



# Technologies

## PARKERIZING 200

### 1. SCOPE

**Parkerizing 200** chemicals are formulated for the conversion of iron and steel surfaces to nonmetallic, zinc phosphate coatings which are highly resistant to corrosion. The coatings have good adhesion, are of an absorptive nature, and provide substantial protection from rust by bonding the final finish of stain, oil, wax, or paint to the articles treated. The **Parkerizing** treatment produces a uniform coating on all surfaces which the solution can reach, and is especially suitable for rust-proofing threaded pieces and articles with small holes or recesses.

**Parkerizing 200** chemicals minimise scale build up on heating coils, tanks, and such material handling equipment as baskets, tumbling barrels, etc.

### 2. MATERIALS

**Neutraliser 202**

**Parco Cleaner**

**Parcolene** Chemical

**Parkerizing 200** and **200B** Chemicals.

Steel wool or scrap iron (used only for buildup)

**Dry-To-Touch 979 Oil**

Testing Reagents and Apparatus.

### 3. EQUIPMENT

The processing tank and piping (for desludging) for use with the **Parkerizing 200** solution should preferably be of type 304, 316, 321 or 347 stainless steel. Mild steel may also be used, but its life will be shorter. The heat transfer surface should be of type 316 stainless, if steam-heated, but of Schedule 80 mild steel or equivalent, if gas-fired. The pump should be fabricated from any of the 300 series of stainless steels.

### 4. THE PROCESS

The complete process for the **Parkerizing 200** treatment normally consists of the following steps:

- A. Cleaning.
- B. Rinsing.
- C. Acid derusting (optional)
- D. Rinsing.
- E. Conditioning with **Parcolene Z**.
- F. Phosphating with **Parkerizing 200**.
- G. Rinsing.

- H. Rinse with **Parcolene 8**.
- I. Drying.
- J. Oiling with **979 Dry-To-Touch Oil** .

## 5. **CLEANING**

All metal must be free from rust, scale, oil, grease, or other foreign matter prior to the **Parkerizing 200** treatment.

Due to the great variety of metals treated, many methods of cleaning are suitable and occasionally, a combination of systems is required. Henkel has available a complete line of **Parco Cleaners**, and will recommend the proper one for each installation.

Occasionally sand or grit blasting is used. This is an ideal cleaning method for preparing metals for the **Parkerizing** treatment, but all oil or grease must be removed first to prevent the sand or grit from becoming dirty.

## 6. **HOT WATER RINSING**

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

## 7. **TREATING WITH PARKERIZING 200 SOLUTION**

### (a) **Buildup**

Fill the tank about three-fourths full with water. Add 72 kgs (50 litres) of **Parkerizing 200** chemical for each 1,000 litres of working volume. Fill the tank to the operating level with water, and mix thoroughly. Place a quantity of clean steel scrap or about 5 kgs of steel wool or scrap in the solution, then heat to 70°C. Leave the steel wool in for at least 30 minutes, then remove it. Replace the water lost by evaporation, and mix the solution thoroughly. Test for Total Acid (section 7.3.1), then add enough **Parkerizing 200** chemical to bring the bath to the require strength. After thoroughly mixing the bath, and heating to 88-99°C, the solution is ready for use.

### (b) **Operation**

The properly cleaned articles are immersed in the **Parkerizing** solution at 88-99°C for 15 minutes to produce a uniform protective coating. Once a definite operating temperature is established, maintain it within + 3°C. The solution should not be boiled, otherwise, the sludge may be disturbed and deposited on the articles.

### (c) **Testing and Control**

#### (i) **Total Acid**

Pipette a 5 ml sample into a 150 ml beaker. Add 5 drops of Indicator 3 (phenolphthalein), then titrate with Titrating Solution 11 (0.1N NaOH) to the development of a permanent, faint pink. A **Parkerizing** solution prepared as above requires approximately 22 ml of Titrating Solution, and is known as a 22 point solution.

Maintain the Total Acid in the range of 20-24 points. An addition of 3 kgs (2 litres) of **Parkerizing 200** chemical per 1,000 litres will increase the strength approximately 1 point. Frequent small additions of this chemical produce more uniform results than occasional large additions, and it is best that the additions be made often enough so that the Total Acid never varies more than a few tenths of a point.

Replace any drop in points due to a mechanical loss of solution resulting from sludge cleanout, leaks, or accidental overflow, by adding 3 kgs (2.0 litres) of **Parkerizing 200** chemical per 1,000 litres for each point required. It is not necessary to add any more iron.

**(ii) Iron**

Pipette a 10 ml sample into a 150 ml beaker, add 10-20 drops of Reagent Solution 44 (50% H<sub>2</sub>SO<sub>4</sub>). Using a 10 ml measuring pipette, titrate with Titrating Solution 18 (0.18N KMnO<sub>4</sub>) to a persistent (10 seconds), faint pink. Each ml. of Titrating Solution used indicates the presence of 0.10% iron. Thus, a 4.0 ml titration is equivalent to 0.40% iron.

Maintain the iron content of the **Parkerizing 200** solution in the range of 0.20-0.60%. The use of **Parkerizing 200B** chemical will keep the iron content from exceeding the upper limit.

**(iii) Iron Control With Parkerizing 200B**

**Parkerizing 200B** chemical is a replenishing material formulated for the control of iron in a **Parkerizing 200** solution. It lowers the iron and raises the Total Acid at the same time. It can be mixed with **Parkerizing 200** chemical in the proper proportions, and the mixture used to maintain constant Total Acid and constant iron contents. **Parkerizing 200B** chemical can also be added to a **Parkerizing 200** bath to lower the iron by a determined amount. The preferred method is to make continuous or frequent small additions of a mixture of **Parkerizing 200** and **200B** chemicals.

**(iv) Use of a Mixture of Parkerizing 200 and 200B Chemicals**

A mixture can be prepared which will maintain the strength of the bath and control the iron so that it neither increases nor decreases in concentration. In order to prepare such a mixture, determine the average amount of **Parkerizing 200** chemical used daily and the average daily increase in iron. Calculate the amounts of **Parkerizing 200** and **200B** chemicals required as follows:

$$\text{kgs. of Parkerizing 200B chemical} = \% \text{ of iron (daily increase)} \times 0.04 \times \text{tank capacity in litres} \quad (1)$$

$$\text{kgs of Parkerizing 200 chemical} = \text{kgs of Parkerizing 200 chemical used daily} - \text{kgs of Parkerizing 200B chemical.} \quad (2)$$

**Example**

A 1,000 litre tank required 50 kgs of **Parkerizing 200** chemical per day and the iron increases 0.10% during 1 day's run. Then, substituting in equation (1) above:

$$\text{kgs of Parkerizing 200B chemical} = 0.10 \times 0.04 \times 1,000 = 4 \text{ kgs} \quad (3)$$

And from equation (2):

$$\text{kgs of Parkerizing 200 chemical} = 50 - 4 = 46 \quad (4)$$

The replenishing mixture would then consist of 46 kgs of **Parkerizing 200** chemical and 4.0 kgs of **Parkerizing 200B** chemical.

It will be necessary to vary the above amounts as production rates change, by increasing the proportion of **Parkerizing 200B** chemical if iron increases, and reducing it if iron decreases. For best results, the iron content of the bath should be maintained in the range of 0.20-0.60%.

The mixture should be kept in an acid proof container and used to maintain the Total Acid in the processing bath. The calculation above will produce enough chemical for one day's operation. However, larger or smaller amounts can be mixed if desired. The mixture is stable and does not deteriorate on standing. It must never be used to build a new bath.

#### **Use of Periodic Additions of Parkerizing 200B Chemical**

If **Parkerizing 200B** chemical is used only periodically, **Neutraliser 202** is used with it. Here, adding 2.0 kgs (1.3 litres) of **Parkerizing 200B** and 1.2 kgs of **Neutraliser 202** per 1,000 litres of processing solution will reduce the iron content by 0.05% and increase the Total Acid value by 0.4 point.

**Note:** Do not mix **Neutraliser 202** with **Parkerizing 200B** chemical, but add each separately to the processing tank.

Do not add **Parkerizing 200B** to the processing tank during a production run. It is preferable to make the addition at the end of the shift.

#### **8. COLD WATER RINSING**

After the **Parkerizing** treatment, the metal is rinsed in cold water for 45-60 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. It should never test more than 0.3 point Total Acid .

#### **9. TREATING WITH A PARCOLENE SOLUTION**

The coated metal, wet from the water rinse, is immersed in a hot, dilute **Parcolene** solution for 30-45 seconds. this treatment materially increases the corrosion resistance of the coating, and is an essential part of the process. The Henkel Corporation has a number of **Parcolene** chemicals available, and will recommend the proper one for each installation.

#### **10. DRYING**

The articles should be dried immediately following the **Parcolene** treatment, unless a water soluble finish is to be applied. Enough heat usually remains from the hot **Parcolene**

treatment to cause heavy gauge articles to dry satisfactorily. Small items may be dried by spreading on a heated tray, by centrifuging, by using a drying oven or an air blowoff. Temperatures above 107EC should not be used.

## 11. FINISHING

The extent to which the coating will absorb finishes depends on its physical characteristics, therefore it is important to carry out the entire process in accordance with the recommended procedure to obtain the maximum protection against corrosion.

The type of finish to use over parts treated with the **Parkerizing** process depends upon individual requirements. **Dry-To-Touch 979 Oil** is recommended for the maximum corrosion resistance.

## 12. GENERAL MAINTENANCE

While **Parkerizing 200** chemicals are designed to minimise the buildup of scale and sludge, they do not eliminate the normal accumulation of coating by-products.

To remove the scale, dry the heat exchanger 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.

In the operation of the process, some insoluble residue is formed as a by-product of the chemical reaction. The material settles to the bottom of the tank and should be removed regularly before its presence causes dusty coatings. A satisfactory method of removal is to transfer the solution to a rinse tank. Leaving as much sludge as possible in the bottom of the **Parkerizing** tank. The sludge may then be removed by any convenient means.

If oil accumulates in the processing tank (usually as a result of poor cleaning or rinsing), it can best be removed in the morning before turning on the heat. It may be either skimmed or blotted off with paper.

The baskets for oiling definitely must not be used for processing.

The average buildup on a surface treated with the **Parkerizing 200** process is 0.0003 to 0.0004 inch (0.007 - 0.010 mm). To obtain a dense, fine-grained coating on some articles where close tolerance is essential, it may be necessary to include in the process a conditioning stage using **Parcolene Z**.

To obtain the highest efficiency, production should be processing practically all the time. That is, when one load of production is taken from the tank, another should be ready to replace it.

Air pockets are the result of placing cup-shaped articles in an inverted position, and will cause spots that are not processed. Large articles in which there is danger from pocketing must be hung or placed in baskets or racks so as to allow perfect drainage and escape of the gas. Smaller pieces of this description are best handled in a tumbling barrel.

Pieces having flat surface need special care to prevent contact of these surfaces while in the solution. The presence of contact marks indicates that both surfaces are not exposed to the action of the solution and remain unchanged or only partially processed. Such pieces must be reprocessed.

### 13. WASTE DISPOSAL INFORMATION

Phosphatising baths are normally maintained in operating condition by addition of replenishing chemicals as needed, therefore they rarely require dumping. However, should it ever be necessary to discard them, neutralisation of the acidity and precipitation of the metals and phosphates may be required to meet federal, state, and local waste control regulations. Henkel Waste Treatment Information Bulletin No. 1002 gives directions for preparing various phosphatising baths for disposal, and is available in request.

To meet pollution control regulations now being enforced by several states, 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 suitable treated to prevent pollution of natural waters.

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