

ENPREP® 114E

Electrolytic alkaline deoxidizer and descaler for iron and steel

ENPREP® 114E is an alkaline powder used in water for the electrolytic derusting and descaling of iron and steel at room temperature and for the electroactivation of steel nickel and stainless steel prior to plating. READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT.

In one simple electrolytic operation, ENPREP 114E will completely remove rust, scale, carbon smut, oxides, and light soil from steel promoting excellent adhesion of subsequent plated coatings. ENPREP 114E solutions eliminate acid dips in plating cycles and replaces acid pickles for rust and scale removal. Because the solutions are alkaline, there is no chemical attack on steel as there is with acids and no corrosion of surrounding equipment from acid fumes. ENPREP 114E is also used in alkaline electroactivation of steel and stainless steel prior to electroless nickel plating

ENPREP 114E has natural cleaning ability. When the work has been adequately precleaned, processing in ENPREP 114E is usually all that is required prior to plating. ENPREP 114E can be used in both barrel and rack plating lines; the solutions are very economical to use and can be maintained indefinitely by periodic analysis and replenishment.

FEATURES/BENEFITS

- Alkaline Descaler
- Low Temperature Operation
- Versatile
- Will Not Attack Steel Substrates
- Saves Energy
- Lowers Overall Finishing Costs

EQUIPMENT REQUIRED

Tanks of polypropylene, welded low carbon steel, or steel tanks lined with Koroseal or rubber are recommended. Carbon electrodes are preferred; however, plain steel anodes, descaled before use, may be used. If carbon anodes are used, a clamping-type anode hook is recommended. Ventilation is recommended.

OPERATING CONDITIONS

ENPREP 114E	16 to 32 av oz./gal. (120 to 240 g/L)
Temperature	70 to 190 °F (21 to 88 °C)
Time	As required

Electrical Requirements

Voltage	6 to 9 Volts (rack) 12 to 15 Volts (barrel)
Current Density	25 to 100 ASF (2.5 to 10 ASD)
Polarity	See Applications Section

MAKE-UP PROCEDURE

Be sure to use vigorous mechanical agitation when dissolving the ENPREP 114E powder in water; if adequate agitation is not used the powder may cake on the bottom of the tank.

To make up an ENPREP 114E solution, proceed as follows.

1. Add 2/3 final volume of cold water to the processing tank.
2. Slowly add the required amount of ENPREP 114E powder with vigorous agitation, stirring until all the powder is dissolved. NOTE: Heat will be generated when the ENPREP powder is dissolved in water.
3. Analyze solution and adjust if necessary to desired concentration.
4. Adjust water to final volume and re-stir.

NOTE: In certain applications requiring increased cleaning capacity such as for heavily oxidized items, certain aerospace applications, and electroactivation of hard to plate alloys, either sodium or potassium cyanide may be used to augment the ENPREP 114 solution. Concentrations will vary depending on the process. Contact your Enthone representative for specific recommendations.

APPLICATIONS

Electrocleaning

Use anodically for electrocleaning of steel or iron parts with light soil. For parts with heavy accumulations of soil, quenching oil or grease, a suitable ENPREP product should be used prior to ENPREP 114E process. Such precleaning eliminates heavy contamination of the ENPREP 114E process, thereby prolonging the life of the solution.

Descaling and Derusting

Periodic Reverse (PR) current (See Appendix) should be used for rusty or scaled steel. While the exact PR cycle will vary for different applications, best results are usually obtained with shorter PR cycle times such as 7 to 10 seconds. The anodic cycle time should always be at least the equal of the cathodic cycle or more. This ensures that any smut that may have formed while the work was cathodic has been removed. Treatment times will vary from 1 to 15 minutes. **It is important to remove the work as close to the end of the anodic cycle as possible.** In automatic machines it is sometimes necessary to install a second tank bussed anodic. It is not necessary to rinse between these process steps.

Current densities of 25 to 100 ASF (2.5 to 10 ASD) are recommended with the higher current densities providing more rapid rust and scale removal. A 6 to 9-volt source is recommended for rack work and a 12 to 15-volt source is recommended for barrel work.

Electroactivation

Solutions used for electroactivation should not be used as a general descaling derusting solution. Such processing will contaminate the solution making it unusable for electroactivation.

Nickel and Nickel Alloys

Current densities of 25 to 100 ASF (2.5 to 10 ASD) Cathodic current is recommended. Anodic current passivates nickel and nickel alloys such as stainless steel. Depending on the alloy, further treatment in 50% HCL followed by Wood's Nickel Strike may be necessary.

Ferrous Alloys

Periodic reverse current with a cycle of 15 seconds cathodic, 15 seconds anodic with current densities of 25 to 100 ASF (2.5 to 10 ASD) are recommended. The final cycle should be anodic so as to prevent the redeposition of unwanted contaminants. Finishing anodic is also important for other reasons as described in the Appendix.

APPENDIX

The polarity applied to the system depends on the reason that an article is being processed. To fully understand the choice of polarity, a brief discussion of Periodic Reverse Current principles is necessary. Cathodic current reduces oxides while the generation of hydrogen gas as a result of electrolysis provides a mechanical means of removing soils by gas scrubbing. Because twice the volume of hydrogen is liberated at the cathode, the mechanical action is twice as effective as when treated anodically. The drawback is that ions in solution tend to redeposit. Anodic current on the other hand, repels these ions but because only one half the volume of gas is generated, the gas scrubbing efficiency is less. In addition, anodic current somewhat passivates ferrous surfaces and to a greater degree nickel alloys such as stainless steel.

Periodic Reverse Current is used to combine the benefits of oxide reduction and vigorous gas scrubbing while at the same time utilizing the soil repelling characteristics of an anodic charge. Periodic reverse current becomes a safe and effective way to remove a variety of oxides and scales without materially affecting the surface of the part.

When using PR current for the electroactivation of nickel and nickel alloys such as stainless steel it must be understood that competing forces are at work. Cathodic current tends to activate while anodic tends to passivate due to the formation of nickel oxide. **If using PR current on nickel alloys always finish cathodic.** Note that it is preferable to use cathodic current only.

Electroactivation of ferrous substrates using PR current is preferred prior to electroless nickel plating. In this case the article to be plated is removed during the anodic cycle. The anodic cycle as stated earlier repels ions in solution. In addition, soluble ions left on the article such as iron, if not removed tend to be over plated causing an unsound deposit that may demonstrate premature corrosion or adhesion failures. An acid treatment is not recommended after alkaline electroactivation. The residual alkaline film left by the electroactivation solution promotes rapid initiation of the electroless nickel deposit.

SAFETY AND HANDLING INSTRUCTIONS

DANGER! ENPREP 114E AND THE OPERATING SOLUTION CONTAIN SODIUM HYDROXIDE WHICH MAY CAUSE SEVERE BURNS.

HAZARDS: ENPREP 114E and the operating solution contain sodium hydroxide which may cause severe burns to skin and eyes, possible blindness. Inhalation may cause severe irritation, burns of respiratory tract. Ingestion may cause severe irritation, burns to gastro-intestinal system. Do not get in eyes, on skin, or on clothing. Do not inhale or take internally.

FIRST AID: In case of contact with ENPREP 114E or the operating solution, immediately flush skin or eyes with plenty of water for at least 15 minutes; get immediate medical attention. Get immediate medical attention. Remove contaminated clothing.

HANDLING: When preparing or maintaining solutions, always add ENPREP 114E slowly and cautiously. Do not get in eyes, on skin, or on clothing. Do not inhale or take internally. Always wear goggles, face shield, rubber gloves, respirator and protective clothing when handling. When making up or adding ENPREP 114E to the solution, allow the solution to cool to a temperature of 120°F (49°C) or lower, and then sift the powder into the warm solution to ensure good mixing. If large quantities of cleaner are dumped directly into the hot cleaning solution, there is danger of eruption due to the heat of solution of the powder. Exhaust ventilation is recommended to remove dust, mists or vapors that may be generated during makeup and operation. Avoid contamination with acids or any other foreign matter. Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling.

CONTAINER INFORMATION: Keep containers tightly closed. Loosen closure cautiously when opening. Store indoors in a cool dry area. Do not reuse containers. Wash before disposal. Improper disposal or reuse of container may be dangerous and illegal.

REFER TO MSDS FOR FURTHER SAFETY AND HANDLING INFORMATION

MATERIAL SAFETY DATA SHEETS

For more detailed information on the toxicological properties of the products described herein, reference can be made to the Material Safety Data Sheet (MSDS) for each product. If you do not have the proper MSDS, it can be requested from: Enthone Inc., attention: Regulatory Affairs Department, 350 Frontage Road, West Haven, CT 06516. For emergency assistance call CHEMTREC (800) 424-9300.

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