



# ENSTRIP™ NP

## TECHNICAL DATA SHEET

ENSTRIP NP non-cyanide stripper to remove nickel from steel and copper

### INTRODUCTION

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", "CONTROL", and "CAUTION" sections for proper handling and usage procedures. READ THE ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT.

Please remember this TDS is for commercial setups. It has been left as a whole instruction but some of the latter part of the document is mainly relevant to larger scale commercial users.

There is no need to concern yourselves with testing of the solution, just use it till it stops working and then replace it if necessary.

### FEATURES

Cyanide free process

Strips nickel from copper plated zinc die castings, steel and copper alloys

Used in conventional steel Equipment

Two-component system

### BENEFITS

Eliminates use of costly sodium cyanide, eliminates cost of waste treatment to destroy cyanide

Reduces inventory requirements.

Eliminates requirements for more costly plastic tanks

Ease of make up

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.

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.

### PREPARATION OF THE SOLUTION

Before handling any of the products referred to in this data sheet ensure all relevant material safety data sheets have been read and understood. 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.

### OPERATING CONDITIONS

ENSTRIP NP1	20 %v/v
ENSTRIP NP2 or 3	20 %v/v
Water	60 %v/v
Temperature	Room to 80 °C
Time	As required
pH	10.9 to 11.4

Parts to be stripped should be cleaned in an 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 NP2. 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:** 240 g/L of **ENPREP 114E** at 38°C with periodic reverse current, approximately 7 seconds anodic current, 4 to 5 seconds cathodic current, at 25 to 35 ASF
- OPTION B:** 30 to 120 g/L of sodium cyanide.
- OPTION C:** 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 40C 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. 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 analysed 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 6 microns per hour. At 80°C a new ENSTRIP NP solution will strip nickel at a rate of 25 microns per hour. As the solution is used, the stripping rate will decrease. One litre of ENSTRIP NP operation solution will dissolve approximately 15 - 30 grams of nickel metal.

#### 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 plate coils are recommended for heating ENSTRIP NP solutions. Teflon 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 stray potential current capable of setting up a galvanic cell within the stripping solution.

### **CONTROL**

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. This loss must be made up by additions of ENSTRIP NP-2. 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.

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.

### **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 de-ionised or distilled water.

1.0 N Sulphuric Acid (H<sub>2</sub>SO<sub>4</sub>) 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.
2. Take a 150 mL sample of the adjusted operating solution, cool to room temperature and filter to remove particulate matter.
3. 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.
4. Using a white background, titrate to the endpoint using 1.0N H<sub>2</sub>SO<sub>4</sub> solution; colour change is from yellow to pink. A pH meter can be used if difficulty exists 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<sub>2</sub>SO<sub>4</sub> titrated x Normality H<sub>2</sub>SO<sub>4</sub> 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.

### **ANALYSIS FOR pH**

After analyzing and replenishing the operation 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).

**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 1t volumetric flask 20 mL test tubes, stoppered (6 required)
- 1 White background

Reagents Needed

Copper Sulphate Solution - add 5 mL of 26° Be ammonium hydroxide (NH<sub>4</sub>OH) to 75 mL of water and then dissolve 1.5 grams of reagent grade copper sulphate pentahydrate (CuSO<sub>4</sub>.5H<sub>2</sub>O). Add water to bring to exactly 100 mL. Ensure that chemicals are added in order given or a solid will precipitate.

1, 1, 2 - Trichloroethylene - purchase from local laboratory supply house.

Standard ENSTRIP Regenerator Solution - into a one litre volumetric flask pipette 0.70 mL of ENSTRIP Regenerator and dilute to exactly one litre with water.

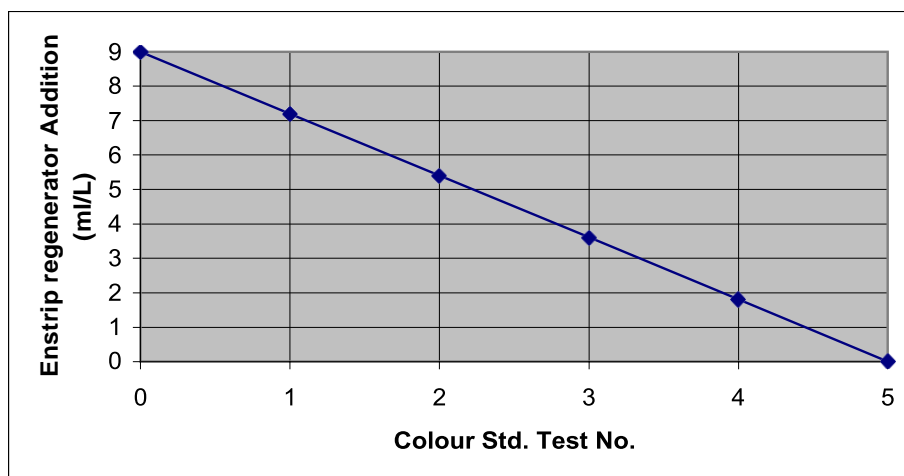
Procedure

1. Number the test tubes 1 to 6.
2. Into each test tube place 10 mL of trichloroethylene and 2 mL of copper sulphate 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 to 5.

Test Tube Number	mL Standard ENSTRIP Regenerator
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-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 colour of the bottom layer of test tube number 6 against colour standards number 1 through 5.
10. Use Graph 1 to determine the amount of ENSTRIP Regenerator to add to the ENSTRIP NP operating solution.

**GRAPH 1: DETERMINING REPLENISHMENT ADDITIONS OF ENSTRIP REGENERATOR FOR ENSTRIP NP OPERATING SOLUTIONS**



#### Procedure

Determine colour standard that best matches test tube number six. Read vertically to diagonal line then read horizontally (left) to determine g/L of ENSTRIP Regenerator required.

#### **Example:**

Colour test tube standard number 4 best matches test tube number six. Reading vertically and left, the operating solution should be replenished with **2.3** mL of Enplate Regenerator per litre of operating solution.

#### **PRECAUTIONARY INFORMATION**

DANGER! ENSTRIP NP-2 AND ENSTRIP NP-3 CONTAIN ETHYLENE DIAMINE, MAY CAUSE SEVERE BURNS. ENSTRIP NP-1 CONTAINS AMMONIUM HYDROXIDE MATERIAL, MAY CAUSE BURNS.

#### FIRST AID

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes; hold eyelids apart to ensure flushing of entire surface, seek immediate medical attention. If ingested, DO NOT INDUCE VOMITING, drink large amounts of water, seek immediate medical attention. In case of inhalation, remove person from area. If breathing has stopped, resuscitate and administer oxygen if necessary, seek immediate medical attention. Remove and wash contaminated clothing.

#### HANDLING INFORMATION

Always wear goggles, face-shield, rubber gloves, apron and boots, respirator and protective clothing when handling. Use with adequate ventilation. Avoid contact with acids, oxidizing materials, halogenated organic compounds or any other foreign material. Avoid contamination from any source. Exhaust ventilation is recommended to remove mist or vapours that may be generated during make-up and operation. Wash thoroughly after handling.

#### CONTAINER INFORMATION

Store in a cool, dry, well-ventilated area. Keep out of sun and away from heat, acids and oxidisers. Loosen closure cautiously, when operating. Do not reuse container, wash thoroughly before disposal. Improper disposal or reuse of container may be dangerous and illegal.

#### WASTE TREATMENT

ENSTRIP NP is an ammoniacal solution and must be neutralised after treatment for nickel metal removal and prior to disposal in an approved manner. Consult local agencies for regulations governing waste effluent disposal, especially with regard to nickel metal.

#### **SAFETY & HANDLING INSTRUCTIONS**

CLASSIFIED AS 'CORROSIVE LIQUID, BASIC, ORGANIC NOS'  
ENSTRIP NP-2  
ENSTRIP NP-3  
WORKING SOLUTIONS OF ENSTRIP NP  
HAZCHEM 2X UN NUMBER 3267

**SAFETY DIRECTIONS**

ENSTRIP NP-2, NP-3 and working solutions can cause severe burns of skin and eyes, possible blindness. Ingestion and/or inhalation may cause severe respiratory tract or gastrointestinal burns.

ENSTRIP NP-2 and ENSTRIP NP-3 may cause sensitisation or allergic response, moderately toxic by skin absorption.

Do not get in eyes, on skin or on clothing.

Do not inhale or take internally.

**REFER TO MSDS FOR FURTHER SAFETY AND HANDLING INFORMATION**  
**In a transport emergency dial 000 Police or Fire Brigade**

**NOTE:** Chemicals not supplied by Caswell Australia Pty Ltd may be referred to in this data sheet. It is essential that the user is completely familiar with the handling and safety directions issued by the suppliers of those chemicals.

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