

**HEUCOPHOS[®], HEUCOSIL[™] & HEUCORIN[®]
ANTICORROSIVES
FROM THE EXPERTS**



BRIGHTER COLORS.
BRIGHTER LIFE.



The degradation of metal by chemical or electrochemical means resulting from exposure to weathering, moisture, chemicals or other agents in the environment in which it is placed."

Worldwide, corrosion destroys a ton of steel every second. Replacement costs in Germany alone exceed 20 billion euros per annum.

Backed by global R&D capabilities and a proven track record in innovative anti-corrosive pigments, Heubach is dedicated to extending the working life of steel.

The Corrosion Cell

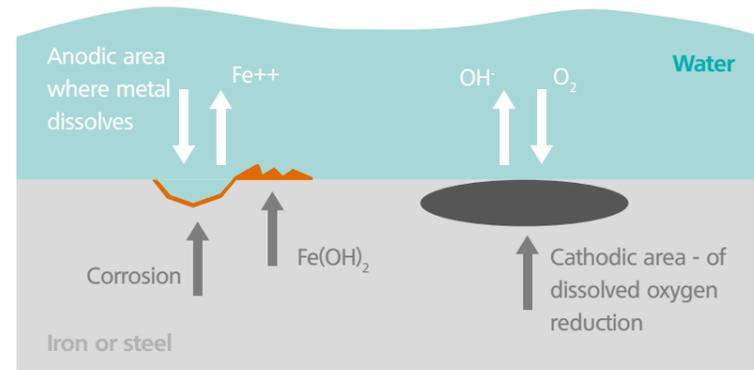


Fig. 1 The formation of rust, a corrosion cell

The corrosion of iron is an electrochemically driven process of energy exchange. With the presence of humidity iron passes into solution at the anode and hydroxyl ions are formed out of water and oxygen at the cathode.

Due to the existence of an electrolyte there is the possibility for the electrons to react at the cathode with the environment. The result is the formation of rust (Fig. 1).



Corrosion Protection

Anti-corrosive pigments inhibit this process either chemically and/or electrochemically (Active Pigments) or physically (Barrier Pigments) and may be divided by the way they work.

Evaluation of Protective Coating Applications

The anti-corrosion primer plays the active role in a protective coating system and the performance of the primer is influenced by numerous key factors:

- › Kind of resin
- › Relation PVC to CPVC
- › Kind of anti-corrosive pigment (physical, chemical and electrochemical properties)
- › Anti-corrosive pigment loading
- › Other pigments and fillers

- › pH-value, pH-stability during storage (especially when incorporated in water based systems)
- › Entire formulation
- › Dispersing conditions
- › And others

All these factors have to be taken into account by the determination and investigation of the ultimate corrosion inhibition formulation. Our experts are more than willing to assist you with all kinds of testing, formulation and corrosion protection know how queries.



Innovation and Customer Service Commitment

Heubach's worldwide R&D capabilities allow for us to combine our resources to continue the strong commitment to innovation in corrosion inhibiting products and protective coating technologies for a wide variety of applications.

Our globally active service team of highly motivated technical specialists are able to provide corrosion protection solutions. They are able to assist with a large number of questions regarding coatings formulation,

and are able to respond quickly to individual customers needs, which allows us to maintain our high standards of innovation on a long term basis.

Extensive application laboratory facilities available in Europe, India, China and the USA are working constantly on finding solutions both local and global for customers within the coatings industry. With the help of all kind of specific application and measuring equipment including e.g. weathering

stations, accelerated weathering test equipment as well as application laboratories dedicated to powder and coil coatings etc. we are able to support our customers to find the ideal corrosion protection solution.

We are looking forward to providing our experience and technology know how to you. A wide reaching network of strategically located offices on six continents ensures global customers short delivery times and flexible service.



Heubach initiated the replacement of chrome-based anticorrosives and became the world market leader in this field. First came standard zinc phosphates, which were free of chrome, but could not match the excellent performance of chromates.

That changed, when Heubach introduced modified product lines such as orthophosphates, polyphosphates, organic inhibitors and the WSA-line. The innovative energy fuelling this process is reflected in the following five product lines, which satisfy the full spectrum of modern protective coatings requirements.



Modified Orthophosphates

The modified orthophosphates are the milestone that originally established Heubach's industry leadership in chrome-free anti-corrosive pigments. HEUCOPHOS® ZPA, ZPO and ZMP set new standards in the industry by doubling the performance efficiency of conventional zinc phosphates. HEUCOPHOS® CMP is a new unique zinc-free anticorrosive with universal applicability.

High-Performance Polyphosphates

The search for chromate replacements in high-performance applications, such as coil coatings and aircraft primers led to the development of the polyphosphate line, which comprises the types HEUCOPHOS® ZAPP, SAPP, SRPP and CAPP. Heubach's high-performance polyphosphates are among the technically most sophisticated anti-corrosive inhibitors in today's market and are the preferred option wherever ultimate protection is required.

Organic Inhibitors

The finding of unique organic / inorganic synergies between HEUCORIN® RZ and HEUCOPHOS® that prevented corrosion even at low dosages opened the way to mainstream and high tech applications. This effect dropped formulation costs and as a result more and more formulators use HEUCORIN® RZ to optimize the protective properties of their anti-corrosive coatings.

WSA - Wide Spectrum Anticorrosive

HEUCOPHOS® ZAM^{PLUS} and ZCP^{PLUS} are the first chrome-free anticorrosives for universal use. These innovative products are specially designed to meet the demand of corrosion control coatings based on conventional, but also high solids, waterborne and powder resins. So far wide spectrum applicability had been the unique advantage of chromate pigments in the past, but the new wide spectrum anticorrosives have the potential to become technologically the cutting edge for the protective coatings of tomorrow.

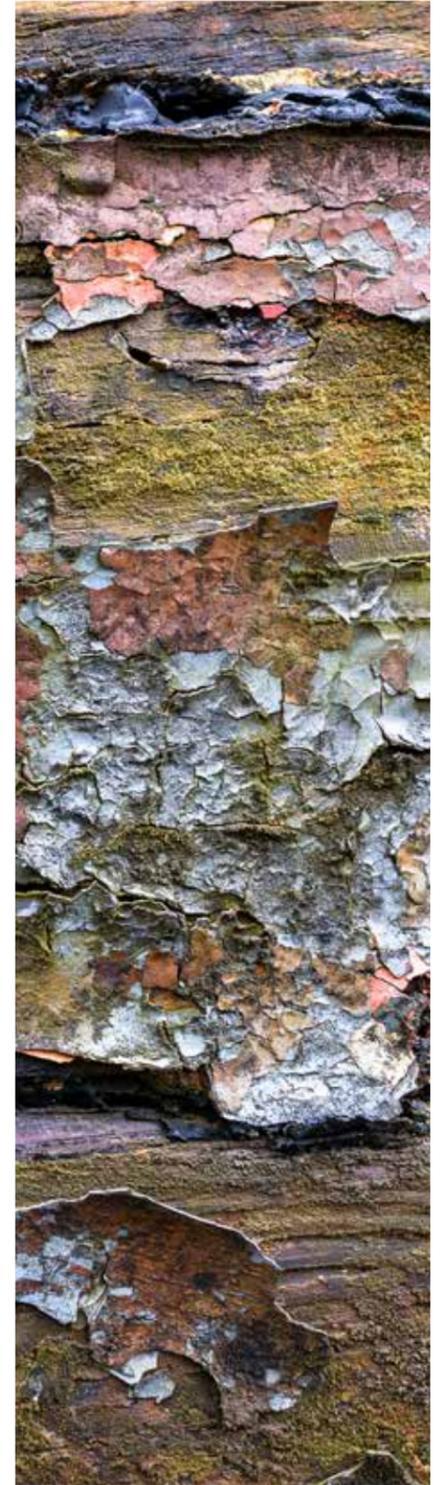
Calcium Modified Silica Pigment

The corrosion protection of pre-treated steel and aluminum sheets is becoming increasingly important and requires continuous R&D efforts to provide suitable and effective corrosion protection solutions.

HEUCOSIL™ CTF is a highly effective zinc-free anticorrosive based on a calcium modified silica gel meeting the specific performance requirements for thin-film applications.

Chemical Inventory Listings Status

All substances of the described HEUCOPHOS® and HEUCOSIL™ products are listed in the National Chemical Inventories: ELNECS/ELINCS (Europe), TSCA (USA), DSL (Canada), AICS (Australia), NZIoC (New Zealand), ENCS [MITI] (Japan), [KJECL (Korea) (except CMP), PICCS (Philippines) and IECSC (China).



Application Guide	Orthophosphates			
	HEUCOPHOS®			
	ZPA	ZPO	ZMP	CMP
Solvent-based Coatings				
Short and medium oil alkyds	+	+++	++	+++
Long oil alkyds	+++			++
High solids alkyds		++	+	+
2K Epoxies	+++	+	+	+++
Epoxy esters	+	++	+	+++
High solids epoxies	+	+++	+	+
2K Polyurethanes	+++			++
High solids polyurethanes	+++			+
Moisture cured polyurethanes	+			+
Silicone resins	+	+++		
Water Based Coatings				
Alkyd emulsions	+	++	+	++
2K Epoxies	+		++	++
1K polyurethanes		+	+++	++
2K polyurethanes	++		+	++
Silicone resins	++	+++		
Acrylics and modified acrylics		+	+++	++
Butadienes		+++	++	+++
Specialty Coatings				
Coil coatings	+			
Aircraft primers				
Wash and shop primers		+		++
Direct to metal	+	+++	+	++
UV cured systems			+++	
Powder coatings				+

Polyphosphates				WSA	Others	
HEUCOPHOS®				HEUCOSIL™		
ZAPP	SAPP	SRPP	CAPP	ZAM ^{PLUS}	ZCP ^{PLUS}	CTF
++			++	+++	+++	
++			++	++	+++	
				+++	++	
+	+++	++		+++	+++	++
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+++ Excellent choice ++ Good choice + Possible choice

■ In addition recommended in combination with HEUCORIN® RZ

■ Resins with low or no VOCs

Modified Orthophosphates

HEUCOPHOS® ZPA, ZPO and ZMP are active multi-level anti-corrosive pigments. Since the market introduction the three grades are among the most popular anti-corrosives in the industry. We have recently added a new, zinc-free and universal pigment HEUCOPHOS® CMP to our portfolio.

HEUCOPHOS® ZPA - a zinc aluminium orthophosphate hydrate is a zinc aluminium orthophosphate with improved phosphate loading. This leads to a controlled increase of inhibiting water soluble content and thus a better formation of protective layers on the metal surface.

HEUCOPHOS® ZPO - organically modified basic zinc orthophosphate hydrate shows excellent protective behaviour in many binder systems, e.g. alkyd resins and physically drying systems, due to the special organic modification

HEUCOPHOS® ZMP - a basic zinc molybdenum orthophosphate hydrate excellent results have been achieved by applying this anti-corrosive pigment e.g. in water based coating systems using 1-part polyurethanes.

HEUCOPHOS® CMP - is a new unique zinc-free anticorrosive with universal applicability. It is based on a special calcium phosphate complex which has been modified with an electrochemical active magnesium compound.

Key Benefits of Modified Orthophosphates

- › Compatibility with a wide range of resin types (ZPA, CMP)
- › Increased water soluble amount resulting in a better supply of inhibitive ions over a long time
- › pH-stabilizing effect due to basic components (ZPO, ZMP)
- › Improved pigment structure, particle size distribution and dispersibility
- › Improved long-term protection due to an increase of the phosphate content (ZPA, CMP)
- › Adhesion promoter function of the organic treatment between metal substrate and organic coating or between inorganic anti-corrosive pigment and binder (ZPO)
- › Non-hazardous metal complex based on phosphate (CMP)
- › Cost-effectiveness (CMP)

Technical Data	ZPA	ZPO	ZMP	CMP
Zinc as Zn [%]	38.5 - 40.5	55.5 - 58.0	53.5 - 56.5	-
Calcium as CaO [%]	-	-	-	43.5 - 47.5
Magnesium as MgO [%]	-	-	-	2.5 - 4.5
Aluminium as Al [%]	4.0 - 5.5	-	-	-
Molybdenum as MoO ₃ [%]	-	-	1.2 - 2.2	-
Phosphorus as PO ₄ ³⁻ [%]	53.0 - 56.0	37.5 - 39.5	37.0 - 40.0	-
Phosphorous as P ₂ O ₅ [%]	-	-	-	43.0 - 47.0
Organic content [typ. %]	-	0.3	-	-
Loss on ignition 600°C/1112°F [%]	9.0 - 12.5	7.0 - 11.0	6.0 - 9.0	5.5 - 7.5
Water-soluble chloride [max. %]	0.025	0.025	0.025	0.025
Water-soluble sulphate [max. %]	0.05	0.05	0.05	0.05
Conductivity [max. µS/cm]	300.0	300.0	250.0	1200
pH	5.5 - 6.5	6.5 - 7.5	5.5 - 7.5	5.5 - 7.5
Density [typ. g/cm ³]	2.8	3.6	3.5	2.8
Oil absorption value [typ. g/100g]	40.0	20.0	25.0	45
Sieve residue 32 microns [max. %]	0.01	0.01	0.01	0.01
Average particle size [microns]	2.0 - 3.5	2.0 - 3.5	2.0 - 3.5	3.0

Solvent-borne 2-part epoxy/polyamidoamine primer

Due to a controlled increase of inhibiting water soluble phosphate content HEUCOPHOS® ZPA shows improved long-term protection compared to zinc phosphate.

- › 744 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Cold rolled steel panels
ST 1205



Control

Zinc phosphate

HEUCOPHOS® ZPA

High-Solids 2-part epoxy/polyamide primer

HEUCOPHOS® ZPO shows significantly better performance properties than standard zinc phosphate in many applications. It has a pH-stabilizing effect due to basic ingredients. The organic modification also promotes adhesion between metal substrate and organic coating or anti-corrosive pigment and binder.

- › 2218 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Bare aluminium



Control

Zinc phosphate

HEUCOPHOS® ZPO

Waterborne acrylic primer

As a result of synergistic effects between molybdenum modification and phosphate ions HEUCOPHOS® ZMP shows excellent protective properties in many binder systems. It is also suitable for economical formulating due to the possibility to reduce the application volume compared with standard zinc phosphate.

- › 864 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Cold rolled steel panels
ST 1205



Control

Competition

HEUCOPHOS® ZMP

Solvent-borne 2-part epoxy primer

The very effective magnesium-calcium synergy within HEUCOPHOS® CMP helps to improve the overall corrosion resistance in a primer system. In contrast to other zinc-free anticorrosives it is applicable in a wide range of different resin systems with protective properties comparable to zinc containing pigments.

- › 504 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Sand blasted steel



Control

Zinc phosphate

HEUCOPHOS® CMP

High-Performance Polyphosphates

The polyphosphates are products based on acidic aluminium triphosphate modified with zinc, strontium, and calcium compounds. By means of altering the chemical structure it was possible to obtain pigments showing a different electrochemical effectiveness compared to orthophosphates. One key property of most polyphosphate grades is the significantly increased phosphate content.

HEUCOPHOS® ZAPP - a zinc aluminium polyphosphate hydrate with improved electrochemical activity. Due to its pigment characteristics, **HEUCOPHOS® ZAPP** is an effective anti-corrosive pigment for different binder systems.

HEUCOPHOS® SAPP - a strontium aluminium polyphosphate hydrate for application e.g. in 2-part epoxy coating systems. Its electrochemical activity in combination with improved long-term protection offers advantages for high-performance applications.

HEUCOPHOS® SRPP is a controlled adjusted modified strontium aluminium polyphosphate hydrate and a special adjustment of **HEUCOPHOS® SAPP** providing outstanding performance in coil coatings and aircraft primers.

HEUCOPHOS® CAPP - a calcium aluminium polyphosphate silicate hydrate which exhibits good results in water based 2-part epoxy resins and also other waterborne coating systems. **HEUCOPHOS® CAPP** is suitable for the application in combination with our other polyphosphates.

Key Benefits of High-Performance Polyphosphates

- › High electrochemical effectiveness due to altered chemical structure design
- › Higher phosphate content compared to most orthophosphates enables excellent long-term protective behaviour (**ZAPP, SAPP, SRPP**)
- › Suitable for replacement of chromates in high-performance applications

Technical Data	ZAPP	SAPP	SRPP	CAPP
Zinc as ZnO [%]	28.0 - 31.0	-	-	-
Aluminium as Al ₂ O ₃ [%]	11.0 - 13.0	10.5 - 13.5	10.5 - 13.5	6.0 - 8.0
Silicon as SiO ₂ [%]	-	-	-	28.5 - 31.5
Phosphorus as P ₂ O ₅ [%]	46.0 - 49.0	43.5 - 48.0	43.5 - 48.0	24.5 - 27.5
Calcium as CaO [%]	-	-	-	26.5 - 29.5
Strontium as SrO [%]	-	23.5 - 30.0	23.5 - 30.0	-
Loss on ignition 600°C/1112°F [%]	8.0 - 12.0	9.5 - 15.0	9.5 - 15.0	6.0 - 9.0
Water-soluble chloride [max. %]	0.025	0.025	0.025	0.025
Water-soluble sulphate [max. %]	0.05	0.05	0.05	0.05
Conductivity [max. µS/cm]	100.0	1400.0	1500.0	150.0
pH	5.5 - 6.5	4.5 - 6.0	4.0 - 6.0	6.0 - 9.0
Density [typ. g/cm ³]	2.8	2.8	2.8	2.6
Oil absorption value [typ. g/100g]	35.0	40.0	40.0	35.0
Sieve residue 32 microns [max. %]	0.01	0.01	0.01	0.01
Average particle size [microns]	2.0 - 3.5	2.0 - 3.5	2.0 - 3.5	2.5 - 4.0

Waterborne epoxy ester primer

HEUCOPHOS® ZAPP offers clearly improved pigment properties due to optimized process conditions of the phosphate condensation reaction. It shows excellent protection in a wide range of binder systems.

- › 552 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Cold rolled steel panels
ST 1205



Control Competition HEUCOPHOS® ZAPP

Solvent-borne 2-part polyurethane primer

HEUCOPHOS® CAPP is especially suited for application in systems which are sensitive towards zinc containing pigments, waterborne epoxies and acrylic dispersions. The polyphosphate silicate offers improved long-term protection due to a pH-buffering effect of the calcium compound.

- › 1406 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Galvanized steel



Control Calcium phosphate HEUCOPHOS® CAPP

High molecular weight polyester Coil primer, polyester topcoat

HEUCOPHOS® SAPP and the specially modified **HEUCOPHOS® SRPP** are both designed for the application in high-performance coatings primarily in coil and aircraft primers.

- › 3360 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Hot dipped galvanized steel pre-treated with Bonder 1303/NL6800/OE (chromium-free)



Control HEUCOPHOS® SAPP HEUCOPHOS® SRPP

Wide Spectrum Anticorrosives

The process of industrial development in the protective coatings world has been closely linked with increased pressure to reduce VOCs. The resin suppliers have developed and introduced new resins, such as high solids, waterborne, powder and UV-cured binders, which accordingly have changed the requirements placed on the anticorrosives.

HEUCOPHOS® ZAM PLUS - an organic modified zinc aluminium molybdenum orthophosphate hydrate:

HEUCOPHOS® ZAM PLUS is a development to meet the demand of protective coatings based on conventional and modern resin systems. It combines the basic chemistry of **HEUCOPHOS® ZPA**, **ZPO** and **ZMP** within one pigment. Its inhibitive properties are attributed to the utilization of certain substances within one product (synergistic effects)

and enable one to formulate protective coatings which are, at least, comparable in performance to chromium containing systems in a vast variety of applications.

HEUCOPHOS® ZCP PLUS - a zinc calcium strontium aluminium orthophosphate silicate hydrate:

HEUCOPHOS® ZCP PLUS has been developed to meet the economical and performance requirements of today and tomorrow. By controlled chemical modifications connected with optimizations of the manufacturing process, it has become possible to improve the electrochemical effectiveness as compared to existing chromate-free anticorrosives on the market for universal applications.

Key Benefits of Wide Spectrum Anticorrosives

- › Chromate-like universal applicability in many different conventional and modern resin systems
- › **HEUCOPHOS® ZAM PLUS** combines the well-known benefits of **HEUCOPHOS® ZPA**, **ZPO** and **ZMP** within one single pigment
- › **HEUCOPHOS® ZCP PLUS** has been tailored to interact synergistically with **HEUCORIN®** inhibitors for excellent performance properties
- › Effective at low loading levels compared to standard zinc phosphates
- › Replacement options for chromate based anticorrosives

Technical Data	ZAM PLUS	ZCP PLUS
Zinc as ZnO [%]	60.5 - 63.5	35.5 - 39.0
Aluminium as Al ₂ O ₃ [%]	1.0 - 2.5	2.0 - 4.0
Silicon as SiO ₂ [%]	-	14.0 - 17.0
Phosphorus as P ₂ O ₅ [%]	25.5 - 28.5	16.5 - 19.5
Calcium as CaO [%]	-	13.0 - 16.0
Strontium as SrO [%]	-	4.0 - 6.0
Molybdenum as MoO ₃ [%]	0.2 - 0.9	-
Organic content [typ. %]	0.2	-
Loss on ignition 600°C/1112°F [%]	7.0 - 11.0	5.5 - 10.0
Water-soluble chloride [max. %]	0.025	0.025
Water-soluble sulphate [max. %]	0.05	0.05
Conductivity [max. µS/cm]	300.0	100.0
pH	6.0 - 7.5	6.5 - 8.0
Density [typ. g/cm ³]	3.5	3.2
Oil absorption value [typ. g/100g]	18.0	30.0
Sieve residue 32 microns [max. %]	0.01	0.01
Average particle size [microns]	2.0 - 3.5	2.0 - 3.5

Waterborne alkyd emulsion primer

HEUCOPHOS® ZAM PLUS is specially recommended for waterborne, highsolids and even high-gloss applications due to the very low oil absorption of the pigment.

- › 672 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Cold rolled steel panels
ST 1205





Control
Zinc phosphate
HEUCOPHOS® ZAM PLUS

Waterborne acrylic primer

By controlled chemical modifications connected with optimization of the manufacturing process, it has become possible to improve the electrochemical effectiveness of **HEUCOPHOS® ZCP PLUS** compared to existing chromate-free anticorrosives on the market for universal applications.

- › 600 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Cold rolled steel panels
ST 1205





Control
Zinc phosphate
HEUCOPHOS® ZCP PLUS

Solvent-borne acid cured epoxy DTM coating

HEUCOPHOS® ZCP PLUS has been developed to meet the economical, ecological and performance requirements of both today and tomorrow. **HEUCOPHOS® ZCP PLUS** is also intended for use in combination with the organic corrosion inhibitors **HEUCORIN®**.

- › 576 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Iron phosphated steel panels





Control
HEUCOPHOS® ZCP PLUS
HEUCOPHOS® ZCP PLUS / HEUCORIN® RZ (9:1)

Organic Inhibitors

The utilization of modified phosphate pigments together with the organic inhibitors in solvent-borne and especially waterborne protective coatings provides an excellent opportunity to combine the performance characteristics of both worlds in terms of anti-corrosion synergy.

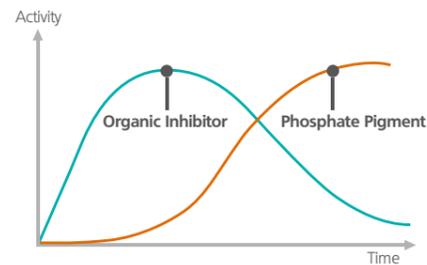
These combinations open possibilities to reduce the tendency towards blistering, to improve early substrate protection, adhesion and wet adhesion properties thus resulting in increased long term protection.

HEUCORIN® RZ - a zinc-5-nitroisophthalate

One major breakthrough in the world of anticorrosives was the discovery of especially one effective organic inhibitor, today well-known under the trade name HEUCORIN® RZ, which is based on a zinc salt of an organic nitro compound. Unique organic/inorganic synergies between HEUCORIN® and HEUCOPHOS® anticorrosives were found, in particular with HEUCOPHOS® ZCP PLUS that prevented corrosion even at low dosages. Adding only very small quantities of HEUCORIN® RZ leads to significant improvements of existing protective coatings.

Requirements on Organic Inhibitors

- › High activity at low concentration levels (typ. 0,5 - 2%)
- › Sufficient thermal stability
- › High activity in the range of pH 5-9 (preferably pH 2-14) Effective at low loading levels compared to standard zinc phosphates
- › Compatibility with a broad variety of resin systems
- › Easy to add in
- › Low water-solubility



Technical Data

Zinc as Zn [%]	43.0 - 46.0
Organic content [typ. %]	49.0
Moisture [max. %]	5.0
Water-soluble chloride [max. %]	0.025
Water-soluble sulphate [max. %]	0.05
Conductivity [max. µS/cm]	500.0
pH	6.5 - 8.0
Density [typ. g/cm³]	2.7
Oil absorption value [typ. g/100g]	40.0
Sieve residue 32 microns [max. %]	0.01
Average particle size [microns]	2.0 - 4.5

Chemical inventory Listing Status

All substances are listed in the National Chemical Inventories:

HEUCORIN® RZ

EINECS/ELINCS (Europe)

DSL (Canada)

AICS (Australia)

NZIoC (New Zealand)

[K]ECL (Korea)

PICCS (Philippines)

IECSC (China)

RZ

Zinc as Zn [%]	43.0 - 46.0
Organic content [typ. %]	49.0
Moisture [max. %]	5.0
Water-soluble chloride [max. %]	0.025
Water-soluble sulphate [max. %]	0.05
Conductivity [max. µS/cm]	500.0
pH	6.5 - 8.0
Density [typ. g/cm³]	2.7
Oil absorption value [typ. g/100g]	40.0
Sieve residue 32 microns [max. %]	0.01
Average particle size [microns]	2.0 - 4.5

Especially if blistering is a major issue in waterborne primer systems, the combination of HEUCOPHOS® ZCP PLUS with HEUCORIN® RZ often helps to overcome the problem.

- › 336 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Cold rolled steel panels
ST 1205



Control



HEUCOPHOS® ZCP PLUS



HEUCOPHOS® ZCP PLUS/
HEUCORIN® RZ (9:1)



Calcium Modified Silica Pigment

HEUCOSIL™ CTF is a highly effective zinc-free anticorrosive based on a calcium modified silica gel. The utilization of HEUCOSIL™ CTF in primer applications has a positive impact on the permeability of the coating as well as the tendency towards blistering and film breakdown. The result is outstanding long term protection.

Aggressive corrosion stimulating ions which enter the paint film can be neutralized due to the basic components in HEUCOSIL™ CTF which also have a pH-stabilizing effect.

The combination of HEUCOSIL™ CTF along with other active pigments provides further advantages in certain applications.

Technical Data	CTF
Calcium as CaO [%]	3.0 - 5.0
Loss on ignition 1000°C [%]	5.0 - 8.0
Water-soluble chloride [max. %]	0.025
Water-soluble sulphate [max. %]	0.05
Conductivity [max. $\mu\text{S}/\text{cm}$]	500.0
pH	6.5 - 8.5
Density [typ. g/cm^3]	2.2
Oil absorption value [typ. $\text{g}/100\text{g}$]	120
Sieve residue 32 microns [max. %]	0.01
Average particle size [microns]	2.0 - 4.0

Key Benefits of HEUCOSIL™ CTF

- › Different chemical and physical identity compared to phosphate based pigments
- › Low solubility
- › Reduces blistering and permeability
- › Enhances long term protection
- › pH-stabilizing effect due to the presence of basic components
- › Low density
- › Combination with other active pigments leads to further advantages



High molecular polyester coil primer, PVDF Topcoat

Replacement of strontium chromate in coil primer applications is still a serious challenge - HEUCOSIL™ CTF is one option.

- › 2000 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Hot dipped galvanized steel pre-treated with Bonder 1303/NL6800/OE (chromium-free)



Control

Strontium chromate

HEUCOSIL™ CTF

Solvent-borne 2-part epoxy / Polyamide primer

The utilization of HEUCOSIL™ CTF leads to lower blistering which has been confirmed by evaluations using accelerated and outdoor exposure.

- › 816 h Salt Spray (ASTM B 117-11)
DIN EN ISO 9227: 2012-09
- › Substrate: Cold rolled steel panels
ST 1205



Control

Competition

HEUCOSIL™ CTF



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