



Type of Bulletin: Technical Process Bulletin
Product Title: DEOXALUME® 2310
Product View: DEOXALUME® 2310
Description: Chromium-Free Deoxidizer/Desmutter for Aluminum
Status: complete

Technical Process Bulletin

Technical Process Bulletin No. 235870
This Revision: 09/15/2006

DEOXALUME® 2310
Chromium-Free Deoxidizer/Desmutter for Aluminum

1. Introduction:

TURCO DEOXALUME 2310 is a chromium-free concentrated acidic liquid product specifically formulated for deoxidizing and desmutting wrought aluminum alloys. TURCO DEOXALUME 2310 is extremely effective in removing surface oxides, discolorations due to heat treatment or thermal deburring, and smut which develops during alkaline etching and chemical milling.

TURCO DEOXALUME 2310 develops a stain-free surface on aluminum alloys and is used prior to finishing operations such as anodizing, chemical milling, penetrant dye inspection and spot or resistance welding. TURCO DEOXALUME 2310 meets the deoxidizing requirements of U. S. Military Specification MIL-W-6858C, Paragraph 4.2 and many other aerospace specifications.

TURCO DEOXALUME 2310 requires no heat, deoxidizes and desmuts rapidly and rinses freely. Working solutions perform well in hard water and can hold up to 1000 ppm copper and 1600 ppm zinc in solution without causing metal discoloration. Since TURCO DEOXALUME 2310 does not foam, it is also highly effective in agitated systems including spray applications and immersion systems which utilize high pressure air agitation or vigorous mechanical agitation.

2. Operating Summary:

<u>Chemical:</u>	<u>Bath Preparation per 100 gallons:</u>
TURCO DEOXALUME 2310	15 gallons
Nitric Acid 42° Bé	25 gallons

<u>Operation and Control:</u>	
TURCO DEOXALUME 2310 Concentration	10 to 20 percent
Nitric Acid Concentration Ratio	20 to 30 percent
Etch Rate	0.1 to 0.4 mils/surface/hour
Temperature	60° to 90° Fahrenheit
Time	2 to 10 minutes

3. The Process:

- A. Alkaline or acid cleaning
- B. Water rinsing
- C. Acid or alkaline etching
- D. Water rinsing
- E. Treating with TURCO DEOXALUME 2310 deoxidizing/desmutting solution
- F. Cold water rinsing
- G. Finishing, etc. (i.e. anodizing, conversion coating, penetrant inspect, resistance welding)

4. Materials:

TURCO DEOXALUME 2310
 DEOXALUME 2350 Toner
 DEOXALUME 2360 Etch Controller or Additive A
 Nitric Acid 42° Bé
 Testing Reagents and Apparatus

5. Equipment:

The process tank, pumps and piping for use with this process solution should be constructed of stainless steel, type 316L or acid-resistant plastic. All process circulating pump seals, valve seats and other elastomers which come in contact with the working solution should be EPDM, Teflon™ or Viton™.

All chemical pump seals, valve seats and other elastomers which come in contact with the concentrated products should be EPDM, Teflon or Viton.

Support equipment available from Henkel Surface Technologies for this process includes: chemical feed pumps, level controls, transfer pumps and bulk storage tanks.

Our sales representative should be consulted for information on Henkel Surface Technologies automatic process control equipment for this process and any additional questions. In addition, the "Henkel Surface Technologies Equipment Design Manual" may be consulted.

6. Treating with TURCO DEOXALUME 2310 Desmutting Solution:

Buildup:

Fill the tank to approximately 40 to 50% full with ambient temperature water. For every 100 gallons of final solution, add 25 gallons of 42° Bé Nitric Acid. Mix and add 15 gallons of TURCO DEOXALUME 2310 and continue to mix until completely uniform. Add the remaining water to bring the solution up to the desired working level.

Operation:

Time: 2 to 10 minutes.
Temperature: 60° to 90° Fahrenheit.
Application: Immersion.
Agitation: Air or mechanical.
Filtration: Recommended

Heating of the TURCO DEOXALUME 2310 bath is not recommended unless the temperature is below 60° Fahrenheit. Immersion time is dependent on the type and quantity of alkaline etchant, the aluminum alloy being processed and the amount of smut or oxides on the parts.

7. Testing and Control:

Never pipet by mouth. Use a pipet filler.

TURCO DEOXALUME 2310 Titration:

Pipet a 5 ml sample into a 250-ml iodimetric flask and add 75 ml Deionized water. Add several boiling chips or glass beads and bring to a boil for 1 minute. Cool to room temperature. Add 2 grams (about ¼ teaspoon) Reagent 2, place the stopper on the flask and stir to dissolve. Add 10 ml Reagent Solution 49 and replace the stopper. Allow to stand for one minute. Titrate with Titrating Solution 104 until a straw color appears. Add several drops of Indicator 10 and continue titrating until the blue-black color disappears for at least one minute. The ml of Titrating Solution 104 multiply by 1.40 is equal to the concentration of TURCO DEOXALUME 2310 in % by volume.

Once the optimum concentration for efficient smut or oxide removal is established, the concentration should be held within ± 2%.

Concentration range of TURCO DEOXALUME 2310: 10 to 20% by volume.

To increase value 1%: Add 1 gallon of TURCO DEOXALUME 2310 per 100 gallons of solution volume.

The iron concentration can also be determined via instrumentation, using a filtered sample run by equipment manufacturers instruction such as ICP.

Free Acid Titration:

Add 50 ml of distilled water to a 150-ml beaker; pipet a 5 ml sample and add to the beaker. Add 15 ml of Reagent Solution 37 and 4 to 6 drops of Indicator 3. While stirring titrate with Titrating Solution 89 to the first permanent pink endpoint. The mls of Titrating Solution 89 multiplied by 1.16 is equal to the nitric acid content of the bath in volume %.

Concentration range of 42° Nitric Acid: 20 to 30 % by volume.

To increase the nitric acid concentration by 1%: Add one gallon 42° Nitric Acid per 100 gallons of bath.

Etch Rate:

The most reliable method to control the fluoride content of the bath is to control the etch rate. The etch rate is determined by immersing a panel for a specific length of time and measuring the mass loss.

$$\text{Etch Rate} = \frac{(I - F) (Th) 30}{(I) (I.T.)} \quad (\text{mils/surface/hour})$$

I = Initial mass (grams)

F = Final mass (grams)

Th = Initial Thickness (mils)

I.T. = Immersion Time (minutes)

A 2024 Clad panel should exhibit an etch rate of 0.1 - 0.4 mils/side/hour.

If needed, to raise the etch rate by approximately 0.100 mils/side/hour, add 0.9 gallon of Additive A per 100 gallons of bath.

Other Operational Recommendations:

The life of the TURCO DEOXALUME 2310 bath is determined primarily by the metallic cation buildup, and it is recommended that cations such as aluminum, copper and zinc be monitored using analytical instrumentation techniques such as Inductively Coupled Plasma (ICP) or Atomic Absorption (AA). When the majority of the alloys processed through the TURCO DEOXALUME 2310 bath are 2xxx and 7xxx series, the copper content of the bath is very important for monitoring bath life.

To prevent staining due to copper redeposition, add 2.0 volume % DEOXALUME 2350 Toner. It is recommended that this be done when the copper content reaches 200 ppm copper and as needed thereafter.

8. Storage Requirements:

TURCO DEOXALUME 2310, 2350 and Additive A are liquid products and will freeze below 30° Fahrenheit. Freezing is not detrimental to the products. Should they freeze, completely thaw in a warm place and stir prior to use. Do not store with chlorine containing compounds.

9. Waste Disposal Information:

Applicable regulations covering disposal and discharge of chemicals should be consulted and followed.

Disposal information for TURCO DEOXALUME 2310, 2350 and Additive A is given on the Material Safety Data Sheets for the products.

The TURCO DEOXALUME 2310 bath is acidic and contains fluoride salts. Waste treatment and neutralization may be required prior to discharge.

10. Precautionary Information:

When handling the chemicals used in this process, the first aid and handling recommendations on the Material Safety Data Sheets should be read, understood and followed.

- * * * * *

® Registered trademark of Henkel Corporation.

Testing Reagent and Apparatus
 (Order only the items which are not already on hand)

<u>Code</u>	<u>Quantity</u>	<u>Item</u>
592462	2*	Beaker, 150-ml, glass
592462	2	Beaker, 150-ml, Plastic
592475	1	Bottle, Dropping, Plastic, 2 oz
596491	1	Bung Wrench
592477	1	Buret Assembly, Automatic, Glass, 25-ml
592484	2	Cylinders, graduated, 50-ml
592489	2	Flasks, Iodimetric, Glass, 250- ml
592398	1 qt	Indicator 3 (Phenolphthalein)
592401	1 qt	Indicator 10 (0.5% soluble starch sol)
592491	2*	Pipet, Volumetric, Glass, 5-ml
592494	1	Pipet filler
592413	1 lb	Reagent 2 (Potassium Iodide)
592433	1 gal	Reagent Solution 37 (25% KF)
592438	5 pt	Reagent Solution 49 (Conc. HCl)
595584	1	Pocket Thermometer (0-220°F)
592445	1 gal	Titrating Solution 89 (1.0N NaOH)
592416	1 gal	Titrating Solution 104 (0.1N Sodium thiosulfate)

*Includes one more than actually required, to allow for possible breakage.

- * * * * -

Henkel Technologies
 32100 Stephenson Highway
 Madison Heights, MI 48071
 Telephone: 248-583-9300
 Fax: 248-583-2976

"The information presented herein is our interpretation of certain test results and field experience to date. This information is not to be taken as warranty or representation for which we assume legal responsibility, nor as permission or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation and verification." © Henkel Corporation.

Henkel Technologies
32100 Stephenson Highway
Madison Heights, MI 48071
Telephone: 248-583-9300
Fax: 248-583-2976

"The information presented herein is our interpretation of certain test results and field experience to date. This information is not to be taken as warranty or representation for which we assume legal responsibility, nor as permission or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation and verification." © Henkel Corporation.

Revision date: 08/13/1998 Print date: 09/18/2006

Verborgene Felder: 19 Parker Amchem

Form Revised 04 June 2001