

Non-Chromated Surface Pretreatment Prior to Painting

RATIONALE

This revision intended to correct editorial and formatting errors from initial specification, and to clarify the paragraph numbering system.

1. SCOPE

1.1 Form

This specification establishes the performance requirements for non-chromated materials used for surface preparation of metallic surfaces prior to applying organic coatings.

1.2 Application

Pretreatment materials qualified to this specification may be used on metallic surfaces that are subsequently painted. These include, but are not limited to, external and internal aircraft surfaces, off-aircraft part surfaces, and aircraft surfaces undergoing touch-up/repairs.

1.3 Classification

Pretreatment materials shall be qualified by Type, Class and Grade as defined below. The pretreatment material is to be tested and evaluated in conjunction with either MIL-PRF-23377 or MIL-PRF-85582 industry qualified primers.

Type 1: Suitable for spray application

Type 2: Suitable for immersion application

Type 3:* Suitable for manual or hand application (i.e., brush, wipe, or other touch up methods)

*NOTE: If Product is already qualified to a Type 1 or Type 2 and there is no formula change for the Type 3, limited testing per Table 4 is permitted.

Class C: Qualified for use with primers that contain hexavalent chromium

Class N: Qualified for use with primers that are free from: barium, hexavalent chromium, cadmium, arsenic, copper, nickel, mercury, or lead

Grade I: 0 to 250 g/L (0 to 2.1 lb/gal) Volatile Organic Content (VOC)

Grade II: 251 to 780 g/L (2.11 to 6.55 lb/gal) Volatile Organic Content (VOC)

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1.4 Safety-Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2825	Material Safety Data Sheets
AMS4035	Aluminum Alloy, Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024-0), Annealed
AMS4037	Aluminum Alloy, Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024; -T3 Flat Sheet, -T351 Plate), Solution Heat Treated
AMS4041	Aluminum Alloy, Alclad Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn, Alclad 2024 and 1-1/2% Alclad 2024, -T3 Flat Sheet; 1-1/2% Alclad 2024-T351 Plate
AMS4045	Aluminum Alloy Sheet and Plate, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr, 7075: (-T6 Sheet, -T651 Plate), Solution and Precipitation Heat Treated
AMS4049	Aluminum Alloy, Sheet and Plate, Alclad, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (Alclad 7075; -T6 Sheet -T651 Plate), Solution and Precipitation Heat Treated
AMS4911	Titanium Alloy, Sheet, Strip, and Plate, 6Al - 4V, Annealed
AS5505	Requirements for Accreditation of Testing Laboratories for Organic Coatings
AS9100	Quality Management Systems - Aerospace – Requirements
ARP1917	Clarification of Terms used in Aerospace Metals Specifications

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B 117	Standard Practice for Operating Salt Spray Apparatus
ASTM D 522	Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
ASTM D 740	Standard Specification for Methyl Ethyl Ketone
ASTM D 1200	Standard Test Method for Viscosity by Ford Viscosity Cup

ASTM D 1849	Standard Test Method for Package Stability of Paint
ASTM D 1974	Standard Practice for Methods of Closing, Sealing and Reinforcing Fiberboard Boxes
ASTM D 3335	Standard Test Method for Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy
ASTM D 3359	Standard Test Method for Measuring Adhesion by Tape Test
ASTM D 3960	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
ASTM D 6905	Standard Test Method for Impact Flexibility of Organic Coatings

2.3 U.S. Government Publications

Available from the Document Automation and Production Service (DAPS), Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, <http://assist.daps.dla.mil/quicksearch/>

FED-STD-141D	Federal Test Method Standards
FED-STD-595/17925	Miscellaneous, Gloss (para 4.5.1 e)
29 CFR 1910-1200	Occupational Safety & Health Standards, Toxic and Hazardous Substances
MIL-PRF-23377	Primer Coatings: Epoxy, High-Solids
MIL-PRF-85285	Coating: Polyurethane, Aircraft and Support Equipment
MIL-PRF-85570	Cleaning Compounds, Aircraft, Exterior
MIL-PRF-85582	Primer Coatings; Epoxy, Waterborne
MIL-C-8507	Coating, Wash Primer (Pretreatment) for Metals, Applications of (for Aeronautical Use)
MIL-C-8514 (ASG)	Coating Compound, Metal Pretreatment, Resin-Acid

2.4 ISO Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org and International Organization for Standardization, 1, rue de Varembé, Case postale 56, CH-1211 Genève 20, Switzerland, Tel: +41-22-749-01-11, www.iso.org.

ISO 1513	1992 Paints and Varnishes - Examination and preparation of samples for testing
ISO 17025	General Requirements for the Competence of Testing and Calibration Laboratories

2.5 PRI Publications

Available from Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527, Tel: 724-772-1616, www.pri-network.org.

PD 2000	Procedures for an Industry Qualified Product Management Process
PRI-QPL-AMS3175	Products Qualified under AMS3175

3. TECHNICAL REQUIREMENTS

3.1 Materials

Composition of the products is not specified, except for the following:

3.1.1 Composition

When tested in accordance with ASTM D 3335, or equivalent, no component of the pretreatment material shall contain arsenic, cadmium, chromium, copper, nickel, lead or mercury metals or compounds in excess of 0.05% by weight.

3.1.2 Toxicity

Manufacturers of components shall use best efforts to ensure that any materials supplied under this specification, when used for their intended purpose in accordance with the precautions as identified on instruction sheets, shipping containers and on the MSDS, shall have no adverse effect on health of personnel. An MSDS which meets the requirements of 29 CFR 1910.1200 shall be prepared and submitted in accordance with AMS2825.

3.2 Shelf Life

Shelf life shall be a minimum of 12 months from the date of packaging when stored in the original unopened containers at a temperature between 40 °F (4.4 °C) and 95 °F (35 °C). Manufacturer's repackaged material (i.e., touch-up and repair kits) must be labeled with original date of package where shelf life of original date of package is retained.

3.3 Pretreatment Material Property Requirements

Pretreatment material and physical requirements are summarized in Table 1, with additional information in following paragraph.

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TABLE 1 - PHYSICAL REQUIREMENTS

Property	Requirement	Conditioning	Test Method
Quality	3.3.1	As received in original container	ISO 1513
Storage Stability	3.3.2	As received in original container	
Accelerated Storage Stability	3.3.3	As received in original container	4.8.1
Admixed Product Properties	3.3.4	--	--
VOC content	3.3.4.1 (per Grade in 1.3)	Mixed, prepared for application	4.8.2
Viscosity	3.3.4.2	Mixed, prepared for application	
Pot Life **	3.3.4.3	Mixed, prepared for application	4.8.3
Drying Time	3.3.4.4	Applied on test panels	4.8.4
Adhesion	3.3.5	--	--
Wet Tape	3.3.5.1 - No delamination or peel and a rating of 4A.		4.8.5
Cross-Hatch	3.3.5.2 - No delamination or peel and a rating of 4B.		4.8.6
Aged Cross-Hatch	3.3.5.3 - No delamination or peel and a rating of 4B.		4.8.7
Flexibility	3.3.6 - No flexibility loss caused by the surface treatment		4.8.8
Corrosion Resistance	3.3.7	--	--
Neutral Salt Spray	3.3.7.1 - Class C and Class N: No blisters or undercutting from the scribe. Class C: no discoloration in the scribe and no pitting in the scribe Class N: discoloration and some corrosion products allowed in the scribe but no pitting	Class C: 2000 hours Class N: 2000 hours	4.8.9.1
Filiform Corrosion	3.3.7.2 - The top coated primer coatings shall not exhibit filiform corrosion extending beyond 1/4 inch from the scribe, and the majority of the filaments shall be less than 1/8 inch in length	Expose to HCl, 1000 hours @ 102 °F and 80% RH	4.8.9.2

** NOTE: Mixing and Pot Life references are only applicable to multi-component systems and powders.

3.3.1 Quality

Pretreatment components taken from original or laboratory containers as received shall be free from extraneous matter and show no skinning, gelling, hard settlement or other objectionable properties which will prevent satisfactory application to produce a defect free film.

Clear Components: Clear system components shall be homogenous and either clear, or translucent.

Pretreatment Powders: Pretreatment components supplied in powder form shall be free flowing and free of any agglomerates that cannot be readily broken up and dissolved under normal agitation in preparation for use. Pretreatment powders shall be readily soluble when mixed according to the manufacturer's instructions.

3.3.2 Storage Stability (Not Applicable for Repackaged Material)

After storing for the required shelf life (3.2), and after mixing and waiting the 8 hour pot life as in 3.3.4.3, the requirements of 3.3.4.1, 3.3.4.2, 3.3.4.3, 3.3.4.4, 3.3.5.1, 3.3.5.2 and 3.3.6 shall be met. Data shall be submitted within one year of initial QPL approval in order to maintain qualification status.

3.3.3 Accelerated Storage Stability (Not Applicable for Repackaged Material)

NOTE: Mixing and Pot Life references are only applicable to multi-component systems and powder.

After storing in accordance with 4.8.1, and after mixing and waiting the 8 hour pot life as in 3.3.4.3, the requirements of 3.3.4.1, 3.3.4.2, 3.3.4.3, 3.3.4.4, 3.3.5.1, 3.3.5.2 and 3.3.6 shall be met. Passing of the accelerated storage stability requirements along with the balance of the testing (except 3.3.2) shall be acceptable for initial QPL approval.

3.3.4 Admixed Product Properties

3.3.4.1 Volatile Organic Compound (VOC) Content

The VOC content of the pretreatment shall be according to Grade per 1.3 when tested in accordance with 4.8.2 and ASTM D 3960, or as certified by the supplier's MSDS when performed in accordance with 4.8.2.

3.3.4.2 Viscosity

The viscosity/consistency of pretreatment materials under Type 1 shall be suitable for application to surfaces by spraying. Type 2 shall be suitable for immersion and Type 3 for manual or hand application as described by the manufacturer.

3.3.4.3 Pot-life

NOTE: Mixing and Pot Life references are only applicable to multi-component systems and powders.

After mixing per manufacturer's instructions, the pretreatment material shall have a minimum pot-life of 8 hours when stored at standard conditions as noted in 4.6.1 in a closed container. At 8 hours the material shall meet the performance and application requirements of this specification.

3.3.4.4 Drying Time

Pretreatment shall be ready to prime within 4 hours after application at standard conditions. When tested in accordance to 4.8.4 and 4.8.6, the adhesion of the panels primed 4 hours after pretreatment application shall be no less than a rating of 4B.

3.3.5 Adhesion

3.3.5.1 Wet Tape

The pretreatment and primer shall have no less than a 4A rating and no component of the coating system shall peel or delaminate from the substrate or any other component of the system when tested in accordance with 4.8.5 and ASTM D 3359 Method A.

3.3.5.2 Cross-Hatch

The pretreatment and primer shall have no less than a 4B rating when tested in accordance with 4.8.6 and ASTM D 3359 Method B.

3.3.5.3 Aged Cross Hatch

After 2000 hours of neutral salt spray, pretreatment and primer coated test panels (ASTM B 117) shall have no less than a 4B rating and no component shall peel or delaminate from the substrate or any other component of the system when tested in accordance with 4.8.7.

3.3.6 Flexibility

The pretreatment process shall not adversely affect the flexibility of the applied primer. A Gardco GE Universal Impact Tester, Model #172 should be used as specified in 4.8.8, and tested in accordance with ASTM D 6905.

3.3.7 Corrosion Resistance

3.3.7.1 Neutral Salt Spray Corrosion Resistance

The pretreatment and primer coated test panels shall exhibit no discoloration in the scribe, no blisters or undercutting from the scribe and no substrate pitting in the scribe when tested in accordance with 4.8.9.1 and ASTM B 117. Discoloration and some corrosion products in the scribe are acceptable for Class N materials.

3.3.7.2 Filiform Corrosion Resistance

The panels using the pretreatment to Class C of this specification shall use MIL-PRF-23377 (Class C1 or C2) or MIL-PRF-85582 (Class C1 or C2) primer and MIL-PRF-85285 topcoat when preparing panels for the filiform corrosion test. Panels using the pretreatment to Class N of this specification shall use MIL-PRF-23377 (Class N) or MIL-PRF-85582 (Class N) primer and MIL-PRF-85285 topcoat when preparing panels for the filiform corrosion test. The top coated primer coatings shall not exhibit filiform corrosion extending beyond 1/4 inch (6.35 mm) from the scribe, and the majority of the filaments shall be less than 1/8 inch (3.175 mm) in length upon completion of the exposure period as specified in 4.8.9.2. In order for the test to be valid, the filiform control panels shall produce filiform growth extending a minimum of 1/4 inch (6.35 mm) beyond the scribe. (note; the same materials (batch number and supplier), should be used for the control panels and test panels). If the filiform control panels do not produce the required growth it will be considered a no-test.

4. QUALITY ASSURANCE PROVISIONS

4.1 Quality System of Manufacturer

Before submitting a product for qualification to this specification, the manufacturer must have a quality system in place which holds a third party accreditation to AS9100.

4.2 Qualification

- 4.2.1 All products sold to this specification shall be listed, or approved for listing on the qualified products list, PRI-QPL-AMS3175. To qualify, the product shall meet all of the tests in this specification. All initial qualification testing is to be carried out by a laboratory which is independent of the manufacturer and is accredited per ISO 17025 and AS5505. All pretreatments submitted for qualification or purchased as qualified products under this specification shall meet all manufacturer production and quality assurance specifications.

Products qualified to this specification are specific to the manufacturer's part numbers or material codes tested and qualified.

- 4.2.2 Qualification testing, review of test results, approval, re-approval and recertification of qualification for QPL listing shall be in accordance with PD 2000.
- 4.2.3 Recertification of qualification is required every 5 years. Recertification consists of a letter certifying that there have been no changes in the material ingredients, manufacturing processes, or site of production since qualification and that the product meets all of the requirements of this specification. In addition a test report shall be provided from a lab of the manufacturer's choosing, showing compliance with all of the qualification tests.

4.3 Approval

- 4.3.1 The activity responsible for maintaining the QPL is the Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527, Tel: 724-772-1616, fax 724-772-1699. Information pertaining to qualification of a pretreatment may be obtained from that activity.

4.4 Re-approval

- 4.4.1 Manufacturer shall use ingredients, manufacturing procedures, processes, and methods of inspection on production products which are essentially the same as those used for the approval sample. If it becomes necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, manufacturer shall submit for re-approval a statement of the proposed changes in ingredients and/or processing and, when requested, sample product. Production product made using the revised procedure shall not be shipped prior to receipt of re-approval.
- 4.4.2 The manufacturer shall submit a statement of any proposed changes per 4.4.1 to PRI for review by the SAE G-8 Qualified Products Group. The QPG may elect to re-approve without testing, or they may require partial or full re-qualification testing to be done before the manufacturer may ship product with the PRI AMS reference.

4.5 Quality Conformance

In order to ensure conformity to the composition and performance established during type approval, the manufacturer shall pull a sufficient amount of pretreatment, taken at random from each batch, to perform all the required acceptance tests as noted below in Table 2. A batch shall be defined as the quantity of material run through a mixer/reactor at one time or, if a blend tank is used, from the final combined material in the blend tank.

4.5.1 Acceptance Testing

Table 2 shows manufacturer's required acceptance/conformance testing which is to be run on as received material.

TABLE 2 - MANUFACTURER'S ACCEPTANCE/CONFORMANCE TESTING REQUIREMENTS

Property	Requirement	Test Method
Viscosity	3.3.4.2	
Pot Life **	3.3.4.3	4.8.3
Drying Time	3.3.4.4	4.8.4
Wet Tape Adhesion	3.3.5.1	4.8.5
Cross Hatch Adhesion	3.3.5.2	4.8.6

** NOTE: Mixing and Pot Life references are only applicable to multi-component systems and powders

4.6 Standard Conditions

4.6.1 Standard Test Conditions

Standard laboratory conditions shall be 77 °F $\pm$ 2 (25 °C $\pm$ 1) and 50% $\pm$ 5 relative humidity. Except as otherwise specified herein, all test specimens shall be prepared and cured and all tests performed under these conditions.

4.6.2 Standard Tolerances

Unless otherwise specified herein, Table 3 shows standard tolerances applied throughout test methods.

TABLE 3 - STANDARD TOLERANCES

Measurement Units	Tolerances
Temperature	± 2 °F (1 °C)
Days	± 2 hours
Hours	± 5 minutes
Minutes	± 10 seconds
Inches (mm)	± 0.010 inch (0.25 mm)

4.7 Preparation of Test Panels

4.7.1 Description of Test Panels

Except as specified in the test procedures of 4.8, all test panels shall conform to the requirements specified in Table 4. Table 4 also indicates the number of panels to be prepared for (i) as received material, (ii) material having undergone 3.3.2 storage stability requirements and (iii) material having undergone 3.3.3 accelerated storage stability requirements. All test panels shall be 0.032 X 3 X 6 inch (0.8 X 76.2 X 152.4 mm) in size unless otherwise noted in Table 4. The test panels shall be prepared as specified in 4.7.1 through 4.7.3. Where identified, "control" panels will be run with Alodine 1200S using the described alloy and the same primer used with pretreatment test panels. For the filiform control panels only, a MIL-C-8514 wash primer in accordance with MIL-C-8507 and a FED-STD-595, 17925, gloss white topcoat conforming to MIL-PRF-85285 will be used.

TABLE 4 - TEST PANEL PLAN

*NOTE: If Product is already qualified to a Type 1 or Type 2 and there is no formula change for the Type 3, limited testing per Table 4 is permitted.

Definition of i, ii, & iii (conditioned materials for testing). i = as received material, ii = as per 3.3.2 Storage Stability, iii = as per 3.3.3 Accelerated Storage

Test Paragraph	Property	Aluminum Alloy and Heat Treatment	Quantity of Panels Required	Limited Test Requirements for Type 3, if formula is the same as testing for Type 1 or 2
3.3.4.4	Dry Time	AMS4049 0.032 X 12 X 12	i) 1 ii) 1 iii) 1	
3.3.5.1	Wet Tape	AMS4041 AMS4045 AMS4037 AMS4911	i) 3 ii) 3 iii) 3 i) 3 ii) 3 iii) 3 i) 3 ii) 3 iii) 3 i) 3 ii) 3 iii) 3	
3.3.5.2	Cross Hatch	AMS4041 AMS4045 AMS4037 AMS4911	i) 3 ii) 3 iii) 3 i) 3 ii) 3 iii) 3 i) 3 ii) 3 iii) 3 i) 3 ii) 3 iii) 3	
3.3.5.3	Aged Cross Hatch	AMS4041 AMS4045 AMS4037 AMS4911	i) 3 i) 3 i) 3 i) 3	AMS4037 3 panels
3.3.6	Flexibility	AMS4035 0.020 inches (0.5 mm) thick AMS4035 0.020 inches (0.5mm) thick (control)	i) 3 ii) 3 iii) 3 i) 3 ii) 3 iii) 3	
3.3.7.1	Neutral Salt Spray	AMS4041 AMS4045 AMS4037	i) 3 i) 3 i) 3	AMS4037 3 panels
3.3.7.2	Filiform	AMS4041 AMS4041 Control	i) 3 i) 3	

4.7.2 Variations to Standard Procedures

The standard panel preparation procedures for this specification are based on normal processing conditions for chemical conversion coatings, and epoxy or polyurethane primers. Subject to approval by the SAE G-8 Qualified Products Group, specific application conditions may be altered from these procedures based on manufacturer's recommended procedures specific to particular materials or systems. This will allow the qualification to this specification of systems employing innovative or unique materials, processes, or procedures.

4.7.3 Panel Preparation

Panels shall be cleaned and abraded/deoxidized per the procedures noted below and should be prepared using materials from the same batch number and supplier for control panels and all test panels.

- a. Solvent wipe panels with methyl ethyl ketone (ASTM D 740) to remove grease and stampings.
- b. Hand-scrub with a non-abrasive pad using a MIL-PRF-85570 Type II cleaner diluted according to manufacturer's instructions with DI water, and then thoroughly rinse to a water-break free surface.
- c. Deoxidize for 2 minutes using a deoxidizing solution consisting of the following: 35% by volume n-butyl alcohol - "Tech Grade", 25% by volume isopropyl alcohol - "Tech Grade", 22% by volume DI water, and 18% by volume 85%-ortho-phosphoric acid - "Tech Grade".
- d. Rinse thoroughly with deionized water and check for water break free surface (if the panels fail water break test, repeat steps b and c).
- e. Spray, immerse, or wipe the pretreatment per manufacturer's instructions according to the "type" that the material is being tested to.
- f. Apply primer and topcoat according to manufacturer's instructions.
- g. Allow to dry at standard conditions for a minimum of 14-days.

The pretreatment shall be applied after mixing and waiting 8 hours (minimum pot life) for all testing i, ii, and iii in table 4. The panels shall be allowed to air dry for 4 hours before the application of primer. After the application of the primer and or topcoat, the panels shall be allowed to air dry for 14 days prior to the start of any testing. Apply pretreatment and subsequent primer and topcoat in accordance with manufacturer's instructions. (NOTE: Mixing and Pot Life references are only applicable to multi-component systems and powders.)

4.7.4 Scribing

Test panels that require an X scribe shall be machined to the dimensions below utilizing a New Hermes IS 6000 or equivalent engraving machine and cutter as described below in Figure 1.

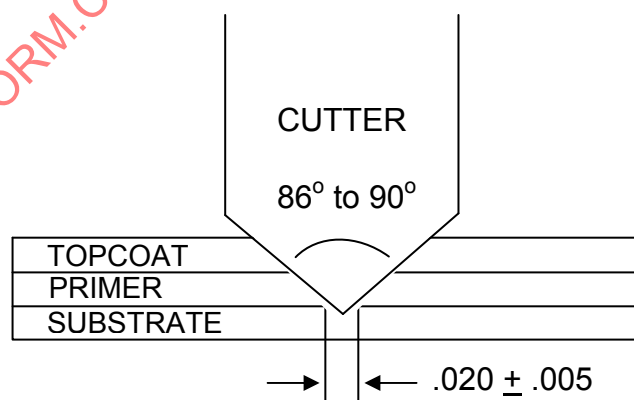


FIGURE 1 - PANEL SCRIBE REQUIREMENTS

4.8 Test Procedures

4.8.1 Accelerated Storage Stability

The test shall be conducted in accordance with ASTM D 1849. Store unopened container as received from manufacturer for 45 days at $125^{\circ}\text{F} \pm 2$ ($51.7^{\circ}\text{C} \pm 1$), then cool to room temperature. Mix per manufacturer's instructions; then wait 8 hours for minimum pot life requirement. Then test to conformance of 3.3.3. (NOTE: Mixing and Pot Life references are only applicable to multi-component systems and powders.)

4.8.2 Volatile Organic Compound Content (VOC)

The test shall be conducted in accordance with ASTM D 3960.

4.8.3 Pot-life

Mix pretreatment according to manufacturer's instructions, then store in closed container for 8 hours at standard conditions for use in 4.7.3 panel preparation.

4.8.4 Dry Time

After the surface treatment has been allowed to dry for 4 hours at $77^{\circ}\text{F} \pm 2$ ($25^{\circ}\text{C} \pm 1$) and $50\% \pm 5$ RH, apply the primer, allow the primer to cure for 14 days and then test adhesion in accordance with 4.8.6.

4.8.5 Wet Tape Test

Loss of adhesion as a result of exposure tests shall be determined in accordance with Method 6301.3 of Federal Test Method Standard FED-STD 141D with the following exceptions:

- a. The test panels shall be thoroughly dried by wiping with clean dry cheesecloth.
- b. The test shall be conducted no more than 10 minutes after wiping and standing at $75^{\circ}\text{F} \pm 2$ ($25^{\circ}\text{C} \pm 1$).
- c. With a razor blade or scalpel, cut two parallel lines 1 inch apart and an X in between and overlapping the parallel lines. The X shall be 0.5 inches wide as shown in Figure 2.
- d. Press a piece of 1-inch (25.4 mm) wide masking tape (3M 250 tape or 3M 2517 tape) perpendicular across the parallel cuts covering the X. The tape shall be pressed down by using eight passes of a 4.5 to 5-pound (2.04 to 2.27 kg) rubber covered roller approximately 3.5 inches (88.9 mm) in diameter by 1.75 inches (44.5 mm) long and having a durometer hardness of 70-80 Shore A.
- e. Within 90 seconds ± 30 of rolling the tape, the tape shall be removed in one abrupt motion, pulling at an angle of 180 degrees to the plane of the panel.
- f. The adhesion is determined by a visual examination of the paint remaining/removed from the scribed area, using the rating scale in ASTM D 3359 Method A.