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# ZEX

Materializing the Future

## ZEXEED™

NIPPON STEEL  
CORROSION RESISTANT COATED STEEL

# EED



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ZEXEED™

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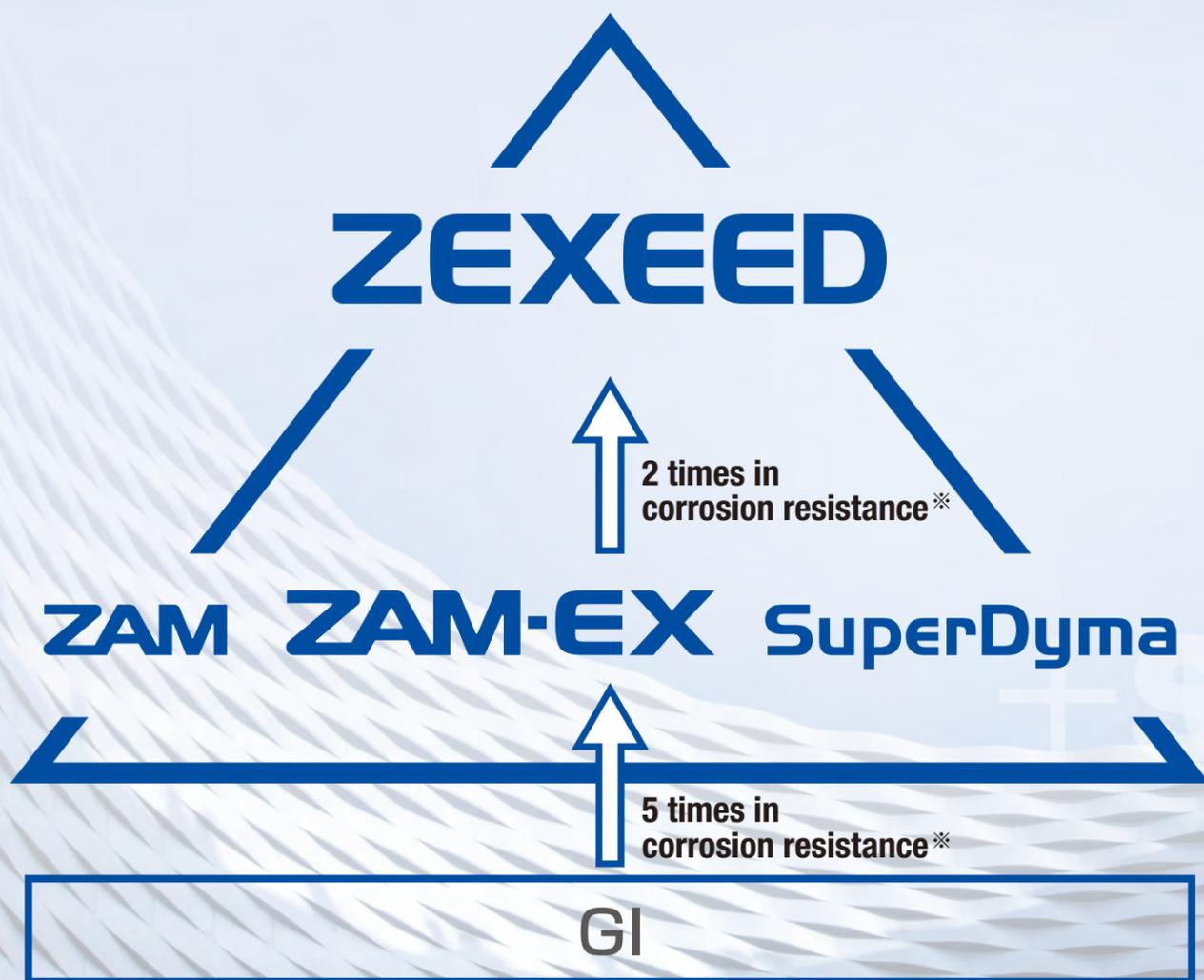
**NIPPON STEEL CORPORATION**

# ZEXEED™

# Materials to support the future

## What is ZEXEED ?

“ZEXEED” is a precoated steel sheet featuring the ultimate corrosion resistance, which was successfully commercialized by Nippon Steel Corporation for the first time in the world. An alloy coating consisting primarily of zinc, with 19% aluminum, 6% magnesium, and trace amounts of silicon realizes anti-corrosion performance on flat surfaces, roughly 10 times that of hot-dip galvanized steel sheet (GI), and roughly twice that of conventional high corrosion resistant coated steel sheet.



※ Corrosion resistance performance calculated based on plating corrosion weight loss on flat surfaces (Combined cyclic corrosion test, JASO M609-91 method, 50 cycles); according to Nippon Steel's research.

## ZEXEED Brand Naming Concept

ZEXEED is a brand name that expresses a new material that transcends zinc plating and contributes to future society by exhibiting unprecedented and superlative corrosion resistance.

Highly corrosion-resistant plated steel sheet: **ZEXEED**

Materializing the Future

# ZEXEED

NIPPON STEEL  
CORROSION RESISTANT COATED STEEL

zinc

- +exceed
- +succeed
- +proceed
- +seeds

### Development background

Since 2000, Nippon Steel's high corrosion resistant coated steel "SuperDyma" and "ZAM" have been adopted by manufacturers in the building materials, automobiles, home appliances, and industrial machinery industries, and their cumulative global sales have reached approximately 15 million tons. "ZEXEED" was developed to satisfy the market demand for higher corrosion resistance. "ZEXEED" will particularly be an excellent material of choice to be used for projects in a harsh environment or in coastal or other areas with high humidity and high temperature.

"ZEXEED" has superior corrosion resistance that far exceeds both that of post-plating, commonly used in the civil engineering and social infrastructure sectors, and conventional high corrosion resistant steel. Tests conducted by Nippon Steel confirmed that "ZEXEED"'s corrosion resistance of flat areas is about twice as high as that of the conventional steel of the same kind and about 10 times higher than that of hot-dip galvanized (GI) steel.

By taking advantage of the excellent corrosion resistance of "ZEXEED," we will not only reduce life cycle costs by extending the service life of our products, but also meet the various needs of our customers and society, such as the urgent issues of measures to counter aging social infrastructure, as well as process and labor saving associated with the decrease in the working population.

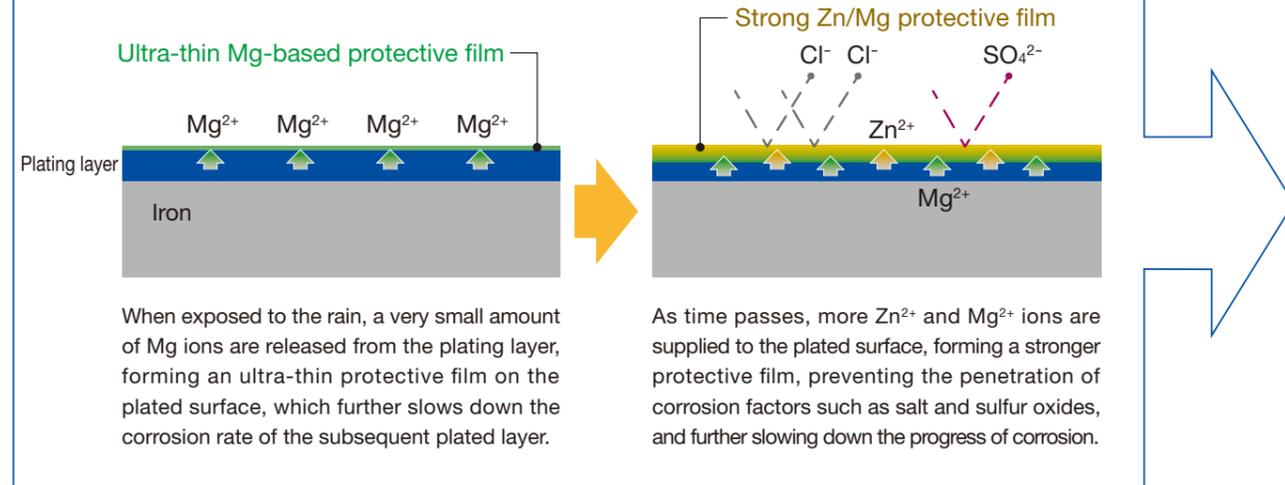
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# Corrosion Resistance

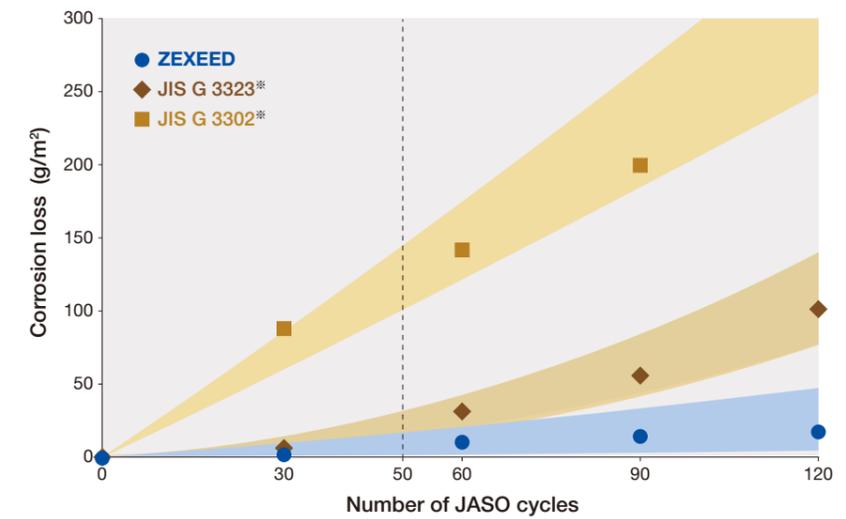
## ZEXEED™ Corrosion Prevention Mechanism Flat surface

For Zn-based plated steel sheets containing magnesium, Mg<sup>2+</sup> ions are eluted by rainwater, etc. when exposed to air, forming a thin protective film made up of corrosion products. ZEXEED can prevent corrosion of steel substrate for a long time because the protective film forms faster and is stronger than conventional highly corrosion-resistant plated steel sheet.

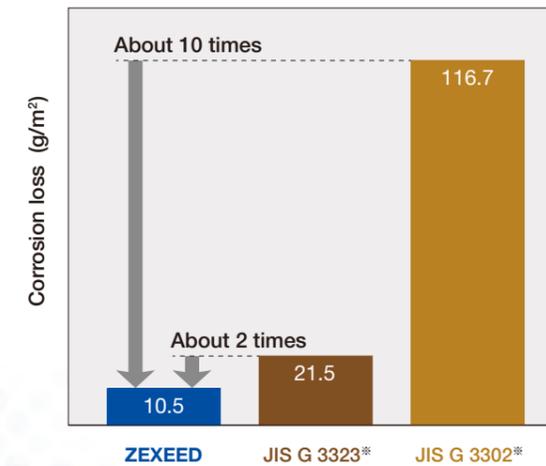
### Corrosion prevention mechanism of a flat surface in a general corrosive environment



### Change in corrosion loss of each plated steel sheet in JASO test



### Corrosion loss in JASO 50 cycles test



**ZEXEED's corrosion resistance is about twice as high as conventional high corrosion resistant steel and about 10 times higher than hot-dip galvanized (GI) steel.**

\*JIS G 3323: Hot-dip zinc-aluminum-magnesium alloy-coated steel sheet  
\*JIS G 3302: Hot-dip zinc-coated steel sheet

### Corrosion loss evaluation method

Rust removal process using weight evaluation measurements before and after testing

Immerse in a 30% aqueous solution of chromium(VI) oxide for 15 minutes (at 23°C)

### Relationship to corrosion rate

JASO M609-91 method		30 cycles
Atmospheric exposure test	Okinawa	About 3 years
	Heavy industrial zone	About 3 years
	Urban and coastal areas	About 6.5 years
	Rural area	About 10 years
	Mountainous and arid areas	About 20 years

Authors: Kiyonori Nakamura, Hiromasa Nomura, Masashi Yamamoto, Masamitsu Matsumoto, Shigeo Tsujikawa.  
An Experimental Study on the Structure and Durability of Steel Houses  
Proceedings of the Architectural Institute of Japan, September 1995, p5-7

# Corrosion resistance of a flat surface

## Accelerated corrosion test (JASO)

Due to the fact that the corrosion rate of the plating layer is slow and the barrier effect of the protective film formed on the plating layer lasts, ZEXEED has about 10 times the corrosion resistance of hot-dip galvanized steel sheet, and about 2 times that of conventional highly corrosion-resistant galvanized steel sheet.

### Combined cycle corrosion test (JASO M609-91 method)

	Initial	60 cycles	120 cycles	180 cycles
<b>ZEXEED™</b> T20 (25 μm) untreated				
<b>Hot-dip zinc - Aluminum - Magnesium Alloy coated steel sheet</b> JIS G 3323 K27 (29 μm) untreated				
<b>Post-plated</b> JIS H 8641 HDZ45 (69 μm) untreated				
<b>Hot-dip galvanized</b> JIS G 3302 Z45 (37 μm) untreated				Hot-dip galvanized ※ Test stopped after 90 cycles due to red rust on all surfaces (photo shows 90 cycles)

Test conditions JASO M609-91  
 (8 hours/cycle)  
 Salt spray : 2 hours at 35°C, 5% NaCl  
 ↓  
 Drying : 4 hours at 60°C, 20 to 30% relative humidity  
 ↓  
 Wetting : 2 hours 50°C, 95% or higher relative humidity

## Corrosion Acceleration Test (Neutral Salt Spray)

ZEXEED shows high corrosion resistance in the neutral salt spray test.

### Neutral salt spray test

	600 hours	1000 hours
<b>ZEXEED™</b> T20 (24 μm) untreated		
<b>Hot-dip zinc - Aluminum - Magnesium Alloy coated steel sheet</b> JIS G 3323 K27 (29 μm) untreated		
<b>Post-plated</b> JIS H 8641 HDZ45 (76 μm) untreated		
<b>Hot-dip galvanized</b> JIS G 3302 Z45 (37 μm) untreated		

Test method: Neutral salt spray test (JIS Z2371)

Test conditions  
 35°C, 5% NaCl, continuous spray  
 Sample size: 100 x 50 mm  
 Except for post-plating, upper left and right end faces open, lower cross-cut inserted

# Corrosion resistance of a cut end face

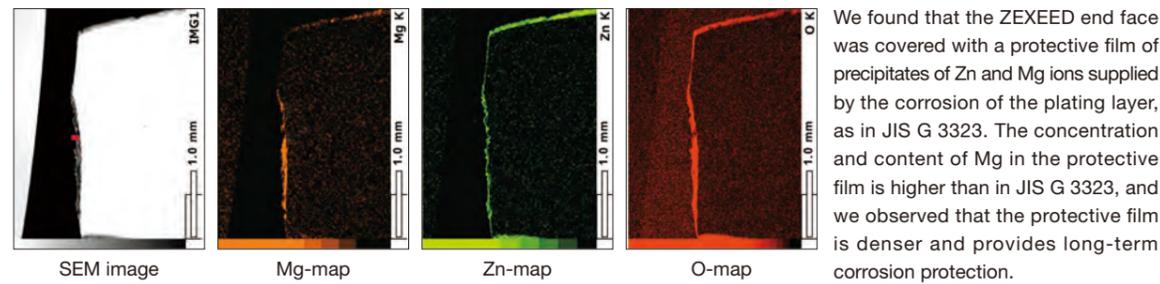
The end-face of ZEXEED exposes the steel substrate, so red rust may occur at an early stage. However, the plating components around the end-face will dissolve, and a dense protective film will form on the end-face, which suppresses the progress of corrosion of the steel substrate.

- \* Depending on the environment, red rust may not appear.
- \* The corrosion protection mechanism may not work depending on the environment and weather conditions.

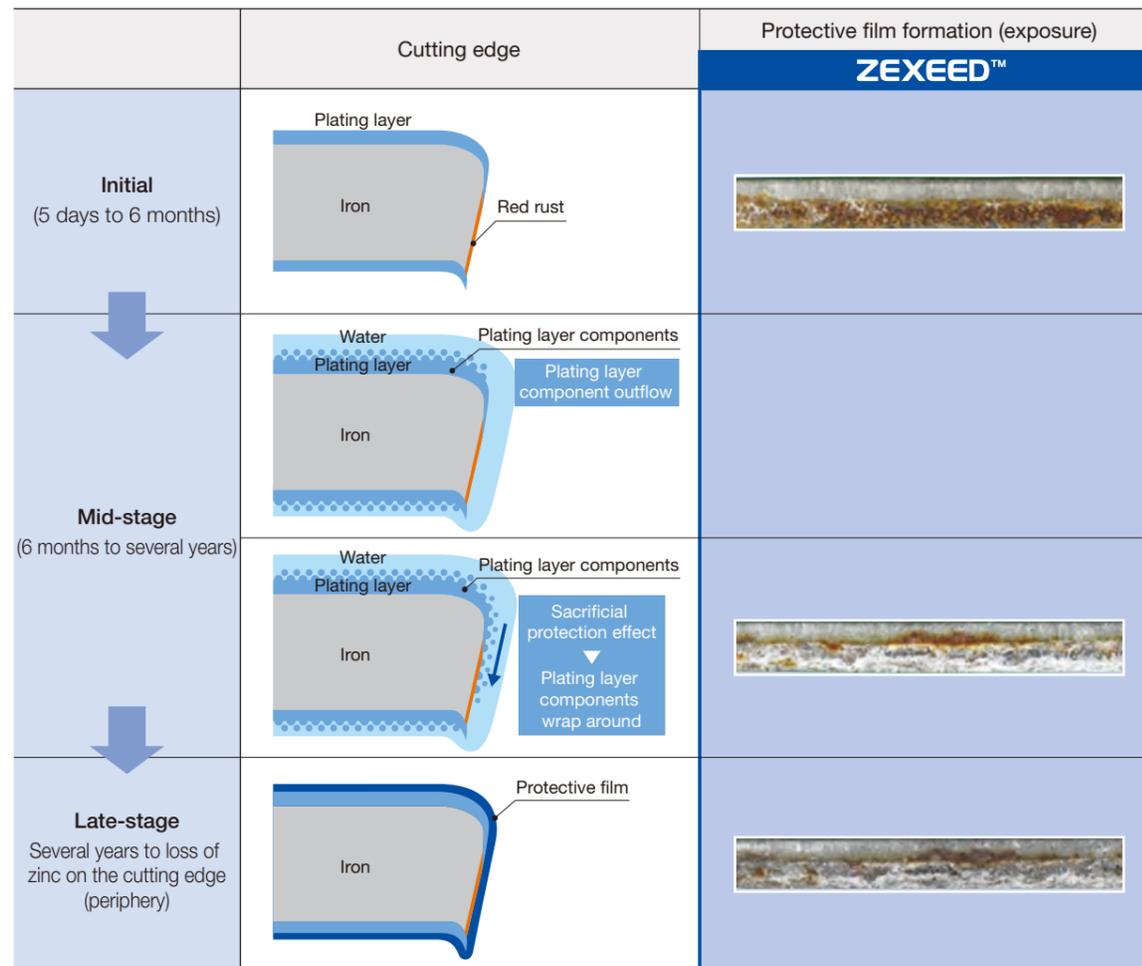
## Improvement of corrosion resistance of the end face

- Mg is effective in improving the corrosion resistance of zinc plating.
- Mg is strongly detected in the end-face of ZEXEED; this is thought to improve corrosion resistance.

## Elemental distribution using energy dispersive X-ray spectroscopy at the end face of ZEXEED



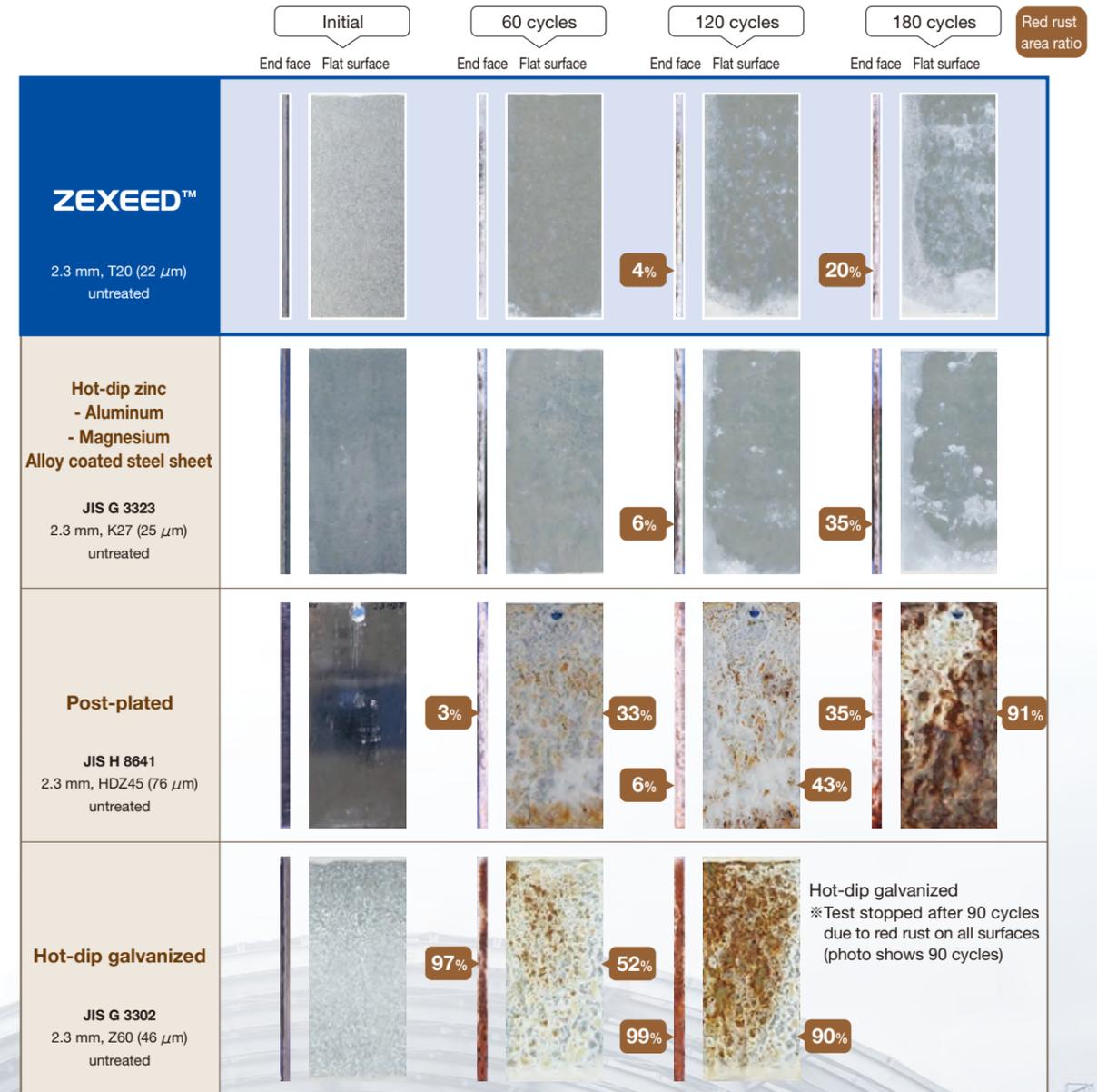
## End-face corrosion protection mechanism



## Corrosion acceleration test (JASO)

ZEXEED is superior to other zinc-coated steel sheets in terms of corrosion resistance at the cut end face.

\* The red rust area ratio may vary depending on the degree of plating loss on the end face.

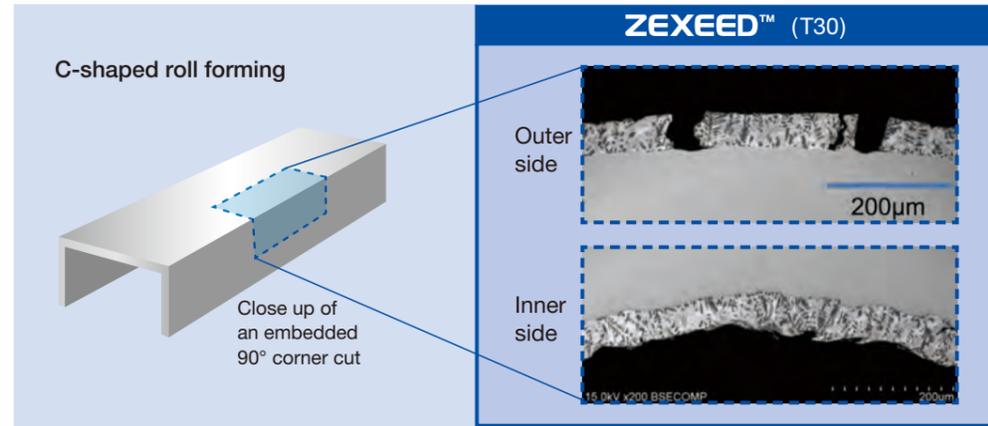


**Test conditions JASO M609-91**  
(8 hours/cycle)  
Salt spray : 2 hours at 35°C, 5% NaCl  
Drying : 4 hours at 60°C, 20 to 30% relative humidity  
Wetting : 2 hours 50°C, 95% or higher relative humidity  
Test period: Up to 180 cycles  
Test specimen size: 100 x 50 x 2.3 mm  
(Aside from the rear plating, the top, bottom, and right side are coated with paint)

# Corrosion resistance of processed parts

## Condition of the plating layer in the processed area

The plating layer of ZEXEED is hard, and cracks may occur in the plating layer of the processed part, but they will not peel off because the plating is firmly secured by strong adhesion to the steel plate.



This product can be applied to processes such as cold roll forming and press forming.

Test method: Roll forming process  
 Test material: ZEXEED(T30) QM  
 Test period: 600 cycles

Test conditions **JASO M609-91**  
 (8 hours/cycle)

Salt spray : 2 hours at 35°C, 5% NaCl  
 ↓  
 Drying : 4 hours at 60°C, 20 to 30% relative humidity  
 ↓  
 Wetting : 2 hours 50°C, 95% or higher relative humidity

## Protective film for processed areas

A protective film containing Zn and Mg is formed on the processed part by sacrificial protection provided by the plating layer, giving the surface high corrosion resistance.

Part shown in the cross-section	Protective film	Bending part
 Cross-section	Zn	
	Mg	

## Examples of end-face corrosion resistance in processing

ZEXEED exhibits high corrosion resistance to processing such as metal punching. The cut edge from the punching process is protected by a protective film formed by the elution of the plating layer.

\* For outdoor exposure, red rust may form depending on the plate thickness and aperture ratio, but it will be covered by the protective film over time.



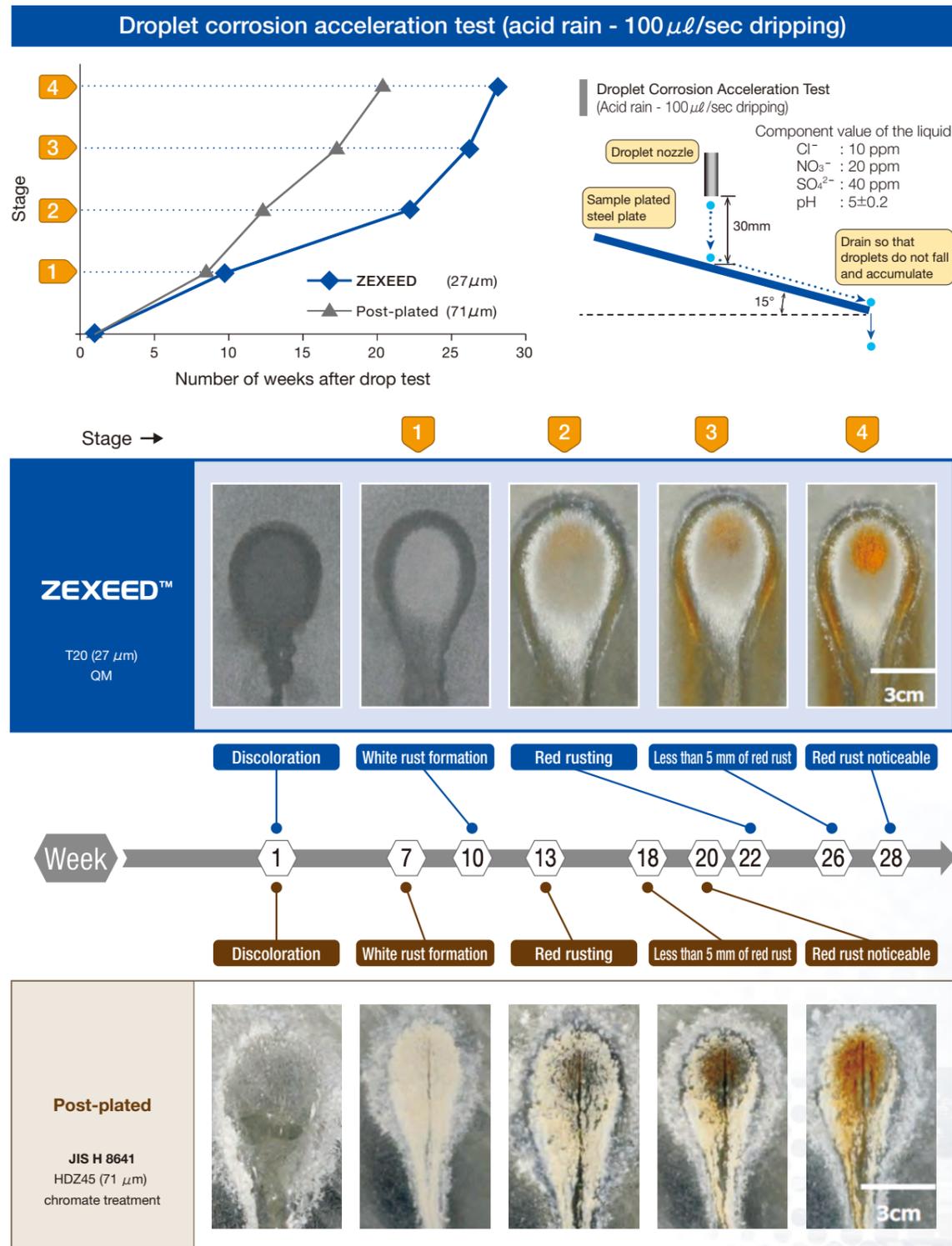
Test method: Punching and press forming  
 (Hole diameter: φ20mm, Aperture ratio: 30%)

Test conditions **JASO M609-91**  
 (8 hours/cycle)

Salt spray : 2 hours at 35°C, 5% NaCl  
 ↓  
 Drying : 4 hours at 60°C, 20 to 30% relative humidity  
 ↓  
 Wetting : 2 hours 50°C, 95% or higher relative humidity

# Corrosion resistance in a droplet-forming environment

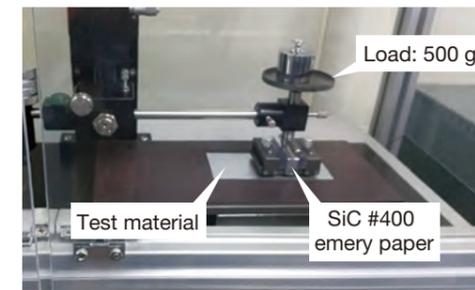
ZEXEED shows superior corrosion resistance to hot-dip galvanized coatings (JIS H 8641) in a droplet-forming environment prone, even with less than half the plating deposit.



# Scratch resistance

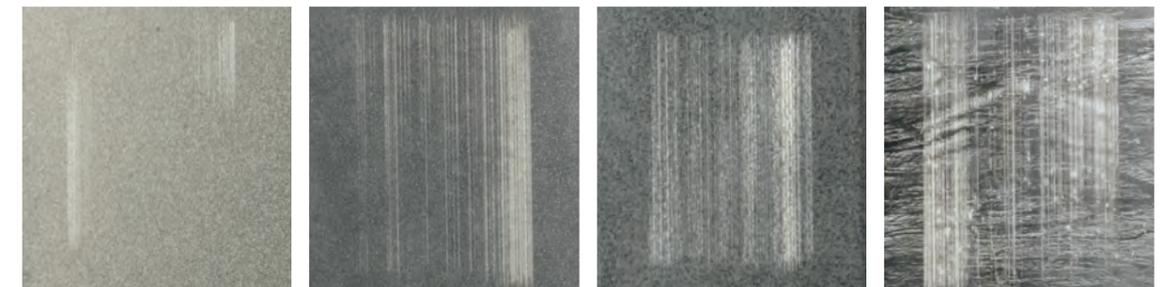
ZEXEED has better scratch resistance than other zinc-based hot-dip coatings.

## Results of scratch resistance evaluation tests



TriboGear friction tester, Shinto Scientific Co., Ltd  
 Surface Texture Tester Model: 14FW

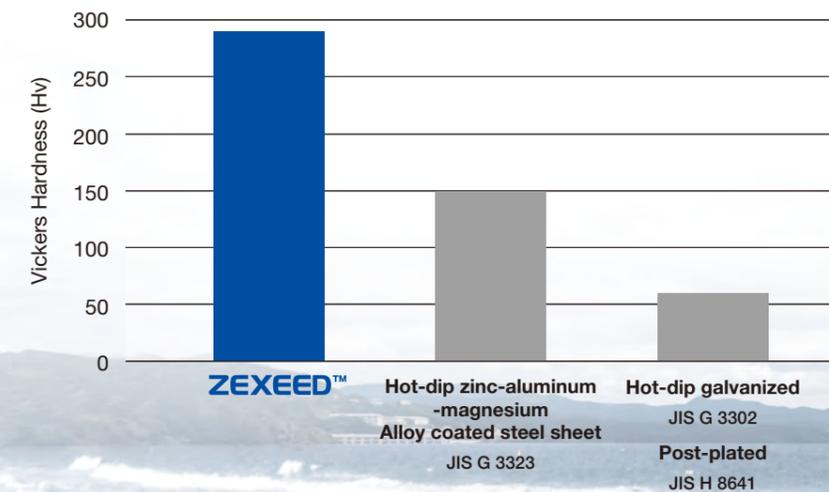
Travel speed	500 mm/min
Travel distance	40 mm
Number of reciprocations	10 times
Load	500 g



**ZEXEED™** (T20 - untreated)  
**Hot-dip zinc-aluminum-magnesium Alloy coated steel sheet** (JIS G 3323) (K27 - untreated)  
**Hot-dip galvanized** (JIS G 3302) (Z27 - untreated)  
**Post-plated** (JIS H 8641) (HDZ35 - untreated)

## Vickers Hardness (Hv)

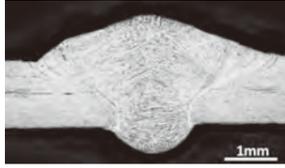
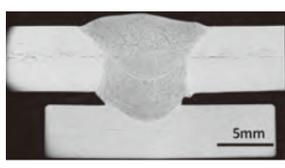
Compared to other zinc-based hot-dip galvanized steel plate, ZEXEED has a harder coating layer, which provides superior scratch resistance during processing.



## Evaluation of arc welded area

ZEXEED has no quality problems with the strength of the weld toe or the condition of the inside of welds made by arc welding.

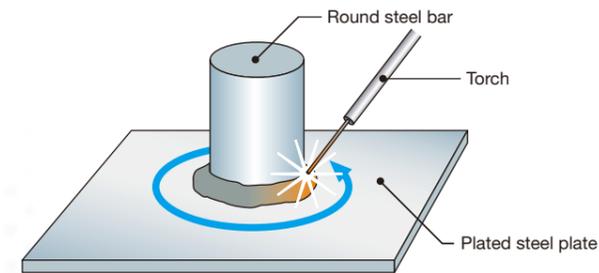
Standard: NSTH400, Plating deposit symbol: T20

Plate thickness (mm)	Cross-section of welded area (before grinding the front and back)	Appearance after tensile test
1.6		
3.2		
6.0		

## Precautions

ZEXEED requires optimized welding conditions for various types of welding (overlapping corner arc welding, spot welding, etc.). There are no quality problems with the strength and internal condition of welded parts welded under optimal conditions.

### Circumferential fillet welding



#### <Caution>

When arc welding, the weld bead usually shrinks, but depending on the structure of the welded member, a large internal tensile force may be applied to the base metal near the bead (e.g., circumferential corner welding [see figure at left]). If a plated steel sheet such as ZEXEED is used for such welding, the base metal around the bead may crack (Note 1), so please check the welding conditions before use (please contact us for suggested welding conditions, etc.).

#### (Note 1)

Liquid metal embrittlement: Embrittlement caused by molten metal entering the grain boundary of iron under tensile stress. This is also called zinc embrittlement.

### Introduction of typical welding conditions Reference

We confirm that there are no quality problems for ZEXEED concerning the strength of the welded parts and the condition of the inside of the weld.

#### ■ Arc welding

##### ① Welder

Use a carbon dioxide welder.

##### ② Shielding gas and welding wire

The conditions shown in the table on the right are recommended for shielding gas and welding wire to be used during welding.

Welder	Shielding gas	Type of welding wire
Carbon dioxide gas welder	Carbon dioxide gas	SF-309SD* (Our company's special welding material for highly corrosion-resistant plating)
		JIS Z 3312 YGW 12

\*FC-309SD, suitable for semi-automatic welding, is also available.

#### ■ Spot welding

The optimum welding conditions for spot welding should be set according to the plate thickness. For example, for a plate thickness of 1.6 mm, we recommend the following settings for electrodes and welding conditions (applied pressure, welding time, and welding current).

Steel sheet	Spot welder	Electrode material	Electrode shape	Electrode (mm)				Applied pressure (kN)	Welding time (cyc.) 50Hz			Welding current (kA)
				Nominal diameter	Total length	Tip Diameter	Tip Curvature		Sq.T	W.T	Ho.T	
1.6mm	Stationary air-pressurized type	Chromium steel	DR	16	23	6	40	3	40	20	10	7.5 ~ 9.0

# Various repair examples

## Repairs to the cut end face

The corrosion resistance of ZEXEED can be further improved by applying a repair coating to the cut end face.

### Repair paint

Paint name	Manufacturer
Royal Silver	Royal Corporation
Zinc Coat SD	Nippon Paint Anti-corrosive Coatings Co., Ltd.

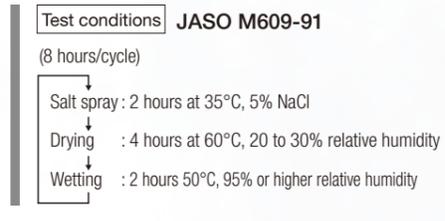
### Sample

Steel sheet	Plating thickness	Plating deposit	End face
ZEXEED™	4.5mm	T30	Shearing
Post-plated	4.5mm	HDZ45	—

### End-face repair area: JASO test - Appearance

Cycle	ZEXEED™		Post-plated
	Without repair	With repair	
0			
30			

Caution  
 ① For details on how to use a repair paint, its quality and performance, and compliance with environmental regulations, please contact the respective manufacturer.  
 ② It may not be possible to paint over the repair paint. Please check with the customer.



## Repair welds

ZEXEED provides good corrosion resistance when appropriate repair coating is applied to welded areas.

### Repair paint

Paint name	Manufacturer
Royal Silver	Royal Corporation
Zinc Coat SD	Nippon Paint Anti-corrosive Coatings Co., Ltd.

### Sample

Steel sheet	Plating thickness	Plating deposit	Welding method	Welding point	Welding wire
ZEXEED™	4.5mm	T30	CO <sub>2</sub> arc welding	Plated flat surface	YM-28
Post-plated	4.5mm	HDZ45	CO <sub>2</sub> arc welding	Plated flat surface	YM-28

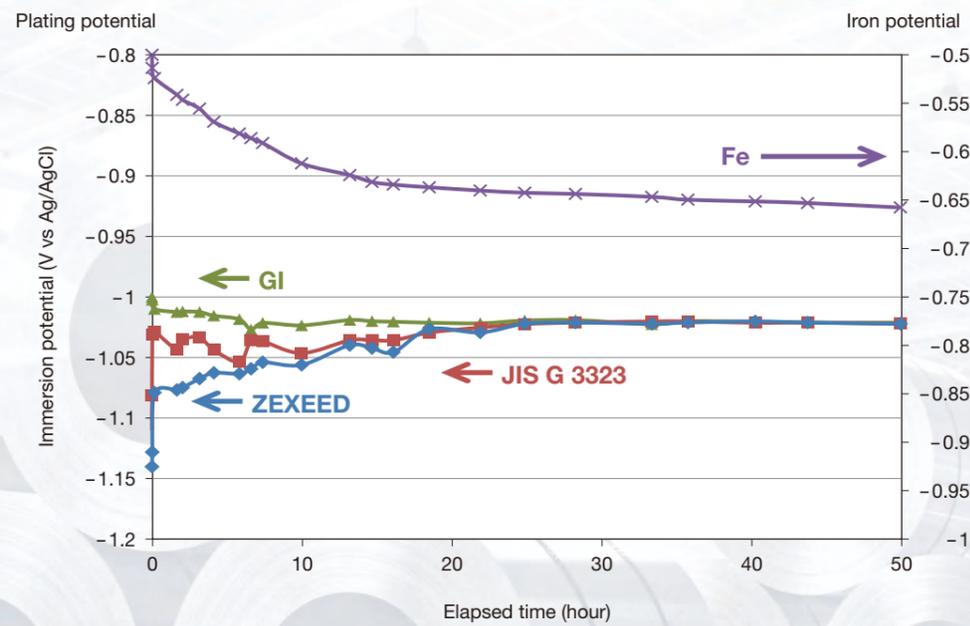
### Weld repair area: JASO test - Appearance

Cycle	0	60	120	180
ZEXEED™	Without repair 			
	With repair 			
Post-plated				

## Corrosion potential (corrosion when in contact with dissimilar metals)

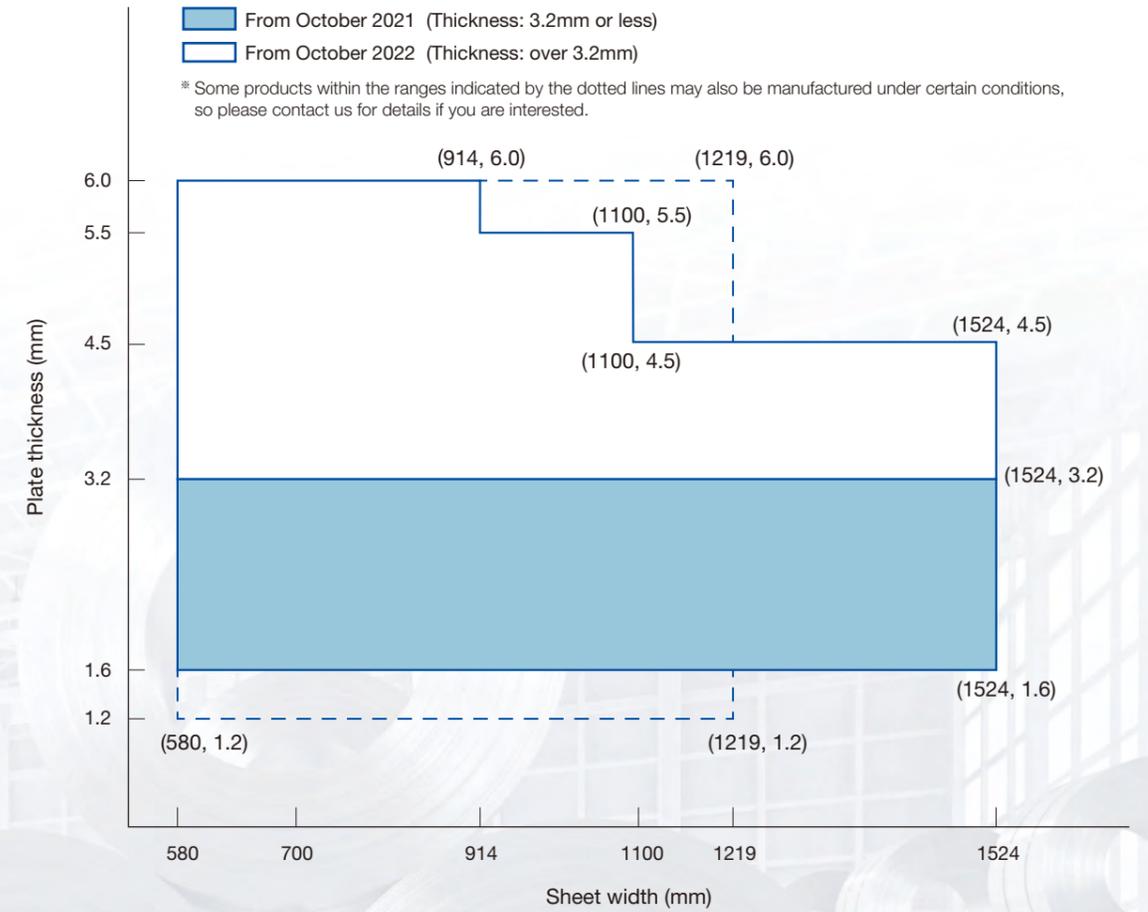
- When one metal comes into contact with another metal, corrosion is accelerated, which is called “galvanic corrosion.”
- When two metals come into contact with each other, the metal with the lower potential (the base metal) will corrode.
- However, since galvanic corrosion also exists with ZEXEED, we recommend that the bolts and rivets to be used in contact with ZEXEED to be of equivalent potential (other zinc-based plating products such as post-plating) or to be coated.

### ■ Immersion potential in 5% NaCl aqueous solution (reference electrode Ag/AgCl)



	Metal	Potential (V; vs Ag/AgCl)
↑ Noble	Stainless steel	+0.30
	Copper	+0.14
	Hydrogen	-0.199
	Nickel	-0.449
↓ Base	Iron	-0.639
	Zinc	-0.962
	Aluminum	-1.861
	Magnesium	-2.562

## Manufacturable Range



## Indication symbol, deposit, surface finish, chemical coating, oil coating

### ■ Type, symbol and applicable thickness

The symbols for each type and the applicable marking thicknesses are shown in Table 1. The indicated thickness is the thickness of the stock sheet before plating.

Table 1 Type symbol and applicable indicated thickness Units: mm

Type symbol	Indicated thickness	Type
NSTHC	1.6 - 6.0	General use
NSTHP1		Type 1 for drawing
NSTHP2		Type 2 for drawing
NSTH400		For structural use
NSTH440		
NSTH490		
NSTH540		

### ■ Plating deposit

Plating is applied with equal thickness on both sides. The symbols used to indicate the plating deposit shall be as shown in Table 2.

Table 2: Minimum amount of plating deposit for general products (total of both sides) Unit g/m<sup>2</sup>

Plating deposit display symbol	3-point average minimum deposit	1-point minimum deposit
T12	120	102
T20	200	170
T30	300	255

Note: The maximum deposit on both sides of the plating may be agreed upon in discussions with the receiving parties.

### ■ Surface Finish of the Plating

The surface finish of the plating shall be in accordance with Table 3.

Table 3: Types and symbols of surface finish of plating

Type of surface finish of plating	Symbol	Description
Zero spangle	Z	The spangle is made as fine as possible

### ■ Chemical treatment

Table 4 shows the types and symbols of chemical coatings for plates and coils.

Table 4 Types and symbols of chemical coatings

Type of chemical treatment	Symbol
Chromate-free treatment (general)	QM

QA treatment = scheduled for commercialization in October 2022

### ■ Oiling

The types and symbols of coating oils for plates and coils are shown in Table 5.

Table 5 Types and symbols for coating oils

Type of coating oil	Symbol
No coating oil	X
General coating oil	N
Thick coating oil	H
Thin coating oil	L

## Dimensional tolerance

### ■ Product Thickness Tolerance

- The value for thickness tolerance that is applied shall be obtained by adding the equivalent plating thickness in Table 9 to the indicated thickness.
- Thickness tolerance shall be in accordance with Table 8-1 and Table 8-2.
- Thickness shall be measured at any point at least 25 mm inside from the side edge.

Table 8-1 Product thickness tolerance (for general use/drawing)

Indicated thickness	Width (mm)		
	<1,200	1,200 to <1,500	1,500 - 1,524
1.60 to <2.00	± 0.17	± 0.18	± 0.19
2.00 to <2.50	± 0.18	± 0.20	± 0.22
2.50 to <3.15	± 0.20	± 0.22	± 0.25
3.15 to <4.00	± 0.22	± 0.24	± 0.27
4.00 to <5.00	± 0.25	± 0.27	± 0.29
5.00 - 6.00	± 0.27	± 0.29	—

Table 8-2 Product thickness tolerance (for structural applications)

Indicated thickness	Width (mm)
	1,524 or less
1.60 to <2.00	± 0.20
2.00 to <2.50	± 0.21
2.50 to <3.15	± 0.23
3.15 to <4.00	± 0.25
4.00 to <5.00	± 0.46
5.00 - 6.00	± 0.51

### ■ Width tolerance

Table 9 Width tolerance Units: mm

Milled edge (A)	Cut edge (B)
+ 25	+ 10
0	0

### ■ Unit mass of plate

Table 10 Unit mass of plate

Standard thickness (mm)	Plating deposit display symbol		
	T12	T20	T30
1.2	9.603	9.705	9.827
1.6	12.743	12.845	12.967
2.0	15.883	15.985	16.107
2.3	18.238	18.340	18.462
3.2	25.303	25.405	25.527
4.5	35.508	35.610	35.732
6.0	47.283	47.385	47.507

Note:

Unit mass of stock sheet (kg/m<sup>2</sup>) = Base mass of stock sheet x plate thickness (mm)

Base mass of stock sheet = 7.85 (kg/mm<sup>2</sup> · m<sup>2</sup>)

Unit mass of plate (kg/m<sup>2</sup>) = Unit mass of stock sheet (kg/m<sup>2</sup>) + Plating quantity constant

### ■ Coating weight

Table 11 Coating weights

Plating deposit display symbol	T12	T20	T30
Plating amount constant	0.183	0.285	0.407

## Mechanical properties

### ■ Bendability of general products

The bendability of plates and coils is tested according to the bending test conditions shown in Table 6, using a 75-125mm wide test piece with a length that is approximately twice its width. The bendability shall be such that no crack or fracture of 7mm+ (which would be visible with the naked eye) will form on either of the sides along the width of the outer surface of the test piece. Also, the bending test can be omitted <sup>Note 1)</sup>. However, if the customer specifically requests it, the bending test will always be performed.

Note 1) The test can be omitted at the discretion of the manufacturer, but the bendability must meet the standards.

Table 6 Type symbol and applicable indicated thickness

Type symbol	Bending angle	Inner spacing (piece)			
		Indicated thickness			
		1.6 mm to <3.0 mm		≥3.0 mm	
		Plating deposit display symbol			
		T12·20	T30	T12·20	T30
NSTHC NSTHP1 NSTHP2	180°	1	2	2	2
NSTH400		2	2	3	3
NSTH440 NSTH490 NSTH540		3	3	3	3

### ■ Plating Adhesion

Plating adhesion can be evaluated by a method other than the bend test at the discretion of the manufacturer. In this case, the evaluation must be equal to or better than the plating adhesion by the bend test. The method of evaluating plating adhesion may be determined by the receiving party.

### ■ Tensile test characteristics of general products

The yield point, tensile strength, and elongation of plates and coils are shown in Table 7.

Table 7 Yield point, tensile strength and elongation

Type symbol	Yield point or proof strength (N/mm <sup>2</sup> )	Tensile strength (N/mm <sup>2</sup> )	Yield ratio (%)	Elongation (%)					Test piece and direction
				Indicated thickness (mm)					
				1.6 to <2.0	2.0 to <2.5	2.5 to <3.2	3.2 to <4.0	4.0 - 6.0	
NSTHC	—	—	—	—	—	—	—	—	JIS No.5 rolling direction
NSTHP1	—	≥270	—	≥34	≥35	≥35	≥36	≥36	
NSTHP2	—	≥270	—	—	≥38	≥38	≥39	≥39	
NSTH400	≥295	≥400	—	≥18	≥18	≥18	≥18	≥18	
NSTH440	≥335	≥440	—	≥18	≥18	≥18	≥18	≥18	
NSTH490	≥365	≥490	—	≥16	≥16	≥16	≥16	≥16	
NSTH540	≥400	≥540	—	≥16	≥16	≥16	≥16	≥16	

High railings, soundproof walls



Windbreak fences, snowbreak fences, wave crossing fences



Interior components of tunnels



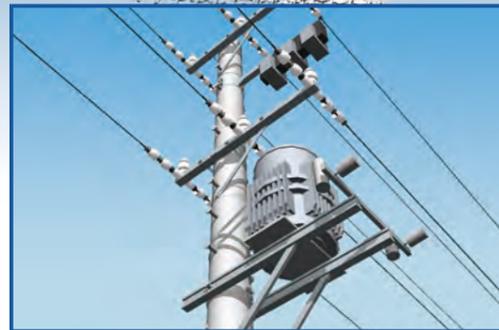
Photovoltaic mounts



Switchboards, communication base enclosures



Overhead wire hardware



Steel protective fences



Deck plates



## Precautions for use

If surface-treated steel sheets are not handled and used properly, their features cannot be fully taken advantage of. Please note the following points when using them. The technical information contained in this document is intended to provide examples of typical characteristics and performance, and does not constitute any guarantee. Please note that we cannot be held responsible for any damage caused by incorrect or inappropriate use of the information in this document.

### Cargo work/storage

- ① Water damage during loading, unloading, and storage may cause rust. Take care to avoid loading and unloading in the rain, getting wet in the tide, condensation, etc. Storage in high humidity or an atmosphere containing sulfurous gas is also undesirable. It is recommended that you store this product indoors in a dry and clean environment.
- ② If the packing paper is damaged, please repair it.
- ③ If the product is stored in coils or sheets stacked for a long period of time, the plated surface may turn black, so it is recommended to use the product as soon as possible.

#### ⚠ Warnings

- If coils get tipped over or rolled, or sheets are collapsed, it will be extremely dangerous.
- When storing the product, make sure that it is in a stable condition to prevent the coil from tipping over, rolling over, or the sheet from collapsing.

### Handling

- ① When scrubbing the surface of the steel sheet with organic solvents, be careful that the surface film may be worn off or peeled off.
- ② In addition, sweat, fingerprints, etc., on the surface may interfere with the coating and corrosion resistance. In such cases, perform post-treatment and repair as necessary.
- ③ Please be aware that stains caused by oil or other foreign substances may interfere with the performance of the coating.

#### ⚠ Cautions

- The coils are made of straight sheets that are wound into coils. If the external force that holds the coil in place, such as a binding hoop, is removed and the end of the coil becomes free, the coil will jump up in an attempt to return to a straight state. As a result, the coil winding may become loose and the coil may suddenly expand outward. When this happens, there is a possibility of damaging people or objects in the vicinity of the coil.
- When removing (cutting) the hoop (band) that holds the coil in place in order to use the coil, do so with the coil end directly underneath the coil to prevent the coil end from jumping up, or work in a place where there is no safety or problem even if the coil end jumps up and the coil suddenly expands outward. Please work in a safe and secure place.

### Processing

- ① For degreasing, we recommend weak alkaline type, organic solvent degreasing and nonionic type neutral detergent. Some degreasing agents, such as strong alkaline degreasers, may dissolve the coating or corrode the zinc, so please take note of this before use.
- ② If the temperature at the time of degreasing is high (over 60°C), please check the temperature thoroughly.
- ③ After degreasing, be sure to dry the product thoroughly. If handled when not sufficiently dry, the film may peel off.
- ④ Please check before using in processes employing ultrasonic cleaning and alkaline ion cleaning.

### Aging

In general, steel sheets tend to deteriorate with the passage of time. In other words, decreased workability, stretcher strain, and coil break may occur. To prevent this, we recommend using the product as early as possible.

### Color tone

- ① In general, if hot-dip galvanized steel sheet is used without coating, metallic luster decreases (so-called blackening phenomenon) and color tone changes occur over time. Please keep this in mind when considering the use of ZEXEED without post-coating or as a substitute for stainless steel or aluminum.
- ② Blackening is a phenomenon in which the product will appear black due to the presence of a very thin oxide film on the zinc surface layer.

### Welding

- ① For resistance welding, the electrodes may be damaged by zinc pickup, so proper care and replacement is necessary.
- ② During welding, fumes, mainly composed of zinc oxide, are generated. The effect of fumes varies depending on the plating deposit and the work environment, but it is recommended to work in a well-ventilated and ventilated area.

### Coating

Paintability varies depending on the type of paint and painting method.

### Galvanic corrosion

- ① If the product is used in contact with dissimilar metals, the corrosion of the metal with lower corrosion potential will be accelerated.
- ② If there is a concern about galvanic corrosion due to the use of noble metals such as SUS304 for rivets, it is necessary to insulate the rivets by coating them with a coating for noble metals.

### Considerations for the operating environment

ZEXEED has excellent corrosion resistance in general use environments. However, in severe and special-use environments where galvanized steel is not suitable, ZEXEED does not fully demonstrate its superiority, and red rust may occur at an early stage. Please be careful when using the product under the following conditions (if necessary, please consider using it in combination with additional measures to avoid adverse effects).

- In water, running water, or an environment where water (rainwater, alkaline water, etc.) accumulates.
- In environments in which corrosion accelerating factors (volcanic ash, acid rain, industrial waste, exhaust fumes, gases such as ammonia gas, chemicals, etc.) are mixed.
- In the event of any physical or chemical damage caused by transportation, storage, processing, construction, maintenance, or modification after shipment.
- In the event of damage to the plating due to contact corrosion with different metals or contact with other materials that cause chemical or physical changes.
- In the event of physical damage to the plating due to bending or contact with other materials.
- Please refrain from using this product with acids or strong alkalis.

### Other

If the product is to be exposed to high temperatures for a long period of time, please check beforehand.

## Ordering Guide

When ordering, please confirm the following items according to the intended application for the product.

### Standards

Select the appropriate material from the standards listed in this catalog according to the severity of the processing and the processing method.

### Weight

Select the appropriate weight of coating material according to the required degree of corrosion resistance, usage conditions, and processing methods.

### Dimensions

The dimensions (thickness, width, and length) of steel plates are the basic conditions for material yield. Please design appropriately within the manufacturing range described in this catalog.

### Coils

The use of coils is useful for improving material yield, continuity of operations, and automation.

Please note, however, that in the case of coils, it is not possible to remove defective parts based on inspection results, so the inclusion of some defective parts may be unavoidable.

### Edge finishing

Please specify either mill edge or slit edge according to the usage conditions.

### Surface treatment

Select the appropriate surface treatment from those listed in this catalog according to the post-processing method and usage conditions.

### Oiling

In addition to the type of surface treatment, you can choose to apply rust inhibiting oil or no oil. Select the coating oil for improvement of intermediate rust prevention, reduction of fingerprint stains and scratches during handling, and lubrication during press work.

### Packing weight

Please specify the packing mass according to the cargo handling capacity and workability. The larger the coil mass, the better the workability. In the case of coils, specify the maximum mass (and minimum unit mass if necessary). The average packing mass actually shipped is determined by the relationship between the maximum mass and the dimensions, since the manufacturing mass is divided.

### Internal and external diameters

In the case of coils, specify the inside and outside diameters according to the specifications of the uncoiler of the shearing line equipment to be used. When selecting the internal diameter, consideration should be given to the occurrence of coil break and reel marks on the internal diameter of the coil, depending on the plate thickness.

### Dimensional accuracy (thickness, width, length)

The dimensional accuracy of the plate thickness, width, length, etc. falls within the range described in this catalog. However, depending on the conditions of use of the product, strict specifications may be required for assembly accuracy, component accuracy, etc. If you have such a request, please consult with us in advance to clarify the specifications.

### Applications, processing methods, etc.

We conduct quality control to better match the intended use of the product. For this reason, we request that you clarify the conditions of use, such as the name of the application and processing method.

## Trademark Guidelines

### Guidelines for the use of “ZEXEED,” a registered trademark of Nippon Steel Corporation

Nippon Steel Corporation has applied for or registered the “ZEXEED” trademark in Japan and other countries around the world. Customers are requested to obtain prior written permission from Nippon Steel before using the “ZEXEED” trademark.

In addition, please be sure to follow these guidelines when using the “ZEXEED” trademark in your product catalogs, websites, product packaging, or other media.

If you use the “ZEXEED” trademark in a manner that differs from the that specified in this guideline, you may receive a complaint from a third party regarding trademark infringement or other problems may arise.

Please note that we will not be held responsible for any such claims.

If you have any questions about the contents of this guideline or how to indicate trademarks, please feel free to contact our sales representative.

#### Regarding specific use of the trademark

1. Before using our registered trademark “ZEXEED,” please contact our sales representative and obtain prior written permission to use the trademark, and reach an agreement on the notation method and content.
2. When listing “ZEXEED” in a catalog, etc., it should be indicated in such a way as to satisfy all of the following items, and to make it clear that it is the name of the “material used in the customer’s product” and that Nippon Steel Corporation is the manufacturer and distributor of the material.

- (1) The name of the customer’s product shall be placed and indicated in the most prominent position in catalogs, etc.
- (2) Make it clear that “ZEXEED” is a trademark or registered trademark of Nippon Steel Corporation. In addition, “TM” (trademark pending) or “®” (trademark registered) must be added to the first or most prominent place where the trademark is used.  
\*How to use the trademark  
① Method of notation for “ZEXEED”: Note 1) or Note 2)  
Note 1) “ZEXEED” is a trademark of Nippon Steel Corporation.  
Note 2) “ZEXEED” is a registered trademark of Nippon Steel Corporation.  
② Using it as Nippon Steel Corporation’s “ZEXEED™” or “ZEXEED®”  
③ Using it as “ZEXEED™” or “ZEXEED®” highly corrosion-resistant plated steel sheet  
(3) “ZEXEED” shall be one word and shall not be split up when written.

[Contact] ● For inquiries, please contact the sales representative at the head office or any branch or branch office of Nippon Steel Corporation, or

● ZEXEED Customer Support Center

➔E-mail: [zexeed@jp.nipponsteel.com](mailto:zexeed@jp.nipponsteel.com)

\*For details, please refer to the “ZEXEED” website.

➔URL: [www.nipponsteel.com/en/product/zexeed/](http://www.nipponsteel.com/en/product/zexeed/)

# Memo

A large grid of graph paper for writing notes. The grid consists of 20 columns and 30 rows of small squares, with a dashed horizontal line running through the middle of the grid.A second large grid of graph paper for writing notes, identical in layout to the first grid, with 20 columns, 30 rows, and a dashed horizontal line.