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## CHEM FILM

Few surface treatments offer the same protection and enhancement as a chemical conversion coating while maintaining as-received dimensional tolerances. Chem Film, also referred to by proprietary names such as Irridite and Alodine, is traditionally a chrome based conversion coating that can be applied to aluminum to offer corrosion resistance, increased adhesion properties, and depending on the type required, electrical conductivity. In contrast with anodized and phosphate finishes, these properties can be achieved without adding discernable thickness or altering the part.

Every day, MIL works with countless parts that will be exposed to environmental conditions and subject to deterioration. Just as passivation is performed to prevent corrosion on stainless steel, chem film is ideal for protecting aluminum. A good chem film coating can withstand salt spray testing for as many as 168 hours without showing signs of oxidation or corrosion whereas the same material left bare is far more susceptible to the affects of exposure.

As aluminum is notorious for its poor adhesion properties, aerospace industry specifications nearly always require a pre-treatment prior to application of coatings like prime and paint. Unlike a pre-treatment like anodize, which builds and changes the structure of the part surface, chem film is simply a very thin coating that is applied to the surface. Before it dehydrates, the coating behaves as a gelatinous film that due to its soft nature, acts as an open molecular bonding structure similar to glue. This makes it an ideal base to increase paint adhesion and prolong the life of inorganic and organic coatings alike. When anodizing is required, masking adhesion is also greatly increased in the same way to prevent anodizing leakage onto surfaces with tight tolerances. Parts that are masked without the aid of chem film as a pre-treatment are immediately at greater risk for anodizing leakage which can lead to Disposition: Scrap.

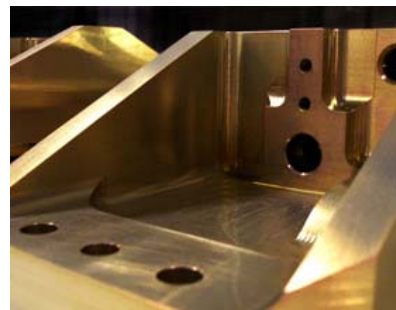
There are two classes widely used in the aerospace industry. As established by MIL-DTL-5541, both Class 1A and Class 3 refer to coatings that offer increased corrosion resistance and adhesive properties. Class 3 however, also maintains electrical conductivity. Even after 168 hours of salt spray testing, Class 3 coatings must exhibit electrical resistance at no greater than 10,000 microhms per square inch. This property supports frequent integration of aluminum into applications such as aircraft controls where electrical conductivity is crucial.

MIL-DTL-5541 also has established two types of chem film coating. Type I is the traditional hexavalent chrome based coating that is most recognizable by its color that can range anywhere from yellow to gold to green to brown, and even clear upon request. Besides the value of the coating itself, the appearance lends itself well for cosmetic or identification purposes. Type II is the environmentally friendlier one and can come in the form of a trivalent-chrome or chrome-free coating. The introduction of this type has resulted in increasing frequency of engineering drawing revisions due to new European standards like RoHS, and an overall push in the aerospace industry for greater environmental responsibility.

To protect aerospace, medical, and aluminum parts from many other industries, MIL has included both types and classes established in MIL-DTL-5541, and many other chem film specifications to its roster of processing capabilities. Just as with nearly all of the processes it performs, MIL maintains a large number of Prime and NADCAP approvals for chem film as evidence of its processing excellence. Aluminum parts coated at MIL are thus uniquely protected and supportive to offer enhanced life span and efficiency.

### Highlights:

- Does not affect part dimension
- Provides enhanced corrosion resistance
- Ideal adhesive base under organic and inorganic coatings
- Increases masking adhesion
- Types and Classes as established by MIL-DTL-5541 include:
  - Type I – Hex chrome which ranges in color
  - Type II – More environmentally friendly non-hex chrome
  - Class 1A – Maximum Corrosion Resistances
  - Class 3 – Allows Electrical Conductivity



*Chem film is sometimes applied to help masking adhere to a part before anodizing.*

1401 GREENLEAF AVE. | ELK GROVE VILLAGE, IL 60007 | P. (847) 437 - 4488 F. (847) 437 - 4538



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