



Innozinc
Facility
Introduction

Innozinc®

4th generation ceramic galvanizing process of high corrosion resistance and chemical resistance as a new paradigm

Facility introduction



Ceramic galvanizing Innozinc with high corrosion resistance is innovative galvanizing technology that can help address environmental issues by reducing carbon emissions and wastewater discharge and is an effective substitute for electric galvanizing, hot dip galvanizing, and zinc–nickel plating.

Innozinc characteristics

Corrosion resistance	High corrosion resistance passing the salt spray test ([KS D 9502] 700~1,000 hours) and cyclic corrosion test ([JIS H 8502] 80 cycles)
Durability	Much higher surface durability with iron plating than metal plating
Welding	Weldable without the removal of the galvanized surface, resulting in improved productivity, cost reduction, and fume reduction
Fastening	No need for overlapping of nuts and excellent fastening, tightening, and sealing capacity of the fastener
Attachment	5B test results with excellent attachment force
Post-coating attachment	Meets the zinc plating attachment force criterion of 3 Mpa or higher under ISO 20340
Pencil hardness	9H, highest level of pencil hardness
Solution toxicity	VOCs 26 types, RoHS test results : Not detected
Environmental	Eco-friendly process that generates less wastewater and carbon emissions
Productivity	Higher productivity with automated production

Environmental



• Wastewater discharge reduction

- Alkaline degreasing and pickling rust removal processes can remove oil and rust without a washing process, thus making it possible to **reduce wastewater by 40%**.
- **Process water is purified for recycling** and wastewater reduction.



• Carbon emission reduction

- No direct source of CO₂ discharge in the galvanizing process, thus no carbon emissions are generated as a result of burning fossil fuel.
- **Carbon emissions reduced by 65%** compared to hot dip galvanizing.



• Performed at room temperature, saving energy and suppressing fumes

- **A room temperature (25°C) process** saving heat and energy.
- Possible to suppress gas fumes generated when evaporation occurs at high temperatures.
- Less thermal damage that occurs at high temperatures.



• No harmful chemicals used

- The RoHS test results for 5 main heavy metals (Pb, Cd, Hg, Cr6+ and a total of 26 types) showed that **none were detected**.
- Contains no harmful chemicals such as xylene, toluene, and ethylbenzene.
- ※ Chrome processing possible depending on demand



• Improvement of the working environment

- **No need to remove burrs**, which can cause fatigue.
- **Plating does not need to be removed for welding**, which lowers fatigue and reduces fume generation.
- 500°C high temperature galvanizing port is not used, thus posing no danger to workers.
- Automated facilities ensure worker safety.

Comparison of galvanizing methods

• Electro galvanizing

- Degreasing → washing (3 times) → pickling → washing(3 times) generates wastewater containing hazardous chemicals.
- Low corrosion resistance.



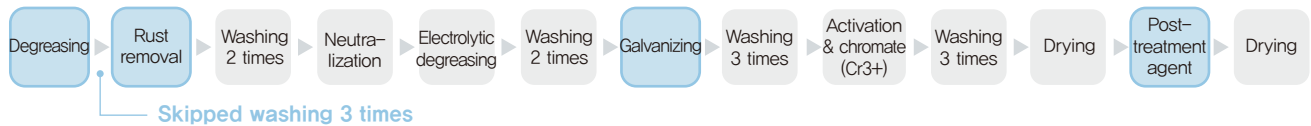
• Hot dip galvanizing

- Degreasing → washing (3 times) → pickling → washing(3 times) generates wastewater containing hazardous chemicals.
- Zinc maintained in liquid → 450°C or higher maintained → fossil fuels used massively → lots of carbon emissions.
- Basic defects occur such as white rust of zinc.



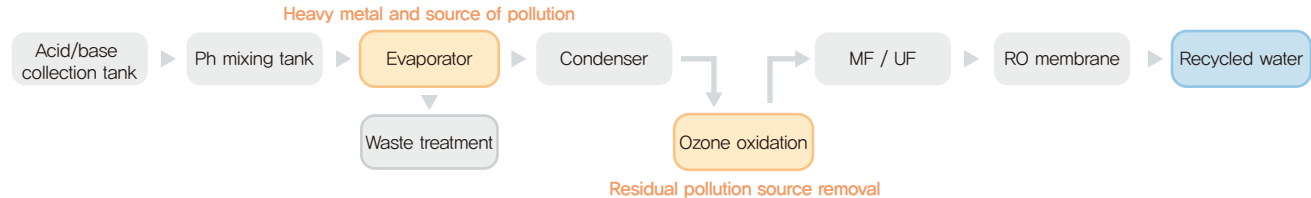
• Ceramic galvanizing Innozinc

- Skip the washing process (3 times) in the degreasing and rust removal (pickling) process to reduce the amount of wastewater produced. Performing the process at room temperature reduces carbon emissions.
- Ceramic galvanizing and post-treatment agent improve corrosion resistance.



• Wastewater recycling process in Innozinc galvanizing

- ① Reduces the number of processes involved in existing wastewater treatment by simplifying the process.
- ② Processes can be linked for installation, thus minimizing the site area required.
- ③ High processing efficiency and minimum waste.



Innozinc process solutions

• **Oil-B30** Pre-treatment additive for degreasing

- **Does not generate any wastewater, as the three washing processes** after the alkaline degreasing process are eliminated by the use of an additive that can substitute an alkaline degreaser.
- Excellent for removing old oil. Suppresses fumes from the evaporation of alkaline material, thus ensuring a clean environment.

• **Rust-B40** Acid pre-treatment additive for high-performance rust removal

- **Can be worked at a concentration that does not correspond to hazardous chemicals of 9% hydrochloric acid**, and by lowering the use temperature reduces heat energy and fumes generation.
- Quickly removes scales and rust (at least 1.5 times the performance of hydrochloric acid when used alone) and prevents excessive corrosion of the main material.

• **Ceramic Booster** Galvanizing corrosion resistance booster







- **Reduces the corrosion speed** of existing zinc layer by half.
- Improved reliability for long-term rust-proofing.

• **Ceraco** Post-treatment for eco-friendly performance improvement and improved corrosion resistance of the galvanizing

- Water-based inorganic eco-friendly post-treatment coating material.
- **Absence of the 6 main heavy metals under RoHS, harmful chemicals and VOCs**, and odors to ensure a safe and pleasant working environment.

Comparison of corrosion resistance in salt spraying tests (SST)









In the case of electro galvanizing and hot dip galvanizing, both white and red rust occur, but when using Innozinc, no defects are found. Innozinc's ceramic galvanizing process can provide strong corrosion resistance against salt, and thus it can be applied effectively to shipbuilding.

Classification	Electro galvanizing 8 μ m	Hot dip galvanizing 80 μ m	Innozinc® 8 μ m
Before SST test			
SST 480hr			

Test method : ASTM B 117

Comparison of corrosion resistance in cyclic corrosion tests (CCT)



In the case of hot dip galvanizing, a significant amount of white rust and a small amount of red rust after 40 cycles were found after 40 cycles, but when using Innozinc, a beautiful surface was maintained after 80 cycles. Innozinc's ceramic galvanizing process can provide high resistance against corrosion by salt, and as such can be used effectively for replacing hot dip galvanizing for large steel designs, pipes, nuts, and bolts in chemical complexes or shipbuilding in the marine environment.

Classification	Before CCT test	CCT 40Cycle	CCT 64Cycle	CCT 80Cycle
Innozinc® 8 μ m				
Hot-dip galvanizing 80 μ m				

Test method : [JIS H 8502] CCT 80Cycle / 1Cycle : Salt spraying(35°C, 5% NaCl) 2hr – drying(60°C, 25% R.H) 4hr – Wetting(50°C, 98% R.H) 2hr





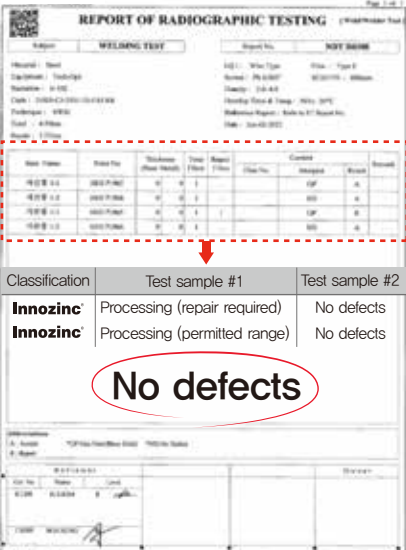
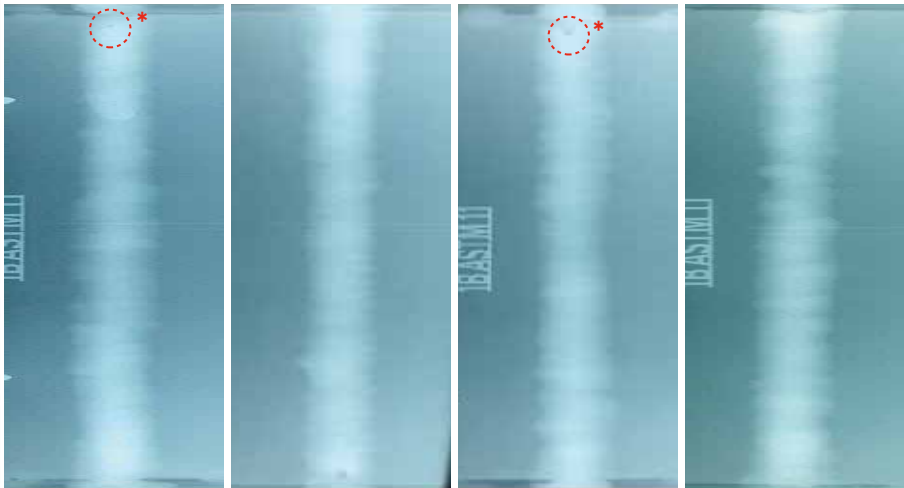
Comparisons of corrosion performance after fastening bolts two times

Visual inspection results, Both galvanized products were visually checked. No cracks or damage was found. According to the results of SST, in the case of hot dip galvanizing, after 240 hours of SST, white and red rust formed throughout, while with Innozinc, slight white rust was apparent near the screw head. Innozinc's special tools can provide excellent corrosion resistance and durability despite physical damage, and as such it is suitable for fasteners such as bolts/nuts.

Test method	Before SST Test	SST 240hr
1. Tooling 		
2. Visual inspection after tooling 	Innozinc® Bolt (8μm)	
3. Salt Spray Test [ASTM B117] SST 240 hours 		
KTR KOREA TESTING & RESEARCH INSTITUTE	Hot dip galvanizing bolt (55μm)	

Test method : In the shipbuilding yard, electric tools were used to fix and loosen them 2 times and the surface was visually checked → SST(ASTM B117) for 240 hours.

Weldability

Test method	Innozinc® Welding test			
	#1	#2	#3	#4
1. Crack / undercut / overlap / void evaluation 2. Welding defect evaluation 3. Evaluation results derivation				
				
Welding defect test report	Welding defect evaluation photos			

Innozinc galvanizing test samples (4EA) were welded without the removal of the zinc layer, and test results confirmed the absence of defects.

Hot dip galvanizing and welding: Zinc with a low melting point first penetrates the welding area, thus creating holes, cracks, and other quality issues. Also, while the zinc material melts in the post-layer, lots of fumes are generated, thus requiring removal of plating in the welding area or masking of the welding area. Innozinc's ceramic galvanizing improves welding performance and reduces the amount of foreign substances such as spatters, and there are less fumes generated. As such, it is possible to immediately weld without removing galvanized materials from the welding joint.

* Crack holes at the ends are not due to plating and thus excluded from the evaluation.

Applications

Solar power facilities



Solar power installations



On-ground frame



Solar power bolt · nut

Shipbuilding, Marine



Shipbuilding steel designs



Cable trays



Open gratings

Road engineering



Road grating



Guard rails



Falling rock prevention columns

Automobiles



Caliper body, Support brackets



Bolt / nut



Other automobile parts

Container parts



Locking bracket bolts



Door handles



Locking rod, Locking supports

General industrial



Bolts / nuts



Hinges



Pipe joint and welding joint steel materials

Innozinc facility images

Barrel line facility



Rack line facility



To take a good look at Innozinc facilities, please scan the QR code on the bottom-left of each image.

Facility installation procedures



Facility consulting

Consulting on the installation location, equipment type, and required lot/floor area



Installation location analysis

Analysis after a visit to the installation location



Contract

Main contract, additional construction contract, operation scheduling, etc.



Construction kick-off

Drawings, material delivery, and equipment manufacture and installation



On-site training (licensing)

Engineering, production and production control training

* Licensing : to be undertaken by the company



Equipment check and mass production testing

Cycle time and loading / unloading function check



Facility operation

One expert dispatched and stabilization for one month.



Follow-up management

Equipment and solution management and marketing

For detailed inquiries about facilities, please email kemp.marketing@kempkorea.com

Installation guidance

Classification	Item	Item details	Remarks
Facility contract	Contract	Deposit 50%, contract term of 9 to 10 months	Issuance of contract performance bond
Site area	Necessary area	Factory height of more than 8 meters Boiler, compressor on floor 1 /scrubber facility on floor 2 • 1 barrel : 10 x 30m • 3.5m rack : 18 x 50m • 5m rack : 20 x 50m • 7m pipe : 30 x 50m	
Facility manufacturing	Design	Drawings and approved drawings, material delivery, functional part ordering	Design costs additionally incurred
Foundation works	Wastewater treatment	Process water purified and recycled	Select depending on availability of waste-water treatment plant for the factory site.
	Boiler	City gas pipe work • 1 barrel : 0.5 tons • 3.5m rack : 0.5 tons x 2 units • 5m rack : 0.8 tons x 3 units • 7m pipe type : 0.8 tons x 5 units	Heat discharge facility installation
	Compressor	• 1 barrel : 50 hp • 3.5m rack : 50 hp • 5m rack : 100 hp • 7m pipe : 100 hp	Boiler/compressor rooms separately installed, duct installed.
	Electricity expansion	• 1 barrel : 300Kw • 3.5m rack : 700Kw • 5m rack : 900Kw • 7m pipe : 1,200Kw	
On-site installation	Installation	Washing vehicle and tank, rectifier, carrier, anode/cathode saddle, exhaust hood oil separator, zinc dissolving tank, hoist, filter, and scrubber	
Solution	Solution production	Liquid ordering and production	Solution cost separately estimated
License and permission	License and permission registration	Chemical accident prevention plan, harmful chemical handling facility installation inspection, harmful chemical business operation permit	License and permit to be obtained by the company

Option

Classification	Item	Remark
1barrel	Barrel auto-injection metering withdrawal device, smart factory	
3.5m Rack	Loading/unloading vehicles, smart factories	
5m Rack	Loading/unloading vehicles and robots, smart factories	
7m Pipe	Loading/unloading vehicles, smart factories	

※ The above details are subject to change anytime.
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Innozinc V6/OCT 2023