

3M™ Surface Pre-Treatment AC-130

Product Description

3M™ Surface Pre-Treatment AC-130 and AC-130-2 are high-performance surface preparations for adhesive bonding. As sol-gel preparations, 3M AC-130 Pre-Treatment products promote enhanced adhesion as a result of the chemical interaction at the interfaces between the metal and the 3M AC-130 Pre-Treatment (sol-gel) and the 3M AC-130 Pre-Treatment and the primer.

Common surface preparation techniques such as phosphoric acid anodizing (PAA) or sulfuric acid-sodium dichromate etchings are used to provide acceptable surfaces for bonding. These hazardous materials and waste produced by these procedures are both environmentally and economically undesirable. 3M AC-130 Pre-Treatment provides an excellent environmentally friendly alternative to achieve the high performance required.

When used with the leading adhesive primers and adhesives, 3M AC-130 Pre-Treatment provides an economical and environmentally superior alternative to more costly and hazardous processes. The product may be applied by brush, spray, or dip. Simply, 3M AC-130 Pre-Treatment is applied to surfaces at ambient drying conditions and then primed prior to bonding.

Long-term durability of adhesion to metal has been demonstrated. Data reveals 3M AC-130 Pre-Treatment provides equivalent or better moisture durability than many of the currently used surface preparations for on-aircraft repairs.

Testing by the wedge test described in ASTM D3762 on aluminum substrates shows that 3M AC-130 Pre-Treatment performs comparatively to the more traditional grit-blast silane procedure. When grit-blast is used with the 3M AC-130 Pre-Treatment, the sol-gel process has shown wedge test results similar to PAA (Phosphoric Acid Anodizing). The grit-blast and 3M AC-130 Pre-Treatment process also provided acceptable test results on titanium, stainless steel, and nickel alloys in the same test compared to standard controls.

3M AC-130 Pre-Treatment also performs similarly to PAA in tensile lap shear and floating roller peel tests at a variety of temperatures. The grit-blast process has been shown to provide a more durable bond than the nylon pad process in the wedge test at 60°C and 95-100% RH. However, the nylon pad process provides end-users with a process that exceeds the performance of the grit-blast silane surface preparation, is quicker to perform in the field, and does not require the painstaking containment and subsequent cleaning of residual grit.

Surface Preparation

3M™ Surface Pre-Treatment AC-130 may be applied to surfaces after manually deoxidizing the surface by either 1) grit blasting; 2) sanding with #180 or finer sandpaper, or 3) Scotch-Brite™ pad abrasion. The success of the bonding operation relies on the thorough de-oxidation and preparation of the metal surface.

Patents

5,958,578	5,939,197	5,869,140
5,869,141	5,849,110	5,814,137
6,037,060		

Typical Physical and Application Properties

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Color	As mixed, it is slightly cloudy un-tinted
Induction Time	30 minutes
Pot Life	10 Hours after mixing

Standard Package Sizes and Coverage

Kit Designation	Coverage	
	Square Feet	Square Meters
50ml Kit	2.5	0.23
100ml Kit	5.0	0.50
500ml Kit	25	2.3
1000ml Kit	50	4.6
1,500ml Kit	75	6.9
Gallon Kit	189	17.4

Available Product Configurations

3M™ Surface Pre-Treatment AC-130	4-Part, Clear
3M™ Surface Pre-Treatment AC-130-2	2-Part, Clear



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Typical Application Technique

Prepare 3M™ Surface Pre-Treatment AC-130 in accordance with instructions. Scale up for size of part and the method of spray application as necessary. Application rate is approximately 1 liter of 3M AC-130 Pre-Treatment per 50 square feet of surface to be coated.

Spray Application

Apply 3M™ Surface Pre-Treatment AC-130 coating solution by spray-drenching the part surface. Spray solution generously, allowing excess to run off of the part 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 drenched with fresh solution at least 1 time during the application period. Ensure treated surface does not dry between spray coats. Larger surface areas may require being coated in sections.

Allow coated part to drain for 5 to 10 minutes. If there is any surplus 3M AC-130 Pre-Treatment that has pooled or collected in crevices, pockets, or other collection areas, including drip edges or fastener holes, use filtered compressed air to blow off excess solution while maintaining a wet surface. Do not splatter this excess solution onto adjoining part surfaces. A cloth pre-wetted with 3M AC-130 Pre-Treatment may be used to gently blot, not rub, the surface of pooled solution. Do not blow dry areas of the part that are able to freely drain

Brush Application

Apply fresh 3M™ Surface Pre-Treatment AC-130 liberally by brushing with a clean natural bristle brush or swabbing with a clean wiper, cheesecloth or gauze. Do not scrub with a brush or applicator. Apply solution generously, keeping the part surface continuously wet with the solution for a minimum period of 1 minute. Part surface should be drenched with solution. Brushes or wipers should not leave streaks on the surface. Part surfaces must not be allowed to dry and should be wetted with fresh solution at least one time during the solution application process.

Allow coated part to drain for 5 to 10 minutes. If there is any surplus 3M AC-130 Pre-Treatment that has pooled or collected in crevices, pockets, or other collection areas, including drip edges or fastener holes, use filtered compressed air to blow off excess solution while maintaining a wet surface. Do not splatter this excess solution onto adjoining part surfaces. A cloth pre-wetted with 3M AC-130 Pre-Treatment may be used to gently blot, not rub, the surface of pooled solution. Do not blow dry areas of the part that are able to freely drain.

Dry/Cure of 3M™ Surface Pre-Treatment AC-130

Dry the solution-coated parts under ambient conditions for a minimum of 60 minutes. Minimize contact with the part, as the coating may be easily damaged or contaminated until fully cured. Exact drying time will vary depending on configuration of the part and ambient conditions. Alternately, after drying at ambient temperature for a minimum of 30 minutes parts may be heated to 140°F maximum for an additional 30 minutes minimum to facilitate drying. After drying, coated surfaces should be protected from contamination prior to applying the bonding primer.

Health and Safety Precaution

3M™ Surface Pre-Treatment AC-130 is safe to use and apply when recommended precautions are followed. Before using this product, read and understand the Material Safety Data Sheet (MSDS), which provides information on health, physical and environmental hazards, handling precautions and first aid recommendations. An MSDS is available on request.

Storage

The shelf life of 3M™ Surface Pre-Treatment AC-130 and AC-130-2 is 12 months from date of packaging, when stored in the original unopened containers between 40°F and 100°F.

3M™ Surface Pre-Treatment AC-130

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.

Product Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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These products were manufactured under a 3M Quality Management System registered to the AS9100 standard.



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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.



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

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.

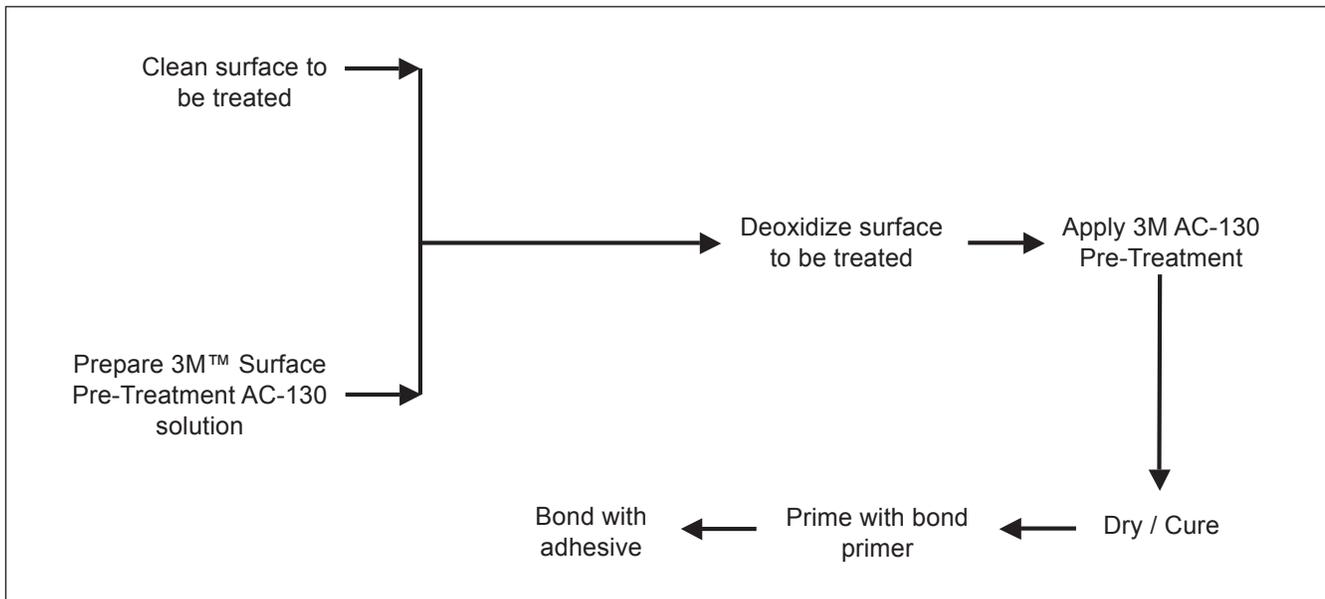


Figure 1: Process Flow for 3M™ Surface Pre-Treatment AC-130

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.

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

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.

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

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

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