ZINGA v/s Hot Dip Galvanizing & Paints

ZINGA®	CHARACTERISTICS	HDG	Paint
✓	Active cathodic protection	✓	✗
✓	Easy application on site	✗	✓
✓	Reloadable	✓ With ZINGA	✗
✓	Easily overcoatable	✓ / ✗	✓
✓	Application under extreme circumstances (high & low temperatures and in humid environments)	n/a	✓ / ✗
✓	Unlimited shelf life	n/a	✗
✓	Contact with potable water = OK!	✓	✓ / ✗
✓	Flexible layer, adjusts itself to the metal structure (resistant to temperature variations and mechanical shocks)	✗	✗
✓	Welding on coating / use on welding	✗	✓ / ✗

ZINGA®	Paints
Active cathodic protection	
ZINGA® has the most important advantage that it offers a real cathodic (galvanic) protection. ZINGA® has a concentration of 96% special zinc in its dry layer which gives it its galvanic characteristics. The film galvanising system ZINGA® (also called “Zinganisation®“) distinguishes itself from cold galvanisation because of its higher quality. Only the application method of ZINGA® can be compared to traditional paint products, and not its protective properties.	Not even paints with a relatively high zinc content can provide cathodic protection. It has been scientifically proven that a concentration of at least 92% of distilled zinc in the dry film is required to rightfully use the terminology “cathodic protection throughout the dry layer”. Most of these zinc rich paints have only a small percentage of zinc, which does not guarantee a galvanising protection throughout the layer.
Easy application on site	
ZINGA® can be applied in the same way as paints.	Paints can applied on site using a brush or roller or spraying (airless, conventional).
Reloadable	
A cured ZINGA® layer, will reliquidise if a new layer of ZINGA® is applied. This ensures the creation of 1 ZINGA® layer with a continuous electrochemical contact between the Zinc particles and thus galvanic protection. If the ZINGA® layer is very old, the Zinc salts on the surface (ensuring a passive protection), need to be removed to ensure complete reliquidisation; this can be obtained by performing a light sweep blast.	Apart from reversible paints (e.g. vinyl paints), most paints cannot be overcoated with a paint without creating two separate layers. This can cause interlayer moisture and consequently weakening of the system. If a painted steel structures needs to be repainted, the entire structures needs to be blast cleaned.
Overcoatable	
ZINGA® can be overcoated with a fast drying, compatible paint. Care should be taken to avoid affection of the Zinc layer by aggressive solvents of the topcoat.	Protective paint systems mostly consist of 2 or 3 layers of paints; combining different types of paints to create a solid barrier layer and a decorative coloured finish.

ZINGA®	Paints
Application under extreme circumstances	
ZINGA® can be applied in a wide variety of weather conditions. The application surface temperature range is from -15°C to +40°C with a maximum humidity of 95% so long as the dew point is 3°C above the steel temperature.	Most paints have rather small windows of application. This includes window ranges of ambient temperature, relative humidity and/or steel temperature. Only specialized paints (which are more expensive) can be used in less favorable conditions, limiting the application frame in which structures can be coated.
Unlimited shelf life	
ZINGA® has unlimited shelf life. This means it is possible to always have ZINGA® in storage for touch up or for future projects.	Most paints have a shelf life of between 1 and 3 years. This prevents long storage of paints for touch ups.
Contact with potable water	
ZINGA® only contains non-toxic elements in its dry layer (after evaporation of the solvent). Therefore it can be, and has been, used in contact with potable water. Since the ZINGA® remains active, it produces Zinc salts which dissolve in the water. This can sometimes lead to small precipitations in the water, which are however non toxic. To avoid this, we recommend to wash the surface very thoroughly with fresh water. For more information, contact a Zingametall representative.	Only highly specialized paints can be used in contact with potable water. Since most paints use xylene, toluene or M.E.K. solvents, these cannot be used in contact with potable water as this poses threat to human health.
Flexible layer	
ZINGA®, containing 96% Zinc in the dry layer has very few binder. In fact, not every Zinc particle is completely surrounded by resin. This also explains why the ZINGA® layer is rough and porous. However, this is why ZINGA® behaves like a metal when it comes to impact and bending. An impact will simply push away and compress the Zinc particles, not “breaking” the ZINGA® layer.	Paints are formed by adding pigments and other components to a resin. Generally, the pigments take in only a small part of the paint; therefore the pigments are completely surrounded by resin. As the resin cures, it becomes a solid, strong product. However, this is also brittle. Upon impact, the resin will show cracks, creating a breach in the barrier that form the protection of a paint.

ZINGA®	Paints
Welding on coated steel	
Zinganised® steel can be welded without the release of any toxic fumes (tested according BS 6853) and with a very small burn back.	Steel that has been coated with a paint can not be welded unless the paint is removed in that area. Most paints release toxic fumes upon welding and leave a burn back (area where the paint is burned away by the welding) that is extensive.

ZINGA VS METALLISATION

ZINGA	Performance	Metallisation
Offers a cathodic protection throughout the layer, comparable to the cathodic protection of hot dip galvanising (*Prof. Defrancq - University of Ghent*).	**Active Protection**	Offers a cathodic protection throughout the layer.
A layer of zinc salts slowly builds up on the ZINGA surface. This creates a barrier protection for the metal substrate. Next to this, a supplementary barrier protection is provided by the binder in ZINGA. The binder reduces the disintegration of the zinc.	**Passive Protection**	The 100 % zinc in the thermal zinc spray system is a naked zinc, without the barrier protection of the zinc particles in ZINGA.
Does not need a topcoat. A single layer of ZINGA is in itself a Duplex system offering on one side an ACTIVE-CATHODIC protection, on the other side a PASSIVE-BARRIER protection.	**Unique System**	Has porosities and the zinc in a metallisation layer is a naked zinc, therefore it is necessary to apply a stabilisation coating before applying one or two topcoats.
ZINGA containing 96 % of zinc remains a flexible layer, and resists to mechanical shocks by being compressed. There is no risk of disbonding (not even around the impact) within a multiple layer of ZINGA. It will never show adhesion failures. Even on thin metal ZINGA remains always the same flexible layer.	**Flexibility and Brittleness**	The probability exists that abrasion and/or impact (e.g. road debris), due to the brittleness of thermal spray coatings, results in a high incidence chipping and crack propagation, thereby undermining the integrity of the coating surface. Excessive cracking, at any DFT, when applied to thin/flexible metal surfaces. As a result, the thermal zinc spray flakes off and/or cracks due to metal surface flexure, thereby undermining the integrity of the coating coverage.
ZINGA will not break down at sharp corners due to its flexibility.	**Sharp corners**	Thermal spray coatings tend to break down at sharp corners creating target corrosion sites.
A polymerised ZINGA layer will re-liquidise upon contact with ZINGA, even after 20 years.	**Reloading**	After application, the zinc will not re-liquidise upon contact with a new layer.
	Application	
ZINGA is applied on a clean and rough surface to be obtained by a blasting Sa 2 ½, 12.5 µm with the right blasting material. A complete cleaning to the white metal is not required, a certain degree of adhering rust can be accepted, it will even increase the binding of the ZINGA to the metal surface.	**Surface Preparation**	The Thermal Spray process requires an extremely clean white blast metal surface (Sa 3) for a proper binding 0integrity. Extreme and absolute dry surface is required. Fully cleaned surfaces are critical to the Thermal Spray process. Moreover, white cleaning is difficult to obtain over large surface areas. The clean white metal grit blast process (to SSPC-SP-5) can also produce component distortion. Conventionally it is advised to use the Thermal Spray within 30 minutes in the open air and within 6 hours in covered areas.
A ZINGA-coating can be applied everywhere under normal conditions, regardless of temperature and humidity. It does not require highly qualified personnel.	**Work Force**	Thermal Spray coatings are very labour intensive and have to be performed by highly trained technicians in a workshop.

ZINGA can be applied in a complete automatic unit by spraying or dipping.	**Automatisation**	Thermal Spray cannot be applied automatically.
ZINGA can be applied in humid circumstances and this will accelerate and improve the polymerisation of the ZINGA layer.	**Humidity**	There is a poor Thermal Spray application consistency due to the sensitivity to humidity of the Thermal Spray compound. Specifically, during application, flow from the nozzle to the vehicle surface the Thermal Spray Aluminium can experience a chemical reaction causing application of a dual material compound (aluminium and aluminium oxide), instead of exclusively Aluminium. The aluminium oxide is highly prone to chipping which results in the forming of voids and defects in the applied coating.
The most economic and easiest way to apply ZINGA is by dipping. Internal surfaces of the components can be treated by dipping without the need of de-gazing : ZINGA is always applied at ambient temperature.	**Internal coating**	It is impossible to coat internal surfaces by Thermal Spraying. (e.g. most notable vehicle components, not readily accessible unless fully disassembled).
ZINGA is not restricted regarding time laps between surface preparation and application. ZINGA can even be applied on blow oxidation.	**Time Laps in Applications**	The Thermal Spray process is demanding and difficult to control in mass production (e.g. mass vehicle production) environment versus component work or smaller quantities. This is primarily due to the necessity to apply the Thermal Spray compound immediately after surface cleaning and preparation, because even minimal post-cleaning contamination on the metal surface will undermine the integrity of the Thermal Spray application.
The film thickness can easily be measured (wet and/or dry) so that the dry layer thickness will be close to the required (uniform) thickness.	**Film Thickness Control**	The Thermal Spray application process is difficult to control regarding thickness uniformity over large areas. This is particularly true for lower thickness levels
Welding on ZINGA is possible, once the welding is finished, roughened and cleaned, a new ZINGA layer over the welding will provide an all over protection.	**Welding areas**	Metallisation should be avoided at least to 5 cm from the welding areas, this in order not to influence the quality of the welds by zinc.
ZINGA can be repaired and reloaded at any time. The old ZINGA surface should be clean of dust and loose rust. After a certain time repairs become invisible.	**Repair**	Thermal coatings are very difficult to repair. A blasting or grinding of the surface would be required and the application of the repair layer must be executed very carefully. Repairs will remain visible.
	General	
The cost price of ZINGA is comparible to the price of other protective coatings. The application costs will be relatively low.	**Cost Price**	Comparing the same thickness, Metallisation is about 30 to 40% more expensive than Zinganisation. This is if only the product and application cost are considered, all superior qualities of zinganisation left unconsidered.
Atmospheric: 5.5 – 12.5 Immersion: 5.5 – 9.0	**pH Limitations**	Atmospheric: 5.5 – 9.0 Immersion: 5.5 – 9.0

ZINGA®	HDG
Active cathodic protection	
ZINGA® has the most important advantage that it offers a real cathodic (galvanic) protection. ZINGA® has a concentration of 96% special zinc in its dry layer which gives it it's galvanic characteristics. ZINGA® (also called "Zinganisation") shows comparable protection as HDG.	Steel members which have been hot dip galvanized have proven cathodic protection by the sacrificial action of the the zinc on its surface. Damages to the HDG steel substrate show protection by the throwing power of the zinc layer.
Easy application on site	
ZINGA® can be applied in the same way as paints, on site or in workshops.	Hot dip galvanization cannot be realized on site. The steel structures or beams have to be transported to and from the HDG plant. In case of repairs they have to be de-mounted or dismantled, transported to the HDG plant, hot dipped again, transported to the workplace or building site and re-mounted.
Reloadable / Rechargeable	
A cured ZINGA® layer, will reliquefy if a new layer of ZINGA® is applied on top of it. This ensures the creation of one homogenous ZINGA® layer with a continuous electrochemical contact between the Zinc particles, providing full galvanic protection. If the ZINGA® layer is very old, the Zinc salts on the surface (ensuring a passive protection), need to be removed to ensure cleanliness of the surface and complete reliquefication with the old ZINGA® layer; this can be obtained by performing a light sweep blast or a high pressure hot water washing.	Hot dipped structures can be hot dipped again but will require demounting or dismantling, blasted eventually and dipped into the Zinc bath. ZINGA®'s mechanism of protection is so similar to conventional galvanizing that they work in complete unison, as they are merely different forms of zinc. Rather than replacing galvanized assets, structures can simply have their protection "re-charged" by applying ZINGA® to the rough surface of the old galvanizing after appropriate decontamination and removal of the salts.
Overcoatable	
ZINGA® can be overcoated with a fast drying, compatible paint. Care should be taken to avoid contamination of the Zinc layer by the use of aggressive solvents in the topcoat. The use of alkyd paints on top of ZINGA® is to be avoided.	HDG requires specialized, compatible paints ; a thorough surface preparation is also needed before the application of a topcoat on HDG. This includes alkaline or acid rinsing and sweep blasting of the surface.

ZINGA®	HDG
Application under extreme circumstances	
ZINGA® can be applied in a wide variety of weather conditions. The ambient temperature should be between -15°C to +50°C with a maximum humidity of 95% as long as the dew point is 3°C above the steel temperature.	Not applicable. A HDG layer is applied in the hot dip plant.
Unlimited shelf life	
ZINGA® has an unlimited shelf life. This means it is possible to always have ZINGA® in your inventory for touch up or for future projects. ZINGA® has a very long pot life. An opened ZINGA® can be re-used many days after having opened it (if carefully closed). When opened, ZINGA® will not form a skin layer.	Not applicable.
Contact with potable water	
ZINGA® does not contain toxic elements in its dry layer (after evaporation of the solvent). Therefore it can be, and has been, regularly used in contact with potable water. Since the ZINGA® remains active, it produces Zinc salts which dissolve in the water. This can sometimes lead to small precipitations in the water, which are however non-toxic. To avoid this, we recommend to do a water saturation with fresh water 12 hours after application of the ZINGA®. For more information, please contact the Zingametall Tech Team.	Galvanizers that have submitted test coupons of their galvanized steel and have been approved by the NSF (National Science Foundation) have the authority to galvanize steel for use with potable water

ZINGA®	HDG
Flexible layer	
ZINGA® containing 96 % of zinc remains a flexible layer, and resists to mechanical shocks by being compressed. There is no risk of disbonding (not even around the impact) within a multiple layer of ZINGA®. It will never show adhesion failures. Even on thin metal ZINGA® will keep its flexibility. An impact will simply push away and compress the zinc particles, not “breaking” the ZINGA® layer.	When hot-dipped structures are bent over a certain angle, the coating could be damaged and the total structure will need to be hot-dipped again in order to restore the coating. It is recommended to use a zinc rich liquid coating (like ZINGA®) In general, it is advised to bend the structures before hot-dipping. In practice, this is not always possible (e.g. pipes that need to be fitted to form connections).
Small burn-back on welded steel	
Zinganised steel can be welded without the release of any toxic fumes (tested according to BS 6853) and with a very small burn back. Since the ZINGA® is not in any way alloyed with the steel, there is no danger of zinc inclusion in the weld. Once the welding is finished, roughened and cleaned, a new ZINGA® layer over the welding will provide an all over protection.	For HDG structures it is recommended to weld before hot-dipping. If welded after hot-dipping, the zinc coating should be removed at least one to four cm from either side of the intended weld zone and on both sides of the steel part. Grinding is the most effective means of removing the galvanized coating.
No risk of deformation of the steel beams or members	
ZINGA® is applied under ambient temperature and there is no risk of deformation / distortion of the steel structures or members.	With hot-dip galvanization a risk of deformation of thin steel beams or members will need consideration. (due to the use of high temperatures of molten Zinc @ 450°C).