B-9 NICKEL STRIPPERS

For fast removal of Nickel from Steel, Copper, Brass, Zinc Die-cast, Silver, Gold, Tin, Aluminum, Lead and Lead Alloys
No Etching
No Fuming
One-Component
Non-Toxic

AEROSPACE SPECIFICATIONS

PRATT & WHITNEY
Alternate stripper to PS 644 in SPOPs 25, 26, 29, and 49. B-9 is designated as SPMC 128 for use in solution SPS 128. PS 644 also applies to SPOPs 315 and 320 for electroless nickel stripping.

BOEING AEROSPACE & ELECTRONICS:
PSD Number 2-27
PROCESS SPEC. Number BAC 5771

THIS PRODUCT IS PATENTED

DISTRIBUTED BY: Aqua Bond Inc.
PO Box 63635
Toronto, Ontario, M1V 5K2
Tel. No. (416)-754-7211

TABLE OF CONTENTS

EQUIPMENT NEEDS…… Page 3

MIXING INSTRUCTIONS…… Page 4

BATH OPERATION INSTRUCTIONS…….. Page 4

SMUT REMOVAL POST TREATMENT……. Page 5

B-9 NICKEL STRIPPER
Removing Electrolytic Nickel
From Steel……. Page 4

B-9 NICKEL STRIPPER
Removing Electroless Nickel
From Steel……. Page 5

B-929 NICKEL STRIPPER
Removing Electrolytic Nickel
From Copper, Brass, Silver,
Gold, and Zinc Die-cast…… Page 6

B-9 PLUS NICKEL STRIPPER
Removing Nickel From Steel
In The Occasional Presence Of
Copper……. Page 6

B-9 NICKEL – IRON STRIPPER
Removing Nickel – Iron Plate…… Page 7

B-913 NICKEL STRIPPER
Removing Nickel From Aluminum…… Page 7

WASTE DISPOSAL…… Page 7 - 8

ANALYZING FOR NICKEL CONTENT…… Page 9

PRODUCT DESCRIPTIONS

PERFORMANCE AND BATH LIFE

When mixed in accordance with simple directions and operated at the recommended temperature, a new solution of B-9 Nickel Stripper should strip ELECTROLYTIC NICKEL at the rate of one to two mils per hour and should dissolve 2 1/2 - 6 ounces of nickel per gallon of solution depending upon the amount of stripper used for make up, the operating temperature, agitation and etc. of the stripping bath during use. The stripping rate of ELECTROLESS NICKEL depends on the phosphorus content of the plate as well as other factors. Phosphorus content not exceeding five percent should dissolve at the same approximate rate as electrolytic nickel plate. Higher phosphorus values will require additional time.

Chemical nickel strippers remove the most nickel per gallon of solution when they are correctly maintained. A stripping bath that is used lightly and kept hot over a prolonged time period will strip less nickel than an identical bath that is used quickly. To prolong bath life, allow all B-9 products to cool to room temperature when not in use.

A one-component nickel stripper, the B-9 product line offers ease of operation, an absence of fumes and unpleasant odors, almost complete elimination of operator hazards, and simplified waste disposal of the spent bath. Your supplier stands ready at all times to assist you with technical advice to aid in adapting the B-9 Nickel Strippers to your needs in your facilities.

TANKS AND EQUIPMENT

TANKS: Tanks may be unlined steel, polypropylene, stainless steel or most any plastic lined tank that will survive operational temperature.

AGITATION: Agitation or circulation of the B-9 stripper solutions is required to prevent stratification of the bath. Mild air, pumped or stirred solution, mechanical agitation or tumbling parts in a barrel are all adequate methods.

HEAT: Solution heating is required to maintain a recommended temperature of 120 degrees to 150 degrees Fahrenheit during the stripping operation. To prolong bath life, heating should be discontinued immediately after use. NOTE: Steam coils should never be placed directly in the stripping bath. If steam is used the coils should be placed in a separate compartment filled with water to make the heating process more gentle. The stripping bath will last much longer if heat is applied in this manner from any source. (A SAVINGS OF UP TO 40 % CAN BE REALIZED OVER THE LIFE OF THE BATH). If the heater must be in the stripping bath, you must agitate the bath thoroughly to reduce boiling of the bath at the interface of the heater. It is recommended that agitation be directed at, or placed under, the heater to quickly move the solution in contact with the heating surface.

PLEASE NOTE: STAINLESS STEEL OR TITANIUM HEATERS ARE RECOMMENDED FOR IN BATH USE. DO NOT USE PLAIN STEEL OR QUARTZ HEATERS.

MIXING INSTRUCTIONS

There are two methods of usage of all B-9 products: The BATCH method and the ADDITION method. The Batch method is often used by those operators who wish to make up smaller baths as needed and use them to completion, usually removing 2 1/2 to 4 ounces of nickel per gallon of solution. Those operators using larger tanks who need to achieve greater life and nickel concentrations may use the addition method.

BATCH METHOD

1. Fill the stripping tank half full of 120 degrees to 150 degrees F water.
2. Add two and one-half (2 1/2) pounds of Nickel Stripper for each gallon of the tank's working capacity. (NOTE: Users of the B-9 Nickel-Iron Strippers should use Three pounds (3) per gallon.)
3. Complete filling the tank with warm water and stir while heating to the operating temperature of 120 degrees to 150 degrees F.
4. When the operating temperature reached, and the powder dissolved, the stripping bath is ready to use. Follow "Bath Operation Procedures" outlined on page #4.

ADDITION METHOD

1. Fill stripping tank half full of 120 degrees to 150 degrees F water.
2. Add Two (2.0) pounds of Nickel Stripper for each gallon of the tank's working capacity.
3. Complete filling the tank with warm water and stir while heating to the operating temperature of 120 degrees to 150 degrees F.
4. When the proper temperature is reached, and the powder dissolved, your stripping bath is ready.
5. After completion of each stripping operation, analyze your bath for nickel content using the standard murexide indicator procedure. (Listed on page #9 for your convenience.) After completing your titration procedure, you may bring your bath back to the original operating condition by ADDING .60 POUNDS OF NICKEL STRIPPER PER GALLON OF TANK VOLUME PER OUNCE OF NICKEL IN THE SOLUTION.
6. After stirring in the addition, cool tank until next usage. Do Not Cover.

Some crystallization of ingredients may occur in cold climates. These will dissolve when the bath is reheated and stirred.

BATH OPERATION PROCEDURES

After removing all chromium, immerse parts in the Nickel Stripper solution. Racked parts should be suspended in solution, not touching the bottom or sides of the tank or heating coils. Parts should be slightly spaced to allow circulation of stripper solution and avoid point-contact problems. For the most economical operation, it is recommended that the operator strip as many parts as can possibly be put in the tank at one time, filling it to its part-holding capacity. Parts can be very successfully stripped in a rotating barrel. In most instances, the smut will be removed by the tumbling action during the stripping cycle. Successful stripping has been achieved with an enclosed stripping system by placing hot water, the B-9 stripper (in the correct quantity) and preheated parts in an enclosed barrel and slowly tumbling.

POST TREATMENT

The black smut remaining on stripped parts is a combination of nickel oxides and nickel sulfides and can be removed by any one of the following methods:

1. If hexavalent chromium (chromic acid - app. 1 lb/gal) or cyanide (app. 4 oz/gal) is in house, a post dip in either will remove the nickel smut.
2. To remove smut from steel parts, the use of reverse current at six or more volts while the part is in the strip tank is effective but may decrease the bath's life.
3. A separate bath made up on 50% spent strip and 50% new strip (made up at only 1 lb/gal) with reverse current at six or more volts is being widely used. Watch for etching of high nickel steels.
4. For removal of smut from steel, copper, or zinc die cast, the following formulation will quickly remove all smut with no etching of the zinc or copper:

(a) N.T.A. Trisodium Salt: 1/2 lb/gallon (Nitrilotriacetic Acid - Available from W.R.Grace or Dupont)

(b) 35% Hydrogen Peroxide: 5 - 10% by volume

Because of the short life of Hydrogen Peroxide, this dip must be made up on a daily basis and the same disposal methods used for any chelated material should be followed.

5. If stripping a thin electrolytic nickel (0.2-0.4 mils) the smut will also be thin and can usually be removed during normal cleaning cycle prior to replating. Electroclean, Rinse, and Acid dip. If residual smut is detected after acid, repeat the process.

NOTE: IMMERSE STRIPPED PARTS IN SMUT REMOVAL SOLUTION IMMEDIATELY FOLLOWING STRIPPING AND RINSING.

REMOVING ELECTROLESS NICKEL FROM STEEL WITH B-9 NICKEL STRIPPER

B-9 Nickel Stripper gives superior results when used for removal of electroless nickel coatings. When stripping electroless nickel containing no more than five percent phosphorus, follow the "Mixing Instructions", and "Bath Operation" and "Post Treatment" procedures.

When stripping bright electroless nickel in a new bath up to half-life, the smut will be dissolved if the parts are allowed to remain in the bath or 1-2 hours after the stripping is completed. The stripper solution should not affect the base metal. This process, however, is not as effective after the bath passes half-life.

Fast removal of HIGH PHOSPHORUS ELECTROLESS NICKEL coatings (6 - 15%) can be achieved by applying three (3) volts of reverse current to the parts during the stripping cycle. This electrochemically enhanced stripping process is an important new development in stripping high phosphorus electroless nickel deposits. (Process Patented)

To apply the reverse current, we recommend an electrical D.C. power unit adjustable to six more volts with the capacity to provide twenty amps per square foot of surface area.

Caution: This procedure will etch a copper-based alloy and should be employed for steel and aluminum substrates only.

We have also verified that heating the electroless nickel part prior to immersion stripping often speeds the process of removal of electroless nickel plate. Heating the part to 450 **Fahrenheit** for one hour with immediate immersion (after cooling to room temperature) in the stripping bath will usually shorten the required stripping time.

Your electroless nickel bath contains stabilizers that prevent bath collapse and spontaneous plate out. After stripping, these stabilizers are concentrated in the smut. Occasionally, a stripped part that looks smut-free actually has trapped stabilizers that cling invisibly in the cracks and pores of the metal and may cause pitting when the part is replated. If pitting occurs, we highly recommend the electrical smut removal process described in the "Post Treatment" section (page #5) be employed after stripping. Note: When stripping low phosphorus electroless nickel in a new stripping bath, the operator may often note the absence of smut on the part and will be led to think that stripping is not occurring. This is not uncommon in a new bath, but, as the bath ages, smut will begin appearing on the parts.

B-929 NICKEL STRIPPER
REMOVING ELECTROLYTIC NICKEL FROM BRASS, COPPER, ZINC DIECAST, SILVER, AND GOLD

The B-929 Nickel Stripper formulation contains elemental sulfur which inhibits copper contamination and extends the life of the B-929 stripping bath. The sulfur content of the bath should be maintained by the plater at a rate of about a 2 ounce addition per stripping cycle or as needed by visually checking the bath. If sulfur is floating on and in the bath, no addition will be needed. You need not worry about adding too much sulfur to your bath. It will be used as it is needed and an over addition will have no ill effects on the bath. NOTE: Agitation is essential to keep the sulfur dispersed in the stripping bath. An additional benefits of the B-929 formulation is the great reduction, or possibly complete elimination of smut build-up, especially on the thinner nickel plates. The Hydrogen Peroxide formulation listed in item #4 of the "Post Treatment" section, will efficiently remove any remaining smut without attack on the softer substrates.
The B-929 is made up and operated using the same procedures as the B-9. Please refer to "Mixing Instructions", "Bath Operation" and "Post Treatment" for more details.

B-9 PLUS
REMOVING NICKEL FROM STEEL IN THE PRESENCE OF COPPER

The B-9 Plus formulation offers the same aggressive stripping action as the original B-9 but also contains elemental sulfur to protect your bath from the occasional introduction of copper. For the job shops that must use their bath for nickel over steel and nickel over copper plate, this would be the more versatile system. Because it is a more aggressive formulation than the B-929, the user may experience some attack on the softer substrates such as brass although the attack will result in an overall 'smoothing' or 'dulling' of the surface rather than the deep etch lines or pitting one commonly encounters with the electrical or harsh amine strippers. Again, the operator should follow the "Mixing Instructions", "Bath Operation" and "Post Treatment" procedures for best results. He should also review the suggestions listed above regarding the maintenance of sulfur in the stripping bath, thereby extending the life of the B-9 Plus bath.

B-9 NICKEL - IRON
REMOVING NICKEL – IRON ELECTROPLATE

The only variation in usage of the B-9 Nickel - Iron Stripper is in the make-up. As noted on page #4 under "Mixing Instructions", the operator should add three pounds per gallon rather than the 2 1/2 needed for the other B-9 products. The B-9 Nickel - Iron Stripper has been tested on plate containing up to 40% iron and has proven effective in its removal of the defective plate with no attack on the substrate. Please refer to "Mixing Instructions", "Bath Operation" and "Post Treatment" for best results.

B-913
REMOVING NICKEL FROM ALUMINUM
Although nitric acid solutions have traditionally been used to quickly remove nickel from aluminum, a resulting problem was sometimes hydrogen embrittlement of the base metal. Use of the B-913 does not cause hydrogen embrittlement simply because no molecular hydrogen is generated during the stripping process. The B-913 offers a further enhancement of the elimination of operator hazards from exposure to strong acids. Following the "Mixing Instructions" and the "Bath Operation" procedures the operator should obtain a stripping rate of at least one mil per hour. Post treatment for smut removal should be handled in the same manner as the treatment for steel or the operator may follow his normal in-house procedure for desmutting aluminum.

DISPOSAL
B-9 users are currently employing the following disposal methods:
(1.) In consultation with licensed waste disposal companies, we have been advised that, because of the non-toxic formulation of the B-9 products, the spent solution, after having been fixed in a solid base by the disposal company, may be deposited in an INDUSTRIAL rather than a hazardous landfill. This disposal classification results in reduced charges and is, in many cases, more economical than treating within your facilities. The operator should take care that he does not deposit chromium into his stripping bath; thereby causing the solution to be classed as hazardous waste which may not qualify as a fixable industrial waste. For more information contact your B-9 supplier or L. W. D., Inc., P. O. Box 327, Calvert City, Kentucky 42029, Telephone: 502-395-8313. Contact Mr. Alan Orth.
(1A.) A manufacturer of stainless steel is now licensed to take waste that is high in chromium and nickel. This recycling process, which relieves the generator of the cradle to grave responsibility mandated in the RCRA law, is available at very reasonable prices. For more information contact your B-9 supplier or INMETCO, P. O. Box 720, Ellwood City, Pa. 16117, Telephone 412-758-2800.
(2.) For those companies having the capacity of reducing hexavalent chrome in their waste treatment system using Bisulfite in an acid medium, the following procedure has worked well in many installations: At the rate of 1/2 to 1 gallon per hour (depending upon the volume of your waste water) the operator may employ an injector pump to inject the spent nickel stripper into his system prior to the Bisulfite treatment, thus breaking the chelator in the B-9 strippers.
(3.) The addition of VINMET 1140 (Sodiumdimethyldithiocarbamate) or VINMET 1180 results in an immediate precipitation of the nickel in your spent B-9 solutions, creating a sludge which can then be treated by being slowly fed (after review by your waste disposal

consultants) through your waste treatment system. The above named chemical can be obtained through your B-9 supplier.
(4.) Plating out the nickel from the spent stripping bath is also being successfully employed. Again, the residual liquid is slowly fed through your waste treatment system. Some operators may want to employ this plate-out treatment along with a chemical treatment.
(5.) BATCH TREATMENT FOR B-9 NICKEL STRIPPER
(a) Perform a titration or an AA to determine the amount of nickel per gallon of spent stripper bath (titration instructions below)
(b) Pour in ELEMENTAL SULFUR at an amount of 4 ounces per one ounce of nickel per gallon in the solution. EX: 100-gallon bath containing 3 ounces per gallon of nickel would require 75 lbs sulfur.
(c) Add 50 % LIQUID CAUSTIC at an amount of 10% of volume. (1 gallon of caustic per 10 gallons of spent stripper.)
(d) Stir the mixture fast enough to disperse the sulfur into the solution while heating to 170 degrees Fahrenheit.
(e) Maintain heating and stirring for 12 hours.
(f) After 12 hours, add filter aid at one ounce per gallon of solution and filter using a filter press.

LABORATORY TEST INSTRUCTIONS FOR ABOVE BATCH TREATMENT PROCEDURE

To conduct a small scale laboratory test on the above batch treatment process:
(a) Place a 250 ml Erlenmeyer flask on a hot plate-stirrer.
(b) Pour in 140 mls of spent B-9 nickel stripper.
(c) Pour in elemental sulfur at an amount of 4 ounces per one oz/gal. nickel in solution. (1 oz/gal. equals approximately one gram per 140 ml)
(d) Add 50% liquid caustic at an amount of 10% of volume. (For 140 mls stripper, add 14 mls liquid caustic)
(e) Stir and heat solution to 170 degrees F. for 12 hours.
(f) After 12 hours of heat and agitation, add filter aid at 1 ounce per gallon of solution and filter. (For 140 mls, add 1-gram filter aid.)
In using the above process, our customers have achieved a reduction in nickel from 3.5 oz/gal to as low as "undetectable" to 4.5 ppm and no higher than 10 ppm. This is, of course, totally dependent upon the operator.
The procedure should be carried out in a separate tank or container equipped with heat and agitation. If done in the stripping tank, you will have nickel sulfide settling on tank and, if improperly cleaned, entering the new solution.

TO ANALYZE YOUR STRIPPING BATH FOR NICKEL CONTENT

Reagents Needed: Concentrated Ammonium Hydroxide
Murexide Mix (1 gram of murexide mixed with 100 grams of CP Sodium Chloride)
E.D.T.A. (Disodium Dihydrate Salt) 0.0575Molar Standard Solution

PROCEDURE

Pipette a one half ml sample of nickel stripper solution into a 150 ml Erlenmeyer flask.
Dilute to 75 ml with D. I. water.
Add 10 ml Ammonium Hydroxide.
Add Murexide Mix in a quantity equal in size to the head of a large kitchen match.
Titrate with 0.0575Molar E.D.T.A. to a violet-purple end point.

CALCULATIONS

Number mls 0.0575Molar E.D.T.A. titrated x 0.897 factor = oz /gal. nickel metal.
ADD .60 LBS NICKEL STRIPPER PER GALLON OF TANK VOLUME PER OUNCE OF NICKEL TO RETURN STRIPPING BATH TO ORIGINAL CONDITION.

EXAMPLE: 100 gallon tank:
Analyzation #1: Nickel analyzed at 0.50 oz/gal.
Multiply 0.60 x 100 gallons x 0.50 oz. nickel = 30 lbs required addition of B-9.
Analyzation #2: Next day, nickel analyzed at total of 1.25 oz/gal.
SUBTRACT THE PREVIOUS DAY'S ANALYSIS:
1.25 - 0.50 = 0.75 oz/gal nickel added.
Multiply 0.60 x 100 gallons x 0.75 oz. nickel = 45 lbs required addition of B-9.

==========

NOTICE: Metalx, Inc believes that the information contained in these instructions is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all-inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with nor followed in violation of applicable laws, regulations, rules or insurance requirements. NO WARRANTY IS MADE, EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE.

Revised 1/2/07 Reviewed 9-15-09