Process Specification for the Sealing of Joints and Faying Surfaces

Engineering Directorate

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REVISIONS		
VERSION	**CHANGES**	**DATE**
--	Original version	2/19/98
A	Addition of Aeroglaze 9743/9700 primer. Addition of addresses and CAGE codes for sealant vendors.	4/19/99
B	Modified paragraph 3.1, Clarified sealing of helical wire inserts in sections 6.5 and 8.0, updated part number for Super Koropon in section 3.0	7/14/00
C	Changed Division name. Revised section 3.1 (Work Instructions) and moved to section 6.1, renumbered section 6, and revised section 9.0 (Training).	10/2004
D	Deleted Aeroglaze 9741 as an approved primer. Changed JPG-8500.4 to JPR-8500.4 Added part numbers to material references. Updated manufacturer of Koropon to PRC Desoto. Added pot life & mixing ratio & thinning information in section 6.8. Added detail on rivet application in section 6.5.	8/2006
E	Updated signatories. Change manufacturer from Lord to SOCOMORE. Changed 9743 to 9743A, and 9700 to 9700B to reflect manufacturers numbering change.	5/2020

1.0 SCOPE

This process specification establishes requirements for the sealing of joints and faying surfaces for the purposes of moisture exclusion, corrosion protection or the containment of gas pressure.

2.0 APPLICABILITY

This process specification shall be applicable whenever the sealing of joints and/or faying surfaces is invoked per Section 3.0, “Usage”.

3.0 USAGE

The use of a sealant is standard practice between the faying surfaces of dissimilar metals. It is also standard for aluminum joined to aluminum when the surfaces are not already coated with a corrosion resistant organic primer. It is also standard for primed aluminum surfaces when the assembly will be used in a wet or humid service environment.

Examples of common sealant usage include:

Faying surface sealing of joints between conversion-coated aluminum parts. Faying surface sealing of joints between anodized aluminum parts.
Sealing a stainless steel hinge to an anodized aluminum part. Sealing stainless steel bolts in an anodized aluminum part.
Sealing aluminum or steel rivets in primed aluminum sheet. Sealing stainless steel inserts in aluminum parts.
Sealing stainless steel bearings in aluminum parts.

This process specification shall be called out on the engineering drawing by using an appropriate drawing note. The specific process and sealant shall be included in the drawing note. For example:

SEAL FAYING SURFACES WITH AEROGLAZE 9743A/9700B PER NASA/JSC PRC-4004.

SEAL FAYING SURFACE WITH PR1440C PER NASA/JSC PRC-4004.

SEAL FASTENERS WITH AEROGLAZE 9743A/9700B PER NASA/JSC PRC- 4004.

SEAL INSERTS WITH SUPER KOROPON PRIMER BASE PER NASA/JSC PRC-4004.

SEAL RIVETS WITH AEROGLAZE 9743A/9700B PER NASA/JSC PRC-4004. SEAL

BUSHING WITH AEROGLAZE 9743A/9700B PER NASA/JSC PRC-4004.

Faying surface sealing is normally performed simultaneously with the sealing of the fasteners that clamp the joint together. When used in conjunction with a fastener or mechanical part installation specification, this sealing note shall immediately follow the appropriate installation note. For example:

INSTALL THINWALL SCREW THREAD INSERTS PER NASA/JSC PRC-9004. SEAL INSERTS WITH AEROGLAZE 9743A/9700B PER NASA/JSC PRC-4004.

As shown in the examples above, the specific sealant selected is identified by including a short description in the drawing note. The standard sealants and configurations used at JSC are as follows:

Faying Surfaces:	<u>Aeroglaze 9743A/9700B</u> Super Koropon Primer Base Super Koropon Primer PR1440C
Threaded Fasteners:	<u>Aeroglaze 9743A/9700B</u> Super Koropon Primer Base Super Koropon Primer PR1440C
Threaded Inserts:	<u>Aeroglaze 9743A/9700B</u> Super Koropon Primer Base Super Koropon Primer
Rivets:	<u>Aeroglaze 9743A/9700B</u> Super Koropon Primer Base Super Koropon Primer PR1440C
Bushings, Bearings:	<u>Aeroglaze 9743A/9700B</u> Super Koropon Primer Base Super Koropon Primer

The preferred sealant is <u>underlined</u>.

When Super Koropon Primer is used without the curing solution, it is called “Super Koropon Primer Base.” Used by itself, the primer base dries but does not fully cure, which allows for easier disassembly of fasteners and faying surfaces.

Aeroglaze 9743A/9700B product is not fully catalyzed which will promote disassembly of sealed joints.

Nonstandard sealant materials (those not listed above) may be used, but should be reviewed in advance with Materials and Processes (M&P).

A complete description of the sealing material shall be called out in the parts list on the engineering drawing, as follows:

Part number	Description	Material	Specification
Aeroglaze 9743A/9700B	Epoxy Primer		
Super Koropon 515-700	Epoxy Primer Base		
Super Koropon 515-700/910-704	Epoxy Primer		
PR1440C	Polysulfide Sealant Base and Accelerator		MIL-S-8802
PR-182	Adhesion Promoter		

Aeroglaze 9743A/9700B is manufactured by Socomore. 9743A is the epoxy primer base, and 9700B is the curing agent.

Super Koropon, PR1440C, and PR-182 are manufactured by PRC Desoto.

SOCOMORE
CAGE Code F6892

PRC Desoto Aerospace Coatings
CAGE Code 83574

Surface preparations that are appropriate for sealant application are: cured epoxy primer, anodized aluminum, chromate conversion coated aluminum, and bare metals. When a new sealing technique is developed for a specific surface preparation, it shall be verified to produce acceptable results and then documented in the appropriate work instruction.

4.0 REFERENCES

All documents listed are assumed to be the current revision unless a specific revision is listed.

SOP-007.1 *Preparation and Revision of Process Specifications*

JPR 8500.4 *Engineering Drawing System Manual*

5.0 MATERIALS REQUIREMENTS

No special materials are needed for this process. Sealant material shall be specified on the engineering drawing.

6.0 PROCESS REQUIREMENTS

6.1 WORK INSTRUCTIONS

All work shall be performed to written procedures. The work instructions shall contain sufficient detail to ensure that the manufacturing process produces consistent, repeatable products that comply with this specification.

For work performed at JSC facilities, these work procedures consist of Detailed Process Instructions (DPI's).

For contracted work, the Contractor shall be responsible for preparing and maintaining, and certifying written work procedures that meet the requirements of this specification.

6.2 GENERAL REQUIREMENTS

The surfaces to be sealed must be cleaned with an appropriate solvent prior to sealant application. In addition, the sealant must be used while it is still wet and within its potlife requirement.

The joint shall be assembled and the excess sealant shall be removed to achieve a smooth fillet at the exposed joint.

6.3 FAYING SURFACE SEALING

For faying surface sealing, the sealant shall be applied to one or both sides of the metallic joint, as referenced on the drawing, before assembly.

6.4 FASTENER SEALING

For threaded fasteners, the sealant shall be applied to the bottom surface of the head, the fastener shank, the underside of the washer(s), and the interior surfaces of the hole and countersink. Threads shall be kept free of sealant, so in some cases it may not be possible to coat the hole completely.

6.5 RIVET SEALING

For rivet sealing, sealant shall be applied to each rivet shank and under the head before it is inserted into its corresponding hole.

6.6 INSERT SEALING

Sealant shall be applied to both the hole and any existing countersink before a key-locked insert is inserted.

Sealant shall be applied to the external surfaces of thinwall inserts before they are inserted.

Sealant shall be applied in a thin coat only to the fastener hole before helical wire inserts are installed. Extra care shall be used to preclude sealant from transferring to the internal threads of the insert.

6.7 BEARING AND BUSHING SEALING

Sealant shall be applied to both the bore and the outside diameter of the bearing or bushing.

6.8 SEALANT-SPECIFIC REQUIREMENTS

The ratio of Aeroglaze 9743A mixed with Aeroglaze 9700B hardener shall be modified to 20:1 by weight (with a tolerance of ± 2% by weight on the 9743A). The lower percentage of hardener produces a weaker cure to improve removability of fasteners and faying surfaces sealed with the primer.

The ratio of Super Koropon Primer Base to Super Koropon Primer Catalyst shall be 1:1 by volume (with a tolerance of ± 5% by volume).

Mixed Sealant pot life for Super Koropon Primer shall be limited to (8) eight hours after mixing. Mixed Sealant pot life for Aeroglaze shall be limited to (8) eight hours after mixing.

Super Koropon Primer Base (used without the curing solution) pot life is only limited by the consistency of product. When it becomes too thick to apply, it may be thinned one time with MEK at a ratio of 2 – 5% MEK per primer by volume for ease of

application as detailed in the work instructions. If thinned once and becomes too thick to apply, it must be discarded. PR1440C is used to provide an airtight seal for cabin pressure. PR-182 adhesion promoter shall always be used with the PR1440C. The surface shall be prepared so that the adhesion promoter will wet the surface. The adhesion promoter shall dry for 15 minutes before the PR1440C is applied. The PR1440C shall be applied within 24 hours after the PR182 is applied.

7.0 PROCESS QUALIFICATION

The sealing process shall be qualified and accepted prior to assembly of production parts. This qualification shall provide documented evidence that the installation procedures are capable of meeting the requirements of this process specification and the engineering drawing. Any change to the procedure shall require requalification.

8.0 PROCESS VERIFICATION

Verification of proper sealant application shall consist of inspection to ensure that the dried sealant forms a continuous fillet on the surface between the parts being joined.

When using PR1440C, verification that the adhesion promoter wets the base surface in a continuous manner and does not bead up is also required. In-process verification coupons are required for PR1440C application.

When a sealant is used with helical wire inserts, a lot verification using a swab shall be performed to determine if sealant has transferred to the internal threads of the insert. If sealant is found, all inserts installed in the lot shall be checked and the sealant shall be removed if necessary, before the sealant has completely cured.

9.0 TRAINING AND CERTIFICATION OF PERSONNEL

This process shall be performed by personnel qualified through training or experience and certified by their supervision to conduct the process.

10.0 DEFINITIONS

Epoxy primer	Paint containing epoxy resin that is applied to joints and/or faying surfaces for corrosion resistance; one example is Super Koropon primer.
Faying surfaces	Mating surfaces, including the mating surfaces of a fastener joint.
Primer base	Primer that is used without catalyst or curing agent