

## TECHNICAL SPECIFICATIONS FOR THE APPLICATION OF ZINGARD

Complementary to the technical data sheet of Zingard, these technical specifications for Zingard 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 cathodic protection, an electric contact is required between Zingard 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 Zingard:

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 Zingard is applied on a hot-dip galvanisation or a metallisation layer, or when it is applied on top of an existing Zingard layer. Please refer to the additional technical specifications for Zingard for relevant detail.

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

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

##### • General guidelines to obtain roughness

Zingard 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 shotblasting (with spherical particles). Make sure that the surface is degreased before the gritblasting.

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

On small areas or on non-critical applications Zingard 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 Zingard. Please consult with the MGDuff representative.

**• Maximum time to application**

Apply the Zingard 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 Zingard. 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 Zingard 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 Zingard 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 sweep-blasting the surface with angular non-metallic grit. This standard of blasting will remove approximately 10 to 15 µm of zinc as well as all the surface contaminants. It will also provide an acceptable profile for the Zingard 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).
- 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 Zingard 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 Zingard. In most cases the formation of rust has created an adequate roughness profile to obtain a good adhesion between the Zingard 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-blasting or with a rotating abrasive disk or a chipping hammer. After doing the local touch-ups the total surface should be completely coated with Zingard, 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 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 Zingard up to the required DFT.

- **Zingarded surfaces**

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

- **Zingard as a unique system**

Zingard 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 Zingard 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 Zingard sacrifices itself due to cathodic protection. A new layer of Zingard can be directly applied once the surface has been properly cleaned and it will reliquidise and recharge the previous Zingard layer. The DFT of Zingard that should be applied depends upon the remaining Zingard 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 Zingard 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 Zingard 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 Zingard 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.

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

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

In a duplex system, Zingard 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 Zingard, provided that the longer drying time is taken into account.

The surface of the Zingard 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 Zingard can only be done after 24 hours then the Zingard 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 Zingard. MGDuff will recommend different sealers and topcoats that are directly compatible on Zingard. For any other product you must do a small compatibility test beforehand.

To avoid pinholes when Zingard is topcoated, use the mist coat & full coat technique. This means that the first paint layer on Zingard 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**

Zingard can be applied on top of a hot-dip galvanisation layer, a metallisation layer or an old Zingard layer in order to renew or enhance the cathodic protection. The DFT of Zingard that should be applied depends upon the existing zinc layer. The galvanising film Zingard recharges or re-galvanises the old active layer and will offer a better cathodic protection. The Zingard 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 Zingard 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 Zingard by brush on all sharp edges, nuts and bolts and weld areas before the application of the first full layer of Zingard 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 gritblasting 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 Zingard.

## Maintenance and repair

**• Damaged or weathered Zingard applied as a unique system**

In time the layer will become thinner as the Zingard sacrifices itself due to cathodic protection. A new layer of Zingard can be directly applied once the surface has been properly cleaned and it will re-liquidise and recharge the previous Zingard layer. The DFT of Zingard that should be applied depends upon the remaining Zingard 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 Zingard 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 Zingard 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 Zingard layer underneath. If the Zingard is also weathered (but not damaged to the bare metal) a new Zingard 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 Zingard. Please follow the above mentioned general guidelines to obtain cleanliness and roughness.

## Additional information

**• Water Saturation**

The performance of a Zingard system can be improved by a process of saturation. After the Zingard is thoroughly dry (2 hours per coat) apply a fine spray or mist of water at low pressure over the surface of the Zingard for at least two hours.

This procedure **must** be carried out whenever a Zingard system without a top coat is going to be immersed in salt water or when a Zingard system has been applied inside potable water tanks

**• Welding on top of Zingard**

The welding of steel coated with Zingard (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 zingarded steelwork must be free of oil, grease and any chemicals that are flammable. The Zingard 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 Zingard because this will cause adhesion failure of any subsequent coatings that will be applied on the Zingard. Please ensure that adequate ventilation and extraction is used at all times. When welding zingarded steel, the operator must wear a mask that conforms to the regulations.

• **Zingard 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 Zingard.

The first application of Zingard on the welding seams must be done by brush.

• **Zingard 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. Zingard 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. Zingard is in itself equally active as an anode. Normally the zinc anodes will sacrifice themselves first, before the Zingard, to the underlying steel structure. However, when the water has a temperature higher than 20°C then the Zingard 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 Zingard will behave in these circumstances. This is merely a general guideline.

• **Immersion of a zingarded structure**

When a freshly zingarded 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 Zingard 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 Zingard layer, it should be washed preferably by steam-cleaning at 140 bar at 80°C.

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