

English



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GEOPERT[®], a breakthroughs
anti-corrosion solution
for metal corrosion-protecting
coating materials

GEOPERT[®]



E
C O
Zinc Flake Coating
Zincotec Corporation

Introduction

Electroless thin-film zinc flake coating is one of the surface treatment agents used in industry to protect metal parts against corrosion.

An electroless chemical coating solution containing zinc and aluminum, GEOPERT® is a corrosion protection solution that has been adopted in almost all industry sectors, particularly the automotive industry. This product is a new level of corrosion protection system, which is completely different from existing electrodeposited zinc plating and hot-dip galvanizing. It is an eco-friendly solution that does not generate any wastewater or air pollution during the process, and in recent years has been adopted worldwide.

Through the systematic introduction of the GEOPERT® surface treatment method, we hope to help production sites achieve excellent quality, and address any questions in advance.

Today, zinc flake coating has been rapidly replacing the electroplating market, and is expected to become the optimum solution in the corrosion protection market in the near future.

There are two main types of zinc flake coating materials: oil-based coating using organic solvent and water-based coating using deionized water.

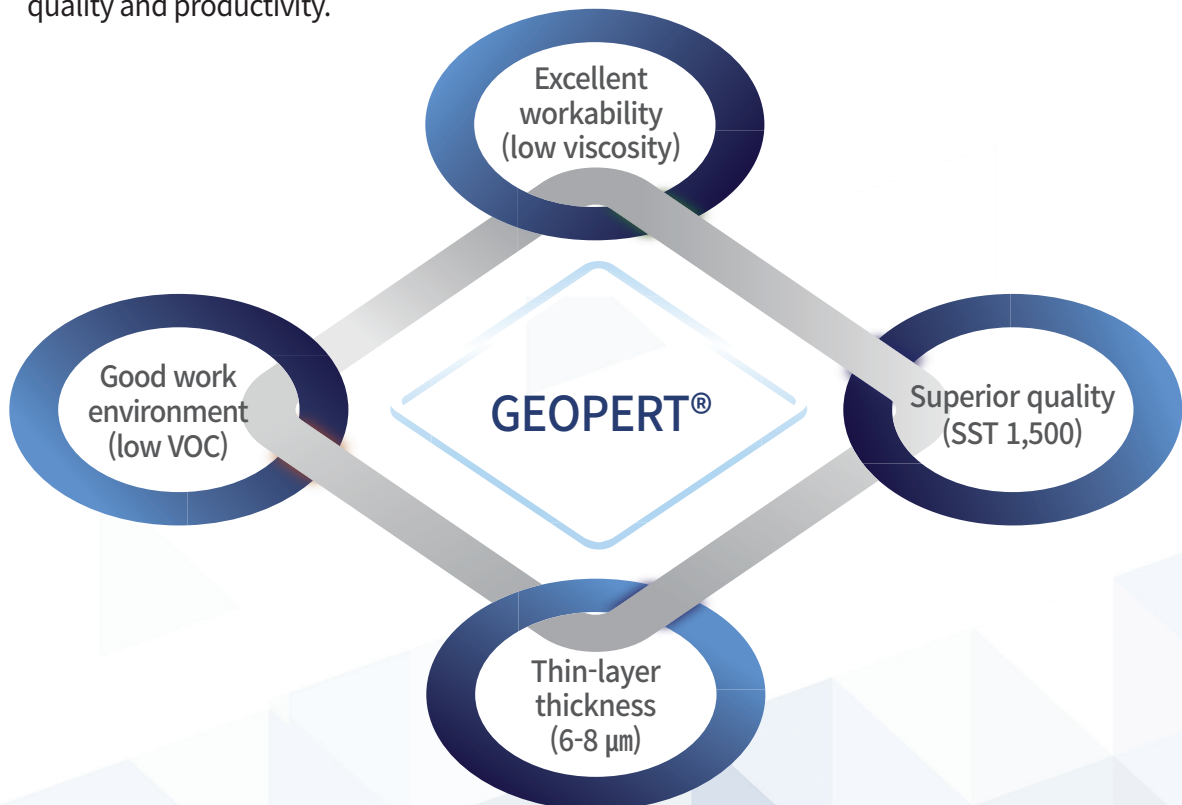


Comparison of Oil-based and Water-based Products

	Oil-based product	Water-based product
Solvent	Organic solvent	Deionized water
Fire risk	Yes	No
Odor	Severe	Almost none
Work environment	Poor	Good
Legal regulation	Complex	Almost none
Curing temperature (°C)	250-260	300-330
Climate impact	High	Low
Layer thickness (µm)	12-20	6-10
Additional expense	Yes	No
SST (hours)	1,000 ↑	1,000 ↑
Production cost (%)	100	70

GEOPERT® Silver Series, the Most Innovative Products

GEOPERT®, Zincotec's water-soluble zinc/aluminum composite coating material, is a breakthrough corrosion protection coating agent that completely blocks the formation of red rust in a 1,500-hour salt spray test (SST). With its high corrosion resistance, low VOC, low viscosity, and thin-layer thickness, GEOPERT® has been recognized by many customers for its superior quality and productivity.



Product Features

- Water-soluble product
- Environmentally friendly
- Low viscosity
- Bright silver
- Chromium-free
- No hydrogen embrittlement
- No wastewater generation
- Non-hazardous material
- No additional expense in the process
- High corrosion protection performance
- Reduced production cost
- Does not require an emission prevention facility

» Basic Specifications for Surface Treatment

-This product meets Hyundai-Kia HMC MS-619-08 zinc-aluminum composite coating specifications.

» Surface Treatment Work Method

GEOPERT® product composition

-A: Slurry of glycol, zinc and aluminum

-B: Viscous liquid consisting of organic and inorganic binders and deionized water

-C: Thickener in the form of white powder

» Dip Spin System Work Method

-The basic work method is coat twice and harden twice.

-Application method: Dip-Spin (2C×2B)

-Curing condition: 320-330°C×20 min

1. Make-up Method(Expert GEOPER 500)

Action to be taken in advance

(1) Calibrate the temperature of GEOPERT® A and B to 18-22°C in advance.

(2) Stir the precipitated metal powder of GEOPERT® A with the dedicated spatula for over 20 minutes until it is sufficiently uniform.

(3) Shake GEOPERT® B thoroughly before adding, so that there is no sediment.

(4) While mixing GEOPERT® A with the agitator, slowly add prepared liquid B to container A.

(5) When mixing is complete, slowly add the pre-weighed thickener.

☞ Generally, thickener is added in the amount of 1.0-2.5g/kg (A+B), but this can be increased or decreased based on the company's viscosity standard management.

(6) After A+B+C have been fully added, the appropriate temperature range is 20-24°C. Stir for over 12 hours.

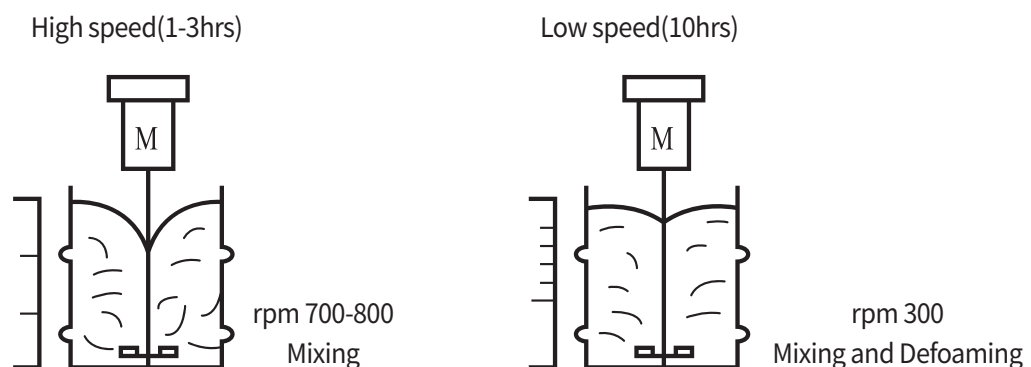
At this time, make sure to close the lid in order to prevent any evaporation of the organic content.

Agitation speed

A + B mixing step: low speed stirring 200-300 rpm

C Addition step: High-speed stirring 700-800 rpm (2-3 hours)

Mixing and degassing steps: Low speed stirring 250-300 rpm (more than 10 hours)



2. Standard Management Practice and Method

- (1) Viscosity (20°C): 60-90sec (Zahn cup2)
 - (2) pH : 6.5-7.5/6.0-7.0(GEOPERT 500)
 - (3) Specific gravity : 1.250-1.420
 - (4) Solid content(%): 28-32
- ☞Solid test method : carry out GEOPERT(A+B+C) at 120-170°C×10min and curing 320-330°C×25min or actual production drying furnace

»Viscosity Management Tips

-When viscosity is too high

- (1) Adjust viscosity by adding GEOPERT® B.
- (2) Decrease viscosity through make-up without adding a thickener to a new solution.
- (3) Add deionized water. Care should be taken here,since adding too much deionized water may adversely affect the quality.
- (4) If a large amount of bubbles is generated, add a defoaming agent to remove bubbles.

-When viscosity is too low

- (1) Dissolve a thickener in a separate container, and gradually add it to the liquid tank to increase viscosity.
- (2) Gradually increase viscosity by adding a higher amount than usual during make-up.
- (3) Increase viscosity by raising the metal particles that have precipitated at the bottom of the chemical tank.
- (4) Keep airtight to prevent the absorption of moisture in the air.
- (5) Increase the temperature so that moisture caused by condensation in the chemical tank does not get into the liquid tank.

»Specific Gravity Management Tips

When specific gravity is too high

- (1) Add deionized water.
- (2) Add liquid B.

When specific gravity is too low

- (1) Raise the metal particles that have precipitated at the bottom of the chemical tank.
- (2) Add new fluid.
- (3) Keep airtight to prevent evaporation of the organic content.
- (4) Make sure that moisture does not get inside.

»pH Management Tips

pH is a very important factor that determines the quality performance of this product.

When pH is too high

- (1) Add liquid B to adjust the pH.
- (2) Add acid to adjust the pH.

When pH is too low

- (1) Add deionized water to adjust the pH.
- (2) Add alkali to adjust the pH.

👁️ How to check chemical performance

- ① Apply GEOPERT® that has been prepared with a bar coater to a cold rolled steel panel (SPCC-SD 0.8×70×150), and harden it for 10 minutes at 150°C in preheating and 20 minutes at 330°C in curing.
- ② Under the same conditions as ①, apply once again to the panel and harden it.
- ③ After natural cooling for 24 hours, confirm that the weight is 300mg/dm² or more, that the cello tape adhesion test result is 4.0 or more and that the color is silver luster.

Judgment : When the chemical is altered, the adhesive strength is lowered and the luster of silver appears to be gray.

3. Coating Process Management

1 Dip Spin System

1) Degreasing

- 1-1) Degrease thoroughly with methyl chloride or the same alkaline or neutral aqueous solvent cleaner.
- 1-2) For aqueous cleaners, rinse the degreased parts as soon as possible, and dry them.

2) Shot blast

- 2-1) Shoot sufficiently with the sus ϕ 0.2-0.3 ball at a least velocity of 50mm/s or higher.
- 2-2) In principle, shot-completed products should be coated within 8 hours.
(Care should be taken, as corrosion can occur on the surface of the substrate if the humidity is 60% or higher.)
- 2-3) If there is an electroplating process, it may adversely affect the quality due to the steam of the acid. For this reason, it is important to establish precautionary measures to prevent steam and acidic chemicals.

3) Coating

- 3-1) Check pH, viscosity, specific gravity, temperature, etc. before commencing work
- 3-2) Check the chemical tank for bubbles, foreign material or any change, etc.
- 3-3) Fill the basket up to 1/3 or 1/4 with the substrate.
- 3-4) Perform the work, following the specified dipping time, number of revolutions, and spin time.
- 3-5) Put the coated product in the drying furnace as soon as possible.
Note: During times of high humidity (such as rainy season), the quality can be degraded due to moisture.
- 3-6) It is good to remove iron particles by attaching magnets to the chemical tank.
- 3-7) To obtain a good surface, regularly filter the chemical at least once every two weeks with an 80-100 mesh to remove impurities and keep the chemical clean.
- 3-8) Always keep the basket clean through regular cleaning.

👁️ Management method

- After burning at 200°C in the drying furnace, perform shooting.
- Make a separate cleaning bath, and wash with water.

4) Coating weight

To obtain 1,000 hours of SST, the coating weight should be at least 200 mg/dm² and the minimum layer thickness should be 6-8 μ m.

- 4-1) In general, coating weight is proportional to the viscosity of the solution, and is inversely proportional to the revolution speed of the centrifuge.
- 4-2) In coating weight management, it is difficult to manage both viscosity and revolution speed.
It is recommended to alter the revolution speed and time based on the product while maintaining a constant viscosity.
- 4-3) To secure high corrosion protection performance, the uniformity of the coating is very important.

☞ Uniform coating method

- The volume of substrates to be put in the basket should be no more than 30% of the volume to the basket dipping line.
- For products that may overlap or adhere to each other (e.g. flat washers), shake or dip two to three times.
- In hot and humid weather, blow air at room temperature with a fan, and then put into the drying furnace as soon as possible.
- When conditions are hot and humid, increase the liquid temperature up to 25°C, and keep the viscosity slightly higher than usual. Perform the work while readjusting the revolution speed.

5) Curing

The curing process is critical to obtaining the excellent corrosion protection performance that GEOPERT® can provide.

Care should be taken here, as the quality may decrease if the temperature is lower or higher than the reference temperature.

5-1) Pre-Heating

Leave at a suitable temperature of 80-170°C for 10-15 minutes.

- ① While passing the preheating section, gradually increase the temperature. Rapidly reaching a high temperature must be avoided.
- ② After evaporating about 80% of the volatile components of the layer in the preheating process, transfer to the curing process.
- ③ Rapid drying at high temperatures can cause the metal particles of the wet film components of GEOPERT® to erect in the vertical direction, which will cause the coating to peel.
- ④ A ventilation system must be installed to ensure that all of the moisture and organic matter generated in the drying furnace can be discharged to the outside.
- ⑤ Be aware that if there are any degreasing agents (organic components, etc.) around the entrance to the drying furnace, there will be adverse effects on quality when the coated material enters the drying furnace.

5-2) Curing

Leave at a suitable temperature of 320-330°C for 20-25 minutes.

- ① Keep in mind that the curing process is critical to achieving excellent corrosion protection performance, and as such the curing process must be performed at the optimum drying temperature and residence time.
- ② If the coating temperature is low, it will result in under-baking, which will have an adverse effect on the corrosion protection function of GEOPERT®.
- ③ When parts with different latent heat temperatures are continuously put into the drying furnace, set the condition for parts with high latent heat (thick parts).
- ④ When adjusting the conveyor speed while the set temperature is fixed within a suitable range, set the condition for parts with high latent heat rather than parts with low latent heat (thin parts).
In this case, there will be no significant problems as long as the curing residence time does not exceed 40 minutes.
- ⑤ When dropping coated parts after coating or curing, make sure that the parts are dropped from a height of 50cm or less in order to prevent surface damage caused by collision between parts.
- ⑥ Evenly spread parts with high latent heat on the conveyor net so that they are not stacked in two to three layers.
- ⑦ Care should be taken here, as quality problems that result from under-baking are much worse than those caused by over-baking.

4. Cooling

- ① Heat-treated products should be cooled by a fan or natural cooling until they reach room temperature. If the products are cooled at temperatures below zero or through forced cooling with cold water, it will cause problems with adhesion and corrosion protection.
- ② Heat-treated products should not be seal-packed within 24 hours.
- ③ Care should be taken in this step, since contact with moisture or rain water immediately after the heat treatment may cause red rust and corrosion protection problems.
- ④ The completed products (adhesion, SST, etc.) should be tested after 24 hours.

5. Storage and handling of GEOPERT® coating agents

- ① GEOPERT® should be stored at 18-22°C. The shelf life of GEOPERT® A and B is one year.
- ② Do not expose GEOPERT® to sunlight or ultraviolet rays.
- ③ Any remaining amount of GEOPERT® should be sealed and stored at a temperature of 10°C or less.
- ④ Do not store at temperatures below zero or above 30°C.
- ⑤ If work will not be performed for an extended period, keep GEOPERT® in the chemical tank at a temperature below 10°C. This will prolong the pot life.
- ⑥ The make-up solution is effective for 27 days at 20°C.

Spray System Work Method

This is an appropriate method for parts with a large surface area, or parts for which the appearance is deemed important.

- ① Automobile brake discs, fuel pipes, steel plates, etc.
- ② Spray viscosity should generally be controlled to a lower viscosity than dipping.
 - ☞ Before commencing the work, determine optimum viscosity conditions through preliminary inspection.
- ③ Care should be taken here, since edges and hole edges are coated during spraying.
- ④ The rest of the work should proceed in the same manner as for the dip spin system.

Dip-Drain System Work Method

This method is applied to parts that are difficult to coat using the dip spin and spray system, such as pipes, man-hole covers, and meshes.

- ① Viscosity should be generally controlled to a lower viscosity than for dipping.
 - ☞ Before commencing the work, perform a preliminary inspection to determine the optimum viscosity conditions.
- ② After spraying, thoroughly eliminate moisture using an air blower to prevent condensation.
- ③ The rest of the work should proceed in the same manner as for the dip spin system.

» Determining the Optimum Curing Temperature for GEOPERT

1. Purpose: determining the optimum curing temperature
2. Method: alkaline extraction method
3. Test method
 - ① Test instrument preparation
 - Constant temperature water bath (set at 40°C)
 - Sample extraction beaker: glass or plastic beaker
 - Ultrasonic cleaner
 - Alkali extract: 4g/l (LiOH monohydrate)
 - Tweezers

② Sample

- Sample Weighing / Measured Value = $W_b(g)$
- Sample Coating Surface Measurement / Measured Value = $S(dm^2)$
- Calculation of alkali extract: Determine the extract amount so that the extract amount for $1dm^2$ of the sample coating surface area S becomes 70-100cc. Select a beaker that will allow the parts to be completely immersed in the extract.
- The sample is a product coated on the previous day.
- The volume weight of coating parts should be 15 – 50mg / dm^2 .

③ Alkali extraction

- Surface area of the test sample: $1dm^2$
- Randomly sample parts coated with GEOPERT, and weigh them on a scale to a precision level of 0.0001g.
- Make 100 ml of 0.4% LiOH solution.
- Immerse the sample ($1dm^2$) in 100 ml of 0.4% LiOH solution, and leave at 40°C for 1 hour.
- Remove the sample with tweezers, and wipe with deionized water.

④ Visual observation of alkali extract

- Appearance of the extract: Observe the extract with naked eyes.

👁️ Criteria

- Proper curing: The liquid is not cloudy, and is light-yellow colored.
- Under-baked: The liquid is light yellow, and has floating gray metal particles.
- Over-baked: The liquid is not colored.

⑤ Ultrasonic cleaning and coating weight decrease measurement

Place the extracted sample in a suitable size beaker, and perform ultrasonic cleaning with an appropriate amount of deionized water.

Perform cleaning for 15 to 20 minutes, frequently changing the cleaning water until no floating gray metal particles can be observed.

- Wash samples that have gone through ultrasonic cleaning with tap water, and dry them with a dryer until there is no remaining moisture.
- Measure the weight of the dried samples. (W_a)

- Coating weight decrease

$$\text{Decreased coating weight (mg/dm}^2\text{)} = \frac{W_b - W_a}{S} \times 1,000$$

W_b : weight before extraction

W_a : weight after extraction

S : surface area

👁️ Criteria

- Proper curing:** The reduced coating weight is 20-100mg/ dm^2 .
- Under baking:** The reduced coating weight is 100mg/ dm^2 or more.
- Over baking:** The reduced coating weight is 20mg/ dm^2 or less.

» Causes of Defects and Solutions

Problem	Cause	Solution	Quality Impact
Viscosity is too high	No production for an extended period of time	<ul style="list-style-type: none"> Add a new solution without a thickener. Add Liquid B 	<ul style="list-style-type: none"> Poor appearance Reduced workability Reduced corrosion resistance
	Organic component in coating agents has evaporated	<ul style="list-style-type: none"> Perform sealing. Add additional Liquid B Add deionized water 	
Viscosity is too low	Condensed water or moisture on the surface of the tank has gotten inside	<ul style="list-style-type: none"> Increase the liquid tank temperature. Add additional thickener 	<ul style="list-style-type: none"> Thin layer Reduced corrosion resistance
	Precipitated metal powder	Raise the metal powder	
Specific gravity is too high	Organic components have evaporated	<ul style="list-style-type: none"> Add deionized water. Add additional Liquid B 	<ul style="list-style-type: none"> Excessive coating weight Reduced adhesion
Specific gravity is too low	Precipitated metal powder	Raise the metal powder	<ul style="list-style-type: none"> Shortage in coating weight Reduced corrosion resistance
	Entry of moisture	Add a new solution	
pH is too high	Aging of coating solution due to hardening overtime	<ul style="list-style-type: none"> Add a new solution. Put additional Liquid B 	<ul style="list-style-type: none"> Loss of gloss Reduced adhesion Reduced corrosion resistance
Large amount of bubbles	Abnormal agitator blade height and speed	Add liquid	<ul style="list-style-type: none"> Uncoated areas Poor appearance Reduced corrosion resistance
	Insufficient amount of chemicals in the tank	Adjust the speed and height	
	Unknown cause	Add defoaming agents	
Cosmetic defects	Rough surface	Filter	<ul style="list-style-type: none"> Rough surface Stain occurrence Reduced adhesion
	Poor preprocessing	<ul style="list-style-type: none"> Replace the degreasing agent. Shoot sufficiently. 	

» Comparative Data for Various Surface Treatment Types

Item	Surface Treatment Type			
	GEOPERT®	Electroplating	Hot-dip galvanizing	Organic coating
Weather resistance	◎	○	◎	△
Salt damage prevention	◎	×	△	×
Heat resistance	◎ max 450°C	△ max 200°C	○	-
Hydrogen embrittlement	◎	×	△	◎
Coating uniformity	○	○	△	×
Screw fastening	○	○	×	×
Paint adhesion	◎	△	×	◎
Appearance	○	◎	×	◎
Material diversity	◎	○	△	◎
Layer thickness (µm)	6-8	6-8	50-100	20-40
Wastewater generation	No	Yes	Yes	-
Environmental pollution	Pollution-free	Wastewater Air pollution	Wastewater Air pollution	-

◎ Excellent ○ Good △ Normal × Poor

»GEOPERT Process Management Standard

NO	Process	Management Item		Management Method				Note
		Item	Management Criteria	Measurement cycle	Measurement	Record management	Dept.	
1	Incoming Inspection	Surface condition	Oil, plating, painting, coloration	Once /LOT	Naked eyes	Process control sheet	Sales Dept.	-
		Product condition	Deformation, moisture, red rust					
		Parts mixed	Entry of foreign parts					
2	Degreasing	Temp. (°C)	85 - 92	Once /4hr	Thermometer	Work log	Production Dept.	T.C.E
		Time	Steam increase		Naked eyes			
3	Shot	Release amount	12APM or higher	Once /4hr	Meter	Work log	Production Dept.	Sus ϕ 0.2m/m
		Release time	8 \pm 2 min		Timer			
4	Coating	Revolution speed	300 \pm 50 rpm	Once /4hr	Meter	Work log	Production Dept.	-
		Revolution time	20 \pm 5 sec \times 2 times		Timer			
		Viscosity	60-90 sec	Once / Day	Viscometer	Q.C log	Quality Dept.	Zahn Cup 2
		Specific gravity	1.250 - 1.420		Gravimeter			
5	Curing	Temp. (°C)	330 \pm 05	Once /4hr	Thermometer	Work log	Production Dept.	Curing temp
		Time	55 \pm 5 min		Speedometer			-
6	Inspection	Appearance	Exposure, blistering, foreign matter, discoloration	Once /LOT	Naked eye	Q.C log	Quality Dept.	-
		Adhesion	4.0 or higher		Tape			18m/m 3Magent
		Coating weight	200mg/dm ² \uparrow	Once / Day	Quantitative analysis			-
		Corrosion resistance	1,000hrs \uparrow	3ea/ Month	SST			-
7	Release	Release quantity	Customer name, product name, delivery date, weight, quantity	For every release	Scale Naked eye	Release instruction	Sales Dept.	-

»Comparative Datafor Various Zinc Flake Coatings

	GEOPERT®	GEOMET	MAGNI (DELTA)
Property	Water-based	Water-based	Oil-based
Main solvent	Deionized water	Deionized water	PMA
Odor	Mild	Mild	Very strong
Work environment	Pleasant	Normal	Poor
Flammability	Non-hazardous material	Non-hazardous material	Hazardous material
Coating color	Bright Sliver	Gray Sliver	Sliver
Viscosity	Normal	High	Low, Normal
Heat resistance (°C)	450	350	300
Electro-conductivity	Good	Good	Poor
Lubricity	Good	Poor	Normal
Layer thickness (μ m)	6-8	6-10	12-16
SST(Hrs)	1,500	1,000	1,000
Production cost (%)	Low (80)	Normal(100)	High (120)

» Product and Technical Data

◆ GEOPERT® Silver Product Series

Product Model	Appearance/Curing Temperature	Property / Application
GEOPERT® 500	bright silver 320°C×20min	<ul style="list-style-type: none"> • Low viscosity (Gardner cup #2) : 60 ~ 90sec • High corrosion resistance (6-8µm): 1,500hrs ↑ • Excellent heat-resistance: 450°C • Automotive parts, bolts/nuts, marine parts, wind power plant etc.
GEOPERT® 720	silver 320°C×20min	<ul style="list-style-type: none"> • Viscosity (Gardner cup #2) : 90 ~ 120sec ☞ When spraying 18 ~ 25sec • High corrosion resistance (6-8µm): 1,000hrs ↑ • Excellent heat-resistance: 400°C • Automotive parts, bolts/nuts, marine parts, streetlight etc.
GEOPERT® 505	bright silver 310°C×20min	<ul style="list-style-type: none"> • Low viscosity (Gardner cup #2) : 60 ~ 90sec • Corrosion resistance (6-8µm): 1,000hrs ↑ • Excellent heat-resistance: 450°C • electric/electronic parts, automotive parts, decorations etc.
GEOPERT® 815	bright silver 320°C×20min	<ul style="list-style-type: none"> • Low viscosity (Gardner cup #2) : 60 ~ 90sec • Corrosion resistance (6-8µm): 1,000hrs ↑ • Torque Control contain • Excellent heat-resistance: 450°C • Automotive parts, bolts/nuts, ship components, wind power plant etc.
GEOPERT® 808	bright silver 280°C×20min	<ul style="list-style-type: none"> • Low viscosity (Gardner cup #2) : 60 ~ 90sec • Low curing • Corrosion resistance (6-8µm): 1,000hrs ↑ • Excellent heat-resistance: 450°C • Die casting parts, magnetic parts etc.
GEOPERT® 420	bright silver 320°C×20min	<ul style="list-style-type: none"> • Low viscosity (Gardner cup #2) : 60 ~ 90sec • Corrosion resistance (6-8µm): 1,000hrs ↑ • Rich aluminum contain • Excellent heat-resistance: 550°C • Burner body, burner crater, casting etc.

◆ Silver products Range



ex) Application example



◆ BLACKPER® Black Product Series

These one-component, water-based black products are mainly divided into products with or without coefficient of friction modifiers.

The BLACKPER® black products offer low viscosity, a beautiful appearance and vivid color expression, and can meet any customer preferences, such as glossy, semi-gloss, and matte.

Work method

- 1) Curing condition: 220°C×20 min
- 2) Coating method: Dip-Spin(2C×2B), Spray(1C×1B)
- 3) Layer thickness (μm): 5-10
- 4) Shelf life: 2 years

☞ Unlike silver products, these one-compound products do not require prior mixing.

Product Model	Appearance/Curing Temperature	Property / Application
BLACKPERT® G	Glossy Black 220°C × 20min	<ul style="list-style-type: none"> • Low viscosity (Gardner cup #2) : 18 ~ 25sec/dipping • Clear glossy black • Electrical parts, electronic parts etc. glossy parts.
BLACKPERT® M	Matt Black 220°C × 20min	<ul style="list-style-type: none"> • Low viscosity (Gardner cup #2) : 18 ~ 25sec/dipping • Clear Matt Black • Automotive parts, marine parts etc. matt parts.
BLACKPERT® GM	Semi-Matt Black 220°C × 20min	<ul style="list-style-type: none"> • Low viscosity (Gardner cup #2) : 18 ~ 25sec/dipping • Clear Semi-Matt Black • Automotive parts, marine parts etc. semi-matt parts.
ECOBBLACK® G	Glossy Black 160°C × 20min	<ul style="list-style-type: none"> • Low viscosity (Gardner cup #2) : 40 ~ 80sec/dipping • No odor • Electrical parts, electronic parts etc. glossy parts. • SST : 200hrs
ECOBBLACK® M	Matt Black 160°C × 20min	<ul style="list-style-type: none"> • Low viscosity (Gardner cup #2) : 40 ~ 80sec/dipping • No odor • Automotive parts, marine parts etc. matt parts. • SST : 200hrs
ECOBBLACK® GM	Semi-Matt Black 160°C × 20min	<ul style="list-style-type: none"> • Low viscosity (Gardner cup #2) : 40 ~ 80sec/dipping • No odor • Automotive parts, marine parts etc. semi-matt parts. • SST : 200hrs

◆ Black products Range



ex) Application example



◆ Top Coating Series

Coefficient of Friction Modifier

This is a one-compound water-based product without odor. It is a coefficient of friction modifier for fasteners.

- 1) Curing condition: 180°C×20 min
- 2) Coating method: Dip-Spin(1C×1B)
- 3) Layer thickness (μm): 1-2
- 4) Shelf life: 1 year



Product Model	Appearance/Curing Temperature	coefficient of friction(μ)	torque coefficient(k)
TORCA A	Transparent 170°C × 20min	0.08 ~ 0.14	0.12 ~ 0.19
TORCA B		0.10 ~ 0.15	0.15 ~ 0.21
TORCA C		0.12 ~ 0.18	0.17 ~ 0.24

Top Coating

This is a one-component water-based product without odor. It is applied for scratch prevention, bi-metallic contact corrosion protection, increased adhesion property, and increased corrosion resistance.

- 1) Curing condition: Varies according to the product.
- 2) Coating method: Dip-Spin, Spray
- 3) Layer thickness (μm):1-2
- 4) Shelf life: 1 year

Product Model	Appearance/Curing Temperature	Property / Application
TOPCOAT 10W	Transparent 170°C×20min	<ul style="list-style-type: none"> • Bi-metallic contact corrosion protection • Increase of corrosion resistance / increase of adhesion property • Automotive hose clip etc.
TOPCOAT 100W	Transparent 140°C×20min	<ul style="list-style-type: none"> • Excellent adhesion • Hardness : 3H • Buttons and other apparel materials

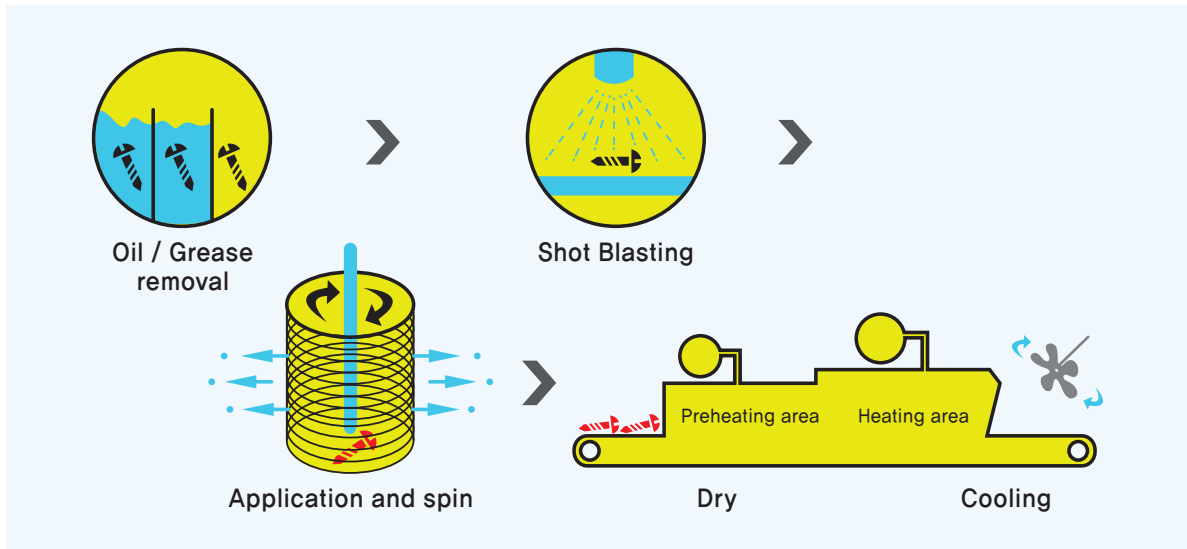
Degreasing agent

Product Model	Property / Application
D&D	<ul style="list-style-type: none"> • derusting & degreasing agent • odorless & water soluble

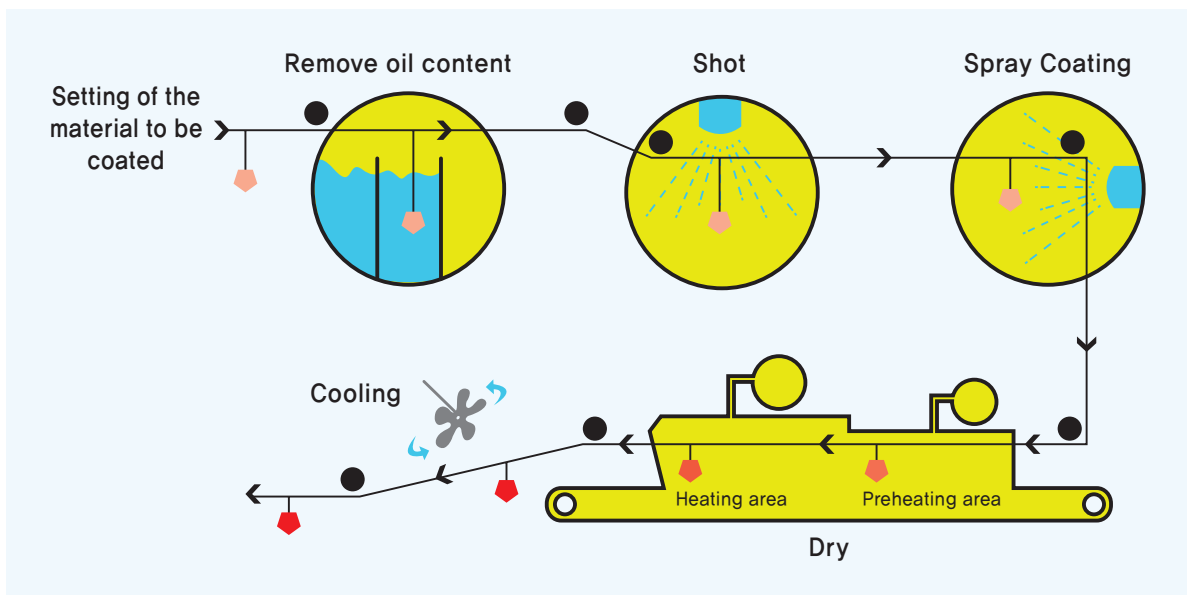
◆ Manufacturing Flow



Dip-spin method - A method appropriate for coating small articles such as bolts, nuts, clips, etc.



Spray method - A proper method for coating parts with wide surface area or parts where appearances area deemed important.





Nothing lasts forever!

But our products can help them last longer.

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