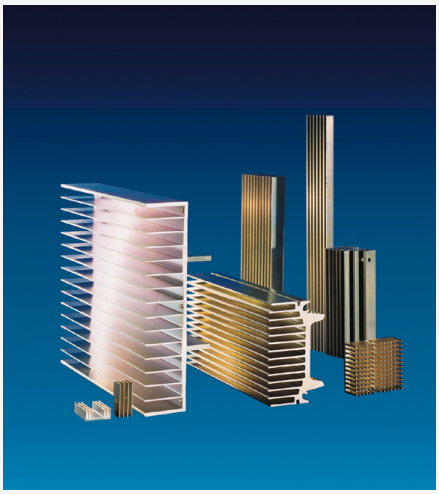
DuBois Heatbath Products

Aluminum Pretreatment



The pretreatment of aluminum prior to metal finishing operations such as chromating, anodizing and electroless nickel can vary widely depending on the soils present, the alloy being processed and the finishing operation itself. Aluminum presents some challenges because it is an amphoteric metal, which means that it will dissolve in solutions of both low and high pH unlike iron, which dissolves in acids but resists alkalis. In addition, aluminum has a strong affinity for oxygen and by nature is covered with a thin protective oxide film that must be removed prior to processing.

Common Pretreatment Steps for Processing Aluminum

Non-etch Cleaner: Removes light soils to allow for uniform etching of the surface in subsequent steps. Usually mildly alkaline and may contain an inhibitor to protect against attack.

Etch: Removes oxide film and dissolves some aluminum to result in a uniform, clean surface. Can be alkaline or acid but alkaline etchants are more common. The etching step is usually skipped when processing castings and high silicon alloys.

Deoxidizer: Removes alloying elements (smut) present on the aluminum surface after etching. Also removes oxide film that has reformed. Results in a uniform aluminum surface. Formulas are a mix of acids that vary widely depending on the alloy being processed. Mixtures of nitric acid, sulfuric acid and fluoride are common. Ferric iron containing deoxidizers mixed with acids and fluoride are also popular.

Zincate: Removes new oxides formed on the aluminum and replaces it with a thin film of zinc which acts as a barrier to prevent oxide formation which is imperative for plating operations.

Typical Processing Cycles

Chromating Line	**Alternate Chromating Cycle**
1. Non-etch Cleaner	1. Acid Cleaner
2. Rinse	2. Rinse
3. Etch	3. Chromate
4. Rinse	4. Rinse
5. Deoxidizer	5. Dry
6. Rinse	
7. Chromate	
8. Rinse	
9. Dry	
Anodizing Line	**Electroless Nickel Line**
1. Non-etch Cleaner	1. Non-etch Cleaner
2. Rinse	2. Rinse
3. Etch	3. Etch
4. Rinse	4. Rinse
5. Deoxidizer	5. Deoxidizer
6. Rinse	6. Rinse
7. Bright Dip	7. Zincate
8. Rinse	8. Rinse
9. Deoxidizer	9. Nitric Acid Strip
10. Rinse	10. Rinse
11. Anodize	11. Zincate

12. Rinse	12. Rinse
13. Color/Dye	13. Rinse
14. Rinse	14. EN
15. Seal	15. Rinse
16. Dry	16. Dry

Deoxide NC-9, a deoxidizer to consider

Deoxide NC-9 is a blend of iron salts, mixed acids and fluoride used to remove oxides, heat scale and smut from aluminum and aluminum alloys. This complex mixture is an ideal choice when processing a wide variety of aluminum alloys prior to most metal finishing applications.

Controlling Alkaline Etch Baths

Alkaline etchants are composed primarily of sodium hydroxide and a chelator that functions to prevent the dissolved aluminum (sodium aluminate) from forming a hard scale on tank walls. As the sodium aluminate builds in the alkaline etch bath, there is a decrease in etching rate. To compensate for this, the concentration of the etch bath is increased based on the concentration of aluminum in the bath. Watch this video to see the procedure for determining aluminum concentration.

Titration of an Aluminum Etch Bath

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