3M™ Surface Pre-Treatment AC-130 and AC-130-2 Metal Alloy Surface Preparation for Bonding

Scope

This document describes the process for the application of 3M™ Surface Pre-Treatment AC-130 pre-bond surface treatment to facilitate adhesive bonding to Metal Alloys such as; Aluminum, Titanium, Stainless Steel, and Nickel.

This process is recommended on metal alloys in the following forms: sheet, plate, foil, forging, and honeycomb core. This formulation is applicable for parts subsequently bonded with epoxy-based adhesive systems.

NOTE: Subject matter contained in this document is covered by patents pending and by the following United States patents: 5,814,137; 5,849,110; and 5,939,197.

Materials

- 3M™ Surface Pre-Treatment AC-130, 3M
- Wipers, cheesecloth, gauze or clean cotton rags
- 180 grit Sanding Paper/Discs
- 3M™ Scotch-Brite™ 2- or 3-inch medium grit "Roloc" discs, 3M
- Aluminum oxide abrasive grit, 50-80 micron (#280 to #180 grit)
- Solvents, in order of preference: acetone, methyl ethyl ketone (MEK), methyl propyl ketone (MPK), a blend of MEK and MPK, acetone, isopropyl alcohol (IPA)
- Bonding Primer

Facilities Control

- Air used for drying, air-water rinsing, and blow off shall be treated and filtered so that it is free of moisture, oil, and solid particles.
- 3M™ Surface Pre-Treatment AC-130 and primer application shall be conducted in an area provided with ventilation.
- Recommended temperature for application and cure are 57°F to 87°F and relative humidity should not exceed 85 percent.
- Grinders used shall have a rear exhaust with an attachment to deliver the exhaust away from the part surface.
- Sanding tools shall have a random orbital movement.

Definitions

The following definitions shall apply to terms that are uncommon or have special meanings as used in this specification:

Water-Break-Free Surface: A surface that maintains a continuous water film for a period of at least 30 seconds after having been spray or immersion rinsed in clean water at a temperature below 100°F.

Spray-Drench: Spraying of the surface with 3M™ Surface Pre-Treatment AC-130 solution such that the entire sprayed surface remains consistently wet over a controlled period of time. There may be a small amount of excess material that will run off of the part during this application.

Definitions *(continued)*

Homogeneous: Of a uniform or similar nature throughout. A homogeneous solution will have the same uniform consistency throughout the mixture.

Induction Time: The time after which all of the 3M AC-130 Pre-Treatment components were combined, but before the mixed solution is active. Do not treat the part with the solution before the elapsed induction time is complete.

Pot-Life: The limited time period, after all of the 3M AC-130 Pre-Treatment components were mixed, within which the coating material must be used. Do not treat the part with the solution after the pot-life time has expired.

Manufacturing Control

WARNING

This process involves the use of chemical substances that are hazardous. Please refer to the MSDS and employer's safety instructions. For disposition of hazardous waste materials, consult site environmental engineers for proper disposal methods.

- Hardware to be processed shall be handled with minimal contact area.
- Protect parts from oil, grease, and fingerprints. Solvent clean parts if they become contaminated during handling and transport.
- Orient parts for processing to maximize drainage and minimize contact points during cleaning and spray drenching with 3M™ Surface Pre-Treatment AC-130 solution.
- Parts shall be water-break free.
- Mask dissimilar metals and neighboring regions where appropriate.
- Apply bond primer within 24 hours of 3M AC-130 Pre-Treatment application. Cool parts to room temperature, prior to application of organic finishes.
- Apply adhesive within 24 hours of 3M AC-130 Pre-Treatment application.
- If necessary, contain grit and dust residues generated during the mechanical deoxidization processes.
- Examples of acceptable equipment include HVLP guns, airless sprayers, prevail sprayers, and conventional garden sprayers.

Process parts in accordance with the flow chart depicted in Figure 1.

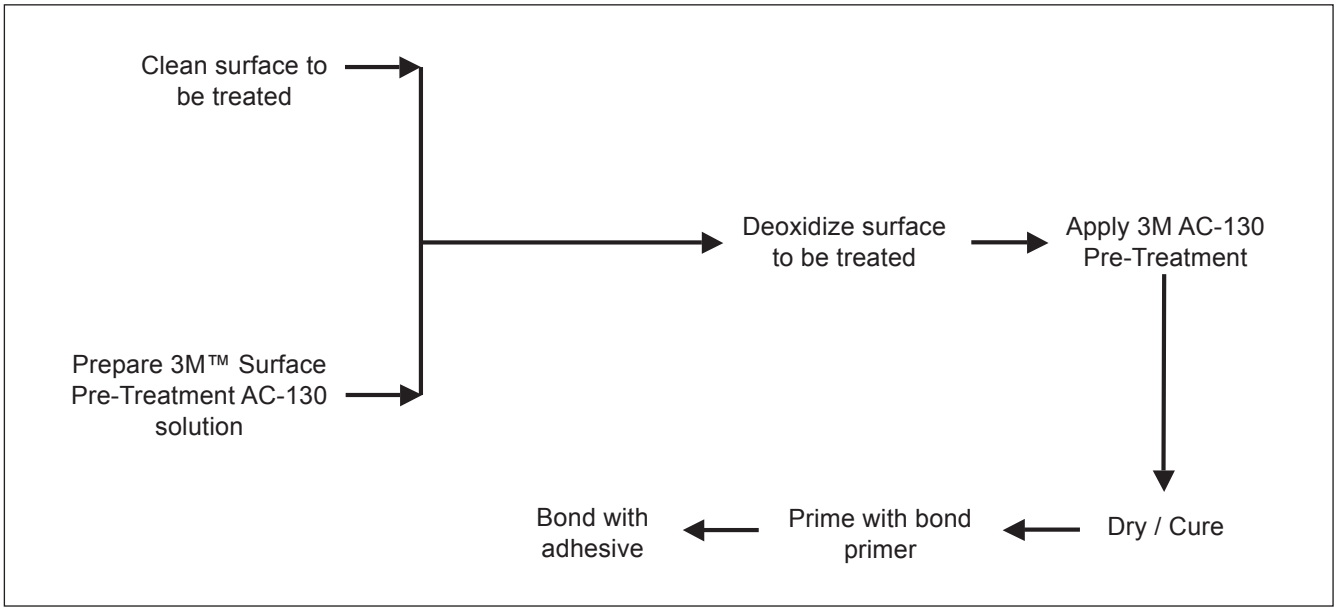

Figure 1: Process Flow for 3M™ Surface Pre-Treatment AC-130

3M™ Surface Pre-Treatment AC-130 and AC-130-2
Metal Alloy Surface Preparation for Bonding

Clean and Prepare Surface to be Treated

Solvent clean the part surface areas to be bonded and adjacent surfaces. Remove all surface coatings and residual adhesive residues down to bare metal using locally approved procedures. Re-clean the bare metal surface by solvent wiping. Remove all contaminants.

CAUTION: Proper protective equipment, such as protective gloves, respirators, and eye protection must be worn during these operations.

GRIT BLAST DEOXIDIZATION

1. Using alumina grit, grit blast a region slightly larger than the bond area. Use 30-80 psi oil-free compressed air or nitrogen. Slightly overlap blast area with each pass across the surface until a uniform matte appearance has been achieved. Ideal blast pressure is dependent on the angle of the nozzle to the surface and the speed at which the blaster traverses over the surface.
2. Remove loose grit residue with a clean, dry, natural bristle brush or with clean, oil-free compressed nitrogen or air.
3. Apply 3M™ Surface Pre-Treatment AC-130 solution as soon as possible after completion of the grit blast process. Time between completion of grit blast deoxidization and application of 3M AC-130 Pre-Treatment shall not exceed 8 hours. Avoid contamination of the freshly abraded surface.

SANDING DEOXIDIZATION

1. Connect sander or a high-speed grinder to an oil-free nitrogen or compressed air line. Thoroughly abrade the surface by sanding with abrasive paper for one to two minutes over 6" x 6" sections, covering the entire surface uniformly. A preferred method would be to guide the sander from side to side across the entire 6" x 6" area and then change the direction of travel of the sanding by 90 degrees to achieve one cross coat. Change the sandpaper when it becomes worn, as evidenced by tears, seizing of the tool, and clogging. At a minimum, use one fresh piece of sandpaper for each 6" x 6" area. Sanding speed should be adjusted in order to complete all passes within a one to two minute period over a 6" x 6" area. With proper airflow, the sanding disc should maintain free rotation with lightly applied pressure during the entire procedure. After the area has been abraded in sections, re-sand the entire surface using a fresh piece of sandpaper.
2. Remove loose grit residue with a clean, dry, natural bristle brush or with clean, oil-free compressed nitrogen or air.
3. Apply 3M AC-130 Pre-Treatment solution as soon as possible after completion of the sanding process. Time between completion of sanding deoxidization and application of 3M AC-130 Pre-Treatment shall not exceed 30 minutes. Avoid contamination of the freshly abraded surface.

MECHANICAL SCOTCH-BRITE DEOXIDIZATION

1. Connect high-speed grinder to an oil-free nitrogen or compressed air line. Thoroughly abrade the surface with an abrasive disc for a minimum of one to two minutes over each 6" x 6" section, covering the entire surface uniformly. Change the abrasive disc when it becomes worn, as evidenced by seizing of the tool or clogging of the pad. Use a fresh disc for each 6" x 6" area. After the area has been abraded in sections, abrade the entire surface again using a fresh Roloc disc.
2. Remove loose grit residue with a clean, dry, natural bristle brush or with clean, oil-free compressed nitrogen or air.
3. Apply 3M AC-130 Pre-Treatment solution as soon as possible after completion of the Scotch-Brite™ abrasion process. Time between completion of Scotch-Brite™ deoxidization and application of 3M AC-130 Pre-Treatment shall not exceed 30 minutes. Avoid contamination of the freshly abraded surface.

MANUAL SCOTCH-BRITE™ DEOXIDIZATION

1. Thoroughly abrade the surface with a very fine Scotch-Brite™ pad for a minimum of one to two minutes over each 6" x 6" section, covering the entire surface uniformly. Change the pad when it becomes worn. Use a fresh Scotch-Brite pad for each 6" x 6" area. After the entire area has been abraded in sections, abrade the entire surface again using a fresh pad.
2. Remove loose grit residue with a clean, dry, natural bristle brush or with clean, oil-free compressed nitrogen or air.
3. Apply 3M AC-130 Pre-Treatment solution as soon as possible after completion of the Scotch-Brite™ abrasion process. Time between completion of Scotch-Brite deoxidization and application of 3M AC-130 Pre-Treatment shall not exceed 30 minutes. Avoid contamination of the freshly abraded surface.

Application of 3M™ Surface Pre-Treatment AC-130

SPRAY APPLICATION

1. Apply 3M™ Surface Pre-Treatment AC-130 solution by spraying onto the metal surface. Spray solution generously, allowing excess to run off the surface. Keep part surface continuously wet with the solution for a minimum of 1 minute. Part surfaces must not be allowed to dry and should be wetted with solution at least one time during the solution application period. For large areas, treat smaller sections at a time for the minimum application time progressing over the entirety of the part to ensure the treated surface does not dry between spray coats.
2. Allow the coated hardware to drain for 5-10 minutes. If there is any surplus 3M AC-130 Pre-Treatment solution collected in crevices, pockets, or other contained areas, use filtered compressed air to lightly blow off excess solution while leaving a wet film behind. Do not splatter this excess solution onto adjoining part surfaces. Alternatively, the excess 3M AC-130 Pre-Treatment solution may be gently blotted, not rubbed, off the surface using a clean wiper that has been pre-wetted with the 3M AC-130 Pre-Treatment mixture. Do not dry off areas of the part that are able to freely drain. The part may still be wet after only 5-10 minutes of air-drying.
3. Let the coated parts dry under ambient conditions for a minimum of 60 minutes. Minimize contact with the part during this time, as the coating may be easily damaged until fully cured. Exact drying time will depend on the configuration of the part and room conditions.
4. Apply bond primer or adhesive within 24 hours of 3M AC-130 Pre-Treatment application. Keep part surface clean during entire operation.

MANUAL APPLICATION

1. Apply 3M AC-130 Pre-Treatment solution by brushing with a natural bristle brush or swabbing with a clean wiper, cheesecloth or gauze. Apply solution generously, keeping the part surface continuously wet with the solution for a minimum period of 1 minute. Part surfaces must not be allowed to dry and should be covered with fresh solution at least one time during the solution application period.
2. Allow the coated parts to drain for 5-10 minutes. If there is any surplus 3M AC-130 Pre-Treatment solution collected in crevices, pockets, or other contained areas, use filtered compressed air to lightly blow off excess solution while leaving a wet film behind. Do not splatter this excess solution onto adjoining part surfaces.
3. Alternatively, the excess 3M AC-130 Pre-Treatment solution may be gently blotted, not rubbed, off of the surface using a clean wiper that has been pre-wetted with the 3M AC-130 Pre-Treatment mixture. Do not dry off other areas of the part that are able to freely drain. The part may still be wet after only 5-10 minutes of air-drying.
4. Let the coated parts dry under ambient conditions for a minimum of 60 minutes. Minimize contact with the part during this time, as the coating may be easily damaged until fully cured. Exact drying time will depend on the configuration of the part and room conditions.
5. Apply bond primer or adhesive within 24 hours of 3M AC-130 Pre-Treatment application. Keep part surface clean during entire operation.

BATH APPLICATION

1. Apply 3M AC-130 Pre-Treatment solution by submerging the part in 3M AC-130 Pre-Treatment. Allow the part to soak in the bath for a minimum of one minute, but not to exceed three minutes. Remove the part from the batch and allow the part to drain for 5 – 10 minutes. If there is any surplus 3M AC-130 Pre-Treatment collected in crevices, pockets or other contained areas, use filtered, compressed air to lightly blow off excess solution while leaving a wet film behind. Do not splatter the excess solution on to adjoining part surfaces. Let the part dry under ambient conditions for a minimum of 60 minutes. Minimize contact with the part during this time as the coating may be easily damaged until fully cured. Bond primer and/or adhesive within 24 hours of 3M AC-130 Pre-Treatment application.

3M™ Surface Pre-Treatment AC-130 Mixing Procedure

The 3M™ Surface Pre-Treatment AC-130 solution shall be prepared according to 3M's mixing instructions provided in each kit. Use kit size appropriate for size of area to be treated. For example, approximately 100 ml of the 3M AC-130 Pre-Treatment will be enough to coat about 5 square feet of bond zone. Scale up as required.

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Acceptable Results

- An acceptable 3M™ Surface Pre-Treatment AC-130 coating is smooth and continuous without evidence of surface contamination.
- Dark areas caused by draining and uneven drying of the sol-gel solutions are acceptable.

Storage

Materials included in this document that is considered to be time and temperature sensitive, shall be stored in accordance with local requirements from time of receipt through use.

For Additional Information

In the U.S., call toll free 1-800-235-2376, or fax 1-800-435-3082 or 651-737-2171. For U.S. Military, call 1-866-556-5714. If you are outside of the U.S., please contact your nearest 3M office or one of the following branches:

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Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

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Aerospace and Aircraft Maintenance Department
3M Center, Building 223-1N-14
St. Paul, MN 55144-1000
1-800-235-2376
www.3M.com/aerospace

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