

# BONDERITE M-MN LT-10 MANGANESE PHOSPHATE

(Known as PARCO LUBRITE LT-10)

Issued 3/20/2017

## 1. Introduction:

BONDERITE M-MN LT-10 (Known as PARCO LUBRITE LT-10) is formulated to produce a non-metallic, corrosion resistant coating on iron and steel surfaces. BONDERITE M-MN LT-10 produces a corrosion resistant crystalline coating which forms an excellent base for the adhesion of organic finishes and adhesives for the bonding of rubber. BONDERITE M-MN LT-10 produces an oil-absorptive coating, which permits rapid break-in of moving parts without scuffing by preventing metal-to-metal contact between the bearing surfaces. It increases lubrication of treated surfaces due to the oil-absorptive coating on articles such as pistons, rings, liners, camshafts, tappets, motor blocks and similar bearing surfaces. BONDERITE M-MN LT-10 will remove light metal scratches remaining from machining operations.

## 2. Operating Summary:

Chemical:	Bath Preparation per 100 gallons:
BONDERITE M-MN LUBRITE LT-10 MU	8 gallons
BONDERITE M-MN LUBRITE LT-10 R V	As needed per production load
BONDERITE M-AD 301 (Known as ADDITIVE 301)	
BONDERITE M-AD 40 (Known as PRIMER 40)	
Equipment:	
Air Diffusers	
Operating and Control:	
The optimum FA & TA ranges for each application are to be defined by the our representative.	
Total Acid (TA)	30 points (ml)
Free Acid (FA)	1.4 to 2.1 points (ml)
TA/FA Ratio	14:1 minimum
Iron	1000 ppm (0.1%)maximum
Time	Approximately 5 to 20 minutes
Temperature	140° to 160° Fahrenheit

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### **3. The Process:**

The coating is usually applied on precision parts which are expensive, and care must be exercised in their cleaning and processing to avoid rejects. In carrying out the treatment, suitable cleaning and processing equipment should be provided. Articles of established manufacturing limits and tolerances should first be processed on an experimental basis and submitted for approval before they are processed on a production basis. The same cleaning and processing procedures should be followed on articles treated in production that were employed on the experimental trial. In view of the wide variety of articles and many types of steel and iron treated with the process, no general instructions can be given which will apply in every case. However, the instructions given herein have been derived from commercial experience and if carefully followed, should produce satisfactory results.

The complete process for the treatment normally consists of the following steps:

- A. Cleaning
- B. Water rinsing
- C. Surface conditioning
- D. Treating with the BONDERITE M-MN LT-10
- E. Water rinsing
- F. Post treatment (optional)
- G. Drying (not required if a soluble oil is to be applied)
- H. Oil finishing (optional)

### **4. Materials:**

BONDERITE C-AK (Known as PARCO CLEANER)  
BONDERITE M-AC M (Known as FIXODINE M conditioning agent)  
BONDERITE M-MN LT-10 MU (Known as PARCO LUBRITE LT-10 MAKE-UP)  
BONDERITE M-MN LT-10 R V (Known as PARCO LUBRITE LT-10 REPLEN. V)  
BONDERITE M-AD 301 (Known as ADDITIVE 301)  
BONDERITE M-AD 40 (Known as PRIMER 40)  
BONDERITE M-PT (Known as PARCOLENE post treatment products)  
Testing Reagents and Apparatus

### **5. Equipment:**

Process tanks and housings may be fabricated from 300 series alloy stainless steel, such as 304L or 316L. The 316L being preferred for maximum tank life. Process pumps should be constructed of 316 or 304 stainless steel alloys. In all cases approved welding techniques must be used.

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, 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.



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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.

### 6. Surface Preparation:

#### Cleaning:

All metal must be clean and free from rust, oil, grease, buffing, polishing and drawing compounds, smut, and dirt before the treatment. The use of strong alkaline cleaning is recommended for maximum performance. It may at times be necessary to use a strong acid to remove light rust prior to treatment with BONDERITE M-MN LT-10. To promote uniform etching of the metal and to protect against excessive build-up and by the processing solution, the use of BONDERITE M-AC M conditioning agent is required.

#### Water Rinsing:

A warm water rinse, either spray or immersion, is recommended. Rinses should be overflowed continuously at a rate which will keep them clean and free from scum and contamination.

### 7. Treating with BONDERITE M-MN LT-10:

#### Buildup:

Fill the tank about 3/4 full with water. Then add 8 gallons [U.S.] of BONDERITE M-MN LT-10 MU for each 100 gallons of working volume. Add sufficient water to bring the solution up to the working level, mix thoroughly by stirring. Add 63 ml BONDERITE M-AD 40 per 100-gallon bath to decrease FA value 0.1 point. Heat bath to the operating temperature of 140° to 160° F.

#### Operation:

Time: 5 to 20 minutes.

Temperature: 140° to 160° Fahrenheit.

The coating weight obtained with this treatment depends on the method of cleaning, the type of metal or alloy and the hardness and surface finish.

### 8. Testing and Control:

Never pipet by mouth, use a pipet filler.

#### Total Acid:

Pipet a 10 ml sample into a 150-ml beaker. Add 5 drops of Indicator 3. Titrate with Titrating Solution 11 to the development of a permanent pink color. The ml of Titrating Solution 11 used is the total acid value in points.



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Total acid range of a working bath: 25 to 50 points (ml).

To increase value 1.0 point: Use approximately 1400 ml of BONDERITE M-MN LT-10 R V per 100 gallons of solution volume.

Normally the total acid is maintained at 25 to 50 points. Frequent small additions of BONDERITE M-MN LT-10 R V chemical give more uniform results than occasional additions of large amounts, and it is desirable to control the solution within  $\pm 2.0$  point of the value found to give best results.

### Free Acid:

Pipet a 10 ml sample into a 150-ml beaker. Add 4 drops of Indicator 11, and then titrate with Titrating Solution 11 until a blue color develops. The ml of Titrating Solution 11 used is the free acid value in points.

Free acid range: 1.4 to 2.1 points (ml)

To decrease FA value 0.1 point during operation: Use 63 mls BONDERITE M-AD 40 per 100-gallon bath.

### Manganese Concentration:

Pipette a 5 ml sample into a clean 100 ml graduated cylinder or a clean 100 ml volumetric flask. Dilute to line with DI water and mix well. Label flask dilution "A".

Pipette 10 mls of dilution "A" into another 100 ml graduated cylinder or 100 ml volumetric flask. Dilute to line and mix well. Label dilution "B".

Use dilution "B" for analysis.

Follow Hach Method 8034, program 295 for method of analysis when using a DR/2000, DR/2400 spectrophotometer or DR/800 series colorimeter. If using the Hach "Pocket Colorimeter", follow procedure provided for Manganese (Mn), High Range.

Multiply reading times 200 = manganese value.

To increase manganese value in bath 230 – 250 ppm, add 1 pint (500 ml) of BONDERITE M-AD 301 (Known as ADDITIVE 301) per 100 gallons.

Avoid heating the BONDERITE M-MN LT-10 processing solution above the recommended range or for extended periods of time when idle since these conditions result in raising the Free Acid. Free Acid values above the desired range can etch steel surfaces and could fail to produce complete coatings within the normal processing time.

### Iron Level:

Pipet a 10 ml sample from the operating bath and place in 150 ml beaker. Add 20 drops of Reagent Solution 44. Titrate with Titrating Solution 18 to a persistent (10 seconds) faint pink end point. Each ml of TS-18 represents 0.1% iron.

Iron level range: 0.0025% to 0.1% (1 drop to 1 ml TS-18).

The iron content should be maintained under 0.1%; however, satisfactory coatings may be obtained outside this range depending on the particular type of steel or alloy being processed.



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### Reduction of Iron Level:

The simplest method of maintaining Iron levels is by aerating the bath by using gas diffusers. Air should be introduced into the bath from columns of fine bubbles from a gas diffuser(s). Several may be necessary. Place diffusers above the sludge level to prevent stirring sludge from bottom of tank. Aeration may be continuous or intermittent as needed. Partial dumping of the operating bath may also be used to reduce the iron.

Sludge that will be generated as a byproduct may be filtered or allowed to settle to bottom of tank.

### **9. After Treatment:**

#### Water Rinsing:

After treating with BONDERITE M-MN LT-10 solution, the work is rinsed in water for 30 to 60 seconds.

The rinse should be continuously overflowed and the flow should be regulated with the rate of production so that the main body of the rinse never becomes excessively contaminated.

#### Treating with a Post Treatment Solution:

The post treatment has no effect on the wear resistance of the coating but does substantially improve the corrosion resistance. Its use is recommended in all cases where corrosion resistance is important; for other applications it may be omitted. A number of post treatment chemicals are available and the proper one for each installation will be recommended.

#### Drying:

The articles should be dried immediately after the water rinse or post treatment (unless a water soluble oil is to be applied). Articles, which do not dry quickly, should be dried with an air blow-off or a drying oven, or by spreading on a heated tray.

#### Oil Finishing:

The type of finish to use over parts treated with the BONDERITE M-MN LT-10 process depends on individual requirements. A number of excellent finishes are available and the proper one for each installation will be recommended.

### **10. Storage Requirement:**

No special storage is required for BONDERITE M-MN LT-10 mu or BONDERITE M-MN LUBRITE LT-10 R V. If the product 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 is formed as a by-product of the chemical reaction. The residue settles to the bottom of the tank and should be removed regularly before its presence causes dusty coatings. Some methods for removing sludge are to use settling cone, vacuum filtering, etc.



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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 chemicals, in the form as supplied, is given on the Material Safety Data Sheet for each product.

The processing bath is acidic and contains phosphates, nitrates and metal ions. Waste treatment may be required prior to discharge to the sewer. 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 chemicals in the form as supplied, the precautionary, 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 can cause irritation of the skin and eyes. Do not get in eyes, on skin, or on clothing. In case of contact, follow the recommendations on the Material Safety Data Sheet for BONDERITE M-MN LUBRITE LT-10 MU or BONDERITE M-MN LUBRITE LT-10 R V.



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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>
VWR# 89000-202 .....	2 .....	Beaker, 150-ml
592478 .....	1 .....	Buret Assembly, 5 ml
592477 .....	1 .....	Buret Assembly, 25-ml Automatic
592398 .....	250 ml.....	Indicator 3 (Phenolphthalein)
592402 .....	250 ml.....	Indicator 11 (bromophenol blue)
VWR# 89003-350 .....	2 .....	Pipet, 10-ml Volumetric
VWR# 53497-009 .....	1 .....	Pipet Filler
592427 .....	4.0 L.....	Titration Solution 11 (0.1N NaOH)
593846 .....	2.5 L.....	Reagent Solution 44
592429 .....	1.0 L.....	Titration Solution 18

**The following is available from Hach Co. ([www.hach.com](http://www.hach.com)).**

5930000 .....	1 .....	Hach DR 2400 Spectrophotometer
4844000 .....	1 .....	Hach DR/820 Colorimeter
4670015 .....	1 .....	Hach "Pocket Colorimeter" Manganese (Mn) High range (100 tests included)
24276-06 .....	6/pkg .....	Sample Cell 10 ml, with cap
24300-00 .....	Set .....	High Range Manganese Reagent Set (100 Tests)
12791-42 .....	100 ml.....	Manganese Standard Solution, 1000-mg/L Mn.
14258-10 .....	16/pkg .....	Manganese Standard Solution, 10-ml Voluette Ampoule, 250-mg/L Mn

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