

BONDERITE M-ZN 196X

ZINC PHOSPHATE

(KNOWN AS BONDERITE 196X)

Issued 7/24/2013

1. Introduction:

BONDERITE M-ZN 196X (known as BONDERITE 196X) is a single chemical process used to produce an adherent, zinc phosphate coating on steel to facilitate the cold deformation of metal. This is made possible by the lubricant-adsorptive and reactive properties of the coating.

BONDERITE M-ZN 196X (known as BONDERITE 196X) is applied by an immersion process. When used in conjunction with a suitable lubricant, the coating reduces the friction and the deforming forces encountered in such typical operations as cold extrusion, cold heading, drawing of wire and tubing, ironing, necking, nosing, upsetting, etc.

2. Operating Summary:

<u>Chemical:</u>	<u>Bath Preparation per 100 Gallons:</u>
BONDERITE M-ZN 196X (known as BONDERITE 196X)	47 pounds (3.5 gallons)
BONDERITE M-AD 180 (known as ADDITIVE 180)	51 pounds (4.2 gallons)
BONDERITE M-AD 131 (known as ACCELERATOR 131)	3 fluid ounces

<u>Operation and Control:</u>	
Acid Ratio	5 to 9
Total Acid*	22 to 25 points
Accelerator	1.0 to 7.5 points; Ideal 1 to 2.5 points
Temperature	170° to 180° Fahrenheit
Immersion Time	3 to 10 minutes
*Lower or higher concentrations may be required for certain operations.	

3. The Process:

The complete process for the BONDERITE M-ZN 196X (known as BONDERITE 196X) treatment normally consists of the following steps:

- A. Cleaning
- B. Water rinsing



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- C. Pickling
- D. Water Rinsing
- E. Treating with the BONDERITE M-ZN 196X (known as BONDERITE 196X) solution
- F. Water rinsing
- G. Neutralizing
- H. Applying a lubricant

4. Materials:

BONDERITE M-AD 131 (known as ACCELERATOR 131)
BONDERITE M-AD 180 (known as ADDITIVE 180)
BONDERITE M-ZN 196X (known as BONDERITE 196X)
BONDERITE Lubricant
BONDERITE Cleaner
BONDERITE Post Treatment
Testing Reagents and Apparatus

5. Equipment:

Mild steel may be used to construct process tank and housings for concentrations of 65 total pounds, or less, per 100 gallon. For higher concentrations and longer equipment life, the tanks and housings should be constructed of 304L or 316L, or comparable dual certified grade. The 316L providing the better corrosion resistance and longest equipment life. In all cases, approved welding techniques must be used.

Process piping and pumps should be constructed of 316 or 304 stainless steel alloys.

Heat exchanger plates should be polished 316 stainless steel. If gas fired burner tubes are used, they should be made of Schedule-80 mild steel pipe or equivalent. All process circulation pump seals, valve seats, door seals, etc., which come into contact with the process solution and occasional acid equipment cleaners, should be EPDM, FKM or PTFE. Note that while CSPE is compatible with the process solution, it is not compatible with acid equipment cleaners which may be used.

Chemical feed pump parts and other elastomers which may come into contact with the concentrated replenishing chemical should be EPDM, CSPE, FKM or PTFE.

Support equipment available from Henkel Surface Technologies for this process includes: chemical feed pumps, level controls, transfer pumps and bulk storage tanks.

Our sales representative should be consulted for information on Henkel Surface Technologies automatic process control equipment for this process and any additional questions.

6. Surface Preparation:

Cleaning:

All metal must be free from grease, oil, rust, scale or other foreign matter before the treatment. A number of PARCO CLEANER products are available and the proper one will be recommended for each installation.

Hot Water Rinsing:

After cleaning, the metal must be thoroughly rinsed with water. The rinse should be overflowed continuously at a rate which will keep it clean and free from scum and contamination.



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Pickling:

Sometimes, the metal may go directly from the water rinse into the processing solution, but usually, scale and rust are present and must be removed. The usual mill practice of pickling in sulfuric or muriatic acid is satisfactory.

Water Rinsing:

After the acid pickle, the metal must be thoroughly rinsed in overflowing water to prevent carryover of acidic material into the processing solution. It is best to use a double water rinse. The first rinse may be cold, but the second should be heated, preferably as close as possible to the processing solution temperature.

7. Treating With The BONDERITE M-ZN 196X (known as BONDERITE 196X) Solution:**Buildup:**

The amount of BONDERITE M-ZN 196X (known as BONDERITE 196X) and BONDERITE M-AD 180 (known as ADDITIVE 180) recommended for initial bath preparation is shown below, however, operating conditions, drawing requirements, lubricant type and other factors may require higher or lower concentrations. Our representative should be consulted.

	Buildup per 100 Gallons	
	Pounds	Gallons
BONDERITE M-ZN 196X (known as BONDERITE 196X)	47	3.5
BONDERITE M-AD 180 (known as ADDITIVE 180)	51	4.2

Fill the tank about three-fourths full with water. Add the proper amount of BONDERITE M-ZN 196X (known as BONDERITE 196X) and BONDERITE M-AD 180 (known as ADDITIVE 180) and sufficient water to bring the solution up to the working level. Mix thoroughly and heat to the operating temperature.

Immediately before processing any work, add 3 fluid ounces of BONDERITE M-AD 131 (known as ACCELERATOR 131) for each 100 gallons of operating volume.

Operation:

Time: 3 to 10 minutes.

Temperature: 170° to 180° Fahrenheit.

The best processing time and temperature for the BONDERITE M-ZN 196X (known as BONDERITE 196X) solution depend on the metal alloy and surface, the cleaning procedure used and the type of forming operation involved. After the time and temperature have been established for an installation, they should be followed closely. It is desirable to hold the temperature within $\pm 5^\circ$ Fahrenheit of the value found to give best results.

8. Testing and Control:

Never pipet by mouth, use a pipet filler.

Total Acid:

Pipet a 5 ml sample into a 150-ml beaker. Add 5 drops of Indicator 3. Titrate with Titrating Solution 11 to the development of a permanent, faint pink color. The ml of Titrating Solution 11 used is the total acid value in points.

Total acid range: 23 to 25 points for the recommended buildup concentration. If another concentration is used, maintain the total acid within ± 1.0 point of that determined on initial buildup.



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To increase value approximately 1.0 point: Add 2.7 pounds (0.2 gallon) of BONDERITE M-ZN 196X (known as BONDERITE 196X) per 100 gallons of operating bath.

Replenishing is best accomplished by adding the chemical continuously with a metering pump into a turbulent area of the tank. Adjust the metering rate to hold the total acid value within the specified range.

Free Acid:

Pipet a 5 ml sample into a 150-ml beaker. Add 5 drops of Indicator 11. Titrate with Titrating Solution 11 until the yellow color just changes to bluish green by daylight or fluorescent light, or to blue-violet by incandescent light. The ml of Titrating Solution 11 used is the free acid value in points.

The free acid and total acid values are used to calculate the acid ratio below.

Acid Ratio:

The acid ratio is obtained by dividing the total acid value by the free acid value. Thus, if the total acid is 25.0 and the free acid is 4.2, then the acid ratio is:

$$25.0 \text{ divided by } 4.2 = 6.0$$

The acid ratio should stabilize within the range of 5 to 9.

If the acid ratio should get below 5 or above 9, processing may be continued, but a sample of the solution should be sent for analysis, and our representative should be notified immediately.

Accelerator:

Indicator Paper Test (qualitative): Dip a strip of Indicator Paper 17 into the BONDERITE M-ZN 196X (known as BONDERITE 196X) bath. The paper should not change color. IF IT TURNS PINK, NO WORK SHOULD BE PROCESSED UNTIL THIS CONDITION IS CORRECTED. This is accomplished by adding 1 fluid ounce of BONDERITE M-AD 131 (known as ACCELERATOR 131) per 100 gallons of bath. Mix thoroughly, then test again. If the indicator paper still turns pink repeat the Accelerator additions, testing with Indicator Paper between additions, until no color change occurs. Only then should work be processed, and the solution tested for accelerator concentration.

Check the solution with Indicator Paper 17 before the first and second loads run on each shift, and after any period when no work has been processed for an hour or more. The solution should be tested with Indicator Paper 17 just before putting in a load of work instead of afterward.

Saccharometer Test Method (quantitative): Partially fill the Saccharometer with processing solution. Tip the Saccharometer to dispel all entrapped air in the closed end and to permit the solution to completely fill the closed end of the tube. Hold the tube upright and completely fill with processing solution. Approximately 75 ml of processing solution will be required.

Add approximately 2 grams (1/2 teaspoonful) of Reagent 137 into the Saccharometer tube. Stopper the tube opening and invert so that Reagent 137 flows into the closed end. These procedure steps should be done as rapidly as possible to obtain accurate reproducible results.

Place the Saccharometer upright on a Table top and remove the stopper. After a minimum of two minutes or when the evolution of gas ceases, record the milliliters of gas trapped in the closed end of the tube. This measurement is the accelerator value in points.



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Accelerator range: 1.5 to 7.5 points (ml)

To increase value 1.0 point: Add 1.5 fluid ounces of BONDERITE M-AD 131 (known as ACCELERATOR 131) per 100 gallons of solution volume.

9. After Treatment:

Water Rinsing:

After bonderizing, the work is thoroughly rinsed in cold water. The rinse should be continuously overflowed and the overflow should be regulated with the rate of production so that the main body of the rinse never becomes excessively contaminated.

Neutralizing:

The bonderized metal, after the water rinse, is treated with a hot, dilute BONDERITE (KNOWN AS PARCOLENE) (neutralizer) solution for 30 to 60 seconds to eliminate any residual acidity. The solution is generally heated to about the same temperature as the lubricant, but in some installations, satisfactory results may be obtained by operating at lower temperatures.

A number of BONDERITE (KNOWN AS PARCOLENE) chemicals are available, and the proper one for each installation will be recommended.

Applying a Lubricant:

The type of lubricant to use depends upon individual requirements. Suitable lubricants for this purpose are available under the BONDERLUBE trademark, and the proper one will be recommended.

10. Storage Requirements:

We recommend that ALL CHEMICALS be stored and used in locations which will not permit direct access to sanitary or surface drains. These areas should be constructed in such a manner that any chemicals lost can be either salvaged or suitably treated to prevent pollution.

This Chemical should be protected from freezing and stored in heated indoor area; keep container closed, and in a well ventilated area. If the chemical does freeze after extended storage at low temperature, thaw in a warm place and stir thoroughly before using.

11. General Maintenance:

In the operation of the process, some insoluble residue, normally referred to as sludge, is formed as a by-product of the chemical reaction. This material settles to the bottom of the tank and should be removed regularly before its presence causes dusty coatings. An excellent method of removal is an arrangement whereby a portion of the solution and sludge is pumped into a settling tank from which the settled sludge may be periodically discharged into containers, preferably after the solution is returned to the processing tank. The pump (for sludge removal) should preferably be made from stainless steel, but mild steel may be used with a somewhat shorter life. Another satisfactory method is to transfer the solution to a rinse tank, leaving as much sludge as possible in the bottom of the processing tank. The sludge may then be removed by any convenient means.

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When the solution has been heated for some time, scale will form on the heating unit and must be removed at intervals so that adequate heat transfer will occur and the proper processing temperature will be maintained. To remove the scale, dry the heat transfer surface either by removing it from the solution or by pumping the solution from the tank. The scale may then be removed by a suitable chemical or mechanical method.

12. Waste Disposal Information:

Applicable regulations covering disposal and discharge of chemicals should be consulted and followed.

Disposal information for the chemical used, in the form as supplied is given on the Material Safety Data Sheet for the product.

The processing bath is acidic and contains phosphate and heavy metal. Waste treatment and neutralization may be required prior to discharge to the sewer (Refer to Waste Treatment Information Bulletin WT1002, available on request.).

The processing bath and sludge can contain ingredients other than those present in the chemical as supplied and analysis of the solution and/or sludge may be required prior to disposal.

13. Precautionary Information:

When handling the chemical products used in this process, the first aid and handling recommendations on the Material Safety Data Sheet for each product should be read, understood and followed.

The processing bath is acidic and may cause irritation of the skin and eyes. The bath contains nickel which can cause sensitization or allergic skin reactions which may be accentuated by heat and humidity. Do not get in eyes, on skin or on clothing. See Material Safety Data Sheet for appropriate protective clothing. In case of contact, follow the recommendations on the Material Safety Data Sheet for BONDERITE M-ZN 196X (known as BONDERITE 196X) and BONDERITE M-AD 180 (known as ADDITIVE 180).

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Testing Reagents and Apparatus

(Order only those items which are not already on hand)

<u>Code</u>	<u>Quantity</u>	<u>Item</u>
597722	1	Acid Dropping Bottle
592462	3*	Beaker, 150-ml
592477	1	Buret Assembly, 25-ml Automatic
592398	1 qt	Indicator 3 (Phenolphthalein)
592402	1 qt	Indicator 11 (Bromphenol blue)
592475	2	Indicator Dropping Bottle
592405	2 bottles ..	Indicator Paper 17
592491	2*	Pipet, 5-ml Volumetric
592494	1	Pipet Filler
592499	1	Pitcher, Graduated, Plastic
592417	1 bottle ...	Reagent 137 (Sulfamic acid)
593826	1	Saccharometer
592427	1 gal	Titration Solution 11 (0.1N NaOH)

*Includes one more than actually required, to allow for possible breakage.

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