



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.

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形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 G3141:2017	JFS A 2001:2014	ASTM A1008M-18	ISO 3574-2012
DC01	St12	SPCC	CS C	DC01	DC01	St12	SPCCT	JSC270C	CS Type C	CR1
DC03	St13	SPCD	CS A CS B	DC03	DC03	RRSt13	SPCD	JSC270D	CS Type A CS Type B	CR2
DC04	St14	SPCE	DS A 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 ^a Tensile test ^a								下列公称厚度 (mm) 的 r ₉₀ 值 ^c , 不小于 r ₉₀ ^c min.		n ₉₀ 值 不小于 ^c n ₉₀ ^c min.
		屈服强度 Yield Strength MPa _b	抗拉强 度 Tensile Strength R _m , MPa	下列公称厚度 (mm) 的断后伸长率 ,A _{80mm} %, ≥ Elongation after fracture,A _{80mm} %, ≥								
				< 0.30	0.30~ < 0.50	0.50~ < 0.70	0.70~ < 1.0	1.0~ < 1.6	≥ 1.6	≤ 2.0	> 2.0 ~ 2.5	
DC01	St12	140~280 ^d	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

^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L₀ = 80mm, b₀ = 20mm), 试样方向为横向。
^a No. P6 test piece (L₀=80 mm, b₀=20mm) specified in GB/T 228.1-2010 and taken in the transverse direction apply.
^b 无明显屈服现象时应采用 R_{p0.2}, 否则采用 R_{eL}。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。
^b If the yield point is not pronounced, the values apply to the 0.2%- proof strength R_{p0.2}, otherwise the lower yield point R_{eL} 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.
^c r₉₀ 值和 n₉₀ 值的要求仅适用于厚度 ≥ 0.50mm 的产品。厚度大于 2.5mm 时, r₉₀ 值不作要求。
^c The requirements for r₉₀ and n₉₀ 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 r₉₀ is not required.
^d 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。
^d 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.





牌 号 Steel grade	拉伸试验 ^a Tensile test ^a									$\bar{r}$ 值 ^{c,d} ≥	
	屈服强度 ^b Yield Strength MPa, ≤	抗拉强度 Tensile Strength R _m ,MPa, ≥	下列公称厚度 (mm) 的断后伸长率 ,A _{50mm} %, ≥ 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

^a 试样为 JIS Z2241 中的 No.5 试样，试样方向为纵向。
^a No.5 test piece specified in JIS Z2241 and taken in the longitudinal direction apply.
^b 无明显屈服现象时采用 R_{p0.2}，否则采用下屈服强度 R_{eL}。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。
^b If the yield point is not pronounced, the values apply to the 0.2%- proof strength R_{p0.2}, otherwise the lower yield point R_{eL} 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.
^c 当公称厚度 < 0.5mm 或 > 1.6mm 时，r 值不作要求。
^c No guarantee for r value in case of thickness <0.5mm or >1.6mm
^d $\bar{r} = (r_0 + r_{90} + 2r_{45}) / 4$

代号 Designation	屈服强度 ^{a,b} , MPa Yield Strength	断后伸长率 ^a , A _{50mm} %, ≥ Elongation A _{50mm} %, ≥	$\bar{r}$ 值 ^{a,c} $\bar{r}$ Value ^{a,c}	$\bar{n}$ 值 ^{a,d} $\bar{n}$ Value ^{a,d}
CS A、CS B、CS C	140 ~ 275	30	—	—
DS A、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

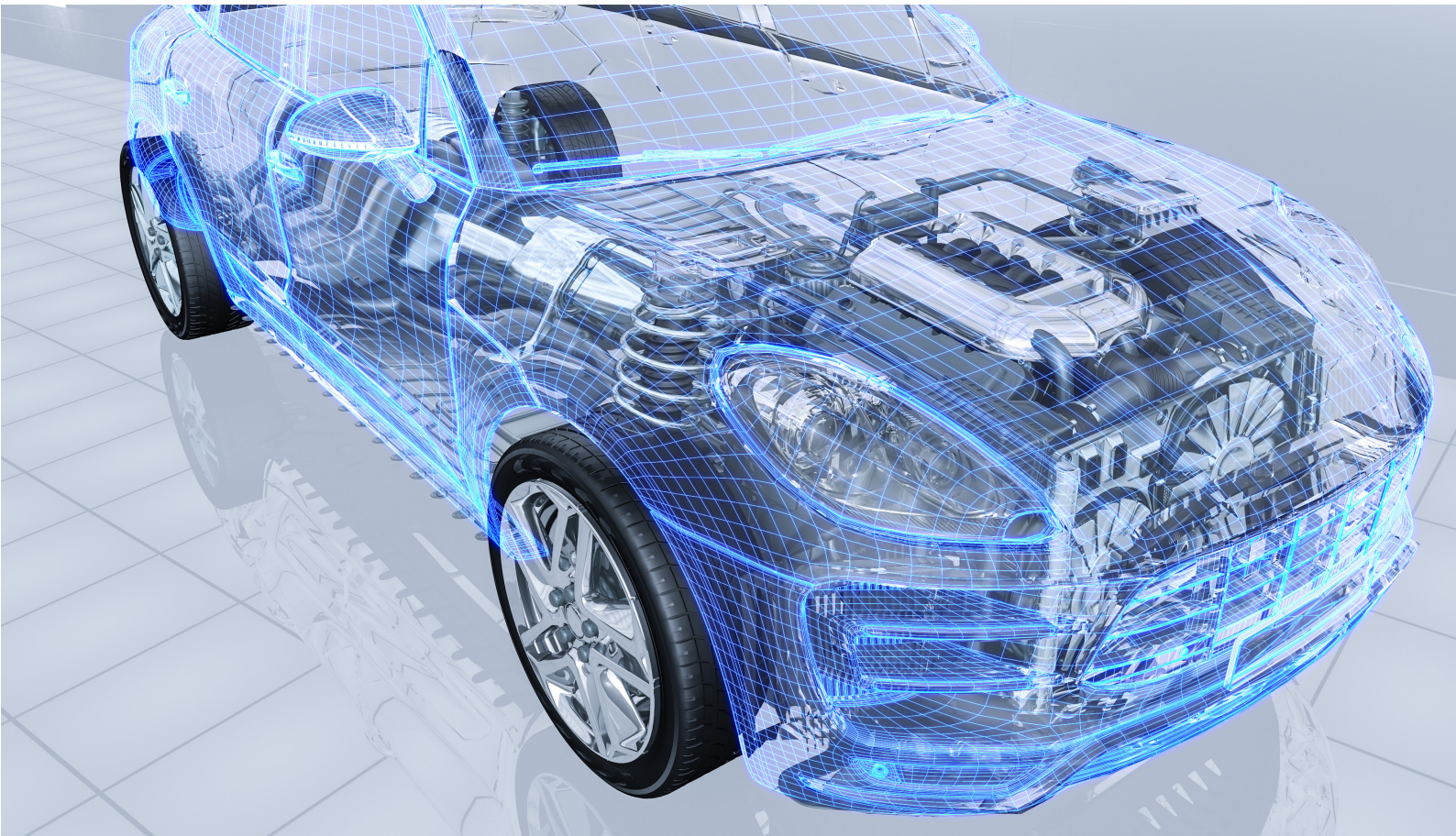
^a 试样为 GB/T 228.1-2010 中的 P5 试样 (L0=50mm,b0=12.5mm)，试样方向为纵向。
^a No. P6 test piece(L0=80 mm,b0=20mm)specified in GB/T 228.1-2010 and taken in the longitudinal direction apply.
^b 无明显屈服现象时采用 Rp0.2，否则采用下屈服强度 ReL。
^b If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (Rp0.2), otherwise the yield strength values apply to the lower yield strength(ReL).
^c $\bar{r} = (r_{90} + 2r_{45} + r_0) / 4$ 。
^d $\bar{n} = n_{90} + 2n_{45} + n_0) / 4$ 。

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、CS A、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.



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 pannels and various reinforcement pannels.

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	JFS A2001:2014
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 ^{a,b} Yield Strength MPa	抗拉强度 ^a Tensile Strength R _m ,MPa, ≥	下列公称厚度 (mm) 的断后伸长率 ^a ,A _{50mm} %, ≥ Elongation after fracture ^a ,A _{50mm} %, ≥				
			< 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

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

牌号 Steel grade	屈服强度 ^{a,b} Yield Strength ^{a,b} MPa, ≥	抗拉强度 ^a Tensile Strength R _m ,MPa	断后伸长率 ^a Elongation after fracture A _{80mm} %, ≥
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

^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L₀ = 80mm,b₀ = 20mm)，试样方向为横向。
^a No. P6 test piece(L₀=80 mm,b₀=20mm)specified in GB/T 228.1-2010 and taken in the transverse direction apply.
^b 无明显屈服现象时采用 R_{p0.2}，否则采用上屈服强度 R_{eH0}
^b If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R_{p0.2}), otherwise the yield strength values apply to the upper yield strength(R_{eH}).

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 20564.4-2010	EN 10268:2006+A1:2013	ASTM A1008/A1008M-2018	JFS A 2001:2014
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 ^a Yield Strength MPa	抗拉强度 Tensile Strength R _m ,MPa	下列公称厚度的断后伸长率 Elongation after fracture			
			A _{80mm} ^b %, ≥			A _{50mm} ^c %, ≥
			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

^a 无明显屈服现象时应采用 R_{p0.2}，否则采用 R_{eLo}
^a If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R_{p0.2}), otherwise the yield strength values apply to the lower yield strength(R_{eL}).
^b 试样为 GB/T 228.1-2010 中的 P6 试样 (L₀ = 80mm,b₀ = 20mm)，试样方向为横向。
^b No. P6 test piece(L₀=80 mm,b₀=20mm)specified in GB/T 228.1-2010 and taken in the transverse direction apply.
^c 试样为 JIS Z2241 中的 No.5 试样，试样方向为横向。
^c 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 ^a Yield Strength MPa	抗拉强度 Tensile Strength R _m ,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 ₉₀ ^d , ≥				n ₉₀ ^d ≥	BH ₂ ^e MPa ≥
			A _{80mm} ^b			A _{50mm} ^c	≤ 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	

^a无明显屈服现象时应采用 R_{p0.2}, 否则采用 R_{eL}。

^aIf definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R_{p0.2}), otherwise the yield strength values apply to the lower yield strength(R_{eL}).

^b试样为 GB/T 228.1-2010 中的 P6 试样 (L₀ = 80mm,b₀ = 20mm), 试样方向为横向。

^bNo. P6 test piece(L₀=80 mm,b₀=20mm) specified in GB/T 228.1-2010 and taken in the transverse direction apply.

^c试样为 JIS Z2241 中的 No.5 试样, 试样方向为横向。

^cNo.5 test piece specified in JIS Z2241 and taken in the transverse direction apply.

^d该要求不适用于厚度超出 0.50mm ~ 2.50mm 的产品。

^dThis requirement does not apply to products with thickness exceeding 0.50mm ~ 2.50mm.

^e厚度大于 1.2mm 时, BH₂ 值需另行协商。

^eWhen the thickness is greater than 1.2mm, BH₂ value 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是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-2018	JFS A 2001:2014	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℃，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℃ .

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 pannel such as door outer pannel, hood outer pannel, roof outer pannel, 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	JFS A 2001:2014	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）

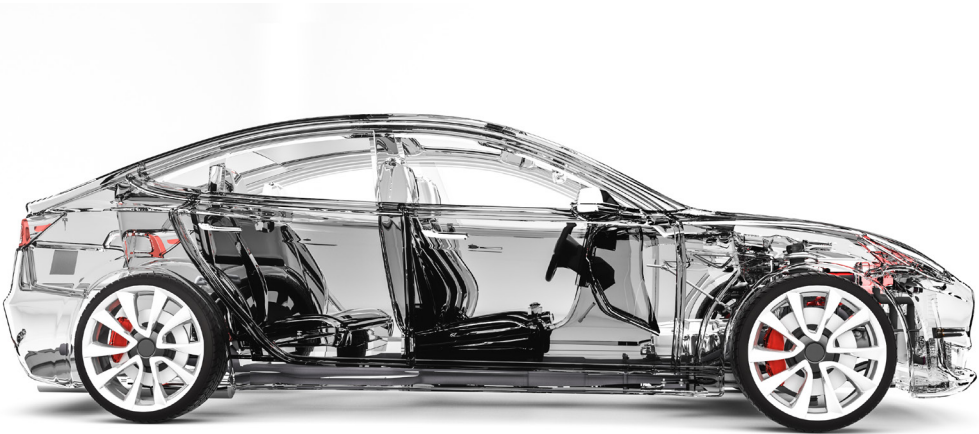
牌号 Steel grade	屈服强度 ^a Yield Strength MPa	抗拉强度 Tensile Strength R _m MPa	下列公称厚度 (mm) 的断后伸长率 %, 不小于 Elongation after fracture,%,min.						下列公称厚度 (mm) 的 r ₉₀ ^d , ≥				n ₉₀ ^d ≥
			A _{90mm} ^b			A _{50mm} ^c							
			0.50	> 0.50 ~ 0.70	> 0.70	< 1.0	1.0 ~ < 1.6	≥ 1.6	≤ 2.0	> 2.0	≤ 1.5	> 1.5	
HC180P	180 ~ 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	—			—			—	

^a无明显屈服现象时应采用 R_{p0.2}, 否则采用 R_{el}。
^aIf definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R_{p0.2}), otherwise the yield strength values apply to the lower yield strength(R_{el}).
^b试样为 GB/T 228.1-2010 中的 P6 试样 (L₀ = 80mm,b₀ = 20mm), 试样方向为横向。
^bNo. P6 test piece(L₀=80 mm,b₀=20mm)specified in GB/T 228.1-2010 and taken in the transverse direction apply.
^c试样为 JIS Z2241 中的 No.5 试样， 试样方向为横向。
^cNo.5 test piece specified in JIS Z2241 and taken in the transverse direction apply.
^d该要求不适用于厚度超出 0.50mm ~ 2.50mm 的产品。
^dThis 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℃，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℃ .



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	拉伸试验 ^a							下列公称厚度 (mm) 的 r ₉₀ 值 ^c , 不小于		△ r 不大于
	屈服强度 MPa ^b	抗拉强度 R _m ,MPa	下列公称厚度 (mm) 的断后伸长率 ,A _{80mm} %, ≥							
			0.30~ < 0.50	0.50~ < 0.70	0.70~ < 1.0	1.0~ < 1.6	≥ 1.6	≤ 2.0	> 2.0 ~ 2.5	0.30~ < 2.50
Uni-FISH340	180~250	340~420	30	32	34	35	36	2.0	1.6	0.2
Uni-FISH390	200~280	390~450	28	30	32	33	35	1.8	1.5	0.2
Uni-FISH440	220~300	440~500	26	28	30	32	34	1.6	1.2	0.2

^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L₀ = 80mm,b₀ = 20mm), 试样方向为横向。

^b 无明显屈服现象时应采用 R_{p0.2}, 否则采用 R_{eLo}。 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。

^c r₉₀ 值的要求仅适用于厚度≥ 0.50mm 的产品。厚度大于 2.5mm 时, r₉₀ 值不作要求。

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。

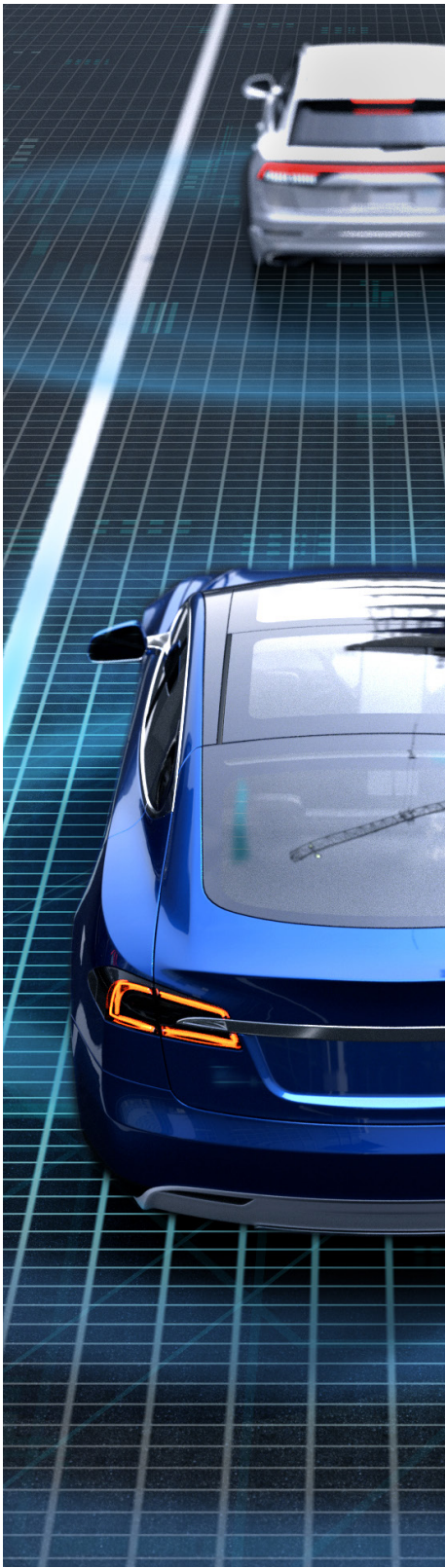
The microstructure of DH steel consists mainly of ferrite and martensite and small amounts of bainite and retained austenite. Compared to dual phase steels, they show a higher elongation and stronger work hardening capacity. DH steels are especially suitable for deep drawing parts.

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
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
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

1.1.7.8 力学性能（Mechanical Properties）

牌号 Steel grade	拉伸试验 ^a				n 不小于 min.
	屈服强度 ^b Yield Strength ^b MPa	抗拉强度 Tensile Strength R _m ,MPa, ≥	下列公称厚度的断后伸长率 ,A _{80mm} %, 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
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	—
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 ^c	20 ^c	—
HC600/980QP	600 ~ 850	980	13 ^c	15 ^c	—
HC700/980MS	700 ~ 960	980	—	3	—
HC860/1100MS	860 ~ 1100	1100	—	3	—
HC950/1180MS	950 ~ 1200	1180	—	2	—
HC1030/1300MS	1030 ~ 1300	1300	—	2	—

^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L₀ = 80mm, b₀ = 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。

^a No. P6 test piece(L₀=80 mm,b₀=20mm)specified in GB/T 228.1-2010 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.

^b 无明显屈服现象时采用 R_{p0.2}, 否则采用 R_{el}。

^b If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R_{p0.2}), otherwise the yield strength values apply to the lower yield strength(R_{el}).

^c 试样为 JIS Z 2241 中的 No.5 试样, 试样方向为横向。

^c 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)

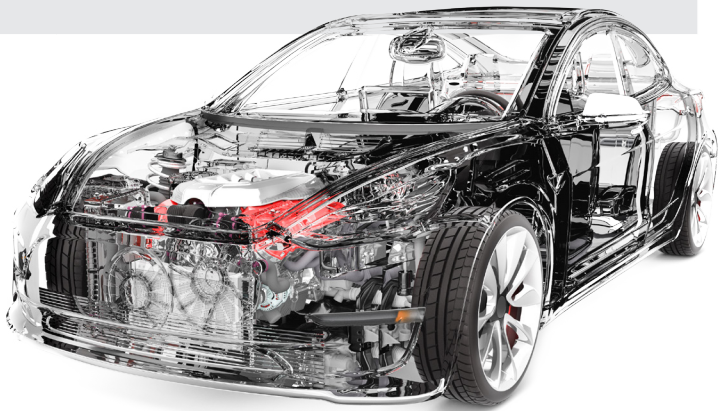
牌号 Steel grade	拉伸试验 ^a Tensile testing		
	屈服强度 ^b /MPa Yield Strength	抗拉强度 R _m /MPa Tensile Strength	断后伸长率 A _{80mm} / % ≥ Elongation after fracture
HR950/1300HS	320 ~ 630	480 ~ 800	13
HR1000/1500HS			
CR950/1300HS	280 ~ 450	≥ 450	20
CR1000/1500HS			
CR950/1300HS+AS	350 ~ 500	500 ~ 700	10
CR1000/1500HS+AS			
HR1200/1800HS	350 ~ 600	500 ~ 700	10
CR1200/1800HS			
CR1200/1800HS+AS			

^a 厚度小于 3mm 的钢板及钢带, 试样为 GB/T 228.1-2010 中的 P6 试样 (L₀ = 80mm, b₀ = 20mm); 厚度不小于 3mm 的钢板及钢带, 试样为 GB/T 228.1-2010 中的 P13 试样 (L₀ = 80mm, b₀ = 20mm)。试样方向为横向。

^a When the thickness is less than 3mm, the sample shall be No.P6 test piece(L₀=80 mm,b₀=20mm) specified in GB/T 228.1-2010. When the thickness is not less than 3mm, the sample shall be No.P13 test piece(L₀ = 80mm,b₀ = 20mm) specified in GB/T 228.1-2010. The sample direction is transverse.

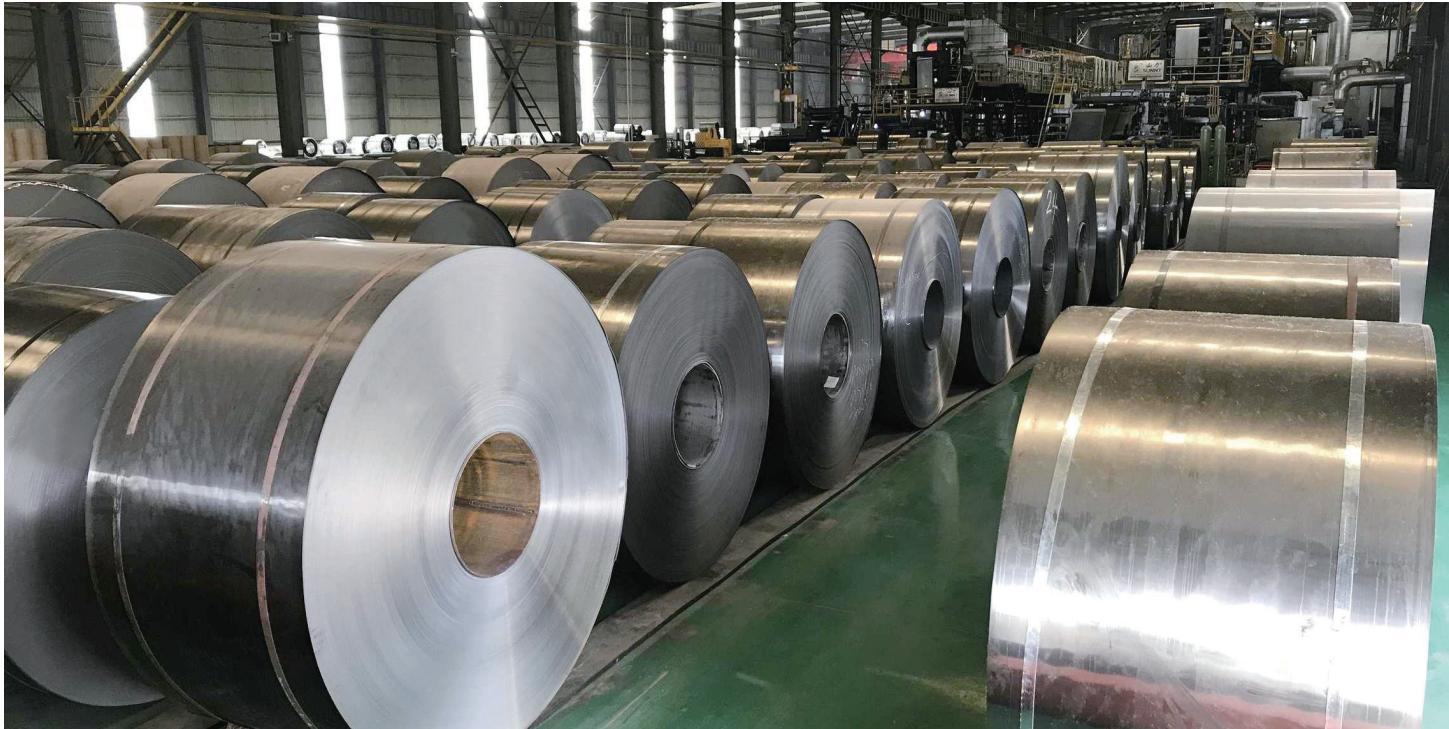
^b 屈服现象不明显时采用 R_{p0.2}, 否则采用 R_{el}。

^b If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R_{p0.2}), otherwise the yield strength values apply to the lower yield strength(R_{el}).



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

牌号 Steel grade	拉伸试验 ^a Tensile testing			硬度 ^c Hardness	
	屈服强度 ^b MPa Yield Strength	抗拉强度 Rm MPa Tensile Strength	断后伸长率 A _{50mm} %, ≥ Elongation after fracture	HV10, ≥	HRC, ≥
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	-	-
HR1200/1800HS CR1200/1800HS CR1200/1800HS+AS	≥ 1200	≥ 1800	4	-	-
^a 试样为 GB/T 228.1-2010 中的 P5 试样 (L₀ = 50mm,b₀ = 12.5mm)。 ^a The sample shall be No.P5 test piece(L₀=50mm,b₀=12.5mm) specified in GB/T 228.1-2010. ^b 屈服现象不明显时采用 R_{p0.2}, 否则采用 R_{el}。 ^b If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R_{p0.2}), otherwise the yield strength values apply to the lower yield strength(R_{el}). ^c 当无法从零件上获得标准拉伸试样进行拉伸试验时, 可使用零件芯部的显微硬度 HV10 或表面宏观硬度 HRC, 但对于厚度小于 0.8mm 的材料不适用 HRC 检测。 ^c When standard tensile specimens cannot be obtained from the part for tensile testing, the micro-hardness HV10 of the core of the part or the macro-hardness HRC of the surface can be used, but HRC testing is not applicable for materials with a thickness of less than 0.8mm.					



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；热镀铝硅钢板及钢带以冷轧、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、热镀铝硅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、热镀铝硅）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 ^{a,b} Tolerances on thickness for a nominal width ^{a,b}					
		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
	> 2.50 ~ 3.00	±0.15	±0.15	±0.16	±0.100	±0.110	±0.120
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
	> 2.50 ~ 3.00	±0.17	±0.18	±0.18	±0.120	±0.130	±0.140
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
	> 2.50 ~ 3.00	±0.20	±0.20	±0.21	±0.130	±0.140	±0.150
> 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

^a 钢带两端各 10m 内的厚度允许偏差可比规定值超出 50%。

^aThe thickness tolerances within 10m at each end of the steel strip may be increased by a maximum of 50%.

^b 纵切钢带的厚度允许偏差：应符合纵切前钢带的相关规定。

^bThe 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 ^{a,b} 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 ^d	0.50 ~< 0.95	±0.03
	0.95 ~< 1.40	±0.04
	1.40 ~< 2.50	±0.05
	2.50 ~ 3.00	±0.06
> 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

^a 钢带两端各 10m 内的厚度允许偏差可比规定值超出 50%。
^aThe thickness tolerances within 10m at each end of the steel strip may be increased by a maximum of 50%.
^b 纵切钢带的厚度允许偏差：应符合纵切前钢带的相关规定。
^bThe 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
	≥ 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

1.1.11.3 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 srtp	—	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)

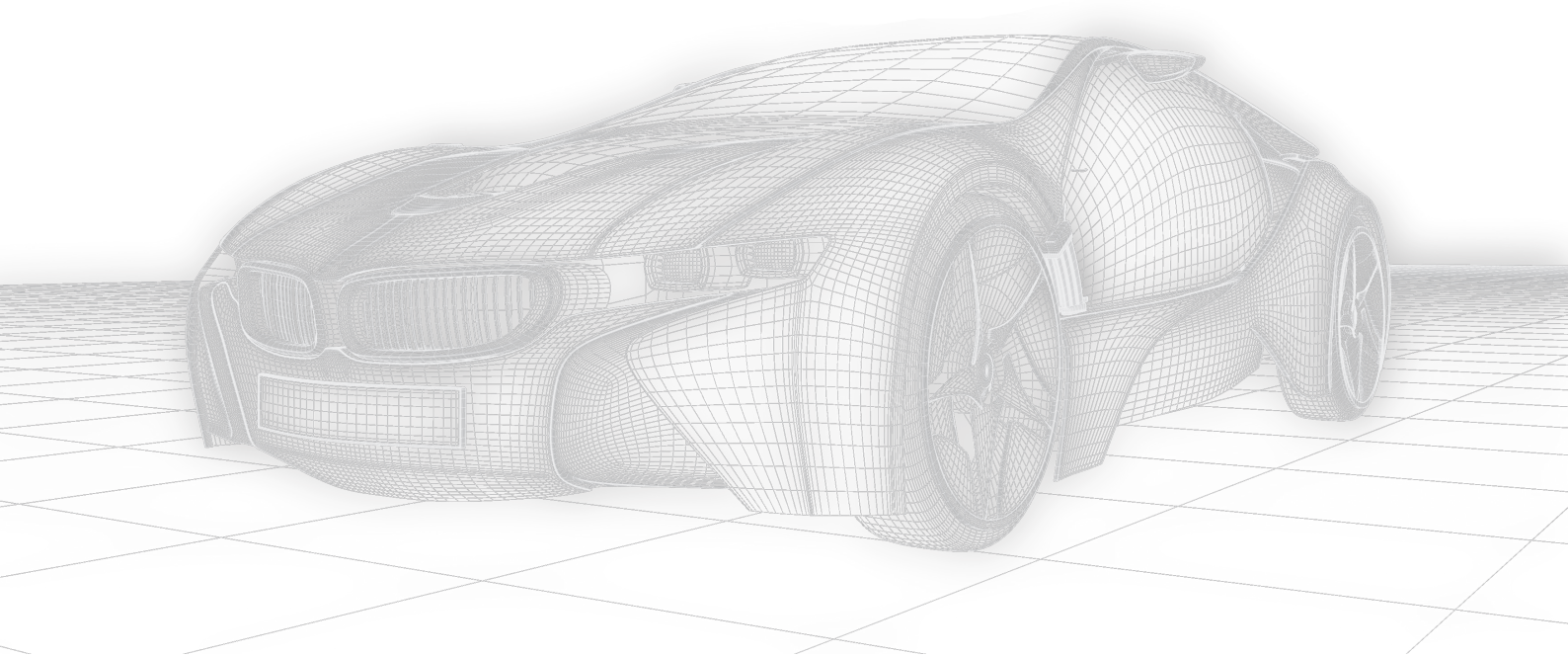
牌 号 Steel Grade	用 途 Application	特 点 Feature
DC51D (+Z, +ZF, +ZM)	一般用 Commercial purpose	低碳钢 Low carbon steel
DC52D (+Z, +ZF, +ZM)	冲压用 Drawing	
DC53D (+Z, +ZF, +ZM)	深冲用 Deep drawing	
DC54D (+Z, +ZF, +ZM)	特深冲用 Extra-deep drawing Ex- tra-deep drawing	超低碳钢 Ultra-low carbon steel
DC56D (+Z, +ZF, +ZM)	超深冲用 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),H-C550LAD (+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), HC700/980DPD (+Z, +ZF),		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		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, HC780/980CPD+Z, HC900/1180CPD+Z		复相钢 Complex phase steel
HC550/980QPD+Z, HC600/980QPD+Z		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 G3302:2019	ASTM A653M-19a
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-19a	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	—
HC820/1180DPD+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	—	—	—	—



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	—	—
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	—	—

1.2.3 力学性能（Mechanical Properties）

牌号 Designation		屈服强度 ^{a,b} Yield strength MPa	抗拉强度 ^a Ten- sile strength R _m , MPa	下列公称厚度 (mm) 的断后伸长率 Elongation ^a , A _{80mm} , %, ≥				r ₉₀ 值 a ≥	n ₉₀ 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 ^f	+Z、+ZF、+ZM	-	270 ~ 500	15	18	20	22	—	—
DC52D ^f	+Z、+ZF、+ZM	140 ~ 300 ^c	270 ~ 420	19	22	24	26	—	—
DC53D ^g	+Z、+ZF、+ZM	140 ~ 260	270 ~ 380	23	26	28	30	—	—
DC54D ^g	+Z	120 ~ 220	260 ~ 350	29	32	34	36	1.6 ^d	0.18
	+ZM、+ZF			27	30	32	34	1.4 ^d	
DC56D ^g	+Z	120 ~ 180	260 ~ 350	32	35	37	39	1.9 ^d	0.21
	+ZM、+ZF			30	33	35	37	1.7 ^{d,e}	0.20 ^e
DC57D ^g	+Z	120 ~ 170	260 ~ 350	34	37	39	41	2.1 ^d	0.22
	+ZM、+ZF			32	35	37	39	1.9 ^{d,e}	0.21 ^e

^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L₀=80mm,b₀ = 20mm), 试样方向为横向。
^a No. P6 test piece(L₀=80 mm,b₀=20mm)specified in GB/T 228.1-2010 and taken in the transverse direction apply.
^b 无明显屈服现象时采用 R_{p0.2s}, 否则采用下屈服强度 R_{eL}。
^b If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R_{p0.2}), otherwise the yield strength values apply to the lower yield strength(R_{eL}).
^c 表面质量为 FB 时, DC52D 的屈服上限为 360MPa。
^c When the surface grade is FB, the yield strength upper limit of DC52D is 360MPa.
^d 当产品公称厚度大于 1.5mm 时 ,r₉₀ 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, r₉₀ 的规定不再适用。
^d When the nominal thickness of the product is greater than 1.5mm, the r₉₀ 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 r₉₀ is not required.
^e 当产品公称厚度大于 0.50mm 且小于等于 0.70mm 时, r₉₀ 最小值可比表中规定值减小 0.2, n₉₀ 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, r₉₀ 最小值可比表中规定值减小 0.4, n₉₀ 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, r₉₀ 最小值可比表中规定值减小 0.6, n₉₀ 最小值可比表中规定值减小 0.04。
^e For 0.50mm < nominal thickness ≤ 0.70mm, the minimum r₉₀-value reduced by 0.2 and the minimum n₉₀-value reduced by 0.01 apply. For 0.35mm < nominal thickness ≤ 0.50mm, the minimum r₉₀-value reduced by 0.4 and the minimum n₉₀-value reduced by 0.03 apply. For nominal thickness ≤ 0.35mm, the minimum r₉₀-value reduced by 0.6 and the minimum n₉₀-value reduced by 0.04 apply.
^f 力学性能有效期为制造完成后 1 个月内。
^f Mechanical properties just for products within 1 months from manufactured.
^g 力学性能有效期为制造完成后 6 个月内。
^g Mechanical properties just for products within 6 months from manufactured.

牌号 Designation		屈服强度 ^{a,b} Yield strength MPa, ≥	抗拉强度 ^{a,c} Tensile strength R _m , MPa, ≥	下列公称厚度 (mm) 的断后伸长率 ^a , A _{80mm} , %, ≥ Elongation after fracture,A _{80mm} %, ≥			
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 ^d	+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.

^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L₀=80mm,b₀ = 20mm), 试样方向为纵向。
^a No. P6 test piece(L₀=80 mm,b₀=20mm)specified in GB/T 228.1-2010 and taken in the longitudinal direction apply.
^b 无明显屈服现象时采用 R_{p0.2s}, 否则采用上屈服强度 R_{eH}。
^b If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R_{p0.2}), otherwise the yield strength values apply to the upper yield strength(R_{eH}).
^c 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。
^c For all grades except S550GD+Z,S550GD+ZF,S550GD+ZM, a range of 140MPa can be expected for tensile strength.
^d 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。
^d 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.

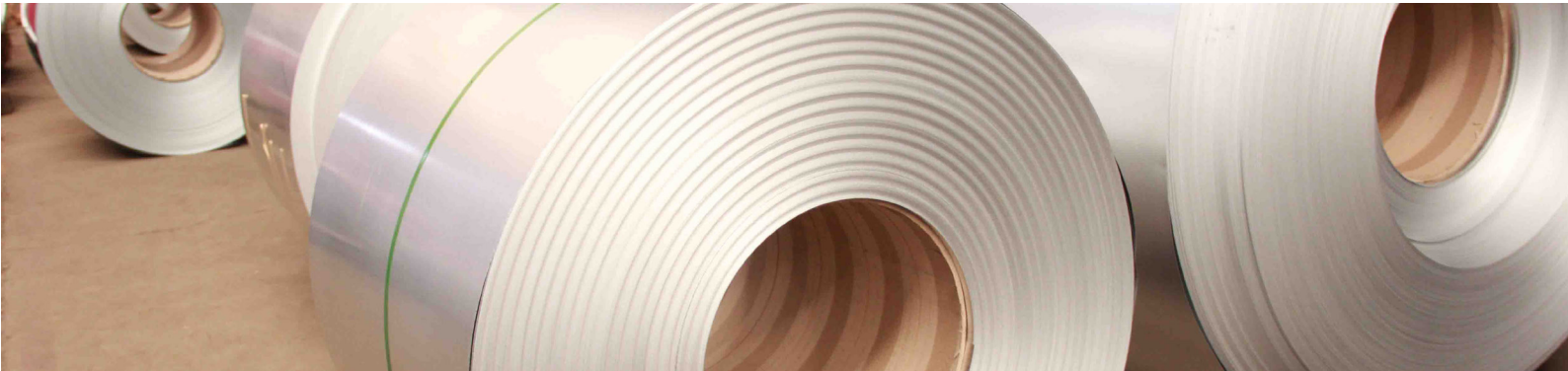
牌号 Designation		屈服强度 ^{a,c} Yield strength MPa	抗拉强度 ^a Tensile strength R _m , MPa	下列公称厚度 (mm) 的断后伸长率 ^{a,d} , A _{80mm} %, ≥ Elongation after fracture, A _{80mm} %, ≥				BH ₂ ^a MPa, ≥	r ₉₀ ^{a,e,f} ≥	n ₉₀ ^{a,f} ≥
钢种 Steel grade	镀层种类 Types of coatings			≤ 0.35	> 0.35 ~ 0.50	> 0.50 ~ 0.70	> 0.70			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

^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L₀=80mm,b₀ = 20mm), 试样方向为横向。
^a No. P6 test piece(L₀=80 mm,b₀=20mm)specified in GB/T 228.1-2010 and taken in the transverse direction apply.
^b 试样为 JIS Z 2241 中的 No.5 试样, 试样方向为横向。
^b No.5 test piece specified in JIS Z2241 and taken in the transverse direction apply.
^c 无明显屈服现象时采用 R_{p0.2}, 否则采用下屈服强度 R_{el}。
^c If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R_{p0.2}), otherwise the yield strength values apply to the lower yield strength(R_{el}).
^d 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。
^d When coating types is ZF and ZM, the minimum value of elongation reduced by 2 applies.
^e 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, r₉₀ 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, r₉₀ 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, r₉₀ 的规定不再适用。
^e When the coating type is ZF and ZM or the nominal thickness is greater than 1.5mm and less than 2.0mm, the minimum r₉₀-value reduced by 0.2 applies. When the nominal thickness is greater than or equal to 2.0mm, the minimum r₉₀-value reduced by 0.4 applies. r₉₀ no longer applies when the nominal thickness is greater than 2.5mm.
^f 当产品公称厚度大于 0.50mm 且小于等于 0.70mm 时, r₉₀ 最小值可比表中规定值减小 0.2, n₉₀ 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, r₉₀ 最小值可比表中规定值减小 0.4, n₉₀ 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, r₉₀ 最小值可比表中规定值减小 0.6, n₉₀ 最小值可比表中规定值减小 0.04。
^f For 0.50mm < nominal thickness ≤ 0.70mm, the minimum r₉₀-value reduced by 0.2 and the minimum n₉₀-value reduced by 0.01 apply. For 0.35mm < nominal thickness ≤ 0.50mm, the minimum r₉₀-value reduced by 0.4 and the minimum n₉₀-value reduced by 0.03 apply. For nominal thickness ≤ 0.35mm, the minimum r₉₀-value reduced by 0.6 and the minimum n₉₀-value reduced by 0.04 apply.
^g 该要求值为 =(r₉₀+2r₄₅+r₀)/4。当产品公称厚度大于 1.5mm 时, 最小值可比该值减小 0.2。
^g =(r₉₀+2r₄₅+r₀)/4, For nominal thickness is greater than 1.5mm, the minimum -value reduced by 0.2 applies.
^h 力学性能有效期为制造完成后 6 个月内。
^h Mechanical properties just for products within 6 months from manufactured.
ⁱ 力学性能有效期为制造完成后 3 个月内。
ⁱ Mechanical properties just for products within 3 months from manufactured.

牌号 Designation		屈服强度 ^{a,b} Yield strength MPa	抗拉强度 ^a Tensile strength R _m ,MPa, ≥	下列公称厚度 (mm) 的断后伸长率 ^{a,c} , A _{80mm} %, ≥ Elongation after fracture,A _{80mm} %, ≥			n 值 ^a ≥
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	—
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

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.

^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L₀=80mm,b₀ = 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。
^a No. P6 test piece(L₀=80 mm,b₀=20mm)specified in GB/T 228.1-2010 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.
^b 无明显屈服现象时采用 R_{p0.2}, 否则采用下屈服强度 R_{el}。
^b If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R_{p0.2}), otherwise the yield strength values apply to the lower yield strength(R_{el}).
^c 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。
^c When coating types is ZF and ZM, the minimum value of elongation reduced by 2 applies.



牌号 Designation		屈服强度 ^{a,b} Yield strength MPa	抗拉强度 ^a Tensile strength R _m ,MPa, ≥	下列公称厚度 (mm) 的断后伸长率 ^a ,A _{80mm} %, ≥ Elongation after fracture,A _{80mm} %, ≥		
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.						
^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L ₀ =80mm,b ₀ = 20mm), 试样方向为纵向。 ^a No. P6 test piece(L ₀ =80 mm,b ₀ =20mm)specified in GB/T 228.1-2010 and taken in the longitudinal direction apply. ^b 无明显屈服现象时采用 R _{p0.2} , 否则采用下屈服强度 R _{eL} 。 ^b If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R _{p0.2}), otherwise the yield strength values apply to the lower yield strength(R _{eL}).						

牌号 Designation		屈服强度 ^{a,b} Yield strength MPa	抗拉强度 ^a Tensile strength R _m ,MPa, ≥	下列公称厚度 (mm) 的断后伸长率 ^a ,A _{50mm} %, ≥ Elongation after fracture,A _{50mm} %, ≥		
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。						
^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L ₀ =80mm,b ₀ = 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。 ^a No. P6 test piece(L ₀ =80 mm,b ₀ =20mm)specified in GB/T 228.1-2010 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. ^b 无明显屈服现象时采用 R _{p0.2} , 否则采用下屈服强度 R _{eL} 。 ^b If definite yield phenomenon is not present, the yield strength values apply to the 0.2%-proof strength (R _{p0.2}), otherwise the yield strength values apply to the lower yield strength(R _{eL}).						

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℃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 （03）	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 （04）	不得有腐蚀点，但在小范围内允许存在轻微压痕、划伤、锌流波痕、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 （05）	较好的一面必须对缺欠进一步限制，即不能影响涂漆后的外观质量，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 ²) 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 ^a	N、M、F	30 ~ 150(单面) Each side	—	—
注 1：纯锌和锌铁合金 50g/m ² 镀层的厚度约为 7.1μm，锌铝镁合金 50g/m ² 镀层的厚度约为 7.5μm。 Note 1: Coating thickness is 7.1μm, when the coating mass is 50g/m2 for zinc and zinc-Fe alloy coating. Coating thickness is 7.5μm, when the coating mass is 50g/m2 for Zn-Al-Mg Alloy coating.				
^a 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 nurber	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存储期间表面产生白锈。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，钢板及钢带经热镀加光整拉矫或热镀加光整后交货。

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 ^{a,b,c} 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
260 ~ < 340 ^d	> 2.50 ~ 3.00	±0.16	±0.16	±0.17	±0.110	±0.120	±0.130
	≤ 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
340 ~ 420	> 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
	≤ 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
> 420	> 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
	≤ 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
^a 双面镀层重量之和不小于 450g/m ² 的热镀层产品厚度允许偏差可比规定值超出 ±0.01mm。 ^a The thickness tolerance of hot-dip coating products with the sum of double-sided coating weight not less than 450g/m2 can exceed ± 0.01mm. ^b 钢带两端各 10m 内的厚度允许偏差可比规定值超出 50%。 ^b The thickness tolerances within 10m at each end of the steel strip may be increased by a maximum of 50%. ^c 纵切钢带的厚度允许偏差：应符合纵切前钢带的相关规定。 ^c The thickness tolerances of slit wide strip: it shall comply with the relevant regulations of the steel strip before the slit cut. ^d 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。 ^d 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 ^{a,b,c} 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 ^d	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
^a 其中双面镀层重量之和不小于 450g/m² 的热镀层产品厚度允许偏差可比规定值超出 ±0.01mm。 ^aThe thickness tolerance of hot-dip coating products with the sum of double-sided coating weight not less than 450g/m2 can exceed ± 0.01mm ^b 钢带两端各 10m 内的厚度允许偏差可比规定值超出 50%。 ^bThe thickness tolerances within 10m at each end of the steel strip may be increased by a maximum of 50%. ^c 纵切钢带的厚度允许偏差：应符合纵切前钢带的相关规定。 ^cThe thickness tolerances of slit wide strip: it shall comply with the relevant regulations of the steel strip before the slit cut. ^d 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。 ^dDC51D+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,1/2tolerance, 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 ^a	< 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				

^a 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。
^aDC51D+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	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
^a 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。 ^a The slit wide strip with the minimum yield strength ≤ 280MPa as specified may comply with this; When the specified minimum yield strength >280mpa, the camber shall be negotiated by both parties.				

1.3 汽车用热轧酸洗钢板及钢带 (Hot Rolled and Pickled Sheets and Strips for Automobile)

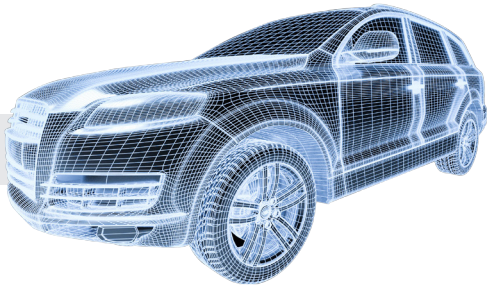
1.3.1 一般结构用热轧酸洗钢带 (Hot-rolled and Pickled Strip for General Structural Use)

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

Q/SGZGS 0316-2019	JIS G 3101-2015	GB/T 912-2008 GB/T 3274-2007
SS330	SS330	Q195
SS400、SS400B	SS400	Q235A、Q235B
SS490、SS490B	SS490	—

Q/SGZGS 0316-2019	JIS G 3106-2015	GB/T 912-2008 GB/T 3274-2007
SM400A	SM400A	Q235A、Q235B、20
SM400B	SM400B	Q235C
SM400C	SM400C	Q235D
SM490A、SS490AB	SM490A	Q345A、Q345B
SM490B、SS490BB	SM490B	Q345C
SM490C、SS490CB	SM490C	Q345D
SM490YA	SM490YA	Q345A、Q345B
SM490YB	SM490YB	Q345C
SM520B	SM520B	Q420A、Q420B
SM520C	SM520C	Q420C
SM570	SM570	-

Q/SGZGS 0316-2019	EN 10025-2019	DIN 17100-1980	GB/T 912-2008 GB/T 3274-2007
St37-2	S235JR	St37-2	Q235B
St37-3	S235J0	St37-3	Q235B
St44-2	S275JR	St44-2	Q235C
St50-2	--	St50-2	Q345A
St52-3	S355J0	St52-3	Q345C



1.3.1.2 力学性能（Mechanical Properties）

牌 号 Grade	拉伸试验 ^a Tensile Test ^a						180° 弯曲试验 ^b 弯芯直径 180° Bending Test Diameter	夏比 V 型冲击试验 Charpy V-notch impact test	
	R _m MPa	以下厚度的上屈服强度， ≥ R _{eH} ^c / MPa		A， ≥ ,%				温 度 Temperature ℃	冲击吸收能量 Impact energy， J
				A _{50mm}	A _{200mm}				
		公 称 厚 度 Nominal thickness mm							
		≤ 16	>16	≤ 5	>5-16	>16			
SS330	330-430	205	195	26	21	26	3.0a	-	-
SS400 SS400B	400-510	245	235	21	17	21	3.0a		
SS490	490-610	285	275	19	15	19	4.0a		
SS540	≥ 540	400	390	16	13	17	4.0a		
SM400A	400-510	245	235	23	18	22	—	-	-
SM400B								0	≥ 27
SM400C								0	≥ 47
SM490A SM490AB	490-610	325	315	22	17	21	—	-	-
SM490B SM490BB								0	≥ 27
SM490C SM490CB								0	≥ 47
SM490YA	490-610	365	355	19	15	19	—	-	-
SM490YB							—	0	≥ 27
SM520B	520-640	365	355	19	15	19	—	0	≥ 27
SM520C	520-640						—	0	≥ 47
SM570	570-720	460	450	19 ^f		26 ^f	—	-5	≥ 47
a: 拉伸试验采用横向试样；试样尺寸来自日标 JIS Z 2241 规定的 1A 号和 5 号试样，其中 1A 号试样和 5 号试样分别采用 200mm 和 50mm.Tensile test applies to transverse samples. Sample 1A and sample 5 of JIS 2241. b: 弯曲试验采用横向试样，仲裁试验时试样宽度为 35mm。 Bending test applies to transverse samples, while width of the sample for referee test is 35mm. c: 屈服现象不明显时，采用 Rp0.2。Taking Rp0.2 in case of indistinct yield. d: 冲击试验采用纵向试样，经供需双方协议，也可使用横向试样。Charpy V-notch impact test applies to longitudinal samples. e: 经供需双方协议，也可使用低于本表规定的试验温度。Lower temperature can applies to impact test if agreed in order. f: 对于 SM570 牌号，各规格的断后伸长率均采用 A50mm（即采用 JIS Z 2241 中 5 号试样）。For SM570, The elongation applies to A _{50mm} samples									

牌号 Grade	拉伸试验 ^a Tensile Test ^a										180°弯曲试验 ^b 弯芯直径 D 180° Bending Test Diameter D		夏比 V 型缺口冲击试验 ^c Charpy V-notch impact test	
	抗拉强度 R _m , N/mm ²		下屈服强度 R _{eL} , N/mm ²		断后伸长率, % Elongation at Fracture/%									
					A ₈₀ mm L ₀ =80mm, b=20mm								A L ₀ =5.65 √ S ₀	试验温度 Temperature, °C
	<3	≥ 3	<16	≥ 16	≤ 1.5	>1.5-2	>2-2.5	>2.5-<3	≥ 3	<3	≥ 3			
St37-2	360-510		235	225	15	16	17	18	19	24	1.5a	2a	+20	≥ 27
St37-3											1a	1.5a	0	≥ 27
St44-2	430-580	410-560	275	265	12	14	15	16	17	21	2.5a	3a	+20	≥ 27
St50-2	490-660	470-610	295	285	10	11	12	13	14	18	--	--	--	--
St52-3	510-680	470-630	355	345	12	13	14	15	16	20	2.5a	3a	0	≥ 27
a: 拉伸试验取横向试样, 试样宽度 b=20mm. Tensile test applies to transverse samples. Sample width b = 20mm. 1MPa=1N/mm2 b: 弯曲试验取横向试样, 推荐采用试样宽度≥ 20mm, 仲裁试样宽度 b=20mm. Bending test applies to transverse samples. Width b ≥ 20mm samples are taken for bending test, while width of the sample for referee test is 20mm. c: 冲击试验取纵向试样, 另外对于 St37-2、St44-2, 仅当需方提出要求时, 才进行冲击试验. Charpy V-notch impact test applies to longitudinal samples. For St 37-2 and St44-2, impact test is necessary only if demander requires.														
牌号 Grade	最小上屈服强度 ^{a, b} R _{eH} , N/mm2		拉伸强度 R _m , N/mm2		最小冲击功 ^c 纵向 Minimum impact energy, J longitudinal		最小延伸率 ^d % Minimum elongation, %							
	厚度 Thickness, mm		厚度 Thickness, mm		温度 Tempe rature	K _{V2}	厚度 Thickness, mm							
							L ₀ =80mm, 宽度 Width = 20mm		L ₀ =5.65 √ S ₀					
	≤ 16	> 16 ≤ 40	<3	≥ 3	≥ 1.5 ≤ 2	>2 ≤ 2.5	>2.5 ≤ 3	≥ 3						
S235JR ^e	235	225	360 ~ 510		20	27	17	18	19	24				
S235J0					0									
S235J2					-20									
S275JR ^e	275	265	430 ~ 580		20	27	15	16	17	21				
S275J0					0									
S275J2					-20									
S355JR ^{b)}	355	345	510 ~ 680		20	27	14	15	16	20				
S355J0					0									
S355J2					-20									
S355K2					-20						40			
a) : 用横向试样做拉伸试验. Tensile test applies to transverse samples. b) : 若无屈服现象, 则测定 0.2% 的规定强度 Rp0.2; 有争议时, 采用 0.2% 的规定强度. If the yield point is not pronounced, the values apply to the 0.2%-proof strength Rp0.2; If the yield point is pronounced, the values apply to the lower yield point Rel. c) : 采用厚度小于 10mm 的试样时, 冲击功应按与试样横截面积成正比例减小. 厚度小于 6mm 的产品不进行冲击试样. For samples with width less than 10mm, the impact energy should decrease in proportion with the cross sectional area of the sample. For samples with width less than 6mm, the impact test is not necessary. d) : 拉伸试样可做定标距试样, 有争议时用比例试样, 其标距长度 L ₀ =5.65 √ S ₀ 。 samples L0=80mm can applies to the tensile test. samples L ₀ =5.65 √ S ₀ applies to referee test . e) 质量等级为 JR 的钢种, 若协议中没要求可不做冲击试验. 见可 EN10025-1 选项 3)。For JR grades, impact test is not necessary if no requirement in the contract. See EN10025-1, 3.														

1.3.2 冷成形用热轧酸洗钢带（Hot-Rolled and Pickled Strip for Cold Forming）

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

Q/SGZGS 0314-2019	JIS G 3131-2018	EN 10111-2008	DIN 1614: 2-1986	ISO 3573-2012
SPHC	SPHC	-	-	-
SPHD	SPHD	-	-	-
SPHE	SPHE	-	-	-
SPHF	SPHF	-	-	-
DD11	-	DD11	StW22	HR1
DD12	-	DD12	StW23	HR2
DD13	-	DD13	StW24	HR3
DD14	-	DD14	-	-

1.3.2.2 力学性能（Mechanical Properties）

牌 号 Grade	拉伸试验 ^a tensile test							180°弯曲试验 ^a 180° Bend test	
	抗拉强度 R _m / MPa	下列厚度（mm）的断后伸长率 A _{50mm} / % elongation for thickness A _{50mm} %						下列厚度（mm）的弯曲直径 Diameter for thickness	
		< 1.6	1.6 ~< 2.0	2.0 ~< 2.5	2.5 ~< 3.2	3.2 ~< 4.0	≥ 4.0		
SPHC	≥ 270	≥ 27	≥ 29	≥ 29	≥ 29	≥ 31	≥ 31	D=0	D=1a
SPHD	≥ 270	≥ 30	≥ 32	≥ 33	≥ 35	≥ 37	≥ 39	—	—
SPHE	≥ 270	≥ 32	≥ 34	≥ 35	≥ 37	≥ 39	≥ 41	—	—
SPHF	≥ 270	≥ 37	≥ 38	≥ 39	≥ 39	≥ 40	≥ 42	—	—
注：1MPa=1N/mm2。									
拉伸试验和弯曲试验采用纵向试样。The tensile test and bending test shall be carried out in longitudinal direction.									

牌 号 Grade	拉伸试验 ^a Tensile Test ^a						性能保证期，月 Warranty Period,Month
	R _m N/mm2	R _{el} ^b , N/mm2	A % 不小于				
			A _{80mm} L ₀ =80mm;b=20mm		A		
		厚度，mm					
		<2.0	2.0 ~ 11.0	1.5 ~ <2.0	2.0 ~ <3.0	3.0 ~ 11.0	
DD11	≤ 440	170 ~ 360	170 ~ 340	22	23	24	c
DD12	≤ 420	170 ~ 340	170 ~ 320	24	25	26	6
DD13	≤ 400	170 ~ 330	170 ~ 310	27	28	29	6
DD14	≤ 380	170 ~ 310	170 ~ 290	30	31	32	6

a：表中所列拉伸试验规定值适用于横向试样。Tensile test applies to transverse samples.

b：屈服现象不明显时，采用 R_{p0.2}。Taking R_{p0.2} in case of indistinct yield.

c：推荐 DD11 钢种在有效期 6 个月内使用。Proposed warranty Period for DD11 is 6 month.

注：由于钢存在时效性，建议用户尽早使用。Note: Users are recommended to consider the aging of the steel.

1.3.3 汽车结构用热轧酸洗钢带（Hot-rolled and Pickled Strip for Automotive Structure）

首钢汽车结构用热轧酸洗钢是采用先进的冶炼技术和控轧控冷工艺生产的，低碳、低硫和低磷含量的，具有优良冷成形性能和焊接性能的低碳微合金化钢，广泛用于汽车零部件的制造。

Shougang hot-rolled and pickled steel for automotive structure is a low-carbon micro-alloyed steel with low carbon, low sulfur and low phosphorus content, excellent cold forming performance and welding performance, which is produced by advanced smelting and TMCP technology. It is widely used in the manufacture of automobile parts.

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

Q/SGZGS 0 315-2019	EN 10149:2-2013	SEW 092-1990
S315MC	S315MC	--
S355MC	S355MC	--
QStE340TM	--	QStE340TM
QStE380TM	--	QStE380TM
S420MC QStE420TM	S420MC	QStE420TM
S460MC QStE460TM	S460MC	QStE460TM
S500MC QStE500TM	S500MC	QStE500TM
S550MC QStE550TM	S550MC	QStE550TM
S600MC QStE600TM	S600MC	--
S650MC QStE650TM	S650MC	--
S700MC QStE700TM	S700MC	--

Q/SGZGS 0 3 15-2016	JIS 3113-2006（2011）	JIS G3134-2006（2011）
SAPH310	SAPH310	--
SAPH370	SAPH370	--
SAPH400	SAPH400	--
SAPH440	SAPH440	--
SPFH490	--	SPFH490
SPFH540	--	SPFH540
SPFH590	--	SPFH590
SPFH540Y	--	SPFH540Y
SPFH590Y	--	SPFH590Y

GB/T 3273-2015	EN 10149-2: 1995
370L	S315MC
420L	S355MC
440L	S420MC
510L	S460MC
550L	S500MC

1.3.3.2 力学性能（Mechanical Properties）

牌 号 Grade	拉伸试验 ^a										弯曲试验 ^b Bending Test 180°	
	抗拉强度 R _m /MPa	下列厚度的上屈服强度 ^c R _{eH} / MPa			下列厚度的断后伸长率 Elongation at Fracture A _{50mm} / %							
		公称厚度 Nominal Thickness mm			公称厚度 Nominal Thickness mm						公称厚度 Nominal Thickness mm	
		< 6.0	6.0 ~< 8.0	8.0 ~< 14.0	< 2.0	2.0 ~< 2.5	2.5 ~< 3.15	3.15 ~< 4.0	4.0 ~< 6.3	≥ 6.3	< 2.0	≥ 2.0
SAPH310	≥ 310	≥ 185 ^d	≥ 185 ^d	≥ 175 ^d	≥ 33	≥ 34	≥ 36	≥ 38	≥ 40	≥ 41	D=0a	D=2a
SAPH370	≥ 370	≥ 225	≥ 225	≥ 215	≥ 32	≥ 33	≥ 35	≥ 36	≥ 37	≥ 38	D=a	D=2a
SAPH400	≥ 400	≥ 255	≥ 235	≥ 235	≥ 31	≥ 32	≥ 34	≥ 35	≥ 36	≥ 37	D=2a	D=2a
SAPH440	≥ 440	≥ 305 ^e	≥ 295 ^f	≥ 275 ^g	≥ 29	≥ 30	≥ 32	≥ 33	≥ 34	≥ 35	D=2a	D=2a
1N/mm2=1MPa。												
^a 拉伸试验采用纵向试样，标距长度 L0=50mm，宽度 b=25mm，相当于 GB/T 228.1 中 P14 号试样。Tensile test applies to longitudinal samples.L0=50mm，width b=25mm ^b 弯曲试验采用横向试样，压头弯曲直径为 D，试样宽度 b=15 ~ 50mm，推荐采用 b=25mm。Bend test applies transverse samples.Diameter is D, width b=15~50mm, b=25 is proposed. ^c 屈服现象不明显时，采用 Rp0.2。Taking Rp0.2 in case of indistinct yield. ^d 对于 SAPH310，屈服强度值仅供参考，不作为验收技术条件。For SAP310,ReH is reference. ^e 经供需双方协商，可调整为 ≥ 275MPa。Also can change to 275MPa,when agreed in order. ^f 经供需双方协商，可调整为 ≥ 265MPa。Also can change to 265MPa,when agreed in order. ^g 经供需双方协商，可调整为 ≥ 255MPa。Also can change to 255MPa,when agreed in order.												

牌 号 Grade	拉伸试验 ^a Tensile Test ^a						180°冷弯试验 ^b , 180° Bend- ing Test	
	屈服强度 ^c R _{el} / MPa	抗拉强度 R _m /MPa	断后伸长率 Elongation at Fracture A ₅₀ mm / %					
			公称厚度 Nominal Thickness, mm				公称厚度 Nominal Thickness, mm	
			< 2.0	2.0 ~< 2.5	2.5 ~< 3.25	3.25 ~ 8.0	< 3.25	≥ 3.25
SPFH490	≥ 325	≥ 490	≥ 22	≥ 23	≥ 24	≥ 25	D=a	D=2a
SPFH540	≥ 355	≥ 540	≥ 21	≥ 22	≥ 23	≥ 24	D=2a	D=3a
SPFH590	≥ 420	≥ 590	≥ 19	≥ 20	≥ 21	≥ 22	D=3a	D=3a
SPFH540Y	≥ 295	≥ 540	—	≥ 24	≥ 25	≥ 26	D=2a	D=3a
SPFH590Y	≥ 325	≥ 590	—	≥ 22	≥ 23	≥ 24	D=3a	D=3a
a 拉伸试验取横向试样，试样 L0=50mm，b=25mm。Tensile test applies to transverse samples.L0=50mm，b=25mm。 b 弯曲试验采用横向试样，压头弯曲直径为 D，试样宽度 b=15 ~ 50mm，推荐采用 b=25mm。Bend test applies transverse samples.Diameter is D, width b=15~50mm, b=25 is proposed. c 屈服现象不明显时，采用 Rp0.2。Taking Rp0.2 in case of indistinct yield.								

牌 号 Grade	拉伸试验 ^a Tensile Test ^a				180°冷弯试验 ^b Bending Test 180°
	上屈服强度 ^c ReH/MPa	抗拉强度 R _m /MPa	断 后 伸 长 率 ^d Elongation at Fracture		
			A _{80mm} /%	A /%	
			公称厚度< 3mm Nominal Thickness < 3 mm	公 称 厚 度 ≥ 3mm Nominal Thickness ≥ 3mm	
S315MC	≥ 315	390 ~ 510	≥ 20	≥ 24	D=0a
S355MC	≥ 355	430 ~ 550	≥ 19	≥ 23	D=0.5a
S420MC	≥ 420	480 ~ 620	≥ 16	≥ 19	D=0.5a
S460MC	≥ 460	520 ~ 670	≥ 14	≥ 17	D=1a
S500MC	≥ 500	550 ~ 700	≥ 12	≥ 14	D=1a
S550MC	≥ 550	600 ~ 760	≥ 12	≥ 14	D=1.5a
S600MC	≥ 600	650 ~ 820	≥ 11	≥ 13	D=1.5a
S650MC	≥ 650 ^b	700 ~ 880	≥ 10	≥ 12	D=2a
S700MC	≥ 700 ^b	750 ~ 950	≥ 10	≥ 12	D=2a

^a 拉伸试验采用纵向试样。Tensile test applies to longitudinal samples.

^b 弯曲试验采用横向试样，压头弯头直径为 D，试样宽度 b ≥ 20mm，推荐采用 b=25mm。Bend test applies transverse samples.Diameter is D, width b=15~50mm, b=25mm is proposed.

^c 屈服现象不明显时，采用 R_{p0.2o} Taking R_{p0.2} in case of indistinct yield.

^d 钢材厚度 < 3mm 时采用标距长度 L₀=80mm 的非比例试样，试样宽度推荐采用 b=20mm；当试样厚度 ≥ 3mm 时，采用标距长度 $L_0 = 5.65\sqrt{S_0}$ 的比例试样，试样宽度推荐采用 b=25mm。When thickness is below 3mm,tensile test applies on-proportional samples L₀=80mm,b=20mm;while thickness is ≥ 3mm, applies proportional samples $L_0 = 5.65\sqrt{S_0}$,b=25mm.

^e 当厚度 ≥ 8mm 时，屈服强度下限允许降低 20MPa。Allowable reduction of min. yield strength is by 20MPa for strip with thickness is not less than 8.0mm.

牌 号 Grade	拉伸试验 ^a Tensile Test ^a				180°冷弯试验 ^b 180° Bending Test
	屈服强度 ^c R _{eH} /MPa	抗拉强度 R _m /MPa	断 后 伸 长 率 ^d /% Elongation at Fracture/%		
			A _{80mm} / %	A %	
			公称厚度< 3mm Nominal Thickness < 3 mm	公 称 厚 度 ≥ 3mm Nominal Thickness ≥ 3mm	
QStE340TM	≥ 340	420 ~ 540	≥ 19	≥ 25	D=0.5a
QStE380TM	≥ 380	450 ~ 590	≥ 18	≥ 23	D=0.5a
QStE420TM	≥ 420	480 ~ 620	≥ 16	≥ 21	D=0.5a
QStE460TM	≥ 460	520 ~ 670	≥ 14	≥ 19	D=1a
QStE500TM	≥ 500 ^e	550 ~ 700	≥ 12	≥ 17	D=1a
QStE550TM	≥ 550 ^e	600 ~ 760	≥ 12	≥ 15	D=1.5a
QStE600TM	≥ 600 ^e	650 ~ 820	≥ 11	≥ 13	D=1.5a
QStE650TM	≥ 650 ^e	700 ~ 880	≥ 10	≥ 12	D=2a
QStE700TM	≥ 700 ^e	750 ~ 950	≥ 10	≥ 12	D=2a

^a 拉伸试验采用纵向试样。Tensile test applies to longitudinal samples.

^b 弯曲试验采用横向试样，压头弯头直径为 D，试样宽度 b ≥ 20mm，推荐采用 b=25mm。Bend test applies transverse samples.Diameter is D, width b=15~50mm, b=25mm is proposed.

^c 屈服现象不明显时，采用 Rp0.2。Taking Rp0.2 in case of indistinct yield.

^d 钢材厚度< 3mm 时采用标距长度 L0=80mm 的非比例试样，试样宽度推荐采用 b=20mm；当试样厚度≥ 3mm 时，采用标距长度 $L_0 = 5.65\sqrt{S_0}$ 的比例试样，试样宽度推荐采用 b=25mm。When thickness is below 3mm,tensile test applies on-proportional samples L0=80mm,b=20mm;while thickness is ≥ 3mm, applies proportional samples $L_0 = 5.65\sqrt{S_0}$,b=25mm.

^e 厚度大于 8.0mm 的钢带，其屈服强度下限允许降低 20MPa。Allowable reduction of min. yield strength is by 20MPa for strip with thickness more than 8.0mm.

牌号 Grade	拉伸试验 ^a tensile test			180°弯曲试验 ^b 180° Bend test 弯芯直径 D
	下屈服强度 ^c R _{eL} /MPa ≥	抗拉强度 R _m /MPa	断后伸长率 ^d A/%/ ≥	
S330LW/ S330LF	225	330 ~ 430	33.0	0.5a
S380LW/ S380LF	235	380 ~ 480	28.0	1.0a
S400LW/ S400LF	235	400 ~ 520	26.0	1.0a
S420LW/ S420LF	290	420 ~ 520	26.0	1.0a
S440LW/ S440LF	295	440 ~ 550	26.0	1.0a
S490LW/ S490LF	325	490 ~ 600	24.0	2.0a
S540LW/ S540LF	355	540 ~ 660	22.0	2.0a
S590LW/ S590LF	420	590 ~ 710	20.0	2.0a
S650LW/ S650LF	500	650 ~ 770	17.0	2.0a
S700LW/S700LF	550	700 ~ 850	15.0	2.0a
^a 拉伸试验和弯曲试验采用纵向试样。Tensile and bending test apply to longitudinal samples. ^b 弯曲试样宽度 b=35mm。Width b=35mm samples are taken for bending test. ^c 屈服现象不明显时，采用 R _{p0.2} 。Taking Rp0.2 in case of indistinct yield. ^d 厚度 6 ~ 10mm 的钢板和钢带断后伸长率允许较本表值降低 1%，厚度大于 10mm 的钢板和钢带断后伸长率允许较本表值降低 2%。Allowable reduction of elongation is by 1% and 2% of this table for sheets and strip with thickness 6~10mm and thickness more than 10mm, respectively.				

牌号 Grade	下屈服强度 R _{eL} /MPa	抗拉强度 R _m /MPa	断后伸长率 Elongation at Fracture, A/%	180°弯曲试验 b=35mm 180° Bending Test Width b=35mm	
				厚度 Thickness ≤ 12mm	厚度 Thickness > 12mm
370L	≥ 245	370 ~ 480	≥ 28	D=0.5a	D=1a
420L	≥ 280	420 ~ 520	≥ 26	D=0.5a	D=1a
440L	≥ 305	440 ~ 540	≥ 26	D=0.5a	D=1a
510L	≥ 355	510 ~ 630	≥ 24	D=1a	D=2a
550L	≥ 400	550 ~ 670	≥ 23	D=1a	—
注：a 为试样厚度；b 为冷弯试样的宽度；d 为弯心直径。 Note: a=thickness of samples; b=width of samples; D=diameter.					

1.3.4 高扩孔钢（High Hole Expansion Steel）

首钢高扩孔钢采用先进的控轧控冷技术生产，显微组织主要为铁素体和贝氏体组织，具有高的扩孔率、优良的成形性能和焊接性能，主要用于要求翻边变形的汽车零部件，如摆臂、车轮等。

Shougang hot-rolled and pickled high hole expansion steel is produced by advanced TMCP technology. The microstructure is mainly ferrite and bainite. It has high hole expansion rate, excellent formability, and welding performance. It is mainly used for automotive parts with flanging deformation, such as swing arm, wheel, etc.

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

GB/T20887.2-2010	prEN 10338-2007	SAE J2745-2007	JFS A1001-1998	
HR300/450HE	HDT450F	HHE440T/310Y	JSH440A	JSH440B
HR440/580HE	HDT560F	HHE590T/440Y	JSH590A	JSH590B
HR600/780HE	-	HHE780T/600Y	-	-

1.3.4.2 力学性能（Mechanical Properties）

牌号 Grade	拉 伸 试 验 ^a Tensile Test ^a			扩孔率 λ %
	下屈服强度 ^{b,c} R _{eL} /MPa	抗拉强度 R _m /MPa	断后伸长率 % Elongation at Fracture/% (L ₀ =80mm,b=20mm)	
HR300/450HE	300 ~ 380	≥ 450	≥ 24	≥ 80
HR440/580HE	440 ~ 620	≥ 580	≥ 14	≥ 75
HR600/780HE	600 ~ 800	≥ 780	≥ 12	≥ 55
^a 拉伸试验试样为纵向试样。Tensile test applies to longitudinal samples. ^b 屈服现象不明显时，采用 Rp0.2。Taking Rp0.2 in case of indistinct yield. ^c 经供需双方协商同意，对屈服强度下限值可不作要求。By mutual consent, the lower limit of yield strength is not required.				

1.3.5 热轧双相钢（Dual Phase Steel）

首钢热轧双相酸洗钢带采用先进的控轧控冷技术生产，显微组织主要为铁素体和马氏体，具有低屈强比、高的加工硬化率、高的疲劳性能和优良冷成形性能。双相钢广泛用于制造形状复杂汽车零件和加强件，如轿车车轮轮辐、纵梁等。

Shougang hot-rolled and pickled dual phase steel is produced by advanced TMCP technology. The microstructure is mainly ferrite and martensite. It has low yield ratio, high work hardening rate, high fatigue performance and excellent cold forming performance. Dual phase steel is widely used in manufacturing automotive parts and stiffeners with complex shapes, such as car wheel spokes, longitudinal beams, etc.

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

GB/T 20887.3-2010	prEN 10338-2007	SAE J2745-2007	JIS G3134-2006	JFS A1001-1998
HR330/580DP	HDT580X	DP 590T/300Y	SPFH590Y	JSH590Y
HR450/780DP	-	DP780T/380Y	-	JSH780Y

1.3.5.2 力学性能（Mechanical Properties）

牌号 Grade	拉 伸 试 验 ^a Tensile Test ^a			n 值 n value
	下屈服强度 ^b R _{eL} MPa	抗拉强度 R _m MPa	断 后 伸 长 率 Elongation at Fracture, A ₈₀ mm/% (L ₀ =80mm,b=20mm)	
HR330/580DP	330 ~ 470	≥ 580	≥ 19	≥ 0.14
HR450/780DP	450 ~ 610	≥ 780	≥ 14	≥ 0.11
a 拉伸试验试样为纵向试样。Tensile test applies to longitudinal samples. b 屈服现象不明显时，采用 Rp0.2。Taking Rp0.2 in case of indistinct yield.				

1.3.6 热轧相变诱导塑性钢（Transformation Induced Plasticity Steel）

首钢相变诱导塑性酸洗钢带采用先进的控轧控冷技术生产，具有高强度、高塑性、优良冷成形性能和高碰撞吸收能的特点。广泛用于制造形状复杂汽车构件、安全构件等，如悬架、防撞梁、保险杆等。

Shougang hot-rolled and pickled transformation induced plasticity steel is produced by advanced TMCP technology. It has high strength, high plasticity, excellent cold forming performance and high collision absorption energy. It is widely used in manufacturing automotive parts and safety parts with complex shapes, such as suspension, anti-collision beam, bumper, etc.

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

GB/T 20887.4-2010	SAEJ2745-2007
HR400/590TR	TRIP 590T/400Y
HR450/780TR	TRIP 780T/450Y

1.3.6.2 力学性能（Mechanical Properties）

牌号 Grade	拉伸试验 ^a Tensile Test ^a			n 值 n value (10% ~ 20%)
	下屈服强度 ^b R _{eL} MPa	抗拉强度 R _m MPa	断后伸长率 % Elongation at Fracture% (L ₀ =80mm,b=20mm)	
HR400/590TR	≥ 400	≥ 590	≥ 24	≥ 0.19
HR450/780TR	≥ 450	≥ 780	≥ 20	≥ 0.15
a 拉伸试验试样为纵向试样。Tensile test applies to longitudinal samples. b 屈服现象不明显时，采用 Rp0.2。Taking Rp0.2 in case of indistinct yield.				

1.3.7 热轧复相钢（Complex Phase Steel）

首钢复相酸洗钢带采用先进的冶炼技术和轧制技术生产，组织由铁素体、贝氏体、马氏体和沉淀析出相等组成，晶粒细小、强度高、成形性能好。广泛用于车门加强件、纵梁和抗冲击安全件。

Shougang hot-rolled and pickled complex phase steel is produced by advanced smelting and TMCP technology. The material consists of bainite, ferrite, and a small amount of martensite and residual austenite with fine grains. With high strength and good formability, it is widely used in door stiffener, longitudinal beam, and impact safety parts.

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

GB/T 20887.6-2017	EN 10338:2015	VDA239-100:2011
HR660/760CP	HDT760C	HR660Y760T-CP
HR720/950CP	—	—

1.3.7.2 力学性能（Mechanical Properties）

牌号 Grade	拉 伸 试 验 ^a Tensile Test ^a			
	下屈服强度 ^{b,c} , R _{eL} /MPa	抗拉强度 , R _m / MPa	断后伸长率 % Elongation at Fracture% (L ₀ =80mm,b=20mm)	
			板厚 /mm	
			<3.0 ^b	≥ 3.0 ^c
HR660/780CP	660-820	≥ 760	≥ 10	
HR720/950CP	720-920	≥ 950	≥ 9	

a 屈服现象不明显时，采用 R_{p0.2}。 Taking R_{p0.2} in case of indistinct yield.

b 试样为 GB/T 228.1 -2010 中的 P6 试样（L₀ =80 mm,b₀ = 20 mm），试样方向为纵向。 Applies to longitudinal samples, P6 sample of GB/T 228.1 -2010（L₀ =80 mm,b₀ = 20 mm）

c 试试样为 GB/T 228.1 -2010 中的 P13 试样（L₀ =80 mm,b₀ = 20 mm），试样方向为纵向。
No. P13 test piece (L₀=80mm, b₀=20mm) specified in GB/T 228.1-2010 shall be used, and the test shall be carried out in the longitudinal direction.

1.3.8 表面质量（Surface Quality）

表面质量级别 Grade	代号 Code No.	特征 Features
普通级表面 General surface	FA	表面允许有深度（或高度）不超过钢板厚度公差之半的麻点、凹面、划痕等轻微、局部的缺陷，但应保证钢板及钢带允许的最小厚度。 It is allowed for the existence of minor and local surface defects whose depth or height will not exceed the half of thickness tolerances, such as pit, concave and scratch. The minimum thickness of the strips and sheets must be guaranteed.
较高级表面 Relatively high-grade surface	FB	表面允许有不影响成形性的缺陷，如轻微划伤、轻微压痕、轻微麻点、轻微辊印及色差等。 It is allowed for the existence of a few surface defects which will not affect forming, such as minor scratch, impression, pit, roll mark and tint.

1.3.9 交货状态（Delivery Conditions）

- (1) 钢板及钢带以热轧或控轧状态交货。
- (2) 钢板及钢带为热轧酸洗表面时，通常以涂油状态供货，所涂油膜应能用碱水溶液去除，在通常的包装、运输、装卸和储存条件下，供方保证自生产完成之日起 3 个月内不生锈。经供需双方协商，并在合同中注明，热轧酸洗表面也可以不涂油状态交货。不涂油的酸洗钢板及钢带，在运输和加工过程中易产生锈蚀和擦伤。
- The hot rolled and pickled products are normally delivered in oiled condition. 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 three months from the date on which the products are made available at the manufacturer’ s work under normal conditions of packaging, transportation, handling and storing. The products can also be delivered in un-oiled condition as required in order by the purchaser. However, there will be increased risk of corrosion and scratches during transportation and processing for un-oiled products.



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）

公称厚度 Nominal thickness	规定最小屈服强度 Re 小于 360MPa 钢带（包括连轧钢板）厚度允许偏差 Re < 360MPa Tolerances on thickness *					
	普通精度 PT.A General precision			较高精度 PT.B Relative high precision		
	公称宽度 Nominal Width			公称宽度 Nominal Width		
	750 ~ 1200	> 1200 ~ 1500	> 1500 ~ 1600	750 ~ 1200	> 1200 ~ 1500	> 1500 ~ 1600
> 1.5 ~ 2.0	±0.17	±0.19	±0.21	±0.13	±0.14	±0.14
> 2.0 ~ 2.5	±0.18	±0.20	±0.21	±0.14	±0.15	±0.17
> 2.5 ~ 3.0	±0.20	±0.21	±0.22	±0.15	±0.17	±0.19
> 3.0 ~ 4.0	±0.22	±0.24	±0.26	±0.17	±0.18	±0.21
> 4.0 ~ 5.0	±0.24	±0.26	±0.28	±0.19	±0.21	±0.22
> 5.0 ~ 6.0	±0.26	±0.28	±0.29	±0.21	±0.22	±0.23
> 6.0 ~ 7.0	±0.29	±0.30	±0.31	±0.23	±0.24	±0.25
公称厚度 Thickness	规定最小屈服强度 Re 不小于 360MPa 钢带（包括连轧钢板）厚度允许偏差 Re ≥ 360MPa Tolerances on thickness *					
	普通精度 PT.A General precision			较高精度 PT.B Relative high precision		
	公称宽度 Nominal Width			公称宽度 Nominal Width		
	750 ~ 1200	> 1200 ~ 1500	> 1500 ~ 1600	750 ~ 1200	> 1200 ~ 1500	> 1500 ~ 1600
> 1.5 ~ 2.0	±0.19	±0.21	±0.23	±0.14	±0.15	±0.15
> 2.0 ~ 2.5	±0.20	±0.23	±0.25	±0.15	±0.17	±0.19
> 2.5 ~ 3.0	±0.22	±0.24	±0.26	±0.17	±0.19	±0.21
> 3.0 ~ 4.0	±0.24	±0.26	±0.29	±0.19	±0.20	±0.23
> 4.0 ~ 5.0	±0.26	±0.29	±0.31	±0.21	±0.23	±0.24
> 5.0 ~ 6.0	±0.29	±0.31	±0.32	±0.23	±0.24	±0.25
> 6.0 ~ 7.0	±0.32	±0.33	±0.34	±0.25	±0.26	±0.28

1.3.10.2 宽度允许偏差（Tolerances on Width）

钢带及不切边钢板的宽度允许偏差（Tolerances on width of as-rolled sheet and Strip）

公称宽度 Nominal width	允许偏差 Tolerances
≤ 1500	0/+20
> 1500	0/+25

切边钢带（包括连轧钢板）的宽度允许偏差

（Tolerances on width of trimmed continuously hot rolled steel sheets and strips）

公称宽度 Nominal width	允许偏差 Tolerances
≤ 1200	0/+3
> 1200~1500	0/+5
> 1500	0/+6

1.3.10.3 长度允许偏差（Tolerances on Length）

公称宽度 Nominal width	允许偏差 Tolerances
2000~8000	0.5%× 公称长度 (nominal length)
> 8000	0/+40

1.3.10.4 不平度（Tolerances on Flatness）

公称厚度 Nominal thickness	公称宽度 Nominal width	不平度 /mm 不大于 Flatness /mm max.				
		规定的最小屈服强度 Re/MPa Specified minimum yield strength				
		≤ 300		> 300		
		P.F.A	P.F.B	> 300~360	> 360~420	> 420
> 2	≤ 1200	15	8	18	23	按协议
	> 1200 ~ 1500	18	9	23	30	
	> 1500	23	12	28	38	

1.3.10.5 镰刀弯（Tolerances on Edge Camber）

公称长度 Nominal length	公称宽度 Nominal width	镰刀弯不大于 Camber, ≤		测量长度 Gage length
		切边 Edge cropped	不切边 Edge not cropped	
< 5000	≥ 600	实际长度（Actual length）×0.3%	实际长度（Actual length）×0.4%	实际长度（Actual length）
≥ 5000	≥ 600	15	20	任意 5000 长度 Random 5000

1.4 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层钢板，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.

1.4.1 用途及特点（Applications and Characteristics）

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

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

Q/SGJS 0014-2020	GB/T 2518-2019	EN 10346:2015	VDA 239-100
DD51D+Z	DX51D+Z	DX51D+Z	HR0
DD51D+ZM	-	DX51D+ZM	
DD52D+Z	DX52D+Z	DX52D+Z	HR2
DD52+ZM	-	DX52D+ZM	
S220GD+Z	S220GD+Z	S220GD+Z	-
S220GD+ZM	-	S220GD+ZM	
S250GD+Z	S250GD+Z	S250GD+Z	
S250GD+ZM	-	S250GD+ZM	
S280GD+Z	S280GD+Z	S280GD+Z	
S280GD+ZM	-	S280GD+ZM	
S320GD+Z	S320GD+Z	S320GD+Z	
S320GD+ZM	-	S320GD+ZM	
S350GD+Z	S350GD+Z	S350GD+Z	
S350GD+ZM	-	S350GD+ZM	
S400GD+Z	-	—	
S400GD+ZM			
S500GD+Z	-	—	
S500GD+ZM			
S550GD+Z	S550GD+Z	S550GD+Z	
S550GD+ZM	-	S550GD+ZM	
HD300LAD+Z	HX300LAD+Z	HX300LAD+Z	HR300LA
HD300LAD+ZM	-	HX300LAD+ZM	
HD340LAD+Z	HX340LAD+Z	HX340LAD+Z	HR340LA
HD340LAD+ZM	-	HX340LAD+ZM	
HD380LAD+Z	HX380LAD+Z	HX380LAD+Z	HR380LA
HD380LAD+ZM	-	HX380LAD+ZM	
HD420LAD+Z	HX420LAD+Z	HX420LAD+Z	HR420LA
HD420LAD+ZM	-	HX420LAD+ZM	
HD460LAD+Z	HX460LAD+Z	HX460LAD+Z	HR460LA
HD460LAD+ZM	-	HX460LAD+ZM	
HD500LAD+Z	HX500LAD+Z	HX500LAD+Z	HR500LA
HD500LAD+ZM	-	HX500LAD+ZM	
HD550LAD+Z	HD550LAD+Z	-	HR550LA
HD550LAD+Z	-		
HD700LAD+Z	-	-	HR700LA
HD700LAD+ZM	-		
HD330/580DPD+Z		-	HDT580X+Z
HD330/580DPD+ZM	HDT580X+ZM		
HD300/450FBD+Z	-	HDT450F+Z	HR300Y450T-FB
HD300/450FBD+ZM		HDT450F+ZM	
HD440/580FBD+Z	-	-	HR440Y580T-FB
HD440/580FBD+Z			
HD600/780FBD+Z	-	-	HR600Y780T-FB
HD600/780FBD+ZM			
HD660/760CPD+Z	HD660/760CPD+Z	-	HR660Y760T-CP
HD660/760CPD+ZM	-		
HD900/1180MSD+Z	-	-	HR900Y1180T-MS
HD900/1180MSD+ZM			

Q/SGJS 0014-2020	JIS G 3302:2019
SGHCD+Z	SGHC
SGHCD+ZM	-
SGH340D+Z	SGH340
SGH340D+ZM	-
SGH400D+Z	SGH400
GH400D+ZM	-
SGH440D+Z	SGH440
SGH440D+ZM	-
SGH490D+Z	SGH490
SGH490D+ZM	-
SGH540D+Z	SGH540
SGH540D+ZM	-

1.4.3 力学性能（Mechanical Properties）

牌号 Grade		屈服强度 ^{a,b} MPa Yield strength MPa	抗拉强度 ^a R _m ,MPa Tensile strength	断后伸长率 ^{a,c} , A _{80mm} %, ≥ Elongation
钢种 Steel grade	镀层种类 Coating species			
DD51D ^d	+Z、+ZM	—	270 ~ 500	22
DD52D ^d	+Z、+ZM	140 ~ 300 ^e	270 ~ 420	26
^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L₀=80mm,b₀ = 20mm), 试样方向为横向。 ^a Using P6(L0 = 80mm, b0 = 20mm) sample of GB/T 228.1-2010. Sample direction is horizontal. ^b 无明显屈服现象时采用 R_{p0.2}, 否则采用下屈服强度 R_{eL}。 ^b Taking Rp0.2 in case of indistinct yield, otherwise ReL. ^c 当镀层种类为 ZM 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. ^d 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. ^e 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 ^{a,b} MPa, ≥ Yield strength MPa	抗拉强度 ^{a,c} R _m , MPa, ≥ Tensile strength	断后伸长率 ^{a, d} Elongation A _{80mm} %, ≥
钢种 Steel grade	镀层种类 Coating species			
S220GD	+Z、+ZM	220	300	20
S250GD	+Z、+ZM	250	330	19
S280GD	+Z、+ZM	280	360	18
S320GD	+Z、+ZM	320	390	17
S350GD	+Z、+ZM	350	420	16
S400GD	+Z、+ZM	400	470	15
S500GD	+Z、+ZM	500	530	—
S550GD	+ZM	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.				
^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L ₀ =80mm,b ₀ = 20mm), 试样方向为纵向。 Using P6(L0 = 80mm, b0 = 20mm) sample of GB/T 228.1-2010. Sample direction is longitudinal. ^b 无明显屈服现象时采用 R _{p0.2} , 否则采用上屈服强度 R _{eH} 。 Taking Rp0.2 in case of indistinct yield, otherwise ReH. ^c 除 S550GD+Z、S550GD+ZM 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+ZM. ^d 当镀层种类为 ZM 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 ZM, the minimum value of elongation can reduce two units compare to the table.				

牌号 Grade		屈服强度 ^{a,b} MPa Yield strength MPa	抗拉强度 ^a R _m ,MPa Tensile strength	断后伸长率 ^{a,c} , A _{80mm} %, ≥ Elongation	n 值 ^a		BH ₂ ^a MPa, ≥
钢种 Steel grade	镀层种类 Coating species				n _{4.6} , ≥	n _{10-20/Ag} , ≥	
HD330/580DPD	+Z、+ZM	330 ~ 450	580 ~ 680	19	0.16	0.13	30
^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L ₀ =80mm,b ₀ = 20mm), 试样方向为纵向。 Using P6(L0 = 80mm, b0 = 20mm) sample of GB/T 228.1-2010. Sample direction is longitudinal. ^b 无明显屈服现象时采用 R _{p0.2} , 否则采用下屈服强度 R _{eL} 。 Taking Rp0.2 in case of indistinct yield, otherwise ReL. ^c 当镀层种类为 ZM 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 ^{a,b} MPa Yield strength MPa	抗拉强度 ^a R _m ,MPa Tensile strength	断后伸长率 ^{a,c} , A _{80mm} %, ≥ Elongation	BH ₂ ^a MPa, ≥
钢种 Steel grade	镀层种类 Coating species				
HD300/450FBD	+Z、+ZM	300 ~ 400	450 ~ 550	24	30
HD440/580FBD	+Z、+ZM	440 ~ 600	580 ~ 700	15	30
HD600/780FBD	+Z、+ZM	600 ~ 760	780 ~ 920	12	30
HD660/760CPD	+Z、+ZM	660 ~ 820	760 ~ 960	10	30
^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L ₀ =80mm,b ₀ = 20mm), 试样方向为纵向。 Using P6(L0 = 80mm, b0 = 20mm) sample of GB/T 228.1-2010. Sample direction is longitudinal. ^b 无明显屈服现象时采用 R _{p0.2} , 否则采用下屈服强度 R _{eL} 。 Taking Rp0.2 in case of indistinct yield, otherwise ReL. ^c 当镀层种类为 ZM 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 ^{a,b} MPa Yield strength MPa	抗拉强度 ^a R _m ,MPa Tensile strength	断后伸长率 ^{a,c} Elongation A _{80mm} %, ≥	n 值 ^a n _{10-20/Ag} ≥
钢种 Steel grade	镀层种类 Coating species				
HD300LAD	+Z、+ZM	300 ~ 380	380 ~ 500	24	0.14
HD340LAD	+Z、+ZM	340 ~ 440	420 ~ 540	22	0.13
HD380LAD	+Z、+ZM	380 ~ 480	450 ~ 570	20	-
HD420LAD	+Z、+ZM	420 ~ 520	480 ~ 600	18	-
HD460LAD	+Z、+ZM	460 ~ 560	520 ~ 640	16	-
HD500LAD	+Z、+ZM	500 ~ 620	560 ~ 700	14	-
HD550LAD	+Z、+ZM	550 ~ 670	610 ~ 750	12	-
HD700LAD	+Z、+ZM	700 ~ 850	750 ~ 950	10	-
^a 试样为 GB/T 228.1-2010 中的 P6 试样 (L ₀ =80mm,b ₀ = 20mm), 试样方向为纵向。 Using P6(L0 = 80mm, b0 = 20mm) sample of GB/T 228.1-2010. Sample direction is longitudinal. ^b 无明显屈服现象时采用 R _{p0.2} , 否则采用下屈服强度 R _{eL} 。 Taking Rp0.2 in case of indistinct yield, otherwise ReL. ^c 当镀层种类为 ZM 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 ^{a,b} MPa, ≥ Yield strength MPa	抗拉强度 ^{a,c} R _m MPa, ≥ Tensile strength	断后伸长率 ^{a, d} , A _{50mm} %, ≥ Elongation
钢种 Steel grade	镀层种类 Coating species			
SGHCD	+Z、+ZM	205	270	-
SGH340D	+Z、+ZM	245	340	20
SGH400D	+Z、+ZM	295	400	18
SGH440D	+Z、+ZM	335	440	
SGH490D	+Z、+ZM	365	490	16
SGH540D	+Z、+ZM	400	540	
^a 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. ^b 无明显屈服现象时采用 R _{p0.2} ，否则采用上屈服强度 R _{eH} 。 Taking Rp0.2 in case of indistinct yield, otherwise ReH.				

1.4.4 拉伸应变痕（Tensile Strain Marks）

对于牌 号 DD51D（+Z、+ZM）、DD52D（+Z、+ZM）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、+ZM）、DD52D（+Z、+ZM）the customers are suggested to use them as soon as possible because they tend to develop tensile strain marks. Special requiremen

1.4.5 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、锌流波痕、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.

1.4.6 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.



1.4.7 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 ²) Nominal coating mass range supply	
		纯锌镀层 (Z) zinc coating	锌铝镁合金镀层 (ZM) Zn-Al-Mg Alloy Coating
等厚镀层	N、M、F	80 ~ 600	80 ~ 600
差厚镀层 ^a	N、M、F	30 ~ 150（单面） Each side	-
注 1：纯锌 50g/m ² 镀层的厚度约为 7.1μm，锌铝镁合金 50g/m ² 镀层的厚度约为 7.5um。 Note 1: Coating thickness is 7.1μm, when the coating mass is 50g/m ² for zinc and zinc-Fe alloy coating. Coating thickness is 7.3~8.1μm, when the coating mass is 50g/m2 for Zn-Al-Mg Alloy coating.			
^a 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.			

1.4.8 表面处理（Surface Treatment）

序号 Serial nurber	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存储期间表面产生白锈。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.

1.4.9 交货状态（Delivery Status）

通常情况下，钢板及钢带经热镀加光整拉矫或热镀加光整后交货。

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

1.4.10 尺寸允许偏差（Tolerances on Dimensions）

1.4.10.1 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 ^{a,b,c} 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 ^d	> 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
^a 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%. ^b 对双面镀层重量之和不小于 450g/m ² 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 ² can exceed ± 0.01mm. ^c 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. ^d 牌号 DD51D+Z(ZM) 厚度允许偏差应符合此档规定。 DD51D+Z(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,1/2tolerance, tolerance zone move-up, tolerance zone move-down, positive and negative tolerance.

1.4.10.2 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

1.4.10.3 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

1.4.10.4 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 ^a	< 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					

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

1.4.10.5 镰刀弯 (Tolerances on Edge Camber)

产品状态 Product status	公称长度 Nominal length	镰刀弯 Cam ber ≤	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 Slit wide strip	-	2	2000

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

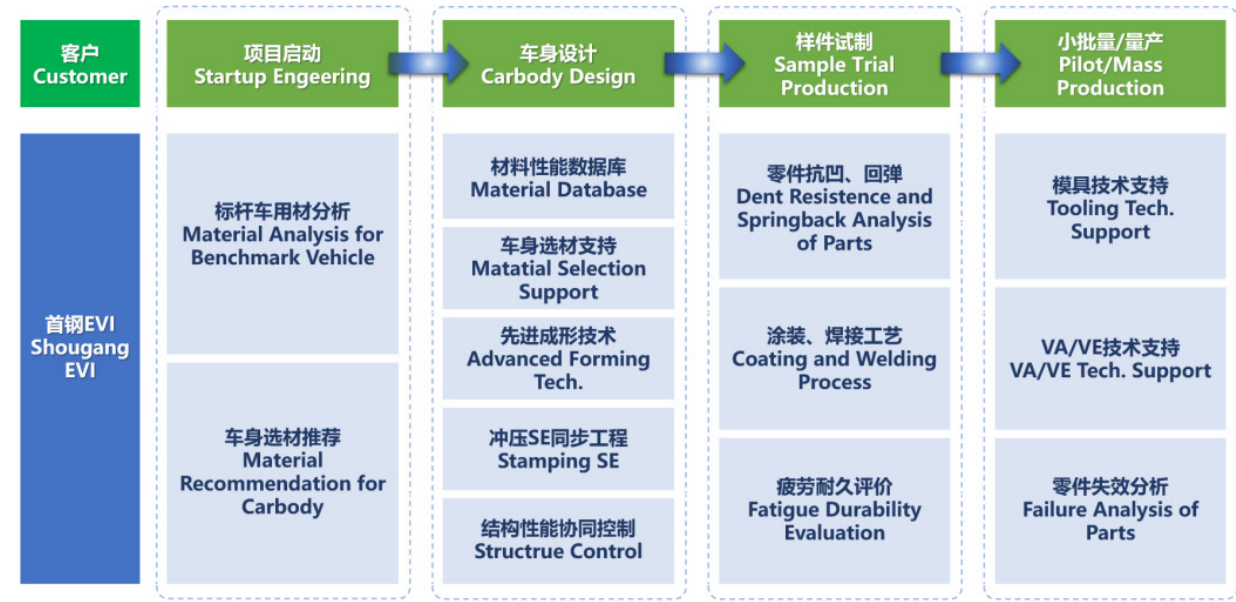
Chapter 2 Application

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.

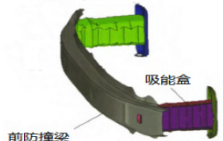
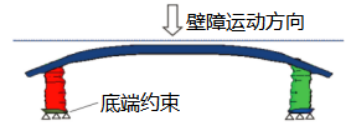
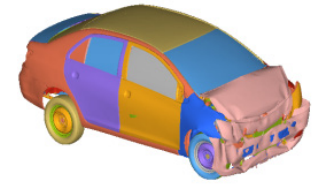
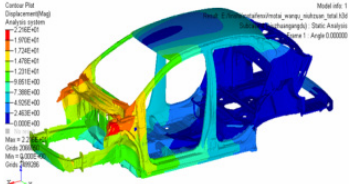
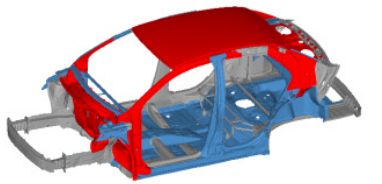


2.1EVI 技术（Early Vendor Involvement Technology）

2.1.1 车身轻量化 (BIW Lightweight)

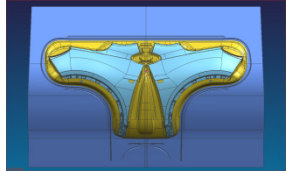
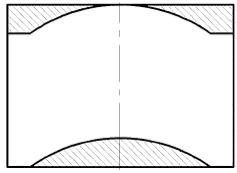
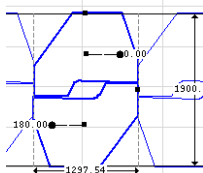
通过材料优化、先进成形工艺、结构优化等综合解决方案，实现整车轻量化，并全面评估从总成到整车级别的安全性。

Shougang EVI can provide customers with comprehensive solutions consist of material design, advanced forming technology, structure optimization, and so on to reduce BIW weight and evaluate the comprehensive safety performance from the assembly level to the vehicle level.

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
牌号规格优化 Material Grade Opt.	热成形工艺 Hot Stamping	形状优化 Shape Opt.	碰撞性能 Impact Analysis
	液压成形工艺 Hydroforming	断面优化 Cross Section Opt.	抗凹性 Dent Resistance
高强度应用 AHSS Application	辊压成形 Roll Forming	接头优化 Joint Opt.	刚度分析 Stiffness Analysis
 前防撞梁小总成 Assembly of Front Bumper  正面 100% 碰撞 100% Overlap Frontal Crash  正面 40% 偏置 40% Overlap Frontal Crash			
小总成轻量化解决方案 Lightweight Solution on Assembly Level			
 整车碰撞 Vehicle Collision  刚度模态 Stiffness and Modal  灵敏度 Sensitivity			
整车轻量化解决方案 Lightweight Solution on Vehical Level			

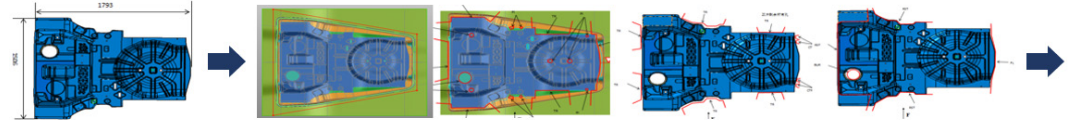
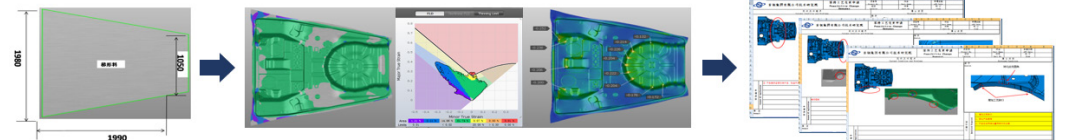
2.1.2 技术降成本（Cost Reduction）

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
 左右件合并 Merging of Left and Right Parts	 坯料设计优化 Blank Design Optimization	 优化排样 Layout Optimization

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	工艺更改申请 (ECR) Support Engineering Change Request

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。

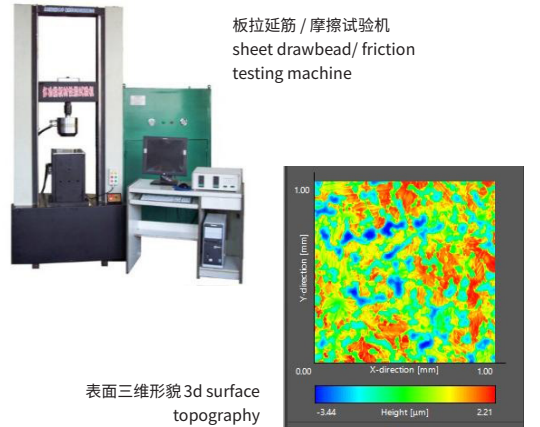
The forming test of automotive steel is mainly used to evaluate the sheet forming performance. The forming laboratory is equipped with the ability to analyze tests such as forming limit, hole expansion, erichsen cupping test, cone sup test, hydro-bulging test, secondary working embrittlement, etc., which 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。

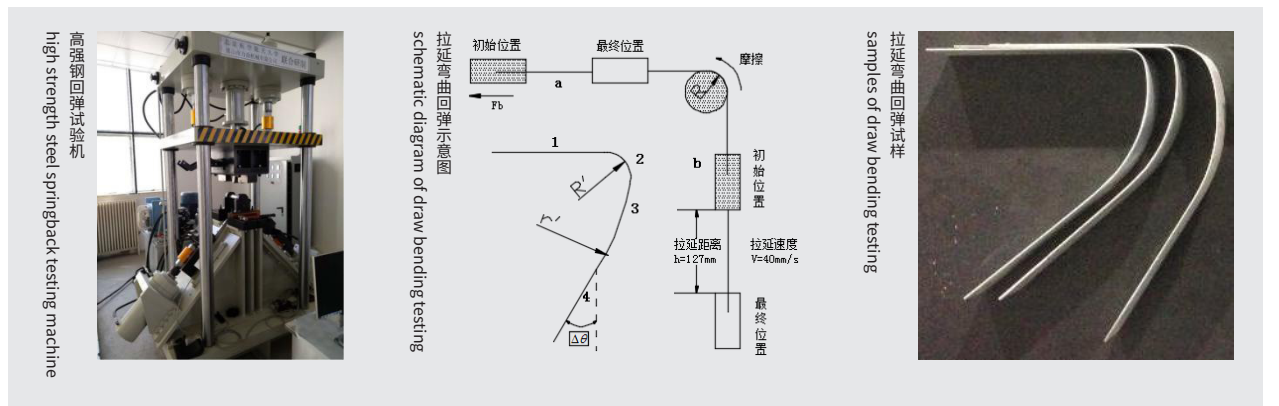
Friction characteristics have a great influence on the sheet metal forming process. Sheet drawbead/ friction testing machine has the functions of sheet coating peeling test, friction coefficient test and drawbead restraining force test. It is widely used for testing the friction coefficient of sheet 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、拉伸弯曲和拉伸弯曲回弹试验。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。

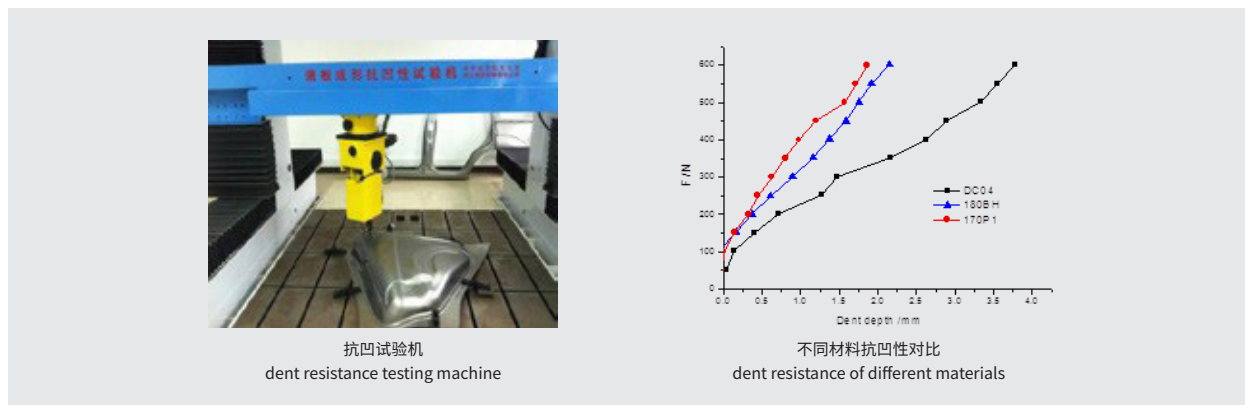
High-strength steel springback testing machine is mainly used to study the springback law of high strength steel. The testing machine can conduct U-bending, V-bending, stretch bending and draw bending springback test. It is of great significance to improve the forming accuracy of high-strength steel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

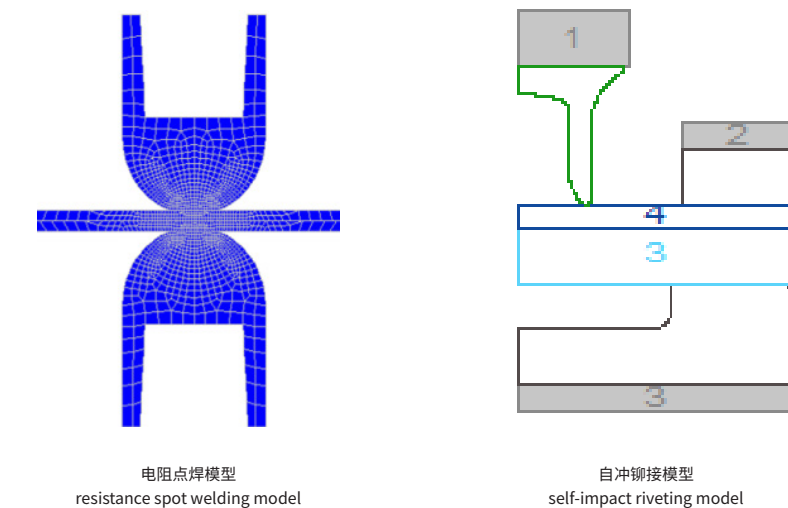


2.3 连接技术 (Joining Technology)

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。

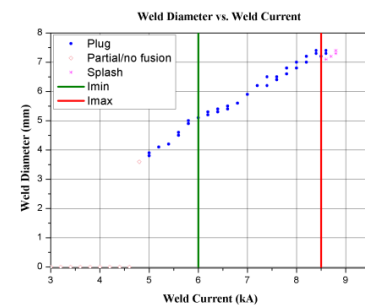
Shougang Automotive Steel Joining Laboratory is an international and professional automotive steel welding test and certification platform, equipped with intermediate frequency DC spot welding, power frequency AC spot welding, laser welding, arc welding and self-piercing riveting equipment, as well as 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.



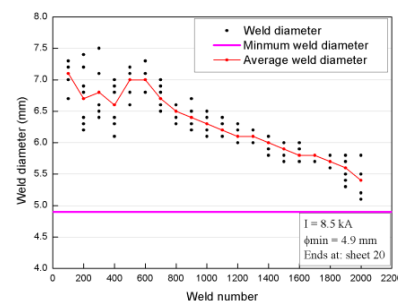
2.3.2 汽车板连接技术 (Automotive Steel Joining Technology)

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。

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, so as to improve the comprehensive performance of welded joints..



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性等优点。

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).



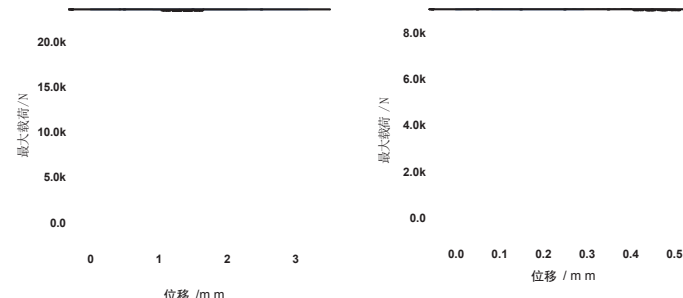
2.3.3.3 胶接技术支持 (Adhesive Bonding Technical Support)



zwick 拉伸试验机
(tensile testing machine)



湿热循环箱
(Humidity and heat circulation box)



胶接拉伸试验
(bonding tensile test)

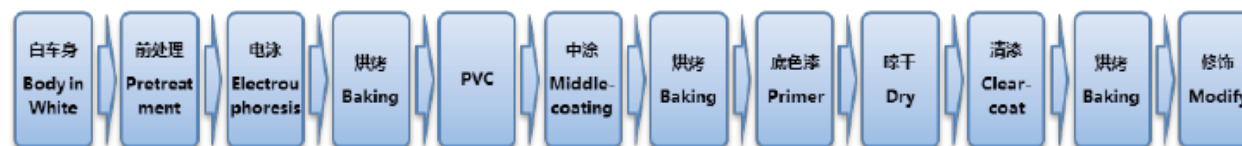
位移—力曲线

2.4 涂装技术 (Painting Technology)

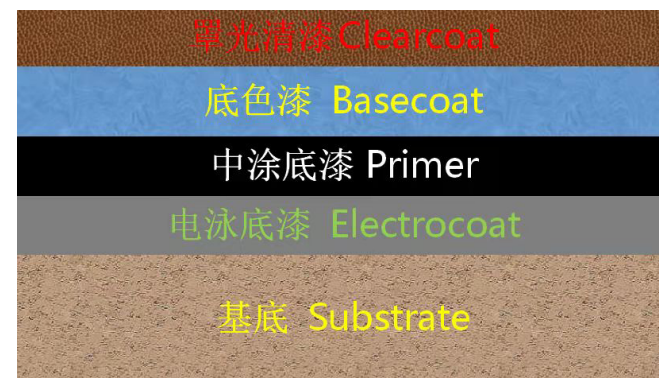
涂装是指汽车厂家在涂装车间将涂料涂覆于白车身上，经干燥成膜的工艺。涂装的主要功能保护作用、装饰作用，特殊功能。

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。

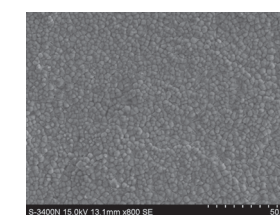
Phosphating is the core process of pretreatment. The surface of steel plate / zinc coating reacts with acid phosphate solution to form a non-metallic and semi conductive porous phosphate inorganic conversion film. The main function of the conversion film is to improve the adhesion between the substrate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

磷化膜主要成分： $\text{Zn}_2\text{Fe}(\text{PO}_4)_2 \cdot 4\text{H}_2\text{O}$ 和 $\text{Zn}_3(\text{PO}_4)_2 \cdot 4\text{H}_2\text{O}$

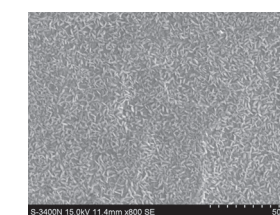
Component of phosphating film: $\text{Zn}_2\text{Fe}(\text{PO}_4)_2 \cdot 4\text{H}_2\text{O}$ and $\text{Zn}_3(\text{PO}_4)_2 \cdot 4\text{H}_2\text{O}$

不同钢材及镀层磷化膜微观形貌：

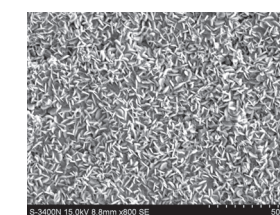
Microstructures of phosphating film on different substrates:



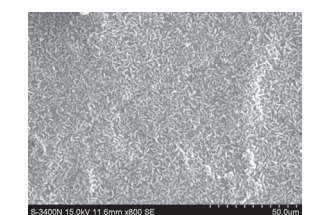
DP590 磷化形貌



GI 板磷化形貌



GA 板磷化形貌



ZM 板磷化形貌

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。

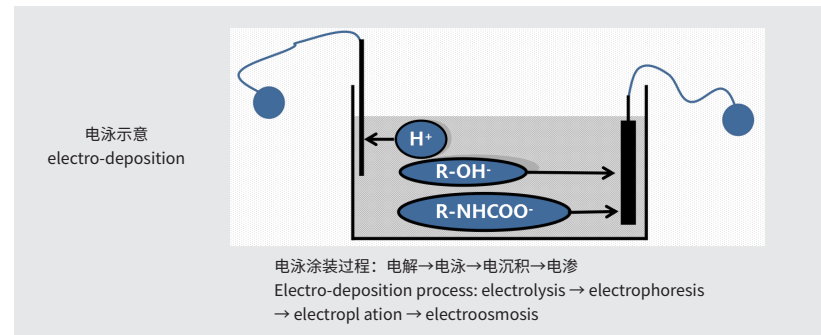
For the annealed steel sheet, composition and morphology of the surface oxides, roughness, microstructure and other factors have different degrees of influence on the

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.



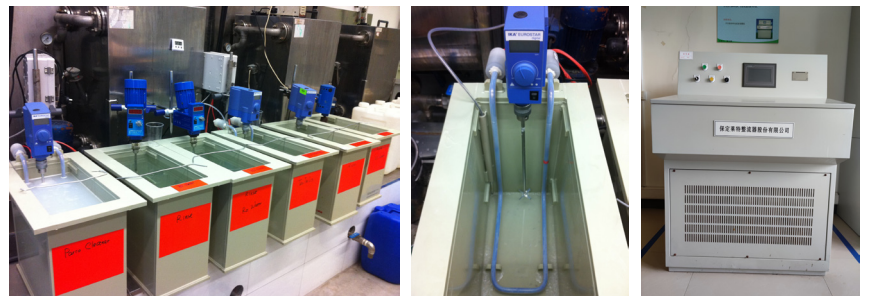
2.4.4 涂装与腐蚀技术研究 (Coating and Corrosion Technology)

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 material selection, 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，首钢质量体系建设 and 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 大项中 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为汽车制造商提供先行服务。

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

- 提供详细的汽车板介绍材料与标准
- 为用户提供正确的选材指导
- 提供汽车用钢先期介入 在车型设计进行初选材料；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 detailed instruction data and standards of SHOUGANG steel's automotive sheets.
- Serving users with instructions on correct selection of material.
- Providing earlier involvements on automotive steel Preliminary material selection in model design, providing CAE emulation analysis, verifying accuracy of the design and material selection for parts and presenting 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
- 异议处理
- 客户信息反馈
- 为用户提供网上质保书查询功能
- 为用户提供首钢汽车板产品在使用中各类问题的咨询，进行汽车板产品使用 现场跟踪服务
- 快速有效的处理产品质量异议，包括现场的跟踪调整试验，提供异议材料紧急替 代方案，满足用户生产需求 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
- Order tracking
- Providing detailed user order tracking information to ensure punctual goods delivery.
- Query for certificate quality level
- Technical supports
- Claim handling
- Customer information feedback
- Providing users with online query for certificated quality level.
- Providing users with advisories for various problems met during the application of Shougang automotive sheets and site tracking service on product application.
- Quickly and effectively handling claims on product quality, including site tracking& adjustment tests, provision of emergent substitute proposal against claimed materials to meet users’ production demands.
- 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 本产品标准号
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 边缘状态
Edge status
- 6 表面质量级别
Surface quality level
- 7 不平度精度
Flatness accuracy
- 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 method
- 12 用途
Application
- 13 其他特殊要求
Other special requirements



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 ²	7.85（厚度 1mm，面积 1 m ² 的重量）	—
单位重量 kg/m ²	基本重量（kg/m ² ）× 厚度（mm）	修约至四位有效数字
钢板面积 m ²	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 ² ）× 钢板面积（m ² ）	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 ²	7.85 (weight with T=1mm and area=1m ²)	-
Unit weight kg/m ²	Basic weight (kg/m ²) × Thickness (mm)	Revised and cancelled to four effective digits
Steel sheet area m ²	Width (m) × Length (m)	Revised and cancelled to four effective digits
Weight per sheet kg	Unit weight (kg/m ²) × Steel sheet area (m ²)	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

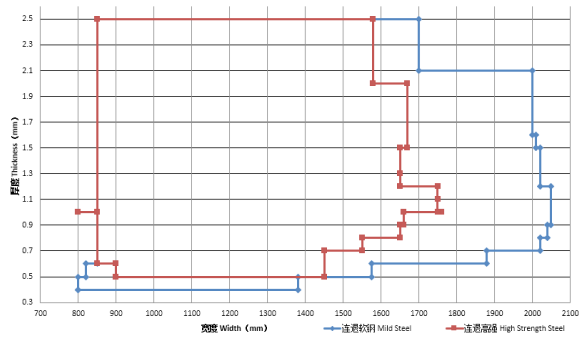
铝镁镀层 Zn-Al-Mg Alloy Coat

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

首钢汽车板供货范围 Scope of Supply

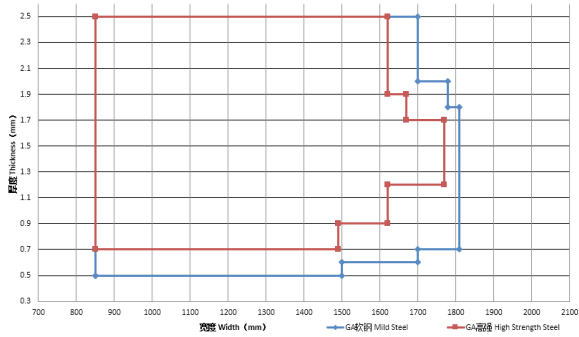
连退接单能力示意图

Availability of Annealed Cold Strips



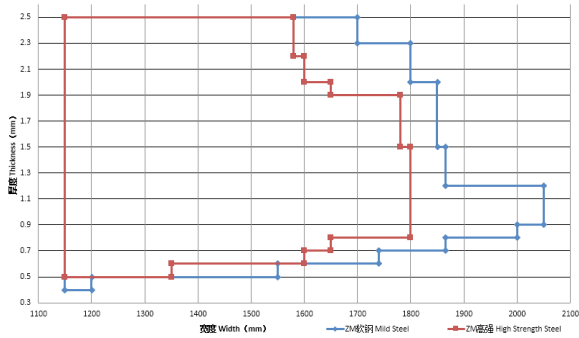
GA 产品接单能力示意图

Availability of Hot-Dip Galvannealed Steel Strips



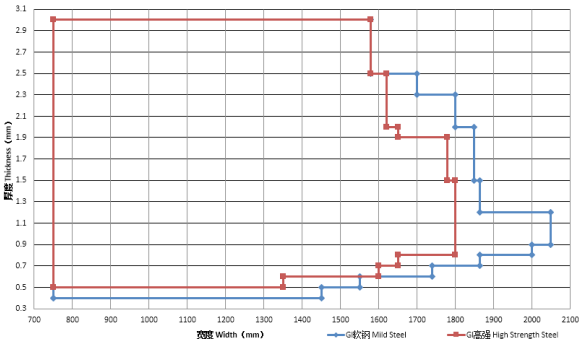
锌铝镁产品接单能力示意图

Availability of ZM Coated Steel Strips



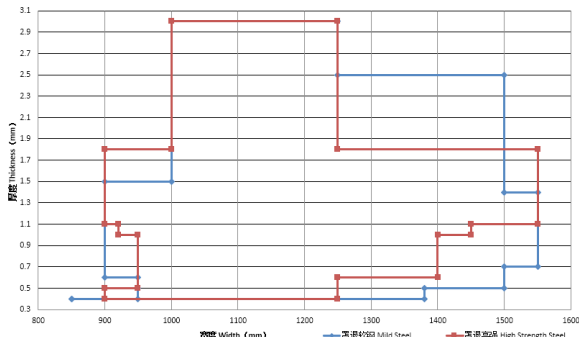
GI 产品接单能力示意图

Availability of Hot-Dip Galvanized Steel Strips



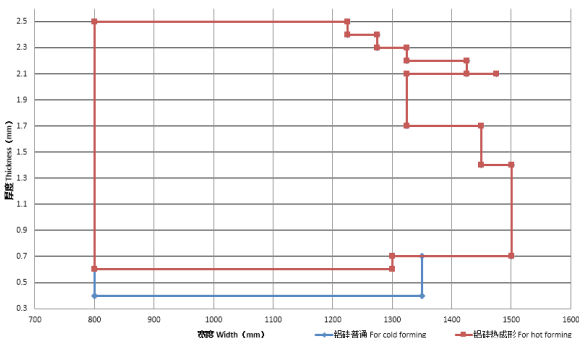
罩退产品接单能力示意图

Availability of Batch Annealed Steel Strips



铝硅镀层产品接单能力示意图

Availability of Al-Si Coated Steel Strips



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

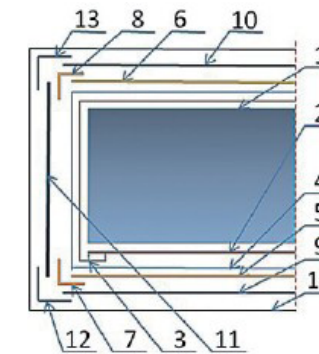
每批交货的钢板及钢带 (钢卷) 必须开具质保书。质保书上按需要应注明：商标、供方名称、品名、标准、产品规格、钢卷号或捆包号、用户合同号、炉号、颜色、重量、订货单位、件数、标准中规定的各项试验的结果、交货日期、质保书签发日期、质量管理部门负责人的签字等。

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..



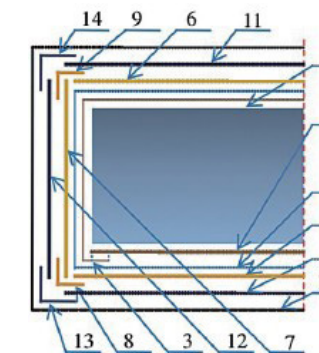
包装方式 Packing Methods

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 |

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
Guangzhou Shougang Steel Trade Co., Ltd.
电话：020-22123069
传真：020-22123691

山东首钢钢铁贸易有限公司
Shandong Shougang Steel Trade Co., Ltd.
电话：0532-80667080
传真：0532-80667087

中国首钢印度有限公司
China Shougang India Private Limited
Tel: 0091 124 4100380/1
Tax: 0091 124 4100381

首钢国际 (新加坡) 有限公司
Shougang InternaTional(Singapore) PTE. Limited
Tel: 0065 62251706
Tax: 0065 62252617

首钢国际 (奥地利) 有限公司
Shougang International(Austria)GmbH
Tel: 0043 1 802 1995 10
Tax: 0043 1 802 1995 50

首钢国际 (加拿大) 投资有限公司
Shougang International(Canada)Investment LTD.
Tel: 001 6046970128
Tax: 001 6046970113

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

首钢智慧供应链平台

<https://imp.shougang.com.cn>

天津首钢钢铁贸易有限公司
Tianjin Shougang Steel Trade Co., Ltd.
电话：022-84914552
传真：022-84918191

武汉首钢钢铁贸易有限公司
Wuhan Shougang Steel Trade Co., Ltd.
电话：027-59710209
传真：027-59710258

首钢国际 (马来西亚) 有限公司
Shougang International(Malaysia)SDN.BHD.
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(Singapope)PTE.LTD.
Tel: 0065-62251706
Tax: 0065-62252617

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



首钢智慧供应链平台
Shougang for WeChat



扫描下载本册内容
Scan QR code to download this file

北京首钢股份有限公司
Beijing Shougang Co., Ltd.



本手册以环保纸印刷
Using the recyclable paper

SGGF 2021-10-15-002



9 787203 118411