



# Technical Process Bulletin

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## ALODINE® T 5900

### 1. Introduction:

Alodine T 5900 treatment develops a complex trivalent chromium conversion coating on aluminium and its alloys, metals coated with IVD aluminium, magnesium, titanium and zinc surfaces. The process provides bare ASTM-B117 salt spray resistance and it serves as an excellent base for bonding of paints and adhesives. Neither the product itself nor the conversion coating developed by the process contain hexavalent chromium. Alodine T 5900 can be used in immersion or pressure spray applications.

Alodine T 5900 is a non-hexavalent chrome complex conversion coating which meets the requirements of MIL-DTL-81706, Type II, Classes 1A (A) and 3 (B), Methods A, B, C.

Alodine T 5900 is listed on the QPL for MIL-DTL-81706

Alodine T 5900 is authorized for use on parts that need to meet MIL-DTL-5541 Type II coatings.

### 2. Operating Summary:

<u>Chemical:</u>	<u>Bath Preparation per 100 Gallons:</u>
Alodine T 5900	- 5 gallons (5% by volume) - 18.9 liters
Alodine T 5900 Toner	- 1 gallon (1% by volume) - 3.8 liters
<u>Operation and Control:</u>	
pH (meter)	- 3.8 to 4.0
Concentration limits	- 3.0 to 10%
Temperature (° Fahrenheit)	- 68 - 110 (20 - 43 °C)
Immersion Time (minutes)	- 5 - 10
Spray Time (minutes)	- 1.5 - 10

### 3. Process:

The complete process sequence for Henkel Alodine T 5900 treatment normally consists of the following steps:

- A. Non-etch Alkaline Cleaning
- B. Water rinse
- C. Deoxidizing for MIL-DTL-5541, Class 3; optional for Class 1A
- D. Water rinse
- E. Treating with the Alodine T 5900 processing solution

F. Water rinsing  
G. D.I. water rinsing  
H. Drying -

#### 4. Materials:

Alodine T 5900  
Alodine T 5900 Toner  
Sulfuric (5% by volume) Acid Solution

#### 5. Equipment:

Process tank and housing for the Alodine T 5900 should be fabricated from stainless steel, such as 316L or 304L. Alloy 316L being preferred for maximum tank life. In all cases, approved welding techniques must be used. Polyvinyl chloride (PVC) or CPVC lined mild steel can be used.

In spray applications process piping and pumps should be constructed of 316 or 304 stainless steel alloys. Various formulations of plastic pipe may be used with recommended support spacing, Schedule-80 is recommended. PVC Type I is limited to maximum process temperatures of 140° Fahrenheit. CPVC and PP may be used up to a maximum process temperature of 190° Fahrenheit. PVDF may be used for all expected operating temperatures.

Heat exchanger plates should be polished 316 stainless steel. Gas fired burner tubes are not recommended. All process circulation pump seals, valve seats, door seals, etc., which come into contact with the process solution and occasional acid equipment cleaners, should be EPDM, Viton™ or Teflon™.

Chemical feed pump parts and other elastomers which may come into contact with the concentrated replenishing chemical should be Viton or Teflon.

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

Your local sales representative should be consulted for information on Henkel Technologies automatic process control equipment for this process and any additional questions.

#### 6. Surface Preparation:

##### Cleaning:

All surfaces to be treated with Alodine T 5900 must be free from grease, oil and other foreign matter before the treatment.

##### Water Rinsing:

After cleaning, the metal must be thoroughly rinsed with water. The rinse should be overflowed continuously at a rate which will keep it clean and free from scum and other contamination.

##### Deoxidizing (optional):

If the aluminum is to be treated with ALODINE T 5900 processing chemical for Class 3 coatings or if the surface has corrosion products or heavy oxides, it should be conditioned by installing two additional steps between the post cleaner rinse and the ALODINE T 5900 treatment step. One is for deoxidizing with a deoxidizing chemical, such as Turco Liquid Smut Go NC, and one is for an additional cold water rinse.

7. Treating with the ALODINE T 5900 Processing Solution:Buildup:

Acid proof equipment is required. Fill the tank about three-fourths full with water, temperature 75° to 100° Fahrenheit (24-37°C). For each 100 gallons (378.5 liters) of final solution volume, add 1 gallon (3.8 liters) of ALODINE T 5900 Toner and circulate or thoroughly mix, then add 5 gallons (18.9 liters) of ALODINE T-5900 and thoroughly mix. Finally, add sufficient water to bring the solution up to the working level and then heat, if necessary, to the desired operating temperature.

Operation:

Time: 1 to 10 minutes  
 Temperature: 68° to 110° Fahrenheit (20 to 43°C)

Each alloy reacts with the ALODINE T 5900 solution to produce a coating that is characteristic of that alloy. The bath should produce a light, blue to blue iridescent, coating within the operating conditions selected.

Immersion Processing:

Concentration, % by volume of Alodine T 5900 Toner	- 1
Concentration, % by volume of Alodine T 5900	- 5
pH (meter)	- 3.8 - 4.0
Temperature (°Fahrenheit)	- 68 - 110 (20-43°C)
Time (minutes)	- 5 - 10
Agitation	- Slow

Spray Processing:

Concentration, % by volume of Alodine T 5900 Toner	- 1
Concentration, % by volume of Alodine T 5900	- 5
pH (meter)	- 3.8 - 4.0
Temperature (°Fahrenheit)	- 68 - 110
Time (minutes)	- 1.5 - 10
Pressure (psi)	- 6 - 12

Note: DI water, less than 5 microsiemens, should be used to charge the Alodine T 5900 tank.

Monitoring pH is very important for an Alodine T 5900 bath. Levels of pH outside of the prescribed ranges will result in failure of the bath to provide optimal coating.

For bath makeup and maintenance, if the pH is less than 3.8, small additions of Alodine T 5900 Toner must be made with agitation or circulation

For bath makeup and maintenance, if the pH is above 4.0 but less than 4.4, small additions of 5% Sulfuric Acid must be made with agitation or circulation. Use Sulfuric acid only for this pH adjustment. For baths over a pH of 4.4 the Alodine T 5900 cannot be put back into solution and the bath should be replaced.

For working solutions, always make any needed additions of water, Alodine T 5900 to the bath and allow for complete mixing before adjusting the pH, as stated above.

8. Testing and Control:

Never pipet by mouth, use a pipet filler bulb.

HACH Method 8024, Alkaline Hypobromite Oxidation Method.

Hach meter DR/890 Colorimeter is used for the following procedure.

Concentration:

Pipet a 10 mL sample of the Alodine T 5900 bath into a 100 mL volumetric flask and dilute to the mark with deionized water (dilution #1). Pipet 5 mL of the dilution #1 into a 500 mL volumetric flask and dilute to the mark with deionized water (dilution #2). Dilution #2 will be the testing solution (sample) for the following HACH Method 8024 needed to determine the chromium level.

First fill the round sample cell with 25 mL of the above sample. Add the contents of one Chromium 1 Reagent Powder Pillow cap and mix well. Remove the cap and place in a boiling water bath for 5 minutes. Replace the cap and be sure to secure tightly. Cool the sample cell to 77°F (25°C) under running water. Remove the cap and add the contents of one Chromium 2 Reagent Power Pillow, cap and invert to mix. Remove cap and add one Acid Reagent Powder Pillow, cap and invert to mix. Remove cap and add one ChromaVer 3 Chromium Reagent Powder Pillow, cap and invert to mix. Allow a 5-minute reaction time.

Prepare a blank by filling another sample cell with 25 mL of the sample prepared in the 500 mL volumetric flask.

Zero the colorimeter with the blank and read the prepared sample.

To determine the bath concentration:

Reading in mg/L of Prepared Sample X 11.79 = % of Alodine T 5900

To increase the value of Alodine T 5900 by 1 point (%):

Add 1 gallon of Alodine T 5900 to 100 gallons of the bath and follow with 0.2 gallons of Alodine T 5900 Toner.

9. After Treatment:

Water Rinsing:

After treating with ALODINE T 5900 the work should be thoroughly rinsed in clean cold water. The rinse should be continuously overflowed such that the main body of the rinse never becomes excessively contaminated.

Post Treatment:

After the treated metal is given a 'tap or city' water rinse, a 5 - 15 second D.I. water rinse is desired to remove water borne salts from the conversion coated surface. These salts normally cause spotting of leave behind light films which may adversely effect paint adhesion, paints resistance to moisture blistering, appearance, etc.

Drying:

Parts coming from the final water rinse or post treatment stage can be dried in an indirectly fired oven or by any other means which will not contaminate the treated metal. Peak metal temperature should not exceed 140° Fahrenheit (60° C).

10. Storage Requirements:

No special storage requirements are required for ALODINE T 5900 or ALODINE T 5900 Toner. If any of these products were to freeze after extended storage at a low temperature, thaw in a warm place and very carefully stir thoroughly (until no solids are observed) before use.

11. Waste Disposal Information:

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

Disposal information for ALODINE T 5900 and ALODINE T 5900 TONER is given on the Material Safety Data Sheet for each product.

The processing bath is acidic and contains trivalent chromium and complex fluorides. Waste treatment and neutralization will be required prior to discharge. (Refer to Waste Treatment Information Bulletin WT1004, available on request.)

12. Precaution:

Consult the appropriate Material Safety Data Sheets for safety and handling guidelines for the products listed in this bulletin.

Testing Reagents and Apparatus

(Order only those items which are not already on hand)

<u>Code</u>	<u>Quantity</u>	<u>Item</u>
xxxxxx	2*	Volumetric Flask, 100-mL
xxxxxx	2*	Volumetric Flask, 500-mL
592491	2*	Pipet, 5-mL Volumetric
592492	2*	Pipet, 10-ml Volumetric
592494	1	Pipet Filler

Contact the Hach Company at (800) 227-4224 for the following reagents and apparatus.

xxxxxx	1	Hach meter DR/890 Colorimeter
24019-06	2	HACH Sample Cells
22425-00	1	Total chromium reagent set (100 tests)

\* Includes one more than actually required, to allow for possible breakage. Beaker, 150-mL

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