

posco
STEELEON

COATED
STEEL SHEET



COATED STEEL SHEET

ALCOSTA (Hot-dip aluminized steel sheet)

ALZASTA (Hot-dip 55% Al-Zn alloy coated steel sheet)

ALSUSTA (Hot-dip aluminized stainless steel)

MACOSTA (Hot-dip Zn-Al-Mg alloy coated steel sheet)

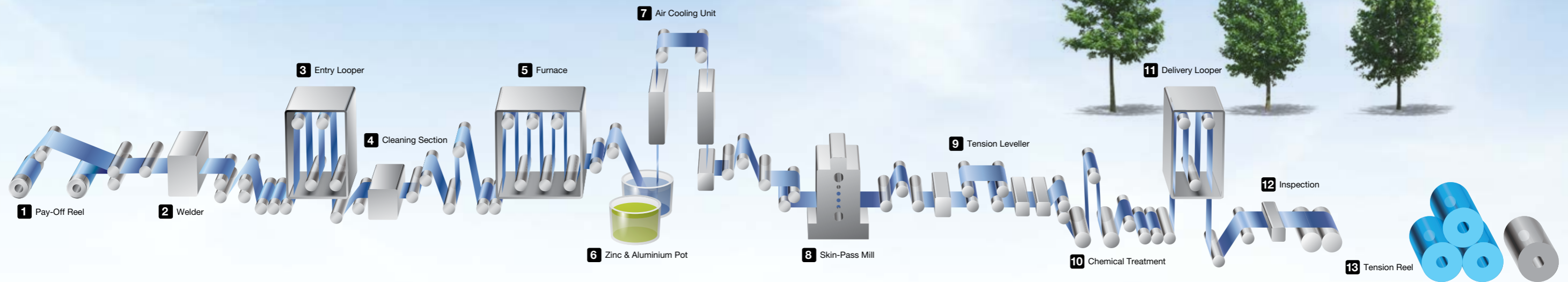
MANUFACTURING PROCESS

posco
STEELEON

POSCO STEELEON's hot-dip aluminized steel sheet (ALCOSTA) has been recognized for the excellence of quality and technology in the global market as it was selected as world's top product offering the best quality in galvanized steel sheet industry, and is also leading the color-coated steel sheets by launching printed sheet sheets, PosART(inkjet-printed steel sheet), and Lami steel sheet, leading the upgrades of color steel sheets.

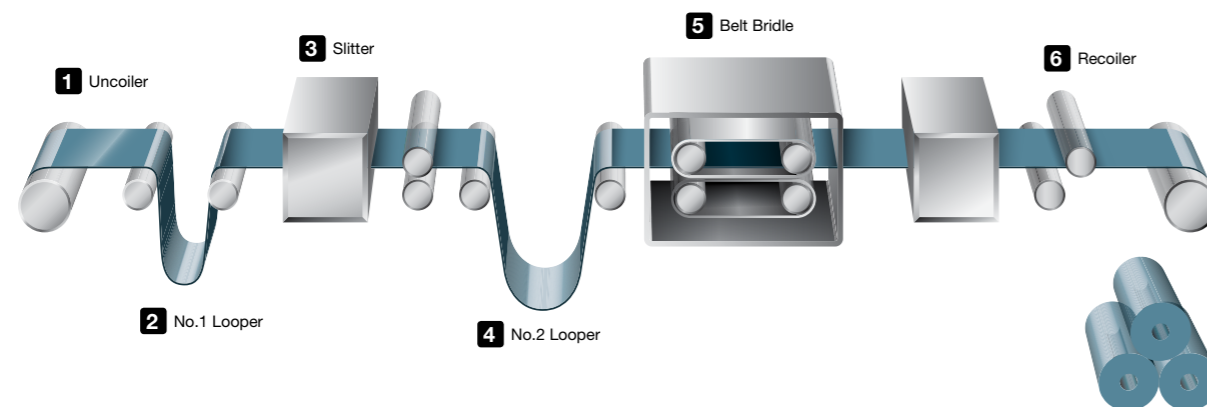
Continuous Galvanizing Process

- **ALCOSTA** (Hot-dip aluminized steel sheet)
- **ALZASTA** (Hot-dip 55% Al-Zn alloy coated steel sheet)
- **ALSUSTA** (Hot-dip aluminized stainless steel)
- **MACOSTA** (Hot-dip Zn-Al-Mg alloy coated steel sheet)

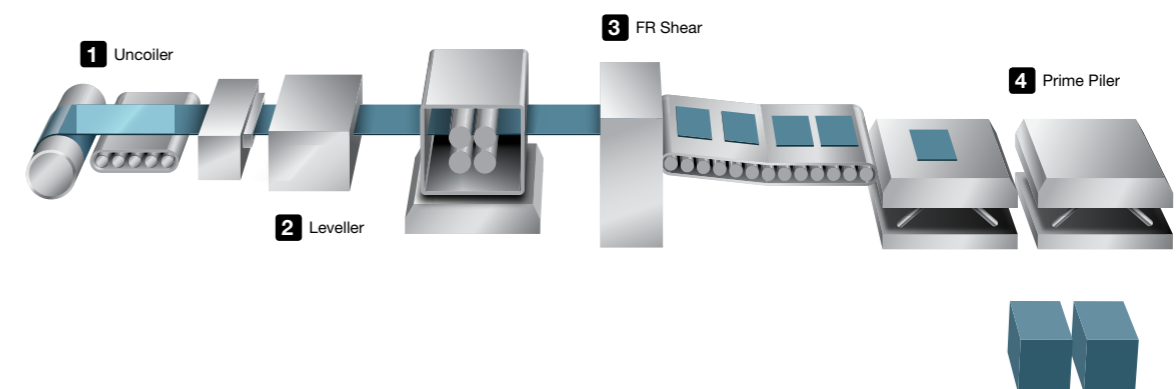


Processing

SKELP



SHEET





ALCOSTA

 Hot-dip aluminized steel sheetALCOSTA
(Hot-dip aluminized steel sheet)

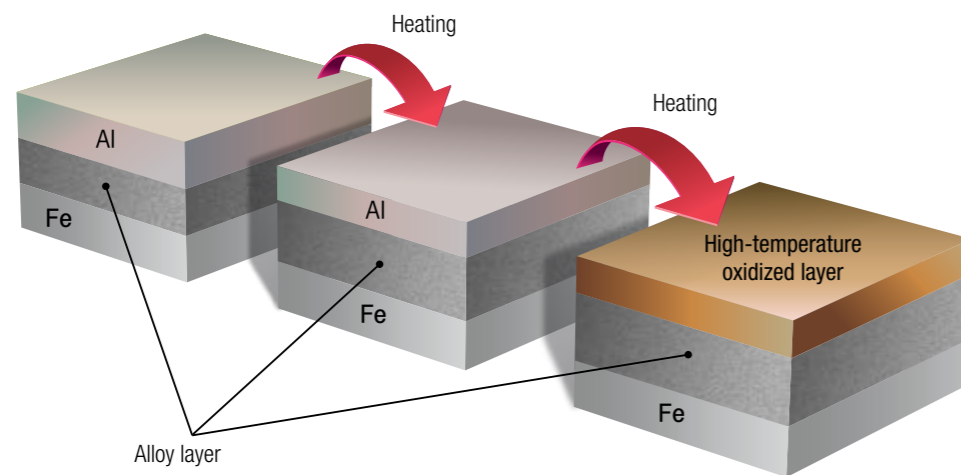
Product features

Product	Characteristics	Characteristics
ALCOSTA (Aluminized Steel)	<ul style="list-style-type: none"> Beautiful surface as POSCO STEELEON's technology suppresses crystallization during solidification of melted aluminum layer Even surface and outstanding corrosion resistance due to the sacrificing effect of aluminum Outstanding corrosion resistance/heat resistance, paintability 	<ul style="list-style-type: none"> Home appliances Automobile parts Steel cans Oil pipeline cover (post-plated products)

Heat resistance

The heat resistance of ALCOSTA is outstanding compared to Zn-coated steel sheet, 55% Al-Zn alloy coated steel sheet and cold-rolled steel sheet. There is no change in appearance or discoloration even after extended exposure at the high temperature of 400°C. At temperatures above 400°C, the surface transforms into AL-Fe alloy layer, so although there is discoloration, the heat resistance/corrosion resistance are maintained, up to approximately 600°C.

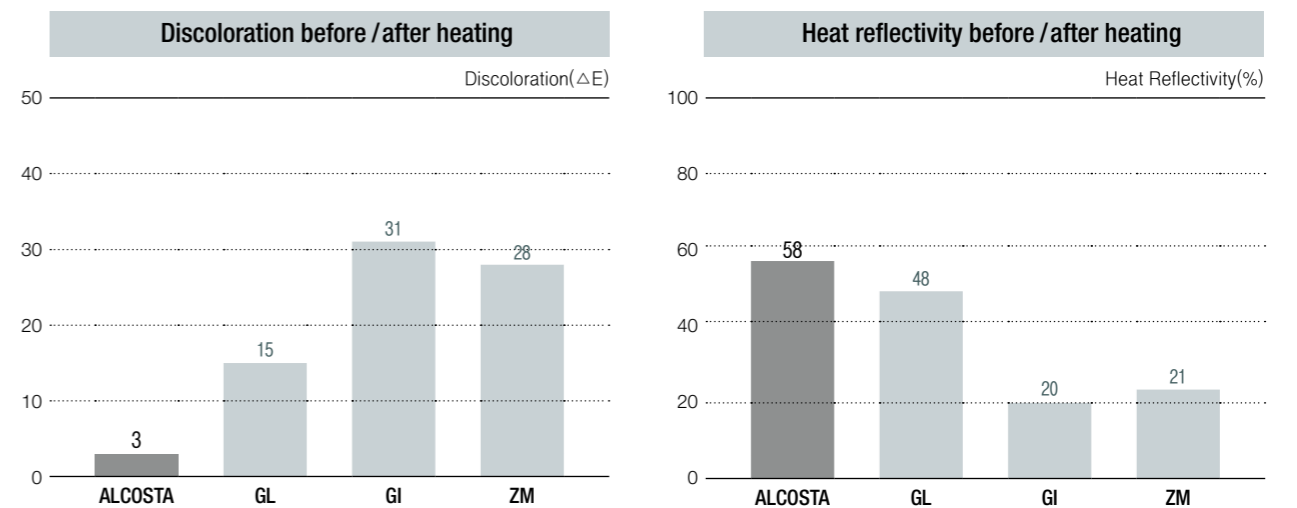
I Transformation of coated layer with heating I



Discoloration & Heat Reflectivity

The surface of ALCOSTA is very beautiful and has outstanding heat reflectivity. It is used for thermal reflectors in toaster, gas range, oil stove, gas oven, clothes dryer, etc.

I Comparison by coating material (at 400°C, 24Hrs) I

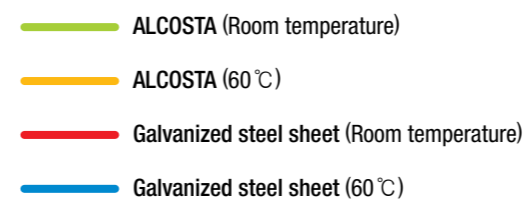


Corrosion resistance

ALCOSTA forms a thin oxide layer and hydroxide layer in the air and water, and offers outstanding corrosion resistance.

I Corrosion resistance in acidic solution I

ALCOSTA offers stronger corrosion resistance in acidic solution compared to galvanized steel sheet.





ALCOSTA (Hot-dip aluminized steel sheet)

ALCOSTA (Hot-dip aluminized steel sheet)

Salt Water Spray Test

Al shows higher electrode status than Fe, and as Fe is cathodized, Al prevents the corrosion of Fe as a sacrificial anode. In the salt water spray test of ALCOSTA, its outstanding corrosion resistance was proven as follows.

Salt water spray test result by product

Product	Room temperature	24Hrs.	72Hrs.	240Hrs.	360Hrs.	720Hrs.
ALCOSTA SA1D(40g/m ²)	250°C×24Hrs.	→		Red rust forms after 288 hours	→	
ALCOSTA SA1D(80g/m ²)	250°C×24Hrs.	→			Red rust forms after 384 hours	→
GALVANIZED Steel Sheet	250°C×24Hrs.	→	20% red rust	→	100% red rust	

Corrosion resistance test against exhaust gas

In the corrosion test using exhaust gas, ALCOSTA and stainless steel demonstrated similar corrosion resistance effects.

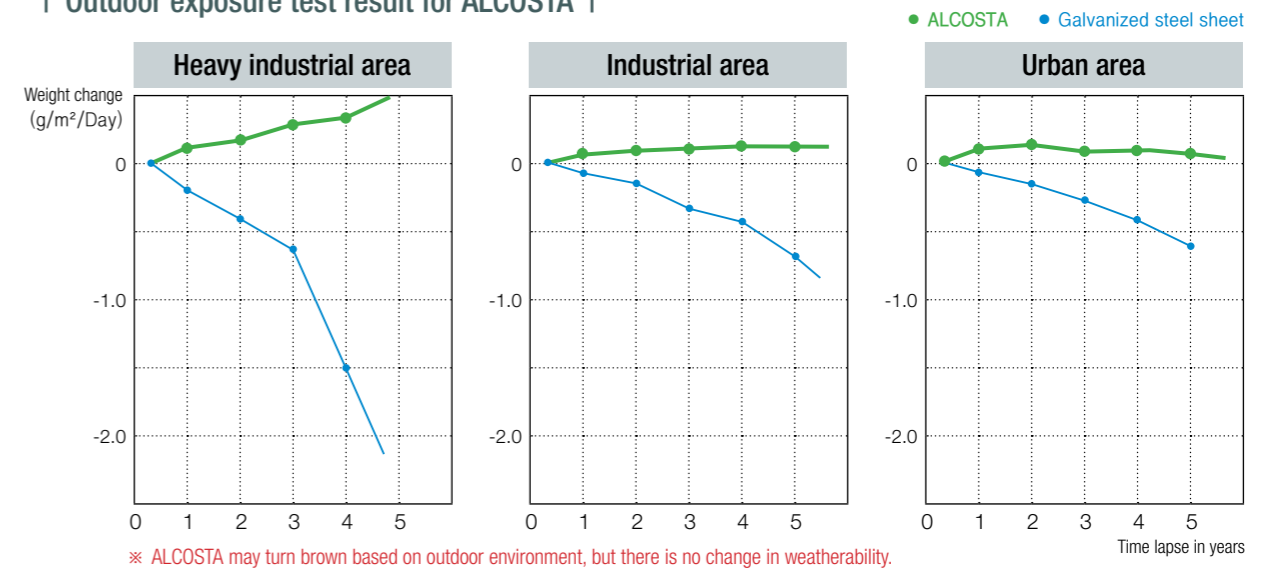
Muffler Test Result : Comparison based on corrosion rate of CR material as 100%

Products	Corrosion ratio (Decrease of thickness in the parenthesis)
STS439	22.9%
STS409L	27.5%
ALCOSTA(80g/m ²)	30.1% (16μm)
EGI(40g/m ²)	92.8% (80μm)
Cold-rolled steel sheet	100% (87μm)

Weatherability

ALCOSTA forms a fine, stable oxide layer on the surface, and offers outstanding weatherability in severely corrosive environments of industrial areas.

Outdoor exposure test result for ALCOSTA



Processability

ALCOSTA has a solid alloy layer between steel and AL layers, therefore, is generally known to have less processability than cold-rolled steel sheets or galvanized steel sheets. However, DQ and DDQ of ALCOSTA offer better processability than cold-rolled steel sheets.

Mechanical properties of ALCOSTA by type

(Specimen Thickness : 0/8mm)

Product	Type	Symbol (KS/JIS)	Tensile test		
			Yield strength (MPa)	Tensile strength (MPa)	Elongation (%)
ALCOSTA	Commercial Quality	SA1C	≥ 226	≥ 294	-
	Drawing Quality	SA1D	≥ 206	≥ 284	≥ 36
	Deep Drawing Quality	SA1E	≥ 196	≥ 275	≥ 40

※ Above figures are the general values of 0.8T. For the scope of warranty, please refer to the manufacturing specifications.



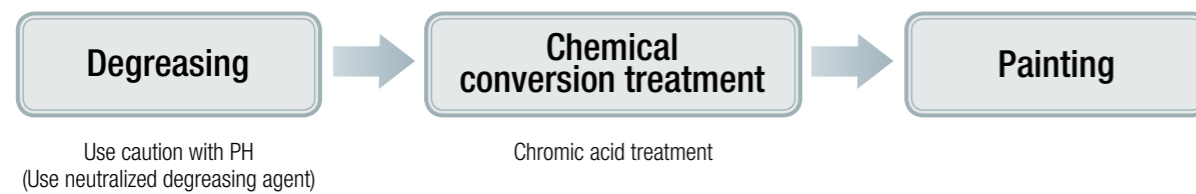
ALCOSTA (Hot-dip aluminized steel sheet)

ALCOSTA (Hot-dip aluminized steel sheet)

Paintability

ALCOSTA offers better paintability than galvanized steel sheet, and can achieve more outstanding paintability through chemical conversion treatment.

Pre-treatment for painting



Paint

Applicable paints are as follows.

- Vinyl resin paint
- Polyurethane resin paint
- Silicone resin painting
- Lacquer
- Phenolic resin paint

Usage

It is used in various products including home appliances, kitchen appliances, automobile parts, steel can (food container, paint container, lubricant container), post-galvanized products (oil pipeline cover), etc.

Home/Kitchen Appliances



- TV shrink band
- Gas range
- Dryer
- Microwave oven
- Stove
- Boiler

Automobile



- Muffler
- Fuel tank
- Radiant cover

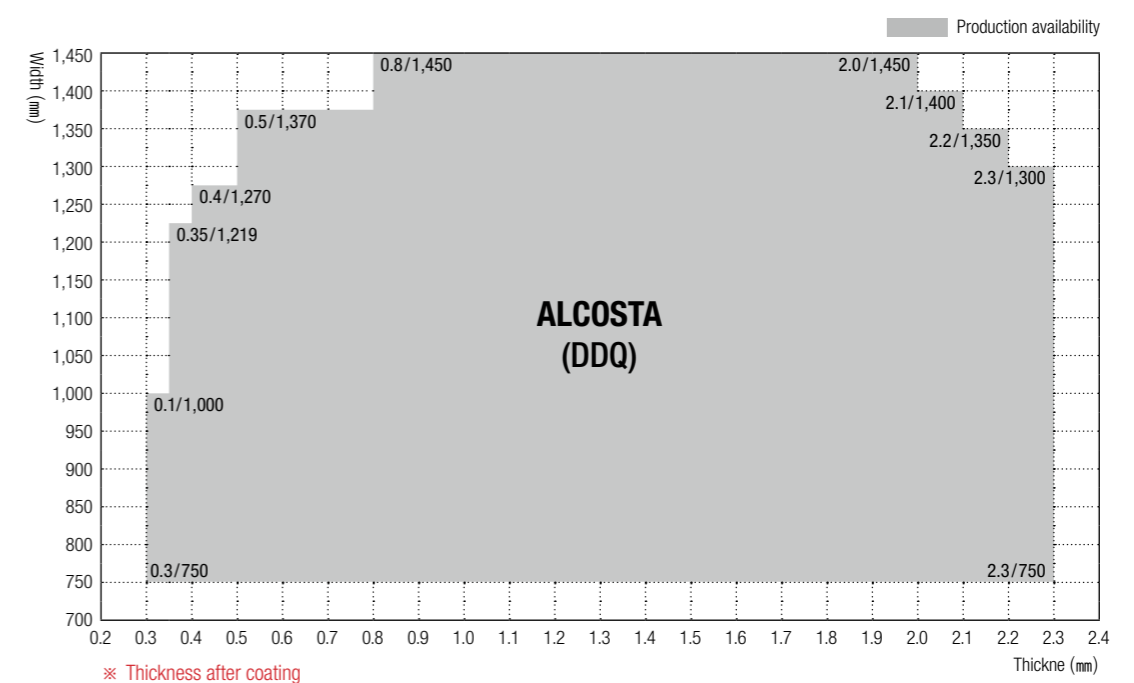
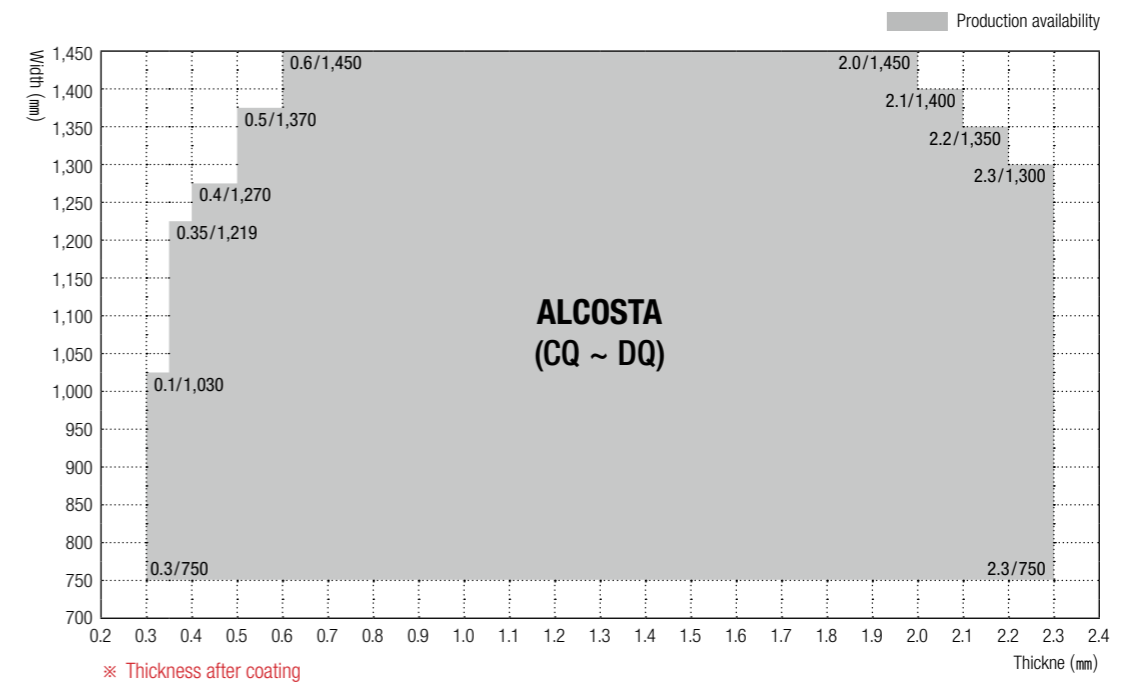
Others



- Steel can (food container, paint can, lubricant can)
- Post-coated ALCOSTA (oil pipeline cover)

Product Specifications

Production availability

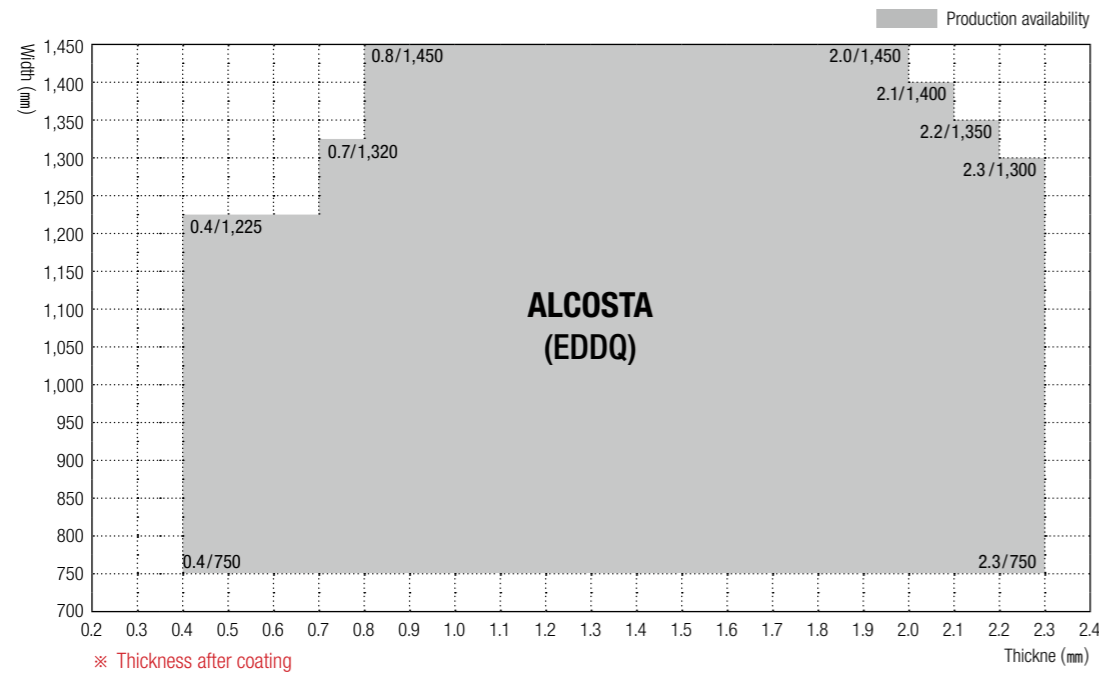




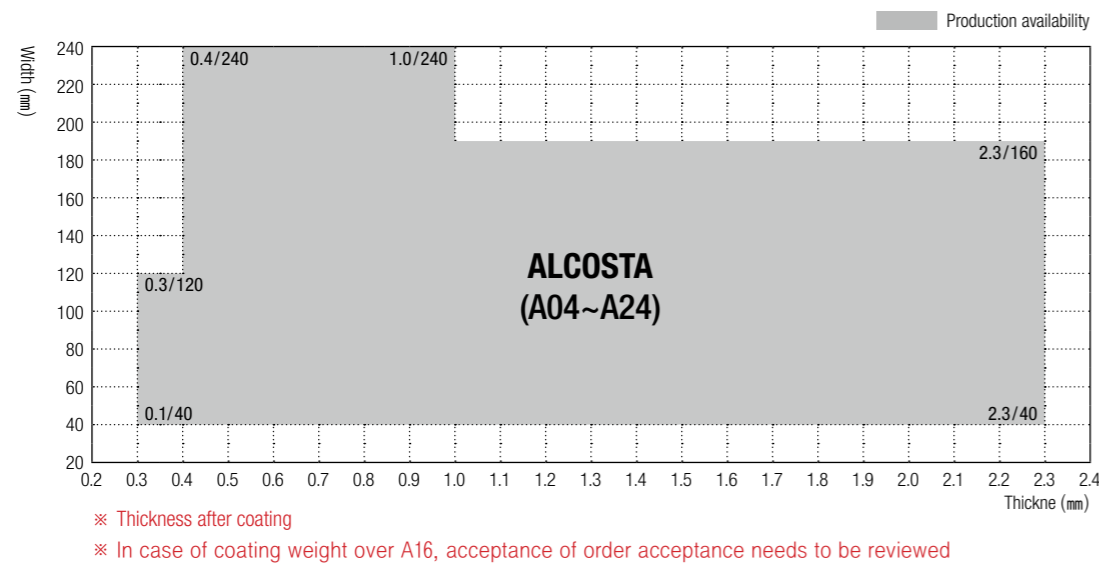
ALCOSTA (Hot-dip aluminized steel sheet)

ALCOSTA (Hot-dip aluminized steel sheet)

Production availability



Coating Weight



Quality specifications

Standard Comparison

Classification	KS D 3544	JIS G 3314	ASTM A 463	DIN EN 10346
Commercial Quality	SA1C	SA1C	CS	DX51D
Drawing Quality	SA1D	SA1D	-	DX52D, 53D
Deep Drawing Quality	SA1E	SA1E	DDS	DX54D
Extra Deep Drawing Quality	-	-	EDDS	DX56D

KS D 3544

Classification	Symbol	Elongation(%)			Bending	
		0.4≤t<0.6	0.6≤t<1.0	1.0≤t	Bend Angle	Inner Spacing od Bend
Commercial Quality	SA1C	-	-	-	180°	4t
Drawing Quality	SA1D	≥30	≥32	≥34	180°	1t
Deep Drawing Quality	SA1E	≥34	≥36	≥38	180°	1t

※ Tensile strength is provided as reference, which should be 28kgf/mm² (275N/mm²) or higher.

JIS G 3314

Classification	Symbol	Tensile strength (MPa)	Yield strength (MPa)	Elongation(%)				Bending	
				0.3≤t<0.4	0.4t<0.6	0.6<t≤1.0	1.0≤t	Bend Angle	Inner Spacing od Bend
Commercial Quality	SA1C	(≥205)	(≥270)	-	-	-	-	180°	4t
Drawing Quality	SA1D	-	≥280	(≥28)	≥30	≥32	≥34	180°	1t
Deep Drawing Quality	SA1E	-	≥270	-	≥34	≥36	≥38	180°	1t



ALCOSTA (Hot-dip aluminized steel sheet)

ALCOSTA (Hot-dip aluminized steel sheet)

Quality specifications

ASTM A 463

Classification	Symbol	Yield strength(MPa)	EL(%)
Commercial Quality	CS Type A	170~345	≥20
	CS Type B	205~345	≥20
	CS Type C	170~380	≥15
Drawing Quality	DDS	140~240	≥32
Deep Drawing Quality	EDDS	125~205	≥38

DIN EN 10346

Classification	Symbol	Yield strength(MPa)	Tensile strength(MPa)	EL(%)
Commercial Quality	DX51D	-	270~500	≥22
Drawing Quality	DX52D	140~300	270~420	≥26
	DX53D	140~260	270~380	≥30
Deep Drawing Quality	DX54D	120~220	260~350	≥34
Extra Deep Drawing Quality	DX56D	120~180	260~350	≥39

Coating Weight

Minimum coating weight (Double side)

(Unit : g/m²)

Coating weight symbol	Minimum coating weight for 3 points on both sides	Minimum coating weight for 1 point on both sides	POSCO STEELEON	KS D 3544	JIS G 3314	ASTM A 463	DIN EN 10346
40	40	30	A04	40	40	T1-13(40)	-
60	60	45	A06	60	60	-	AS 060
80	80	60	zA08	80	80	T1-25(75)	-
100	100	75	A10	100	100	-	AS 100
120	120	90	A12	-	120	T1-40(120)	-
160	160	120	A16	-	-	-	-

1. Average 3-point coating weight on both sides is the arithmetic mean of 3 test piece measurements obtained from the sample.
2. Minimum coating weight is determined based on the discussion with POSCO STEELEON.

Post-treatment

Chemical treatment

Type	Symbol
General chemical treatment	CX
Cr-Free treatment	NX
Lubrication treatment	LX
No treatment	XX

Oiling

Type	Symbol
OILED	• PS : Single side 300~500mg/m ²
	• PL : Single side 501~1000mg/m ²
	• PG : Single side 1001~1500mg/m ²
	• PH : Single side 1500~2000mg/m ²
NON-OILED	PX (No oiling)

Dimensional tolerance

Thickness tolerance

KS, JIS

(Unit : mm)

Thickness(t)	Width (W)	W<1000	Mark
0.40 ≤ t < 0.60		± 0.07	± 0.07
0.60 ≤ t < 1.00		± 0.10	± 0.11
1.00 ≤ t < 1.60		± 0.13	± 0.14
1.60 ≤ t < 2.30		± 0.17	± 0.18
2.30 ≤ t		± 0.21	± 0.22

ASTM

(Unit : mm)

Thickness(t)	Width (W)	W ≤ 1500
t ≤ 0.4		± 0.08
0.4 < t ≤ 1.0		± 0.10
1.0 < t ≤ 1.5		± 0.13
1.5 < t ≤ 2.0		± 0.15
2.0 < t ≤ 2.5		± 0.30

DIN EN

(Unit : mm)

Thickness(t)	Width (W)	W ≤ 1200	1200 < W ≤ 1500
T ≤ 0.40		± 0.05	± 0.06
0.40 < t ≤ 0.60		± 0.05	± 0.06
0.60 < t ≤ 0.80		± 0.06	± 0.07
0.80 < t ≤ 1.00		± 0.07	± 0.08
1.00 < t ≤ 1.20		± 0.08	± 0.09
1.20 < t ≤ 1.60		± 0.11	± 0.13
1.60 < t ≤ 2.00		± 0.14	± 0.15
2.00 < t ≤ 2.30		± 0.16	± 0.17

Width tolerance

KS, JIS

(Unit : mm)

Width (W)	Tolerance
Max 1500	+ 7
	- 0

ASTM

(Unit : mm)

Width (W)	Tolerance
600 ≤ t < 1200	- 0, + 5
1200 ≤ t < 1500	- 0, + 6



Product features

Product	Characteristics	Use
ALZASTA (55% Al-Zn Alloy Coated Steel)	<ul style="list-style-type: none"> Outstanding corrosion resistance due to the strong oxide coating of aluminum and sacrificed protection of zinc Bright gray appearance with unique smoothness, flatness, and fine spangles Outstanding paintability 	<ul style="list-style-type: none"> Building interior/exterior materials (roof, wall, shutter, ceiling, floor) Home appliance interior/exterior (refrigerator, outdoor AC unit) Automobile parts

Heat resistance

ALZASTA offers outstanding heat resistance compared to galvanized steel sheet, and can be used at high temperature of 350 °C without short-term discoloration.

| Heat resistance by product |

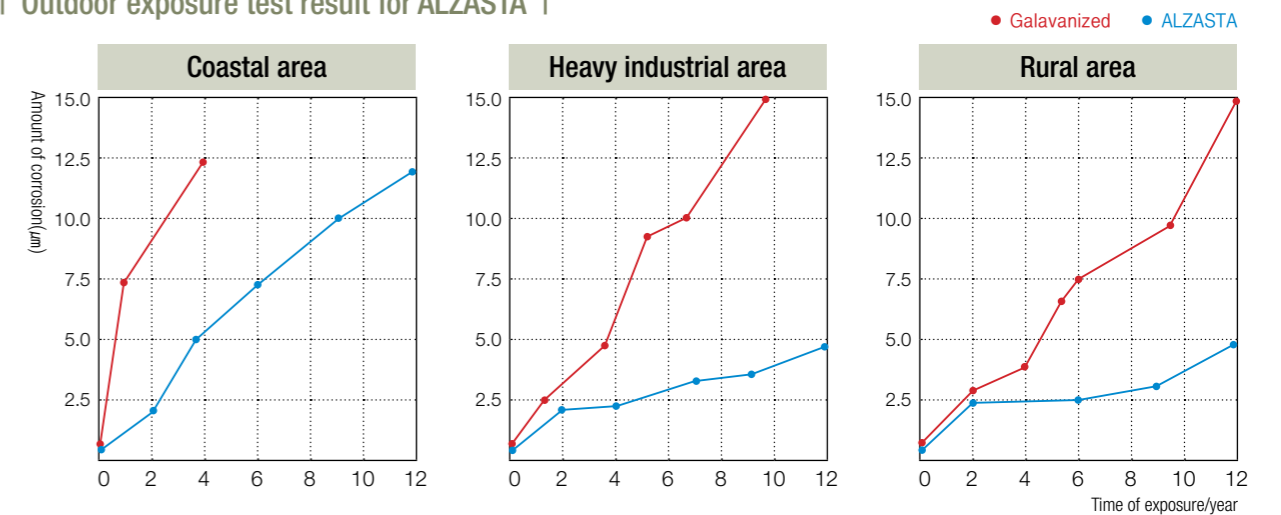
Condition	ALZASTA	GI
350 °C, 24hrs.		

Condition	Coating Amount	Coating Thickness	ΔL	
			Before	After
ALZASTA	150(g/m ²)	40(μm)	89.8	88.2
GI	275(g/m ²)	40(μm)	87.2	62.8

Corrosion resistance

ALZASTA offers over 4 times more corrosion resistance than galvanized steel sheets in various corrosive environments. This is due to the sacrificial effect of galvanized steel sheet caused by stable corrosion product under corrosive environment and dense oxide coating creation by aluminized steel sheet.

| Outdoor exposure test result for ALZASTA |

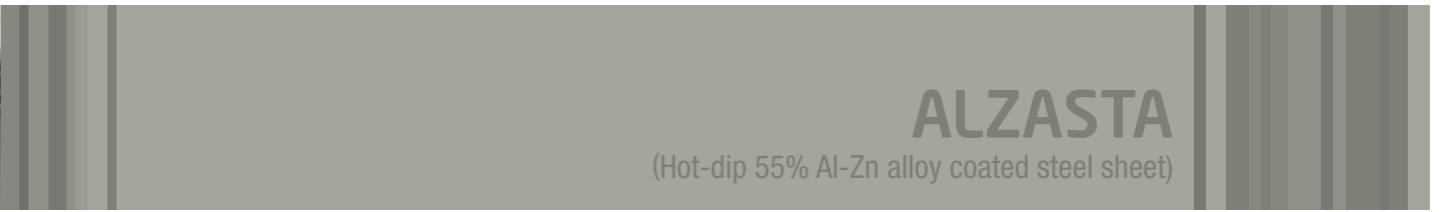


| Corrosion resistance by product (flat surface) |

Galvanized steel sheet	100hr	500hr	1580hr	1860hr
AZ (70g/m ² , Both Side)				
GI (140g/m ² , Both Side)				—



ALZASTA (Hot-dip 55% Al-Zn alloy coated steel sheet)



ALZASTA
(Hot-dip 55% Al-Zn alloy coated steel sheet)

Coating adhesion and processability

ALZASTA offers an equivalent level of processability as galvanized steel sheets and outstanding durability because there are less cracks in processed area.

Ball Impact Test



No peeling off in 1kg, 500mm impact test

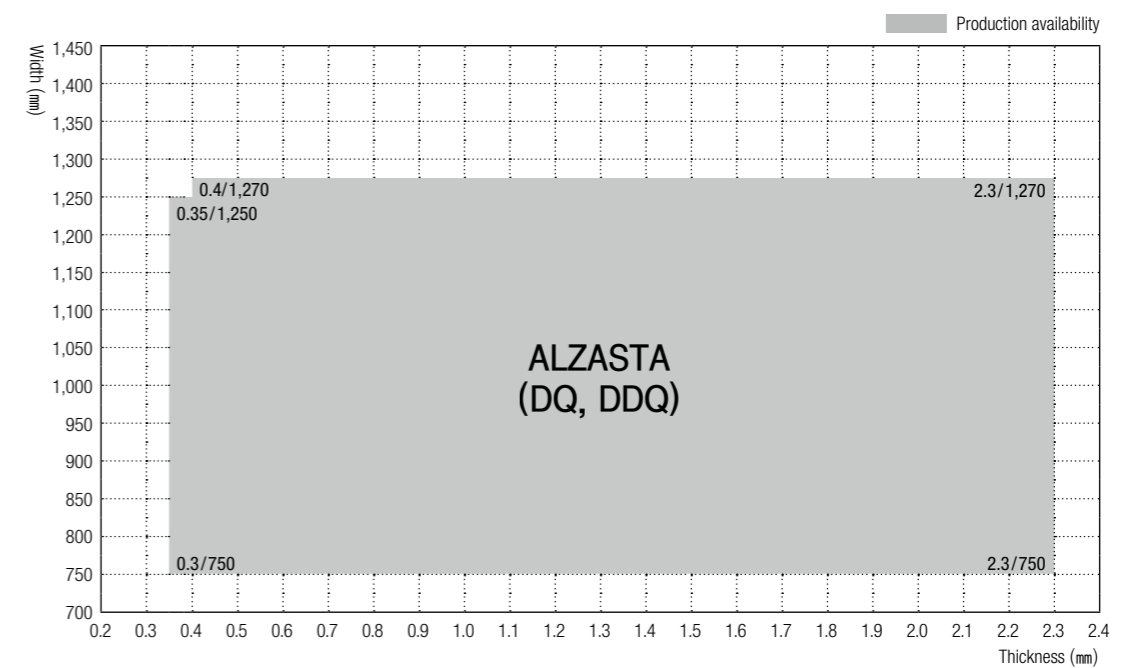
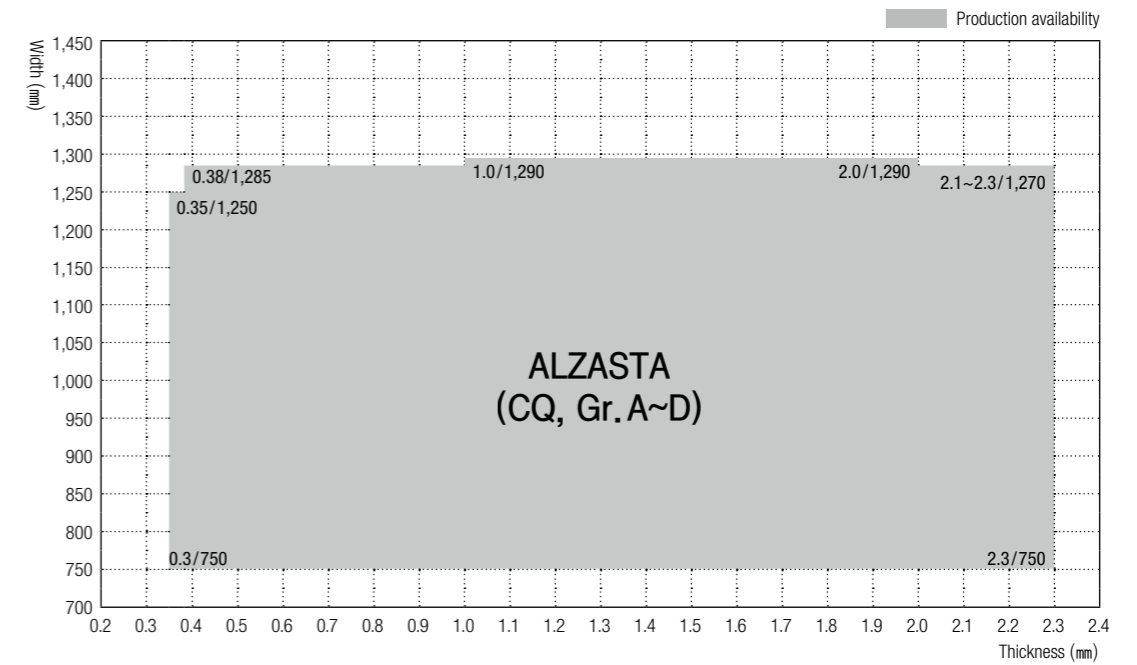
Banding Test



No peeling off in Ot, 180° bending test

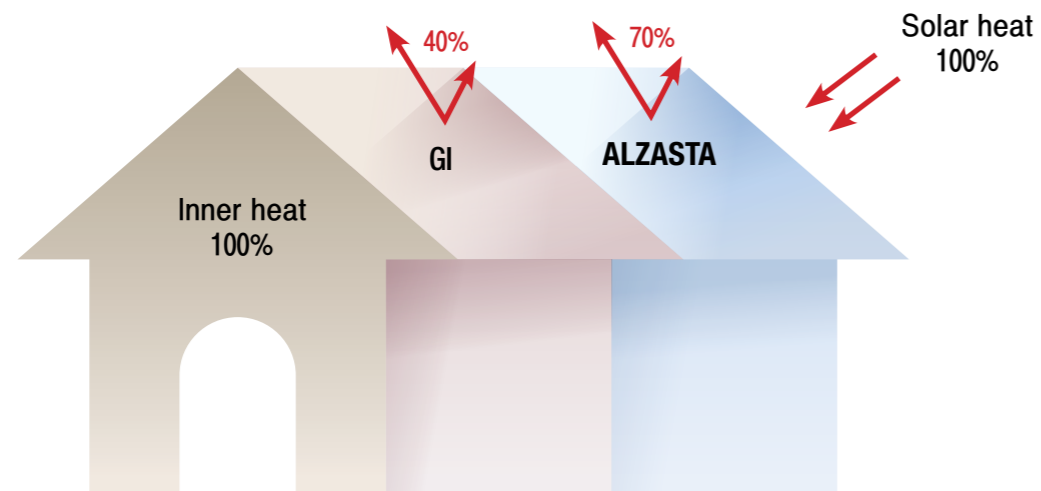
Product Specifications

Production availability



Heat reflectivity

ALZASTA offers 2 times more heat reflectivity than galvanized steel sheets, and brings great energy cost reduction effect when used as the roofing material of various buildings. In particular, it can be combined with black paint containing complex oxide black pigment for even better effect in suppressing temperature increase.

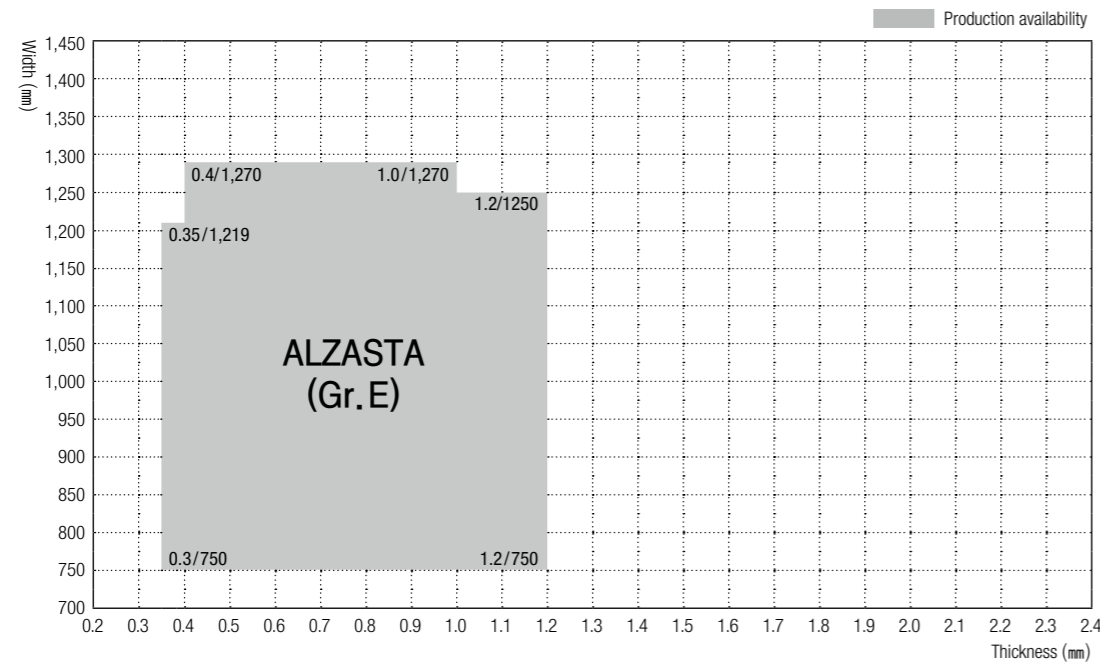




ALZASTA

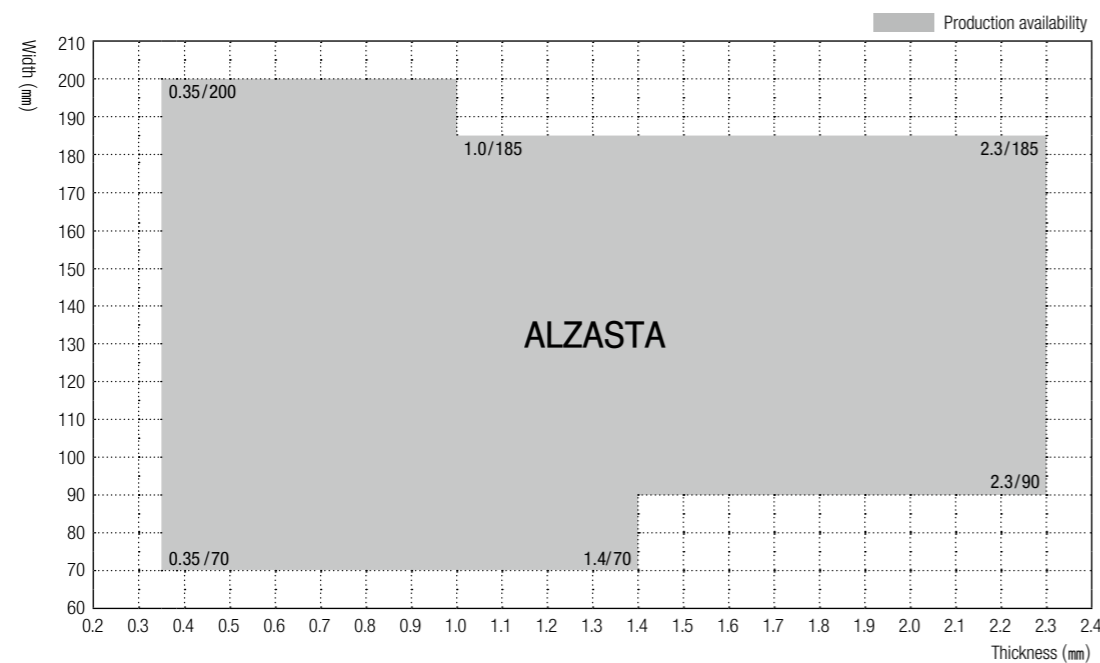
(Hot-dip 55% Al-Zn alloy coated steel sheet)

Production availability



※ Consult in advance when receiving orders below 0.35mm or <1.0mm in thickness exceeding the production availability
 ※ Consult in advance when receiving orders over 1270mm or below 750mm in width exceeding the production availability

Coating weight



Quality Specifications

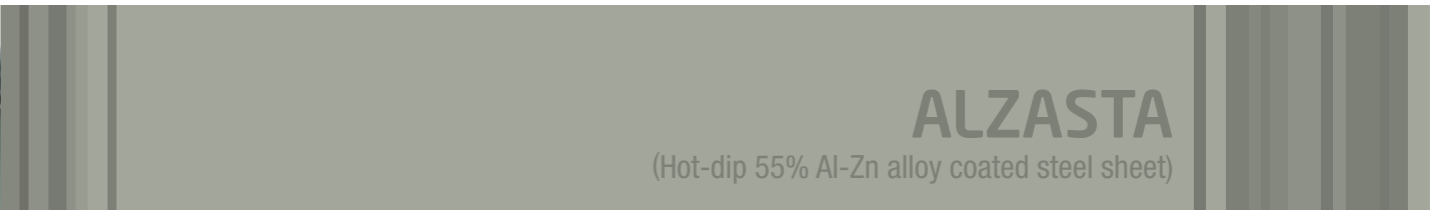
Specification comparison table I

Classification	Specifications				
	KS D 3770	JIS G 3321	ASTM A 792	DIN EN 10346	
Commercial Quality	SGLCC	SGLCC	CS	DX 51D	
Drawing Quality	SGLCD	SGLCD	DS	DX52D, 53D	
Deep Drawing Quality	SGLCDD	SGLCDD	-	DX 54D	
Structural Steel	295MPa	SGLC295Y	SGLC400	Grade 275	S320GD
	335MPa	SGLC335Y	SGLC440	Grade 340	S350GD
	365MPa	SGLC365Y	SGLC490	Grade 410	S420GD
	560MPa	SGLC560Y	SGLC570	Grade 550	S550GD

POSCO STEELEON STANDARD I

Classification	THICK-NESS(mm)	Y.P (MPa)	T.S (MPa)	Elongation(%)					
				0.3≤t<0.4	0.4≤t<0.6	0.6≤t<1.0	1.0≤t<1.6	1.6≤t<2.3	
Commercial Quality	0.35≤ t <2.3	≥250	≥270	≥20	≥21	≥24	≥24	≥25	
Drawing Quality		-	≥270	-	≥27	≥31	≥32	≥33	
Deep Drawing Quality		-	≥270	-	≥29	≥32	≥34	≥35	
Structural Steel		295MPa	≥295	≥400	≥16	≥17	≥18	≥18	≥18
		335MPa	≥335	≥440	≥14	≥15	≥16	≥18	≥18
	365MPa	≥365	≥490	≥12	≥13	≥14	≥16	≥16	
	560MPa	≥560	≥570	-	-	-	-	-	

※ Please consult in advance for specifications other than seen in the table



Dimensional tolerance

Thickness tolerance

KS, JIS

(Unit : mm)

Displayed thickness(t)	Width(W)		
	630<W	630≤W<1000	1000≤W
0.35≤t<0.40	±0.05	±0.05	±0.05
0.40≤t<0.60	±0.06	±0.06	±0.06
0.60≤t<0.80	±0.07	±0.07	±0.07
0.80≤t<1.00	±0.07	±0.08	±0.08
1.00≤t<1.25	±0.08	±0.08	±0.09
1.25≤t<1.60	±0.09	±0.10	±0.11
1.60≤t<2.00	±0.11	±0.12	±0.13
2.00≤t<2.30	±0.13	±0.14	±0.15

EN (based on DX51D~S550GD)

(Unit : mm)

Displayed thickness(t)	Width(W)	
	W≤1200	1200<W≤1500
T≤0.40	±0.05	±0.06
0.40<t≤0.60	±0.05	±0.06
0.60≤t<0.80	±0.06	±0.07
0.80≤t<1.00	±0.07	±0.08
1.00≤t<1.25	±0.08	±0.09
1.25≤t<1.60	±0.11	±0.11
1.60≤t<2.00	±0.14	±0.15
2.00≤t<2.30	±0.16	±0.17

ASTM

(Unit : mm)

Displayed thickness(t)	Width(W)	
	W < 1500	1500 ≤ W
t < 0.40	±0.08	±0.08
0.40 ≤ t < 1.00	±0.10	±0.10
1.00 ≤ t < 1.50	±0.13	±0.13
1.50 ≤ t < 2.00	±0.15	±0.15
2.00 ≤ t < 2.30	±0.30	±0.34

Width tolerance

KS, JIS

(Unit : mm)

Width(W)	Tolerance
Max 1500	+ 7
	- 0

EN

(Unit : mm)

Width(W)	Tolerance
600≤W≤1200	+ 5
1200<W≤1500	+ 6

ASTM

(Unit : mm)

Width(W)	Tolerance
600 ≤ t < 1200	- 0, + 5
1200 ≤ t < 1500	- 0, + 6

Post-treatment

Type	CODE	Use	Remark
Chromate treatment	CX	Building material	General Cr
	JX	Boiler parts	Cr-free
Organic coating	XG	Building material	Cr-type organic coating
	XT	Building material / Home appliances	Cr-type organic coating
	XA	Roofing material	Blue coloring
	XB	Roofing material	Green coloring
Others	XD	Floor heating panel	Gold coloring
	XF	Roofing material	For PE-foam
	XX	Color material	-

Use

Home appliances

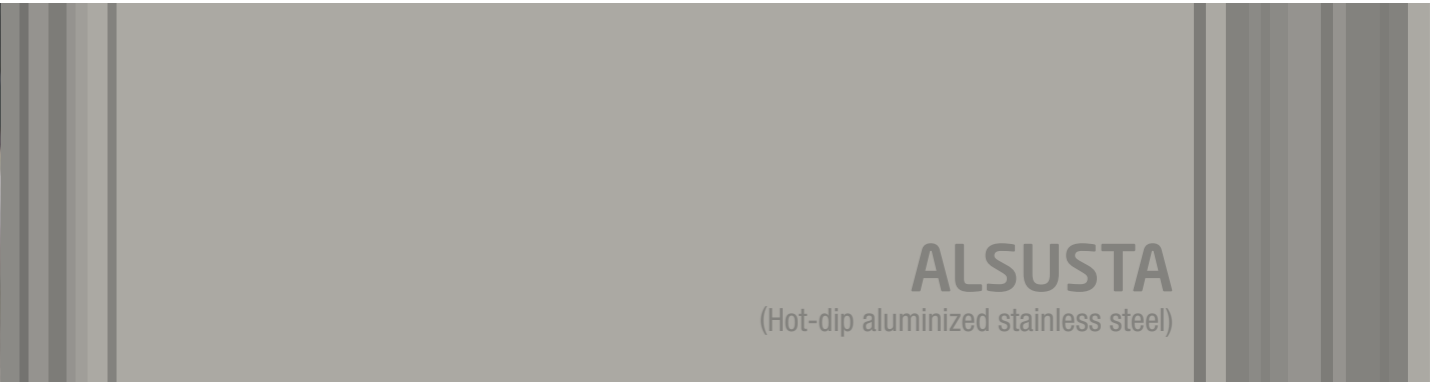
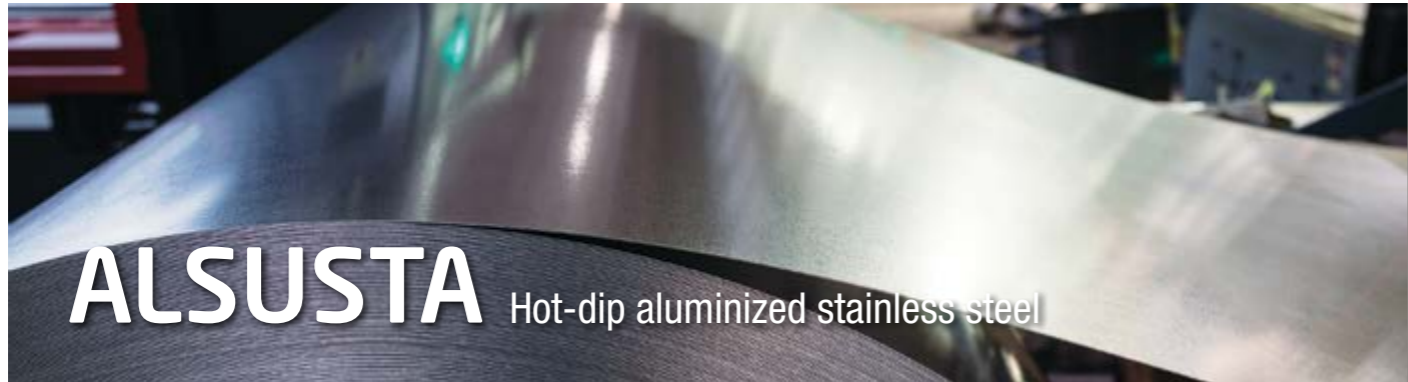


- LCD monitor
- AC outdoor unit
- TV shrinkage band

Construction materials



- Indoor/outdoor panels
- Metal roof tile
- Duct
- Panel board



Product features

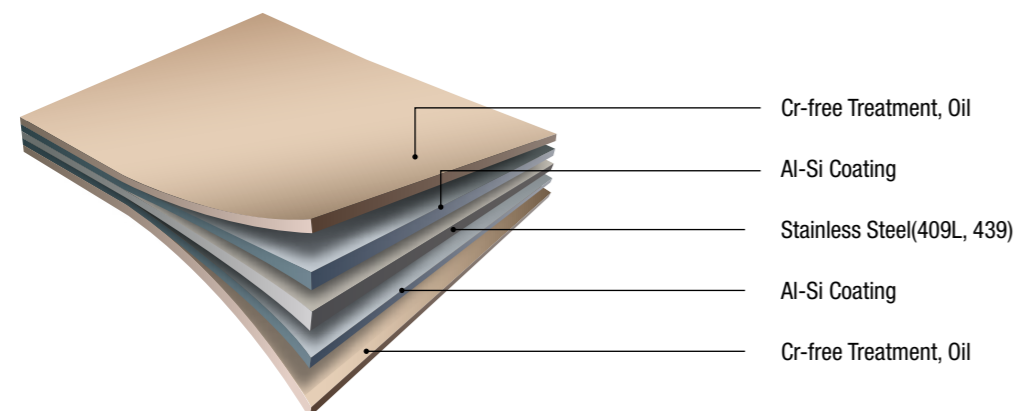
Product	Characteristics	Use
ALSUSTA (Aluminized Stainless Steel)	<ul style="list-style-type: none"> Highly corrosion-resistant STS with outstanding sacrificial anode reaction and beautiful appearance Outstanding resistance to corrosion in salt and condensed water Outstanding red rust resistance up to 472°C Outstanding resistance to oxidation up to 843°C due to coating layer Outstanding decorative tendency 	<ul style="list-style-type: none"> Building interior/exterior material Fuel cell and solar cell panel module Automobile exhaust system

| Specification comparison table |

Order specification		Model name	YP(N/mm ²)	EL(%)
ASTM A 463	FSS Type 409	Al-STSS 409L	170~345	≥20
	FSS Type 439	Al-STSS 439	205~415	≥22

Product structure

Lower cost than 400 series STS, great decorative tendency due to outstanding corrosion resistance and beautiful appearance.



Processability

Highly processable ALSUSTA offers great molding ability and seam welding processability.

| ALSUSTA processing results |



• Stamping formation evaluation



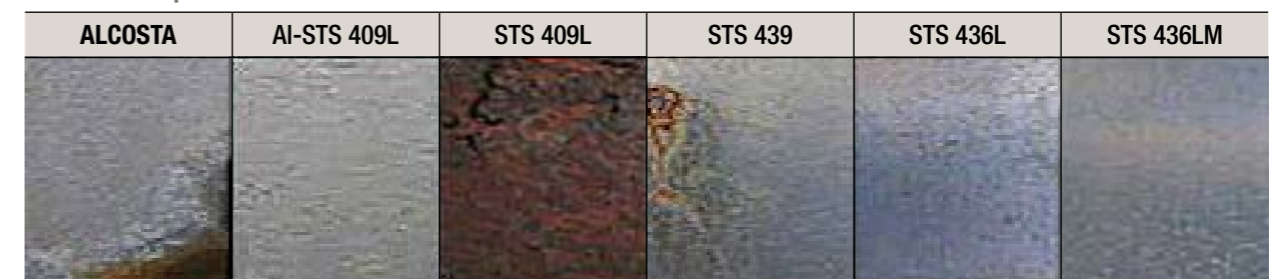
• Pipe-forming capacity evaluation

Corrosion resistance

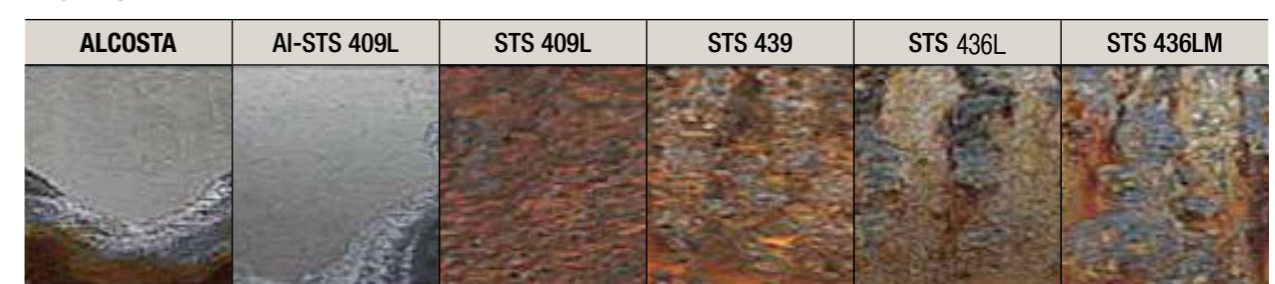
ALSUSTA offers outstanding corrosion resistance in corrosive environment.

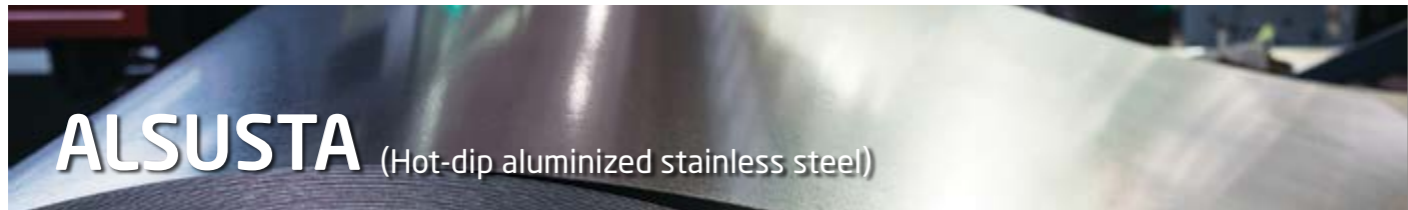
※1Cycle : SST(35°C, 95%RH, 5hr) → Dry(70°C, 30%RH, 2hr) → Humidity(50°C, 95%RH, 3hr) → Dry(60°C, 30%RH, 2Hr)

| Room temperature test |



| Cycling test after 400°C×24Hr thermal shock |





Product specifications

ALSUSTA
(Hot-dip aluminized stainless steel)

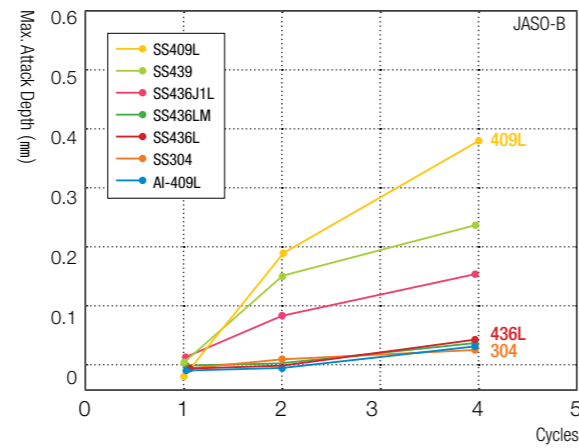
Corrosion resistance

Interior corrosion test against condensed water and deicing salt crack test

Interior condensed water test method and result

Category	Test condition
Solution (ppm)	Cl-100, NO ₃ -20, SO ₃ ²⁻ -600, SO ₄ ²⁻ -600, CH ₃ COO- 800
pH	8.0
Temperature	80°C
Time	24 days
Pattern repetition	Repeat 300cc, 24Hr evaporation 5 times, and heat once at 250°C for 24Hrs

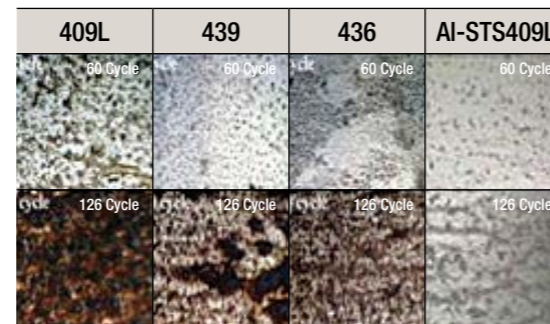
※ AI-STS409L has better interior corrosion resistance than 409L and 439, but lower than 436L and 304.



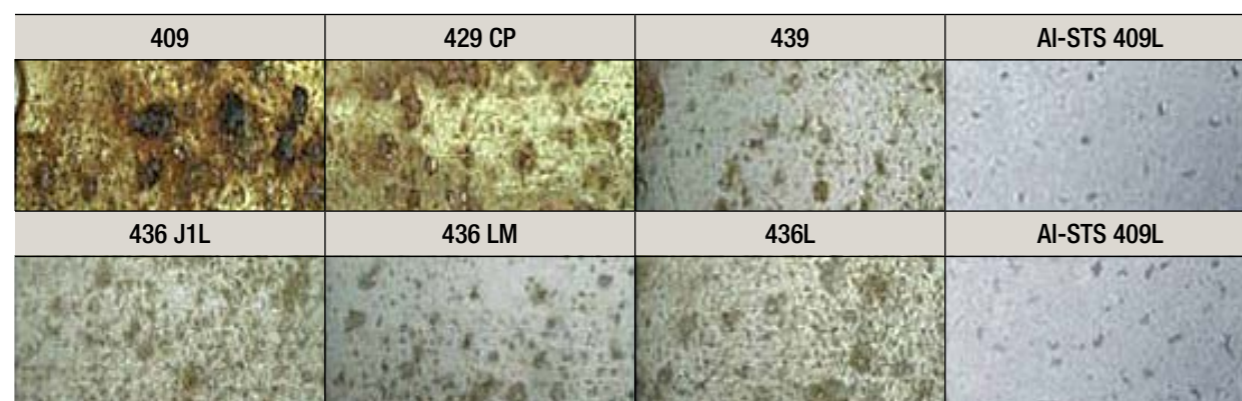
Deicing salt crack test method and result

Category	Test condition
Solution (ppm)	5% NaCl + 5% CaCl ₂
Spraying condition	35°C, 1 Hr
Drying condition	60°C, 20~3z RH, 2 Hr
Wetting condition	50°C, > 95% RH, 1 Hr
Pattern repetition	Maximum 20 cycles of spraying-drying-wetting

※ Based on the result of deicing salt accelerated corrosion result, crack area is AI-STS409L < 436 < 439 < 409L

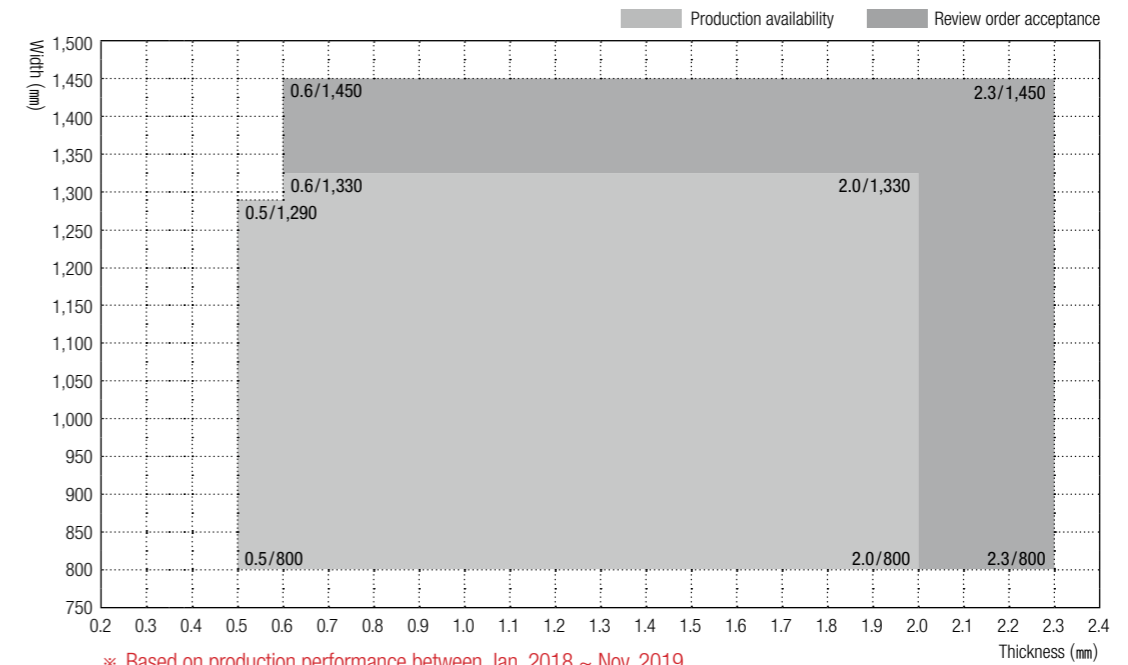


Outdoor exposure result (after 4 months)

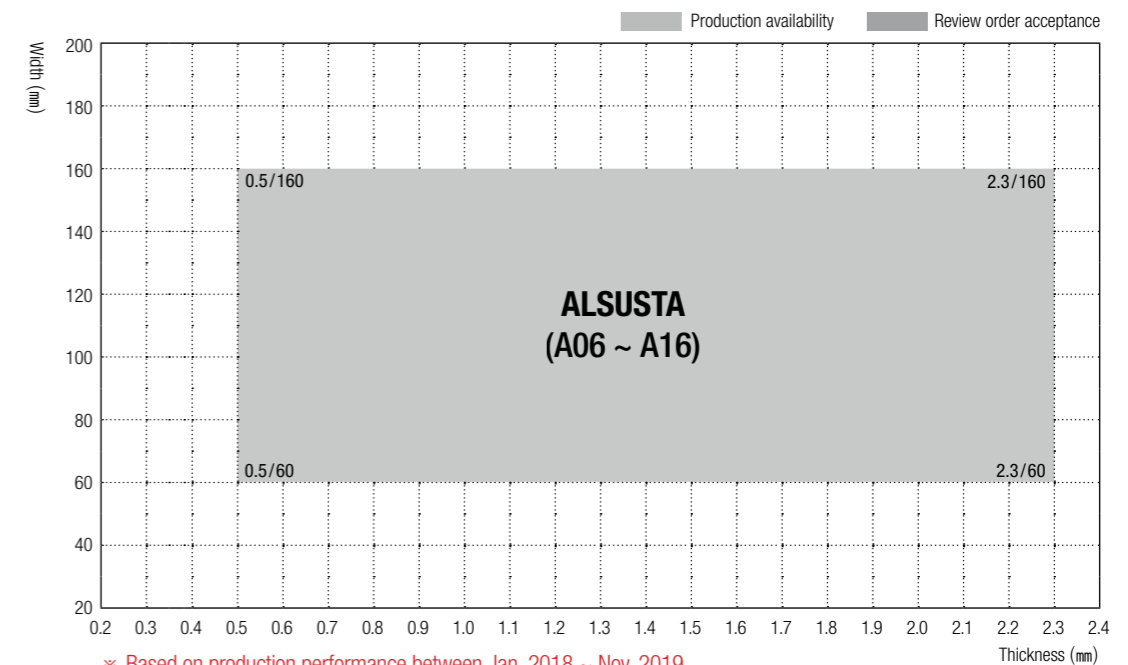


※ In coastal atmosphere exposure test, cracks began to occur on the surface of most products approximately after 10 days, but minor in AI-STS 409L
 ※ Corrosion resistance (crack area) of the specifications after 4 months of atmosphere exposure is AI-STS409L < 436L=436LM < 436J1L < 439 < 429CP < 409L.

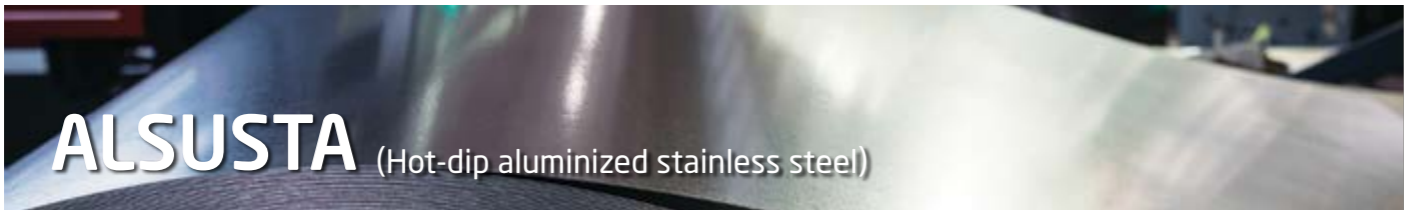
Production availability



※ Based on production performance between Jan. 2018 ~ Nov. 2019



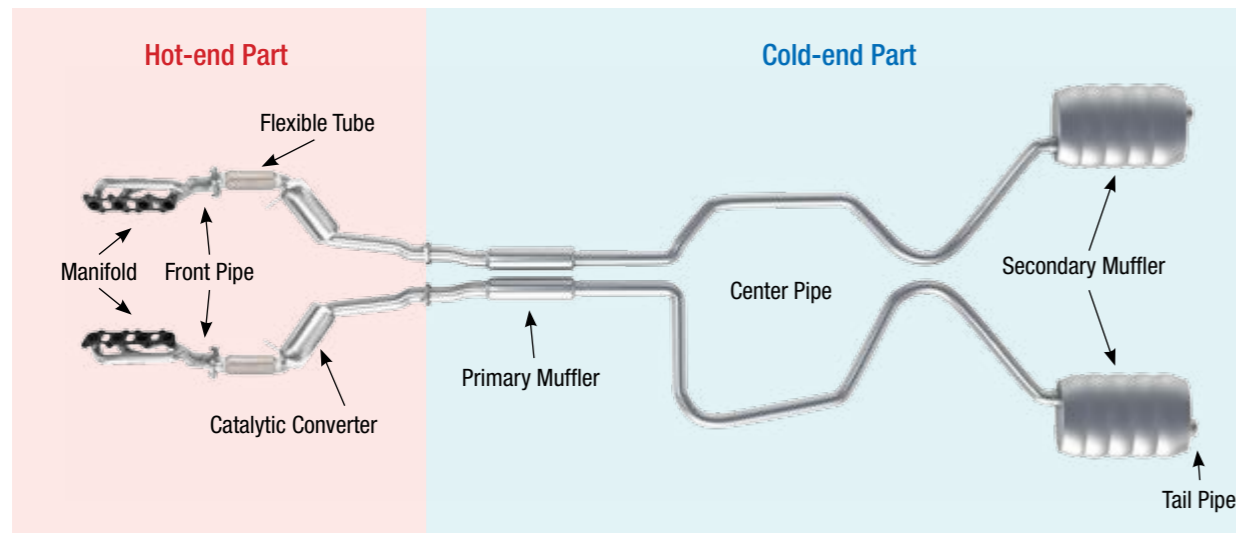
※ Based on production performance between Jan. 2018 ~ Nov. 2019



ALSUSTA
(Hot-dip aluminized stainless steel)

Use

| Automobile exhaust system |



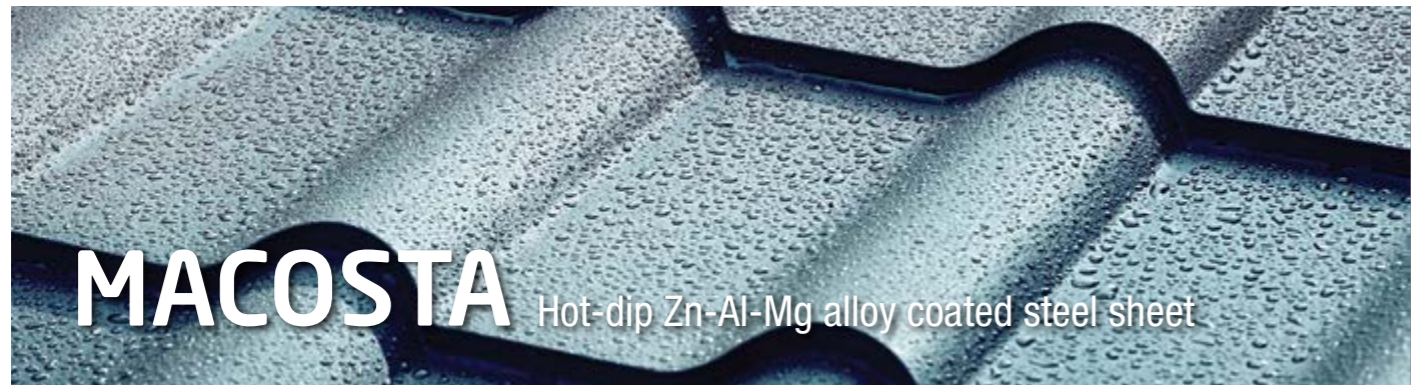
| Interior condensed water test method and result |

Category	Hot End				Test condition		
	Exhaust Manifold	Front Pipe	Flexible Tube	Catalytic Converter Shell Substrate	Center Pipe	Muffler	Tail Pipe
Temperature (°C)	950~750	800~600		1000~1200	600~400	400~100	
Required Characteristics	<ul style="list-style-type: none"> High temperature strength Anti-thermal fatigue Anti-oxidation Formability 		<ul style="list-style-type: none"> Formability Anti-oxidation High temperature strength 		<ul style="list-style-type: none"> High temp. salt damage resistance Wet corrosion resistance Brightness(for tail tip) 		
Popular Materials	Cast Iron 429EM 441 444 310S, 309Si	409 441 429EM 439 304	304 309Si 316L 321	409L 439 430J1L 436J1L	Ceramics 20Cr-5Al	Aluminized steel 409L 429CP 439 436L 436J1L 436LM AL409L, AL439	

| Application in Hyundai-Kia Motors |



※ Applied in all models including G90, Tucson, Kona, K3, etc. in addition to above models



MACOSTA
(Hot-dip Zn-Al-Mg alloy coated steel sheet)

Product specification

MACOSTA is a ternary hot-dip Zn-Al-Mg alloy steel sheet (KS D 3030) with outstanding corrosion resistance and processability, developed based on POSCO STEELEON's unique technology.

KS D 3030 : Regulates hot-dip coated steel sheets and coils made with alloy that consists of 1.5~8% of combination of MG and Al and the rest with Zn (MACOSTA: Hot-dip Zn-Al-Mg alloy steel sheet)

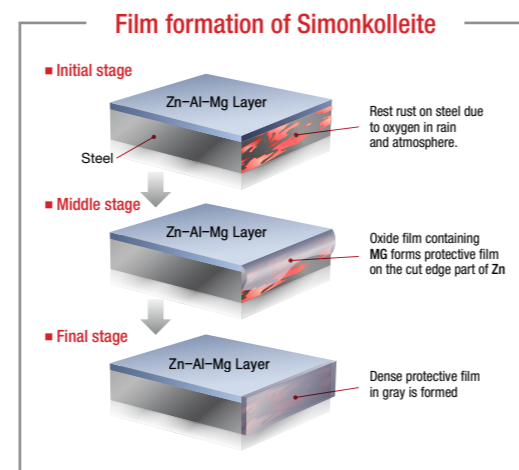
Corrosion resistance

Slab

- Promotes the formation of Simonkollite ($Zn_5(OH)_8Cl_2 \cdot H_2O$), a dense corrosion product with Mg in highly stable state in the coating layer.
- Simonkollite is formed and maintained like a film on the surface of coating layer, preventing corrosion of substrate steel sheet.

Cross section

- Upper coating layer is dissolved to cover the cross section and promote stable growth of corrosion product.
- Corrosion product covers the red rust on substrate steel sheet that is already exposed to prevent corrosion.

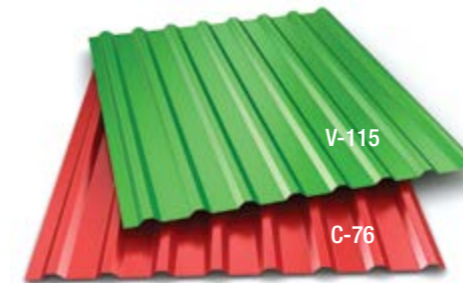


Paintability

Continuous painting and powder painting can be applied just like the existing painted steel sheets and processability,

Roofing material

High weatherproof product



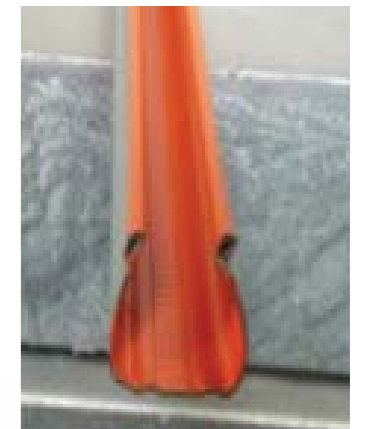
Metal roof tile

Traditional roof tile (MATT product)

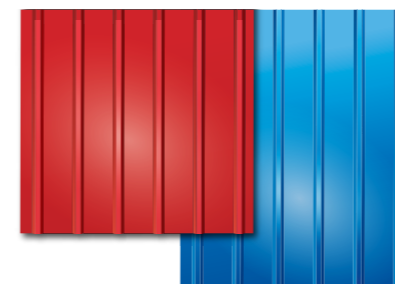


Vinyl greenhouse pad

Bio antibacterial product



Fluorinated product

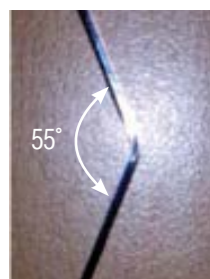


Regular roof tile (MATT product)

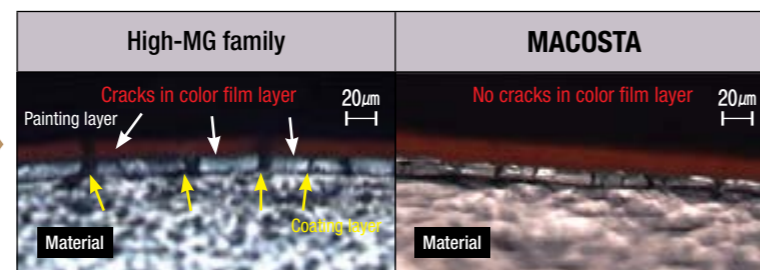


Processability

Offers similar processability to existing coated steel sheets, and particularly reduces cracks in processing compared to ternary alloy-coated steel sheets with high MG content over 3% for outstanding corrosion resistance in processing parts.



Cross sectional comparison after bending test at 55°



- Outstanding hardness of coating layer** : Hardness of coating layer is outstanding compared go GI product, and minimizes contamination of mold during processing → Great galling

Welding characteristics

Various welding methods can be applied including arc welding, spot welding, EWR welding, etc.

Test sample	Evaluation category			
	Welding current range	Consecutive spot welds	Cracks in welding area	Cross section of welding sample
GI	6.0~8.8kA	500	0µm	No cracks
MACOSTA	6.0~7.6kA	500	0µm	No cracks

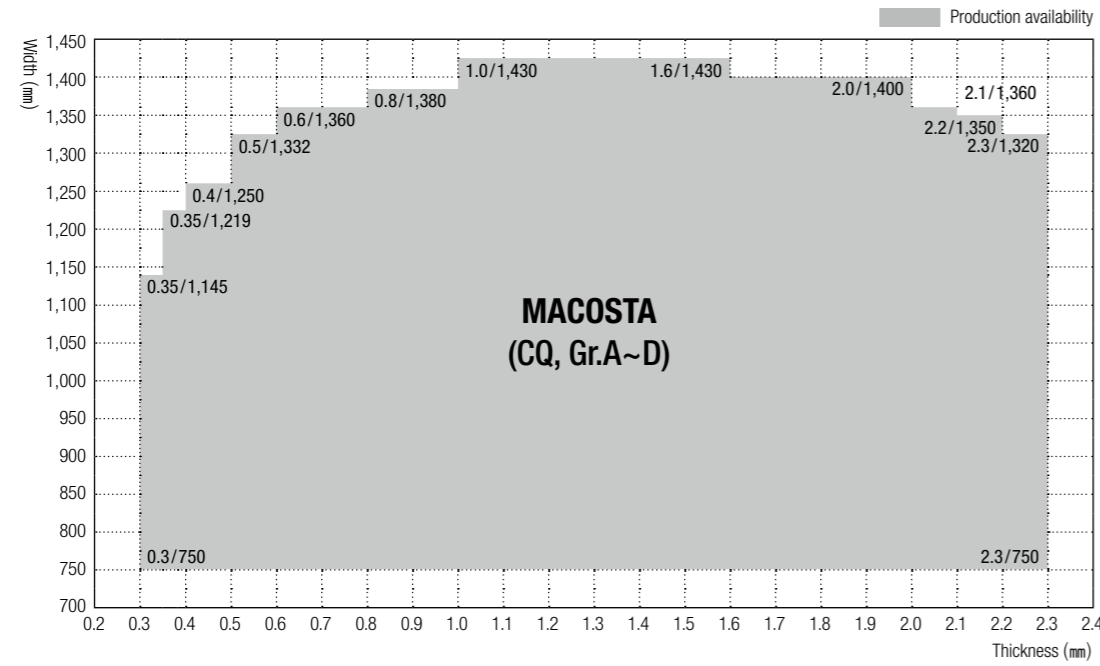


MACOSTA

(Hot-dip Zn-Al-Mg alloy coated steel sheet)

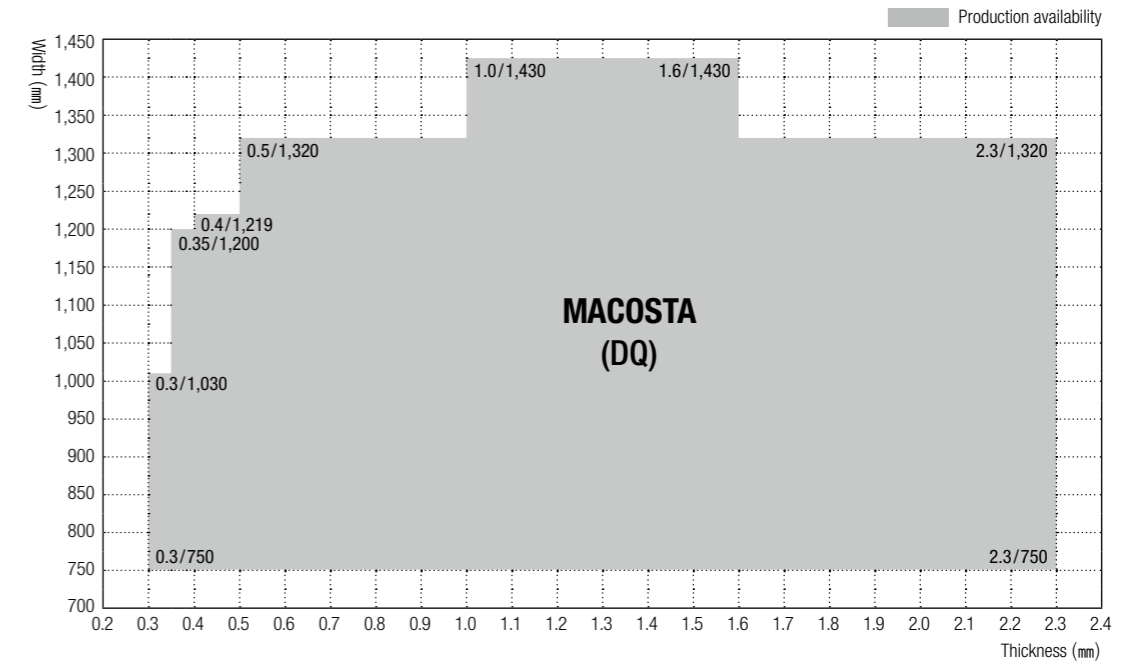
Production availability

I Commercial Quality, Grade A~D I

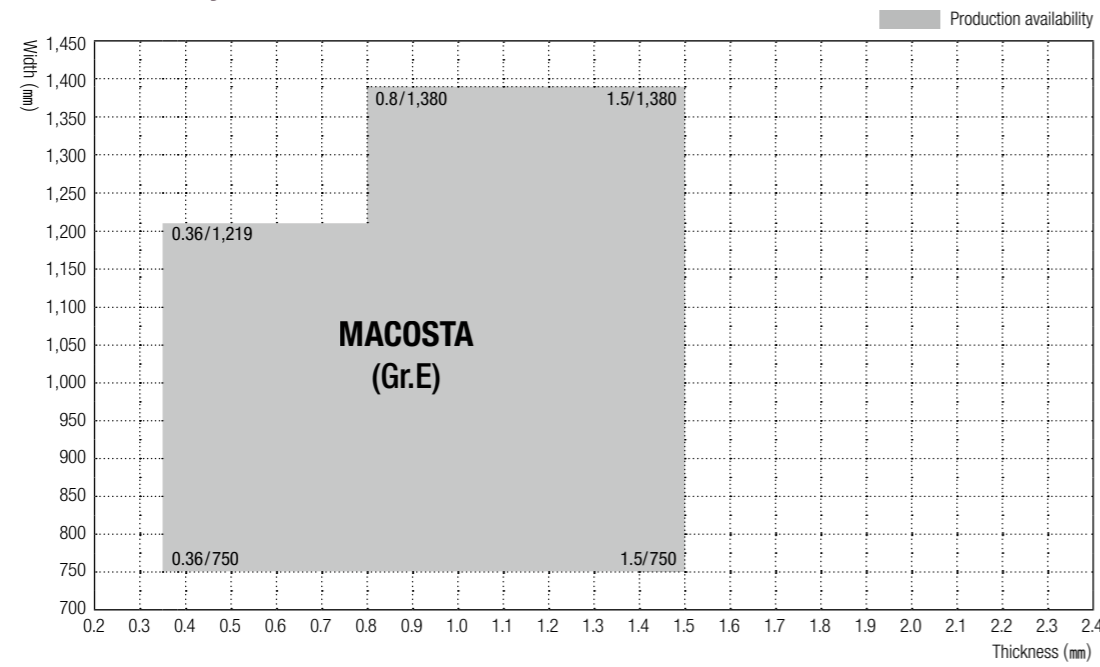


Production availability

I Drawing Quality I



I Commercial Quality, Grade E I





MACOSTA
(Hot-dip Zn-Al-Mg alloy coated steel sheet)

Corrosion resistance performance after processing

- 3~5 times higher corrosion resistance compared to regular galvanized steel sheets (HGI, GI)
- Corrosion resistance of cross section : Simonkolleite formation in MACOSTA prevents red rust in the cross section, cost reduction for secondary post-plating can be omitted (CR+post-coating, powder coating excluded)

Time	MACOSTA (g/m ² , Cross section)		Galvanized steel sheet (g/m ² , Cross section)		Galvalume (g/m ² , Cross section)
	50	90	50	60	50
144 hrs					
576 hrs					
1,008 hrs			-	-	

Molded safety foothold

Type	POSCO STEELEON	Competitor
	MACOSTA	GI
	0.9t, 120g/m ²	0.9t, 120g/m ²
936 hrs		
1,440 hrs		-

※ 5% NaCl (ionized solution), PH6.5~7.2, temperature: 35±2°C

Corrosion resistance performance after processing

Saline water spray test in processing area

Product	Before test	192hrs	552hrs	912hrs
MACOSTA (Coating weight on both sides 134)				
ZAM (Coating weight on both sides 346)				
GI (Coating weight on both sides 129)				
Galvalume (Coating weight on both sides 97)				

Saline water spray test on pipe

Category	MACOSTA (g/m ² , Cross section)	High-Mg, highly corrosion-resistant steel sheet (g/m ² , Cross section)
Corrosion resistance (1,848 hrs)		

※ Compared to high-Mg, highly corrosion-resistant galvanized steel sheet



MACOSTA
(Hot-dip Zn-Al-Mg alloy coated steel sheet)

Corrosion resistance performance after processing

| Automobile fuel filter housing |



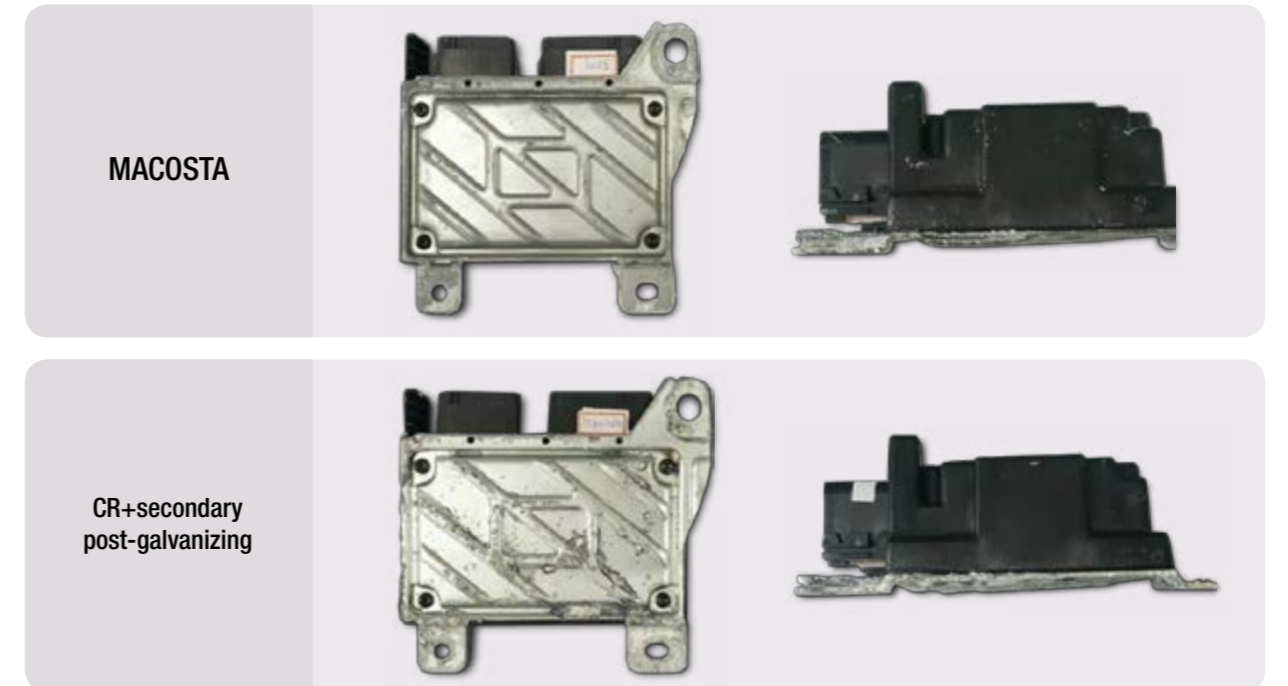
※ No red rust on MACOSTA after 600 hours based on SST → Outstanding processability

| EX-MEAL Test |

Product	Before test	264hrs	432hrs
MACOSTA (1.2t, 120g/m ²)			
CR+secondary post-galvanizing			
CR			

Corrosion resistance performance after processing

| Test on automobile electronic part covers |



※ MACOSTA's outstanding corrosion resistance in molding area, cutting area : CR post-plating replacement completed.

| Test on automobile electronic part covers |

Product	480hrs	1,000hrs	1,200hrs
Electric Zn-Ni coated product			
MACOSTA (1.2t, 120g/m ²)			

※ MACOSTA's outstanding corrosion resistance in molding area, perforated area: No red rust, change to MACOSTA completed.



MACOSTA (Hot-dip Zn-Al-Mg alloy coated steel sheet)

MACOSTA
(Hot-dip Zn-Al-Mg alloy coated steel sheet)

FAQ

Q. Why does the Mg content vary in ternary alloy coated steel sheets?

A. POSCO STEELEON's MACOSTA complies with KS D 3030. Various types of ternary alloy coated steel sheets are manufactured around the world, and their uses can be designated based on Mg content. Generally, the use that requires no processing and high corrosion resistance needs high Mg content, and if processing and corrosion resistance are both required, product with low Mg content is needed.

-Ternary alloy coated steel sheets complies with KS D 3030 by the Korean Agency for Technology and Standards. KS D 3030 defines it as hot-dip coated steel sheets and coils made with alloy that consists of 1.5~8% of combination of MG and Al and the rest with Zn.

High corrosion resistance steel sheet production around the world

Steel manufacturer (Mg composition)	Brand Name	Alloy composition			Use	
		Mg	Al	Other		
High-Mg (3% ↑)	POSCO	PosMAC	3	2.5	General steel building material	
	NSSMC	Super Dyma	3	11		0.3% Si
	NISSIN	ZAM	3	6		0.1% Ti
	JFE	ECOGAL	5	0.5		0.03% Ni
	Arcelor Mittal	Magnelis	3	3.5		
Low-Mg (1~2%)	POSCO STEELEON	MACOSTA	1.5	1.5	General steel building material, Colored steel sheet, Automobile	
	Tata Steel	MagiZinc+	1.6	1.6		
	Voestalpine	Corrender	2.0	2.0	Automobile	
	TKS	Eco Protect	1.0	1.0	General steel building material, Colored steel sheet, Automobile	
	Salzgitter	Stroncoat	2.0	2.0		

Q. Isn't higher Mg content better?

A. Mg promotes the formation of corrosion product in the air and reinforces corrosion resistance. Of course, more Mg content increases corrosion resistance in the original state. However, increase of Mg leads to increase of hardness in coating layer, which may cause cracks in coating/film layers during bending. Moisture infiltration due to cracks aggravates corrosion of processed products, losing the unique characteristics of highly corrosion-resistant steel sheets. POSCO STEELEON is mostly manufacturing cold-rolled F/H-based thin sheets between 0.35T~2.3T, and has jointly developed the product with POSCO to maintain both corrosion resistance and processability by adjusting Mg content.

FAQ

Q. What are the benefits of using MACOSTA?

A. MACOSTA offers great corrosion resistance on the cross section as well as the plane surface. As opposed to post-coating (hot-dip galvanizing, electric Zn-Ni coating, etc.) or post-painting (powder) to reinforce corrosion resistance of existing cold rolled/hot rolled steel sheets (HR, CR, etc.), MACOSTA is used as is and reduces the cost for post-coating dramatically. Also, it can bring more cost reduction by replacing expensive imported highly corrosion-resistant products and low-cost STS products.

Q. I am currently using galvanized steel sheets. I want to use MACOSTA, but how should I decide the coating weight?

A. We suggest you decide the coating weight after fully reviewing the corrosion resistance level that you require. We inform our customers as follows, so please review as reference.

Galvanized steel sheet(GI)	Z120	Z180	Z220	Z270	Z350	Z400	Z600
MACOSTA	M80	M100	M120	M180	M220	M270	M350

Q. I want to use MACOSTA, and would like to know where the design is reflected.

A. When designing, please refer to KS or specification details. For example, in case of a solar panel support, the Revised New Renewable Energy Facility Criteria Guideline by Korea Energy Agency designates the use of "hot-dip galvanized or hot-dip Zn-Al-Mg alloy coated section steel for the support and joint."

Steel houses are regulated by KS D3854 (Zn-coated light gauge steels for structure) for the structure, which also allows the use of hot-dip Zn-Al-Mg alloy coated section steel (KS D 3030). If the design allows the use of KS D 3030, MACOSTA can be applied.

Q. Does MACOSTA show any white rust at all?

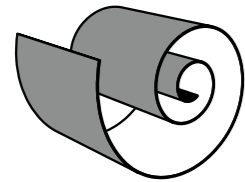
A. MACOSTA suppresses red rust by forming dense white rust oxide known as simonkolleite. In order to suppress white rust as much as possible, POSCO STEELEON is developing various post-treatment materials.

Q. What are the exterior defects that occur in Zn-Al-Mg alloy products like MACOSTA?

A. There may be darkening of the surface and dark spots ranging between 1~5mm in diameter in Zn-Al-Mg alloy steel sheets. Darkening is accelerated in high temperature and humidity, and except the surface looking dark gray due to the general oxidation in the galvanized layer, it is identical to normal products. Dark spots are created as the result of Zn, Al oxides due to local rapid cooling in the cooling process of the galvanized layer. Durability of dark spot area is identical to the durability in other areas.

Coated steel sheet guide

Coated steel sheets manufactured by POSCO STEELEON offer great appearance and durability. However, with improper storage and use, unexpected quality issues may occur, so please comply with the information in product guide.



This guide deals with information on storage, handling and usage precautions of coated steel sheets, and is prepared to prevent issues caused by improper storage or handling. Not complying with the following may result in product loss, so please use extreme caution.

Product warranty information

Please note that product damages due to the following reasons are excluded from warranty.

- Zn peeling off while processing caused by changes with aging due to long-term storage (coated steel sheets: over 6 months, colored steel sheets: over 12 months) - Prompt use is recommended
- White rust due to humidity and moisture infiltration during storage
- Pay attention to humidity and moisture infiltration when storing in coil and sheet forms
- Damaged blocking caused during transport and handling
- Defect caused by the use of product that is different from the purpose of order
- Product damage caused by other improper handling and storage

Handling precautions

Hot-dip galvanized steel sheet does not fully demonstrate its characteristics when not properly used, so please pay attention to the following.

Storage

Avoid places with humidity or possible moisture infiltration, or temperature difference, and store in well-ventilated indoor area. If packing material is damaged during storage, please repair immediately. If stored for a long period of time, fine white rust may develop even if the packing is perfect, so please reduce the storage time as much as possible. In case of humidity or moisture infiltration, dry immediately and use caution not to damage the coated side during transport or operation.

Processing

Lubricants containing special additives corrodes Zn, so please use non-corrosive lubricant, and if inevitable, please degrease and perform other anticorrosion treatment immediately after processing. For processing, please select the specification appropriate for the use. Please avoid processing in the environments of high humidity or severe sulfur dioxide or exhaust.

Welding

In case of resistance welding, Zn adheres to electrodes, so it requires regular cleaning. In case of seam welding, electrode life can be extended with the use of KNURL-GEAR DRIVE system. Please avoid high temperature brazing, especially brazing of GA material. Fume occurs during welding, so please work in well-ventilated area. Generally, hot-dip coated products cannot be soldered with the regular solvent (FLUX).

Handling precautions

Hot-dip galvanized steel sheet does not fully demonstrate its characteristics when not properly used, so please pay attention to the following.

Degreasing

Weak alkaline degreasing agent, natural degreasing agent, and organic solvent are good for degreasing. Strong alkaline degreasing agent corrodes Zn, so please avoid using it.

Painting

Zn is a highly active metal, so it is difficult to obtain good adhesion if painted directly on hot-dip galvanized steel sheet without a separate treatment. Please perform phosphating or other chemical pre-treatment prior to painting.

Aging

Product lacks formability or results in stretcher-strain or fluting after time. Therefore, in order to prevent these problems, please use nonaging steel sheets.

Purpose of use

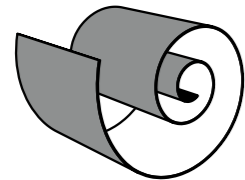
Using the product for purposes other than the purpose at the time of order may result in problems during processing.

Other

When using processed products, effects of coated steel sheets deteriorate if separate treatment (painting, etc.) is not performed on the coated surface (degree of corrosion varies depending on the environment of use).

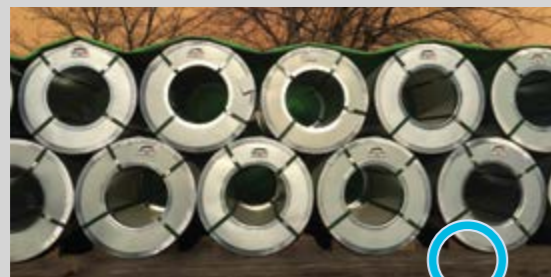
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Precautions for outdoor storage



▲ Use cover, perform condensation control ventilation



▲ Incorrect outdoor storage (cover not used)

- Product should be stored indoors, but if inevitable, use cover (vinyl) for outdoor storage to keep products away from rain. After the rain, ventilate to avoid moisture.
- In case of dew condensation, remove moisture immediately and use caution to avoid film swelling due to moisture infiltration.
- Keep products away from rain, and use the product immediately once it is wet with rain.

Safety precautions



Slippery floor after installation



Risk of coil unwinding



▲ Cut from the side of coil when cutting band

- The surface of product is slippery after installation. Please wear anti-slippery shoes and move carefully. (Use caution when installing on roof and ceiling)
- When cutting the steel band for packaging, please cut from the side of the coil.
- When cutting the steel band or removing filament tape fastened around the product, there is a risk of coil unwinding.

Transport precautions



▲ Transport in rain



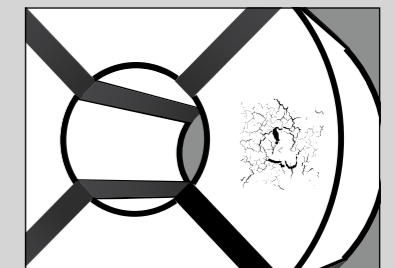
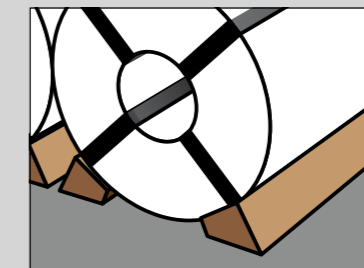
▲ Panel-type transport



▲ Dent prevention

- Avoid loading/unloading in rain, and use cover to prevent white rust due to rainwater infiltration during transport.
- Please pay attention to film surface defect (scratch, dent, etc.) when transporting panels.
- Drive accordingly for the road condition, and avoid speeding and sudden stops to prevent defects caused by transport.
- Prevent defects from floating by using 5-angle skid, and keep the position of banding clamp away from contacting the product.

Other precautions



- When stacking in 2 layers, please insert a rubber pad on the bottom layer of coils, and use rubber pad and 5-angle ski on the ground to prevent dents by foreign matters.
- Performing urethane coating in the area that is in direct contact with the product can prevent damages in the inner diameter.
- Please use caution to avoid dents and damages by impact from product handling tools.



Safe handling tool use



Do not overload



No excessive impact



Do not touch with contaminated gloves