

**\*\*FORD MOTOR CO.LTD TOX NO. 155759\*\***

**Performance MN** is a manganese phosphating process for the treatment of iron and steel surfaces to reduce wear during running in operations.

The crystalline manganese/iron phosphate coating formed on the metal surface provides oil absorbent and anti wear properties. The structure of the coating prevents direct metal-to-metal contact thereby aiding the bedding in of the moving parts. The oil absorptive nature of the coating enhances lubrication and corrosion resistance.

The **Performance MN** process consists of a total system, which should include the following sequence: -

- 1) Clean
- 2) Cold water rinse
- 3) Hot water rinse (or optional crystal modifier.)
- 4) Performance MN phosphating.
- 5) Water rinse.

#### **CLEANING**

Before phosphating it should be ensured that the metal surfaces are free from oil, grease and other contaminants in order that a smooth even crystalline coating can be produced.

Either solvent, alkali or acid cleaners may be used, although if a strongly alkaline or acid pickle is used then it is recommended that a suitable crystal modifier be used in stage 3.

#### **WATER RINSING**

A cold water rinse should be used which is continually overflowing to ensure that it is free from contamination.

#### **HOT WATER RINSE/CONDITIONING RINSE**

A hot water rinse is used to preheat the components to 80-85°C; if a highly alkaline or acidic material has been used in stage 1 then it is recommended that a suitable crystal refiner be used in this stage. If a crystal refiner is used then the temperature should not exceed 60 degrees C.

#### **PERFORMANCE MN PHOSPHATING**

The tank for use with the phosphating process should be constructed of 316 stainless steel as should the heating oils.

**Performance MN** is made up at a concentration of 150-180 litres / 1000 litres of working solution and is added to water heated to approx 70°C. A new solution will need to be aged with iron, added either as steel wool or scrap iron/steel (grease and oil free), for 1-2 hours prior to use.

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Remove the scrap metal and then heat up to the operating temperature of 95-98°C. Make up to the working level with water and determine the concentration as explained in Testing Section. Components are treated by immersion in the above solution for up to 15 minutes (normally 10 minutes is sufficient). Gassing will occur whilst the reaction is progressing. An indication that the coating is complete is when the gassing stops. A smooth complete dark grey coating will be produced, although the thickness and crystalline nature of the finish will be dependant on the preparation method (i.e. type of cleaner, crystal refiner) and grade of steel being processed.

The phosphating solution will need to be controlled regularly to maintain a consistent coating. The following parameters should be observed.

Total Acid (TA) or pointage	40-50 Points (90mls +/- 2mls)
Free Acid (FA)	7-10.5 Points (18mls +/- 1ml)
TA: FA ratio	4.5-6.6:1
Iron content:	0.1 - 0.5%

### TEST METHODS

All tests are carried out on a 10ml sample.

**Pointage/ Total Acid (TA)** is determined using Phenolphthalein indicator and titrating with 0.2N sodium hydroxide solution to a pink end point.

**Free Acid (FA)** is determined using a Bromophenol blue indicator and titrating with 0.2N Sodium hydroxide to a steel blue / blue violet end point

**Iron (Fe<sup>++</sup>)** is determined by acidifying the sample with 50% Sulphuric acid (10-20 drops) and titrating with 0.1N Potassium permanganate to a stable (for 30 seconds) pink end point.

The ferrous iron content is determined as follows:

Titre ( mls) x 0.056 = % Fe<sup>++</sup>

Further details on the above procedures are available upon request.

### MAINTENANCE OF SOLUTION

**Total Acid/Pointage (TA).** Should be maintained in the specified range by the addition of **Performance MN.**

The addition of 1.8 litres / 1000 litres will raise the pointage by 1.

#### Free Acid (FA)

Is generally maintained within the correct range by normal operation of the process although overheating and under use may cause the FA to rise above the recommended levels and it may need to be reduced. Refer to supplier for further details.

Sludge is produced by this process, which settles to the bottom of the tank. This should be removed periodically to prevent deposition onto the work. The heating coils will also scale up during use and will require removal and cleaning as and when necessary in order to maintain efficiency.

### WATER RINSING

The components should be thoroughly rinsed after Manganese Phosphating either using a cold-water rinse if a subsequent process such as dewatering is being used, or (more normally) hot water to aid drying.

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