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TECHNICAL SPECIFICATIONS FOR ZINGANISATION

ZM-RE-ONT-09-A

Complementary to the technical data sheet of Zinga, these technical specifications for zinganisation give an overview of the specific surface preparation and application instructions for each type of surface.

Surface preparation

Cleanliness and roughness

- **Main rules**

In order to obtain a cathodic protection, an electric contact is required between Zinga and its substrate. Therefore the substrate must be **clean** and **rough**. That is the main rule.

It is very important to keep the following working order in mind :
1. eliminating all dirt, grease, oil and salts
2. total removal of all old paint, rust and mill scale
3. roughening
4. dedusting or rinsing

- **General guidelines to obtain cleanliness**

First we describe the most common method to obtain a clean (and at the same time rough) surface for the application of Zinga:
The metal substrate should first be **degreased**, preferably by **steam-cleaning** at 140 bar at 80°C. After that it should be **grit-blasted** or **slurry-blasted** to cleanliness degree SA 2,5 according to the standard ISO 8501-1 or to the cleanliness degree described in the standards SSPC-SP10 and NACE nr 2. This means that the surface must be free from rust, grease, oil, paint, salt, dirt, mill scale and other contaminants. Once the grit-blasting is completed the surface should be **de-dusted** with non contaminated compressed air according to the standard ISO 8502-3 (class 2) or in case of slurry-blasting the surface should be **dried** with non-contaminated compressed air.

Another method to obtain a clean surface is **UHP water-jetting** to cleanliness degree WJ1 according to the standards NACE nr 5 and SSPC-SP12. But keep in mind that this method does **not** create surface roughness.

This high degree of cleanliness is not needed when Zinga is applied on a hot-dip galvanisation or a metallisation layer, or when it is applied on top of an existing Zinga layer. Please refer to the additional **technical specifications for zinganisation** for relevant detail.

For substrates that will not be immersed Zinga can be applied on mild flash rust occurring in the above time periods. For applications that will be immersed Zinga can only be applied on an SA 2,5 prepared surface unless otherwise agreed with the Zingametall representative.

On small areas or on non-critical applications Zinga can be applied on a surface that is manually prepared to degree St 3 according to ISO 8501-1. Please consult with the Zingametall representative.

- **General guidelines to obtain roughness**

Zinga should be applied on a metal substrate that has roughness degree Rz 50 to 70 µm (for total DFT < 280 µm) or Rz 60 to 80 µm (for total DFT > 280 µm) according to the standard ISO 8503-2. This can be obtained by **grit-blasting** (with sharp particles) but not by shot-blasting (with spherical particles). Make sure that the surface is degreased **before** the grit-blasting.

This high degree of roughness is not needed when Zinga is applied on a hot-dip galvanisation or a metallisation layer, or when it is applied on top of an existing Zinga layer. Please refer to the additional **technical specifications for zinganisation** for relevant detail.

On small areas or on non-critical applications Zinga can be applied on a surface that is manually prepared e.g. with a needle gun or a grinding disk, in order to obtain an adequate roughness for Zinga. Please consult with the Zingametall representative.

- **Maximum time to application**

Apply the Zinga as soon as possible on the prepared surface.
- in dry circumstances : max. 24 hours waiting time
- in case of slurry-blasting or if the relative humidity is close to 80% : max. 4 hours waiting time

If contamination occurs before coating, the surface must be cleaned again as described above. Flash rust can be removed by means of an iron brush.

- **Additional information concerning grit-blasting**

The type of grit used for blast-cleaning is preferably either copper slag or garnet with an angular shape. It is very important that the grit used for blasting, consists of different sizes of granules, as described in the norm ASTM C136. A grit mixture with small and heavy granules will give optimal results. The composition of the grit mixture and the size of the granules can be analysed by the sieve test described in ISO 0787-18. A variable grit mixture will produce a very variable surface structure with many high and low peaks, which is ideal for Zinga. For instance a mixture of garnet grit of 30 to 80 mesh is very good. Of course you should always make sure that the grit is clean and does not contain any salt, oil or grease.

The compressor must produce a blasting pressure of 6 to 8 bar at the blasting nozzle. Also make sure that air coming out of the compressor is dry and free from grease and oil. For this purpose you can use an air cooler and a water trap. The presence of contamination in the compressed air can be tested by the Blotter test according to ASTM D4285.

Specific instructions for different types of surfaces

- **New or old steel without galvanising coating**

Follow the above mentioned general guidelines to obtain cleanliness and roughness.

After the surface preparation the total surface must be completely coated with Zinga up to the required DFT.

- **New hot-dip galvanisation or new metallisation (zinc-spraying)**

The newly galvanised or metallised substrate should first be **degreased**, preferably by **steam-cleaning** at 140 bar at 80°C.

Normally a newly metallised surface is rough enough for the application of a Zinga layer but newly hot-dip galvanised substrates have to be roughened in order to obtain a good adhesion. There are different options :

- A first option is using an **etching** product (e.g. GalvafixII, supplied by Zingametall). This product chemically removes little parts of zinc from the galvanised surface, thus creating small pits. This way an adequate roughness for the application of Zinga is obtained. If you use GalvafixII, you should **rinse** it off the surface before it is dry using fresh water.
- Another option is **sweep-blasting** the surface with angular non-metallic grit. This standard of blasting will remove approximately 10 to15 µm of zinc as well as all the surface contaminants. It will also provide an acceptable profile for the Zinga to bond with. If the blast angle exceeds 45°, the blast profile will be too deep. The nozzle size must be a minimum of 10 mm. Regulate the blast-nozzle pressure at 3 bars. A test section should be done to measure the zinc thickness before and after the blast. Once the sweep -blasting is completed the surface should be **de-dusted** with non contaminated compressed air according to the standard ISO 8502-3 (class 2).
- Yet another option is roughening the surface with a rotating abrasive disk or a chipping hammer. Once completed the surface should be **de-dusted** as described.

After the surface preparation the total surface must be completely coated with Zinga up to the required DFT.

- **Hot-dip galvanised or metallised structures with only up to 5% rust**

First of all **UHP water-jetting** is necessary to remove dirt, grease, oil, salts, paint and rust. The rust can also be removed manually with a rotating abrasive disk or a chipping hammer.

If the structure to be treated is only slightly oxidised or just weathered, the rusty areas must be **locally touched-up** with one or more layers of Zinga. In most cases the formation of rust has created an adequate roughness profile to obtain a good adhesion between the Zinga and the formerly galvanised or metallised steel. However, if this is not the case, the surface must first be roughened as described above: either with an etching product, or by sweep-basting or with a rotating abrasive disk or a chipping hammer.

After doing the local touch-ups the total surface should be completely coated with Zinga, in order to recharge the existing hot-dip galvanisation or metallisation layer.

- **Hot-dip galvanised or metallised structures with over 5% rust**

If the structure to be treated shows over 5% of rust, then this means that the cathodic protection of the steel is for over 50% used and local touch-ups will not be sufficient. A surface preparation using blasting techniques is preferred. Follow the above mentioned general guidelines to obtain cleanliness and roughness.

After the surface preparation the total surface must be completely coated with Zinga up to the required DFT.

- **Zinganisation**

The surface preparation before recharging is reduced to a minimum: the surface should be washed preferably by **steam-cleaning** at 140 bar at 80°C. This should remove all dirt, grease, oil and salt from the surface.

System recommendations

- **Zinga as a unique system**

Zinga is used as a stand-alone system, applied in 2 or 3 layers to obtain a total maximum DFT of 120 above the peaks of the roughness profile, with an absolute minimum of 100 µm. 180 µm is the maximum total DFT that we would prescribe for Zinga as a unique system. Applying more than 180 µm would not improve the efficiency of the cathodic protection any more.
The application is done correctly if the following conditions are met :
- at least 80 % of the measured values are above the minimum DFT (120 µm)
- there are no readings below the absolute minimum DFT (100 µm)

This system is strongly recommended because of the easy maintenance. In time the layer will become thinner as the Zinga sacrifices itself due to the cathodic protection. A new layer of Zinga can be directly applied once the surface has been properly cleaned and it will reliquidise and recharge the previous Zinga layer. The DFT of Zinga that should be applied depends upon the remaining Zinga layer.

Please note that the recommended DFT always concerns the DFT that is **above the peaks** of the roughness profile. Take into account the fact that a certain quantity of Zinga will disappear into the cavities of the profile. When the surface has an Rz of 60 µm, it can be assumed that an extra DFT of 30 µm (half of the Rz value) of Zinga should be added up to the recommended DFT. It is important that you are well aware of the exact type of measurement of your DFT measuring device. Sometimes it also measures part of the DFT in the cavities of the profile.

In case the application of the **following** Zinga layer can only be done after 24 hours, then the surface should first be washed preferably by **steam-cleaning** at 140 bar at 80°C.

- **Zinga as primer in a duplex system**

If there is no specific need or requirement to topcoat Zinga with a different product, we always advise to use Zinga as a unique system, because of its recharging capacities.

In a duplex system, Zinga should be applied in **one single application**, preferably by spraying, to obtain a maximum DFT of 60 µm. On surfaces where the risk for mechanical damage is minimal, one could apply up to 80 µm of Zinga, provided that the longer drying time is taken into account.

The surface of the Zinga should be free of zinc salts and other contaminations prior to application of a topcoat. In case the application of the compatible paint on top of Zinga can only be done after 24 hours then the Zinga surface should first be washed preferably by **steam-cleaning** at 140 bar at 80°C.

Only quick-drying compatible paints can be applied on top of Zinga. Zingametall offers different sealers and topcoats that are directly compatible on Zinga. For any other product you must do a small compatibility test beforehand.

To avoid pinholes when Zinga is topcoated, use the **mist coat & full coat technique**. This means that the first paint layer on Zinga should be applied as a mist coat at between 20 and 30 µm DFT. After the mist coat has cured, a full coat should be applied in order to build up the layer to the required DFT.

- **Recharging system**

Zinga can be applied on top of a hot-dip galvanisation layer, a metallisation layer or an old Zinga layer in order to renew or enhance the cathodic protection. The DFT of Zinga that should be applied depends upon the existing zinc layer. The galvanising film Zinga recharges or re-galvanises the old active layer and will offer a better cathodic protection. The Zinga coating will start acting as the anode, sacrificing itself as time goes on and thus saving the hot-dip galvanisation or the metallisation. Only after the Zinga coating has been used up, the hot-dip galvanisation or metallisation layer will take over the cathodic protection and will start functioning as anode.

- **Stripe coat on sharp edges and in corners**

It is recommended to apply a stripe-coat of Zinga by brush on all sharp edges, nuts and bolts and weld areas before the application of the first full layer of Zinga to ensure that all these areas have a similar DFT to that of any adjacent surface. Please note that on new steel work the sharp edges may need to be rounded off to a minimum radius of 4 mm prior to the grit-blasting and the application of a stripe-coat. After the stripe-coat has dried completely the first full coat can be applied to all surfaces. Repeat as required.

This technique of stripe-coating should also be done with all subsequent paint layers that are applied over Zinga.

Maintenance and repair

- **Damaged or weathered Zinga applied as a unique system**

In time the layer will become thinner as the Zinga sacrifices itself due to the cathodic protection. A new layer of Zinga can be directly applied once the surface has been properly cleaned and it will re-liquidise and recharge the previous Zinga layer. The DFT of Zinga that should be applied depends upon the remaining Zinga layer. It is however recommended to recharge the surface **before any rust appears** in order to save on preparation expenses and to ensure that the cathodic protection remains optimal.

An old Zinga layer is weathered and contaminated and should first be washed preferably by **steam-cleaning** at 140 bar at 80°C. This should remove all dirt, grease, oil and salt from the surface.

- **Damaged or weathered Zinga applied as primer in a duplex systems**

If the topcoat is damaged and has become permeable then it should be removed, for example by high-pressure water-blasting, in order to reveal the Zinga layer underneath. If the Zinga is

also weathered (but not damaged to the bare metal) a new Zinga layer can be applied after washing the surface preferably by **steam-cleaning** at 140 bar at 80°C.

When repairing duplex systems with damages down to the bare metal, those spots have to be adequately cleaned and roughened before the application of a new layer of Zinga. Please follow the above mentioned general guidelines to obtain cleanliness and roughness.

Additional information

- **Welding on top of Zinga**

The welding of steel coated with Zinga (max. 40 µm DFT) is possible without excessive zinc fumes because the heat of the approaching weld bead burns off the organic binder well below the melting point of zinc. The remaining zinc dust is removed from the weld zone by convection leaving the weld-area free from contamination.

If the applied DFT is more than 40 µm, the excessive coating must be removed with a wire brush. The zinganised steelwork must be free of oil, grease and any chemicals that are flammable. The Zinga layer should be wire brushed to remove any oxides and surface salts that may be present in order to leave a clean, bright and shiny surface. Dust and debris should be removed by air gun or by vacuuming. Do not use silicone based anti-spatter spray on Zinga because this will cause adhesion failure of any subsequent coatings that will be applied on the Zinga. Please ensure that adequate ventilation and extraction is used at all times. When welding zinganised steel, the operator must wear a mask that conforms to the regulations.

- **Zinga on top of welding**

The welding seams must be degreased and roughened (preferably by grit-blasting, or otherwise with a needle hammer) before the application of Zinga.
The first application of Zinga on the welding seams must be done by brush.

- **Zinga in combination with anodes or impressed current**

In some cases the coating will be specified in combination with impressed current or anodes f.i. on embedded structures or on hulls of ships. Zinga in itself will have a potential of approx. -800 mV. If combined with impressed current, then there is a risk of overprotection. Please make sure that the total potential does not exceed -1000 mV. In other words : an impressed current of -200 mV is allowed.

The same caution should be taken when zinc anodes are used. Zinga is in itself equally active as an anode. Normally the zinc anodes will sacrifice themselves first, before the Zinga, to the underlying steel structure. However, when the water has a temperature higher than 20°C then the Zinga will start sacrificing itself sooner. In general it is recommended to leave out most of the anodes except the ones near or on the propeller and the rudder and on areas with a high risk for abrasion.

It is not possible to predict exactly how the Zinga will behave in these circumstances. This is merely a general guideline.

- **Immersion of a zinganised structure**

When a freshly zinganised structure is immersed in water, until one week after the application all possible measures should be taken to ensure that no oils (even fish oils) come in contact with the Zinga until it has cured completely. In the event of oil spillage or fish oil present in the water pollution booms should be used around the structure. If oils do come in contact with the Zinga layer, it should be be washed preferably by **steam-cleaning** at 140 bar at 80°C.

For more information concerning the product Zinga, please refer to the **technical data sheet** or contact the Zingametall representative. For detailed information about the health and safety hazards and precautions for use, please refer to the Zinga **safety data sheet**.

Waiver*

* The information on this sheet is merely indicative and is given to the best of our knowledge based on practical experience and testing. The conditions or methods of handling, storage, use or disposal of the product cannot be controlled by us and are therefore outside our responsibility. For these and other reasons we retain no liability in case of loss, damage or costs that are caused by or that are linked in any way to the handling, storage, use or disposal of the product. Any claim concerning deficiencies must be made within 3 months upon reception of the goods quoting the relevant batch number. We retain the right to change the formula if properties of the raw material are changed. This data sheet replaces all former specimens.