

NON-TOXIC AND BIO-COMPATIBLE
Type 2 Titanium Anodizing

Anodic treatment of titanium and titanium alloys for implant products known as “Type 2” anodization is typically performed to AMS 2488. SAE International now has responsibility for this specification and the current revision is dated June 2000. As this process is covered under an Aerospace Material Specification, it was first developed for treatment of parts associated with the air and space industries. The properties most often discussed, increased lubricity, anti-galling, and increased fatigue strength were not associated with the medical industry. As the advantages of anodizing titanium became apparent in orthopedic implants, the popularity and acceptance of this coating grew. In addition, toxicity and biocompatibility were not an issue. The anodization process accelerates the formation of an oxide coating under controlled conditions to provide the desired result.

The coating may be created using various electrolytes where the parts are made positive (anodic) with a corresponding negative (cathodic) terminal attached to a D.C. power supply. Electrolytic solutions are proprietary and may vary from one processor to another but must be of pH 13 or higher to conform to specification requirements. Steps in our process are as follows:

1. Parts are first racked appropriately on titanium racks to create electrical contact.
2. Parts are alkaline cleaned to remove any machine oils.
3. The parts are immersed in the electrolyte, current is applied with the voltage

being raised to maintain the required current density during processing. This voltage varies for different alloys and with the capacity and design parameters of the installed equipment and is proprietary.

4. Parts are rinsed, dried and the excess slough is removed. As the process creates a penetrating coating, there is no measurable dimensional change when measured with a micrometer accurate to 0.0001 inch (2.5 μm).
5. Quality inspection is performed on completed parts. Per AMS 2488, “Anodic coating, as received by purchaser, shall be continuous, smooth, adherent to basis metal, uniform in texture and appearance, and free from burned or powdery areas, loose films, discontinuities, such as breaks or scratches, except at contact points or other damage or imperfections detrimental to usage of the coating.”

Control factors include:

- Cleaning and surface preparation.
- Solution limits and control (proprietary).
- Voltage limits and control (proprietary).
- Temperature limits and control.
- Post anodizing treatment and packaging