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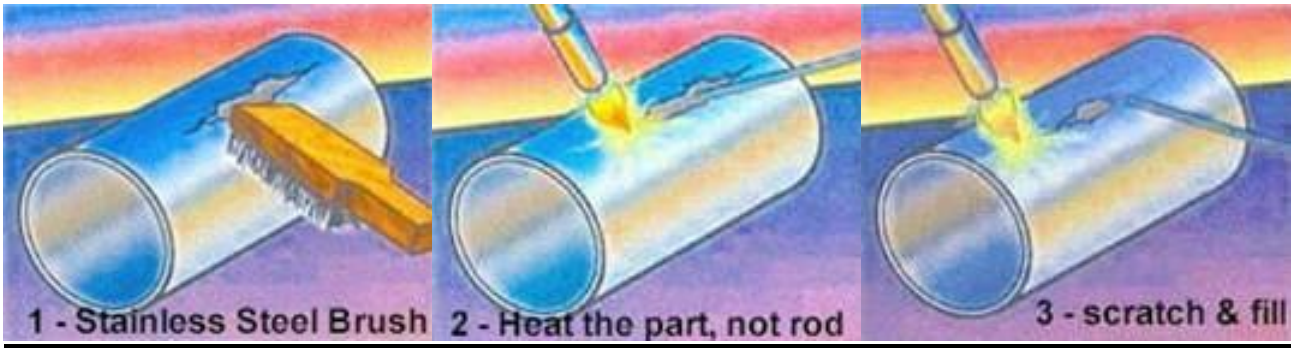
# Soldering Cast Aluminum, Diecast, & Pot Metal with Alumite




Before — Breaking the oxide coating by agitation and fluxing is one key to successful soldering, especially for Aluminum, Stainless Steel and Nickel plated parts. It is important to follow these steps in a timely uninterrupted 1-2-3… sequence. Otherwise, the strong oxide coating can reform and hinder the solder bond. So, make sure you have all your tools and supplies staged and ready to go before you begin.

Pre-Tinning — For some difficult to solder and large surface area joints, it may be extremely helpful to pre-tin the joint area on each part with the solder before setting up to join the parts. Simply follow the steps below to coat the joint area of each part with an even coat of solder. Then, after the parts have cooled, follow the steps again to join the parts. The
1-2-3 rule applies here as well. Don't pre-tin one day and solder the next. A fresh oxide-free surface is important to soldering success. Pre-tinning your parts with the right solder can greatly improve joints on difficult to solder metals & large surface area parts.

## Soldering with Alumite and Kapp Lunar Flux

To solder aluminum, the invisible oxide film must be broken by the solder to obtain metal to metal contact. IF the entire joint surface is accessible to agitation by brushing and by the solder rod, the oxide can be broken simply and effectively without chemical flux using ALUMITE. However, for Butt joints and other inaccessible joints, the joint surface must be well tinned with ALUMITE, or Kapp LUNAR flux will be necessary.

**IT IS ONLY NECESSARY TO HEAT THE PARTS TO A TEMPERATURE THAT WILL MELT THE END OF THE SOLDER STICK AS IT IS DRAWN ACROSS THE HEATED PART SURFACE.**

The solid end of the Alumite stick first punctures and loosens the oxide layer and allows the solder to flow underneath. This is known as "tinning the surface".

Many types of repair and construction are possible using this fluxless technique; however, the aluminum surface must be accessible to stroking by the ALUMITE solder rod. The solder will not flow by itself into a narrow joint. To draw the solder into a narrow joint, companion flux - Lunar Flux - is required.

**ALWAYS USE A NEUTRAL FLAME!**
**ALWAYS KEEP THE FLAME IN MOTION!**
**ALWAYS COOL SLOWLY!**
**NEVER PLUNGE THE HEATED PARTS INTO WATER!**

## T - Joints

For maximum strength, tin both members as described above and bring together. Heat the parts and flow a fillet of solder into the intersection. Fillets are made by running the solder stick along set-up members where contact is desired. Let the heat from the members, NOT THE FLAME, melt the solder. Run the solid end of the solder stick through the molten fillet to remove any trapped oxide. In many cases, adequate strength can be obtained without pre-tinning. However, when the members are not pre-tinned, the fillets alone support the joint load, as the members are not joined to each other, but only to the fillets.

**Butt Joints**
It is most effective to tin the joint surfaces with the Alumite rod prior to jigging the parts for final assembly. Apply Kapp Lunar Flux to the joint surfaces. Ends are beveled and brought together. Follow the tinning procedure, stroking both beveled surfaces of the joint with ALUMITE.

**Lap Joints**
Parts can be tinned and slid together while the solder is still molten. Alternatively, a generous fillet of solder can be applied to the edges of the lap joint, making sure of tinning by running the stick through the molten solder.

**Mitered Joints in Windows, Doors, Screens, Frames**
Members should be solidly jigged. a neutral flame is played over the joint area until the ALUMITE will melt when drawn across the joint. Make sure of tinning action by drawing the solid end of the solder stick through the molten solder deposit. After tinning, the joint may be built up and finished as desired. These joints are stable in high humidity and have remained in perfect condition after many years of exposure.

**Repair and Change Design of Aluminum Match Patterns and Dies**
The Section to be worked is cleaned by filing or grinding, then tinned by heating the aluminum to a temperature that will melt the solder stick rubbing the surface. WHEN TINNING, THE ALUMITE STICK SHOULD ALWAYS BE KEPT OUT OF THE FLAME. Build up the material with a soft flame. Pre-heating the entire match plate of the die to approximately 600°F facilitates this procedure.

**Welding Zinc Based Castings with ALUMITE**
Remove any plating, natural oxide, or foreign matter from the surfaces to be joined. "V" out the fracture and set up the job solidly. Use #1 or #2 tip to preheat the area surrounding the fracture. The weld is then made by heating the fracture directly with a neutral flame until the SURFACE of the base metal can be broken by touching it with the ALUMITE rod. KEEP THE ROD AWAY FROM THE FLAME AS MUCH AS POSSIBLE WHEN STARTING THE WELD. Continue welding the fracture by puddling the solder in the base metal. **NEVER PLUNGE INTO WATER TO COOL.** Finish as desired.

**Welding White Metal with ALUMITE**
Clean plating and scale from the surface to be welded. "V" out the fracture and set up the job solidly. Preheat generally with a neutral or acetylene flame. Heat directly until the parent metal begins to melt, then dip the solder rod in and out of the molten puddle to the desired buildup.
**NEVER PLUNGE INTO WATER TO COOL.** Finish as desired.

**Repairing Stripped Threads with ALUMITE**
Drill the old threads out over size, so that when the new fillet is added all the drilling and tapping will be done in ALUMITE. This will make it easier to work with and will increase strength. After drilling, heat the base metal from the bottom of the hole up. Tin the rod into the wall of the hole, beginning at the bottom and work up. Fill the hole, cool, drill and tap as needed.

| Alumite™ Physical Properties & Technical Data | |
|---|---|
| Melting Range | 715°F - 735°F / 379°C - 391°C |
| Tensile Strength | 39,000 psi |
| Compression Strength | 60,000 to 75,000 psi |
| Shear Strength | 34,000 psi |
| Impact Strength (Charpy) | 4 ft.lbs. to break 1/4" bar |
| Hardness (Brinell-500 kg. load) | 100 |
| Ductility | Good |
| Density | .25lbs./cu. in. |
| Elongation | 3% in 2 inches |
| Linear Expansion Coefficient | 15.4 x 106 / °F |
| Electrical Conductivity | 24.9 (%IACS) |
| Thermal Conductivity | .24 cal / $cm^3$ / °C |
| Corrosion Penetration | 300 x 106 in 1 1 / R |
| Flux | None on Accessible Joints<br>Kapp Lunar™ Flux where needed |
| MIL Specifications | Meets MIL-R4208 |
| *Note: Shear strengths based on double lap joints, Tensile strengths depend on base metals, soldering methods and type of joint. | |