

# Product overview of Nano Ceramic Coating System

## 纳米陶瓷涂料系统产品概述



海威眾達  
HiWin Technology

Cut the cost in half  
Environmental protection and low-carbon

## **Contents**

1. Application background .....	3
2. Product overview .....	3
3. Product performance parameter .....	4
4. Product feature .....	4
4.1 High efficiency reflex .....	4
4.2 Heat Insulation .....	4
4.3 Protection from UV Rays .....	5
4.4 Reduce tank water spray .....	5
4.5 Strong weather resistance and long service life .....	5
4.6 anti-corrosion property .....	5
4.7 Outstanding Elongation .....	7
4.8 Flame Resistance .....	7
4.9 Chemical Content .....	7
5. Recommendation .....	8
5.1 Manufacturer Recommendations .....	8
5.2 Product Limitations .....	9
5.3 Price .....	9
6. Application areas .....	10
6.1 Roof and Metal Buildings .....	11
6.2 Steam Lines, Tanks, Boilers and Valves .....	11
6.3 HVAC Ductwork and Hot Air Duct .....	11
6.4 Refrigerated Warehouses, Trucks, and Trailers .....	12
7. Part cases of our product .....	12
7.1 Oil tank .....	12
7.2 Chemical reagent tank .....	13
7.3 Roof of metal building and glass house .....	13
7.4 Container .....	14
7.5 Cement tank trucks .....	14
7.6 High temperature pipe .....	15
7.7 Chemical reagent tank .....	15
7.8 LNG tank .....	16

## **1. Application background**

In hot summer, the storage tank of light oil (refined oil, chemical solvent, etc.) is subjected to long-term solar irradiation, which leads to significant changes in the temperature of the tank and the medium in the tank. Therefore, occurs the oil and gas volatilization (small respiration), which seriously affects the safety, environmental protection and energy saving of the tank farm. In the conventional state, through the water spray and other "artificial intervention cooling" way to cool the tank and balance the tank pressure, so that the tank is kept in a safe state. The water spray cooling will not only consumes a lot of water resources, power consumption, and generating wastewater, but also lead to equipment corrosion.

## **2. Product overview**

Nano Ceramic Coating Systems product of Hiwell is a coating set reflection, heat insulation, waterproof, anti-corrosion and multi-functional in one of the new materials for cooling and anti-corrosion. The coating can hyperthermal reflex the solar infrared and ultraviolet rays in the range of 300nm-2500nm, which reduce the accumulation of heat on the surface of the object after



the sun irradiation, and also can automatically radiate heat. It can radiate the heat of the surface of the object into the air, which reducing the temperature of the object. At the same time, the coating has excellent weather, water and corrosion resistance, which can effectively achieve energy saving and safety protection of oil tanks, pipelines and factory roofs. Nano Ceramic Coating Systems possess outstanding properties when comparing with conventional methods. Identifying the benefits of Nano Ceramic Coating Systems is significantly to understand the properties and advantages of the product.

### **3. Product performance parameter**

Parameter name	Testing result
Sunlight reflection ratio	0.85
Hemispherical emissivity	0.88
Adhesion	0 rank
Resistant to salt spray	≥350h
Acid resistance (5%HCl)	≥96h
Alkali resistance (5%NaOH)	≥96h
Resistant to artificial aging	≥500h
Erosion resistance	≥2000 times
Low temperature cycle	≥10 times
Water resistance	≥72h
Fire resistance	B1 rank

### **4. Product feature**

#### ***4.1 High efficiency reflex***

The solar thermal reflectivity of the coating is > 90%, which can efficiently reflect the high energy and high frequency light such as ultraviolet and near infrared rays in the sunlight that to reduce the accumulation of radiant heat on the surface of the substrate, and also reduce the surface temperature of various storage tanks, equipment and buildings in spring and summer.

#### ***4.2 Heat Insulation***

Researchers performed a comparison test with Nano Ceramic Coating Systems product versus a sample of Styrofoam for Temperature Resistivity. The procedure was to construct two identical galvanized steel boxes in the form of miniature houses. House A was filled with 50000um (5 cm) of the Styrofoam insulation, while House B's exterior was coated with Nano Ceramic Coating Systems to a thickness of 400um. Both the houses were insulated in the same areas to simulate identical uninsulated volume.

## *Product overview of Nano Ceramic Coating System*

After exposed to infrared lamp for same time, the temperature in the house B is  $\sim 8^{\circ}\text{C}$  cooler than that of House A, and the value reaches  $\sim 20^{\circ}\text{C}$  for their roof. The test results prove that 450um Nano Ceramic Coating Systems eliminates more than 90% radiant heat and reduces temperature greatly on hot surfaces.

### ***4.3 Protection from UV Rays***

Nano Ceramic Coating Systems can be applied directly over composites to provide protection against UV Rays as well as insulating without chemical adverse effect. The conclusion of testing from Changzhou University (Changzhou city, China) shows that: high quality and excellent heat insulation were found for the coating system, and the protection from UV Rays is also outstanding.

### ***4.4 Reduce tank water spray***

The coating can significantly reduce the surface temperature of the storage tank, and reduce the use time of water spray. Save water and electricity consumption, which to achieve energy saving and cost reduction. At the same time, diesel tank and gasoline tank can also achieve the effect of water-free spray.

### ***4.5 Strong weather resistance and long service life***

Strong weather resistance not only can effectively reflect and absorb more than 99% of ultraviolet radiation, but also effectively protect the coated surface, and improve the service life of all kinds of tanks, equipment and facilities.

### ***4.6 anti-corrosion property***

Nano Ceramic Coating Systems can resist the corrosion of acid and alkali solutions. Effectively protect the coated surface, which can prevent acid rain or corrosion. And also significantly improve the service life of the coated equipment and buildings. The coating can be used for 8 to 15 years.

## *Product overview of Nano Ceramic Coating System*

Markedly when they become wet. Nano Ceramic Coating Systems have no air pockets and has no loss of insulation properties when wet, which can be used to stop corrosion of metals. Testing Lab rated Nano Ceramic Coating System 0.0752 (superior) by ASTM d-1653 standards as a moisture vapor barrier.

Nano Ceramic Coating System possesses excellent chemical resistance for various chemical reagents.

**Table 1 Nano Ceramic Coating System tested for reaction against the following chemicals:**

<b>Chemical reagents</b>	<b>Test description</b>	<b>Chemical resistivity results</b>
Ethylene glycol	Immersion 300 hrs	excellent, product not affected, no softening or discoloration
Ethylene glycol + sulfuric acid	Immersion 300 hrs	excellent, metal strip corrosion, but product stability in-tact. Metal under coating shows no corrosion
Sulfuric acid (93%)	Immersion 300 hrs	excellent, metal strip corrosion, but product stability in-tact. Metal under coat shows no corrosion
Hydrochloric acid (40%)	Immersion 300 hrs	acid softens the material no adverse affect or break down
Methanol (98%)	Immersion 300 hrs	softens the material no adverse affects on break down
Acidic acid (50%)	Immersion 300 hrs	acid softens the material no adverse affects or break down
Sodium Hydroxid (20%)	Immersion 168 hrs	excellent, product not affected, no softening or discoloration coated aluminum strip showed no sign of corrosion

The Nano Ceramic Coating Systems product provides good protection for external surface of water tank, oil tank and chemical storage tank to against acid rain, salt fog and moisture.

## *Product overview of Nano Ceramic Coating System*

### ***4.7 Outstanding Elongation***

Based on the conclusion from Shanghai University, the elongation of Nano Ceramic Coating Systems product is more than 30%, which is much better than traditional coating. The outstanding elongation endows a good water proof for this product. After covering with this product, no crack occurs even the expansion and shrinkage take place for the equipment or building due to the high temperature or other reasons. Therefore, the coating can provide protection for moisture and chemical reagents even under extreme conditions. At the same time, it also solves the problems of hard coating film and poor ductility of traditional thermal insulation materials, and easy to crack or even fall off when thermal deformation occurs in the coated equipment.

### ***4.8 Flame Resistance***

Nano Ceramic Coating Systems product flame spread is rated 5 out of 100 according to Changzhou University. Therefore, Nano Ceramic Coating Systems product can be applied directly to hot surfaces in a wide temperature range lower than 400°F without shut down.

### ***4.9 Chemical Content***

Nano Ceramic Coating Systems meets the requirements of environmental protection, and does not contain benzene, formaldehyde and any heavy metals, is friendly to environment and human body. Its fire rating reaches B1 level, and it is non-combustible and non-flammable at flash point. However, the traditional materials are generally oily materials, that contains volatile organic components, which cause serious harm to the human body and aid combustion.

National center for quality supervision and test of building engineering reports Nano Ceramic Coating Systems product has no volatile organic compounds (VOC). Moreover, the material contains no solvents or hazardous chemical elements such as fluorides, chlorines or iodine. An analytical testing laboratory, tested the chemical compound of Nano Ceramic Coating System for heavy metal (lead, mercury and chromium) with excellent results: no heavy metal can be detected from the product. Therefore, this product

## *Product overview of Nano Ceramic Coating System*

is an environmental friendly and human friendly material, no releasing noxious gas during the spray and following applied process.

## **5. Recommendation**

### ***5.1 Manufacturer Recommendations***

Nano Ceramic Coating Systems product not only eliminates radiation heat from sun to depress the increase of temperature of oil (chemical reagent) tank at summer (depress the breath effect, reduce the loss of oil and gas, save shower water), but also decreases the surface temperature of high-temperature equipment (enhance safety).

The best range of application for Nano Ceramic Coating System is 300um~600um. The product serves all needs regarding corrosion protection, energy conservation and safety. It is the most cost effective product on the market regarding tanks and pipelines. Nano Ceramic Coating Systems material provides insulation, protection from corrosion, safety and is impervious to environmental conditions; therefore eliminating the cost of several steps of application, (for example, it eliminates the need for sand blasting, primer, top coating and fiberglass wrap). This product is applied directly to the substrate with good adhesion and no air pockets, thus, eliminating the problem of sagging or wicking insulation which leads to corrosion. In addition, Nano Ceramic Coating Systems material eliminates the problems of animals destroying the insulation or instances of insect or rodent infestation, a common problem with fiberglass wrapped pipelines.

You can eliminate radiant heat, but reached the maximum benefit in accordance with cost versus performance with ~450um thickness material for oil (chemical storage) tank (pipe) application (the highest temperature for tank is 150°C, 302°F). Nano Ceramic Coating Systems product provides energy conservation and corrosion protection while the small amount of fiberglass provides the additional safety at a less expensive cost in a much smaller space.



## *Product overview of Nano Ceramic Coating System*

### **5.2 Product Limitations**

- Nano Ceramic Coating Systems product should not be applied to surface temperature exceeds 163<sup>0</sup>C (330<sup>0</sup>F).
- Application should not be installed in ambient temperatures below 5<sup>0</sup>C (41<sup>0</sup>F) unless surface temperature of substrate exceeds 40<sup>0</sup>C (104<sup>0</sup>F).
- Nano Ceramic Coating Systems product should not be mixed with solvents or applied near where solvents may come in contact with the product prior to curing. Prior to application insure all substrates are free of rust, oil, grease, mil-scale, moisture or any foreign substances which might effect adhesion.

### **5.3 Price**

<b>Volume per bucket</b>	<b>Area of operation for each Kg sample</b>	<b>Thickness of product</b>
20 L (14.5Kg)	1.4 m <sup>2</sup>	~400 um

## **6. Application areas**



Nano Ceramic Coating Systems product can be widely used in various construction, chemical, petroleum, electric power, metallurgy, shipbuilding and other industries. The coating material can be steel, cast iron, galvanized, stainless steel, color steel, wood, cement, concrete, brick, ceramic, glass and textile surface to heat insulation and cooling. At the same time, it can also be used for light oil storage tanks, refined oil storage tanks (gasoline, diesel, aviation kerosene, etc.), chemical plant solvent tanks, gas pipelines, plant roofs and all kinds of exterior wall roofing, containers and cold chain transportation.



## *Product overview of Nano Ceramic Coating System*

### ***6.1 Roof and Metal Buildings***

One of the excellent uses for Nano Ceramic Coating Systems product is a roof coating. The product forms a radiant heat barrier providing insulation qualities and protection from UV rays. In addition, the ceramic insulating properties keep heat expansion and cold contraction of metal roofs to a minimum, thus, eliminating many causes of water damage, uncomfortable wind drafts or costly maintenance problems.

### ***6.2 Steam Lines, Tanks, Boilers and Valves***

A coating with ~450um thickness of Nano Ceramic Coating Systems product greatly reduces temperature (30-40<sup>0</sup>C, 55<sup>0</sup>F-72<sup>0</sup>F) on hot surface. Therefore, Nano Ceramic Coating Systems product conserves energy by containing the heat while reducing the surface temperature providing safety and reducing risk of burns. In addition, Nano Ceramic Coating Systems product serves as a protective coating against corrosion eliminating problems from saturation and sagging which are typical characteristics of fiberglass. Replacing fiberglass with Nano Ceramic Coating Systems product reduces pipe sizes and increases usable space.

Nano Ceramic Coating Systems product can be applied directly to hot surfaces with minimal surface preparation and without plant shutdown. Basic maintenance of Nano Ceramic Coating Systems product is simply washing it clean with a fire hose. In the event that the product needs to be removed, it can be cut and scrapped or sanded. The dust created from sanding the product is considered nuisance dust and contains no harmful material.

### ***6.3 HVAC Ductwork and Hot Air Duct***

The product eliminates radiant heat on hot duct and impedes condensation on cold air duct. In addition, Nano Ceramic Coating Systems product contains the temperature inside by controlling heat losses. Furthermore, the elimination of fiberglass reduces the size of space needed for installation and totally eliminating hiding and breeding space of insects and rodent particularly in the food and beverage industry.

## *Product overview of Nano Ceramic Coating System*

Industry will not specify a latex coating on stainless steel ductwork, tanks, or containers. The chloride content in water based material causes an adverse reaction to stainless steel. Although Nano Ceramic Coating Systems product is a latex based product, the unique property is it contains only 22 ppm's of chloride. Thus, Nano Ceramic Coating Systems product is actually a compliment coating for stainless steel.

### ***6.4 Refrigerated Warehouses, Trucks, and Trailers***

Nano Ceramic Coating Systems product differs from competitive insulation products because it has no air spaces only tiny ceramic particles. These ceramic particles reflect all energy rays hot or cold; therefore, maintaining temperatures as needed in cold storage. Additional benefit of Nano Ceramic Coating Systems product over standard insulators is its ability to retard condensation and prevent corrosion.

## **7. Part cases of our product**

### ***7.1 Oil tank***

Oil tank before and after using the Nano Ceramic Coating Systems product, Xinjiang province, China. Surface temperature of tank decreases 24<sup>0</sup>C after adopting the coating in the summer. The shower water is avoid after using this material.



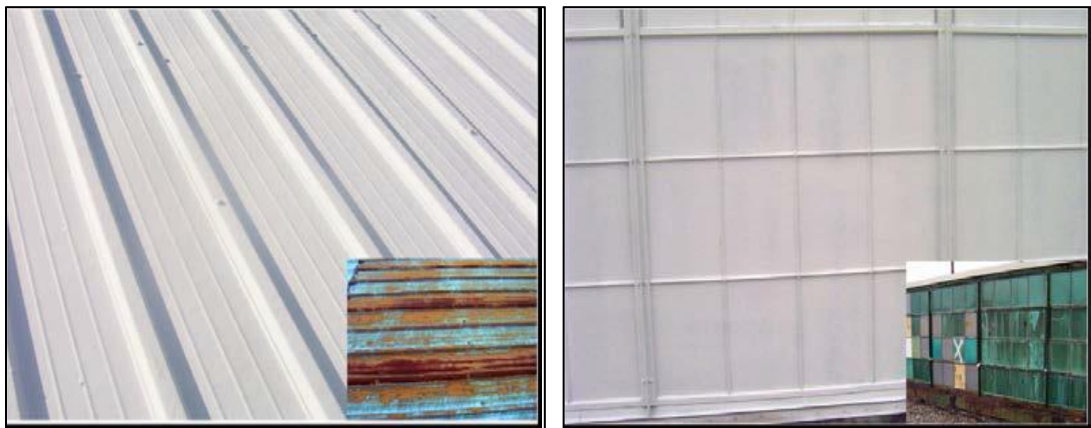
## *Product overview of Nano Ceramic Coating System*

### **7.2 Chemical reagent tank**



Chemical reagent tank before and after using the Nano Ceramic Coating Systems product, Jiangsu province, China. Surface temperature of tank decreases 12<sup>0</sup>C after adopting the coating in the summer.

### **7.3 Roof of metal building and glass house**



The Nano Ceramic Coating Systems product is used on the roof of metal frame workshop in Shanghai city, China. The roof temperature decreases 20<sup>0</sup>C in summer, and the value is 8.4<sup>0</sup>C in the floor of workshop (6m in height). The indoor temperature of glass house decrease 22<sup>0</sup>C in the summer.

## *Product overview of Nano Ceramic Coating System*

### **7.4 Container**



The Nano Ceramic Coating Systems product is used for the container, Shenzhen city and Xinjiang province, China. The temperature decreases 14°C (18°C) in summer.

### **7.5 Cement tank trucks**



The Nano Ceramic Coating Systems product is used for the cement tank of the trucks, HongKong, China. The temperature of cement decreases 9°C in summer.



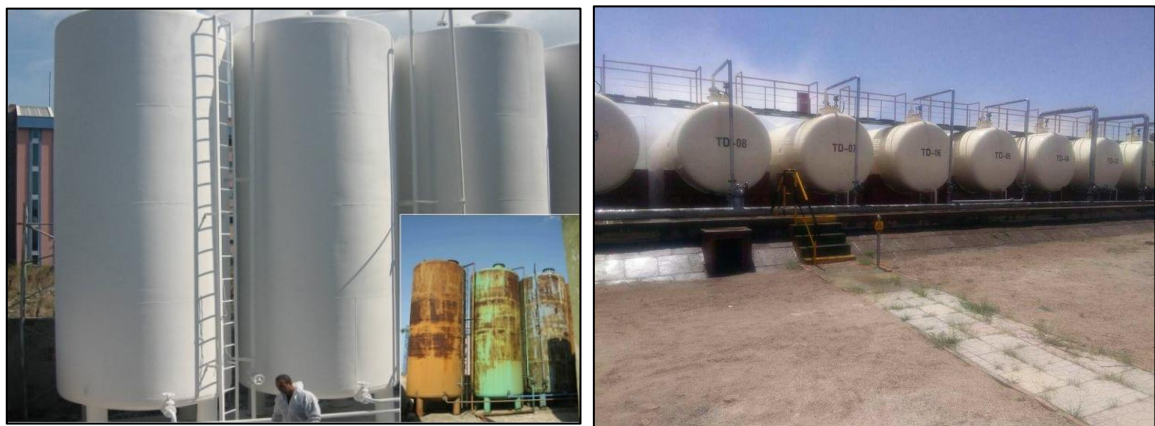
## *Product overview of Nano Ceramic Coating System*

### **7.6 High temperature pipe**



The Nano Ceramic Coating Systems product is used for the high temperature pipe to avoid burn (test), Hainan, China. The temperature of the pipe decrease from 89°C to 47°C with ~450um thickness product.

### **7.7 Chemical reagent tank**



Nano Ceramic Coating System product provides excellent corrosion protect and heat insulation for the chemical reagent tank in the coastal city Lianyungang of China.

## *Product overview of Nano Ceramic Coating System*

### **7.8 LNG tank**



Nano Ceramic Coating System product is adopted on the surface of LNG tank, Zhuhai city, China. The produce provides great cold insulation effect.