BONDERITE

Technical Data Sheet

# BONDERITE M-ZN 4105

Known as Granodine 4105 IT
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## PRODUCT DESCRIPTION

The BONDERITE M-ZN 4105 Process provides the following product characteristics:

| | |
|---|---|
| **Technology** | Metal Pretreatment |
| Product Type | Phosphating products for metals |
| **Application** | Conversion coating |
| Process components: | BONDERITE M-ZN 4105 MU<br>BONDERITE M-ZN 4105 R<br>BONDERITE M-AD 130<br>BONDERITE M-AD 3080 |

BONDERITE M-ZN 4105 is a liquid zinc phosphate product employed in immersion applications on steel surfaces producing a compact conversion layer.

Depending on the layer thickness it produces a highly corrosion resistant conversion layer suitable for protective uses (high coating weight) or an optimum supportive layer for consequent painting treatments (low coating weight).

BONDERITE M-ZN 4105 meets the requirements of the specification TT-C-490.

### Process components

The products involved in the phosphate process are:

BONDERITE M-ZN 4105 MU (Make-up solution)
BONDERITE M-ZN 4105 R (Replenisher)
BONDERITE M-AD 130 accelerator for pre-painting process (for iron content controls)
BONDERITE M-AD 3080 additive for protective coating process

HENKEL Technical Service will suggest you treatment parameters and best use concentration at the start up according to the type of plant and material to treat.

## DIRECTIONS FOR USE

**Preliminary Statement:**
Prior to use it is necessary to read the **Material Safety Data Sheet** for information about precautionary measures and safety recommendations. Also, for chemical products exempt from compulsory labeling, the relevant precautions should always be observed. Please also refer to the local safety instructions and contact Henkel for analytical support.

**Application:**
BONDERITE M-ZN 4105 is applied by immersion at a temperature range from 60 to 70°C. The working time depends on treated material and on layer thickness; it usually ranges between 3 and 8 minutes.

The material to be treated should be immersed in the bath suspended on iron hooks or in iron baskets.

Use only iron materials for hanging.

The quality of the conversion layer is strictly dependent on the quality of the pretreatment cycle.

It is essential to remove from the metal surface any kind of oil, dirt, powder, rust and oxides before the phosphatising process, by suitable cleaning and/or pickling steps.

**Bath make-up, for 1,000 L:**
For 1,000 L of bath use the following products:

| | Pre-painting bath | Protective bath |
|---|---|---|
| BONDERITE M-ZN 4105 MU | ~90 kg | ~180 kg |
| BONDERITE M-AD 130 | ~0.3 kg | - |
| BONDERITE M-AD 3080 | - | ~1 kg |

Working procedure:

- Fill the operating tank with clean tap water to 3/4 of the final volume.
- Add BONDERITE M-ZN 4730 MU.
- Mix to a complete homogeneity through recirculating pump.
- Heat to the operating temperature and fill up the tank.
- Make the controls and (when necessary) the required adjustments.
- Before starting the process, add 0.3 kg of BONDERITE M-AD 130 dissolved in 10 % of water for pre-painting baths or 1 kg of BONDERITE M-AD 3080 dissolved in water for protective baths.

**Bath Controls (Pre-painting Bath):**
The bath is maintained at optimal conditions by controls of Total Acid value, Free Acid value and Acceleration points.
A standard bath prepared at 90 g/L has a Total Acid value of 30 pts, a Free Acid value of 3.5 pts and Accelerator points of 8 pts.

Total Acid:

- Pipette 10 mL of bath into a 250 flask or beaker.
- Add 30 to 50 of deionized water and 5-10 drops of Phenolphthalein Indicator (0.3 % hydro-alcoholic solution).

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- Titrate with 0.1 N Sodium Hydroxide (NaOH) until the colour changes from colourless to pink.
- The mL of 0.1 N NaOH solution used for the titration corresponds to Total Acid points.

Free Acid:

- Pipette 10 mL of bath into a 100 mL flask or beaker and dilute it with 3 to 50 mL of deionized water.
- Add 5 to 10 drops of Bromophenol Blue Indicator (0.04 % aqueous solution) or Methyl Orange Indicator (0.1% aqueous solution).
- Under slight agitation titrate with 0.1 N Sodium Hydroxide (NaOH) until the colour changes from yellow to blue (Bromophenol Blue) or from orange to yellow (Methyl Orange).
- The mL of 0.1 N NaOH solution used for the titration correspond to Free Acid points.

Accelerator Points:

Before making the control make sure that Iron II is not present (use the sensitive strips). If present add some BONDERITE M-AD 130 (i.e. 50 g for each 1,000 L bath) in water solution. When the bath is free from Iron II titrate as explained below:

- Transfer 100 mL of working bath into a 250 mL flask and add 20 drops of Sulphuric Acid (H2SO4) in 50% solution.
- Titrate with 0.1 N Potassium Permanganate (KMnO4) until persistent pink colour appears.
- The mL of 0.1 N KMnO4 used for the titration is the Accelerator value.

**Bath Controls (Protective Bath):**
The bath is maintained at optimal conditions by controls of Total Acid value, Free Acid value and Iron content. A standard bath prepared at 180 g/L has a Total Acid value of 60 pts, a Free Acid value of 7.0 pts.

Total Acid:

- Pipette 10 mL of bath into a 250 flask or beaker.
- Add 30 to 50 mL of deionized water, 20 mL of Hehn Reactive and 5 to 10 drops of Phenolphthalein Indicator (0.3% hydro-alcoholic solution).
- Under slight agitation titrate with 0.1 N Sodium Hydroxide (NaOH) solution until the colour turns from colourless to pink.
- The mL of 0.1 N Sodium Hydroxide required give Total Acid value.

Free Acid:

- Pipette 10 mL of bath into a 100 mL flask or beaker and dilute it with 30 to 50 mL of deionized water.
- Add 5 to 10 drops of Bromophenol Blue Indicator (0.04 % aqueous solution) or Methyl Orange Indicator (0.1% aqueous solution).
- Under slight agitation titrate with 0.1 N Sodium Hydroxide (NaOH) until the colour changes from yellow to blue (Bromophenol Blue) or from orange to yellow (Methyl Orange).
- The mL of 0.1 N Sodium Hydroxide required give the Free Acid value.

Iron content:

- Pipette 10 mL of bath into a 250 mL flask or beaker.
- Add about 10 mL of DI water and 10 mL of Sulphuric Acid (H2SO4) in 50% solution.
- Titrate with 0.1 N Potassium Permanganate (KMnO4) until the colour turns to stable pink.
- Considering A value as the mL of 0.1 N KMnO4 used for the titration, the $Fe^{2+}$ content results from the formula:

$Fe^{2+}$ (g/L) = 0.56 * A

**Bath replenishment:**
Total Acid:

The bath concentration reduces during the process.
When the concentration is lower than the correct range add 2.7 kg of BONDERITE M-ZN 4105 R for each missing point and for each 1,000 L of bath.
If possible, we recommend making frequent controls (at least two per shift) and frequent (or possibly continuous) replenishing addition of BONDERITE M-ZN 4105 R in order to keep the initially fixed concentration as consistent as possible.

Accelerator points (pre-painting bath):

For each missing point of Accelerator add 40 g of BONDERITE M-AD 130 dissolved in water for each 1,000 L of bath.

Iron content (protective bath):

Whenever the Iron content is higher than 5 g/L reduce it by adding BONDERITE M-AD 130 dissolved in water in the following proportions:

To decrease 1 g/L of Fe content add 0.3 g/L of BONDERITE M-AD 130.

**Caution:**

1. The tank and the heat exchanges should be made of stainless steel or anti-acid material, e.g. polypropylene.
2. The tank bottom should be cone-shaped to get an easier removal of the settled sludge.
3. The heat exchanges should be installed away from the sludge settling area inside the tank.
4. The bath must always be kept clean and therefore it is necessary to remove periodically the sludge which will be collected at the bottom of the tank. Floating impurities such as oil etc. must be removed by skimming or with absorbent paper. Whenever it is necessary to renew the bath partly (i.e. losses due to periodical maintenance) use BONDERITE M-ZN 4105 MU as for the make up of a new bath.
5. Rinse thoroughly the material with cold water immediately after the treatment with BONDERITE M-ZN 4105.

6. Slight differences in the product appearance do not affect its performances.

## Storage

| Process Component | Recommended Storage Temperature, °C | Shelf life, months (in unopened original packaging) |
|---|---|---|
| BONDERITE M-ZN 4105 MU | -10 to 40 | 36 |
| BONDERITE M-ZN 4105 R | 0 to 40 | 36 |

## Classification

Please refer to the corresponding **Material Safety Data Sheets** for details on:

**Hazards identification**
**Transport information**
**Regulatory information**

## ADDITIONAL INFORMATION

### Disclaimer

**Note:**

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. Henkel is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product.
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