ZINGA®

A FILM GALVANISING SYSTEM WITH CATHODIC PROTECTION

Every year corrosion is costing billions to the industry. This corrosion doesn't merely make the assets appear neglected, more importantly it causes structural instability and consequently poses a serious safety hazard. It also causes severe disruption of the production process and thus profitability. ZINGA differentiates from other anti-corrosion methods in combining both Passive and Active protection in an easily applied film galvanising system that not only delivers active cathodic protection but also provides a passive physical shield.

EXTREME ENVIRONMENTS DEMAND **SUPERIOR PROTECTION**

WHAT IS ZINGA®?

ZINGA® is a one component Film Galvanising System containing 96% zinc (dust) in its dry film. It is a metallic coating and not a paint. The purity of the zinc used, is so high that dry ZINGA® does not contain any toxic elements.

ACTIVE AND PASSIVE PROTECTION

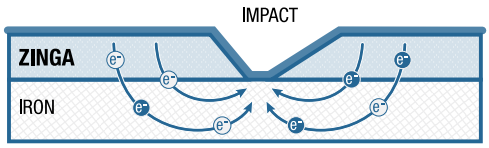
ACTIVE GALVANIC PROTECTION

The zinc in ZINGA® (anode) sacrifices itself, protecting the steel beneath in a comparable and even better way than hot-dip galvanising. Upon impact, the electron flow resulting from a potential difference between the Zinc and steel will prevent the steel from corroding.

PASSIVE BARRIER PROTECTION

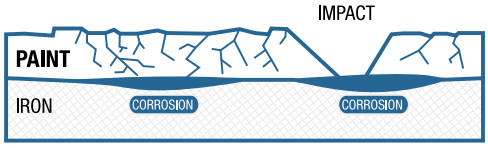
As the ZINGA® oxidises, a layer of zinc salts slowly builds up on the ZINGA® surface, closing the film and enhancing the barrier effect of the coating. Next to this, a supplementary barrier protection is provided by the binder in ZINGA®. The binder reduces the depletion of the Zinc, providing a long lasting active protection.

GALVANIC - NO CORROSION



PROTECTING LAYER	ZINC-SYSTEMS = ACTIVE SYSTEMS
REACTION DUE TO AIR AND MOISTURE	
$O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$	$Zn \rightarrow Zn^{2+} + 2e^-$
FORMATION OF:	ZnO

NON GALVANIC - CORROSION



PROTECTING LAYER	PAINT-SYSTEMS = PASSIVE SYSTEMS
REACTION DUE TO AIR AND MOISTURE	
$O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$	$Fe \rightarrow Fe^{2+} + 2e^-$
FORMATION OF:	Fe_2O_3

ZINGA®

IN ZINC WE TRUST FOR FIGHTING RUST

HOW CAN IT BE USED?

STAND ALONE SYSTEM

ZINGA® provides comparable protection to conventional galvanising without the need for topcoats. Although ZINGA® is only available in grey (the natural colour of zinc), the significant advantage of this form of application is that the ZINGA® layer can be re-coated at any point in the future with the bare minimum of preparation and without compromising the integrity of the coating (see Re-charging of ZINGA®). ZINGA® on its own is often used, because the structure is already on site or too big for the molten zinc baths. For optimal protection, ZINGA® should be applied in two layers of 60 or 90 µm DFT each.

AS A PRIMER WITH SUITABLE TOPCOATS

Not everybody likes the colour grey and with the additional protection of a compatible topcoat the coating durability offered significantly increases. ZINGA® does not even have to start actively working until the topcoat has been compromised and with no underlying corrosion creep or rust bubbling, the topcoat itself inevitably lasts longer. In a duplex system (Active + Passive), ZINGA® should be applied in 1 layer of min. 60 to 80 µm DFT.

AS SHOP PRIMER

At a thickness of 30-40 µm, ZINGA® can be used as a shop primer. The big benefit is found in the fact that the steel structures do not require reblasting before coating if ZINGA® is applied as a shop primer. The steel structure can be overcoated with ZINGA® to obtain a cathodic protection or with any other paint without the need for reblasting! Zinganised steel structures can be welded and bent during assembly.

REPAIR FOR WORN OR DAMAGED HOT-DIP GALVANISING OR HOT METAL SPRAY

This is probably the most common use of ZINGA® as it requires the simplest surface preparation. ZINGA®'s mechanism of protection is so similar to conventional galvanising that they work in complete unison, as they are merely different forms of zinc. Rather than replacing galvanised assets, structures can simply have their protection "re-charged" by applying ZINGA® to the rough surface of the old galvanising after appropriate decontamination and removal of the salts.

ON REBARS

Widely used in countries where the available concrete can be of lower quality (e.g. Iran, India, Saudi Arabia), Zinganising the steel re-bars before assembly and immersion in concrete ensures vastly increased protection from corrosion without reducing the pull-out strength of the bars. Recent tests in three independent laboratories showed that ZINGA® had at least twice the corrosion protection of either galvanised or epoxy coated rebars.

PHYSICAL & CHEMICAL PROPERTIES

- **RELATIVE DENSITY:** 2,67 kg/dm³ at 15 °C
- **DRY EXTRACT:** 80% in weight, 58% in volume (ASTM D2697)
- **TEMPERATURE RESISTANCE:** From -40 °C to +150 °C
- **COLOUR:** Grey (zinc)
- **THEORETICAL SPREAD RATE:** 3,62 m²/kg for 60 µm DFT
- **FLASH POINT:** 47 °C
- **SHELF LIFE:** Unlimited

ZINGA®	CHARACTERISTICS	HOT-DIP GALVANISATION	PAINT
✔	Active cathodic protection	✔	✖
✔	Easy application on site	✖	✔
✔	Reloadable	✔ WITH ZINGA®	✖
✔	Overcoatable	✖	✔
✔	Application under extreme circumstances (high & low temperatures and in humid environments)	-	✖ / ✔ *
✔	Unlimited shelf life	-	✖
✔	Contact with potable water = ok**	✔	✖ / ✔ *
✔	Flexible layer, adjusts itself to the metal structure (resistant to temperature variations and mechanical shocks)	✖	✖
✔	Welding on coated steel***	✖	✖
✔	The structure keeps its form during application.	✖	✔

** Requires special paints.*
*** Authorisation depends on local legislation.*
**** Please contact a Zingametall representative for more information.*

With hot-dip galvanisation, deformation of the structure is possible due to the use of high temperatures of molten Zinc. There is also potential for hydrogen embrittlement within welds.

HOW TO APPLY ZINGA®?

Once thoroughly mixed, ZINGA® can be applied by using a normal paintbrush, a short-fibre roller (not for the first coat), or a conventional or airless spray-gun. When applying ZINGA® by spraying it must only be thinned with Zingasolv.

ZINGA® can be applied in a wide variety of weather conditions. The application surface temperature range is from -15 °C to +60 °C, where conditions allow with a maximum humidity of 95% so long as the steel temperature is 3 °C above the dew point. Like all coatings the substrate surface should be free from all types of contamination.

PREPARATION OF THE SURFACE

NEW METAL SURFACES:
Steam-clean or high-pressure wash-down all surfaces, followed by a grit or slurry blasting to SA 2.5 to obtain a roughness degree Rz 50 to 70.

OLD, PREVIOUSLY GALVANISED, PAINTED AND/ OR RUSTY SURFACES:
Steam-clean to remove all contamination from porous surfaces. Allow to dry off and blast-clean as normal.

GALVANISED AND ZINGANISED STEEL IN (FAIRLY) GOOD CONDITION:
Steam-clean the surface, followed by a light sweep blast to remove the zinc salt layer.

DRYING TIME

ZINGA® is touch dry and dust-free in about 10 minutes at 20 °C (40 µm DFT).
It can be overcoated with a new layer of ZINGA® 1 hour after touch dry.
ZINGA® can be overcoated with a compatible paint after 6 to 24 hours, depending on drying conditions. To overcoat ZINGA®, use a mist/full coat technique.

ZINGA® RELOADING

Another of ZINGA®'s unique characteristics is its ability to re-liquidise when a new coat of ZINGA® is applied onto an existing ZINGA® layer to form a single homogeneous layer. This ensures a massive cost saving in on-going maintenance, because the old ZINGA® layer does not need to be removed before re-coating with a new ZINGA® layer (a removal of contaminants is required though).

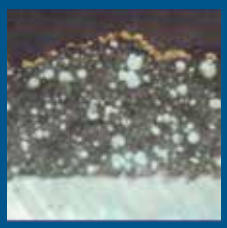


Fig. 1
A thin film of gold dust was applied on top of a first dry coating of ZINGA®. The coating was photographed using a strong microscope (µm scale).

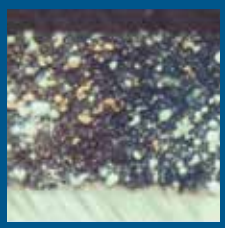


Fig. 2
Seven days later, a second coating of ZINGA® was applied on top of the gold dust. The gold dust becomes fully integrated within the two coatings, proving that the homogenisation of the two ZINGA® layers has actually taken place.

Fig. 3
The same test has been done with a zinc rich epoxy paint. The layer of gold dust remains intact between the two paint layers. The gold film is clearly visible, demonstrating that the two layers remain separate layers.

INDEPENDENT TEST RESULTS

Over the last 30 years ZINGA® has undergone numerous testing at different certified laboratories all over the world. All testing was according to local and international standards. The most important include:

- ISO 12944: ZINGA® 2 x 90 µm DFT - C5 I/M High
- NORSOK M-501- syst. 1 and 7: ZINGA® 2 x 60 µm DFT - passed
- ASTM B-117 (Salt spray): ZINGA® 2 x 90 µm DFT - over 4200 hours passed

CERTIFICATIONS AND APPROVALS

In consequence of ZINGA®'s performance (proven by testing), ZINGA® has been approved for use by governments, companies, armies. The most important include:

- Lloyd's Register (Approval for use in void spaces)
- European Technical Approval (Europe)
- Approval by APAS (Australia)
- Registration by Petrobras (Brazil)
- Approval by Ministry of Transport (Canada)
- Approval by Czech Railway (Czech Republic)
- Approval by GASCO (Egypt)
- Approval by Engineers India Limited (India)
- Approval by Statoil (Norway)
- Approval by CFE (Mexico)
- Approval by Meralco (Philippines)
- Approval by Agrement Technic (Romania)
- Approval by SWCC (Syria)
- Approval by Land Rover (UK)
- Approval by Crown's Castle (USA)

The Kalvoya bridge in Norway has been treated with ZINGA® in 1985. After 30 years, the bridge is still in good condition.

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