



SPECIFICATION FOR PAINTING, COATING AND MARKINGS SEAKR

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REVISION/CHANGE RECORD

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-	01/21/14	G. Vialle	Initial Release	N/A
A	04/17/18	G. Vialle	Update Certification Requirements	4-10, 12-13
B	02/15/19	J. Shonts	Remove Obsolete References to Colored Inks; General update to format and content	4-9, 11-13
C	01/27/22	J. Shonts	Revise supplier cure requirements for marking inks; Add laser etch requirements.	All
D	05/16/24	J. Shonts	Include requirements for wet installation of helicoils/fasteners	10, 12, 15
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1 SCOPE

This specification designates standard finish, coating, and marking processes to be used in the fabrication of mechanical piece parts for SEAKR Engineering. Detailed requirements, locations, and dimensions of the parts are specified in the mechanical drawing and may be supplemented by additional notes on the Purchase Order (PO). There shall be no substitutions or additional exceptions without written approval from SEAKR.

2 APPLICABLE DOCUMENTS

The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the applicable issues of the Government/Military documents shall be those in effect on the date of the procurement. All other requirements shall default to Industry Standards.

2.1 Government/Military Specifications and Standards

A-A-56032	Ink, Marking, Epoxy Base
MIL-DTL-5541	Chemical Conversion Coatings on Aluminum and Aluminum Alloys
MIL-A-8625	Anodic Coatings for Aluminum and Aluminum Alloys
MIL-C-26074E	Coatings, Electroless Nickel, Requirements for
NASA-HDBK-6003	Application of Data Matrix Identification Symbols to Aerospace Parts Using Direct Part Marking Methods/Techniques

2.2 Industry Standards

ASME Y14.100	Engineering Drawing Practices
ASTM-E595	Standard Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment
9929 Data Sheet	Aeroglaze Conductive Primer
Z307 Data Sheet	Aeroglaze Conductive Black Paint

2.3 Order of Precedence

The following order of precedence shall apply in the event of a conflict between the procurement document(s), the text of this document and the references cited herein:

1. Contract or purchase order (PO)
2. Mechanical drawing or SCD
3. This specification
4. Other applicable documents referenced herein

3 ACRONYMS AND DEFINITIONS

Chem Film:	Chemical (Chromate) Conversion coating
C of C:	Certificate of Conformance
Gouge or Scuff:	An area imperfection where length is approximately equal to width. Any imperfection of a depth that significantly changes the tonal quality of the anodize color is considered an imperfection.
Machined Finish:	Milled surface finish (prior to coating), No bead blast
MFR:	Manufacturer
PO:	Purchase Order
Room Temperature:	74°F ±5°F (23°C ± 5°C)
SCD:	Source Control Drawing
Scratch:	A linear imperfection where length is much greater than width, and the depth does not meet the thickness requirements of the coating

4 FINISHES AND COATINGS

Surface finishes and coatings shall be as indicated on drawing. Clean all parts to ensure they are free of oil and debris after machining operations.

A tabular summary of finish requirements can be found in **Appendix A**.

4.1 Black Conductive Paint

If specified on the mechanical drawing, indicated surfaces are to be painted with Aeroglaze 9929 primer and Aeroglaze Z307 conductive black paint provided by Lord Corporation (CAGE 30676). Apply primer and paint to indicated surfaces per manufacturer's instructions. Refer to Aeroglaze Z307 and 9929 primer data sheets.

4.1.1 Thickness

Primer dry film thickness shall be 0.6 mils (0.0006 inch), minimum. Paint topcoat dry film thickness to be 0.8 mils (0.0008 inch), minimum, and shall result in uniform black color. Maximum total thickness shall not exceed 5 mils. Record the average total paint and primer thickness after tack-free cure per part number and deliver with shipment.

4.1.2 Cure

In order to meet ASTM-E595 outgassing requirements, a minimum of 14-day final cure at greater than 50% relative humidity and room temperature shall be performed. An extended bake out for a minimum of 96 hours at $65^{\circ}\text{C} \pm 5^{\circ}\text{C}$ under ambient pressure is required after final cure. Lot curing record (time, temperature, humidity, and thickness) is required with shipment.

4.1.3 Adhesion Test Coupon

Reserved.

4.2 Black Anodized Coating

If specified on the mechanical drawing, indicated surfaces are to be anodized as specified.

The anodize color shall be consistent and uniform in tonal quality when viewed under normal lighting. Surface irregularities attributed to masking along edges shall be minimized to the greatest practical extent. Anodized surfaces shall not have visible scratches, gouges or scuffs exceeding the criteria outlined in **Section 6**.

4.3 Electroless Nickel Plating

When specified on the mechanical drawing, indicated surfaces are to be nickel plated as specified per MIL-C-26074.

The nickel plating finish shall be consistent and uniform when viewed under normal lighting. Surface irregularities attributed to masking along edges shall be minimized to the greatest practical extent. Plated surfaces shall not have visible scratches, gouges, or scuffs exceeding the criteria outlined in **Section 6**.

4.4 Powder Coat

Reserved.

4.5 Chemical Conversion Coating (Chem Film)

If specified on the mechanical drawing, indicated surfaces are to be conversion coated as specified per MIL-DTL-5541.

The chem film color shall be consistent and uniform when viewed under normal lighting. Surface irregularities attributed to masking along edges shall be minimized to the greatest practical extent. Conversion coated surfaces shall not have visible scratches, gouges, or scuffs exceeding the criteria outlined in **Section 6**.

4.6 Wet Installation of Helicoils and Fasteners

When required by the mechanical drawing or Purchase Order, helicoils, fasteners, or other mechanical piece parts as controlled by the print, are to be wet installed with PPG Aerospace (aka PRC-DeSoto) 02GN084 primer. Alternate materials, including MIL-PRF-23377 equivalent primers or MIL-PRF-81733 equivalent sealants may be used with written approval from SEAKR Engineering.

In the case of fasteners, neither primer nor sealant should be applied to the threaded portions, and only applied to the grip length or immediately under the head of the fastener. For helical coils, sealant is prohibited from the interior threads, and should be applied to the exterior threads prior to installation.

5 MARKING

All text shall be in a sans serif font, typically provided by SEAKR in configuration controlled (.dxf) electronic files with drawing. Unless otherwise noted, text shall be approximately 0.125 inches high.

Any artwork required shall be provided by SEAKR in configuration controlled (.dxf) electronic files with drawing.

The markings shall be legible when viewed under normal lighting.

5.1 Engraving

Engrave per configuration controlled electronic files. Depth shall be as indicated on engineering drawing. If not specified, maximum depth shall be 0.015 inches.

5.2 Silk Screen/Ink Stamp

Ink is to be applied after other coatings and in accordance with A-A-56032. SEAKR approved inks are listed in Table 1. If the supplier cannot comply with the SEAKR preferred cure schedule due to process, material, or equipment limitations, then alternative cure schedules that are in compliance with the manufacturer's specifications are permitted. Material Certificate of Compliance and lot curing record, which details the temperature and duration used, is required with shipment.

Table 1: SEAKR Approved Inks

Color	Ink	Catalyst	MFR CAGE Code	SEAKR Preferred Cure Schedule
White	Enthone M9N or 50-100 or 50-120R	B3 or 9 or 20	02258	Heat Cure for 30 min @ 150°C (302°F)
Black	Enthone M0N[C]	A or B13/28	02258	



5.3 Laser

5.3.1 Laser Etch

Laser etch per the drawing controlled electronic files provided by SEAKR. Laser engraving shall be in accordance with the requirements of MIL-STD-792F, 5.8, Type VIII, with the exceptions noted in Appendix A.

5.3.2 Laser Bond

Laser bond mark to drawing/configuration controlled electronic files and per NASA-HDBK-6003. Characters and lines shall have a solid fill.

Table 2: SEAKR Approved Laser Marking Material

Color	Material	Catalyst	Cure
Black	THERMARK LMM6000	N/A	N/A

5.4 Adhesive Labels

Reserved.

6 ACCEPTANCE CRITERIA

6.1 Dimensional Limits

Dimensional limits apply after all coating applications.

6.2 Scratches

No scratches permitted greater than the dimensional requirements provided in **Appendix A**.

6.3 Gouges/Scuffs

No gouges/scuffs permitted greater than the dimensional requirements provided in **Appendix A**.

6.4 Drips

No drips permitted.

6.5 Contamination

Parts shall be free of residue and debris. Completed parts shall be visibly clean, to result in the absence of all particulate and non-particulate matter visible to the normal unaided eye (except corrected vision). Fabricator shall exercise reasonable care to minimize debris detectable in threaded holes under 10X magnification.

6.6 Touch-Ups

Area to be touched up shall be not greater than 5 percent of the total item surface area. Touchup materials and processes must comply with relevant finish specification.

6.7 Adhesion Test

Reserved.

APPENDIX A: SUMMARY OF SEAKR STANDARD COATING REQUIREMENTS

Coating /Spec	Thickness	Cure	Scratches	Gouges/scuffs
<u>Paint</u> Aeroglaze Z307	1.4 mil, minimum (paint + primer)	14 day @ Room Temp + 96hr @ 60°C	No scratches greater than 0.25 inch long or greater than 0.005 inches wide. No more than one visible scratch (any size) per any 25 square inches of contiguous surface.	No gouges/scuffs greater than 0.01 in ² in area. No more than two visible gouges/scuffs (any size) on any contiguous surface.
<u>Anodize</u> MIL-DTL-8625 Type II	Class 2 (0.07-1.0 mil)	N/A		
<u>Nickel-Plating</u> MIL-C-26074, Class 4 (Aluminum) MIL-C-26074, Class 1 (Copper)	Grade A (1-5 mil) Grade B (0.5-5 mil)	N/A N/A	The coating shall be smooth, continuous, uniform in appearance, adherent, and free from visible blisters, pits, flaking, peeling, pitting, nicks, dents, dings nodules, porosity, cracks and other defects. All details of workmanship shall conform to the best practices for high quality coating.	
<u>Conversion Coating</u> MIL-DTL-5541	Class 3 (0.01-0.04 mil)	N/A	The chemical conversion coating shall be continuous in appearance and visibly discernible in 93 foot-candles of illumination. It shall be free from areas of powdery or loose coating, voids, scratches, flaws, and other defects or damages which reduce the serviceability of parts or are detrimental to the protective value and paint bonding characteristics.	
<u>Laser Etch</u> MIL-STD-792F	Type VIII	N/A	Exceptions to MIL-STD-792F: 5.8 Laser engraved characters shall have a nominal depth of 0.0005 to 0.001 inch deep, but a maximum depth of the characters shall be no greater than 0.0015 inch. 5.8(b) Each user activity shall have a formal qualification procedure for the laser engraving machine. This qualification procedure must demonstrate that the laser engraving machine will provide a marking that is legible under normal lighting and that does not exceed the depth requirements noted in 5.8 above. This procedure must be approved by SEAKR prior to start of production.	

APPENDIX B: PAINT PROCESS FLOW CHART (FOR REFERENCE ONLY)

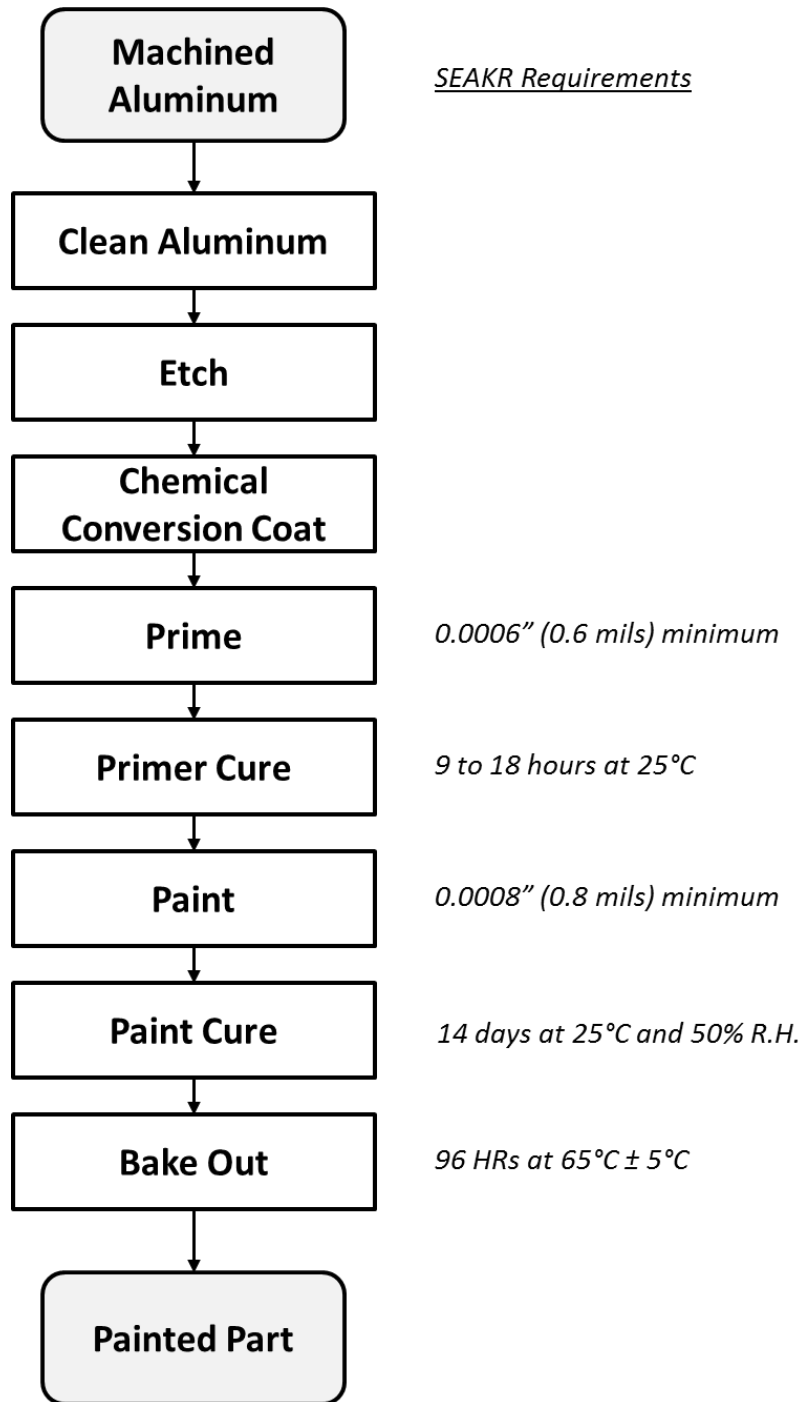


Figure 1: PAINT PROCESS FLOW CHART