BONDERITE

Technical Process Bulletin

BONDERITE M-ZN 181X
ZINC PHOSPHATE
(Known as BONDERITE 181X)

Issued 10/8/2015

INTRODUCTION

BONDERITE M-ZN 181X (Known as BONDERITE 181X) chemicals are conversion coating agents formulated for altering, by immersion application, steel surfaces to nonmetallic, zinc phosphate coatings of the proper structure to retain lubricant and facilitate cold forming of the metal. The coating facilitates drawing by:

A. Reducing metal-to-metal contact
B. Prolonging tool life
C. Permitting faster drawing speed
D. Reducing press downtime and thereby increasing efficiency.
E. Reducing material breakage
F. Producing a smoother and more uniform surface on the finished product

OPERATING SUMMARY

Chemical: Bath Preparation per 100 Gallons:

Wire/Cold Heading

	Batch	Strand	Tubing	Extrusion
BONDERITE M-ZN 181X MU				
Pounds:	87	304	109	174
Gallons:	7	24.5	8.8	14

BONDERITE M-AD 131 (Known as ACCELERATOR 131):
2 fluid ounces (60 ml) per 100 gallons

Operation and Control:

Wire/Cold Heading

	Batch	Strand	Tubing	Extrusion
Total Acid (Points)	19 - 21	68 - 72	24 - 26	39 - 41
Acid Ratio (TA/FA)		---------- 5.5 to 7.5 ----------		
Time (minutes)	3 - 7	-------	2 - 5	3 - 7
Time (seconds)	------	5 - 15	------	------
Temperature		------- 170° to 190°Fahrenheit -------		

Henkel

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THE PROCESS:

The complete process for the BONDERITE M-ZN 181X treatment normally consists of the following steps:

A. Cleaning
B. Water rinsing
C. Pickling
D. Water Rinsing
E. Treating with BONDERITE M-ZN 181X solution
F. Water rinsing
G. Neutralizing post treatment
H. Applying a lubricant

MATERIALS

BONDERITE M-AD 131
BONDERITE M-ZN 181X MU (Known as BONDERITE 181X MAKEUP)
BONDERITE M-ZN 181X R (Known as BONDERITE 181X REPLENISHING)
BONDERITE Lubricant
BONDERITE Cleaner
BONDERITE Post Treatment
Testing Reagents and Apparatus

EQUIPMENT

Mild steel may be used to construct process tank and housings for concentrations of 90 pounds, or less, per 100 gallon. For higher concentrations and longer equipment life, the tanks and housings should be constructed of 304L or 316L. 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. Various formulations of plastic pipe may be used with recommended support spacing, Schedule-80 being generally recommended. PVC Type I is limited to maximum process temperatures of 140° Fahrenheit. CPVC and PP may be used up to a maximum process temperature of 190° Fahrenheit. PVDF may be used for all expected operating temperatures and may reduce the rate of scale buildup in process piping.

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 Technologies for this process includes: chemical feed pumps, level controls, transfer pumps and bulk storage tanks.

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

SURFACE PREPARATION

Cleaning:
All metal must be free from grease, oil, rust, scale or other foreign matter before the treatment. A complete line of cleaners is available and the proper one will be recommended for each installation.

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.

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 rinse prior to phosphating should be heated, preferably as close as possible to the BONDERITE solution temperature.

TREATING WITH BONDERITE M-ZN 181X SOLUTION

Buildup:
The amount of BONDERITE M-ZN 181X MU 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	
Forming Operation:		Pounds	Gallons
Wire/Cold Heating	- Batch	87	7
	- Strand	304	24.5
Tubing		109	8.8
Extrusion		174	14

Fill the tank about three-fourths full with water. Add the proper amount of BONDERITE M-ZN 181X MU and sufficient water to bring the solution up to the working level. Mix thoroughly, add heat to the operating temperature.

Immediately before processing any work, add 2 liquid ounces (60 ml) of BONDERITE M-AD 131 solution per 100 gallons and mix thoroughly.

Operation:
Time: 2 to 7 minutes (5 to 15 seconds for strand line operation).
Temperature: 170° to 190° Fahrenheit.

The best processing time and temperature for the BONDERITE M-ZN 181X solution depend on the metal 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, and it is desirable to hold the temperature within ± 5° Fahrenheit of the value found to give best results.

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: Within ± 1.0 point (± 2.0 point for strand line operation) of value which gives the best results.

To increase value 1.0 point: 3.0 pounds (1 quart) of BONDERITE M-ZN 181X R per 100 gallons of solution volume.

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.

Mechanical Loss:
Replace any drop in points due to a mechanical loss of solution (sludge cleanout, leaks, etc.) by adding 4.4 pounds of BONDERITE M-ZN 181X MU for each 100 gal of working solution volume for each total acid point required.

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 value is 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 17.8 and the free acid is 2.7, then the acid ratio is:

17.8 divided by 2.7 = 6.6

Maintain the acid ratio in the range of 5.5 to 7.5. If it gets below 6.0, discontinue the use of BONDERITE M-ZN 181X R and use BONDERITE M-ZN 181X MU instead. Use 4.2 pounds of the Makeup material per 100 gallons for each point of total acid required. When the acid ratio returns to 6.0, resume the use of the appropriate Replenishing chemical.

If the acid ratio frequently gets below 6.0, it is probably due to solution loss through leaks or excessive drag out, and corrective steps should be taken.

If the acid ratio should get above 7.5, processing may be continued, but a sample of the solution should be obtained and our representative should be notified immediately.

Accelerator:
Dip a strip of Indicator Paper 17 into the BONDERITE M-ZN 181X 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 liquid ounces (30 ml) of BONDERITE M-AD 131 solution 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.

Check the BONDERITE M-ZN 181X 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.

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 M-PT (Known as PARCOLENE) (neutralizing post treatment) 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 products 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 for the particular application will be recommended.

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.

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 or interferes with the operation of the spraying system. 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.

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 of by pumping the solution from the tank. The scale may then be removed by a suitable chemical or mechanical method.

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.

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 181X MU (known as BONDERITE 181X MAKEUP) or Replenishing chemicals.

TESTING REAGENTS AND APPARATUS
(Order only those items which are not already on hand)

Code	Quantity	Item
89000-202**....	2*	Beaker, 150-ml
17579-482**....	1	Buret Assembly, 25-ml Automatic
592398	1 qt	Indicator 3 (Phenolphthalein)
592402	1 qt	Indicator 11 (Bromphenol Blue)
41579LH***.....	2	Indicator Dropping Bottle
592405	2 bottles ..	Indicator Paper 17
89003-482**....	2*	Pipet 5-ml Volumetric
53600-108**.....	1	Pitcher, Graduated, Plastic
30250****.....	1	Thermometer, Floating
592427	1 gal	Titrating Solution 11 (0.1N NaOH)

*Includes one more than actually required, to allow for possible breakage.
** VWR Part # - vwr.com or 800-932-5000
*** Consolidated Plastics Part #
****Thomas Scientific Part #

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