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AND SPACE ADMINISTRATION -----  
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NASA/KSC GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2015

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SECTION 09 91 00.00 98

PAINTING

11/14

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NOTE: This specification covers the requirements for coating systems, materials, surface preparation, and application of protective coatings on aluminum.

Notes are for designer information and will not appear in the final project specification.

Prepare the coating schedule (paragraph entitled, "Schedules") indicating the areas to be coated, surface preparation, and finish color required.

Adhere to [UFC 1-300-02](#) Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Recommended changes to a NASA/KSC Master Specification Section should be submitted as a Criteria Change Request (CCR) to the appropriate Technical Proponent (TP) through the [SpecsIntact Help Desk](#).

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date,

and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 1 (1982; E 2004) Solvent Cleaning

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595 (Rev C; Notice 1) Colors Used in Government Procurement

1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Keep submittals to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

An "S" following a submittal item indicates that the submittal is required for the Sustainability Notebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY

REPORTING. Submit the following in accordance with Section 01 33 00  
SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Inspection Forms [; G]

Material, Equipment, and Fixture Lists [; G]

SD-09 Manufacturer's Field Reports

Inspection Reports [; G]

1.3 QUALITY CONTROL

Submit material, equipment, and fixture lists for installation equipment, protective coating systems, listing all materials to be used on the project. Include manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site information.

1.3.1 Personnel Safety

Take necessary precautions in accordance with OSHA regulations to ensure safety of personnel engaged in these operations and personnel who may be affected by such operations. Some of the materials to be handled under this specification are combustible or toxic, or both. Using material safety information provided by the manufacturer, provide equipment as required for safe application and instructing the users regarding the hazards and proper handling procedures to prevent health hazards or possible explosion.

1.3.2 Inspection Forms

Submit inspection forms at the prework conference used by the Coating Inspector and forwarded to the Contracting Officer prior to delivery of the coated work to the job site.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials in their original, unbroken containers bearing the manufacturer's name, product identification, and batch number.

Store coatings, thinners, and cleaners in tightly closed containers in a covered, well-ventilated area where they are protected from exposure to extreme cold or heat, sparks, flame, direct sunlight, or rainfall.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Abrasives

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**NOTE: To assure safety when abrasive blasting with silica sand is performed, use protective equipment required by NIOSH (National Institute for Occupational Safety and Health)**

The only respirator suitable for use when using silica sand is Type CE, pressure-demand, abrasive blast supplied air respirator, with a protection factor of 2000.

When silica sand is not used as the blasting agent, and when a protection factor of 25 (loose fit hood/helmet) provides adequate protection use Type CE, continuous flow, abrasive blast air respirator.

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Use a commercial silica blasting stand as an abrasive blasting material (readily available from industrial and commercial sources) for surface preparation METHOD 1. Use nutshells for METHOD 2.

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NOTE: Shellblast (nutshells) is available from Agrashell, Inc., 5934 Keyston Drive, Bath, PA 18014, (215) 837-6705.

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Use Scotch Brite Clean 'N Strip Abrasive discs, or equal.

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NOTE: Abrasive discs are available from 3M Cleaning Products Division, St. Paul, MN 55144, (612) 733-1110.

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Use Tri-M-Ite-Wetordry abrasive sanding sheets and type-D sanding disc or equal.

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NOTE: Sanding sheets and discs are available from 3M Automotive Trades Division, St. Paul, MN 55144, (612) 733-1110.

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### 2.1.2 Sealant Compound

Provide self-curing, single component, polysulfide-rubber type sealant conforming to [\_\_\_\_]. Use gray color sealant capable of being applied into the joint with a caulking gun.

### 2.1.3 Protective Coatings

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NOTE: No protective coatings are required for normal atmospheric service. In industrial and marine (within two miles of the sea coast) environments, nitrile rubber base aluminum pigmented coating is recommended (KSC Federal stock number 8030-00-485-3656). As an alternative, or when color is required for coding or aesthetics, wash prime in accordance with MS DOD-P-15328, or abrasive blasting and coating with an appropriate protective finish is acceptable.

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Select a coating system from the following listing. Make no substitutions without the approval of the Contracting Officer. Ensure all thinners and cleaners are products of the coating manufacturer. Ensure primer and finish coats of the coating system are products of the same manufacturer.

System I:

AR-7, Nitrile rubber base,  
aluminum pigmented coating

B.F. Goodrich  
6061 B.F. Goodrich Blvd.  
Jacksonville, FL 32226  
(904) 757-3660

System II:

Provide contrasting color to each successive coating for a visual assurance of complete coverage.

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Primer (Wash) Pretreatment  
(Formula No. 117 for Metals)

<u>INHIBITIVE POLYAMIDE EPOXY PRIMER</u>	<u>ALIPHATIC POLYURETHANE FINISH COAT</u>	<u>MANUFACTURER</u>
Amercoat 370	Amercoat 450HS	PPG One PPG Place Pittsburgh, PA 15272 412/434-3131
Carboline 893	Carboline 134HG	Carboline Company 350 Hanley Industrial Ct. St. Louis, MO 63144 314/644-1000
Devran 201H	Devthane 359	ICE-DEVOE 925 Euclid Ave. Cleveland, OH 44115 216/344-8798
Corlar 3.2 PR or Corlar 2.1PR	Imron 3.5 HG	DuPont Company DuPont Building 1007 Market Street Wilmington, DE 19898 800/441-7515
MCR 4361	Hythane 4600	Porter International P.O. Box 1439 Louisville, KY 40201 800/727-2468
Sigma 5434	Sigma 5520	Sigma Coatings 3300 River Road Harvey, LA 70059 504/347-4321

2.1.4 Finish Colors

Ensure finish colors conform to the following **FED-STD-595** numbers when specified in the coating schedule.

Brown (Safety)	No. 10080
Red (Safety)	No. 11105
Red	No. 11136
Yellow (Standard)	No. 13538
Yellow (Safety)	No. 13655
Green	No. 14110
Green (Safety)	No. 14187
Blue (Safety)	No. 15102
Gray (Safety)	No. 16187
Gray	No. 16473
Black	No. 17038
White	No. 17875

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Protection Of Equipment and Adjacent Surfaces

Protect all equipment and adjacent surfaces from damage such as, but not limited to, abrasive intrusion, overblast, and overspray.

3.1.2 Surface Preparation

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NOTE: Three methods of surface preparation are described in this section. Specify Method 1 for surface roughening of new aluminum and for removal of corrosion and other surface contaminants from aged aluminum. Specify Method 2 for removal of old coatings from aluminum which is in good condition and has no corrosion. Specify Method 3 for removal of mildew, chalking, and other contaminants from the surface of an existing coating which is in good condition. Specify the required method in paragraph entitled, "Schedules."

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Ensure all painting surfaces are clean, dry, and free from oil, grease, dirt, dust, corrosion, peeling paint, and any other surface contaminants.

Prepare and coat while accessible surfaces that become inaccessible after installation of hardware or components.

Prepare coated surfaces before recontamination can occur. Sequence surface preparation and coating operations so that freshly applied coatings are not contaminated by dust or foreign matter.

Use compressed air free of moisture and oil for surface preparation operations.

3.1.2.1 Methods of Surface Preparation

Use the following surface preparation methods when specified in the coating schedule.

- a. Method 1

Abrasive blast the surface with staurolite abrasive sand, (see CAUTION), mechanically cleaned with abrasive discs or hand- or power-sanded with abrasive sanding sheets (approximately 220-grit) or discs (approximately 36-grit). When possible use abrasive blasting. Use mechanical cleaning when: abrasive blasting is impractical, would damage the structure or component, or is prohibited in the area of work. Completely remove all corrosion and foreign material and slightly roughen all surfaces. Do not reuse abrasive blasting material.

#### CAUTION

ALUMINUM IS SUSCEPTIBLE TO DISTORTION WHEN IT IS ABRASIVE BLASTED WITH SILICA SAND. TAKE SPECIAL CARE TO ENSURE AGAINST ANY METAL DISTORTION BY REDUCING BLAST NOZZLE PRESSURE AND INCREASING THE WORKING DISTANCE FROM NOZZLE TO SURFACE. IN SOME CASES, SUCH AS IN THE SURFACE PREPARATION OF LIGHT GAGE ALUMINUM SHEET, THESE PRECAUTIONS MAY NOT BE SUFFICIENT TO PREVENT DISTORTION, USE AN ALTERNATE PROCEDURE, SUCH AS SANDING OR MECHANICAL CLEANING.

#### b. Method 2

Abrasive blast surface with nutshells, 1.18/0.60 mm 14/30 mesh. Completely remove all residue from all surfaces. Do not reuse abrasive blasting material.

#### c. Method 3

Clean surface with a 5-percent solution of chlorine bleach and wash with water under high pressure (minimum of 6900 kilopascal) 1,000 psi.

#### 3.1.2.2 Inspection of Surface Preparation

Immediately after the surface has been prepared, the Contracting Officer will inspect to determine compliance with the specification for surface preparation. Reclean any areas not meeting the surface preparation requirements until approved. Apply no coatings until the surface preparation has been approved.

#### 3.2 APPLICATION

Manufacturer's recommendations for thinning, mixing, handling, and applying his product are considered a part of this specification. In the event of conflict between the requirements of this specification and the manufacturer's recommendations, this specification takes precedence.

Use compressed air, free of moisture and oil for spraying coatings.

Ensure each coat of material applied is free from runs, sags, blisters, and bubbles; variations in color, gloss, and texture; holidays (missed areas); excessive film build; foreign contaminants; dry overspray. Complete masking and apply each coat to form a film of uniform thickness.

Do not apply coating when rain is imminent or when the temperature or humidity is outside the limits recommended by the coating manufacturer.

Thoroughly work all coatings into all joints, crevices, and open spaces.

Adequately protect all newly coated surfaces from damage.

Ensure surface temperatures are at least 3 degrees C 5 degrees F above the dew point during application to prevent moisture condensation.

Apply all coatings by airless or conventional spray. Use airless spray for large surface areas. Use conventional spray for areas of intricate configuration and touchup.

### 3.2.1 Mixing and Application Procedures

Thoroughly stir material with a mixing instrument such as a Jiffy Mixer, manufactured by the Jiffy Mixer Company, Inc., San Francisco, California, or approved equal. Power the mixer by an air motor or an explosion proof electric motor.

Strain mixed material through a 600 to 250 micrometer 30 to 60 mesh screen.

Provide continuous slow agitation during application of all coatings to maintain uniform suspension. Avoid continuous rapid agitation.

Thin material for workability and improved spray characteristics only. Use only the manufacturers' recommended thinner and amount.

Thin AR-7 (Nitrile rubber base coating) up to 50 percent with the thinner specified.

Adjust spray equipment to produce an even, wet coat with minimum overspray.

Apply material in even parallel passes, overlapping 50 percent to provide complete and uniform coverage. Give special attention to welds, cutouts, sharp edges, rivets, crevices, and bolts to ensure proper coverage.

When used, keep the pressure pot at the same level or above the spray gun for proper material delivery.

### 3.2.2 Dry-Film Thickness (DFT)

Ensure wash primer coating DFT is 0.010 to 0.015 mm 0.4 to 0.6 mils.

Ensure nitrile rubber base aluminum pigmented coating DFT is 0.008 to 0.013 mm 3 to 5 mils.

Ensure polyimide epoxy DFT is 0.006 to 0.010 mm 2.5 to 4 mils.

Ensure aliphatic polyurethane DFT is 0.005 to 0.010 mm 2 to 4 mils.

### 3.2.3 Touchup

Touch up abrasions and scratches as follows:

- a. Clean and degrease surface per SSPC SP 1.
- b. Sand lightly to smooth and feather edges of damaged areas with sandpaper.
- c. Apply finish coats to the affected area. Ensure finish coats are compatible with existing coatings. Contracting Officer may require a test patch.

Blend touched-up areas in with the surrounding coating.

3.2.4 Caulking

Provide caulking after application and curing of the primer.

Apply caulking before application of AR-7, Nitrile rubber base coating.

Caulk all exterior exposed joints including but not limited to the following:

- a. Perimeter of faying and bearing surfaces of structural members
- b. Joints in members between intermittent welds
- c. Perimeter of bearing surfaces between floor plates and supporting members (inside, outside, top, and bottom)
- d. Stair treads where joined to channel stringers
- e. All openings of 13 mm 1/2-inch or smaller. Use foam filler backup material as required.

3.3 FIELD QUALITY CONTROL

[Government will] [Contractor will] provide inspection reports of all surface preparation and coating applications to ensure the requirements of this specification are fulfilled. Government reserves the right to perform any or all of the inspections set forth in this specification. Inspector will be a NACE, Level III, certified coating inspector. Inspector will maintain a daily inspection log, documenting compliance with the Quality Assurance Provisions defined herein. Inspection logs are signed and sealed by the Inspector and submitted to the Contracting Officer. Ensure the inspector attends the pre-work conference, and is responsible for all field work, and coordination of deviation waivers with the Contracting Officer. Provide safe access for the Inspector to his work for all inspections.

3.4 SCHEDULES

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**NOTE: Prepare the coating schedule providing the information shown below.**  
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<u>SURFACE</u> <u>DESCRIPTION</u>	<u>SURFACE PREP METHOD</u>	<u>FINISH COLOR</u>
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