

# COLD ROLLED STEEL

posco





Cold rolled steel is a high quality steel product with a smooth, beautiful surface and excellent machinability. POSCO operates two cold rolling mills in Pohang and four cold rolling mills in Gwangyang. With the ever-growing demand in cold rolled products, we are expanding our development in the manufacturing activities of high quality products.

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COLD ROLLED STEEL



Upon completion of its first-phase manufacturing facility in 1973, Pohang Steelworks, Korea's first integrated steel mill, was finally completed after 4 stages of construction at Young-il Bay in February 1981.

POSCO is capable of producing and processing a variety of carbon steels and stainless steels. The company's global competitiveness was further enhanced when we opened the world's first FINEX commercialization facility in May 2007.

**Main products** hot-rolled steel, plate, cold-rolled steel, wire rod, electrical steel, stainless steel, API steel, etc.

**Crude steel production** 16.185 million tons (as of 2013)



Gwangyang Steelworks is the world's largest integrated steel mill. It features an optimal plant layout with carbon steel processing and high-mill processing capabilities, producing automotive steel, high-strength hot rolled steel, high-quality API steel, and thick plates among other products.

With the goal of specializing in the manufacturing of the world's best automotive steels, Gwangyang Steelworks focuses on enhancing its competitive edge.

**Main products** hot-rolled steel, plate, cold-rolled steel, car steel, API steel, etc.

**Crude steel production** 20.231 million tons (as of 2013)

# The POSCO Quality

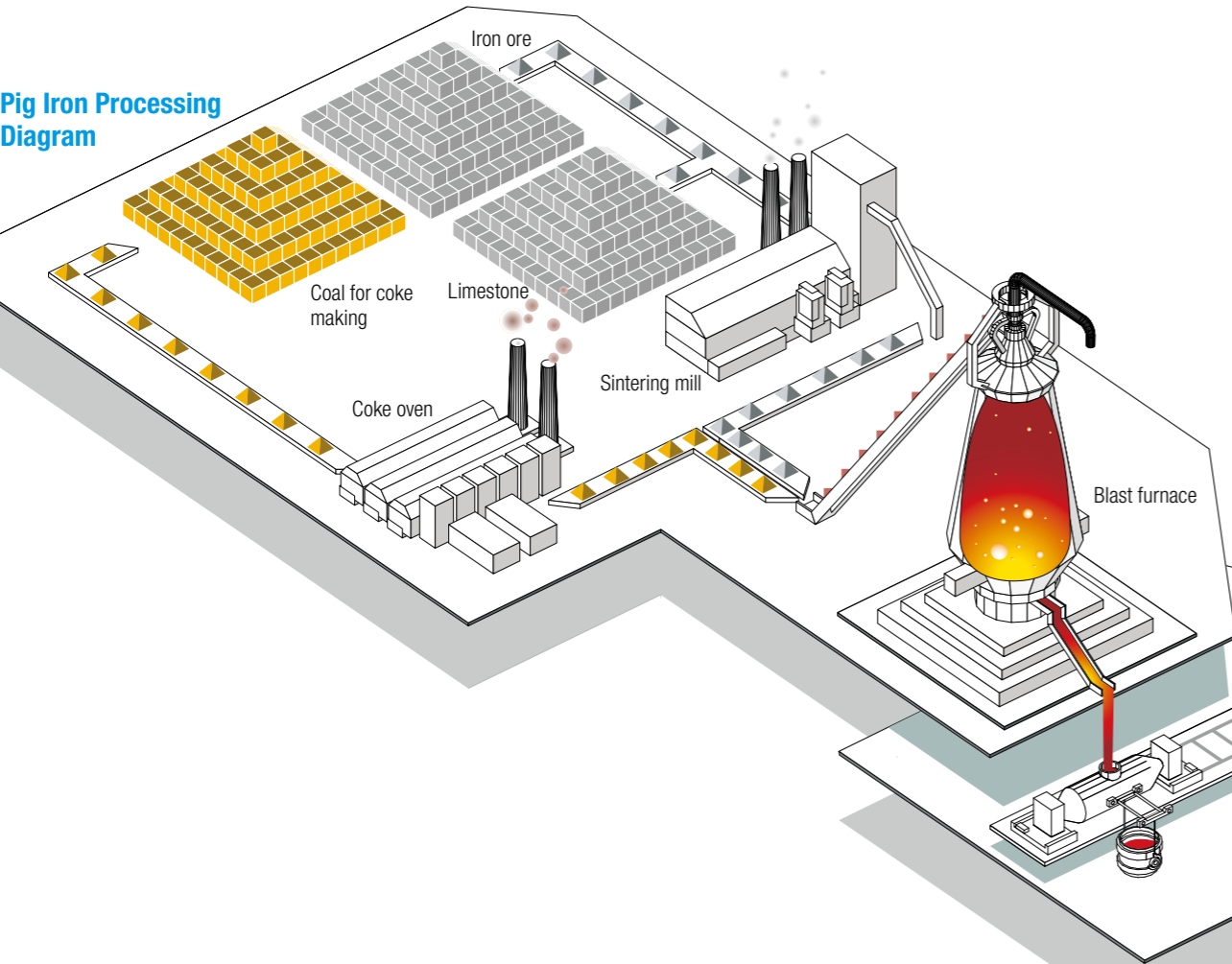
## Ultra-High Quality Products Which Touch the Customer's Soul

- **Customer Inside:** We create the best value for customers by keeping their needs foremost.
- **Basic Inside:** We focus on fundamentals and principles, eliminating deviation and waste.
- **Synergy Inside:** We seek to grow alongside our supplier chain through trust and communications.

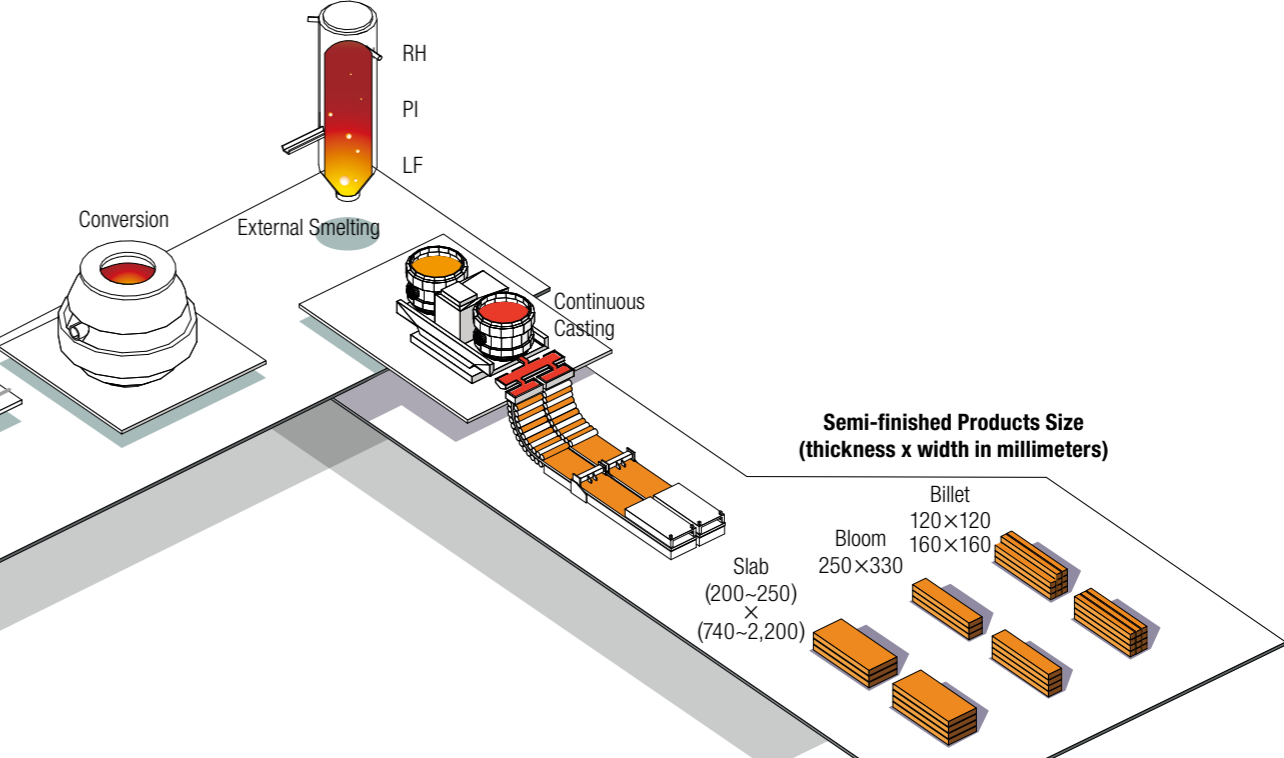


Manufacturing Processes

Pig Iron Processing Diagram



Steelmaking/Continuous Casting Processes



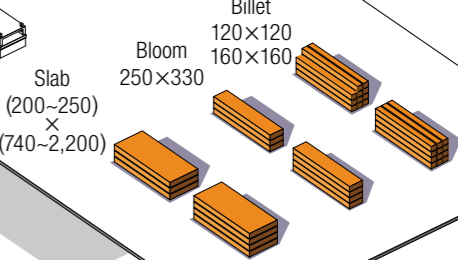
Stages of Pig Iron Processing in Detail

Process	Description
Sintering	Iron ore, the main ingredient in steelmaking, is sorted by size into subgroups such as pelletized ore (10~25mm), lump ore (larger than 25mm), and fine ore (less than 10mm). After being crushed and sorted at the raw material factory, lump ore is sent to post-processing facilities in the form of pelletized or fine ore.
Fuel treatment	Limestone and powdered coke are mixed with fine ore, which is produced from crushing lump ore. The mixture is first heated at about 1,200°C, cooled, and then crushed into sintered ore of 10~50mm granule dimensions. - Operating facilities: five in Pohang and four in Gwangyang
Coke treatment	Coke is produced by heating various coals over 1,000°C to remove water and ash. The suitable grain size of coke to be used in blast furnaces is 25~75mm considering air permeability and chemical reactivity. - Operating facilities: five in Pohang and four in Gwangyang
Blast Furnace	Sintered ore, lump coke and other powdered raw materials are introduced at the top of the furnace in multiple stages. Then, the bottom of the furnace is brought up to a temperature of about 1,100°C to heat the coke/iron ore mixture, inducing a reduction reaction to produce molten iron. - Operating facilities: six in Pohang (including the first COREX furnace) and five in Gwangyang

Steelmaking/Continuous Casting Processes

Process	Description
Converter	- Molten iron in the furnace is converted to molten steel by adding oxygen, and Impurities are removed during this process. - Pohang: 3 converters of 100-ton capacity each at the 1st steelmaking plant, 3 converters of 300-ton capacity each at the 2nd steelmaking plant - Gwangyang: 3 converters of 250-ton capacity each at the 1st steelmaking plant, 3 converters of 250-ton capacity each at the 2nd steelmaking plant
Additional Refining Facilities	These processes remove impurities and make subtle adjustments to the chemical composition of the molten steel product of the converter.
	<b>RH</b> - Acronym for Reinstahl Huttenwerke & Heraus - Ar or N <sub>2</sub> is blown into the molten steel ladle to remove an impurity in this process, hydrogen gas, and to separate and raise non-metallic inclusions to the surface. - Decarbonizing can be accomplished by adding an oxygen injection process.
	<b>PI</b> - Powder injection - Through a lance, powders such as Ca-Si are injected to remove sulfuric elements. Non-metallic inclusions are separated and then raised to the surface by stirring the bottom of the molten steel volume.
	<b>LF</b> - Ladle Furnace - During this process, a high current electric arc is used to incuse the temperature of the molten steel.
Continuous Caster	- Molten steel, which has undergone external refining processes (RH, PL and LF), is poured into molds to produce specific desired shapes. Intermediate products such as slabs, blooms, and billets are produced.

Semi-finished Products Size (thickness x width in millimeters)

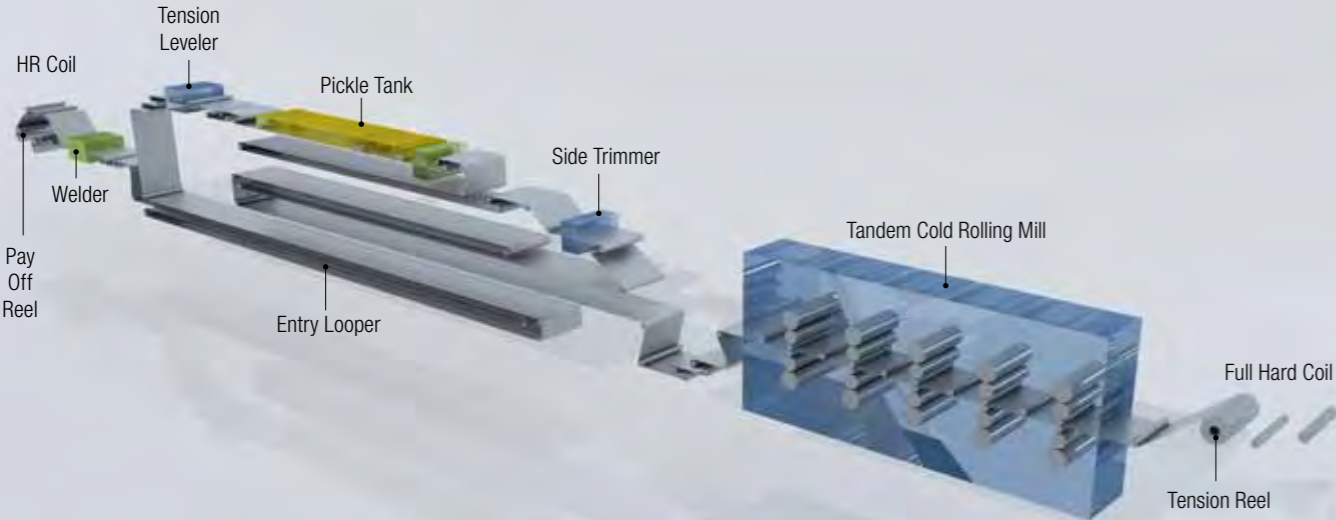




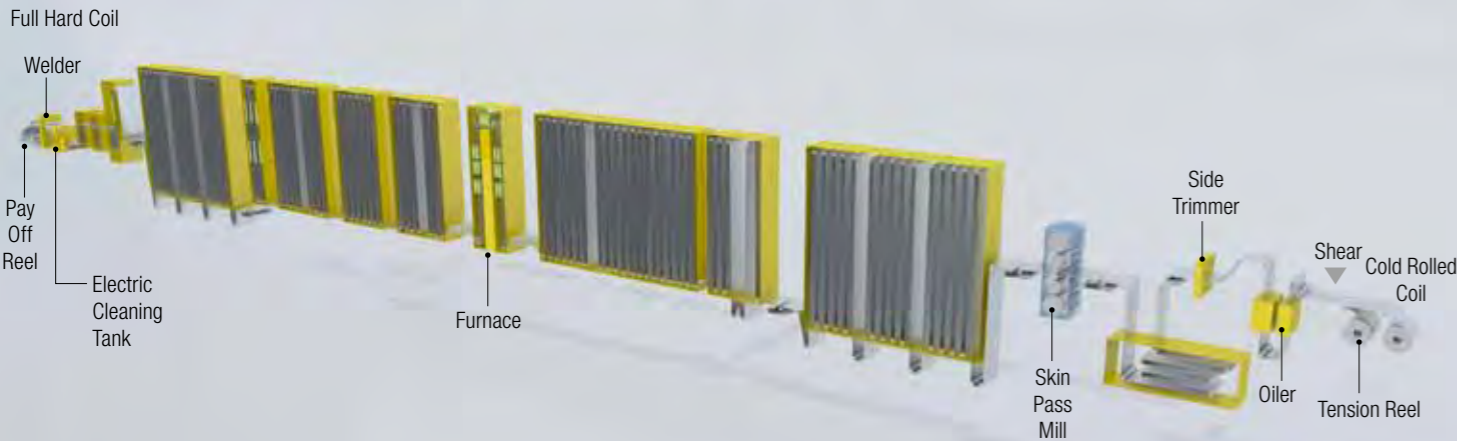
# Manufacturing Processes & Equipment for Cold Rolling

In order to deliver quality products meeting customer requirements, POSCO is equipped with the latest fully-automated, computer-controlled, cutting-edge facilities and technologies. These tools guarantee products of the highest precision and quality for our customers.

## PL/TCM (Pickling Line and Tandem Cold Mill)



## CAL (Continuous Annealing Line)



**Pickling**  
The hot-rolled coil passes through a pickling line, where scale breaker machines and hydrochloric acid solutions are used to remove surface scale and oxide film, which cause surface flaws during the final stage of cold rolled steel processing.



**Cold Rolling**  
Pickled coils are cold rolled in tandem mills to a specified thickness, typically 40~90%, of original material dimensions. Fully automated thickness and shape adjustment is ensured through state of the art process machinery.



**Electrolytic Cleaning**  
The purpose of electrolytic cleaning is to remove lubricant oil and contaminants on the cold rolled steel prior to the annealing process. All traces of surface oil are removed through mechanical and chemical action as the cold rolled coil passes through an alkaline solution bath.



**Annealing**  
After cold-rolling, the steel is hard and brittle, and its grains are elongated in the rolling direction. To obtain the desired grain structure and improve the mechanical properties, the material is reheated in a furnace and subjected to cycles of rapid heating and cooling. Steel products with extra deep drawing qualities and high tensile strength can be produced via this high productivity manufacturing method. Two annealing methods are commonly used: batch annealing and continuous annealing.

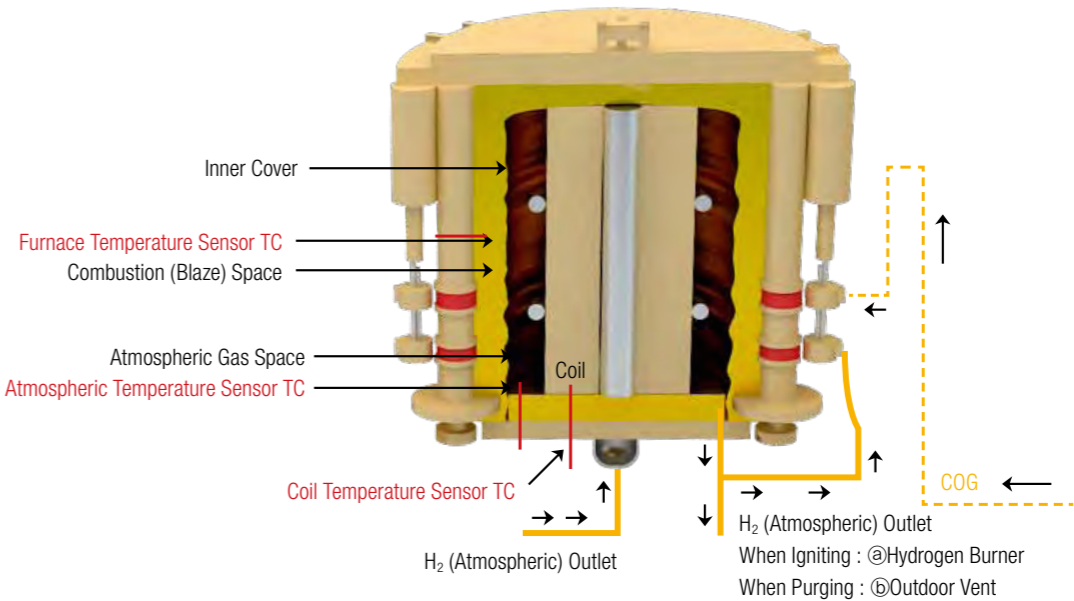
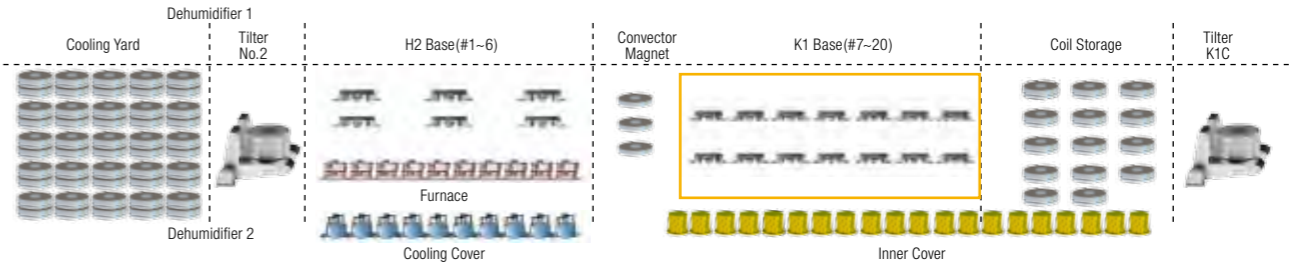


**Skin Pass**  
A final rolling process is performed in order to remove minor surface defects such as stretch marks and to produce a smooth, lustrous surface. Skin Pass results in a further thickness reduction of about 1%.



**Finishing and Inspection**  
During this final stage of manufacturing, cold rolled strips are trimmed to customer specified size. The finished product is subject to final inspection, where thickness, width and surface quality are verified. Samples are sent for laboratory testing of mechanical properties as appropriate for specific end use.

## BAF (Batch Annealing Furnace)



# Main Uses

Cold rolled steel sheet (CR) features a fine surface and excellent workability. It is used for a variety of products ranging from home appliances such as refrigerators and washing machines to industrial machinery, architectural components and automobiles. Cold rolled steel is an indispensable material in our modern society.

## Commercial Cold Rolled Steel

This type of steel is appropriate for manufacturing ordinary objects like refrigerator doors, drum containers and furniture as well as automobile parts such as oil filters.

## HSS (High Strength Cold Rolled Steel) (up to 60kg class)

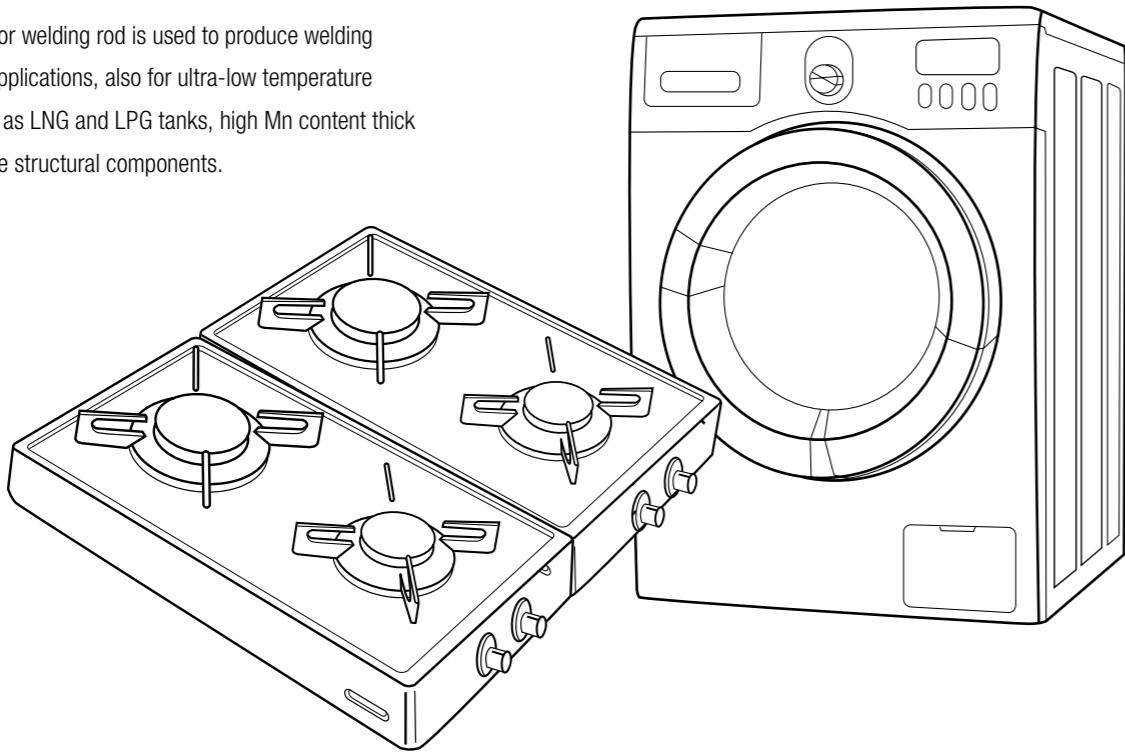
High strength steel is used in products requiring a material with higher strength than traditional cold rolled steel can provide. If machinability is also required along with strength, HSS is the right choice.

## Structural Cold Rolled Steel

This material is particularly suitable for steel components that do not require further processing, such as drawing, but require high strength. Structural CR steel is widely used as a structural building material.

## Cold Rolled Steel for Welding Rod

Cold rolled steel for welding rod is used to produce welding rod for ordinary applications, also for ultra-low temperature applications such as LNG and LPG tanks, high Mn content thick plates, and marine structural components.



## Cold Rolled Steel for Porcelain Enameling

This product features desirable properties for enameled porcelain manufacturing such as heat resistance, corrosion resistance, and gloss surface, as well as traditional steel virtues (impact resistance, high ductility and formability). It is used for components of home appliances, construction materials, kitchen appliances and bathtubs, etc.

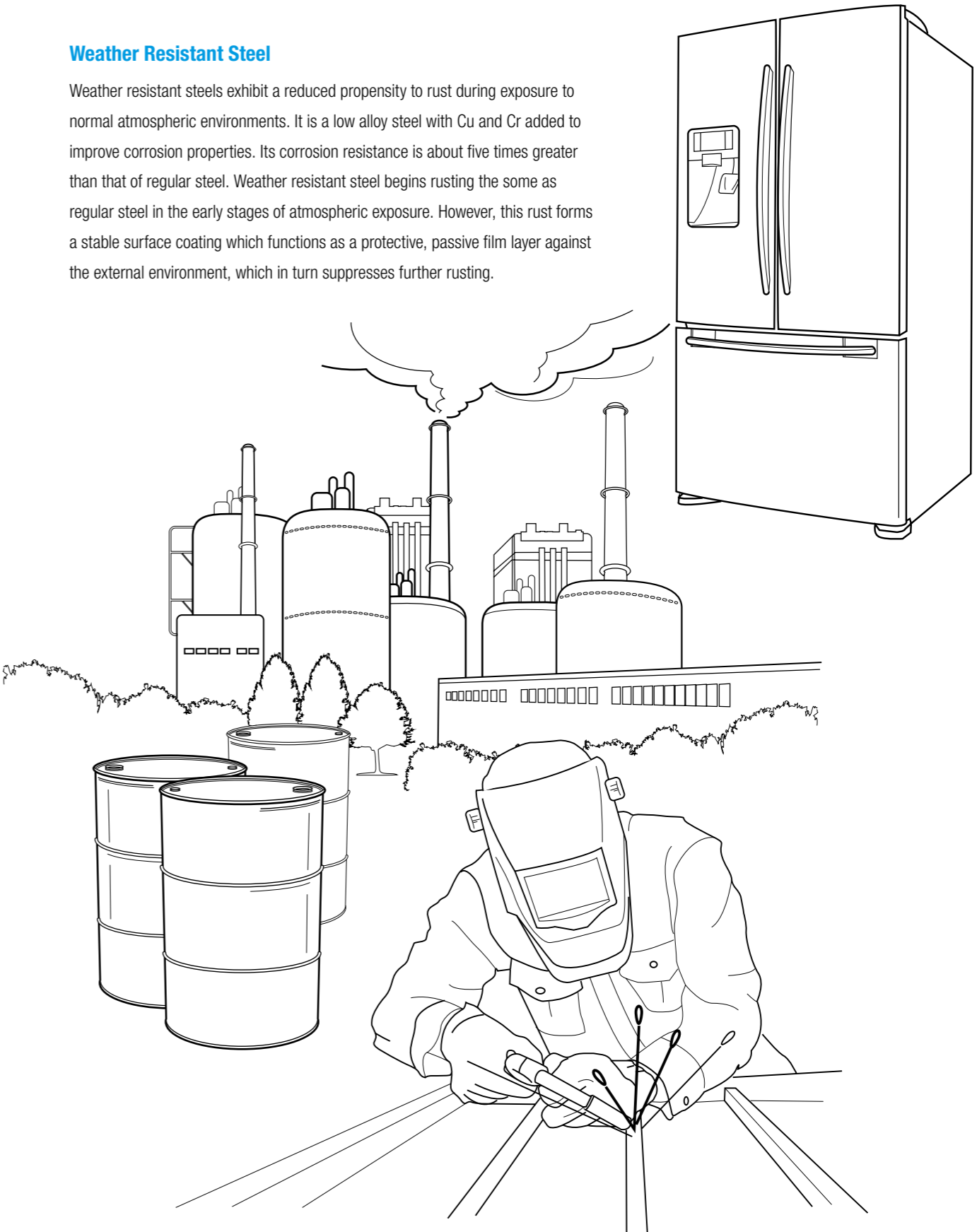
## Sulfate Resistant Cold Rolled Steel

Gases emitted by thermal power plants and boilers, where fossil fuels such as heavy oil and bituminous coal are used, contain Sulfur Oxides (SOx). Sulfur oxides encounter condensed moisture during recovery of waste heat from exhaust gases, creating a highly corrosive environment. Sulfate resistant steel is an excellent choice for desulfurization and smoke elimination facilities where sulfate corrosion is a real concern. Through the use of this steel, maintenance and repair costs can be controlled making compliance with environmental regulations.

⚠ The applications described in this section reflect typical uses and are offered as examples. Please be sure to discuss your end use with our associates when selecting steel products.

## Weather Resistant Steel

Weather resistant steels exhibit a reduced propensity to rust during exposure to normal atmospheric environments. It is a low alloy steel with Cu and Cr added to improve corrosion properties. Its corrosion resistance is about five times greater than that of regular steel. Weather resistant steel begins rusting the same as regular steel in the early stages of atmospheric exposure. However, this rust forms a stable surface coating which functions as a protective, passive film layer against the external environment, which in turn suppresses further rusting.



# Regular Cold Rolled Steel

## General Characteristics

A general purpose steel, it is used to make products such as home appliances, drum containers, furniture, etc.

## Product Types and Features

Division	Characteristics	Uses
for General Use	For goods that require bending, forming, light processing, and welding.	Drums, furniture, etc.
for Machining	For goods that require machinability.	Outer plates for home appliances, etc.
for Deep Machining	For goods that require deep-machinability.	Frames for furniture, home appliances, etc.

Remarks) Rigid steel for general purposes can be ordered in both KS and JIS Standards.

## Chemical Composition

Specifications	C(%)	Mn(%)	P(%)	S(%)
CSP1	~0.15	~0.60	~0.100	~0.035
CSP2	~0.10	~0.50	~0.040	~0.035
CSP3	~0.08	~0.45	~0.030	~0.030

## Mechanical Properties

Specifications	Yield Strength (N/mm²)	Tensile Strength (N/mm²)	Ductility(%)						
			Thickness(mm)						
			0.25~0.3	0.3~0.4	0.4~0.6	0.6~1.0	1.0~1.6	1.6~2.5	2.5~3.3
CSP1	~392	270~	28~	31~	34~	36~	37~	38~	39~
CSP1D	~343	270~	33~	33~	35~	37~	38~	38~	40~
CSP2	~345	270~	30~	33~	36~	38~	39~	40~	41~
CSP3	~294	270~	32~	35~	38~	40~	41~	42~	43~
CSP3N	~294	270~	32~	35~	38~	40~	41~	42~	43~
CSP3E	~294	265~	32~	35~	38~	40~	41~	42~	43~
CSP3X	~294	260~	-	-	47~	47~	49~	50~	-
CSP3Z	~250	255~	-	-	52~	52~	52~	-	-

Remarks) 1. Markings such as '-S', '-E', and '-Z' are added at the end of size symbols indicating tempering level and surface quality. (example: CSP1D-E)  
S: standard tempering, E: strict surface treatment, Z: non-strict surface treatment  
2. Products with markings CSP3N, E, X, and Z are guaranteed for six months without limitation after shipment.

## Comparison Chart of Different National Standards

Grade	POSCO	National Standards			
		KS	JIS	ASTM	EN
Commercial Quality	CSP1 CSP1D	KS-SPCC	JS-SPCC	A1008 CS	EN-DC01, EN-DC03
Drawing Quality	CSP2	KS-SPCD	JS-SPCD	A1008 DS	EN-DC04
Deep Drawing Quality	CSP3(N)	KS-SPCE	JS-SPCE	A1008 DDS	EN-DC05
Extra Deep Drawing Quality	CSP3E, CSP3X, CSP3Z	KS-SPCF, KS-SPCG	JS-SPCF, JS-SPCG	A1008 EDDS	EN-DC06, EN-DC07
Test piece	Rolling direction KS 5	Rolling direction KS 5	Rolling direction JIS 5	Rolling direction ASTM	Perpendicular to Rolling direction EN

Remarks) 1. Components and materials of each national standard are listed in detail in the Appendix (page 31).  
2. The specification comparison chart above is analogous to that of POSCO. Chemical composition and mechanical properties may vary depending on the test methods of each specification.  
3. For details, please contact our technical representative.

## Rigid Steel

Difference in Tempering	Specifications	Hardness	
		HRB	HV
Rigidity	SPCC-1	No testing	No testing
1/2 Rigidity	SPCC-2	74~89	135~185
1/4 Rigidity	SPCC-4	65~80	115~150
1/8 Rigidity	SPCC-8	50~71	95~130

High Strength Cold Rolled Steel

General Characteristics

High strength steel is used in products requiring higher strength than which traditional cold rolled steel can provide.  
If machinability is also required along with strength, HSS is the right choice.

Product Types and Features

Classification	Name	Strengthening Method	Characteristics
E Class	Interstitial Free High Strength Steel High Strength Low Alloy Steel	Using ultra-low carbon steel as the base, the carbonitride-forming element Ti is added to acquire deep machinability. For high strength, permutable solid elements P and Mn are both added.	Proper strength is maintained and deep machinability acquired.
R Class	Rephosphorized Steel	Permutable alloying elements P and Mn are added to low carbon steel. Permutable elements cause lattice mutation and increase internal stress, disrupting electron migration which results in higher strength.	Compared to precipitation-strengthened steel (C class), the degree of the strengthening effect is smaller, but this type of steel still has high strength and good machinability.
C Class	Interstitial Free High Strength Steel	Using low carbon steel as the base, precipitation-enhancing elements Ti and Nb are added to spread carbonitride extracts very finely inside the steel. Precipitation inhibits electron migration, increasing yield strength and impact resistance.	In comparison to regular steel, high strength is maintained with a high yield point.

Chemical Composition

Classification	C(%)	Mn(%)	P(%)	S(%)	Si(%)
E Class	~0.005	~1.0	~0.11	~0.02	~0.40
R Class	~0.09	~1.4	~0.03	~0.015	~0.14
C Class	~0.09	~1.4	~0.025	~0.01	~0.34

Mechanical Properties

Classification	Specifications	Yield Strength(N/mm²)	Tensile Strength(N/mm²)	Ductility(%)
E Class	CHSP35E	185~	340~	34~
	CHSP40E	215~	390~	30~
	CHSP45E	235~	440~	26~
R Class	CHSP35R	185~	340~	35~
	CHSP40R	215~	390~	29~
	CHSP45R	245~	440~	26~
C Class	CHSP45C	275~	440~	22~
	CHSP60C	350~	588~	17~
	CHSP260C	260~340	340~450	28~
	CHSP340C	340~440	410~530	20~
	CHSP420Y	420~530	490~600	16~

Remarks) 1. High Strength Cold Rolled Steel test sample is perpendicular to the rolling direction per KS 13A.  
2. If thickness is less than 0.6mm, tensile test is not performed.  
3. Chemical composition is subject to agreement between POSCO and ordering parties.

Structural Cold Rolled Steel

General Characteristics

This steel is not subject to post processing, and used for steel structures which require high strength.

Product Types and Features

It is widely used for architectural components, Minimum tensile strength is guaranteed.

Chemical Composition

C(%)	Mn(%)	P(%)	S(%)
~0.2	~0.6	~0.04	~0.04

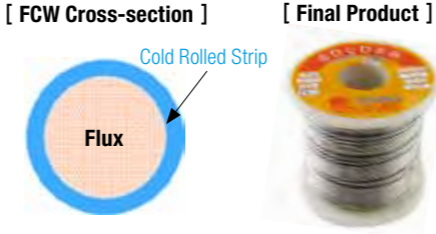
Mechanical Properties

Specification	Tensile Strength(N/mm²)
CSP30	294~
CSP32	314~
CSP34	334~

Cold Rolled Steel for Welding Rod

General Characteristics

Flux Cored Wire Welding Rod :  
The wire product, is made by slitting cold rolled steel in small widths, roll-forming to increase flux volume and passing the material through a die.



Product Types and Features

Division	Specification	Uses	Product characteristics	Welded parts characteristics
General use	CSP2-WB	• General purpose steel	• Excellent Productivity • Low Spatter	Impact resistance(-20℃) ≥ 27J
Ultra-low temperature	CSP2-WC	• Ultra-low temperature steel (LNG, LPG TANK types)	• Excellent ultra-low temperature impact resistance • Excellent Productivity	Impact resistance(-60℃) ≥ 47J
As an adhesive for special applications	CSP2-WE	• High Mn steel plate • Marine structural steel	• High temperature fracture resistance of Mn steel • Excellent ultra-low temperature impact resistance	Impact resistance(-60℃) ≥ 47J
for Low fume uses	CSP3-LW	• Eco-friendly steel	• Decreased fumes during welding • excellent tube forming properties	Impact resistance(-20℃) ≥ 27J

Chemical Composition

Specifications	C(%)	Mn(%)	P(%)	S(%)	Si(%)
CSP2-WB	~0.04	0.1~0.5	~0.02	~0.02	~0.03
CSP2-WC	~0.05	0.1~0.5	~0.015	~0.015	~0.03
CSP2-WE	~0.04	0.1~0.5	~0.01	~0.01	~0.03
CSP3-LW	~0.007	0.5~1.0	~0.015	~0.015	~0.03

Mechanical Properties

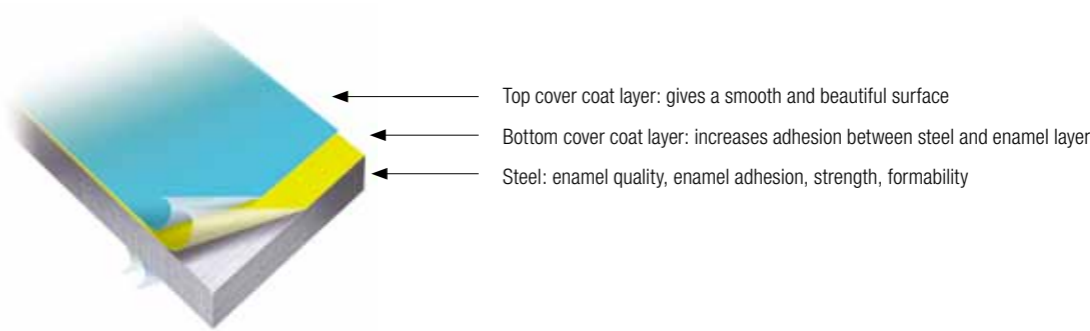
Specifications	Yield Strength (N/mm²)	Tensile Strength (N/mm²)	Ductility(%)				Hardness (HrB)
			0.4~0.6T	0.6~1.0T	1.0~1.6T	1.6~2.0T	
CSP2-WB	~260	270~	36~	38~	39~	40~	~55
CSP2-WC	~264	275~	36~	38~	39~	40~	~60
CSP2-WE	~260	270~	36~	38~	39~	40~	~55
CSP3-LW	~240	270~	38~	40~	41~	42~	~45

Remarks) 1. Test samples oriented in the rolling direction per KS 5.  
2. If thickness is less than 0.6mm, tensile test is not performed.  
3. Chemical composition is subject to agreement between POSCO and ordering parties.

Cold Rolled Steel for Enameling

General Characteristics

The material is baked at high temperature after being coated with inorganic hyaline enamel. Material compositions combines the characteristics of both metal and porcelain enamel such as strength, heat resistance, corrosion resistance, and surface luster.



Main Uses

Division	Uses
Industrial	Chemical reaction furnace, heat exchanger, food processor, hot water tank, holding tank, etc.
Residential	Gas oven, washing machine, microwave oven, gas heater, boiler, dishwasher, kitchen appliances, etc.
Architectural	Shell plates for building, roofs, wall tiles, tunnel panels, blackboard, desks, road signs, exterior materials, etc.

Product Types and Features

Specification	Formability (Drawability)	Enamel characteristic	Enameling
CESP-C	for deep processing	Good	Plasticizing once or twice
POSCENA-C	for regular processing	Very good	

Remarks) Enamel characteristic is mainly due to the enamel processing, which is related to the typical defects such as 'Fish scale' and ' Blister'.

Chemical Composition

Specification	C(%)	Mn(%)	P(%)	S(%)	Notes
CESP-C	~0.008	~0.5	~0.04	~0.06	Ti added
POSCENA-C	~0.008	~0.5	~0.04	~0.04	Ti not added

Mechanical Properties

Specification	Yield Strength (N/mm²)	Tensile Strength (N/mm²)	Ductility(%)				R-bar
			0.4~0.6T	0.6~1.0T	1.0~1.6T	1.6~2.0T	
CESP-C	~240	270~	38~	40~	41~	42~	1.2~
POSCENA-C			34~	36~	37~	38~	1.4~

Sulfate Corrosion Resistant Steel

General Characteristics

Gases emitted by thermal power plants and boilers, where fossil fuels such as heavy oil and bituminous coal are used, contain oxides of sulfur (SOx). Sulfur oxide encounters condensed moisture during recovery of waste heat from exhaust gases, creating a highly corrosive environment. Sulfate resistant steel is an excellent choice for desulfurization and smoke elimination facilities where sulfate corrosion is a big concern. Through the use of this steel, maintenance and repair costs can be controlled making compliance with environmental regulations.

\*Sulfate resistance degree by steel type: regular steel < stainless steel < weather resistant steel < sulfate resistant steel

[ Air Pre-Heater at thermal power plant ]



Regular steel used (serious corrosion shown)      Sulfate resistant steel used (excellent corrosion resistance shown)

Product Types and Features

Specifications	Corrosion resistant environment	Sulfate corrosion reduction	Hydrochloric acid and sulfuric acid compound corrosion reduction
ANCOR-C	Sulfate condensation at low-temperatures	45mg/cm <sup>2</sup> /hr and under	-
ANCOR-CS	Hydrochloric acid and sulfuric acid compound corrosion	30mg/cm <sup>2</sup> /hr and under	5mg/cm/hr and under

\* Advanced environmentally-friendly steel with sulphuric acid Corrosion Resistance

■ Evaluation conditions for corrosion reduction

- Sulfuric acid: 50% sulfuric acid at 70°C
- Hydrochloric acid and sulfuric acid compound corrosion: 31% sulfuric acid and 0.4% hydrochloric acid at 80°C

Chemical Composition

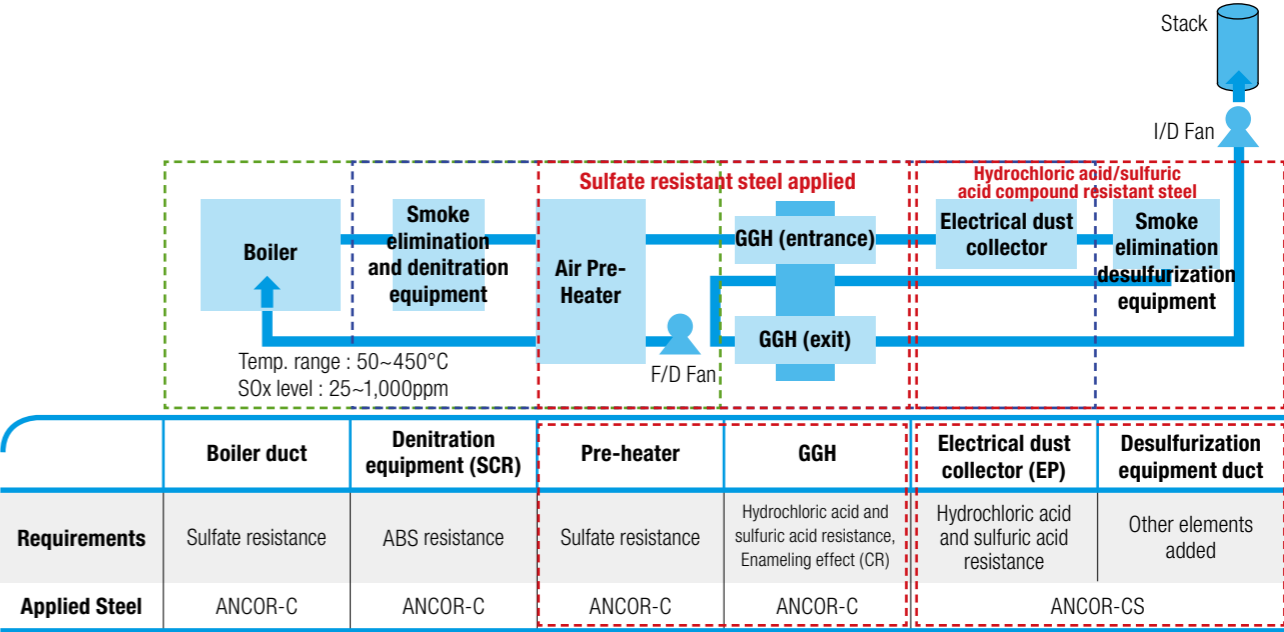
Specifications	C(%)	Mn(%)	Si(%)	Cu(%)	Other
ANCOR-C	~0.1	~0.8	0.1~0.035	0.2~0.5	Other Elements Added
ANCOR-CS	~0.1	~1.7	0.1~0.035	0.2~0.5	Other Elements Added

Mechanical Properties

Specifications	Yield Strength(N/mm <sup>2</sup> )	Tensile Strength(N/mm <sup>2</sup> )	Ductility(%)	Hardness(HrB)
ANCOR-C	245~	340~	22~	50~
ANCOR-CS				

Main Uses

This steel is used in power plant’s burning fossil fuel, boiler heat exchangers, and parts for desulfurization equipment.  
→ Heat element and dust collecting panel usage



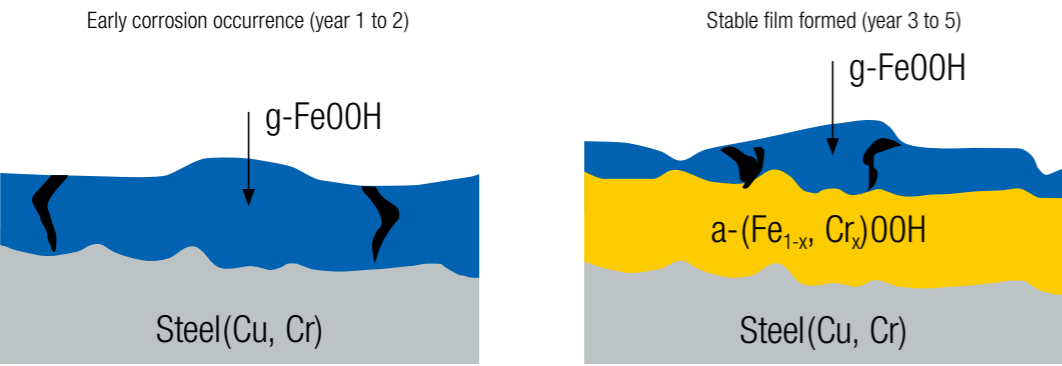
	Boiler duct	Denitration equipment (SCR)	Pre-heater	GGH	Electrical dust collector (EP)	Desulfurization equipment duct
Requirements	Sulfate resistance	ABS resistance	Sulfate resistance	Hydrochloric acid and sulfuric acid resistance, Enameling effect (CR)	Hydrochloric acid and sulfuric acid resistance	Other elements added
Applied Steel	ANCOR-C	ANCOR-C	ANCOR-C	ANCOR-C	ANCOR-CS	

Weather-resistant Cold Rolled Steel

General Characteristics

Weather resistant steels exhibit a reduced propensity to rust during exposure to normal atmospheric environments. It is a low alloy steel that small quantities of Cu and Cr added to improve corrosion properties. Its corrosion resistance is about five times greater than regular steel. Weather resistant steel begins rusting like regular steel in the early stages of atmospheric exposure. However, this rust forms a stable surface coating which functions as a protective, passive film layer against the external environment, which in turn suppresses further rusting.

Surface Corrosion Development of Weather Resistant Steel



Surface g-FeOOH rust formed

Dissolution and precipitation easily occur, resulting low resistance corrosion. At this stage, both regular steel and weather resistant steel are similar.

Stable g-FeOOH rust formed

For weather resistant steel, a stable layer of rust with fine grain size is formed underneath the bottom of corrosion, through interaction with Cu, P, and Cr, making the oxidization harder. In regular steel, the corrosion occurs at the same rate as it does during the early stage.

Specification: KS D 3542(2013) KS-SPA-C, High Weather Resistant Rolled Steel

Chemical Composition

Specifications	C(%)	Si(%)	Mn(%)	P(%)	S(%)	Cu(%)	Cr(%)	Ni(%)
SPA-C	~0.12	0.25~0.75	~0.60	0.070~0.150	~0.035	0.25~0.55	0.30~1.25	~0.065

Mechanical Properties

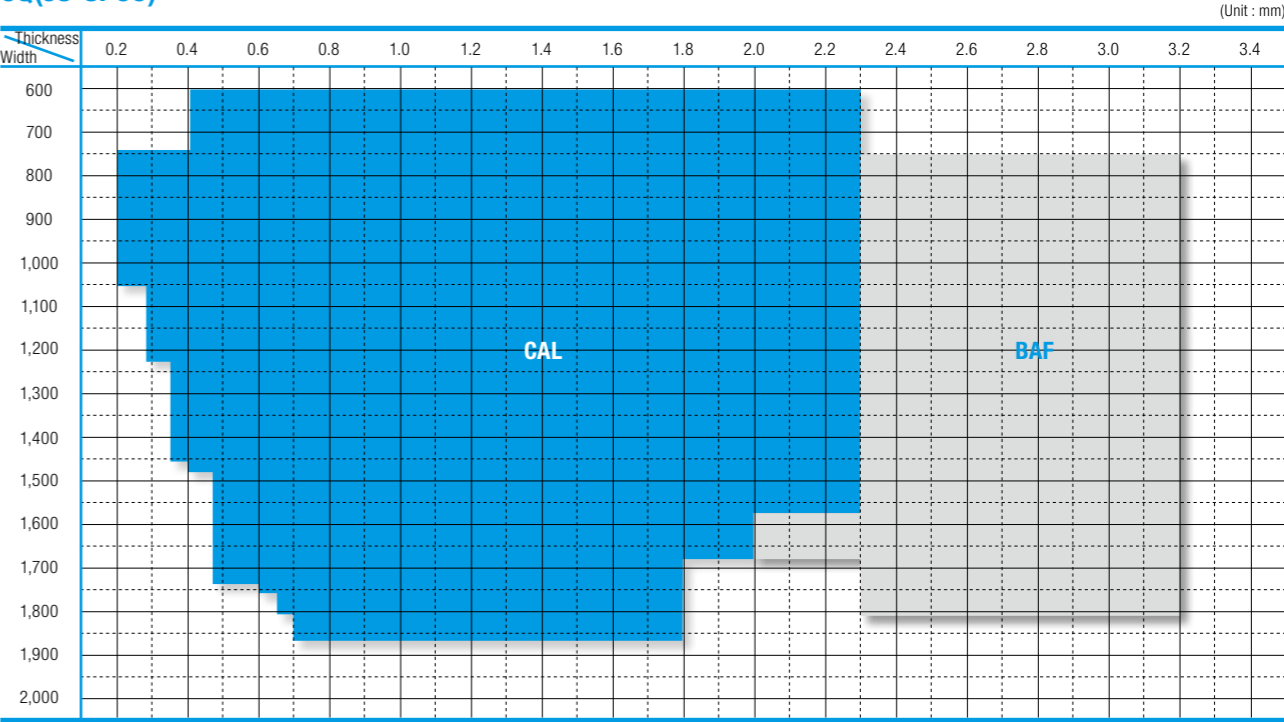
Specifications	Yield Strength(N/mm²)	Tensile Strength(N/mm²)	Ductility(%)
SPA-C	315~	450~	26~

Main Uses

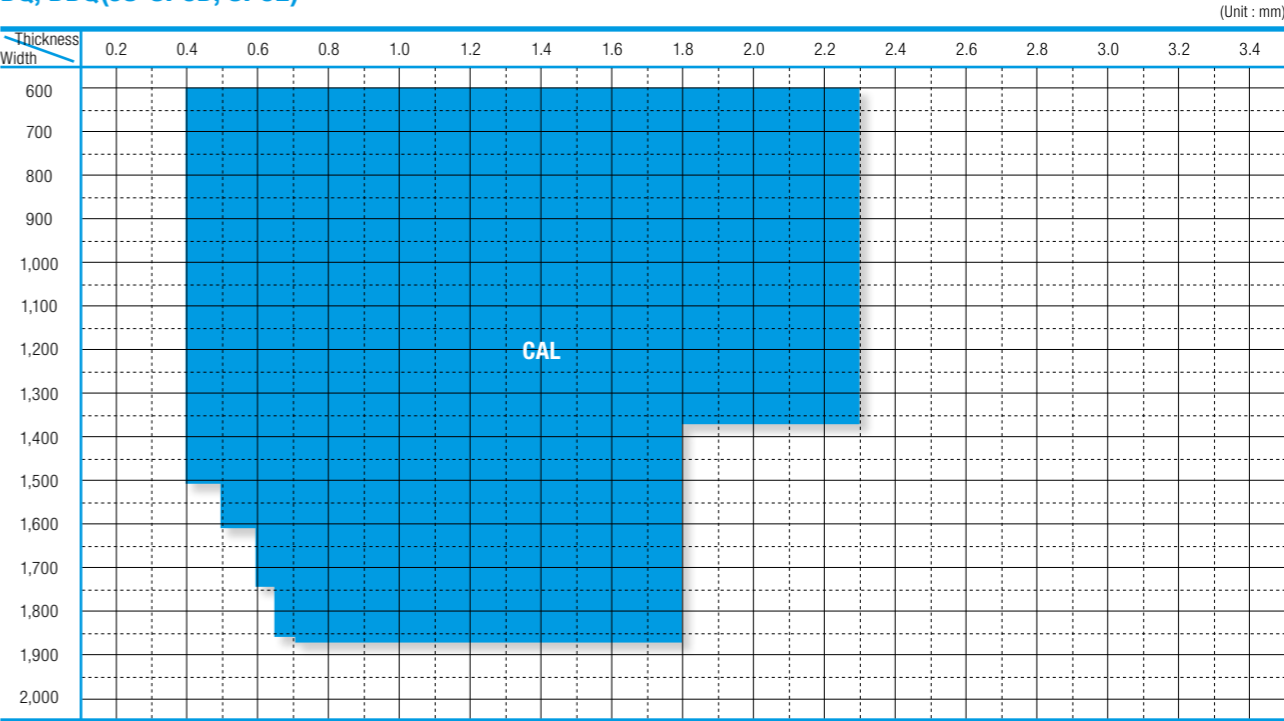
This type of steel is used for bridges, steel tubing utility poles, containers, transmission towers, steel structures, building materials, boiler pre-heaters, heat exchangers, dust collectors, and etc.

Available Dimensions

CQ(JS-SPCC)

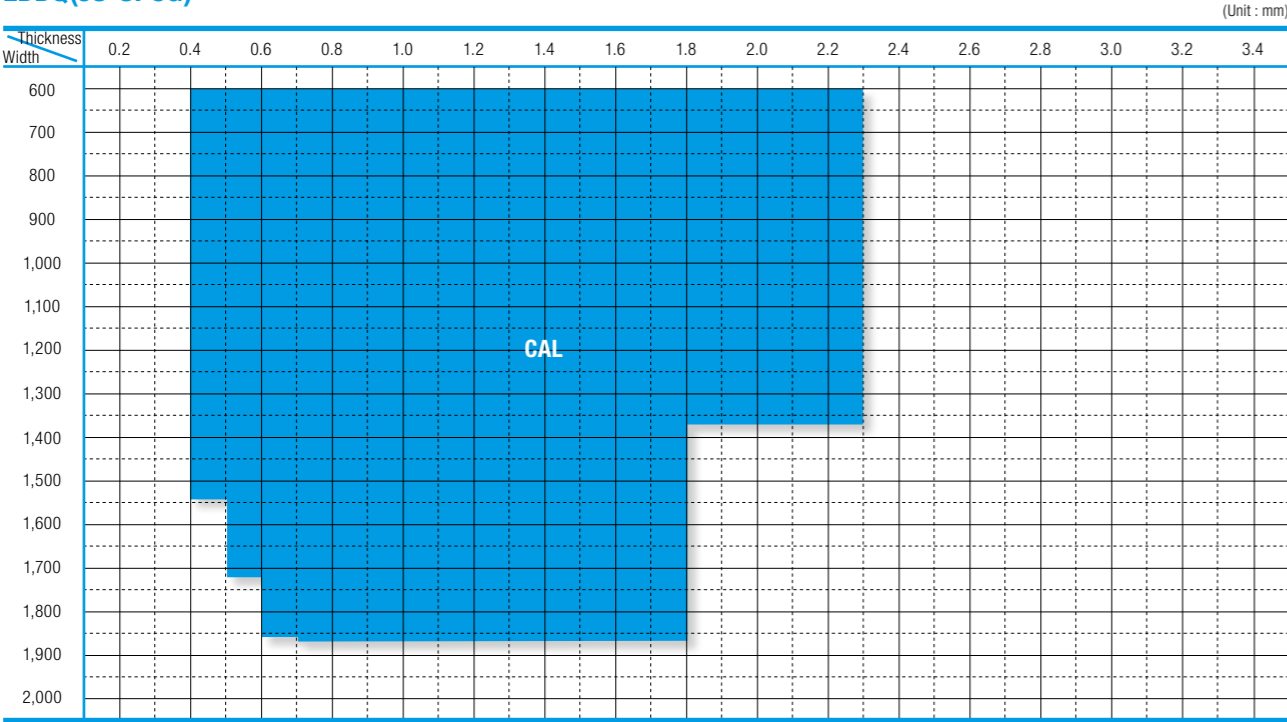


DQ, DDQ(JS-SPCD, SPCE)

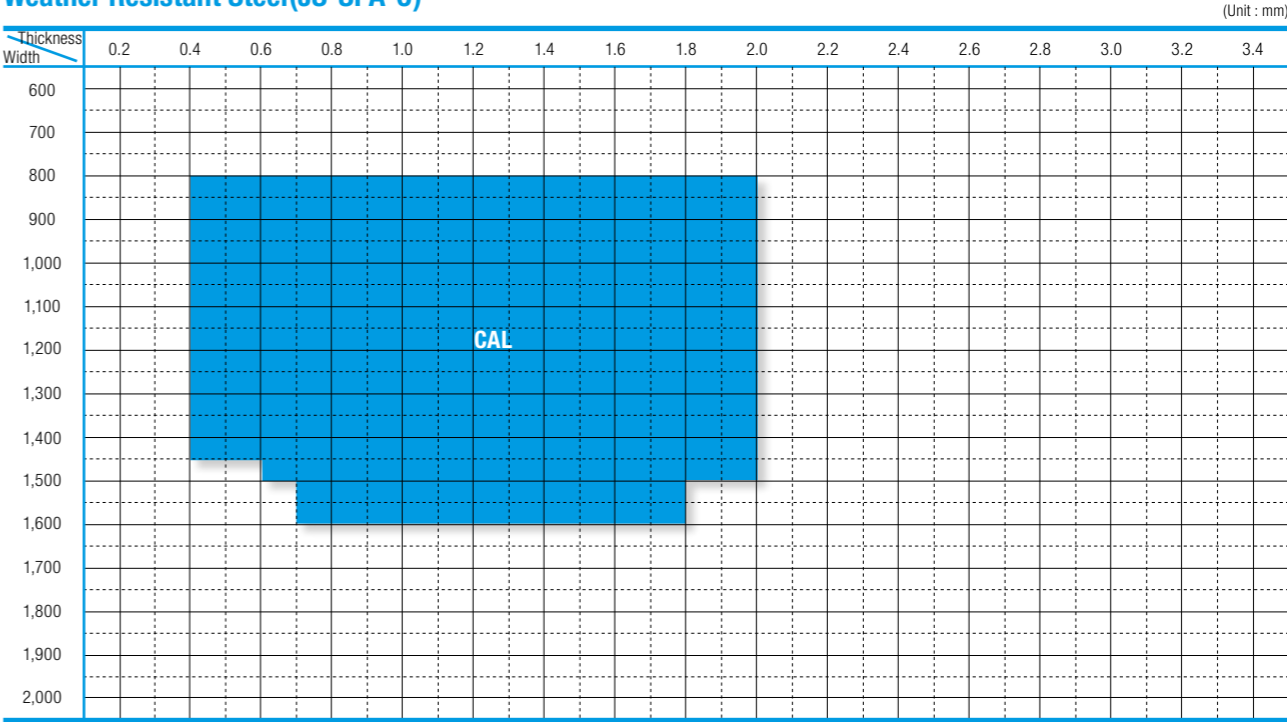


Available Dimensions

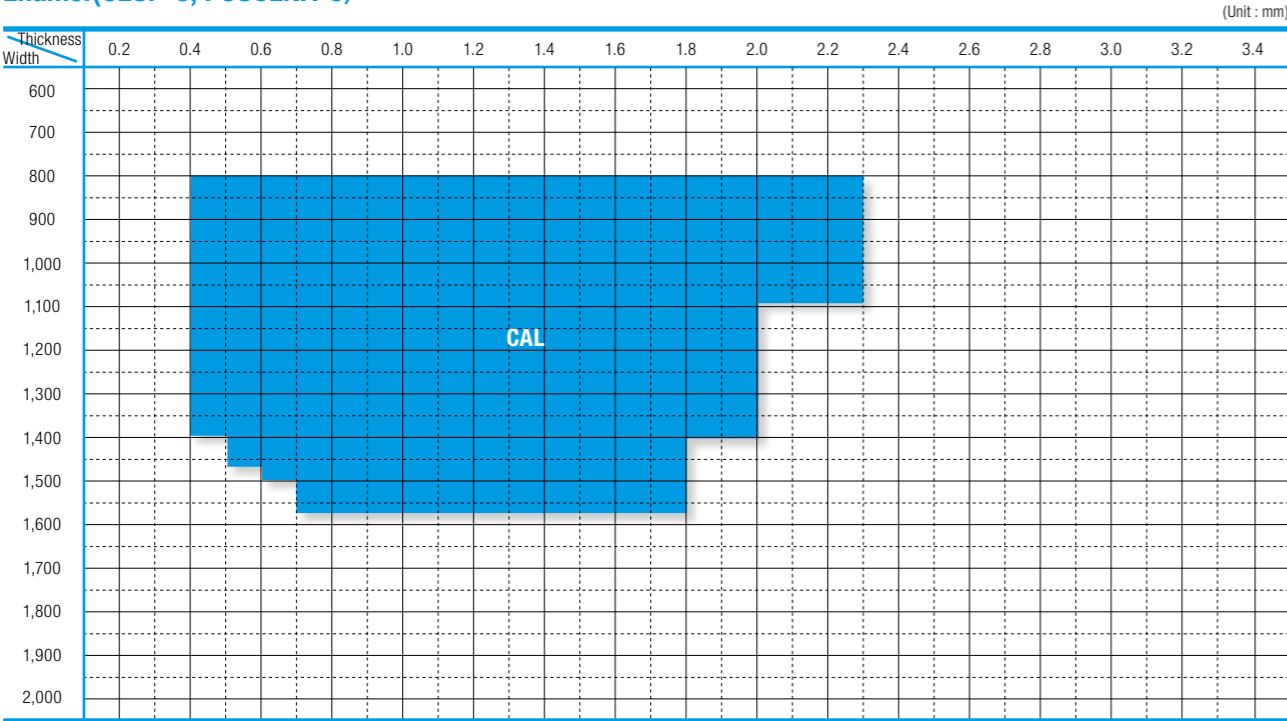
EDDQ(JS-SPCG)



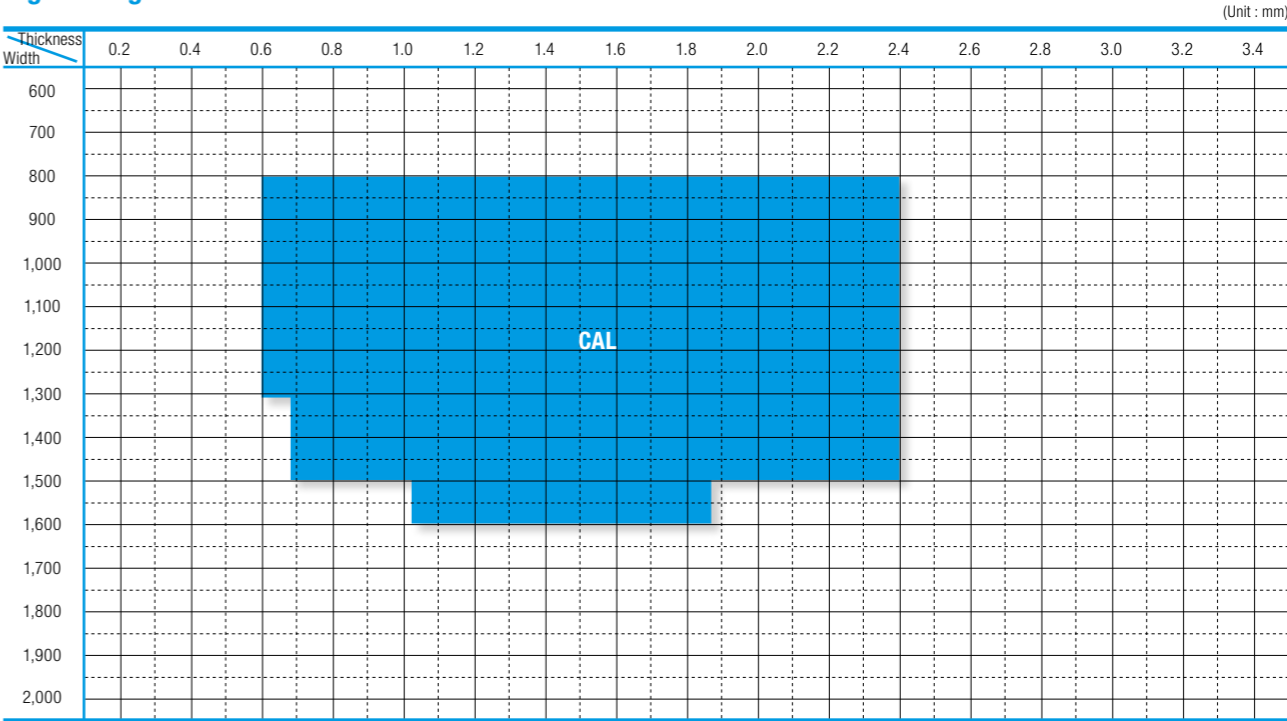
Welding Rod(CSP2-WB, CSP2-WC, CSP2-WE), Sulfate Resistant Steel(ANCOR-C,ANCOR-CS),  
Weather Resistant Steel(JS-SPA-C)



Enamel(CESP-C, POSCENA-C)



High Strength Cold Rolled Steel



Size Tolerance

Thickness Allowance

POSCO Standards

<div>width(mm)</div> <div>thickness(mm)</div>	250~400	400~630	630~1,000	1,000~1,250	1,250~1,600	1,600~
~0.25	±0.030	±0.030	±0.030	±0.030	-	-
0.25~0.40	±0.035	±0.035	±0.040	±0.040	-	-
0.40~0.60	±0.040	±0.040	±0.050	±0.050	±0.060	-
0.60~0.80	±0.045	±0.045	±0.060	±0.060	±0.060	±0.070
0.80~1.00	±0.050	±0.050	±0.060	±0.070	±0.080	±0.090
1.00~1.25	±0.060	±0.060	±0.070	±0.080	±0.090	±0.110
1.25~1.60	±0.080	±0.080	±0.090	±0.100	±0.110	±0.130
1.60~2.00	±0.080	±0.080	±0.110	±0.120	±0.130	±0.150
2.00~2.50	±0.080	±0.090	±0.130	±0.140	±0.150	±0.170
2.50~3.21	±0.090	±0.100	±0.150	±0.160	±0.170	±0.170

KS, JIS Standards

<div>width(mm)</div> <div>thickness(mm)</div>	~630	630~1,000	1,000~1,250	1,250~1,600	1,600~
~0.25	±0.03	±0.03	±0.03	-	-
0.25~0.40	±0.04	±0.04	±0.04	-	-
0.40~0.60	±0.05	±0.05	±0.05	±0.06	-
0.60~0.80	±0.06	±0.06	±0.06	±0.06	±0.07
0.80~1.00	±0.06	±0.06	±0.07	±0.08	±0.09
1.00~1.25	±0.07	±0.07	±0.08	±0.09	±0.11
1.25~1.60	±0.08	±0.09	±0.10	±0.11	±0.13
1.60~2.00	±0.10	±0.11	±0.12	±0.13	±0.15
2.00~2.50	±0.12	±0.13	±0.14	±0.15	±0.17
2.50~3.15	±0.14	±0.15	±0.16	±0.17	±0.20
3.15~	±0.16	±0.17	±0.19	±0.20	-

Width Allowance

POSCO, KS, JIS Standards

Cutting Method	Width(mm)	POSCO	KS, JIS Allowance(mm)
Standard Cutting	~1250	0~+5	0~+7
	1250~		0~+10
Precision Cutting	~1250	0~+2	0~+3
	1250~		0~+4

Length Allowance

POSCO, KS, JIS Standards

<div>Length(mm)</div> <div>Cutting Method</div>	~1,000	1,000~2,000	2,000~3,000	3,000~4,000	4,000~6,000
Standard Cutting	0~+10		0~+15		0~+20
Re-cutting & Precision Cutting	0~+3	0~+4	0~+6	0~+8	-

Planarization

POSCO, KS, JIS Standards

<div>Types</div> <div>Width(mm)</div>	Curvature	Edge deformation	Center deformation
~1000	12(2)	8(2)	6(2)
1000~1250	15(3)	9(2)	8(2)
1250~1600	15(4)	11(3)	8(2)
1600~	20(5)	13(4)	9(2)

- In general, numbers inside parentheses are applied to stretcher leveler processed steel.
- Curvature: bending of the entire plate. There are two axes of bending: in the rolling direction and perpendicular to the rolling direction.
- Edge deformation: Bending occurs at the edges in the width axes and the center remains flat.
- Center deformation: Bending occurs in the center and the edges remain flat.

Horizontal Bending

POSCO, KS, JIS Standards

Division Width(mm)	Steel Plates(mm)		Steel Rods
	Length ~2000	Length 2000~	
~630	4	4 per random length of 2,000	
630~	2	2 per random length of 2,000	

Surface Finishes and Oiling

Surface Finishes

Dull Finish, also called Pear-Skin Finish or Egg-Shell Texture, is a steel surface finish in which designated roughness is produced in its surface. To create these fine roughness, roll surface is grinded and treated with special abrasive blasting method. This surface finish allows lubricant to adhere to the surface more evenly, thus reducing friction during subsequent machining. Also, paint adheres better and lasts longer. Bright Finish, created by passing the steel through highly polished rollers, produces exquisite surface smoothness and a mirror-like luster. Its highly luminous surface makes such treated steel well suited for decorative use.

\* Please consult with our sales representative when ordering steel products with Bright Finish.

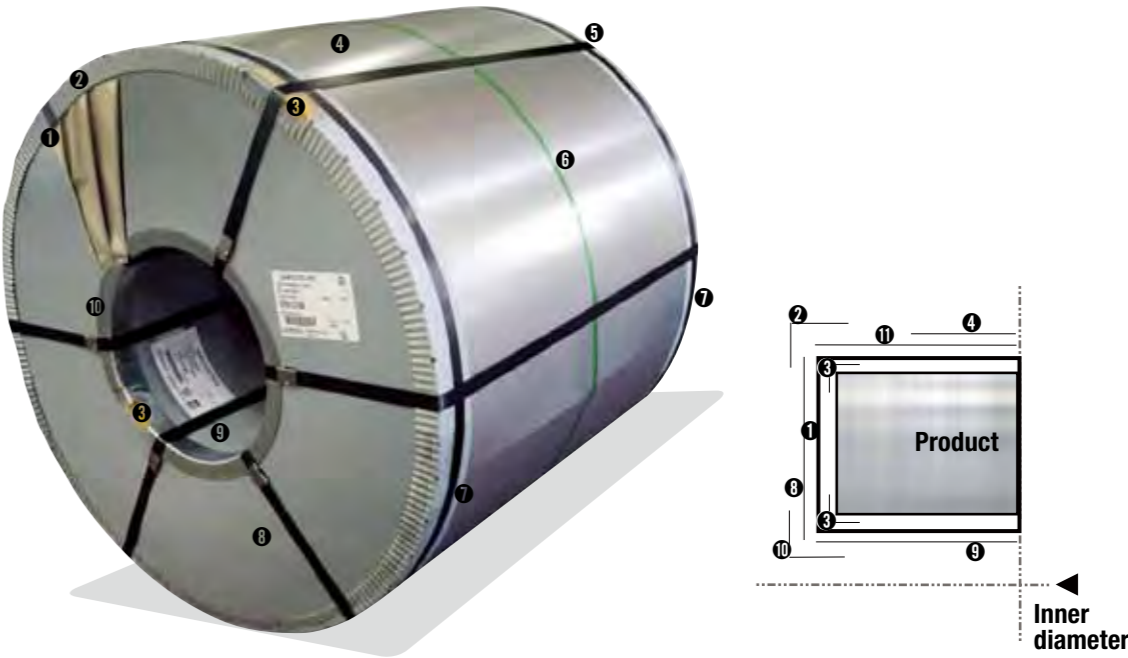
Dull Finish, Ra (μm)				Bright Finish, Ra (μm)	
D3	D5	D7	D9	B2	B4
1.50~2.50	1.00~1.80	0.70~1.30	0.40~0.80	0.30~0.50	0.15~0.30

Oiling

POSCO protects finished products by spraying rust-preventative oil on the steel surface to stop rust from occurring during shipment and warehousing. Upon ordering, our customers can specify the type and amount of oil applied in accordance with their machining needs. Of course, no-oiled steels are very rust-prone and require extreme care to avoid it. Also, rusting remains a likely occurrence with DOS oiled steels.

Specification		Code	Amount of oil used on surfaces(mg/m²)
Regular Oiling	Heavy	AH	3,000~4,500
	General	AG	1,800~3,000
	Light	AL	800~1,800
	Thin	AT	200~800
Dos	Deep	BD	50~100
	Slight	BS	25~50
	Ultra light	BU	10~25
No Oiling		XX	-

Packaging & Marking



Name of outer pack

Name of cross-sectional pack

NO	Name	Material
①	PP VCI WRAP	VINYL
②	OUTER RING	STEEL
③	CORNER WRAP	ANTI-RUST BOARD
④	OUTER PROTECT BOARD	STEEL
⑤	HORIZONTAL BAND	STEEL
⑥	CENTER BAND	PET
⑦	VERTICAL BAND	STEEL
⑧	SIDE BOARD	PLASTIC
⑨	INNER PROTECT BOARD	PLASTIC
⑩	INNER RING	STEEL
⑪	OUTER PROTECT BOARD	ANTI-RUST BOARD

\* Packing Type and materials are changeable.

KS Standards

Chemical Composition

Specification	C(%)	Mn(%)	P(%)	S(%)
KS-SPCC	~0.15	~0.60	~0.050	~0.050
KS-SPCD	~0.12	~0.50	~0.040	~0.040
KS-SPCE	~0.10	~0.45	~0.030	~0.030
KS-SPCF	~0.08	~0.45	~0.030	~0.030
KS-SPCG	~0.02	~0.25	~0.020	~0.020

Mechanical Properties

Specification	Yield Strength (N/mm <sup>2</sup> )	Tensile Strength (N/mm <sup>2</sup> )	Ductility(%)							Hardness	
	0.25t~	0.25t~	0.25~0.3t	0.3~0.4t	0.4~0.6t	0.6~1.0t	1.0~1.6t	1.6~2.5t	2.5t~	HRB	Hv
KS-SPCC	-	-	-	-	-	-	-	-	-	-	-
KS-SPCCT	-	270~	28~	31~	34~	36~	37~	38~	39~	-	-
KS-SPCD	*(~240)	270~	30~	33~	36~	38~	39~	40~	41~	-	-
KS-SPCE	*(~220)	270~	32~	35~	38~	40~	41~	42~	43~	-	-
KS-SPCF	*(~210)	270~	-	-	40~	42~	43~	44~	45~	-	-
KS-SPCG	*(~190)	270~	-	-	42~	44~	45~	46~	-	-	-
KS-SPCC-1	-	-	-	-	-	-	-	-	-	85~	170~
KS-SPCC-2	-	-	-	-	-	-	-	-	-	74~89	135~185
KS-SPCC-4	-	-	-	-	-	-	-	-	-	65~80	115~150
KS-SPCC-8	-	-	-	-	-	-	-	-	-	50~71	95~130

Remarks) 1. Target Temper Grade: (S) Standard, (A) As-annealed. \*Rigid steel products (8, 4, 2, and 1) are excluded.  
2. SPCF: Non-aging deep drawing quality, SPCG: Non-aging extra deep drawing quality. We guarantee deep drawing qualities for six months from date of purchase.  
3. \*The yield strength value in parentheses is for reference only. The delivered yield performance will be subject to agreement between the customer and manufacturer.

JIS Standards

Chemical Composition

Specification	C(%)	Mn(%)	P(%)	S(%)
JS-SPCC	~0.15	~0.60	~0.100	~0.035
JS-SPCD	~0.10	~0.50	~0.040	~0.035
JS-SPCE	~0.08	~0.45	~0.030	~0.030
JS-SPCF	~0.06	~0.45	~0.030	~0.030
JS-SPCG	~0.02	~0.25	~0.020	~0.020

Mechanical Properties

Specification	Yield Strength (N/mm <sup>2</sup> )	Tensile Strength (N/mm <sup>2</sup> )	Ductility(%)							Hardness	
	0.25t~	0.25t~	0.25~0.3t	0.3~0.4t	0.4~0.6t	0.6~1.0t	1.0~1.6t	1.6~2.5t	2.5t~	HRB	Hv
JS-SPCC	-	-	-	-	-	-	-	-	-	-	-
JS-SPCCT	-	270~	28~	31~	34~	36~	37~	38~	39~	-	-
JS-SPCD	*(~240)	270~	30~	33~	36~	38~	39~	40~	41~	-	-
JS-SPCE	*(~220)	270~	32~	35~	38~	40~	41~	42~	43~	-	-
JS-SPCF	*(~210)	270~	-	-	40~	42~	43~	44~	45~	-	-
JS-SPCG	*(~190)	270~	-	-	42~	44~	45~	46~	-	-	-
JS-SPCC-1	-	(550~)	-	-	-	-	-	-	-	85~	170~
JS-SPCC-2	-	(440~590)	-	-	-	-	-	-	-	74~89	135~185
JS-SPCC-4	-	(370~490)	(10~)							65~80	115~150
JS-SPCC-8	-	(290~410)	(25~)							50~71	95~130

Remarks) The numbers marked with an asterisk in the Yield Strength, Tensile Strength, and Ductility sections are for reference only. The actual delivered performance will be subject to agreement between the customer and manufacturer.

ASTM Standards

Chemical Composition

Specification	C(%)	Mn(%)	SI(%)	P(%)	S(%)	AL(%)	CU(%)	NI(%)	CR(%)	MO(%)	V(%)	NB(%)	TI(%)	N(%)	B(%)
A1008 CSA	~0.10	~0.60	-	~0.030	~0.035	-	~0.20	~0.20	~0.15	~0.06	~0.008	~0.008	~0.025	-	-
A1008 CSB	0.02~0.15	~0.60	-	~0.030	~0.035	-	~0.20	~0.20	~0.15	~0.06	~0.008	~0.008	~0.025	-	-
A1008 CSC	~0.08	~0.60	-	~0.100	~0.035	-	~0.20	~0.20	~0.15	~0.06	~0.008	~0.008	~0.025	-	-
A1008 DSA	~0.08	~0.50	-	~0.020	~0.030	0.01~	~0.20	~0.20	~0.15	~0.06	~0.008	~0.008	~0.025	-	-
A1008 DSB	0.02~0.08	~0.50	-	~0.020	~0.030	0.02~	~0.20	~0.20	~0.15	~0.06	~0.008	~0.008	~0.025	-	-
A1008 DDS	~0.06	~0.50	-	~0.020	~0.025	0.01~	~0.20	~0.20	~0.15	~0.06	~0.008	~0.008	~0.025	-	-
A1008 EDDS	~0.02	~0.40	-	~0.020	~0.020	0.01~	~0.10	~0.10	~0.15	~0.03	~0.10	~0.10	~0.15	-	-

Mechanical Properties

Specification	Yield Strength (N/mm <sup>2</sup> )	Tensile Strength (N/mm <sup>2</sup> )	Ductility(%)	Hardness(HRB)	r <sub>m</sub> value	n value
A1008 CSA	140~275	-	30~	~70	-	-
A1008 CSB	140~275	-	30~	~70	-	-
A1008 CSC	140~275	-	30~	~70	-	-
A1008 DSA	150~240	-	30~	~60	1.3~1.7	0.17~0.22
A1008 DSB	150~240	-	30~	~60	1.3~1.7	0.17~0.22
A1008 DDS	115~200	-	30~	~55	1.4~1.8	0.20~0.25
A1008 EDDS	105~170	-	30~	~45	1.7~2.1	0.23~0.27

EN Standards

Chemical Composition

Specification	C(%)	Mn(%)	SI(%)	P(%)	S(%)	CU(%)	NI(%)	CR(%)	MO(%)	V(%)	NB(%)	TI(%)
DC01	~0.12	~0.60	-	~0.045	~0.045	-	-	-	-	-	-	-
DC03	~0.10	~0.45	-	~0.035	~0.035	-	-	-	-	-	-	-
DC04	~0.08	~0.40	-	~0.030	~0.030	-	-	-	-	-	-	-
DC05	~0.06	~0.35	-	~0.025	~0.025	-	-	-	-	-	-	-
DC06	~0.02	~0.25	-	~0.020	~0.020	-	-	-	-	-	-	~0.3
DC07	~0.01	~0.20	-	~0.020	~0.020	-	-	-	-	-	-	~0.2

Mechanical Properties

Specification	Yield Strength(N/mm <sup>2</sup> )			Tensile Strength (N/mm <sup>2</sup> )	Ductility(%)			Anisotropy		R90		N
	0.23~0.501	0.501~0.701	0.701~3.01	-	0.23~0.501	0.501~0.701	0.701~3.01	Sampling Lot/Length/Width/Orientation of Test Sample	Number of Test Samples			
DC01	140~320	140~300	140~280	270~410	24~	26~	28~	-	-	-	-	-
	0.500~0.501	0.501~0.701	0.701~3.01	-	0.500~0.501	0.501~0.701	0.701~3.01	05~2.01		2.01~3.21		
DC03	140~280	140~260	140~240	270~370	30~	32~	34~	51/T/C/C	05	1.3~	1.1~	-
DC04	140~250	140~230	140~210	270~350	34~	36~	38~	51/T/C/C	05	1.6~	1.4~	0.18~
DC05	140~220	140~200	140~180	270~330	36~	38~	40~	51/T/C/C	05	1.9~	1.7~	0.2~
DC06	120~210	120~190	120~170	270~330	37~	39~	41~	51/T/C/C	05	2.1~	1.9~	0.22~
DC07	100~190	100~170	100~150	250~310	40~	42~	44~	51/T/C/C	05	2.5~	2.3~	0.23~

# COLD ROLLED STEEL

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## Contact Us

POSCO Center 440, Teheran-ro,  
Gangnam-gu, Seoul, Korea  
Global Technical Center  
**TEL** 82-2-3457-0114  
**FAX** 82-2-3457-6000

---

### Headquarters

6261, Donghaean-ro, Nam-gu, Pohang-si,  
Gyeongsangbuk-do 790-300, Korea  
**TEL** 82-54-220-0114  
**FAX** 82-54-220-6000

### Seoul Office

POSCO Center, 440, Teheran-ro,  
Gangnam-gu, Seoul 135-777, Korea  
**TEL** 82-2-3457-0114  
**FAX** 82-2-3457-6000

### Pohang Works

6261, Donghaean-ro, Nam-gu, Pohang-si,  
Gyeongsangbuk-do 790-785, Korea  
**TEL** 82-54-220-0114  
**FAX** 82-54-220-6000

### Gwangyang Works

20-26, Pokposarang-gil, Gwangyang-si,  
Jeollanam-do 545-711, Korea  
**TEL** 82-61-790-0114  
**FAX** 82-61-790-7000



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