ENSTRIP NP

Non Cyanide Stripper to Remove Nickel from Steel and Copper

Product Code: 201767

DESCRIPTION

ENSTRIP® NP is a non-cyanide, alkaline stripper that removes electroplated nickel deposits from steel, copper and copper alloys by simple immersion. It will not attack most soldering or brazing metals. Prior to using this product, refer to "MAKE-UP", "OPERATION", and "CONTROL" sections for proper handling and usage procedures.

ENSTRIP NP is supplied as two liquid materials, ENSTRIP NP-1 and ENSTRIP NP-2, that are mixed with water to make the operating solution. ENSTRIP Regenerator, a liquid material, may be required to replenish the inhibitors and accelerators in the operating solution. An additional liquid material, ENSTRIP NP-3 may be used in the ENSTRIP NP process when stripping nickel from steel. ENSTRIP NP-3 is used as a direct replacement for ENSTRIP NP-2 to prevent smut formation on steel in certain applications.

Equipment requirements for ENSTRIP NP are simple: a plain steel tank or drum and, if desired, a steel heating coil. Exhaust ventilation is recommended. The work may be stripped in inexpensive wire baskets, thus eliminating racking costs.

Specifications: ENSTRIP NP fulfills the requirements of Pratt & Whitney SPOP 40.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

Features	Benefits
• Cyanide-free process	• Eliminates use of costly sodium cyanide; eliminates cost of waste treatment to destroy cyanide
• Strips nickel from copper plated zinc die castings, steel and copper alloys	• Reduces inventory requirements
• Used in conventional steel equipment	• Eliminates requirements for more costly plastic tanks
• Two-component system (liquid)	• Ease of make-up

OPERATING PARAMETERS

Concentration

ENSTRIP NP-1	20% by volume
ENSTRIP NP-2 or NP-3	20% by volume
Water	60% by volume

Temperature	Room to 175 °F (80 °C)
Time	As required
pH	10.9 to 11.4

Parts to be stripped should be cleaned in an Enthone alkaline cleaner. Remove all chromium deposits with either a hydrochloric acid dip or an alkaline electrolytic cleaner. If an alkaline electrolytic cleaner is used, the parts should be dipped in a 30 to 50 percent by volume hydrochloric acid solution for several minutes to activate the nickel surface. Follow with a running water rinse; then immerse the parts in the ENSTRIP NP operating solution.

Suspend the rack or basket of parts to be stripped into the ENSTRIP NP solution. Do not allow the parts to touch the bottom or sides of the tank or come in contact with the heating coils. For most efficient stripping, immerse as many parts as possible in the ENSTRIP NP solution. Mechanically agitate the work or solution. **AVOID OVERHEATING THE SOLUTION. DO NOT USE AIR AGITATION**. Remove all parts from the operating solution as soon as they are fully stripped.

Keep the stripping tank covered at all times. Prolonged operation of the solution without a cover will result in some loss of ENSTRIP NP-2 or ENSTRIP NP-3. This loss must be replaced if efficiency is to be maintained. (Refer to section entitled "CONTROL.")

Ensure that copper, lead, chromium, and cadmium are not introduced into the ENSTRIP NP solution. Contamination of the solution with these metals will lower the stripping efficiency. New and used ENSTRIP NP solutions must not be heated for long periods without immersing nickel-plated parts into the solution. Metallic and organic contamination or heating without stripping nickel deactivates the accelerators in the ENSTRIP NP solution.

After nickel has been stripped from copper or copper alloys, the parts will be covered with a protective inhibitor film. This film can easily be removed by dipping the parts in a solution of one of the following:

OPTION A. 4 to 16 oz./gal. (30 to 120 g/L) of sodium cyanide

OPTION B. 4 to 8 oz./gal. (30 to 60 g/L) of chromic acid.

Special Precautions

When ENSTRIP NP (PS 325/PMC 1564) is to be used in accordance with SPOP 40 in the Pratt & Whitney Standard Practices Manual to strip nickel-cadmium plate from assemblies brazed with silver or copper alloy braze, special precautions are recommended. Cadmium electroplated over the nickel plate must be removed before immersion in the ENSTRIP NP solution. The braze alloys used on these assemblies are silver-copper-palladium or copper-manganese and may be susceptible to degradation if the ENSTRIP NP operating solution is not maintained in accordance with the recommendations specified in the "CONTROL" section of this data sheet and Section 70-44-2 of the Pratt & Whitney Standard Practices Manual which recommends that "these solutions must be analyzed frequently and proper strength or concentration maintained".

In all cases, the course of the stripping operation should be closely monitored to insure that braze integrity be maintained. And, that the ENSTRIP NP stripping solution be operated and maintained within specifications.

Stripping Rate

A new ENSTRIP NP solution will strip nickel at room temperature at a rate of 0.25 mil (6 microns) per hour. At 175 °F (80 °C) a new ENSTRIP NP solution will strip nickel at a rate of 1.00 mil (25 microns) per hour. As the solution is used, the stripping rate will decrease. One gallon of ENSTRIP NP operating solution will dissolve approximately 2 to 4 oz. of nickel metal (15 to 30 g/l).

MAKE UP PROCEDURE

Add components in order given. Fill tank half full of water. Add 20% of final volume ENSTRIP NP-1 and stir; then add 20% of final volume ENSTRIP NP-2 or ENSTRIP NP-3 and stir. Add water to bring solution to final operating volume.

EQUIPMENT

Steel or stainless steel tanks are recommended for operating solutions of ENSTRIP NP. The size of the tank is important; the tank should be deep enough to allow a maximum clearance between the bottom of the parts being stripped and the bottom of the tank to allow for any sludge accumulations. The stripping tank should be in a well-ventilated area. Exhaust ventilation is recommended.

Plain steel or stainless steel platecoils are recommended for heating ENSTRIP NP solutions. PTFE heating coils may also be used. Racks, hooks or baskets should be made of steel or stainless steel. Do not use brass or copper racks, hooks or baskets. Mechanical agitators are recommended for solution agitation. Mixer shaft and propeller should be steel or stainless steel. A plastisol coating may be used to eliminate galvanic cells.

Tanks should be equipped with a steel, stainless steel or PVC plastic cover; or polyethylene balls may also be used to blanket the surface of the solution. A temperature controller is recommended. The parts to be stripped and heating coils must be electrically insulated from the tank. All other equipment such as mechanical agitators and temperature sensors, in contact with the stripping solution must be free from any stray potential current capable of setting up a galvanic cell within the stripping solution.

SOLUTION MAINTENANCE

ENSTRIP NP is chemically balanced so that if the solution is prepared and used as directed, all components will be exhausted and can be discarded simultaneously. However, continuous heating of the ENSTRIP NP solution without a cover or with a loose fitting cover will result in evaporation of some ENSTRIP NP-2 or ENSTRIP NP-3. This loss must be made up by additions of ENSTRIP NP-2 or ENSTRIP NP-3 or premature exhaustion of the entire solution will occur. Additions of ENSTRIP NP-2 or ENSTRIP NP-3 must be accompanied by additions of ENSTRIP NP-1. Also, additions of ENSTRIP Regenerator may have to be made. It is important to replenish ENSTRIP NP-2 or ENSTRIP NP-3 and NP-1 before testing for the ENSTRIP Regenerator.

ANALYTICAL PROCEDURES

The following procedures are recommended for proper analysis and replenishment of the ENSTRIP NP operating solution. Perform the analysis in the following order.

CAUTION: The following procedures involve the use of potentially hazardous chemicals; manufacturer's material safety data sheets should be consulted and the appropriate safety cautions followed.

(1) ANALYSIS FOR ENSTRIP NP-2 OR ENSTRIP NP-3

Equipment Needed

5	mL pipette
50	mL burette
250	mL beaker
250	mL Erlenmeyer flask
	Filter paper, Whatman #41

Reagents Needed

1% Methyl Orange Indicator Solution - dissolve 1 gram of methyl orange salt in 100 mL deionized or distilled water.

1.0N Sulfuric acid (H_2SO_4) Solution - purchase from local laboratory supply house.

Procedure

1. Adjust the volume of the ENSTRIP NP operating solution to the original make-up volume by adding water. Mix well.

Take a 150 mL sample of the adjusted operating solution, cool to room temperature and filter to remove particulate matter.

Pipette a 5 mL aliquot of the filtered solution into an Erlenmeyer flask and add 75 mL of deionized or distilled water and several drops of 1% methyl orange indicator solution.

Using a white background, titrate to the endpoint using 1.ON H_2SO_4 solution; color change is from yellow to pink. A pH meter can be used if difficulty exist in seeing endpoint. Calibrate pH meter with 7.0 and 4.01 buffers and then titrate to a pH of 4.0.

Calculation

mL H_2SO_4 titrated x Normality H_2SO_4 x 1.13 = % by volume ENSTRIP NP-2 or ENSTRIP NP-3 in solution

Replenishment

Restore solution to original make-up of 20% by volume ENSTRIP NP-2 or ENSTRIP NP-3; for each volume ENSTRIP NP-2 or ENSTRIP NP-3 replenished add an equal volume of ENSTRIP NP-1.

(2) ANALYSIS FOR pH

After analyzing and replenishing the operating solution for ENSTRIP NP-2 or NP-3 and NP-1 check the pH of the operating solution by taking a 100 mL sample of the solution and cooling it to room temperature. Then, make the pH measurement electrometrically using a pH meter and standardized reference electrode (pH 10 buffer).

If the pH of the operating solution is below 10.9 it must be adjusted with ammonium hydroxide to within the recommended pH range (10.9 to 11.4).

(3) ANALYSIS FOR ENSTRIP REGENERATOR

Equipment Needed

1	mL pipette - Mohr pipette graduated in 0.1 mL units
2	mL pipette - dropper type
5	mL pipette - Mohr pipette graduated in 0.5 mL units
10	mL pipette
20	mL pipette
10	mL graduated cylinder

100	mL volumetric flask (2 required)
1	liter volumetric flask
20	mL test tubes, stoppered (6 required)
1	White background

Reagents Needed

Copper Sulfate Solution - add 5 mL of 26° Bé ammonium hydroxide (NH_4OH) to 75 mL of water and then dissolve 1.5 grams of reagent grade copper sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$). Add water to bring to exactly 100 mL. Ensure that chemicals are added in order given or a solid will precipitate.

1, 1, 2 - Trichlorethylene - purchase from local laboratory supply house.
Standard ENSTRIP Regenerator Solution - into a one liter volumetric flask pipette 0.70 mL of ENSTRIP Regenerator and dilute to exactly one liter with water.

Procedure

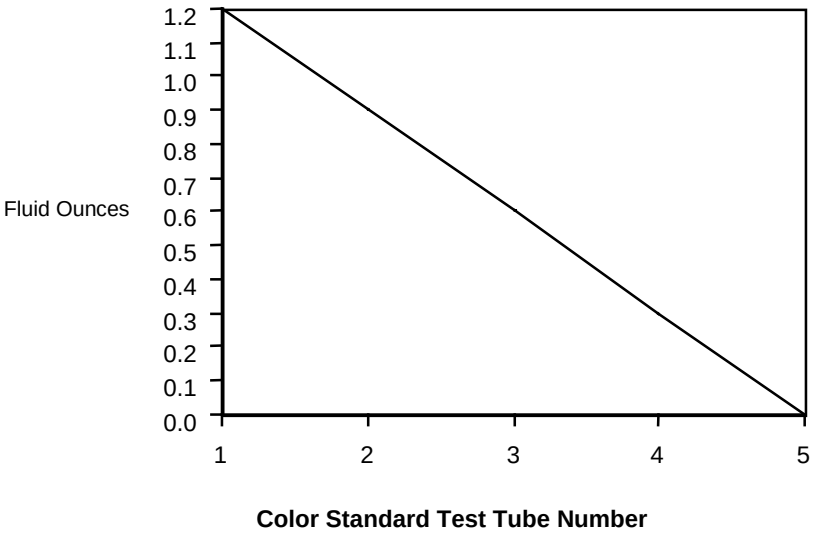
1. Number the test tubes 1 through 6.
2. Into each test tube place 10 mL of trichlorethylene and 2 mL of copper sulfate solution. This results in the formation of two layers, blue on top and clear on the bottom.
3. Make the following additions to test tubes 1 through 5.

Test Tube No.	mL Standard ENSTRIP Regenerator Solution
1	none
2	1.0
3	1.5
4	2.0
5	2.5

4. Stopper each test tube and shake well. The bottom layers will take on varying shades of amber yellow, the top will remain blue.
5. Take a 150 mL sample of the ENSTRIP NP operating solution. Ensure that the operating solution has been adjusted to recommended concentration of ENSTRIP NP-1 and ENSTRIP NP-2 or ENSTRIP NP-3 as outlined under "ANALYSIS FOR ENSTRIP NP-2 or ENSTRIP NP-3."
6. Allow sample to cool to room temperature; then filter to remove particulate matter.
7. Pipette 20 mL of the filtered ENSTRIP NP operating solution into a 100 mL volumetric flask and dilute to exactly 100 mL with water.
8. Pipette 1 mL of the diluted ENSTRIP NP operating solution into test tube number 6 stopper and shake well.
9. Using a white background, compare the amber yellow color of the bottom layer of test tube number 6 against color standards number 1 through 5.

10. Use Graph I to determine the amount of ENSTRIP Regenerator to add to the ENSTRIP NP operating solution.

GRAPH I. DETERMINING REPLENISHMENT ADDITIONS OF ENSTRIP REGENERATOR FOR ENSTRIP NP OPERATING SOLUTIONS



PROCEDURE: Determine color standard that best matches test tube number six. Read vertically to diagonal line then read horizontally (left) to determine fl. oz./gal. of ENSTRIP Regenerator required. If working in liters, multiply fluid ounces per gallon as determined from the chart by 7.81 to determine milliliters per liter to add.

EXAMPLE: Color test tube standard number 4 best matches test tube number six. Reading vertically and left, the operating solution should be replenished with 0.30 fl. oz. of Enplate Regenerator per gallon of operating solution (2.031 mL/L).

SAFETY & WARNING

MacDermid Enthone recommends that the company/operator read and review the Safety Data Sheets for the appropriate health and safety warnings before use.

Safety Data Sheets are available from MacDermid Enthone.

WASTE TREATMENT

Prior to using any recommendations or suggestions by MacDermid Enthone for waste treatment, the user is required to know the appropriate local/state/federal regulations for on-site or off-site treatment which may require permits. If there is any conflict regarding our recommendations, local/state/federal regulations take precedent.

ORDER INFORMATION

Product	Code
ENSTRIP NP 1	201767
ENSTRIP NP 2	201771
ENSTRIP NP 3	201814

CONTACT INFORMATION

To confirm this is the most recent issue, please contact MacDermid Enthone

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Also read carefully warning and safety information on the Safety Data Sheet. This data sheet contains technical information required for safe and economical operation of this product. READ IT THOROUGHLY PRIOR TO PRODUCT USE. Emergency directory assistance: Chemtrec 1 - 800 - 424 - 9300.

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