焊缝 10m 内的厚度允许偏差：可比规定值超出 50%。  
The thickness tolerances within 10m at each end of the steel strip may be increased by a maximum of 50%.

<sup>b</sup> 对双面镀层重量之和不小于 450g/m<sup>2</sup> 的产品，其厚度允许偏差应增加 ±0.01mm。  
The thickness tolerance of hot-dip coating products with the sum of double-sided coating weight not less than 450g / m<sup>2</sup> can exceed ± 0.01mm.

<sup>c</sup> 纵切钢带的厚度允许偏差：应符合纵切前钢带的相关规定。  
The thickness tolerances of slit wide strip: it shall comply with the relevant regulations of the steel strip before the slit cut.

<sup>d</sup> 牌号 DD51D+Z(ZMA) 厚度允许偏差应符合此档规定。  
DD51D+Z(ZMA) should comply with this requirement.

根据需方要求，厚度允许偏差可为：标准公差、1/2 公差、公差带上移、公差带下移、正公差、负公差。

According to requirements from customers, thickness tolerances can be allowed as: standard tolerance, 1/2 tolerance, tolerance zone move-up, tolerance zone move-down, positive and negative tolerance.



### 1.3.10.2 宽度允许偏差 (Tolerances on Width)

切边钢板及钢带的宽度允许偏差符合下表规定，不切边钢板及钢带的宽度允许偏差由供需双方协商。

Tolerances on width of trimmed sheets and strips shall comply with the requirement in the following table. For as-rolled sheets and strips, tolerances on width shall be negotiated by the supplier and the demander.

公称宽度 Nominal Width	宽度允许偏差 Tolerances on width (mm)	
	普通精度 PW.A Normal tolerances	高级精度 PW.B Advanced tolerances
≤ 1200	0/+5	0/+2
> 1200 ~ 1500	0/+6	0/+2
> 1500 ~ 1800	0/+7	0/+3
> 1800	0/+8	0/+3

### 1.3.10.3 长度允许偏差 (Tolerances on Length)

公称长度 Nominal Length	长度允许偏差 Tolerances on length (mm)	
	普通精度 PL.A Normal tolerances	高级精度 PL.B Advanced tolerances
< 2000	0/+6	0/+3
≥ 2000	0/+0.3%×公称长度 0/+0.3% of the nominal length	0/+0.15%×公称长度 0/+0.15% of the nominal length

### 1.3.10.4 不平度 (Tolerances on Flatness)

规定的最小屈服强度 Re MPa Specified Minimum Yield Strength	公称宽度 Nominal width	下列公称厚度下的不平度 不大于 Tolerances on flatness for a nominal thickness/mm/max.					
		普通精度 PF.A Normal tolerances			高级精度 PF.B Advanced tolerances		
		0.8 ~ < 1.6	1.6 ~ < 3.0	3.0 ~ 6	0.8 ~ < 1.6	1.6 ~ < 3.0	3.0 ~ 6
Re < 260	< 1200	8	8	15	4	3	8
	1200 ~ < 1500	10	10	18	5	4	9
	≥ 1500	15	15	23	7	6	12
260 ≤ Re < 360 <sup>a</sup>	< 1200	10	10	18	6	5	9
	1200 ~ < 1500	13	13	25	8	6	12
	≥ 1500	19	19	28	10	9	14
≥ 360	700 ~ 1600	供需双方协商。 Negotiation between the supplier and the demander					

<sup>a</sup> 牌号 DD51D+Z(ZMA) 不平度允许偏差应符合此档规定。  
DD51D+Z(ZMA) waviness allowable tolerance should comply with this requirement.

### 1.3.10.5 镰刀弯 (Tolerances on Edge Camber)

单位为毫米 Dimensions in millimeters

产品状态 Product status	公称长度 Nominal length	镰刀弯 Camber ≤	测量长度 Measuring length
钢板 Sheet	< 2000	0.25%×实际长度 0.25% of the actual length	实际长度 Actual length
	≥ 2000	5	2000
钢带 Wide strip	-	5	2000
纵切钢带 <sup>a</sup> Slit wide strip <sup>a</sup>	-	2	2000

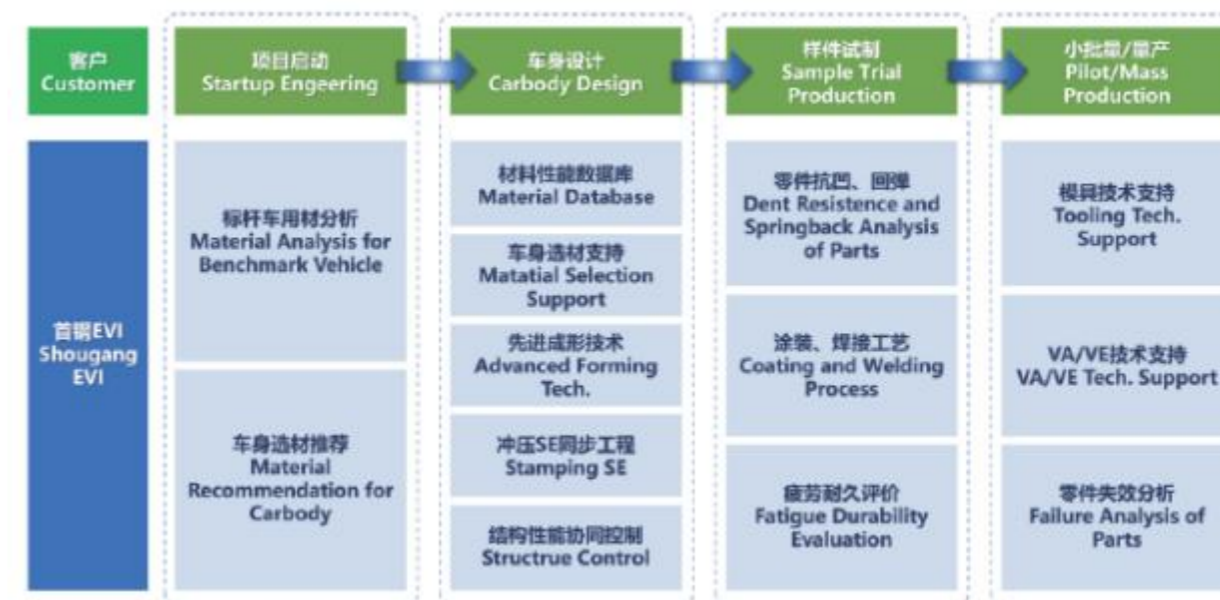
<sup>a</sup> 规定的最小屈服强度 ≤ 280MPa 的纵切钢带可作此规定。  
<sup>a</sup> The slit wide strip with the minimum yield strength ≤ 260MPa as specified may comply with this.

## Chapter 2 Application Technology of Automotive Sheets

### 第二章 使用技术

首钢汽车板 EVI 是先期介入下游汽车客户从设计到量产的全过程，以需求导向、问题导向、目标导向，提供切实可行的解决方案。

Shougang EVI technology of automotive steel sheets refers to the fact that steel manufacturers intervene in the automobile manufacturers to provide technical support from concept design to mass production, which provides customers with practical solutions in the orientation of their demand, problem, and goal.



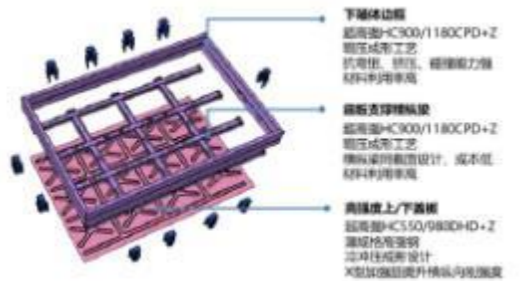
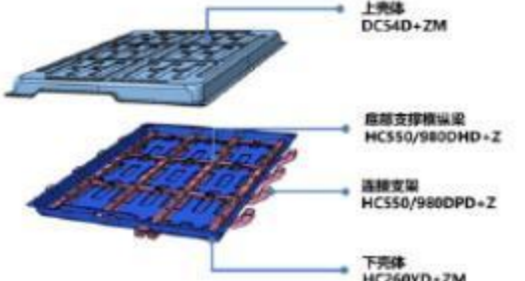
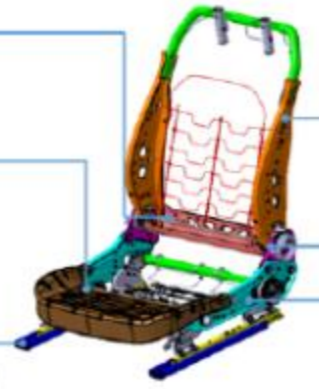


## 2.1 EVI 技术 (Early Vendor Involvement Technology)

### 2.1.1 小总成解决方案 (Assembly solution)

通过高强材料、先进工艺和结构优化等综合解决方案，实现车身小总成轻量化目的。


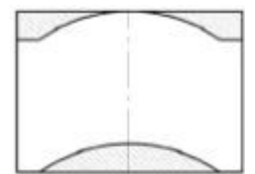

Shougang EVI can provide customers with comprehensive solutions consist of high strength material design, advanced forming technology, structure optimization, and so on to achieve the lightweight goal of carbody assembly.

选材设计 Material Design	先进成形工艺 Adv. Forming Tech.	结构优化 Structure Opt.	性能评估 Performance evaluation
 <p>下箱体出板 原牌号: HC900/1180CPD+Z 工艺: 辊压、辊压、辊压、辊压 材料利用率: 高</p> <p>箱体支撑横梁 原牌号: HC900/1180CPD+Z 工艺: 辊压成形工艺 原牌号: HC900/1180CPD+Z 工艺: 辊压成形工艺 材料利用率: 高</p> <p>箱体上/下盖板 原牌号: HC550/980DHD+Z 工艺: 辊压成形工艺 原牌号: HC550/980DHD+Z 工艺: 辊压成形工艺 材料利用率: 高</p> <p>辊压成形方案 Roll forming solution</p>		 <p>上壳体 DCS4D+ZM</p> <p>箱体支撑横梁 HC550/980DHD+Z</p> <p>连接变型 HC550/980DPD+Z</p> <p>下壳体 HC260VD+ZM</p> <p>冷冲压成形方案 Cold forming solution</p>	
<p>钢制电池包壳体解决方案 Steel battery pack shell solution</p>			
 <p><b>01 下横梁</b> 材料: 低合金高强度钢 原牌号: HC420LA 1.6mm 牌号: HCS00LA 1.4mm 工艺: 冷冲压 减重: 约13%</p> <p><b>02 座盆</b> 材料: 低合金高强度钢 原牌号: HC420LA 0.7mm 牌号: HCS00LA 0.6mm 工艺: 冷冲压 减重: 约14%</p> <p><b>03 滑轨</b> 材料: 高强度比型钢 原牌号: HC700/980CP 1.8mm 牌号: HC900/1180CP 1.6mm 工艺: 辊压 减重: 约11%</p> <p><b>04 靠背边板</b> 材料: 局部成形先进高强度钢 原牌号: HC700/980DP 1.2mm 牌号: HC820/1180DP 1.0mm 工艺: 冷冲压 减重: 约17%</p> <p><b>05 座靠连接板</b> 材料: 热轧酸洗钢 原牌号: S460MC 2.8mm 牌号: S700MC 2.6mm 工艺: 冷冲压 减重: 约7%</p> <p><b>06 靠垫边板</b> 材料: 局部成形先进高强度钢 原牌号: HC700/980DP 1.6mm 牌号: HC820/1180DP 1.4mm 工艺: 冷冲压 减重: 约13%</p> <p>座椅轻量化解决方案 Lightweight Solution of Vehicle Seat</p>			

### 2.1.2 技术降成本 (Cost Reduction)

通过选材方案优化、工艺工序优化、材料利用率提升等手段，实现技术降成本，达到车型目标成本。


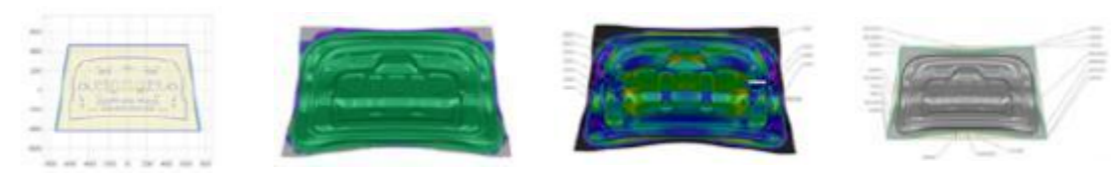
Shougang EVI can provide customers solutions consist of material selection, process optimization and promotion of material utilization ratio to reduce cost and reach model target cost.

工艺与工序优化和材料利用率提升 Process Optimization and Promotion of Material Utilization Ratio		选材方案优化 Optimization of Material Selection
一模两件 Two-cavity in One Mould	坯料形状优化 Blank Shape Optimization	牌号规格优化 Size Optimization
浅拉延 Shallow Forming	排样优化 Layout Optimization	镀层选择 Coating Selection
成形代拉延 Forming to Replace Drawing	锯齿边落料 Saw Edge Blanking	易购性 Shoppability
 <p>左右件合并 Merging of Left and Right Parts</p>	 <p>坯料设计优化 Blank Design Optimization</p>	 <p>优化排样 Layout Optimization</p>

### 2.1.3 零部件同步优化设计 (Synchronous Optimization Design)

为客户提供从工序设计、模面设计、板料尺寸和形状优化到可制造性评估的零部件同步优化设计，实现客户成本价值最优化。

Shougang EVI can provide customers with synchronous optimization design of parts from process design, die surface design, sheet size, and shape optimization to manufacturability evaluation, to realize the optimization of customer cost value.

	
零件 Part	工序设计 Forming Process Design
	
板料尺寸和形状优化 Blank Optimization	仿真结果评估 Evaluation of Simulation Results

## 2.2 冲压成形技术 (Forming Technology)

### 2.2.1 汽车板使用性能数据库 (Automotive Steel Performance Database)

首钢在线汽车板使用性能数据库覆盖 1200MPa 级别及以下汽车板牌号，内容包含化学成分、金相组织、力学性能、成形性能、碰撞性能、疲劳性能等，可满足汽车厂认证和选材的需求，为汽车企业提供准确的材料成形仿真数据。

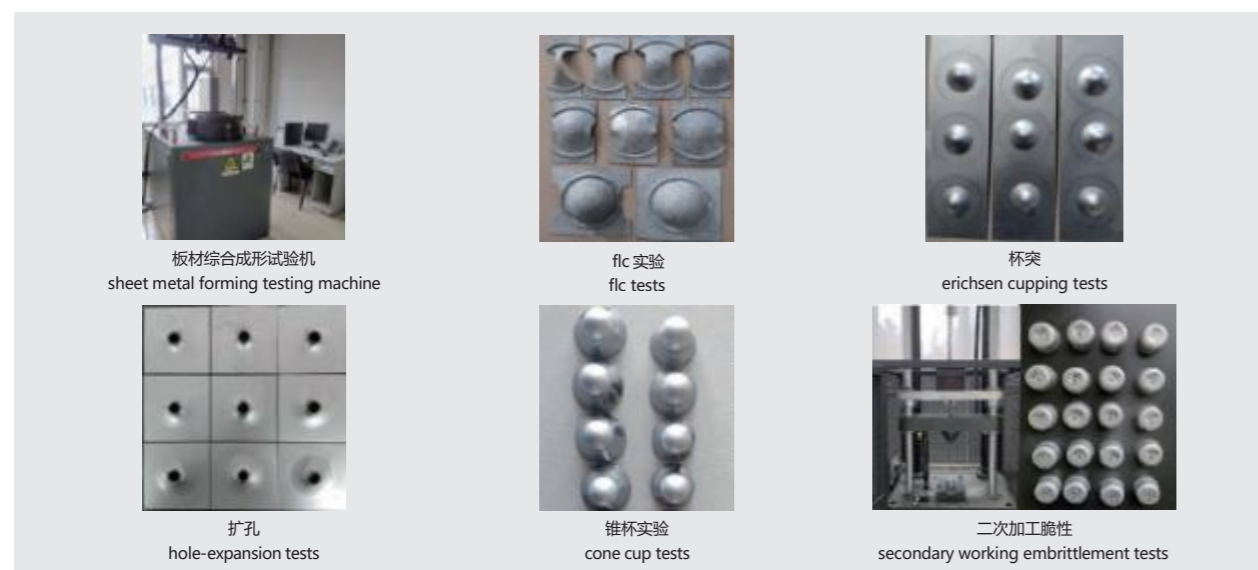
Shougang online automotive steel performance database covers grades up to 1200MPa, including chemical composition, metallurgical structure, mechanical properties, forming properties, collision performance, fatigue performance, etc., which can meet the requirements of auto factory certification and material selection, and provide accurate material forming simulation data for auto enterprises.



### 2.2.2 汽车板冲压成形性能 (Automotive Steel Forming Properties)

汽车板成形试验主要用于板材成形性能评价。成形实验室具备板材成形极限、扩孔、杯突、锥杯、液压胀形、二次加工脆性等试验分析能力，为用户技术服务、选材、冲压缺陷分析提供支撑。

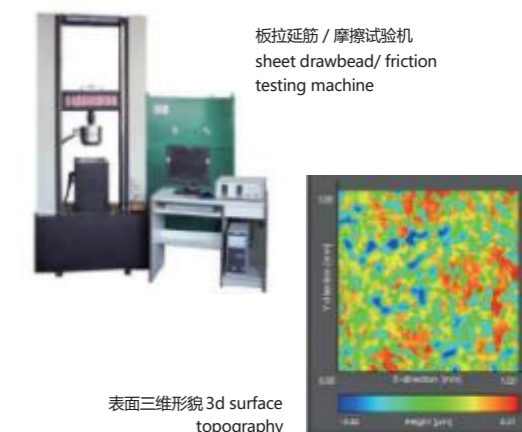
The forming test of automotive steel is mainly used to evaluate the sheet forming performance. The forming laboratory is equipped with the ability to analyze tests such as forming limit, hole expansion, erichsen cupping test, cone cup test, hydro-bulging test, secondary working embrittlement, etc., which provides support for customer technical service, material selection and part stamping defect analysis.



### 2.2.3 表面摩擦特性 (Surface Friction Characteristic)

摩擦特性对板材冲压成形过程有较大的影响。薄板拉延筋 / 摩擦试验机具备板材镀层剥离试验、摩擦系数测试和拉延筋约束阻力试验等功能，广泛用于板材摩擦系数测试、镀锌板锌层附着力的评价、油品润滑性能测试等。

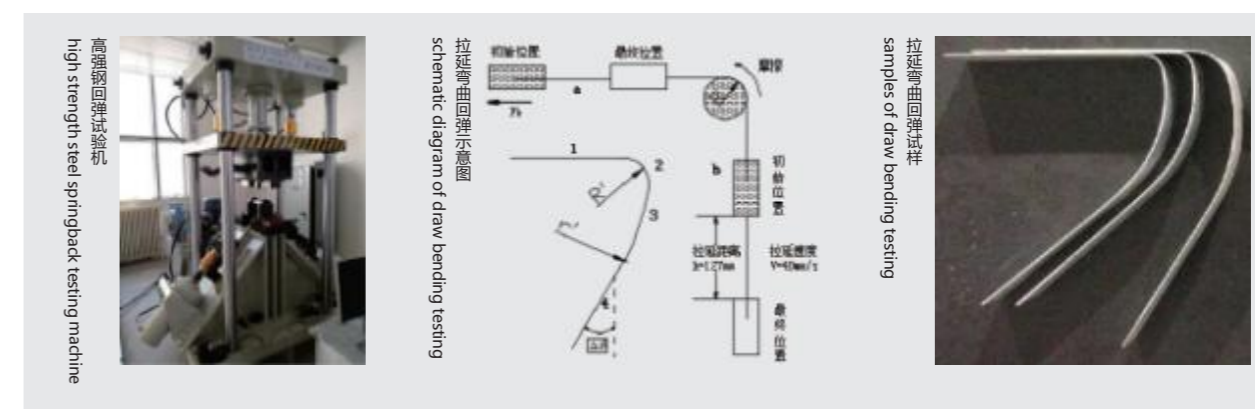
Friction characteristics have a great influence on the sheet metal forming process. Sheet drawbead/ friction testing machine has the functions of sheet coating peeling test, friction coefficient test and drawbead restraining force test. It is widely used for testing the friction coefficient of sheet metal, evaluating the adhesion of zinc coating and testing the lubricity of oil.



### 2.2.4 高强度回弹特性 (High-strength Steel Springback Characteristics)

高强度回弹试验机主要用于研究高强钢的回弹规律，试验机能够完成 U 弯、V 弯、拉伸弯曲和拉延弯曲回弹试验。通过研究回弹产生的原因和规律，对提高高强钢零件的成形精度具有重要的意义。

High-strength steel springback testing machine is mainly used to study the springback law of high strength steel. The testing machine can conduct U-bending, V-bending, stretch bending and draw bending springback test. It is of great significance to improve the forming accuracy of high-strength steel parts by studying the reasons and laws of springback.

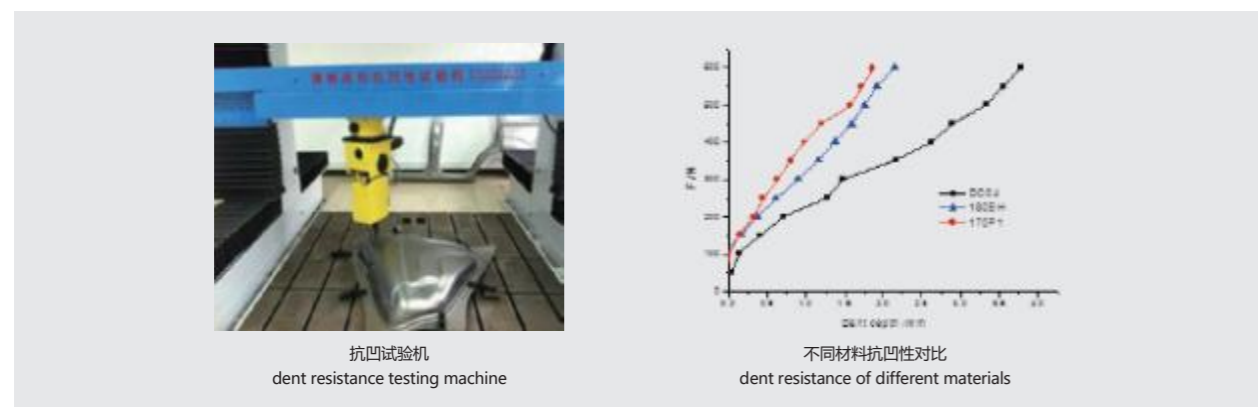




### 2.2.5 覆盖件抗凹性评估 (Outer Panel Dent Resistance Evaluation)

随着汽车轻量化技术的发展，超薄规格高强度钢已应用于汽车外覆盖件的制造中。材料及零件的抗凹性评估是高强度材料推广应用的重要一环。抗凹试验机能够完成覆盖件局部凹痕抗力和抗凹刚度测试，可为零件选材提供依据。

With the development of automotive lightweight technology, ultra-thin high-strength steel has been used in the manufacture of automotive outer panels. The evaluation of dent resistance of materials and parts is an important part of the promotion and application of high-strength steel materials. The dent resistance testing machine can complete the testing of local dent resistance and stiffness of outer panels, which can provide the basis for materials selection of parts.



### 2.2.6 网格应变分析技术 (Circle Grid Analysis Technology)

成形极限图 (FLD) 是评定金属板料冲压成形安全裕度的重要工具，使用网格应变测量系统可以方便地获得冲压后零件表面全场应变数据及板料的厚度减薄率，用于评估零件冲压成形安全裕度。

Forming limit diagram (FLD) is an important tool to evaluate the safety margin of sheet metal stamping. The grid strain measurement system can easily obtain the full-field strain data on the surface of the part and the thickness reduction rate of the sheet after stamping, which can be used to evaluate the safety margin of stamping part.

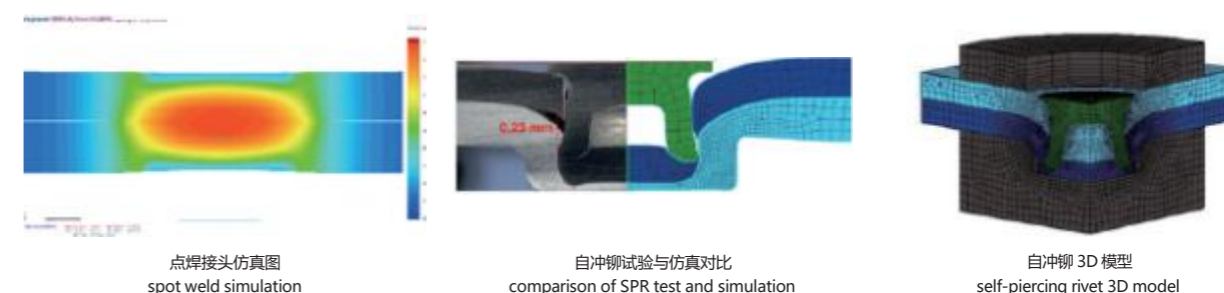


### 2.3 连接技术 (Joining Technology)

#### 2.3.1 汽车板连接实验室 (Automotive Steel Joining Laboratory)

首钢汽车板连接实验室是国际化、专业化的汽车板焊接测试和认证平台，具备中频直流点焊、工频交流点焊、激光焊、弧焊及自冲铆接设备，具备汽车板连接仿真分析能力，可按照美系、欧系、日系焊接标准开展汽车板焊接及机械连接性能测试。

Shougang Automotive Steel Joining Laboratory is an international and professional automotive steel welding test and certification platform, equipped with intermediate frequency DC spot welding, power frequency AC spot welding, laser welding, arc welding and self-piercing riveting equipment, as well as equipped with the automotive steel connection simulation analysis ability to carry out the welding and mechanical connection performance tests in accordance with the welding standards of the United States, Europe, and Japan.

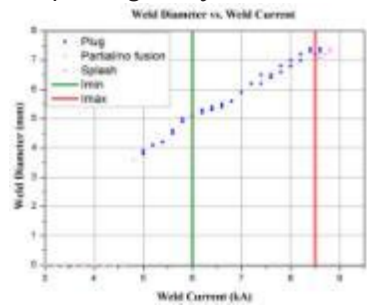




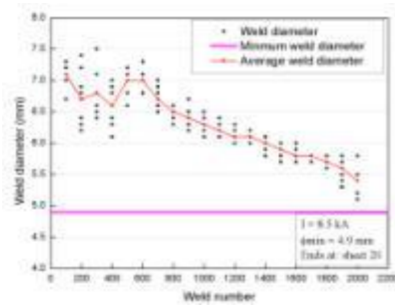
### 2.3.2 汽车板连接技术 (Automotive Steel Joining Technology)

基于现有设备，在汽车板材料连接方面可开展如下研究：材料可焊性研究、接头失效分析、结构焊接性评价、焊接新工艺开发、焊接过程优化控制、提升焊接接头综合性能、异种材料自冲铆接分析、铆接接头性能分析。

Based on the existing equipment, the following researches can be carried out in the connection of automobile plate materials: material weldability research, joint failure analysis, structural weldability evaluation, development of new welding technology, optimization control of welding process, improve the comprehensive performance of welded joints, self-piercing riveting of dissimilar materials analysis, and performance analysis of self-piercing rivet joint.



焊接工艺窗口  
welding lobe



电极寿命  
electrode lifetime



接头失效  
joint failure



### 2.3.3 胶接 (Adhesive Bonding)

胶接是借助胶粘剂在材料表面上所产生的粘合力，将汽车车身同种 / 异种材料牢固地连接在一起的方法。目前胶接工艺是实现汽车轻量化的重要手段。

Adhesive bonding is a method of connecting the same/different materials of automobile body with the adhesive force generated on the material surface.

#### 2.3.3.1 胶接工艺 (Adhesive Bonding Technology)

胶接工艺是将胶体挤压涂敷于汽车零件搭接部位，随后通过热固化工艺，胶层发生热固化转变，形成具有不同强度的搭接接头，形成对不同零件及部位的高强度连接、密封，减震等功能性连接。常见的汽车胶接工艺用胶有：结构胶、折边胶、减震膨胀胶及点焊密封胶等。胶接结构具有承载面积大、应力分布均匀、比强度高、比刚度、抗腐蚀性好、连接效率高以及优异的抗疲劳等优点。

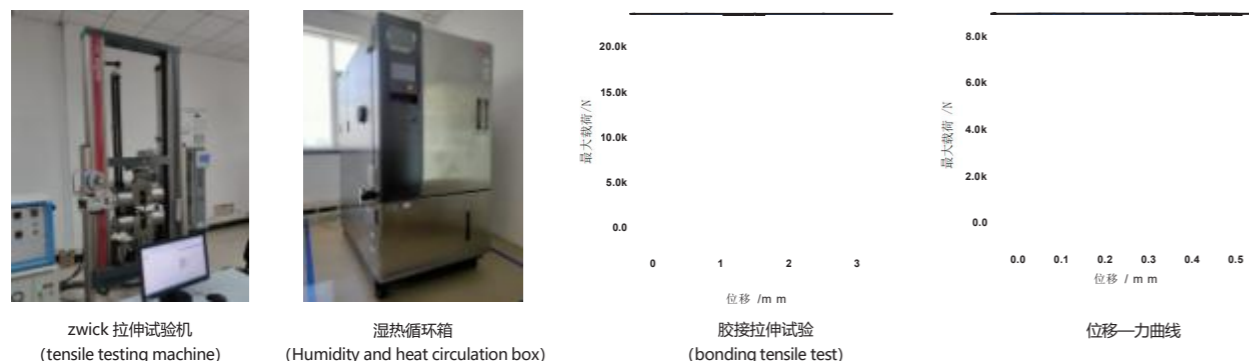
Adhesive bonding process is to apply the adhesive layers on the lap joint of automobile parts, and then through the thermal curing process, the adhesive layer will undergo the thermal curing transformation, forming the lap joint with different strengths: forming the high-strength connection, sealing, shock absorption and other functional connections for different parts and parts. The common adhesive used in automobile bonding process includes: structural adhesive, folding adhesive, damping expansion adhesive and spot welding sealant. The adhesive structure has many advantages, such as large bearing area, uniform stress distribution, high specific strength, high specific stiffness, good anti-candle resistance, high connection efficiency and excellent anti-fatigue.

#### 2.3.3.2 胶接工艺影响因素 (Factors of Adhesive Bonding)

胶接接头的实际力学性能表现受多种接头设计和工艺参数的影响，如材料力学强度、表面粗糙度、胶层厚度、胶接角度、胶瘤和固化工艺（固化温度和时间曲线）等。

The mechanical performance of adhesive joints is influenced by various design and technological parameters of the joints, such as mechanical strength of materials, surface roughness, adhesive layer thickness, adhesive Angle, adhesive nodules and curing process (curing temperature and time curve).

### 2.3.3.3 胶接技术支持 (Adhesive Bonding Technical Support)



## 2.4 涂装技术 (Painting Technology)

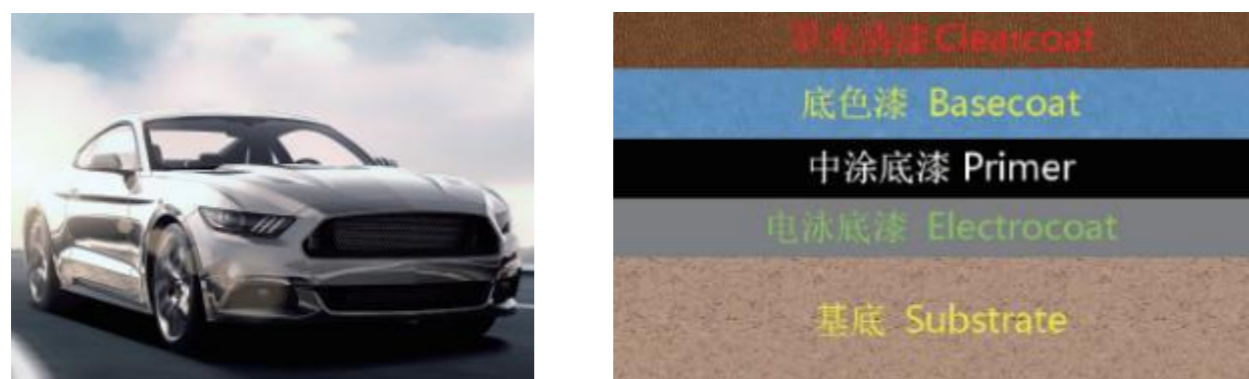
涂装是指汽车厂家在涂装车间将涂料涂覆于白车身上，经干燥成膜的工艺。涂装的主要功能保护作用、装饰作用、特殊功能。

Coating refers to the process that the automobile manufacturer applies the coating on the white body in the painting workshop and forms a film after drying. The main functions of coating are protection, decoration, and special functions.

涂装基本工艺流程示意图 (Typical coating process)



涂层结构示意图 (Illustration of the structure of a typical automobile multi-layers coating)



### 2.4.1 汽车涂装的质量要求及评价指标 (Quality Requirements and Evaluation Index of Coating)

确保汽车整车使用 10 年，汽车车身使用寿命达 20 年或行程 30 万公里以上不产生导致结构性破坏的锈蚀。汽车涂层的主要质量指标：外观装饰性、耐候性、耐蚀性、机械强度、耐介质性。

To ensure that the vehicle can be used for 10 years, the car body life can reach 20 years or the mileage can be more than 300,000 kilometers without any structural failure caused by corrosion. Main quality index of automobile coating: Decorative appearance, Weather resistance, Corrosion resistance, Mechanical strength, Medium resistance.

### 2.4.2 磷化技术 (Phosphating Technology)

前处理工序：脱脂→表面调整→磷化

Pretreatment process: degreasing → surface conditioning → phosphating

磷化是前处理的核心工艺。它是通过钢板 / 镀锌层表面与酸性磷酸盐溶液反应生成一层非金属的、半导电的多孔磷酸盐无机转化膜。该转化膜的主要功能是提高基板与漆膜的结合力，并改善涂层的膜下防腐和耐水性。

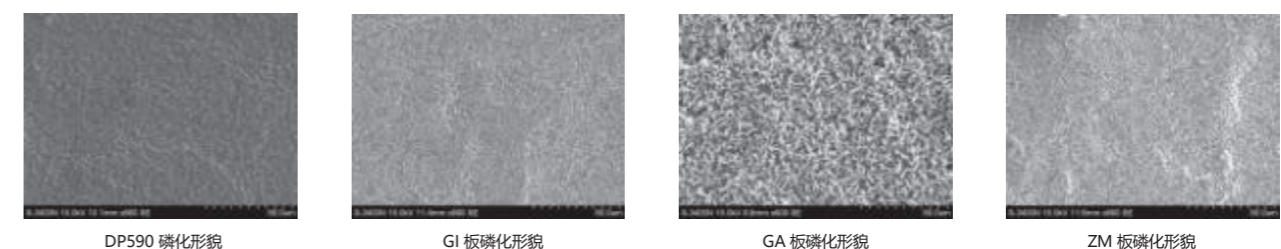
Phosphating is the core process of pretreatment. The surface of steel plate / zinc coating reacts with acid phosphate solution to form a non-metallic and semi conductive porous phosphate inorganic conversion film. The main function of the conversion film is to improve the adhesion between the substrate and the paint film, and improve the under film anti-corrosion and water resistance of the coating.

磷化膜主要成分： $Zn_2Fe(PO_4)_2 \cdot 4H_2O$  和  $Zn_3(PO_4)_2 \cdot 4H_2O$

Component of phosphating film:  $Zn_2Fe(PO_4)_2 \cdot 4H_2O$  and  $Zn_3(PO_4)_2 \cdot 4H_2O$

不同钢材及镀层磷化膜微观形貌：

Microstructures of phosphating film on different substrates:



对于连退板来说，其表面氧化物组成及形态、粗糙度、组织结构等因素均对磷化性能产生不同程度的影响；对于镀层钢板 (GI、GA、ZM) 来说，其锌层表面微观结构、粗糙度等因素对磷化性能产生一定的影响。

For the annealed steel sheet, composition and morphology of the surface oxides, roughness, microstructure and other factors have different degrees of influence on the

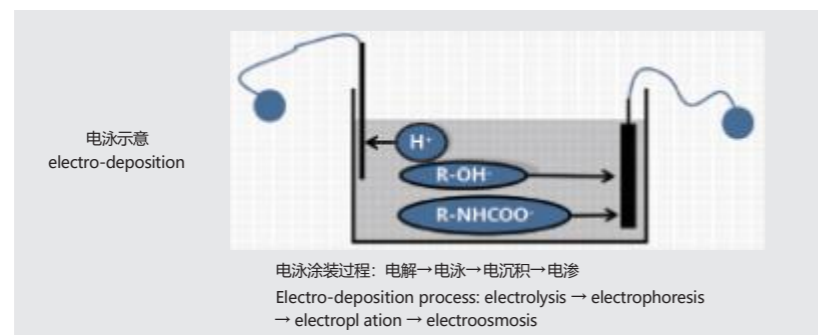
phosphating performance; for the coated steel sheet (GI, GA, ZM), the surface microstructure, roughness and other factors have a certain impact on the phosphating performance.



### 2.4.3 电泳涂装 (Electro-deposition)

电泳涂装是利用外加电场使悬浮于电泳液中的颜料和树脂等微粒定向迁移并沉积于电极之一的基底表面的涂装方法。

electro-deposition is a coating method in which particles such as pigment and resin suspended in electrophoretic solution are directionally migrated and deposited on the substrate surface of one of the electrodes by using an external electric field.



材料表面质量, 磷化膜结晶质量, 电泳漆膜种类、组成以及厚度等均会对电泳漆膜耐腐蚀性能产生影响。

The corrosion resistance of the electrophoretic coating is affected by the surface quality of the material, the crystalline quality of the phosphating film, the type, composition and thickness of the electrophoretic paint film.



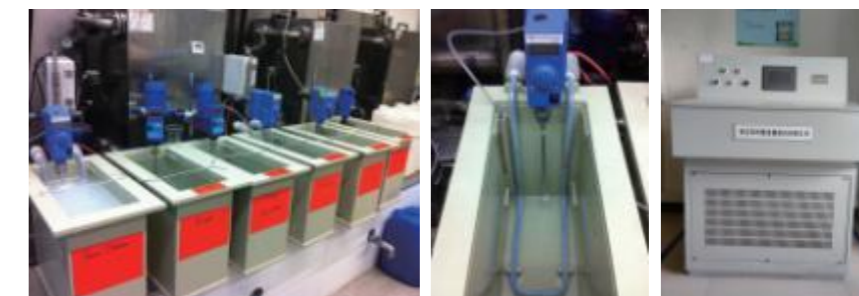
### 2.4.4 涂装与腐蚀技术研究 (Coating and Corrosion Technology)

具备先进的涂装与腐蚀试验室, 可与汽车厂建立联合研发平台, 开展先进涂装工艺模拟、新型表面处理技术、新材料可涂装性等研究工作。

开展涂装 EVI 技术服务, 为主机厂新车型的选材、涂装和腐蚀提供解决方案。

Advanced coating and corrosion lab is able to establish a joint R&D platform with auto factories. It can carry out advanced coating process simulation, new surface treatment technology, new materials and other research work.

The EVI technology services are launched to provide solutions for the automobile factories, such as materialselection, coating, or corrosion of the new models.



汽车涂装 前处理工艺模拟  
Simulation of pretreatment process



涂装腐蚀测试  
Coating corrosion test



# Chapter 3 Quality Assurance

## 第三章 质量保障

近些年来为了使首钢产品在国内和国际市场上更具竞争力，满足汽车用户的需要，首钢在引进国外先进技术装备的同时，不断完善一贯制质量管理、努力提高产品质量、加快质量体系的国际认证步伐。从钢铁行业实际出发，按照 ISO9001 标准的要求，建立和完善文件化质量体系，并于 2009 年 11 月获得了德国莱茵公司 ISO9001 质量管理体系认证证书，2011 年 9 月获得 ISO/TS16949 质量管理体系认证证书，2012 年 9 月获得 ISO14001 环境管理体系认证证书，2017 年 9 月获得 IATF16949 质量管理体系认证证书。

通过贯彻实施 ISO9001 和 ISO/TS16949 标准，首钢质量管理体系建设和运行不断进入更深层次，质量方针和目标得到深入贯彻和实施，持续改进、缺陷预防，减少变差和浪费能力大大提高。按 ISO/TS16949 标准建立起来的严密的文件化质量体系，适应了世界汽车工业不同汽车制造商对质量管理体系的要求，它在质量管理法制化、突出质量管理的八项原则、重视激励员工与充分授权、关注员工的工作效率和质量成本、简化流程、持续改进、重视劳动安全和产品安全性、预防缺陷、防错、开展产品审核和过程审核等方面大大丰富了一贯制质量管理的内容。产品质量先期策划 (APQP) 和控制计划 (CP)、潜在失效模式及后果分析 (FMEA) 等相关手册广泛应用于质量管理。正在实施的六西格玛精益运营管理，把质量管理推向更高层次。实践证明，一贯制质量管理较好地适应了首钢这样的现代化钢铁企业，体现了集中、一贯、高效、优化的特点，实现了质量管理由中间向两头延伸的全过程的整体优化。首钢在自己的质量管理实践中，不断吸收世界先进的质量管理理念和方法，与时俱进，进一步充实和丰富了一贯质量管理的内容。



In recent years, modernized technical equipments are imported from abroad, at the meantime, Shougang Steel has also accelerated the pace of international production quality system certification in order to continuously improve the consistent quality management and product quality. Since 2009, it has built and improved its documentation quality system according to ISO9001 standard requirements in view of the actual situation of iron and steel industry and it was awarded with ISO9001 certification. In addition, it passed the ISO/TS16949:2008 standard certification in 2011 and ISO14001:2004 standard certification in 2012, IATF 16949:2016 was released in Sept. 2017.

With the implementation of ISO9001, ISO/TS16949 and ISO14001 standards, Shougang Steel's quality system construction and operation kept progressing towards deeper levels. Also, the quality policies and targets were pushed forward to a deep degree. It is also deeply enhanced that the ability for continuous improvement, prevention of defects, as well as reduction of variation difference and waste. The strict documentation quality system established according to the ISO/TS16949 standard fitted to the requirements for quality management systems of different automobile makers in the global automobile industry. It greatly enriches the through-going quality management in the aspects such as allowing the quality management by laws, highlighting eight principles for quality management, laying weight on employee inspiration and sufficient authorization, caring working efficiency and quality cost of employees, streamlining the process, keeping improvement, paying attention to labor security and product security, preventing defects and errors, as well as carrying out product review and process review. Manuals related to advanced product quality planning (APQP), control plan (CP), potential failure mode and effect analysis (FMEA) are widely adopted in quality management. The ongoing six-σ intensive lean operation and management pushes the quality management to a higher level. Practices prove that the through-going quality management is relatively well suitable to a modernized steel complex like Shougang Steel, while showing central, through-going, highly efficient and optimal features and realizing full-process, from the center to the two ends by extension, integral optimization of quality management. Keeping absorbing world advanced quality management philosophies and methods during its own quality management practices and maintaining the pace abreast of the time.



### 实验能力

汽车板综合技术实验室：涉及汽车板成形技术、耐腐蚀及涂装工艺等汽车板使用技术相关领域研究，配置的仪器设备主要有：板材综合成形试验机、应变测量系统、薄板拉延筋/摩擦试验机、抗凹性试验机、三维显微分析系统、粗糙度仪、电化学分析仪等。



### Experimental Capacity

Auto-sheet comprehensive technology lab: investigates in the relevant area of auto-sheet application technology, such as the auto-sheet forming, anti-corrosion and coating techniques, etc. The main instruments equipped in this lab include: sheet forming testing machine, strain measurement system, strip drawbead/friction testing machine, dent resistance testing machine, 3D microscopic analysis system, roughmeter and electrochemical analyser, etc.

### 产线检验能力

具有完整的物理实验室、化学实验室、油质实验室、金相实验室、低倍实验室。从原料进厂、生产过程到产品出厂，都经过严格检验，全过程实现了自动化和信息化，为生产高端精品板材产品提供了可靠保证。

实验室通过了中国合格评定国家认可委员会实验室认可，符合 ISO/IEC 17025:2017《检测和校准实验室能力的通用要求》的要求，具备承担矿石、燃料、锰硅合金、钢铁、金属和金属制品、铁磁材料 6 大类中 32 小项检测服务的能力。根据 CNAS 认可准则要求，建立和实施质检监督部管理体系。



### Inspection Capacity of the Production Line

The quality inspection institution is constructed with raw material analysis center, smelting analysis center and steel rolling testing center. It is equipped with a set of experiment labs, including physics labs, chemical labs, oil quality labs, metallographic labs and low-magnification microscopic labs. From the raw material import, manufacturing to the final product delivery, all procedures are strictly controlled. Automation and informatization have been achieved for each procedure, which provides reliable assurance for producing high-end sheet products.

All labs have got the certificate of China National Accreditation (CNAS) of laboratory accreditation. And the labs also fulfill the requirements of ISO/IEC 17025:2017. They possess the capacity of detection service of 32 minor terms out of 6 main terms, which include mineral, fuel, manganese-silicon, steel, metal products and ferromagnetic materials. On the basis of the requirements of CNAS criteria, quality control system has been established and implemented.

## Chapter 4 Service System

### 第四章 服务体系

首钢致力于打造“产品一流、技术一流、管理一流、环境一流”的汽车板生产企业，秉承“服务创造价值、服务塑造形象、服务提升品牌”的服务理念，以用户为中心，全面深化与用户的战略协作，在新产品研发、材料选用、资源配置、拓展合作渠道等方面进行深层次合作。在汽车开发各个阶段均可提供先行服务。

Shougang is committed to creating the “first-class” products, first-class technology, first-class management, first-class environment” automotive sheet production enterprises, adhering to the service concept, “service creates value, service shapes image, service enhances brand,” Upholding the user-centered operation philosophy, Shougang deepens strategic cooperation with users in such aspects as new product research & development, material selection, resource configuration and expansion of cooperation channels, Providing automobile makers with earlier service at each stage during automobile development.





### 售前服务 Pre-sale service

■ 提供详细的产品介绍材料与标准	■ Providing detailed Product introduction and standards
■ 为用户提供正确的选材指导	■ Serving users with instructions on correct selection of material
■ 在车型设计阶段提供供应商先期介入服务, 对车型用材进行初选, 提供 CAE 仿真分析, 验证零件设计与选材的准确性, 并提供最佳方案	■ Providing EVI service on primary selection of materials for vehicle in the model design phase, providing CAE emulation analysis, verifying accuracy of the design and material selection for parts and providing optimal solution

### 售中服务 In-sale service

■ 合同跟踪	■ 提供详细的用户合同跟踪信息, 确保交货期
■ Contracts tracking	■ Providing detailed user order tracking information to ensure punctual goods delivery

### 售后服务 After-sale service

■ 质保书查询	■ 为用户提供网上质保书查询功能
■ Query for certificate	■ Providing users with online query for certificate
■ 技术支持	■ 为用户提供首钢产品在使用中各类问题的咨询以及产品使用现场跟踪服务
■ Technical supports	■ Providing users with advisories for various problems met during the application of Shougang's products and site tracking service on product application
■ 诉求处理	■ 快速有效的处理产品诉求, 包括现场的跟踪调整试验, 提供诉求材料紧急替代方案, 满足用户生产需求
■ Claim handling	■ Quickly and effectively handling claims on product, including site tracking & adjustment tests, providing emergent substitute proposal against claimed materials to meet users' production demands
■ 客户信息反馈	■ 通过各种渠道收集客户信息, 整理分类, 改进产品, 反馈用户, 满足用户需求
■ Customer information feedback	■ Collecting customers' information through various means, sorting and classifying the information, improving products accordingly, feeding back information to users and satisfying users' requirements

# Chapter 5 Ordering Guide

## 第五章 订货指南

### 订货所需信息及注意事项 (Necessary Information and Cautions in Ordering)

订货时用户需提供下列信息

The user needs to provide following information while placing an order\

- 1 产品名称  
Product designation
- 2 产品标准号  
Product standard number
- 3 牌号  
Steel grade
- 4 产品规格及尺寸精度 (包括厚度、宽度、长度)  
Product specification and dimensional accuracy(Incl. thickness, width and length)
- 5 不平度精度  
Flatness<sup>i</sup> accuracy
- 6 边缘状态  
Edge status
- 7 表面质量级别  
Surface quality level
- 8 涂镀产品需提供镀层种类、镀层重量及表面处理  
Coating type, coating weight and surface treatment in case of coated products
- 9 热镀锌产品需提供表面结构  
Surface structure in case of hot dip galvanized products
- 10 重量  
Weight
- 11 包装方式  
Packing<sup>method</sup>
- 12 用途  
Application
- 13 其他特殊要求  
Other special requirements

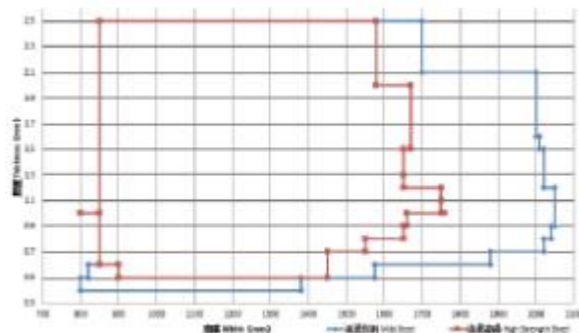




首钢汽车板供货范围 Scope of Supply

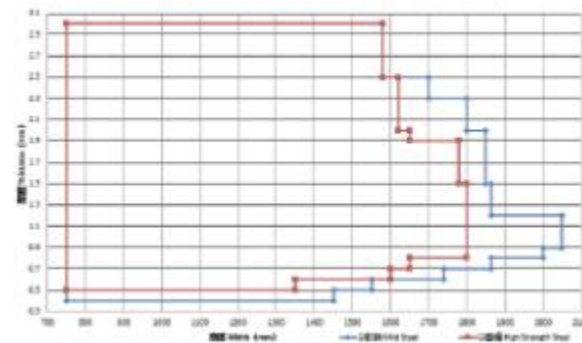
连退接单能力示意图

Availability of Annealed Cold Strips



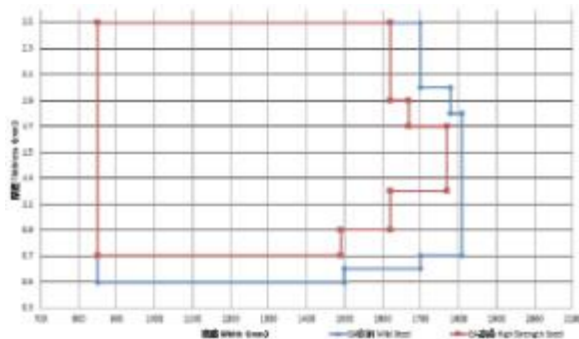
GI 产品接单能力示意图

Availability of Hot-Dip Galvanized Steel Strips



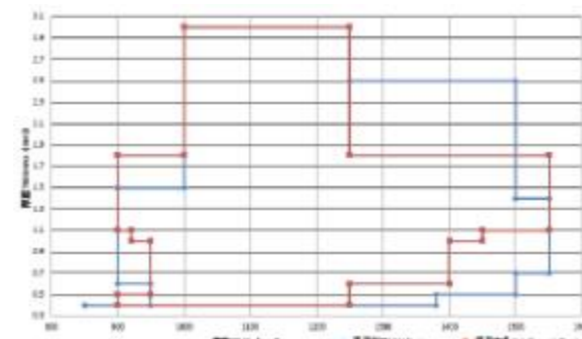
GA 产品接单能力示意图

Availability of Hot-Dip Galvannealed Steel Strips



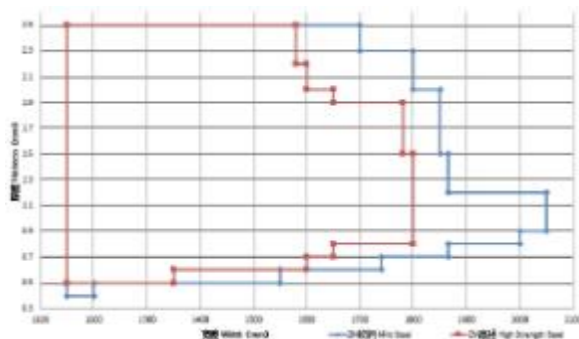
罩退产品接单能力示意图

Availability of Batch Annealed Steel Strips



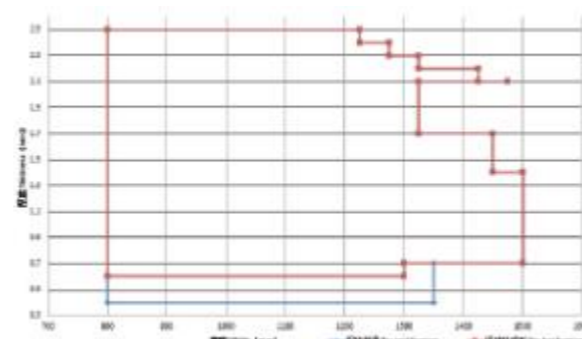
锌铝镁产品接单能力示意图

Availability of ZM Coated Steel Strips



铝硅镀层产品接单能力示意图

Availability of Al-Si Coated Steel Strips



订货涉及的计量方法 (Order-related Quantitative Methods)

钢板理论重量计算方法 Calculation method for theoretical weight of steel sheets

计算顺序	计算方法	结果修约
基本重量 kg/mm·m <sup>2</sup>	7.85 (厚度 1mm, 面积 1 m <sup>2</sup> 的重量)	—
单位重量 kg/m <sup>2</sup>	基本重量 (kg/m <sup>2</sup> ) × 厚度 (mm)	修约至四位有效数字
钢板面积 m <sup>2</sup>	宽度 (m) × 长度 (m)	修约至四位有效数字
1 块板重量 kg	单位重量 (kg/m <sup>2</sup> ) × 钢板面积 (m <sup>2</sup> )	修约至三位有效数字
1 捆重量 kg	1 块板重量 (kg) × 同规格的 1 捆钢板块数	修约至 kg 的整数位 S
总重量 kg	—	—

Calculation Sequence	Calculation Method	Result Revision and Cancellation
Basic weight kg/mm·m <sup>2</sup>	7.85 (weight with T=1mm and area=1m <sup>2</sup> )	-
Unit weight kg/m <sup>2</sup>	Basic weight (kg/m <sup>2</sup> ) × Thickness (mm)	Revised and cancelled to four effective digits
Steel sheet area m <sup>2</sup>	Width (m) × Length (m)	Revised and cancelled to four effective digits
Weight per sheet kg	Unit weight (kg/m <sup>2</sup> ) × Steel sheet area (m <sup>2</sup> )	Revised and cancelled to three effective digits
Weight per bundle kg	Weight per sheet (kg) × number of same-size sheets per bundle	Revised and cancelled to integral number digit in kg S
Total weight kg		

数值修约方法按 GB8170 《数值修约规则》的规定。

Value revision and cancellation method abides by the stipulations of Regulation for Value Revision and Cancellation.

锌层重量计算方法 Calculation method for coating weight

纯镀锌层 Zinc coating

单面公称锌层重量 Single-side Nominal Coating Weight	40	50	60	90	100	110	125	135	175	225
相当锌层厚度 mm Converted Coating Thickness mm	0.008	0.010	0.013	0.017	0.020	0.022	0.024	0.027	0.032	0.040

合金化镀层 Alloy coating

单面公称锌层重量 Single-side Nominal Coating Weight	30	40	50	60	90
相当锌层厚度 mm Converted Coating Thickness mm	0.006	0.008	0.010	0.013	0.017

铝镁镀层 Zn-Al-Mg Alloy Coatin

单面公称锌层重量 Single-side Nominal Coating Weight	30	35	40	50	60
相当锌层厚度 mm Converted Coating Thickness mm	0.0045	0.0054	0.006	0.0077	0.009

### 产品标签及包装方式 (Product tags and packing methods)

#### 标志 Shipping Mark:

标志内容按需要可包括：商标、供方名称、品名、标准、规格、捆包号、用户合同号、炉号、镀层重量、颜色、生产日期、计重方式、净重、毛重、收货单位、防护标志等。

The Shipping Mark should consist of: Trade mark, Seller' s name, Product name, Applicable standards, Specifications, Package No., Contract No., Heat No., Weight of zinc film, Color, Production date, Weighing method, Net weight, Grossweight, Consignee and Protection symbols, etc..

#### 质保书 Quality Certificate

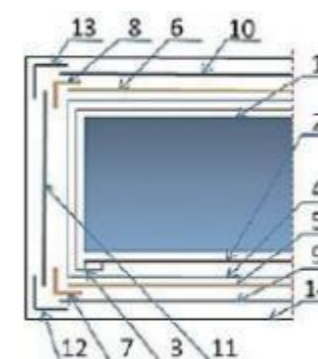
每批交货的钢板及钢带（钢卷）必须开具质保书。质保书上按需要应注明：商标、供方名称、品名、标准、产品规格、钢卷号或捆包号、用户合同号、炉号、颜色、重量、订货单位、件数、标准中规定的各项试验的结果、交货日期、质保书签发日期、质量管理部门负责人的签字等。

Each shipment of delivered steel sheets or steel coils shall be attached with the Quality Certificate. The Quality Certificate shall cover: Trade mark, seller' s name, Product name, Applicable standards, Product specifications, Coil No. & Package No., Contract No., Heat No., Color, Weight, Buyer, Quantity, Test Results as per standards, Delivery time, Quality Certificate issuance date, Signature by Chief of the Quality Control Dept., etc..



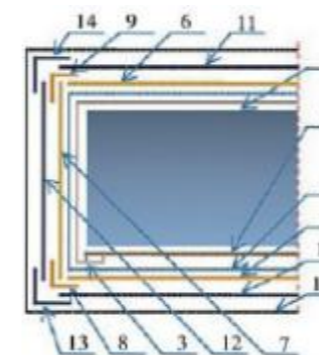
### 包装方式 Packing Methods

#### 普通包装方式 General packing method



- |            |  |
|------------|--|
| 1. 钢卷      | 1.coil                                     |
| 2. 内芯纸板    | 2.inner packing boarding                   |
| 3. 防锈包装纸   | 3.antirust paper                           |
| 4. 普通工业膜   | 4.industrial film                          |
| 5. 内周瓦楞纸护板 | 5.insidecorrugated paperprotective plate   |
| 6. 外周瓦楞纸护板 | 6.outsidecorrugated paper protective plate |
| 7. 内纸护角    | 7.inside paper angle bead                  |
| 8. 外纸护角    | 8.outside paper angle bead                 |
| 9. 内周钢护板   | 9.inside iron protective plate             |
| 10. 外周钢护板  | 10.outside iron protective plate           |
| 11. 端部塑料护板 | 11.round platic protective plate           |
| 12. 内钢护角   | 12.inside iron angle bead                  |
| 13. 外钢护角   | 13.outside iron angle bead                 |
| 14. 径向钢捆带  | 14.radial binding belt                     |

#### 精包装方式 Advanced packing method



- |            |   |
|------------|---|
| 1. 钢卷      | 1.coil                                    |
| 2. 内芯纸板    | 2.inner packing boarding                  |
| 3. 防锈包装纸   | 3.antirust paper                          |
| 4. 普通工业膜   | 4.industrial film                         |
| 5. 内周瓦楞纸护板 | 5.insidecorrugated paper protective plate |
| 6. 外周硬纸护板  | 6.outsidecardboard protective plate       |
| 7. 端部瓦楞纸护板 | 7.round corrugated paper protective plate |
| 8. 内纸护角    | 8.inside paper angle bead                 |
| 9. 外纸护角    | 9.outside paper angle bead                |
| 10. 内周钢护板  | 10.inside iron protective plate           |
| 11. 外周钢护板  | 11.outside iron protective plate          |
| 12. 端部钢护板  | 12.round iron protective plate            |
| 13. 内钢护角   | 13.inside iron angle bead                 |
| 14. 外钢护角   | 14.outside iron angle bead                |
| 15. 径向钢捆带  | 15.radial binding belt                    |



## 联系方式

CONTACT

北京首钢股份有限公司  
Beijing Shougang Co., Ltd.  
http://www.sggf.com.cn

上海首钢钢铁贸易有限公司  
Shanghai Shougang Steel Trading Co. Ltd.  
电话: 021-50930789  
传真: 021-50931008

广州首钢钢铁贸易有限公司  
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电话: 020-22123069  
传真: 020-22123691

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传真: 0532-80667087

首钢鹏龙钢材有限公司  
电话: 010-81470116

苏州首钢钢材加工配送有限公司  
电话: 0512-53995377

宁波首钢浙金钢材有限公司  
电话: 0574-86283086

宁波首钢汽车部件有限公司  
电话: 0574-23455501

哈尔滨首钢武中钢材加工配送有限公司  
电话: 0451-51640025

沈阳首钢钢材加工配送有限公司  
电话: 024-83960710

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China Shougang India Private Limited  
Tel: 0091 124 4100380/1  
Tax: 0091 124 4100381

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Shougang International(Singapore) PTE. Limited  
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Tax: 0065 62252617

首钢国际(奥地利)有限公司  
Shougang International(Austria) GmbH  
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Tax: 0043 1 802 1995 50

首钢国际(加拿大)投资有限公司  
Shougang International(Canada) Investment LTD.  
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Tax: 001 6046970113

首钢智慧营销平台  
Shougang Intelligent Marketing Platform  
https://imp.sggf.com.cn

天津首钢钢铁贸易有限公司  
Tianjin Shougang Steel Trade Co., Ltd.  
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传真: 022-84918191

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佛山首钢中金钢材加工配送有限公司  
电话: 0757-81861600

首钢(青岛)钢业有限公司  
电话: 0532-86682569

株洲首鹏汇隆钢材加工配送有限公司  
电话: 0731-22330180

天津物产首钢钢材加工配送有限公司  
电话: 022-59060812

重庆首钢武中汽车部件有限公司  
电话: 023-63173616

首钢国际(马来西亚)有限公司  
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Tel: 0060 03 33778968/8972  
Tax: 0060 03 33920293

首钢国际(韩国)有限公司  
Shougang International(Korea) CO., LTD  
Tel: 0082 220519118  
Tax: 0082 517459117

首钢国际(香港)投资有限公司  
Shougang International(Hong Kong) Investment Limited  
Tel: 00852-28910011  
Tax: 00852-28910011

卓航海运(新加坡)有限公司  
Superior Ocean Shipping(Singapore) PTE. LTD.  
Tel: 0065-62251706  
Tax: 0065-62252617

## 产品商标介绍

PRODUCT TRADEMARK INTRODUCTION

注册商标	商标名称	商标简述	主要牌号
SOVETEN®	首钢超高强汽车板 Ultra High Strength Steel	抗拉强度超过 780MPa 级别的超高强钢, 产品覆盖酸洗及冷轧双相钢 (DP), 热基、酸洗及冷轧复相钢 (CP)、冷轧马氏体钢 (MS) 等, 广泛应用于车身及底盘安全结构件, 可实现汽车轻量化的同时提升碰撞安全性能。Ultra high strength steel with a tensile strength exceeding 780MPa, including dual phase steel (DP)(pickled or cold rolled), complex phase steel (CP)(hot rolled, pickled or cold rolled), martensitic steel (MS) (cold rolled), etc., are widely used in body and chassis safety structural parts, can reduce the weight of the car and improve the crash safety performance.	HC420/780DP、HC500/780DP、HC550/980DP、HC700/980DP、HC820/1180DP、HC570/780CP、HC660/780CP、HC780/980CP、HC900/1180CP、HC700/980MS、HC860/1100MS、HC950/1180MS、HC1030/1300MS、HC420/780DPD+Z(+ZF、+ZM)、HC500/780DPD+Z(+ZF、+ZM) HC550/980DPD+Z(+ZF、+ZM)、HC700/980DPD+Z(+ZF、+ZM)、HC820/1180DPD+Z(+ZF、+ZM)、+ZM)、HC570/780CPD+Z(+ZM)、HC660/780CPD+Z(+ZM)、HC780/980CPD+Z(+ZM) HC900/1180CPD+Z(+ZM)、HC860/1100MSD+Z、HC1030/1300MSD+Z 等
SOVEHF®	首钢增强成形性超高强汽车板 Ultra High Strength Steel with Improved Formability	在传统高强钢基础上, 引入一定量的残余奥氏体, 在变形过程提供相变诱导塑性来改善延伸率。以增强成形性双相钢 (DH) 和增强成形性复相钢 (CH) 为例, 与同等抗拉强度的传统双相钢和复相钢相比, 具有更高的断后伸长率和加工硬化指数。DH 钢适用于需要深拉伸的零件, CH 钢在拉伸成形和边缘成形获得较好的平衡。On the basis of traditional high strength steel, a certain amount of retained austenite is introduced to provide transformation induced plasticity during deformation to improve elongation. Taking improved formability dual phase steel (DH) and improved formability complex phase steel (CH) as examples, compared with traditional dual phase steel and complex phase steel with the same tensile strength, they have higher elongation after fracture and higher work hardening exponent. DH steel is suitable for parts that require deep drawing, and CH steel has a better balance between drawing forming and edge forming.	HC330/590DH、HC440/780DH、HC550/980DH、HC700/980DH、HC330/590DHD+Z(ZF、+ZM)、HC440/780DHD+Z(ZF、+ZM)、HC550/980DHD+Z(ZF、+ZM)、HC700/980DHD+Z(ZF、+ZM)、HC780/980CHD+Z(ZF、+ZM)、HC900/1180CHD+Z(ZF、+ZM) 等
SOZAMV®	首钢低铝锌铝镁镀层钢板 ZnAlMg(Low Al) coated steel sheet	在传统镀锌镀层的基础上, 添加少量的 Al 和 Mg, 显著提高了镀层的耐腐蚀性和耐摩擦性能, 涂装条件下的耐蚀性提高 1 倍左右, 适用于现有的焊接、涂装、成形工艺技术, 可以用于制造汽车车身、电器等。The corrosion resistance and friction resistance of the coating can be improved significantly by adding a small amount of Al and Mg to the traditional zinc coating. The corrosion resistance under painting condition is increased by about 1 time. The product is suitable for the existing welding, painting and forming technology, and can be used to manufacture automobile body, electrical appliances, etc..	镀层为 ZM 的所有汽车板牌号
SOZAMC®	首钢中铝锌铝镁镀层钢板 ZnAlMg(Medium Al) coated steel sheet	镀层中含有较高的铝含量和镁含量, 镀层的耐蚀性达到镀锌镀层的 3 倍以上, 切口位置也有良好的耐蚀性, 能够大幅度减少热浸锌的用量, 可以广泛用于户外钢结构的制造, 具备对热浸锌工艺的良好替代性。The coating contains high aluminum and magnesium. The corrosion resistance of the coating is more than 3 times that of the zinc coating. The cutting edge also has good corrosion resistance. It can greatly reduce the amount of hot-dip zinc, thus has good substitutability for hot dip galvanizing process. It can be widely used to manufacture outdoor steel structures.	镀层为 ZMA 的所有汽车板牌号
SDUNIFISH®	首钢超细晶各向同性高强外板 Uni-FISH Steel	超细晶各向同性高强外板是首钢在国内首发的一类高强外板, 该钢种具有高强度, 高成形性, 形变均匀和低波纹度, 低的韧脆转变温度等优势。应用于汽车覆盖件可实现厚度适当减薄, 能降低汽车的自重, 可用于制作车门外板、翼子板、发动机盖板、顶盖等外覆盖件。UF Steel is a type of high-strength outer sheet first developed by Shougang in China. It has advantages of high strength, good formability, uniform deformation, lower waviness, and lower-DBTT. It can be used for manufacturing door exterior panels, fenders, engine covers, roof covers, etc., achieving thickness reduction of parts and reducing vehicle weight.	UF340D+Z、UF390D+Z、Uni-FISH340、Uni-FISH390、Uni-FISH440、Uni-FISH340D+Z、Uni-FISH390D+Z、Uni-FISH440D+Z、Uni-FISH340D+ZF、Uni-FISH390D+ZF、Uni-FISH440D+ZF
SOHILAM®	首钢高扩孔高强汽车板 High Strength Steel with High Hole Expansion Ratio	高扩孔高强钢是具有优异扩孔性能的钢种, 产品覆盖冷轧高扩孔钢、酸洗及热基高扩孔钢, 冷轧高扩孔钢应用于车身安全结构件, 有利于提高车身结构抗侵入性能, 提升承载吸能效果; 热轧高扩孔钢具有优异的边缘延展性及疲劳耐久性, 广泛应用于底盘复杂结构件。High hole expansion high strength steel is a steel with excellent hole expansion performance including cold rolled, pickled and hot rolled. Cold rolled high hole expansion steel is used to manufacture body safety structural parts. It is conducive to improve the anti-intrusion performance of the body structure and the load-bearing and energy-absorbing effect. Hot rolled high hole expansion steel has excellent edge ductility and fatigue durability, which is widely used in complex structural parts of the chassis.	HR460/580FBD+Z、HR320/450FBD+Z、HD300/450FBD+Z、HD440/580FBD+Z、HD300/450FBD+ZMA、HD440/580FBD+ZMA、HD600/780FBD+ZMA、HJAC980B2M、HJSC980B2M、HR600Y780T-FB、HR780T/600Y-FB、CR660Y780T-CP、FE780FB、FE980FB、FB60、FE590FB、FE540FB、FE440FB、FBH440Y580T、FBC440Y580T 等





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