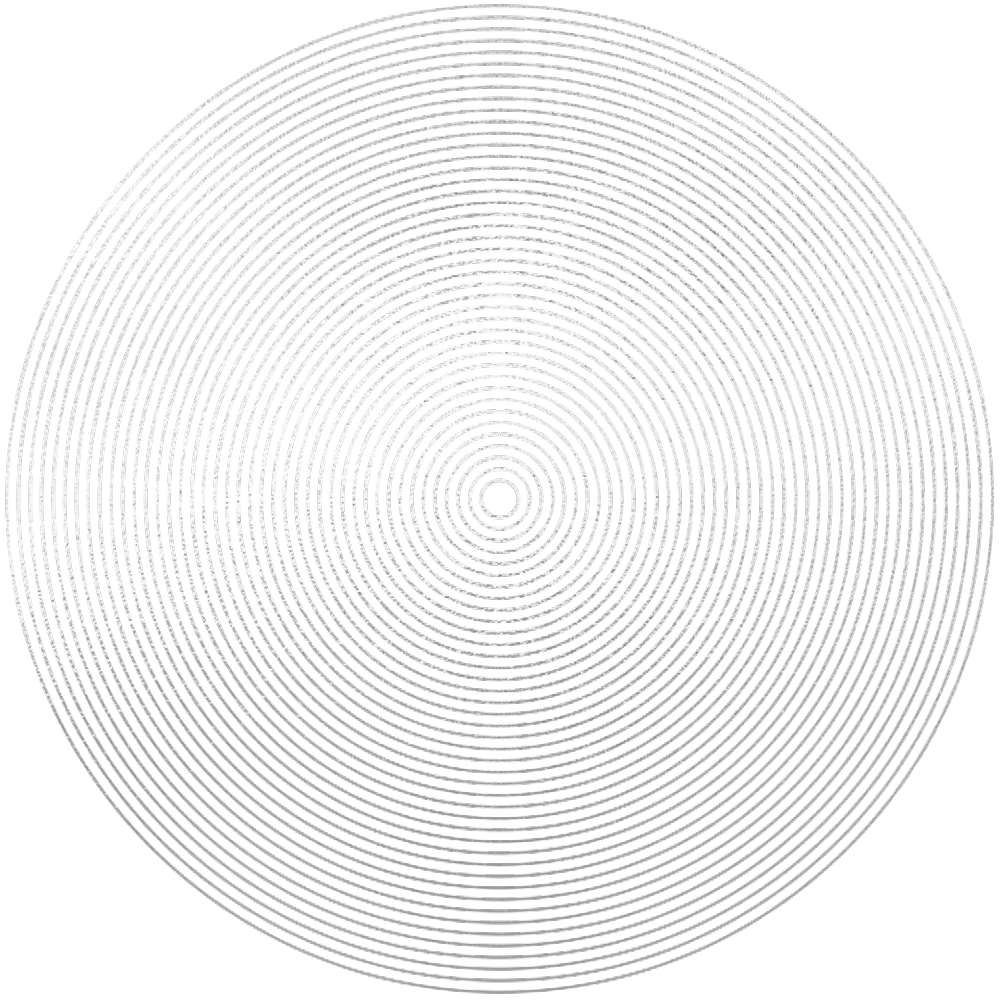
HYUNDAI BNG STEEL PRODUCT BROCHURE

THE FIRST
STEP TO THE HIGH END



HYUNDAI
BNG STEEL

THE FIRST STEP TO THE HIGH END

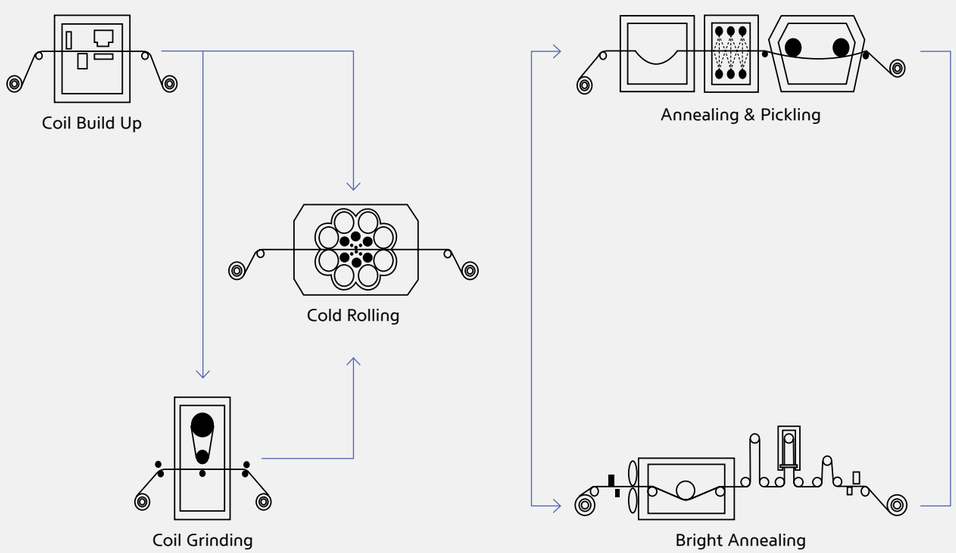
HYUNDAI BNG STEEL PRODUCT BROCHURE

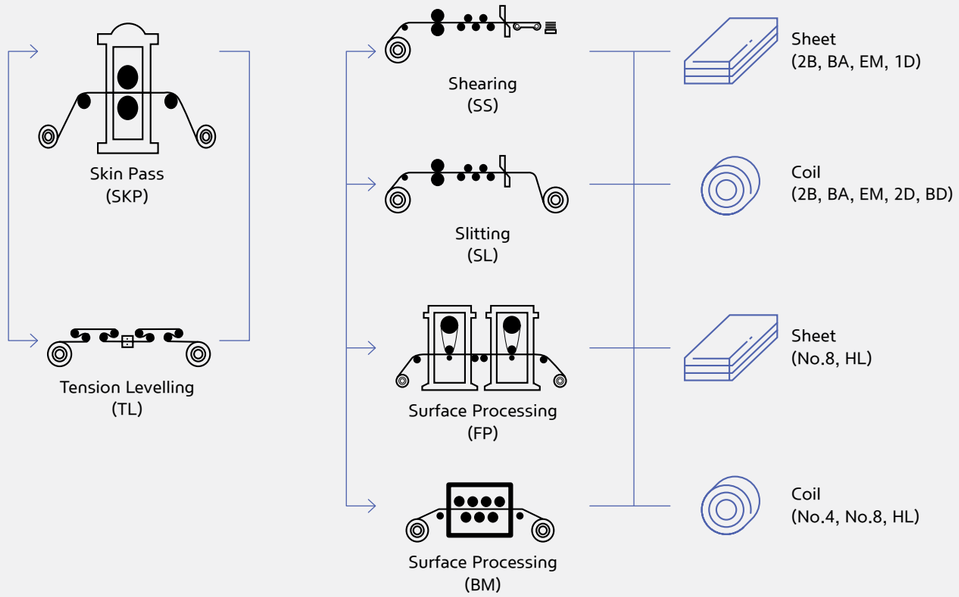
STAINLESS STEEL

01

STS PRODUCT INTRODUCTION

PRODUCTION PROCESS





Cold Rolling → **Heat Treatment** → **Skin Pass & Tension Levelling (SKP & TL)** → **Finishing** → **Products**

› Grinding Process (CG-LINE)

Process that grinds the surfaces to eliminate defects on the product during the hot or cold rolling process

› Cold Rolling (MILL-LINE)

Process where hot coil is cold rolled at various thicknesses as requested by the customer

› Annealing & Pickling Processes (AP-LINE)

Process that eliminates residual stresses leftover from the cold rolling process, adjusts physical properties through heat treatment, and eliminates high-temperature scales formed during heat treatment

› Bright Annealing (BA-LINE)

Process that maintains the inherent gloss of cold-rolled stainless steel in a deoxidized condition through heat treatment

› Skin Pass Rolling (SKP-LINE)

Light cold rolling process to improve mechanical properties, level tension, and create a glossy surface

› Tension Levelling (TL-LINE)

Process that improves flatness by applying tension to special and surface-processed products

› Shearing & Slitting (SS, SL-LINE)

Process that shears and slits cold rolled products into the specifications required by the customer

› Packing & Delivery

Process that packs finished products and delivers them to the destination specified by the customer

STEEL GRADE

AUSTENITE / DUPLEX / FERRITE

301/301L

Properties and Characteristics

› **301**
301 has lower Cr and Ni than 304 and can therefore easily generate deformation induced martensite. It is austenitic with low stability, allowing it to harden during cold processes (increasing tensile strength and hardness), and is weakly magnetic

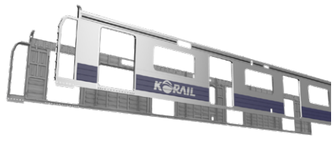
› **301L**
Steel grade with improved intergranular corrosion resistance near the welded region, which compensates for the reduced strength due to reduced C by adding N

Major Applications

› **301**
Vehicle parts, belt conveyor, spring, mixer blade

› **301L**
Frame and external equipment for railroad vehicles





Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
301	205 and above	520 and above	40 and above	207 and below	95 and below	218 and below
301L	215 and above	550 and above	45 and above	207 and below	95 and below	218 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	Miscellaneous
301	≤0.15	≤1.00	≤2.00	≤.045	≤.030	6.0 ~8.0	16.0 ~18.0			
301L	≤.030	≤1.00	≤2.00	≤.045	≤.030	6.0 ~8.0	16.0 ~18.0	≤0.20		

304 / 304I / 304L

AUSTENITE / DUPLEX / FERRITE

Properties and Characteristics

› **304**
The most widely used steel grade, with Ni and high corrosion resistance and heat resistance. Has good mechanical properties with low-temperature strength, does not harden with heat treatment, and is non-magnetic

› **304i**
A 304 steel grade with 9% Ni generally used to create needles

› **304L**
Has low carbon compared to 304, and has good weldability and processability with excellent intergranular corrosion resistance near the welded region after welding

Major Application

› **304**
Tableware and kitchen equipment, pipe, water heater, boiler heat exchanger, bathtub, and interior and exterior construction material

› **304i**
Needles and Optical Ground Wire (OPGW)

› **304L**
Areas that require higher intergranular corrosion resistance than 304





Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
(KS)	304 above 205 and	520 and above	40 and above	187 and below	90 and below	200 and below
	3041 above 205 and	520 and above	40 and above	187 and below	90 and below	200 and below
(ASTM)	304L above 175 and	480 and above	40 and above	187 and below	90 and below	200 and below
	304L above 170 and	485 and above	40 and above	190 and below	92 and below	203 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	Miscellaneous
304	≤0.08	≤1.00	≤2.00	≤0.045	≤0.030	8.0 ~10.5	18.0 ~20.0			
304I	≤0.07	≤0.75	≤2.00	≤0.045	≤0.030	8.0 ~10.5	18.0 ~19.5	≤0.10		Cu ≤0.50
304L (KS)	≤0.03	≤1.00	≤2.00	≤0.045	≤0.030	9.0 ~13.0	18.0 ~20.0			
304L (ASTM)	≤0.03	≤0.75	≤2.00	≤0.045	≤0.030	8.0 ~12	17.5 ~19.5	≤0.10		

STEEL GRADE

304J1

Properties and Characteristics

Steel grade with high formability due to addition of Cu, favorable for products that require deep drawing

Major Applications

Sink basin, thermos bottle, tray, deep processing products



Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
304J1	155 and above	450 and above	40 and above	187 and below	90 and below	200 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	Miscellaneous
304J1	≤0.08	≤1.70	≤3.00	≤.045	≤.030	6.0 ~9.0	15.0 ~18.0			Cu 1.00 ~ 3.00

316L

Properties and Characteristics

Steel grade with intergranular corrosion resistance improved over 316 by reducing C from the 316 steel grade

Major Applications

Chemical and food (milk processing, etc.) plants


Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
316L (KS)	175 and above	480 and above	40 and above	187 and below	90 and below	200 and below
316L (ASTM)	170 and above	485 and above	40 and above	217 and below	95 and below	-

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	Miscellaneous
316L (KS)	≤0.03	≤1.00	≤2.00	≤0.045	≤0.030	12.0 ~15.0	16.0 ~18.0		2.0 ~3.0	
316L (ASTM)	≤0.03	≤0.75	≤2.00	≤0.045	≤0.030	10.0 ~14.0	16.0 ~18.0	≤0.10	2.0 ~3.0	

STEEL GRADE

321

Properties and Characteristics

Prevents intergranular corrosion by adding Ti to 304 steel grade,
and has excellent intergranular corrosion resistance in the 450-900° C intergranular corrosion-sensitive area

Major Applications

Boiler heat exchanger, vehicle exhaust (bellow-shaped tube)

Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
321	205 and above	520 and above	40 and above	40 and above	90 and below	200 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	Miscellaneous
321	≤0.08	≤1.00	≤2.00	≤.045	≤.030	9.0 ~13.0	17.0 ~19.0			Over Ti5xC%

329J3L (S32205)

Properties and Characteristics

Controlled for composition of 50% austenite phase and 50% ferrite phase through chemical composition and the heat treatment process, and has excellent corrosion resistance

Major Applications

Water tank, desulfurization facility, water pipe

Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
329J3L (S32205)	450 and above	620 and above	18 and above	302 and below	107 and below	320 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	Miscellaneous
329J3L (S32205)	≤ 0.030	≤1.00	≤2.00	≤.040	≤0.03	4.5 ~6.5	21.0 ~24.0	0.08 ~0.20	2.5 ~3.5	

STEEL GRADE

409L

Properties and Characteristics

Ferrite steel grade with improved intergranular corrosion resistance due to addition of Ti and Nb, and stable at any temperature due to low C and N

Major Applications

Vehicle exhaust (muffler), heat exchanger plant

Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
409L	175 and above	360 and above	25 and above	162 and below	80 and below	175 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	Miscellaneous
409L	≤0.03	≤1.00	≤1.00	≤.040	≤0.03		10.5 ~11.75			Over Ti6xC%-0.75

AUSTENITE / DUPLEX / **FERRITE**

430

Properties and Characteristics

The representative ferrite steel grade that has a disadvantage for severe fluctuations and drawing than the austenites due to no Ni in the steel

Major Applications

Washing machine, dishwasher, refrigerator, gas stove, internal construction material, kitchen appliances (blender, etc.)

Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
430	205 and above	450 and above	22 and above	183 and below	88 and below	200 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	Miscellaneous
430	≤0.12	≤0.75	≤1.00	≤.040	≤.030		16.0 ~18.0			

STEEL GRADE

AUSTENITE / DUPLEX / **FERRITE**

430J1L

Properties and Characteristics

Improved processability and corrosion resistance in welding area by adding Ti (or Nb) and Cu, reducing C, and increasing Cr in 430

Major Applications

Washing machine, dryer, dishwasher, tableware, vehicle external material, and vehicle exhaust (converter)



Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
430J1L	205 and above	390 and above	22 and above	192 and below	90 and below	200 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	Miscellaneous
430J1L	≤.025	≤1.00	≤1.00	≤.040	≤.030		16.0 ~20.0	0.025 and below		Cu 0.30 - 0.80 Ti, Nb, Zr, or a combination of the three 8x(C%+N%)-0.80

AUSTENITE / DUPLEX / **FERRITE**

436J1L

Properties and Characteristics

Has high corrosion resistance to condensate in vehicle exhaust

Major Applications

Vehicle exhaust (muffler)

Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
436J1L	245 and above	410 and above	20 and above	192 and below	90 and below	200 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	Miscellaneous
436J1L	≤ 0.025	≤1.00	≤1.00	≤0.04	≤0.03		17.0 ~20.0		0.40 ~0.80	Ti, Nb, Zr or a combination of the three 8x(C%+N%)-0.80

STEEL GRADE

AUSTENITE / DUPLEX / **FERRITE**

436L

Properties and Characteristics

Reduced C and N and added only Ti, Nb, or Zr or a combination of the three to provide excellent processability and weldability. Has improved pitting resistance with the addition of Mo.

Major Applications

Vehicle exhaust, boiler heat exchanger

Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
436L	245 and above	410 and above	20 and above	217 and below	96 and below	230 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	기타
436L	≤ 0.025	≤1.00	≤1.00	≤.040	≤.030		16.0 ~19.0	0.025 and below	0.75 ~1.25	Ti, Nb, Zr or a combination of the three 8x(C%+N%)-0.80

AUSTENITE / DUPLEX / **FERRITE**

439

Properties and Characteristics

Has high corrosion resistance from the condensate in the vehicle exhaust

Major Applications

Vehicle exhaust (muffler), elevator

Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
430J1L	205 and above	390 and above	22 and above	192 and below	90 and below	200 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	기타
439	≤ 0.025	≤1.00	≤1.00	≤0.04	≤0.03		17.0 ~20.0			Ti, Nb or a combination of the two 8x(C%+N%)-0.80

STEEL GRADE

443CT

Properties and Characteristics

Has improved corrosion resistance due to a higher amount of Cr and has improved processability

Major Applications

Kitchen equipment, container, elevator

Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
443CT	245 and above	410 and above	20 and above	217 and below	96 and below	230 and below

Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	기타
443CT	≤ 0.025	≤1.00	≤1.00	≤.040	≤0.03		20.0 ~23.0	0.025 and below		Cu 0.3~0.8 Ti 0.8 Max

444

Properties and Characteristics

Has ultra-low carbon content with added high Cr and Mo content to improve pitting resistance, and has excellent high temperature properties

Major Applications

Hot water storage tank, water tank, boiler combustion chamber, EGR cooler

Mechanical Properties

Steel Grade	Proof Stress N/㎟	Tensile Strength N/㎟	Elongation rate %	Hardness		
				HB	HRB	HV
444	245 and above	410 and above	20 and above	217 and below	96 and below	230 and below

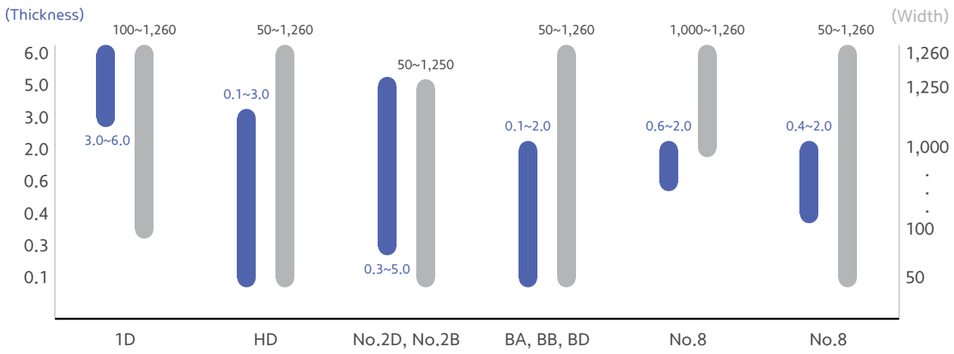
Chemical Composition

Steel Grade	Chemical Composition									
	C	Si	Mn	P	S	Ni	Cr	N	Mo	기타
444	≤ 0.025	≤1.00	≤1.00	≤.040	≤.030		17.0 ~20.0	0.025 and below	1.75 ~2.50	Ti, Nb, Zr or a combination of the three 8x(C%+N%)~0.80

PRODUCT RANGE

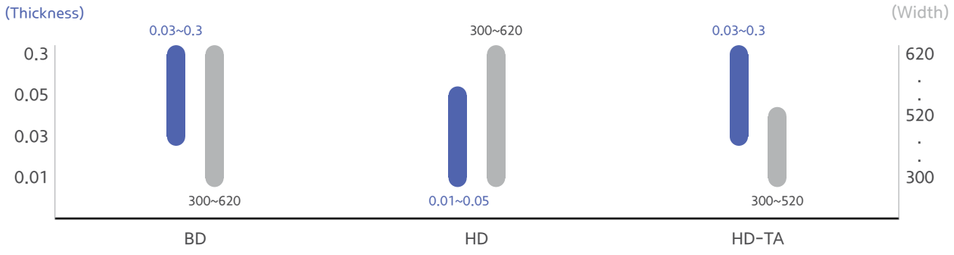
Production Availability By Surface Dimensions

› General Steel



	1D	HD	No.2D, No.2B	BA, BB, BD	No.8	No.4, EM, HL
Thickness	3.0~6.0	0.1~3.0	0.3~5.0	0.1~2.0	0.6~2.0	0.4~2.0
Width	100~1,260	50~1,260	50~1,250	50~1,260	1,000~1,260	50~1,260

› Precision Steel



	BD	HD	HD-TA
Thickness	0.03~0.3	0.01~0.05	0.03~0.3
Width	300~620	300~620	300~520

SURFACE

Surface Code	Surface Status & Process Method	Application	International Standards			
			KS D 3698	JIS G 4035	ASTM A 480	EN 10088-2
1D	Product processed with heat treatment, acid cleaning process, or similar process after hot rolling	Used for applications that do not require glossy surface, such as industrial facilities, building structural materials, chemical tanks, etc.	-	No.1	No.1	1D
HD	Cold rolled product with high hardness using hardening process	Products with high hardness, springs, knives, railroad vehicles, press bench, disk brake, etc.	-	-	TR	2H
TA	Product without residual stresses for products with high hardness	Product with high hardness required for processability (ultra-thin steel)				
No.2D	Product processed with heat treatment, acid cleaning process, or similar process after cold rolling	Product that does not require gloss General use, construction, DDQ, defense use, etc.	No.2D	No.2D	No.2D	2D
No.2B	Product processed with heat treatment, acid cleaning process, or similar process after cold rolling, then skin pass rolled to apply appropriate glossing	Top cold rolled product used for almost all applications	No.2B	No.2B	No.2B	2B
No.4	Product ground with 150-180 mesh in accordance with KSL6001 (abrasive particle size) Regulation	Construction, kitchen, vehicle uses, medical equipment, food facilities, etc.	No.4	No.4	No.4	2J
BA	Product with high reflection and gloss by cold rolling and bright annealing then skin pass rolling	Vehicle part, household appliance, kitchenware, decoration, construction use, etc.	BA	BA	Bright Annealed	2R
BB	Product with excellent metallic gloss by cold rolling then bright annealing then skin pass rolling	Household appliances, kitchenware, and other general uses				
BD	Product with regular metallic gloss by cold rolling then bright annealing	Functional product				
HL	Product ground to apply continual grinding patterns using an appropriate particle size	General use for interior/exterior construction materials	HL	HL	-	2M
No.8	Product ground with high gloss and reflective propertiesusing 800 Mesh or higher particles to buff; has grinding mark (dry)	Construction use, reflector, hand plate, decoration, etc.	-	-	No.7	2P
MR	Product ground with higher gloss and reflective properties using 1,000 Mesh or higher particles to buff; has no grinding mark	Construction use, reflector, hand plate, decoration, etc.	-	-	-	-
EM (Embossed Plate)	Rolling with embossing pattern made by cold rolling then transferring embossing pattern to stainless steel plate	Construction use, elevator interior, hand plate, kitchen use, electronic parts, decoration, etc.	-	-	-	-

Surface Example

304 2B

304 No.4

304 BA

304 BB

304 HL

304 No.8

304 MR

304 EM

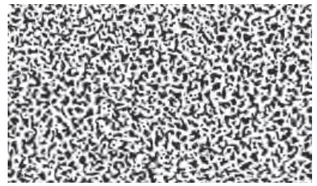
Embossed Surface

› Application

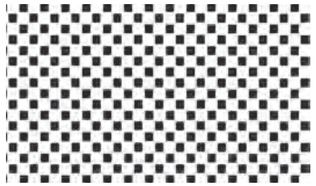
Construction interior and exterior material, kitchenware material, decoration pipe, electronic component material, etc.

› Pattern Types

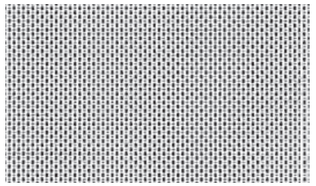
24 Embossed types; 6 dull types



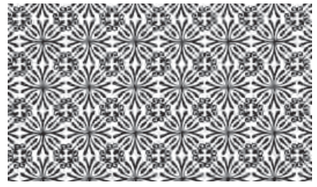
DULL (DD)



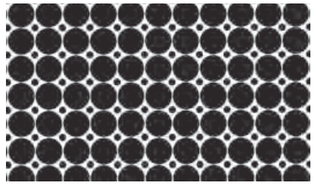
CHECK (EC)



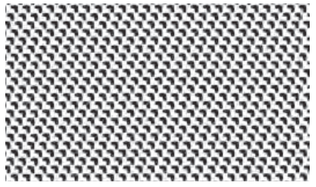
LINEN (EE)



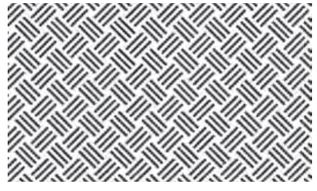
FLOWER (EF)



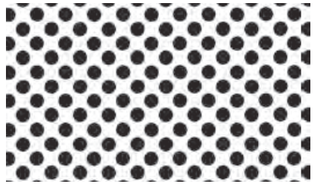
SOAP BUBBLE (EG)



HEART (EH)

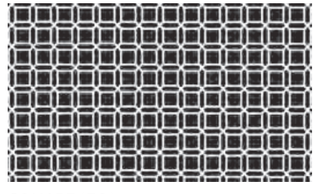


RATAN (EN)

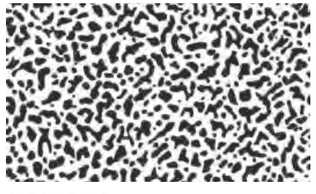


DROP (EO)

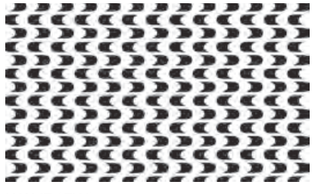
PEBBLE (EP)



SQUARE (EQ)



SPECKLE (ES)



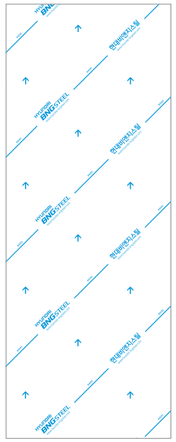
WAVE (EW)

* Steel grade, thickness, width, and surface standard can be changed or a new pattern developed through consultation.

PROTECTION FILMS & PACKAGING

Stainless Steel Plate Surface Protective Film

Type	Mark	Thick (㎛)	Color	Logo	Application	
					Product	Film
PVC (Poly VinylChloride)	WO	100	White	Printed	BA, No.8	Simple cutting and bending
					EM, No.4	Light drawing 2B, HL, No.4, EM
	VO			Not printed	2B, HL, No.4, EM	Export use
	BO	80	Blue	Not printed (translucent)	All surfaces (except No.8)	General forming use
	RO	80	Black & White	Not printed	No.3, D5	Forming use
PE (Poly Ethylene)	PO	80	Translucent light blue	Not printed (translucent)	Surface processing	Surface protection



Packaging Method

› Coil

Domestic (general, precision steel)

Export (general, precision steel)

Domestic (precision steel)

Export (precision steel)

› Sheet

Domestic sheet packaging

Export sheet packaging

PURCHASE INQUIRY

The characteristics of steel plate products can be maximized using the most optimal steel and material properties according to the selected environment and processing conditions.

1. Order Checklist

- Steel Grade : Standard
- Applicable Standards : KS, JIS, AISI, ASTM, DIN EN, TUV, etc.
- Purpose : Work processing and specific material usage environment
- Product Form : Steel coil and sheet
- Product Standard : Thickness, width, length
- Supply Conditions : Protective plastic surface, packaging unit, packaging method
- QA Items
- Delivery method and destination

2. Sales and Technology Inquiries

	Category	Phone Number	FAX Number
Materials Sales Team	Vehicle & Railroad Vehicle Materials	82-2-3467-0023	82-2-563-1292
Korea Sales Team 1	Korea Distribution	82-2-3467-0025	82-2-563-1292
Korea Sales Team 2	Korea Distribution, Actual Demand	82-2-3467-0019	82-2-563-1292
Precision Sales Team	Precision and High-functional Steel	82-2-3467-0044	82-2-563-1292
Overseas Sales Team	Overseas Distribution	82-2-3467-0093	82-2-563-1292
CS Team	Technological Support and Complaint Processing	82-2-3467-0066	82-2-563-1292
Southern Sales Office	Southern Distribution, Actual Demand	82-51-313-4080	82-51-313-4081
Sales Planning Team	Raw Material (Hot Rolled) Purchase	82-2-3467-0033	82-2-563-1292

STS GENERAL INFORMATION

STS STANDARD

Stainless Steel Standard

Standard	Standard No.	Title
KS	D 3705	Hot Rolled stainless steel plates, sheets and strip
	D 3698	Cold Rolled stainless steel plates, sheets and strip
	D 3732	Heat-resisting steel plates and sheets
	D 3534	Cold rolled stainless steel strips for spring
	D 3695	Method of mass calculation for stainless steel plates and Sheet, and heat-resisting steel plates and sheets
JIS	G 4304	Hot Rolled stainless steel plates, sheets and strip
	G 4305	Cold Rolled stainless steel plates, sheets and strip
	G 4312	Heat-resisting steel plates and sheets
	G 4313	Cold rolled stainless steel strips for spring
	G 4310	Method of mass calculation for stainless steel plates and Sheet, and heat-resisting steel plates and sheets
DIN	EN 10029	Hot rolled plates 3mm thick or above ; tolerance on dimensions, shape and mass
	EN 10259	Cold-rolled stainless steel wide strip and plate/sheet - Tolerances on dimensions and shape
	EN 10258	Cold rolled stainless steel narrow strip and cut lengths - Tolerance on dimensions and shape
	EN 10088-2	Stainless steel - Part 2 : Technical delivery condition for sheet / plate and strip of corrosion resisting steels and construction purpose
	EN 10028-7	Flat products made of steels for pressure purpose
	EN 10204	Metallic products - Types of inspection documents
ISO	6931-2	Stainless steels for springs
	9445 : 2002	Continuously cold-rolled stainless steel narrow strip, plate/sheet and cut lengths - Tolerances on dimensions and form
ASTM	A 167	Standard specification for stainless and heat-resisting Chromium-nickel steel plate, sheet, and strip
	A 176	Standard specification for stainless and heat-resisting Chromium steel plate, sheet, and strip
	A 240 / A 240Mc	Standard specification for chromium and chromium-nickel stainless steel plate, sheet, and strip for pressure vessels and for General Applications
	A 480 / A 480M	Standard specification for general requirements for Flat-rolled stainless and heat-resisting steel plate, sheet, And strip

COMPATIBILITY TABLE

Similar Standard By Steel Grade

KS	JIS	DIN	ASTM
STS301	SUS301	1.431	301
STS303	SUS303	1.4305	303
STS304	SUS304	1.4301	304
STS404L	SUS404L	1.4306	304L
STS309S	SUS309S	1.4833	309S
STS310S	SUS310S	1.4845	310S
STS316	SUS316	1.4401, 1.4436	316
STS316L	SUS316L	1.4435	316L
STS316Ti	SUS316Ti	1.4571	316Ti
STS317	SUS317	1.4436	317
STS317L	SUS317L	1.4435	317L
STS321	SUS321	1.4541	321
STS329J1	SUS329J1	1.446	329
STS347	SUS347	1.455	347
STS403	SUS403	1.4	403
STS410	SUS410	1.4024	410
STS416	SUS416	1.4005	416
STS420J2	SUS420J2	1.4021	420
STS430	SUS430	1.4016	430
STS430LX	SUS430LX	1.451	439
STS440C	SUS440C		440C
STS444	SUS444	1.4521	444
		1.4539	904L

CORROSION RESISTANCE

Corrosion Resistance by Key Steel Grade

Stainless steel has excellent corrosion resistance under various corrosive environments compared to other materials, and is extensively used in various fields including chemical, paper, petroleum, nuclear power, and food industries.

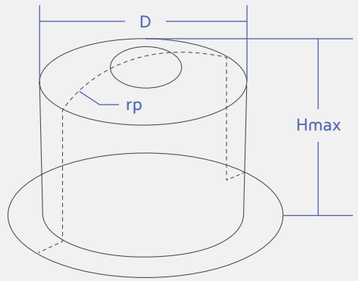
Test Solution	Concentration	Temperature	304	316	410	430
Nitric Acid	5%	20℃	A	A	A	A
	20%	20℃	A	A	A	A
	50%	Boiling	A	A	-	A
	Concentrated solution	Boiling	D	D	E	D
Sulphuric Acid	5	20℃	C	B	-	C
	5	Boiling	E	C	-	E
	50	20℃	D	C	-	-
	50	Boiling	E	D	-	E
	Concentrated solution	20℃	A	A	-	A
	Concentrated solution	Boiling	D	D	-	D
Hydrochloric Acid		20℃	E	E	E	E
Phosphoric Acid	1%	20℃	+A	+A	+A	*A
	5%	20℃	A	A	A	A
	10%	20℃	C	A	D	D
Oxalic Acid	5%	20℃~/Boiling	A	A	B	A
	10%	Boiling	D	C	-	-
Acetic Acid	5~10%	20℃	A	A	A	A
	20~100%	20℃	A	A	C	B
	50%	Boiling	C	B	-	-
Formic Acid	5%	20℃~60℃	B	A	D	C
Lactic Acid	5%	20℃	A	A	C	B
		65℃	B	A	D	B
	10%	Boiling	B	A	-	-
Butyric Acid	5%	20℃~65℃	A	A	A	A
Citric Acid	5%	20℃~65℃	A	A	A	A
	15%	Boiling	A	A	-	B
Chromic Acid	5%	20℃	A	A	-	B
	10%	Boiling	C	B	-	D
Iodine			E	D	-	E
Fluorine		20℃	E	E	E	E
Chlorine Gas	Dry	20℃	C	B	-	C
	Contains moisture	20℃	D	C	-	D
Carbon Trisulphide		20℃	A	A	-	A
Carbon Tetrachloride	Pure	20℃	A	A	-	A
	5~10%	20℃	*C	*B	D	*C
Carbolic Acid		20℃	A	A	-	A
Tartaric Acid		20℃	A	A	C	C

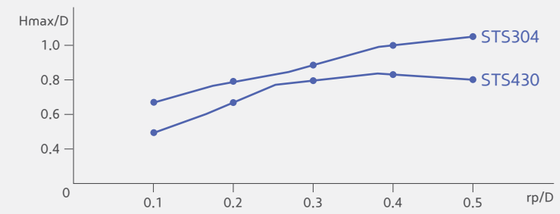
A: Sufficient corrosion resistance, below 0.0089mm/month
B: Satisfactory corrosion resistance, 0.0089~0.089mm/month
C: Average corrosion resistance, 0.089~0.25mm/month
D: Slight corrosion resistance,0.25~0.89mm/month
E: No corrosion resistance, 0.89mm/month and above
+: Vulnerable to corrosion if hydrochloric acid is present.
*: Vulnerable to pitting corrosion if neglected.

DRAWABILITY

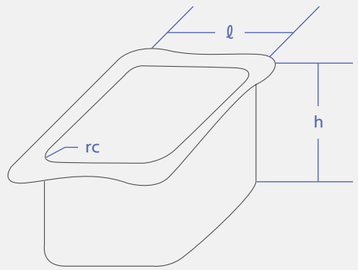
Comparison of Drawability (Formability) for STS304 and STS430

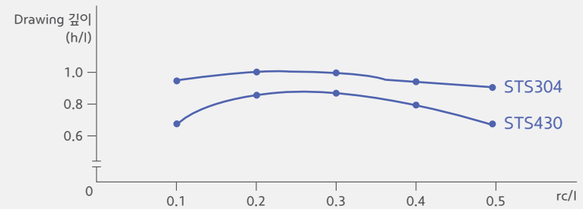
Cylindrical Drawing Limit Ratio





Rectangular Drawing Limit Ratio





Steel Grade	Limit Drawing Ratio (L.D.R.)	Limit Drawing Ratio (h max./dp)	Deep Drawing-Bulging Drawability CCV-21 (mm)
STS304	2.1 ~ 2.2	0.55 ~ 0.58	45.5 ~ 46.0
STS430	1.8 ~ 1.9	0.37 ~ 0.42	48.0 ~ 48.5

WELDABILITY

Weld Difficulty Level of Stainless Steel

Item / Welding Method	Applicable Thickness (mm)	Steel 304	309	310S	430	Application
Gas Welding	t < 1	2	2	2	2	Usually for overlay welding
Shielded Metal Arc Welding	t > 0.8	1	1	1	2	Usually for medium and thick butting plates, corner reinforcement welding, pipes with large diameter, casting overlay, etc.
TIG Welding	0.5 < t < 3	1	1	1	3	Usually used for butting plates, corner reinforcement welding, pipes with small diameter, etc.
MIG Welding	t > 3	1	1	1	3	Usually for medium and thick butting plates, corner reinforcement welding, pipes with large diameter, etc.
Submerged Arc Welding	t > 6	1	2	2	3	Usually used for medium and thick butting plates, corner reinforcement welding, direct welding of large plates for plant use, etc.
Atomic Hydrogen Welding	0.3 < t < 3	2	2	2	2	Usually used for thin plates that do not require airtightness, such as butting plates, corner reinforcement welding, and pressure containers
Spot Welding	0.15 < t < 3	2	2	2	3	Welding, aircraft, vehicles, kitchenware, etc.
Flash Butt Welding	0.25 < t	2	2	2	4	Butting plates, aircraft, vehicle capillary tubes, machine parts, etc.
Seam Welding	0.15 < t < 2	2	2	2	3	Usually used for products that require airtightness, such as butting plates, vehicle parts, gas burners, freezer parts, kitchen equipment, etc.
Soldering	0.3 < t < 2	3	3	3	4	Usually used for welding small parts that require hardness and precise dimensions, such as thin plates

(Note) 1. Widely used and most recommended welding method
2. Ordinarily used but can be restricted.
3. Used in specific situations.
4. Rarely used.

Welding Wire Appropriate for MIG Welding (KS D 7026 / JIS Z 3321)

Steel Grade	Welding Bar Type
STS301, STS301L, STS304, STS304L	Y308, Y308L
STS316, STS316L, STS444, STS317, STS317L	Y316, Y308L, Y310S
STS309S, STS310S	Y309L, Y310L
STS321, STS347	Y347, Y347L
STS430	Y430, Y309, Y310

HOW TO HANDLE STAINLESS STEEL

Stainless Steel Corrosion Types and Prevention Method

Stainless steel has a thin protection layer on the surface that cannot be seen by the human eye.
The protection layer is called a passive film and is an oxidation layer made from a combination of oxygen and chrome that provides corrosion resistance. The corrosion resistance of stainless steel depends on how well this passive film can be maintained in the usage environment. It normally has high corrosion resistance in an environment with abundant oxygen, and even if the passive film on the surface is damaged, it is immediately reformed to maintain the stainless steel's corrosion resistance.

Corrosion Types that Commonly Form on Stainless Steel

› Corrosion on stainless steel is usually separated into three types: galvanic, intergranular, and pitting.

Type	Cause of Occurrence	Prevention Method
Galvanic Corrosion	Occurs due to potential difference between two contacting metals	· Use two metals close to each other in the galvanic series: Reduces potential difference · Produce big, thick metals to be welded · Coating · Install a metal that corrodes more than the two metals (galvanic anode)
Intergranular Corrosion	Corrosion occurs in the 450~850℃ sensitive region for austenites. If processed with heat treatment, Cr23C6 carbide forms on the grains, reducing Cr and eroding the passive film to corrode stainless steel	· Solution heat treatment: The formed carbide is fully solidified at high temperature · Reduce carbon content: Below 0.03% (304L) · Add stabilization element: Ti, Nb (347, 321)
Pitting	· Effect from Cl ion: Cl damages a portion of the passive film, and corrosion forms on this damaged section · Effect from heat: Higher heat accelerates the damaging effect from Cl · Effect from extraneous matter: Extraneous matter on the surface of the product increases Cl concentration	· Prevent Cl ions from adhering · Surface treatment (grinding process) · Heat treatment of welded area · Select a steel grade that is highly resistant to Cl: Steel grade added with Mo (316, 316L)

AUTOMOTIVE PARTS

02

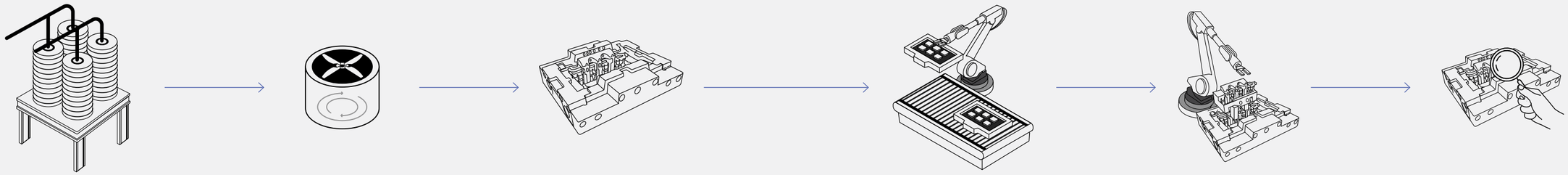
PRODUCTION/PRODUCT INFORMATION

Production Process

Product

Applicated Engine and Vehicle Model

PRODUCTION PROCESS



› ① Sand Loading

Process to stock the silo with new or recycled materials

› ② Mixing sand and binder

Mixing of sand, binder, and additives according to the product's unique recipe

› ③ Core shooting

Process to harden mixed sand in heated metal

› ④ Palletizing

Process to load cores removed from molds into automatically transferred pallets

› ⑤ Assembly

First sub-assembly process to ease assembly at customer's production line

› ⑥ Inspection

Process to visually inspect the quality of the product before storing it

› ⑦ Humidity Controlled Storage

Process to load products in storage facility that automatically maintains a set humidity to prevent quality deterioration from external factors

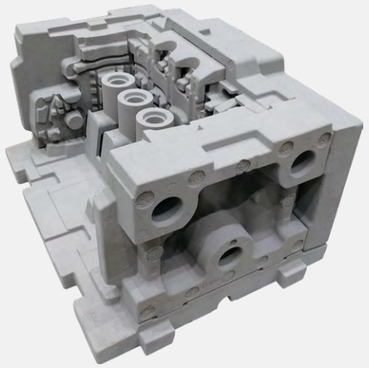
› ⑧ Delivery

Process to transfer the products to the customer using state-of-the-art vibration-free, humidity-free vehicle

› ⑨ Recovery and Recycling

Collects delivered pallets at product vehicle, and used cores are crushed once, collected and then recycled

PRODUCT

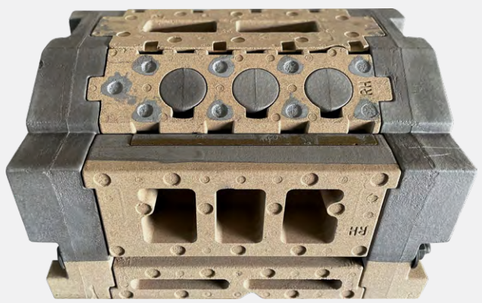


› New R Engine Block Sand Core

Dangjin Plant

S2 Engine Block Sand Core ‹

Gwangju Plant



› A2 Engine Block Sand Core

Gwangju Plant

APPLICATED ENGINE AND VEHICLE MODEL

New R Engine

Sorento, Santa Fe, Tucson, Sportage, Carnival, GV70

S2 Engine

Mohave

A2 Engine

Porter II, Bongo III

HYUNDAI BNGSTEEL PRODUCT BROCHURE

HYUNDAI
BNGSTEEL

HYUNDAI
BNG STEEL

Please refer to the Company Brochure for details on the company.

Changwon Main Office and Plant: 124, Jeokhyeon-ro,
Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea (51707)

Tel 82-55-268-4114 FAX 82-55-268-4134

Seoul Office: 5F & 6F, 512, Teheran-ro (Shinan Building),
Gangnam-gu, Seoul, Korea (06179)

Tel : 82-2-3467-0072 FAX : 82-2-563-1292