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Overview:

Many painters and people new to Zinga applications think that the mist-coat technique is unique to Zinga duplex coating systems, whereas it is in fact considered globally to be 'best practice' when applying any form of a sprayed paint coating.

Painters who complete a five-year apprenticeship will be taught this as part of their training.

The first light coat of paint or sealer applied over most zinc coatings such as hot-dip galvanising, thermal-spray zinc, zinc-silicates and Zinga etc is always known as a 'mist-coat', because it comes out of the spray-gun almost like a mist because it is so light and thinly applied.

In the USA, many applicators call it a 'tack coat', primarily because the initial light coating is left to 'tack off' for around 10-20 minutes, depending on paint type and thickness, air temperature etc.

This 'tack-off' period (known as a 'flash-off' period in European and Far Eastern countries) allows the solvents to evaporate from the film, leaving the coating almost dry on its surface but still sticky or 'tacky' when touched by the finger.

This light 'mist' coating:

1. seals the porous zinc coating and prevents pinholes from forming in any applied topcoats
2. gives additional adhesion to the steel substrate by the zinc through spreading the 'point loading'
3. supports the second coat of the paint or sealer to be applied with its stickiness or 'tack'
4. prevents runs, sags and 'curtaining'(when a long sagging 'wave' appears on a vertical painted surface) because the mist or tack coat 'holds up' any subsequent coatings that are applied on top of them.

Pin-holes:

Why do pin-holes form through paint layers applied onto zinc coatings?

Some zinc coatings are porous on their surfaces, due to the way in which they are manufactured or due to the way they are applied (such as with thermal zinc coatings).

Zinc silicates like Aquazinga have an open latticework structure throughout their coating-films and this holds air, but on very humid days it can contain both air and moisture.

When a heavy coating is applied over the zinc layer, the trapped air and / or moisture tries to escape and it normally escapes through the wet coating-film.

By the time the air and /or moisture forces its way through the coating's film, it has already started 'setting up' (drying on the upper surface of the coating) due to evaporation of the solvent and also due to cross-linking/oxidation of the coating.

When the trapped air/moisture pushes through this coating, the paint cannot 're-flow' and seal the hole/s left behind in the film, because with the solvent gone and curing reactions beginning the coating viscosity is now too high to allow any movement within the paint-film.

So the holes (or pin-holes) left behind can often penetrate right through to the zinc layer, which allows water, water vapour, condensation and salts etc to gain access directly to the zinc layer.

Mist-coats on Zinga duplex systems:

Mist-coating is used on Zinga duplex systems for:

1. application of a sealer-coat as part of a two or three-coat system
2. application of a 2K polyurethane or 2K acrylic directly onto Zinga as part of a 2- coat system

Mist-coat Techniques:

Drying period of the zinc layer:

1. For polyurethane sealers such as Alufer N, or topcoats like the PU tar-free MIO black or for 2K polyurethane or 2K acrylic: always ensure that the Zinga layer has been dried and cured for a minimum of six hours @ 20°C.
2. For epoxy sealers such as Zingaceram EP MIO, always ensure that the Zinga has been dried and cured for a minimum of 12 hours @ 15-20°C, and in the colder months this must be a minimum of 24 hours.

In hot countries with minimum daily ambient temperatures of 30-35°C and daily relative-humidities of around 45% this curing period can be shortened to around 8 – 10 hours.

Application of mist-coats

Two-coat system: Zinga + 2K PU or 2K acrylic topcoat

- 1 The first layer of the top-coat to be applied directly over the Zinga layer should be mixed as normal. If it is a standard 2K PU or 2K Acrylic paint, it will normally be of a lower viscosity with lower solids content anyway (normally around 50% solids), and it will be possible to apply the mist-coat with the standard application dilution of the paint with no problems whatsoever.
- 2 The first coat must be applied to a maximum wet-film thickness in the range of 50-70µm, and if you cannot measure this thickness due to lack of equipment, a good visual guide to use is the opacity of this mist-coat. After application, it should be semi-transparent with the zinc layer just visible.
- 3 Allow the mist-coat to flash off for around 10-15 minutes at 20°C. This period can be shortened to around 5 - 10 minutes at 30°C in hot countries or in heated paint-shops.
Note: 2K PU finishes do not go totally matt after flash-off, but they do go a bit dull.
- 4 After this flash-off period, a second slightly heavier coat to bring up the final coating thickness of the 2K coating into the range of 50 – 70µm DFT and then allow it to cure for six hours, unless it is to be baked in an oven at 40°C or infra-red curing is being used, then a 10-minute cure will be suitable.

Three-coat system: Zinga + Alufer N sealer + topcoat

1. After the Zinga layer has cured for a minimum of 6 hours @ 20°C the mist-coat of Alufer N can be applied.
2. The Alufer N must be diluted in the range of 10 – 15% and thoroughly well mixed.
Note: Only mix enough for the mist-coating process, because the full-coating process requires the Alufer N to have the optimum binder/pigmentation ratios to perform properly.
3. The spray-nozzle must never be smaller than 1.5mm at this dilution, because the MIO pigmentation can potentially clog the spray-tip of the gun with smaller diameter nozzles.
4. Never over-dilute the Alufer N, as there could be some settlement of the pigmentation. This would allow the clear binder with a reduced amount of MIO pigmentation through the spraygun and hence a lower dry film-build than required.
5. Apply the first mist-coat and allow it to flash off for 15 – 20 minutes @ 20°C.

In hot countries with local ambient temperatures of 30 -35°C this time-period can be reduced to a maximum of 10 minutes.

6. Where possible, use a wet-film comb to check the WFT.

Where no wet-film comb is available, a visual check should reveal the Zinga layer beneath the mist-coat. If the Zinga cannot be seen, then the mist-coat is too heavy.

7. After 10-12 minutes, the coating-film can be inspected by observing the surface of the coating from a shallow angle. It should be showing a matt aspect. If more than 50% of the surface is till shiny, then the Alufer N must be given another full 10 minutes to thoroughly flash-off.

Note: the coating takes on a matt aspect because the resin binder is being drawn into the porosity of the zinc underneath, leaving a bit more pigmentation behind on the surface.

In paint chemistry, this coating layer is known as being 'under-bound'.

8. Once the mist-coat has flashed-off for the required time-period and/or has taken on a matt aspect, a second heavier coat now be applied. This should bring the film-thickness to around 80µm DFT.

If this is film-thickness is not heavy enough, another single heavy layer measuring 80µm DFT can be applied after a 6-hour curing period to bring the coating thickness up to 160µm DFT.

Three-coat system: Zinga + Zingaceram EP MIO sealer + topcoat

1. The first layer of Zingaceram EP MIO sealer to be applied over the Zinga layer should be diluted in the range 10 - 20%. This wide variance in dilution is because where the ambient temperature is below 10 degrees the paint requires a lot more solvent to reduce the viscosity. This enables the applicator to put the sealer through a 2.0 mm spray-nozzle and at a very low film-thickness. If the sealer causes the spraygun to 'spit' or 'sputter' then it is not diluted enough. The sealer should come through smoothly and with a good clean fan pattern.

2. The applied wet-film thickness must be in the range of 50-70µm, and it must never exceed 70µm. Where possible a wet-film comb should be used.

If this thickness cannot be measured accurately due to a lack of equipment, a good visual guide to use is the opacity of the mist-coat. It should be semi-transparent or even almost transparent. If you cannot see the zinc layer underneath, then the mist-coat is too heavy.

3. Allow the mist-coat to flash off for around 15-20 minutes at 20°C. After 10-12 minutes the surface of the Zingaceram EP MIO must be inspected by observing it from a shallow angle, and at this point in time the surface aspect should be almost matt. If there are still any shiny areas remaining, then the flash-off period must be extended by at least 10 minutes.
4. This period can be shortened to around 10-12 minutes at 30°C in hot countries like South America, the Middle East, North Africa etc or where the coating is being done in a heated paint-shop.
5. Once the first-layer of the mist-coat has flashed-off for the specified time and has gone matt across the entire surface, then a second mist-coat (or 'full-coat') can now be applied. This is necessary, because the first mist-coat layer will have lost a proportion of the coating-film when it was being drawn into the porous zinc surface. This can leave some areas of the epoxy sealer with a very thin layer-thickness which requires another layer to build it up in order to completely seal the zinc layer.
6. After the second mist-coat layer has cured for 12 hours at 20°C or for 24 hours at temperatures below 10°C the coating-thickness can be checked. Where the sealer must be built up even further to achieve a specified film-thickness, this additional layer can now be applied in a single heavy coat.

Roller applications:

Under certain circumstances, such as in many boat-yards and other locations where any form of spray-painting is expressly forbidden due to health and safety regulations or where the risk of paint damage to other structures or vessels is very high, then the sealer-coat/s must be applied by roller.

When this is done, never dilute the material that is to be applied!

Mist-coating is aimed at removing solvent as fast as possible from the coating-film, and the addition of any solvent will be counter-productive.

Notes:

- i. Only ever use short-haired rollers (also known as 'short-nap' rollers), as long-haired rollers will introduce air into the coating and this will often lead to pin-holing of the finished coating.
- ii. Never use foam or sponge rollers, as they will dissolve in the solvent.
- iii. Never use sheepskin rollers, as they are designed for application of emulsions (wall paints).

Here is a step-by-step guide to roller application:

1. Load the roller with the material, and apply it in long vertical strokes onto the surface of the zinc.
 2. Without re-loading the roller, 'pull out' the material horizontally at 90° to the original direction of application, applying a steady pressure on the roller. This is known as 'boxing' and gives a smooth even finish that looks like a sprayed finish when done correctly.
 3. If the material still looks a bit on the heavy side, it can be 'pulled out' again at 90° to get it as thin as possible and to assist in removing the solvents from the film.
 4. As per a spray-application, the original sealer-coat can be left for 20 minutes to flash off and then another coat can be roller-applied. Once again, check that the original film has turned uniformly matt all over, as this indicates that the solvent has totally left the film and it is ready for the second application.
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Mist-coat Specifications

2-coat system: Zinga + 2K PU		
A	<i>Spray-nozzle diameter</i>	1.8mm (for spraying PU or acrylic coatings)
B	<i>Spray pressure</i>	4 bars (65 psi)
C	<i>Dilution</i>	As per data-sheet
C	<i>Mist-coat</i>	40-60 µm WFT (20-30 µm DFT)
E	<i>Flash-off</i>	15-20 minutes @ 20°C
F	<i>Surface aspect</i>	Matt
G	<i>Second coat</i>	40-60 µm WFT (20-30 µm DFT)
H	<i>Surface aspect</i>	High gloss
I	<i>Film-build</i>	Total-build achieved for 2K PU

3-coat system: Zinga + Alufer N + topcoat		
A	<i>Spray-nozzle diameter</i>	1.8mm (smaller nozzles may trap MIO pigmentation)
B	<i>Spray pressure</i>	4 bars (65 psi)
C	<i>Dilution</i>	Warm weather 10-20% / Cold weather up to 25%
D	<i>In-line filters</i>	Remove - very bad to use them on MIO coatings
E	<i>Mist-coat</i>	50-60µm WFT (30-40 µm DFT)
F	<i>Flash-off</i>	15-20 minutes @ 20°C
G	<i>Surface aspect</i>	Matt
H	<i>Second coat</i>	50-70 µm WFT (33-46µm DFT = total of 80µm DFT)
I	<i>Surface aspect</i>	Matt

3-coat system: Zinga + Zingaceram EP MIO + top-coat		
A	<i>Spray-nozzle diameter</i>	2.2mm (smaller nozzles may restrict paint-flow)
B	<i>Spray pressure</i>	4 bars (65 psi) and on cold days below 10°C 5 bars (70 psi)
C	<i>Dilution</i>	Warm weather 10-20% / Cold weather up to 25%
D	<i>In-line Filters</i>	Remove - very bad to use them on MIO coatings
E	<i>Mist-coat</i>	50-70µm WFT (30-40µm DFT) initial coat
F	<i>Flash-off</i>	15-20 minutes @ 20°C
G	<i>Surface aspect</i>	Matt or near matt
H	<i>Second coat</i>	50-70 µm WFT (30-40µm DFT = total of 80µm DFT)
I	<i>Surface aspect</i>	Matt or near matt
J	<i>Film-build</i>	Should be around 70-80µm DFT
K	<i>Final total film-build</i>	After 12 hours curing @ 20°C apply 90µm WFT Zingaceram