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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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New

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023

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SECTION 09 97 30.30 98

PROTECTIVE COATING OF [CARBON][STAINLESS][STEEL][ALUMINUM] ON [STRUCTURES][FACILITIES][GROUND SUPPORT EQUIPMENT]

11/12

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NOTE: This specification covers the requirements for the application of protective coatings to mitigate corrosion of exterior exposed carbon steel, stainless steel, and aluminum.

This specification includes requirements for materials, equipment, safety,procedures, and quality assurance inspections.

Refer to Appendices A, B, and C for listings of approved coating materials.

This specification is applicable to facilities, launch structures, ground support equipment (GSE), test facilities, and structures that are intended for use at all NASA locations world-wide.

Due to the changing environmental considerations and different site conditions, new advances in corrosion technology, and a wide array of possible applications, do not use this specification as a stand-alone specification that meets every contingency.

Use this specification in the preparation of specific projects for the prevention of corrosion through the use of protective coatings on space vehicle launch structures, facilities, Ground Service Equipment, and test facilities and structures in the specific environments identified as Zones of Exposure.

The appendices are considered to be an integral part of this Specification. Review Appendices A, B, C, and D for the preparation of coating specifications.

Adhere to
http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc
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 NASAKSC Master Specification Section should be submitted 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.

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2023) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A653/A653M	(2023) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or

	Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM D520	(2000; R 2011) Zinc Dust Pigment
ASTM D610	(2008; R 2019) Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D714	(2002; R 2017) Standard Test Method for Evaluating Degree of Blistering of Paints
ASTM D1654	(2008; R 2016; E 2017) Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D4285	(1983; R 2018) Indicating Oil or Water in Compressed Air
ASTM D4417	(2021) Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
ASTM D4752	(2010) Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub

COMPRESSED GAS ASSOCIATION (CGA)

CGA G-7.1	(2011) Commodity Specification for Air; 5th Edition
KSC-STD-F-0004	(2016, Rev G) Standard for Fire Protection Design

NACE INTERNATIONAL (NACE)

NACE RP0198	(2004) The Control of Corrosion Under Thermal Insulation and Fireproofing Materials – A Systems Approach
NACE RP0288	(1994; R 2004) Inspection of Linings on Steel and Concrete
NACE SP0188	(1999; R 2006) Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

KSC-SPEC-F-0006B	(2009) Heat And Blast Protection Coating

	Materials And Application Methods, Specification For
NASA-STD-5008	(2011b; R 2016; E 2016; Change 1) Protective Coating of Carbon Steel, Stainless Steel, and Aluminum on Launch Structures, Facilities, and Ground Support Equipment
NASA-STD-6001	(1998; Rev B 2011) Flammability, Offgassing, and Compatibility Requirements and Test Procedures

NSF INTERNATIONAL (NSF)

NSF/ANSI 61	(2022) Drinking Water System Components - Health Effects

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC AB 1	(2015; E 2017) Mineral and Slag Abrasives
SSPC AB 2	(2015; E 2016) Cleanliness of Recycled Ferrous Metallic Abrasive
SSPC AB 3	(2003; E 2004) Ferrous Metallic Abrasive
SSPC Guide 15	(2013) Field Methods for Extraction and Analysis of Soluble Salts on Steel and Other Nonporous Substrates
SSPC PA 2	(2015; E 2018) Procedure for Determining Conformance to Dry Coating Thickness Requirements
SSPC SP 1	(2015) Solvent Cleaning
SSPC SP 3	(2018) Power Tool Cleaning
SSPC SP 5/NACE No. 1	(2007) White Metal Blast Cleaning
SSPC SP 10/NACE No. 2	(2015) Near-White Blast Cleaning
SSPC SP 11	(2020) Surface Preparation Standard No. 11 - Power Tool Cleaning to Bare Metal
SSPC TU 2/NACE 6G197	(1997) Design, Installation, and Maintenance of Coating Systems for Concrete Used in Secondary Containment

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-A-22262	(1993; Rev B; Am 1 1994; Am 2 1996; Notice 1 2021) Abrasive Blasting Media Ship Hull Blast Cleaning
MIL-PRF-24667	(2008) Coating System, Non-Skid, For Roll, Spray, Or Self-Adhering Application

QPL 22262 (2011) Abrasive Blasting Media Ship Hull Blast Cleaning

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

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

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.134 Respiratory Protection

1.2 DEFINITIONS

a. DFT - Dry Film Thickness

b. GSE - Ground Support Equipment

c. IOT - Inorganic Topcoat

d. WFT - Wet Film Thickness

e. High-gloss finish - a minimum of 85 gloss units (GUs) at a 60-degree angle

f. Semi-gloss finish - 60 GU to 85 GU at a 60-degree angle

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NOTE: The Zone of Exposure is determined by the Design Engineer responsible for preparing the coating specification.

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g. Zones of Exposure - The following zones of exposure are established to define coating system requirements for surfaces located in specific environments:

(1) Zone 1

Zone 1a - Surfaces that are directly impinged on by solid rocket booster (SRB) engine exhaust.

Zone 1b - Surfaces that are indirectly impinged on by SRB exhaust.

Zone 1c - Walking surfaces in Zones 1a and 1b.

(2) Zone 2 - Surfaces that are exposed to elevated temperatures above 65 degrees C above 150 degrees F and/or acid deposition from SRB exhaust with no exhaust impingement.

(3) Zone 3

Zone 3a - Surfaces, other than those located in Zones 1 or 2, exposed to acid deposition from SRB exhaust products.

Zone 3b - Surfaces exposed to other types of chemical contamination (e.g., cooling towers, diesel exhaust stacks, acidic industrial environments, and water treatment facilities).

(4) Zone 4

Zone 4a - Surfaces not located in the launch environment but located in a neutral pH corrosive marine industrial environment or other chloride-containing environments.

Zone 4b - Surfaces located in neutral pH exterior environments in any geographical area.

Zone 4c - Surfaces located in indoor environments that are not air-conditioned.

(5) Zone 5

Zone 5a - Surfaces located in a continuous indoor air-conditioned environment, such as an office or clean room, where both temperature and humidity are controlled more than 90 percent of the time.

Zone 5b - Surfaces located in a low humidity, high ultraviolet environment, such as a high altitude, arid location.

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NOTE: In Zone 6b, based on the complexity of the liquid stored, this has to be engineered separately in compliance with all Federal, State, and local environmental statutory requirements.

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(6) Zone 6

Zone 6a - Surfaces located underground or subject to intermittent or continuous immersion in aqueous environments.

Zone 6b - Surfaces subject to exposure in a chemical/fuel storage environment.

(7) Zone 7 - Surfaces under thermal insulation, such as chilled water, steam, and heated gas lines.

1.3 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project.

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 eNotebook 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" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Plan for Storage of Coating Materials[; G]

Safety and Health Plan[; G]

Hazard Communication Program[; G]

Respiratory Protection Program[; G]

Hearing Conservation Program[; G]

Material Safety Data Sheets[; G]

Quality Control Coating Inspection Plan[; G]

Blasting System Design[; G]

SD-03 Product Data

List of Blasting Aggregates[; G]

Coatings[; G]

Thinners[; G]

SD-04 Samples

Representative Sample Areas[; G]

SD-06 Test Reports

Test Results for Off-Gassing, Flammability, and Hypergolic Compatibility[; G]

Coating System Daily Inspection Report[; G]

SD-07 Certificates

Training Program[; G]

SD-08 Manufacturer's Instructions

Manufacturer’s Recommendations[; G]

1.4 QUALITY ASSURANCE

1.4.1 Applicator Qualifications

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NOTE: The applicator's proficiency and ability to attain the required quality of workmanship for the specified coating system can be verified by testing and qualification in accordance with ASTM D 4228, Standard Practice for Qualification of Coating Applicators for Application of Coatings to Steel Surfaces.

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Provide written evidence indicating the coating applicators have successfully completed a comprehensive training program, such as Painting and Decorating Contractors of America (PDCA)/NACE/SSPC Industrial Painters Training, or equivalent[and qualified in accordance with ASTM D 4228].

Provide all painting personnel an orientation including the following topics: proper mixing and application of the specified coatings(particularly for inorganic zinc coatings), specification requirements, material application characteristics, and inspection criteria. Only personnel that have received training are permitted to perform mixing or application of coatings.

Prepare representative sample areas that meet specification requirements, and NASA-STD-5008.

1.4.1.1 Coating Work Plan

Provide procedures for reviewing contract documents immediately after award to identify errors, omissions, and discrepancies so that any such issues can be resolved prior to project planning and development of detailed procedures. For each proposed deviated change, provide procedures that include appropriate work instructions, material and equipment requirements, personnel qualifications, controls, and process verification procedures. Provide procedures for inspecting work to verify and document compliance with contract requirements, including inspection forms and checklists, and acceptance and rejection criteria.

1.4.2 Responsibility for Inspection

The coating contractor/applicator responsibilities include:

a. Provide continuous quality control of all work to ensure conformance to the project specifications as defined in the paragraph entitled, "Requirements for Inspection," of this section.

b. Submit a project-specific quality control coating inspection plan to the Contracting Officer for approval.

c. Provide the[NASA assigned] coatings inspector with safe access to the work.

The[NASA assigned] coatings inspector is a NACE Certified[Level III][_____] inspector under the NACE International Coating Inspector Program (CIP). Inspection of the surface preparation and coating application processes is performed by the[NASA assigned] coatings

inspector as follows:

a. Perform all of the in-process required inspections.

b. Witness, inspect, and test all protective coating work to verify compliance with the specified requirements

c. Document the work on the inspection forms described in the paragraph entitled, "Inspection Forms," of this section.

d. Prepare and sign the daily inspection reports on a daily basis and submit them to the Contracting Officer on a weekly basis as a minimum.

e. When a nonconformance report is required, sign and submit the report to the Contracting Officer within one workday from the time written.

f. After determining that all nonconformances have been corrected and/or the coating work is in compliance with the project specifications, complete a conformance verification report for the specific item, area, or project.

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NOTE: The application of the certified inspector's seal to the verification conformance report indicates that the inspector personally inspected the indicated work and has found it to be in compliance with the specified requirements.
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g. Sign and seal the conformance verification report.

h. Do not affix the seal to the daily inspection report or to the nonconformance report.

1.4.3 Requirements for Inspection

Zones 1, 2, and 3 - Since these zones are located in the highly corrosive launch environment or other chemical exposures, a NACE inspection is required for all surface preparation and coating applications, including all new work, touch-up of new work, major refurbishment of existing coatings, and modifications.

Zone 4 - For systems requiring abrasive blasting and coating of metallic substrates, all surfaces require a full NACE inspection with the following exception; for touch-up of existing coatings, NACE inspection is not mandatory but recommended in cases of critical systems or equipment.

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NOTE: All other aluminum or carbon steel structures in Zone 5a environments are exempt from NACE inspection. NACE inspections are required for Zone 5b locations.
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Zone 5a and 5b - All clean-room structures fabricated of aluminum or carbon steel that will be abrasive-blast-cleaned and/or coated outside Zone 5 environments require NACE inspection.

Zone 6 - Since this zone is located in a highly corrosive underground

environment or other submerged exposures, a NACE inspection is required for all surface preparation and coating applications, including all new work, touch-up of new work, major refurbishment of existing coatings, and modifications.

Zone 7 - Since this zone is located in a highly corrosive environment, a NACE inspection is required for all surface preparation and coating applications, including all new work, touch-up of new work, major refurbishment of existing coatings, and modifications.

1.4.4 Inspection Hold Points

Mandatory inspection hold points include, but are not limited to, the following:

a. Verification of ambient weather conditions in accordance with paragraph entitled, "Weather Conditions," of this section.

b. Prior to the beginning of surface preparation work; operation of equipment prior to beginning of surface preparation work.

c. After surface preparation work and before the beginning of the coating application work, the mixing of products.

d. Before and after the application of each coat of material.

e. After completion and prior to final acceptance.

1.4.5 Inspection Forms

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NOTE: See KSC Forms 28-589A and 28-588 for examples of these forms.
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Record and document all inspections on forms acceptable to the Contracting Officer (Appendix F).

1.5 Storage of Coating Materials

Store coating materials and thinners in their original containers with the manufacturer’s name, product identification, shelf life, and batch number. Follow the manufacturer’s written instructions for storage limitations. Do not use tarpaulins as the sole means of covering coating materials for storage.

Inspect coating material storage conditions every [week][_____].

Provide on-site Material Safety Data Sheets (MSDS) for coating materials and thinners or made accessible to users in the area. Submit a written plan for storage of coating materials to the Contracting Officer for approval.

1.6 PROJECT/SITE CONDITIONS

1.6.1 Safety and Health Requirements

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NOTE: Some of the materials handled in accordance

with this document are combustible, or toxic, or both.

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Take necessary precautions, in accordance with OSHA regulations, manufacturers' recommendations, and industry standards, to ensure the safety and health of personnel performing the work and personnel who may be affected by such work.

Provide the required equipment for safe and healthful application along with instruction to the users regarding the hazards, proper handling, and disposal procedures to prevent injury or illness.

Submit a written safety and health plan that includes a Hazard Communication Program, a Respiratory Protection Program, and a Hearing Conservation Program that conforms to OSHA requirements and industry standards.

When required to remove surface coatings that contain PCB, lead, chromium, mercury, cadmium, or other regulated materials, include specific provisions in the safety and health plan for complying with all Federal, State, local, and NASA Center specific requirements.

Ensure respiratory protection is in accordance with 29 CFR 1910.134, and Center respiratory protection requirements.

Submit complete design drawings and calculations for the scaffolding and containment system, including an analysis of the loads which will be added to the structure by the containment system and waste materials. A registered engineer shall approve calculations and scaffold system design.

1.6.2 Personal Protective Equipment (PPE)

Use PPE and/or administrative controls when engineering controls cannot be implemented to protect workers. Where required, use PPE in accordance with all Federal, State, NASA, and Center requirements. Ensure both supervisors and workers are properly instructed, trained, and certified in the selection, use, and maintenance of PPE.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

2.1.1 Design Requirements for Carbon Steel

Protect carbon steel surfaces from atmospheric corrosion through the application of zinc coatings (inorganic zinc coating and/or hot-dip galvanizing and/or metallizing) as defined herein. Hot-dip galvanize new steel components, such as stair treads, grating, handrails, pipes, and hardware (nuts, bolts, and fasteners), in accordance with the paragraph entitled, "Protection by Galvanizing," of this section.

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NOTE: The zinc coatings may require topcoating with additional protective coatings as specified; but in neutral pH atmospheres, testing has proven zinc without topcoating to have superior performance.

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Coat all other carbon steel surfaces that are exposed to the atmosphere with inorganic zinc or metallized. For a friction-type joint, use an inorganic zinc coating approved by the American Institute of Steel Construction (AISC).

For carbon steel faying surfaces that are a part of all friction-type and electrical grounding joints, prior to installation, abrasive-blast the surface and coat with 100 um to 150 um 4 mil to 6 mil of inorganic zinc only, in accordance with paragraph entitled, "Stripe Coat Application for Carbon Steel," of this section.

The recommended coating application sequence for carbon steel is to first abrasive blast the steel and then prime it with inorganic zinc before installation or erection. Further topcoating, if required, is applied after all welding, grinding, or drilling has been completed, and after areas damaged by these procedures have been properly repaired with inorganic zinc.

2.1.2 Protection of Stainless Steel

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NOTE: Certain highly alloyed stainless steels, such as AL6XN or 254 SMO, do not require protective coatings for corrosion protection.
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Protect Type 300 series stainless steels from corrosion by the use of protective coatings as defined in the paragraph entitled, "Surface Preparation of Stainless Steel," of this section.

2.2 EQUIPMENT

2.2.1 Compressed Air

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NOTE: The required air capacity depends upon the configuration of the abrasive system used. Have the air system comply with the instructions and recommendations of the abrasive-blasting system manufacturer.
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Provide a compressed air system capable of delivering a continuous nozzle pressure of 620 [_____] kPa 90 [_____] psi minimum to each blast nozzle in operation to achieve the required surface cleanliness and profile. Equip the compressed air system with oil and moisture separators to ensure only clean, dry air is provided to the service outlet.

Ensure the compressed air system complies with Occupational Safety and Health Administration (OSHA), American National Standards Institute (ANSI), CGA G-7.1, and National Institute of Occupational Safety and Health (NIOSH) configurations. Ensure air distribution manifolds conform to American Society of Mechanical Engineers (ASME) standards.

2.2.2 Abrasive-Blasting System

Ensure the abrasive-blasting system complies with OSHA, ANSI, and NIOSH configurations consisting of, but not limited to, the following:

a. A remote-controlled welded pressure pot conforming to ASME standards

b. The required length of blast hose

c. A venturi nozzle

d. A respiratory air-line filter

e. A blast hood approved by the Mine Safety and Health Administration/NIOSH with the required length of air hose.

Ensure the blasting system design produces the specified cleanliness level and profile when coupled with the available compressed air supply.

2.2.3 Coating Application System

Provide an airless spray system, conventional spray system, or other approved coating application system in accordance with the coating manufacturer's recommendations and.

Brush application is permitted for minor touch-up of spray applications and stripe coats of inorganic zinc.

2.3 MATERIALS

2.3.1 Abrasive-Blasting Aggregates

Provide blasting aggregates materials approved in accordance with MIL-A-22262, or SSPC AB 1, or steel grit in accordance with SSPC AB 3. Use only materials approved in QPL 22262, Qualified Products List: List of Products Qualified Under Military Specification MIL-A-22262. Submit the list of blasting aggregates to the Contracting Officer for approval. Ensure the abrasive grade selected produces the required surface profile and possesses physical properties that are compatible with the requirements of this specification. Use new, commercial-grade blasting steel grit with a neutral pH (6.0 to 8.0), rust-free, oil-free, and dry, with a hardness of 40 to 50 Rockwell C. Recycle steel grit in accordance with SSPC AB 2. Select the aggregate size to produce the required anchor profile.

Select aggregates that are free of crystalline silica unless exemptions to this policy are coordinated with the Contracting Officer. Use materials that do not change the surface profile when using blasting aggregate for abrasion-sensitive hardware(such as bellows, gimbal joints, and other thin-walled components). Ensure blasting operations do not produce holes, cause distortion, remove metal, or cause thinning of the substrate.

2.3.2 Protective Coatings, Thinners, and Cleaners

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NOTE: The following paragraphs establish minimum requirements for each generic type of protective coating specified in this specification. See paragraph entitled, "Coating Systems," of this section, for coating intercoat compatibility requirements.
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Ensure coatings possess physical properties and handling characteristics

that are compatible with the application requirements of this specification. Use self-curing coatings. Procure thinners and cleaners for each coating from the manufacturer of the coating. Submit the list of coatings and thinners for approval by the Contracting Officer.

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NOTE: Interested parties should be aware of the following requirement and are urged to arrange for testing of their product so that they may be eligible for award of contracts or orders for coatings to be supplied in accordance with this Specification. To arrange for product testing and the testing criteria, manufacturers must contact the Engineering Directorate, NASA, John F. Kennedy Space (KSC) Center, FL 32899 or contact the Corrosion Technology Laboratory at http://corrosion.ksc.nasa.gov.

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Provide protective coatings compatible with fluids expected in the areas to the extent required to prevent fire, explosion, or damage to facility, hardware, and GSE. Ensure all coating materials, when used in areas where exposure to hypergolic propellants could occur, are compatible with the propellants in accordance with NASA-STD-6001.

2.3.2.1 Inorganic Zinc Coatings

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NOTE: Inorganic zinc coatings that have been approved are listed in Appendix A, Approved Products List for Inorganic Zinc Coatings.

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To be listed, a coating meets the following minimum requirements:

a. Self-curing, multiple-component

b. Dry-temperature resistance to 400 °C 750 °F for 24 hours.

c. Minimum shelf life of 6-months when stored in accordance with manufacturer’s instructions.

d. Minimum of 83-percent zinc by weight in the applied dry film

e. Contain Type III zinc dust pigment in accordance with ASTM D520, and be asbestos-free, polychlorinated biphenyl (PCB)-free, lead-free, cadmium-free, and chromate-free (less than 0.002 percent by weight of mixed coating).

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NOTE: Application characteristics are judged acceptable prior to beach testing.

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f. Attain a rating of not less than 9 in accordance with ASTM D610, and ASTM D1654 when applied to composite carbon steel test panels and exposed at the KSC Beach Corrosion Test Site for the following periods:

(1) 18 months for initial acceptance

(2) 5 years for final acceptance

2.3.2.2 Primer and/or Intermediate Coatings

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NOTE: These coatings are listed in Appendix B, Approved Products List for Topcoat Systems.
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a. Inhibitive Polyamide Epoxy Coatings

Provide a polyamide epoxy coating conforming to the following minimum requirements:

(1) Polyamide-cured

(2) Rust-inhibitive

(3) PCB-free, lead-free, cadmium-free, and chromate-free (less than 0.002 percent by weight of mixed coating)

(4) Suitable as a primer for carbon steel, galvanized steel, and aluminum.

(5) Suitable as an intermediate coat between an inorganic zinc primer and an aliphatic polyurethane finish coat.

(6) Contains a minimum of 40-percent solids by volume.

b. Noninhibitive Polyamide Epoxy Coatings

Provide a polyamide epoxy coating conforming to the following minimum requirements:

(1) Polyamide-cured

(2) PCB-free, lead-free, cadmium-free, and chromate-free (less than 0.002 percent by weight of mixed coating)

(3) Suitable as an intermediate coat between inorganic zinc primer and an aliphatic polyurethane finish coat.

(4) Contains a minimum of 40-percent solids by volume

(5) Do not use as a primer on carbon steel

c. Water-Reducible Intermediate Coatings

Provide a water-reducible intermediate coating conforming to the following minimum requirements:

(1) Self-curing, one or two packages, water reducible

(2) PCB-free, lead-free, cadmium-free, and chromate-free (less than 0.002 percent by weight of mixed coating).

(3) Suitable as an intermediate coat between inorganic zinc primer and water-reducible topcoats

(4) Contain a minimum of 30 percent solids by volume

(5) Do not use used as a primer on carbon steel.

2.3.2.3 Finish Coatings

a. Aliphatic Polyurethane Coatings

Provide an aliphatic polyurethane coating conforming to the following minimum requirements:

(1) Catalyst isocyanate cured.

(2) High-gloss finish (minimum 85 gloss units (GUs) at a 60-degree angle).

(3) Retain gloss and color upon prolonged exterior exposure

(4) Suitable as an exterior finish coat over an inorganic zinc primer with a polyamide epoxy intermediate coat

(5) Contain a minimum of 44-percent solids by volume

(6) PCB-free, lead-free, cadmium-free, and chromate-free (less than 0.002 percent by weight of mixed coating)

(7) Attain a numerical rating of not less than 8 in accordance with ASTM D610 and ASTM D1654 and a numerical rating of not less than 9F in accordance with ASTM D714, when applied as a system to composite carbon steel test panels and exposed at the KSC Beach Corrosion Test Site for the following periods:

(a) 18 months for initial acceptance

(b) 5 years for final acceptance

b. Water-Reducible Topcoats

Provide a water-reducible topcoat conforming to the following minimum requirements:

(1) Self-curing, one or two packages, water-reducible.

(2) PCB-free, lead-free, cadmium-free, and chromate-free (less than 0.002 percent by weight of mixed coating).

(3) Retain gloss and color upon prolonged exterior exposure

(4) [Semi-gloss][High-gloss] finish

(5) Attain a numerical rating of not less than 8 in accordance with ASTM D610 and ASTM D1654 and a numerical rating of not less than 9F in accordance with ASTM D714, when applied as a system to composite carbon steel test panels and exposed at the KSC Beach Corrosion Test Site for the following periods:

(a) 18 months for initial acceptance

(b) 5 years for final acceptance

c. Inorganic Topcoats (IOTs)

Provide an inorganic topcoat conforming to the following minimum requirements:

(1) Dry-temperature resistance to 400 degrees C 750 degrees F for 24 hours

(2) Suitable as a topcoat for inorganic zinc and galvanized steel in high-temperature environments.

(3) Listed as an approved coating system (see Appendix B).

(4) PCB-free, lead-free, cadmium-free, and chromate-free (less than 0.002 percent by weight of mixed coating).

(5) Attain a rating of not less than 9 in accordance with ASTM D610 and ASTM D1654 when applied to composite carbon steel test panels and exposed at the KSC Beach Corrosion Test Site for the following periods:

(a) 18 months for initial acceptance

(b) 5 years for final acceptance

d. Polysiloxane Topcoats

Provide a polysiloxane topcoat conforming to the following minimum requirements:

(1) Suitable as a finish coat for exterior exposure

(2) Contain a minimum of 44 percent solids by volume

(3) High-gloss finish (minimum 85 GU at a 60-degree angle)

(4) Retain gloss and color on prolonged outdoor exposure

(5) PCB-free, lead-free, cadmium-free, and chromate-free (less than 0.002 percent by weight of mixed coating)

(6) Listed as an approved coating system (see Appendix B).

(7) Attain a numerical rating of not less than 8 in accordance with ASTM D610 and ASTM D1654 and a numerical rating of not less than 9F in accordance with ASTM D714 when applied to composite carbon steel test panels and exposed at the KSC Beach Corrosion Test Site for the following periods:

(a) 18 months for initial acceptance

(b) 5 years for final acceptance

2.3.2.4 Epoxy Mastic Coatings

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NOTE: Examples of epoxy mastic coating that

currently meet these requirements include:

(1) Ameron Amerlock 400 AL.

(2) Devoe Bar Rust 239.

(3) PPG Pittguard DTR.

(4) Sherwin-Williams Epolon Mastic

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Provide a epoxy mastic coating conforming to the following minimum requirements:

a. Specifically intended for use over mechanically cleaned steel

b. Contain a minimum of 80-percent solids by volume

c. Two-component, catalyst-cured, aluminum-pigmented

d. PCB-free, lead-free, cadmium-free, and chromate-free (less than 0.002 percent by weight of mixed coating)

2.3.2.5 Coal Tar Epoxy

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NOTE: Examples of coal tar epoxies that currently meet these requirements include the following:

a. Sherwin-Williams Hi-Mil Sher-Tar

b. Made Well 1103

c. Devoe Devtar 247

****

Provide a two-component, high-build coal tar epoxy with low volatile organic content (VOC). Ensure the coal tar epoxy contains, at a minimum, 65-percent solids by volume and produces a one-coat thickness of 405 ìm to 510 ìm 16 mil to 20 mil per coat dry film thickness (DFT).

2.3.2.6 Potable Water Epoxy

****

NOTE: Some NSF-approved products include:

a. Ameron Amercoat 395

b. Devoe Bar Rust 233

c. Sherwin-Williams Potable Water Epoxy

****

Ensure all coatings used in potable water immersion service are three-coat epoxy systems certified by NSF/ANSI 61.

2.3.2.7 Non-Skid Coatings

****

NOTE: Non-Skid coatings supplied by American Safety Technologies, Inc., 565 Eagle Rock Avenue, Roseland, NJ 07068, telephone (800) 631-7841 www.astantislip.com, or an approved equivalent (Primer MS 7C, Topcoat MS 400G, Color Topping MS-200).

****

Ensure approved nonskid coatings conform to MIL-PRF-24667.

2.3.3 Sealants/Caulking

Provide sealants that are self-curing, single-component, polysulfide rubber or polyurethane material only. Provide sealants conforming to ASTM C920, Type S, Grade NS, Class 25, use NT, A, and O. If not topcoated, match the caulking color of the joint to the surface being caulked.

For caulking used in a clean-room environment, select an approved material with low off-gassing characteristics, in accordance with NASA-STD-6001.

2.3.4 Chip-free Clean-room Paint

****

NOTE: Paint systems for metal substrates in clean-rooms may be required to pass tests for adhesion, off-gassing, flammability, vacuum out-gassing, and hypergolic compatibility.

****

Provide paint test results for off-gassing, flammability, and hypergolic compatibility in accordance with NASA-STD-6001.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Surfaces

Prepare surfaces to be coated by cleaning and drying. Free surfaces of oil, grease, dirt, dust, corrosion, peeling paint, caulking, weld spatter, and any other surface contaminants. Degrease surfaces, as required, before subsequent surface preparation procedures or the application of protective coatings, or both.

While surfaces are accessible, prepare and coat surfaces that cannot be accessed after fabrication, erection, or installation. Sequence surface preparation and coating operations, so that freshly applied coatings are not contaminated by dust or foreign matter.

Protect all equipment and adjacent surfaces not to be coated from surface preparation operations. Protect working mechanisms against intrusion of the abrasive.

3.1.2 Cleaning and Degreasing

Perform degreasing by solvent cleaning, detergent washing, or steam cleaning in accordance with SSPC SP 1. Follow this degreasing procedure when cleaning carbon steel, galvanized steel, stainless steel, or

aluminum. Select solvents in accordance with use requirements and applicable Federal, State, and NASA environmental policies.

Use of chlorofluorocarbon solvents is not allowed.

Use clean potable water to wash surfaces when high levels of chloride (>5 ug/cm2) or other undesirable contaminants are found on the surfaces. Perform water washing using standard industrial pressure cleaners with a pressure-versus-volume output balance to ensure thorough and productive cleaning. Ensure all water washing or pressure cleaning operations comply with all Federal, State, local and NASA Center environmental requirements.

3.1.3 Abrasive Blasting

Provide clean and dry abrasive-blasting aggregate.

Remove abrasive residues from the surface, leaving it clean and dry before the coatings are applied.

Contain particulate emissions generated during abrasive-blasting operations. Design the containment system to comply with all applicable Federal, State, and local regulations as well as all NASA policies. Exemptions concerning the containment system must be approved by the Contracting Officer.

Ensure the aggregate used is identified and selected when abrasive-sensitive hardware such as bellows, gimbal joints, and other thin-walled components are abrasive cleaned.

3.1.4 Sealing/Caulking

Completely seal the perimeter of all faying surfaces, joints open less than 13 mm 0.5 in, and skipwelded joints. Use a self-curing, single-component, polysulfide rubber or polyurethane type sealant. Apply the sealant to the joint with a caulking gun after application of the inorganic zinc primer on carbon steel. Ensure the bead has a smooth and uniform finish and cured (tacky to the touch) before the topcoat is applied.

For topcoated zinc primers, apply caulking after the intermediate coat of epoxy.

For coatings on stainless steel, galvanized steel, and aluminum, apply caulking before application of the topcoat.

3.1.5 Inorganic Zinc Protection

3.1.5.1 Carbon Steel Pre-Cleaning

Clean and degrease carbon steel surfaces in accordance with SSPC SP 1 followed by power tool cleaning in accordance with SSPC SP 3, to remove weld spatter, weld slag, laminations, sharp edges, and other surface defects prior to abrasive blasting or power tool cleaning to bare metal.

3.1.5.2 Power Tool Cleaning of Carbon Steel

Use power tools to clean carbon steel to bare metal, in accordance with SSPC SP 11, when a roughened, clean, bare metal surface is required but abrasive blasting is not feasible or permissible. Generate a surface

anchor profile between 40 um to 75 um 1.5 mil to 3.0 mil. Ensure all rust is completely removed from pits and depressions.

3.1.5.3 Abrasive Blasting of Carbon Steel

Abrasive-blast carbon steel to a minimum cleanliness of near-white metal, in accordance with SSPC SP 10/NACE No. 2. Ensure the anchor profile of the blasted surface is 40 um to 75 um 1.5 mil to 3.0 mil, measured in accordance with ASTM D4417. Remove all rust from pits and depressions.

3.1.6 Protection by Galvanizing

****

NOTE: Do not galvanize steel components with an ultimate tensile strength above 900 MPa 130 ksi or hardness above Rockwell C Hardness 28 due to potential hydrogen embrittlement.

Except for Zone 5a & 5b exposures, protect sheet steel with a galvanizing weight lower than G165 with coatings.

****

Apply galvanizing (zinc coating) after fabrication by the hot-dip process conforming to ASTM A123/A123M, ASTM A153/A153M, and ASTM A653/A653M. Ensure galvanizing weight for steel sheet without further coating protection meets the standards of ASTM A653/A653M, with a galvanizing weight of G165.

Do not use the Galvannealed process for the coating of steel sheet.

3.1.6.1 Surface Preparation for Galvanizing

****

NOTE: CAUTION: Some galvanized configurations are susceptible to distortion when they are abrasive-blasted.

****

Take special care to prevent any metal distortion by reducing blast nozzle pressure and increasing the working distance from the nozzle to the surface. In some cases, such as in the surface preparation of light-gage sheet steel, these precautions may not be sufficient to prevent distortion; employ alternate procedures, such as abrading or mechanical cleaning to remove corrosion or roughen the surface. Prepare galvanized surfaces to be further topcoated by degreasing before any additional surface preparation. After degreasing, perform abrasive blasting or mechanical cleaning as required by the Zone of Exposure, as defined in the paragraph entitled, "Galvanizing Coating Systems for Carbon Steel," of this section.

Abrasive blast galvanized surfaces with fine-grade abrasives. Ensure abrasives conform to the requirements in the paragraph entitled, "Abrasive-Blasting Aggregates," of this section. Remove corrosion, old coatings or roughen new surfaces. Ensure the blasted surface is free of all corrosion and foreign matter and have a uniform, slightly roughened appearance. If galvanized steel is prepared for the application of coatings by abrasive blasting, lightly brush-blasted the steel with fine-grade abrasive at a lower pressure to provide a corrosion free and

uniform, slightly roughened surface. Do not completely remove the galvanized finish.

Maintain the zinc coatings clean, dry, and free from contaminants before topcoat systems are applied. Perform field repair of damaged galvanized surfaces in accordance with ASTM A780/A780M, using inorganic zinc coatings.

Mechanically clean galvanized steel in accordance with SSPC SP 3 using abrasive discs/sheets, or other approved methods. Remove all corrosion and foreign matter and slightly roughen the entire surface.

3.1.7 Metallizing Protection of Carbon Steel

Clean and degrease carbon steel surfaces in accordance with SSPC SP 1 followed by power tool cleaning in accordance with SSPC SP 3 to remove weld spatter, weld slag, laminations, sharp edges, and other surface defects prior to abrasive blasting or power-tool cleaning to bare metal.

3.1.7.1 Abrasive Blasting of Carbon Steel

At a minimum, abrasive-blast carbon steel to near-white metal SSPC SP 10/NACE No. 2. Provide an anchor profile of 62.5 um to 75 um 2.5 mil to 3 mil for the blasted surface. Remove all rust from pits and depressions.

3.1.8 Protection of Aluminum

****

NOTE: Protect aluminum from corrosion by the use of protective coatings as defined herein. Certain alloys may require coatings in specific environments as specified in the paragraph entitled, "Aluminum Protective Coatings," of this section.

****

3.1.8.1 Surface Preparation of Aluminum

****

NOTE: CAUTION: Some aluminum configurations are susceptible to distortion and/or destruction when they are abrasive-blasted.

****

Ensure against any metal damage by the choice of abrasive aggregate and by reducing blast nozzle pressure and increasing the working distance from the nozzle to the surface as necessary. In some cases, such as in the surface preparation of light-gage sheet, these precautions may not be sufficient to prevent distortion; use an alternate procedure, such as abrading or mechanical cleaning, to remove corrosion or roughen the surface. Prepare aluminum by degreasing and abrasive blasting or mechanical cleaning, as required by the condition and configuration of the surface.

Use abrasive blasting whenever possible using nonmetallic abrasives. Abrasive-blast aluminum surfaces with fine-grade non-metallic abrasive materials to remove corrosion and old coatings or roughen new surfaces. Ensure the blasted surface is free of corrosion and foreign matter and has a uniform, slightly roughened appearance. Use plastic media or an approved equivalent for abrasive blasting of bellows, gimbal joints, and

other thin-walled, abrasion-sensitive components.

Use mechanical cleaning only when abrasive blasting is impractical, would damage the structure or component, or is prohibited in the area where the work is being performed. Mechanically clean aluminum in accordance with SSPC SP 3 using abrasive discs/sheets, or other approved methods. Remove corrosion and foreign matter and slightly roughen the entire surface.

Do not mechanically clean anodized or chemical-conversion-coated aluminum surfaces.

3.1.9 Surface Preparation of Stainless Steel

****
NOTE: Thin-walled 300-series stainless-steel tubing is subject to pitting corrosion failure in outdoor marine environments. For exterior installations, degrease this tubing, prepared with a stainless-steel wire wheel or equivalent, and coated.
****

Prepare stainless steel by degreasing in accordance with SSPC SP 1 and abrasive blasting or mechanical cleaning. As an alternative, mechanically clean stainless steel in accordance with SSPC SP 3 using abrasive discs/sanding sheets or other approved methods.

****
NOTE: CAUTION: Some stainless steel configurations are susceptible to distortion and/or destruction, when they are abrasive-blasted. Identify susceptible pieces for the Contractor.
****

Ensure against any metal damage by choice of abrasive aggregate and by reducing the blast nozzle pressure and increasing the working distance from the nozzle to the surface as necessary. In some cases, such as in the surface preparation of light-gage sheet, these precautions may not be sufficient to prevent distortion; use an alternate procedure, such as abrading or mechanical cleaning, to remove corrosion or roughen the surface. Use abrasive blasting whenever possible, using nonmetallic abrasives. Abrasive-blast stainless steel surfaces with fine-grade abrasive to remove corrosion and old coatings or roughen new surfaces. Ensure the blasted surface is free of all corrosion and foreign matter and have a uniform, slightly roughened appearance.

3.1.10 Underground, Submerged, or Continuously Wetted Surfaces

****
NOTE: Co-ordinate cathodic protection requirements with the application of this coating.
****

Coal tar epoxy coatings are not allowed for surfaces that are in contact with potable water.

Prepare underground, submerged, or continuously wetted surfaces in accordance with SSPC SP 5/NACE No. 1, with a profile of 75 um to 100 um 3 mil to 4 mil and coated with coal tar epoxy.

3.2 APPLICATION OF COATINGS

Coat all prepared surfaces within 6-hours after surface preparation and before corrosion or recontamination occurs. As an exception, surfaces prepared under temperature and humidity control may be coated after 6-hours but only after inspection of the surface confirms that the cleanliness level has met the specified standards. Prepare again any surface that shows corrosion or contamination, regardless of the length of time after preparation.

The application and handling characteristics of all coatings will vary. Follow written instructions from the manufacturer in conjunction with the requirements defined herein. Follow the manufacturer's written recommendations for thinning, mixing, handling, and applying the product.

Work coatings into all joints, crevices, and open spaces. Protect newly coated surfaces from damage. Protect equipment and adjacent surfaces not to be coated from overspray and splattered coatings.

Contain particulate emissions during all spray-painting operations. Design the containment system to comply with all Federal, State, and local regulations as well as NASA policies. Requested exemptions to this requirement must be approved by the Contracting Officer.

3.2.1 Coating Systems

Ensure thinners and cleaners are products of the coating manufacturer, except as defined in the paragraph entitled, "Non-Skid Coatings," of this section. For intercoat compatibility, ensure coating systems consisting of more than one coat are products of the same manufacturer.

Maintain continuity of the coating manufacturer's system for the duration of an individual project.

3.2.2 Colors

Add pigment to inorganic zinc coatings so that there is a definite contrast between the coating and the dull gray appearance of the blasted steel surface during the coating application.

Ensure color coding for fluid system piping is in accordance with KSC-STD-F-0004. Ensure finish coat colors are in accordance with FED-STD-595.

a. White, No. 17925

b. Blue, No. 15102 (safety)

c. Yellow, No. 13538 (standard)

d. Yellow, No. 13655 (safety)

e. Red, No. 11136

f. Red, No. 11105 (safety)

g. Black, No. 17038

h. Green, No. 14110 (safety)

i. Gray, No. 16187 (safety)

j. Brown, No. 10080 (safety)

k. Gray, No. 16473 (standard)

Use pigments free of PCB, lead, chromium, and cadmium.

3.2.3 Mixing and Application Instructions

Thoroughly mix coating materials prior to application with a mechanical mixing instrument that does not induce air into the coating.[Power the mixer by an air motor or an explosion-proof electric motor.]

Perform all mixing operations over an impervious surface with provisions to prevent runoff to grade of any spilled material.[Strain the mixed coating material through a 30 to 60-mesh screen prior to application.]

Thinning is for viscosity control only. If thinner is required, use the amount recommended by the manufacturer of the thinner.

Agitate the material as required during application to maintain a uniform suspension of solids. Avoid continuous rapid agitation.

Adjust spray equipment to produce an even, wet coat with minimum overspray.[Apply coatings in even, parallel passes, overlapping 50 percent.]

3.2.4 Weather Conditions

Do not apply coating when contamination from any source (i.e., rainfall) is imminent or when the temperature or humidity is outside limits recommended by the coating manufacturer.

Spray application methods are not allowed when wind speed exceeds 25-km/hr 15-mph in the area where the coating is being applied.

To prevent condensation during application, ensure the surface temperature is at least 3 degrees C 5 degrees F) above the dew point and rising.

Limitations against using certain coatings under specific relative humidity (RH) are as follows:

a. Do not apply solvent-based inorganic zinc coatings , polysiloxane topcoats, and IOTs in conditions with <40 percent RH.

b. Do not apply water-based inorganic zinc coatings in conditions with <40 percent or >80 percent RH.

3.2.5 Methods of Application

****
NOTE: Organic midcoats and topcoats may be applied using a brush, roller, or spray device as applicable.
****

Apply coatings with an airless or conventional spray equipment, or both. For minor touch-up of spray applications and stripe coats of inorganic

zinc, brush application can be used.

3.2.6 Coating Finish

Ensure each coat of material applied is free of runs, sags, blisters, bubbles, and mudcracking; variations in color, gloss, and texture; holidays (missed areas); excessive film buildup; foreign contaminants; or dry overspray.

Ensure complete coverage and proper thickness on welds, corners, crevices, sharp edges, bolts, nuts, and rivets.

Ensure each coat of applied material is rendered clean, dry, and free from surface contaminants before another coating is applied.

3.2.7 Touchup of Welds and Damaged Coatings

Touch-up field welds and damaged coatings. Accomplish touch-up and repair promptly after the damage or welding has occurred.

3.2.8 Coating, Drying, and Curing

****

NOTE: The curing time of solvent-based inorganic zinc coatings can be accelerated by rinsing or spraying the coating with potable fresh water after an initial overnight drying. The number and frequency of rinse cycles can vary with environmental conditions. Check with the material manufacturer for recommended procedures.

****

Follow the coating manufacturer's recommended drying and curing times for handling, recoating, and topcoating. Follow the coating manufacturer's recommendations to test the coating for proper curing.

Verify proper curing of solvent-based inorganic zinc-rich coatings by ASTM D4752, prior to further coating. Verify water-based inorganic zinc-rich coatings for curing in accordance with the same procedure, but water is to be substituted as the solvent.

3.2.9 Stripe Coat Application for Carbon Steel

Apply stripe coating with inorganic zinc to welds, cutouts, sharp edges, rivets, crevices, and bolts to ensure complete coverage prior to subsequent applications of inorganic zinc.

3.2.10 Application of Inorganic Zinc Coatings for Carbon Steel

Apply inorganic zinc coatings to a DFT of 100 um 4.0 mil minimum to 150 um 6.0 mil maximum when they are left without a topcoat or when IOT or ablative coating is applied. When the zinc coatings are to be topcoated with organic topcoats, reduce the DFT to 65 um 2.5 mil minimum to 100 um 4.0 mil maximum. Obtain the proper DFT for the inorganic zinc coating in a single application, which may consist of multiple passes, while the coating is still wet (including the application of a stripe coat).

3.2.11 Inorganic Zinc Coating Topcoat Systems for Carbon Steel

Apply the following topcoat systems over the inorganic zinc coatings as required for each Zone of Exposure. Apply topcoats at the DFT recommended by the manufacturer or as specified as follows. Ensure the film thickness of the topcoats is sufficient to achieve uniform coverage and color.

a. Zones 1a and 1b - [Leave inorganic zinc coatings without a topcoat][For maximum protection, topcoat the inorganic zinc coating with a heat-resistant silicone ablative coating material in accordance with KSC-SPEC-F-0006B.]

b. Zone 1c - Leave inorganic zinc coatings without a topcoat.

****

NOTE: As an alternate, surfaces may be topcoated with a heat-resistant silicone ablative coating material in accordance with KSC-SPEC-F-0006B.

****

c. Zone 2 - Apply an IOT conforming to the paragraph entitled, "Coating Finish," of this section, at a DFT of 75 um to 125 um 3 mil to 5 mil.

d. Zones 3a and 3b

(1) Apply an intermediate/tie coat and a finish coat conforming to the paragraph entitled, "Protective Coatings, Thinners, and Cleaners," of this section.

(2) As an alternate, apply [an IOT][a polysiloxane finish coat] at the manufacturer’s recommended DFT.

(3) Ensure the DFT is sufficient to completely hide the inorganic zinc primer.

e. Zones 4a, 4b, and 4c - [No topcoats are required.][Apply topcoats as needed for color coding, safety purposes, identification, or special conditions.][When required for color coding, safety purposes, identification, or special conditions, provide topcoats in accordance with the paragraph entitled, "Colors," of this section.]

f. Zone 5a and 5b - [Apply inorganic zinc coating.][Apply an inhibitive epoxy primer and a polyurethane finish coat at the manufacturer’s recommended thickness.]

g. Zone 6 - Provide a coating system as specified in the paragraphs entitled, "Underground, Submerged, or Continuously Wetted Surfaces," and "Coating Systems for Potable Water Immersion Service," of this section.

h. Zone 7 - Provide the coating system as specified in NACE RP0198.

3.2.12 Galvanizing Coating Systems for Carbon Steel

a. Zones 1a and 1b - [No Topcoat][For maximum protection, topcoat the galvanized coating with a heat-resistant silicone ablative coating material in accordance with KSC-SPEC-F-0006B.]

b. Zone 1c - Leave galvanized surfaces without a topcoat.

****
NOTE: As an alternate, surfaces may be topcoated with a heat-resistant coating material, such as a silicone ablative coating material in accordance with KSC-SPEC-F-0006B.
****

c. Zone 2 - After brush-blasting, apply an IOT conforming to the paragraph entitled, "Inorganic Zinc Coatings," of this section, at a DFT of 75 um to 125 um 3 mil to 5 mil.

d. Zones 3a and 3b - After brush-blasting, apply primer/tiecoat and finish coat in accordance with manufacturer's recommended thicknesses.

(1) [Apply an IOT conforming to the paragraph entitled, "Finish Coatings," under "Inorganic Topcoats (IOTs)," of this section.] [Apply a polysiloxane finish coat conforming to the paragraph entitled, "Finish Coatings," under "Polysiloxane Topcoats," of this section, at the manufacturer's recommended DFT.]

(2) Ensure the DFT is sufficient to completely hide the galvanized coating.

e. Zones 4a, 4b, and 4c - No topcoats are required for galvanizing weights meeting or exceeding ASTM A123/A123M, ASTM A153/A153M, and ASTM A653/A653M, with a galvanizing weight of G165.

****
NOTE: When steel sheet is galvanized to less than ASTM A653/A653M, with a galvanizing weight of G165, further coating in accordance with Zone 3 is required.
****

(1) [As an alternate to topcoats,]degrease and brush-blast steel sheet, and apply an inorganic zinc primer conforming to the paragraph entitled, "Inorganic Zinc Coatings," of this section, with a DFT of 50 um to 75 um 2 mil to 3 mil.

f. Zone 5a and 5b - [No topcoats are required.][Apply topcoat when needed for color coding, safety purposes, identification, or special conditions.]

(1) When topcoats are required for color coding, safety purposes, identification, or special conditions, degrease the surface and apply an epoxy primer at the manufacturer's recommended DFT.

(2) Within 24 hours, apply a polyurethane finish coat at the manufacturer's recommended DFT.

(3) [As an alternate,]Apply a polysiloxane topcoat at the manufacturer's recommended DFT.

(4) Ensure the DFT is sufficient to completely hide the galvanized coating.

g. Zone 6 - The coating system is as specified in the paragraphs entitled, "Underground, Submerged, or Continuously Wetted Surfaces,"

and "Coating Systems for Potable Water Immersion Service," of this section

h. Zone 7 - The coating system as specified in NACE RP0198.

3.2.13 Application of Metallized Coatings

Ensure metal wire used with the arc spray metallizing equipment is [pure zinc][90-10 zinc-aluminum][85-15 zinc-aluminum alloys][53-56 aluminum-magnesium][pure magnesium]. Apply metallized zinc coatings to a DFT of 200 um 8 mil minimum to 375 um 15 mil maximum, depending on the intended service environment.

3.2.13.1 Topcoat Systems for Metallized Zinc Coatings

Apply topcoat systems over the metallized zinc coatings as required for each Zone of Exposure. Select the coating materials from Appendix C, Approved Products List for Metallized (TSC) Systems. Apply topcoats at the DFT recommended by the manufacturer or as specified as follows:

Apply sufficient topcoat film thickness to ensure uniform coverage and color.

a. Zones 1a and 1b - Metallized coatings may be left without a topcoat; however, for maximum protection, topcoat the metallized coating with a heat resistant silicone ablative coating material in accordance with KSC-SPEC-F-0006B.

b. Zone 1c - Leave metallized coatings without a topcoat.

****
NOTE: As an alternate, surfaces may be topcoated with a heat-resistant silicone ablative coating material in accordance with KSC-SPEC-F-0006B.
****

c. Zone 2 - Apply an IOT at a DFT of 75 um to 125 um 3 mil to 5 mil.

d. Zone 3 - Apply an intermediate/tie coat and a finish coat.

(1) As an alternate, apply an IOT at a DFT of 75 um to 125 um 3 mil to 5 mil, or apply a polysiloxane finish coat at the manufacturer’s recommended DFT.

(2) Ensure the DFT is sufficient to completely hide the metallized coating.

****
NOTE: No topcoats are required for Zones 4a, 4b, and 4c, except as needed for color coding, safety purposes, identification, or special conditions.
****

e. Zones 4a, 4b, and 4c - When topcoats are required for color coding, safety purposes, identification, or special conditions, provide topcoats in accordance with the paragraph entitled, "Colors," of this section.

f. Zones 5a and 5b - [Not required][Apply an inhibitive epoxy primer and

a polyurethane finish coat at the manufacturer's recommended thickness.]

g. Zones 6a and 6b - [Apply a metallized coating.][Apply an inhibitive epoxy primer and a polyurethane finish coat. Apply at the manufacturer's recommended thickness.]

h. Zone 7 - Provide a coating system as specified in NACE RP0198

3.2.14 Aluminum Protective Coatings

****

NOTE: Aluminum surfaces require special coatings if used underwater.

Zones 1, 2, and 3 Use the following coatings to protect aluminum in the launch environment and to facilitate washdown of SRB residue on critical hardware.

Zones 4 and 5 No protective coatings are required except as needed for color coding, safety purposes, identification, or special conditions for normal atmospheric service of 1000-, 5000-, and 6000-series alloys.

****

Apply the following protective coatings to aluminum surfaces as required for each Zone of Exposure:

a. Zones 1, 2, and 3 - [Use an inhibited polyamide epoxy coating and aliphatic polyurethane topcoat.] Use a[polysiloxane][IOTs][silicone] ablative coating.

b. Zones 4 and 5 - Fully coat aluminum that is located within 3.5 km 2 mi of the coastline or subject to chemical exposure with an[inhibited polyamide epoxy coating and aliphatic polyurethane topcoat][polysilorane][IOT][and silicone ablative].

c. Zone 6 - Provide the coating system specified in the paragraph entitled, "Underground, Submerged or Continuously Wetted Surfaces," and the paragraph entitled, "Coating Systems for Potable Water Immersion Service," of this section.

d. Zone 7 - Provide the coating system specified in NACE RP0198.

3.2.15 Stainless Steel Protective Coating

a. Zones 1, 2, and 3 - For 300 series stainless steels, use an inhibited polyamide epoxy primer and[aliphatic polyurethane][polysiloxane][silicone ablative] topcoat.

b. Zones 4 and 5 - For special conditions, brush-blast and coat stainless steel with inhibitive epoxy primer to a DFT of 50 um to 75 um 2 mil to 3 mil followed by a finish coat that provides a DFT of 50 um to 75 um 2 mil to 3 mil.

c. Zone 6 - Provide a coating system as specified in the paragraph entitled, "Underground, Submerged or Continuously Wetted Surfaces and

the paragraph entitled, "Coating Systems for Potable Water Immersion Service," of this section.

d. Zone 7 - Provide a coating system as specified in NACE RP0198.

3.2.16 Underground, Submerged, or Continuously Wetted Surfaces

Apply the coating to a minimum DFT of 410 um 16.0 mil and checked for missed areas or pinholes with a properly calibrated holiday detector in accordance with NACE SP0188.

3.2.17 Coating Systems for Potable Water Immersion Service

Ensure all surface preparation for carbon steel is in accordance with SSPC SP 5/NACE No. 1, with a surface profile of 75 m to 100 um 3 mil to 4 mil.

3.2.18 Provision for Nonskid Surfaces

Where a nonskid surface is required for walkways, decks, or other such surfaces, apply a nonskid coating as follows:

a. Carbon steel - Apply coatings directly over the zinc coating (inorganic zinc, galvanizing, or metallizing) and follow surface preparation instructions.

b. Aluminum and stainless steel - Apply coatings directly over these surfaces after surface preparation.

3.2.19 Coating Systems for Metallic Surfaces Under Thermal Insulation

Coating systems for carbon steel and stainless steel surfaces under thermal insulation and cementitious fireproofing are as specified in NACE RP0198.

3.3 FIELD TESTS

3.3.1 Coating Systems for Potable Water Immersion Service

Inspect potable water coating systems in accordance with standard recommended practices in NACE RP0288, and with NACE SP0188.

3.3.2 Inspection Prior to Surface Preparation and Coating Application

Inspect conditions before beginning surface preparation and coating application operations.

3.3.2.1 Surface Condition

Visually inspect the surface condition. Give attention to weld spatter, sharp edges, flame or saw cuts, delaminations, burrs, slag, or other surface irregularities that affect performance of protective coatings prior to surface preparation.

3.3.2.2 Protection of Adjacent Surfaces

Visually inspect adjacent surfaces for adequate protection.[Conduct this inspection with a Government Quality Engineering representative.]

3.3.2.3 Ambient Weather Conditions

Determine the ambient weather conditions at the actual work location before and during the surface preparation and coating application operations to ensure they meet the requirements for the work. Record all of these ambient weather conditions on the Coating System Daily Inspection Report as shown in[Appendix F][KSC Form 28-589].

Use proper instrumentation to measure air temperature, relative humidity, dewpoint, surface temperature, and wind speed and direction. Calibrate all measurement instrumentation per the manufacturer's instructions prior to use.

Do not spray paint when the measured wind speed in the immediate area of the coating work is above 25 km/hr 15 mph.

3.3.2.4 Compressed Air Cleanliness

Inspect the compressed air supply for the use of inline moisture and oil traps. Evaluate proper functioning of the traps daily by allowing the air supply (down line from the traps) to blow against a clean, white cloth for several minutes, in accordance with ASTM D4285.

3.3.2.5 Surface Salt Concentration

Determine the surface chloride concentration on structures prior to surface preparation operations using an industry-recognized method, such as described in SSPC Guide 15. Record the information in the inspection records weekly.

Surfaces that measure 5 ug/cm2 0.00016 oz/ft2 or above require washing with water in accordance with the paragraph entitled, "Cleaning And Degreasing," of this section, prior to surface preparation.

3.3.3 Surface Preparation Inspection

3.3.3.1 Abrasive-Blasting Material

Verify the abrasive-blasting material complies with the paragraph entitled, "Abrasive-Blasting Aggregates," of this section.

3.3.3.2 Blast Nozzle Air Pressure and Size

Determine the air pressure at the blast nozzle through the use of a hypodermic needle air pressure gage. Insert the needle of the gage as close to the nozzle as practically possible and in the direction of the air flow.

Take pressure readings with the blasting system in full operation. Record the nozzle pressure. To ensure the compressor output correlates with the nozzle size, check the nozzle with a blast nozzle orifice gage initially and then at a frequency determined by the[NACE inspector][Contracting Officer's representative].

3.3.3.3 Degree of Surface Cleanliness

****

NOTE: Use of SSPC-VIS 1-89, Visual Standard for Abrasive Blast Cleaned Steel, and SSPC-VIS 3, Visual

Standard for Power - and Hand-Tool Cleaned Steel, is recommended for judging surface cleanliness.
****

Inspect the surface cleanliness after the surface preparation and before primer application. The surface preparation cleanliness requirements apply to 100 percent of the subject area, including places that are difficult to reach.

Verify the degree of cleanliness of abrasive-blasted carbon steel with a visual inspection. Inspect galvanized steel, aluminum, and stainless steel for removal of all corrosion and foreign matter with the surface slightly roughened.

3.3.3.4 Surface Profile or Roughness

Visually inspect galvanized steel, stainless steel, and aluminum surfaces as required for slight roughening.

3.3.4 Coating Finish and DFT

Inspect the finish and DFT of each applied coating prior to the application of successive coats. Take the DFT measurement on carbon steel using a magnetic gage calibrated in accordance with SSPC PA 2. Take DFT measurements on aluminum and stainless steel using an eddy current instrument that has been properly calibrated on surfaces similar to the coated surface.

3.3.5 Caulking Inspection

Visually inspect all surfaces to determine whether they comply with the requirements for sealing and caulking in accordance with the paragraph entitled, "Sealing/Caulking," of this section.

3.3.6 Galvanizing Inspection

Inspect galvanized carbon steel in accordance with the applicable ASTM standard in the paragraph entitled. "Galvanizing Coating Systems for Carbon Steel," of this section.

3.4 ADJUSTING AND CLEANING

3.4.1 Repair of Applied Coatings

Repair newly applied coatings in accordance with Table 1, Repair of Applied Coatings.

Table 1—Repair of Applied Coatings

Existing Coating	Repair Coating
Inorganic zinc	
Zones 1* and 4	Inorganic zinc/epoxy mastic for small area touch-up

Existing Coating	Repair Coating
Zone 2	Inorganic zinc/inorganic topcoat
Zones 3 and 5	Epoxy mastic/polyurethane/polysiloxane system for small area touch-up
Galvanized steel	
Zones 1 and 4	Inorganic zinc/epoxy mastic for small area touch-up
Zone 2	
Zones 3 and 5	
Inorganic topcoat	
	Inorganic zinc/inorganic topcoat
Epoxy/Polyurethane**	
Zones 3, 4, and 5	Epoxy/polyurethane system/polysiloxane
Water-reducible	
Zones 3, 4, and 5	Water-reducible intermediate/finish
Coal tar epoxy	
Zone 6	Coal tar epoxy
* Zones are defined in section 1.4.	
** When this coating is replaced with inorganic zinc, complete removal of the existing coating is required.	

Prepare surfaces by washing with water and using mechanical methods in accordance with SSPC SP 11, to remove corrosion, weld slag, and to “feather back” coating edges.

Perform touch-up and repair promptly after the damage has occurred. Provide touch-up and repair of shop-applied coatings using coatings from the same manufacturer as those applied in the shop.

APPENDIX A

APPROVED PRODUCTS LIST FOR INORGANIC ZINC COATINGS

This list shall be used by or for the Government in the procurement of products covered by this specification. All products listed herein have been tested and meet the requirements for the product as specified. This list is subject to change without notice; revisions or amendments of this list will be issued as necessary. The listing of a product does not release the supplier from compliance with the specification requirements. This list is arranged in two sections based on the coating material's VOC.

Procure thinners and cleaners for each of these coatings from the manufacturer of the coating.

The Materials Test and Corrosion Control Branch in the Engineering Directorate at KSC is responsible for conducting the testing and evaluation of candidate coatings for inclusion in the APL and for submitting updates to the KSC Engineering Directorate, which is responsible for this list.

Section I

Materials With Greater Than 400 Grams/Liter 3.3 Pounds/Gallon VOC:

Coating Designation	Type	Manufacturer
Dimetcote 9	SB	PPG Industries, Inc. One PPG Place Pittsburgh, PA 15272 (800) 722-4509 http://ppgamercoatus.ppgpmc.c
Carbo-Zinc 11	SB	Carboline Company 2150 Schuetz Road St. Louis, MO 63146 314-644-1000 www.carboline.com
Cathacoat 304K Cathacoat 304L	SB	International Paint LLC/ Devoe Coatings 6001 Antoine Drive Houston, TX 77091(713) 682-1711 (800) 654-2616
Metalhide 1001	SB	PPG Industries, Inc. One PPG Place Pittsburgh, PA 15272 (800) 722-4509 www.ppg.com
ZincClad II	SB	Sherwin-Williams Company 101 Prospect Avenue N.W. Cleveland, OH 44115 (800) 336-1110 www.sherwin-williams.com

* SB is solvent based

Section II

Materials With Less Than 400 Grams/Liter 3.3 Pounds/Gallon VOC:

Coating Designation	Type	Manufacturer
Dimetcote D-9HS Dimetcote D-9H	SB SB	PPG Industries, Inc. One PPG Place Pittsburgh, PA 15272 (800) 722-4509 http://ppgamercoatus.ppgpmc.com/
Carbo-Zinc 11HS Carbo-Zinc 11WB Carbo-Zinc 11 VOC	SB WB SB	Carboline Company 2150 Schuetz Road St. Louis, MO 63146 314-644-1000 www.carboline.com
Cathacoat 305 Cathacoat 304V	WB SB	International Paint LLC/ Devoe Coatings 6001 Antoine Drive Houston, TX 77091(713) 682-1711 (800) 654-2616
InterZinc 22HS	SB	International Paint LLC 6001 Antoine Drive Houston, TX 77091 (713) 682-1711 www.international-pc.com
Zinc Clad XI Zinc Clad II Plus	WB SB	Sherwin-Williams Company 101 Prospect Avenue N.W. Cleveland, OH 44115 (800) 336-1110 www.sherwin-williams.com
Kolor-Zinc 2.8 VOC	SB	Keeler & Long/PPG 856 Echo Lake Road Watertown, CT 06795 1-800-238-8596 http://www.ppg.com/coatings/pmc/brands/Pages/default.aspx

* SB is solvent based, WB is water based

APPENDIX B

APPROVED PRODUCTS LIST FOR TOPCOAT SYSTEMS

This list shall be used by or for the Government in the procurement of products. All products listed herein have been tested and meet the requirements for the product as specified. This list is subject to change without notice; revisions or amendments of this list will be issued as necessary. The listing of a product does not release the supplier from compliance with the specification requirements. This list is arranged in two sections based on the coating material's VOC.

procure thinners and cleaners for each of these coatings from the manufacturer of the coating.

The Materials Test and Corrosion Control Branch in the Engineering Directorate at KSC is responsible for conducting the testing and evaluation of candidate coatings for inclusion in the APL and for submitting updates to the KSC Engineering Directorate, which is responsible for this list.

Section I

Materials With Greater Than 400 Grams/Liter 3.3 Pounds/Gallon VOC:

Primer (Type)	Midcoat (Type)	Topcoat (Type)	Manufacturer
Cathacoat 304L (SB) Cathacoat 304L (SB) Cathacoat 304L (SB) Cathacoat 304K (SB)	Devran 201 (SB)* Devran 230 (SB) Devran 201 (SB)* Devran 201 (SB)*	Devthane 359 (SB) Devthane 369 (SB) Devthane 369 (SB) Devthane 379 UVA (SB)	International Paint LLC/Devoe Coatings 6001 Antoine Drive Houston, TX 77091 (713) 682-1711 (800) 654-2616 www.international-pc.com
MetalHide 1001 (SB)	PittGuard 95-245 (SB)*	PittThane 95-812 (SB)	PPG Industries, Inc. One PPG Place Pittsburgh, PA 15272 (800) 722-4509 www.ppg.com
Kolor-Zinc 2.8 VOC (SB)	N/A	Coraflon ADS (SB)	Keeler & Long/PPG 856 Echo Lake Road Watertown, CT 06795 1-800-238-8596 http://www.ppg.com/coatings/
Carbozinc 11 (SB)	N/A	Carbothane 133 LH (SB)	Carboline Co. 2150 Schuetz Road St. Louis, MO 63146 314-644-1000 www.carboline.com
* Can be used as a direct-to-metal primer for stainless steel, aluminum, and other materials in Zone 5a and 5b environments.			

* SB is solvent based, WB is water based

Section II

Materials With Less Than 400 Grams/Liter 3.3 Pounds/Gallon VOC:

Primer (Type)	Midcoat (Type)	Topcoat (Type)	Manufacturer
D-9HS (SB) D-9HS (SB) D-9H (SB) D-9H (SB) D-9H (SB)	Amerlock 400 (SB)* N/A Amercoat 383 (SB) Amerlock 2/400 (SB)* Amerlock 2/400 (SB)*	Amercoat 450HS (SB) PSX700 (SB) PSX1001 (SB) Amercoat 450H (SB) Amercoat 335 (SB)	PPG Industries, Inc. One PPG Place Pittsburgh, PA 15272 (800) 722-4509 http://ppgamercoatus.pp/
CZ-11HS (SB) CZ-11HS (SB) CZ-11HS (SB) CZ-11WB (WB) CZ-11WB (WB) CZ-11WB (WB)	Carboguard 893(SB)* Carbomastic 15(SB)* Carboguard 893 (SB)* N/A Carboguard 893 (SB)* Carboacrylic 3358 (WB)	Carbothane 134HS (SB) Carboacrylic 3359(WB) Carboxane 2000 (SB) Carboxane 2000 (SB) Carboacrylic 3359(WB) Carboacrylic 3359(WB)	Carboline Co. 2150 Schuetz Road St. Louis, MO 63146 314-644-1000 www.carboline.com
Cathacoat 304V (SB)	Devran 201 H (SB)*	Devthane 379 (SB)	International Paint LLC/Devoe Coatings 6001 Antoine Drive Houston, TX 77091 (713) 682-1711 (800) 654-2616
Zinc Clad XI (WB) Zinc Clad II Plus (SB) Zinc Clad II Plus (SB)	N/A Macropoxy 646-100 (SB)* Macropoxy 646-100 (SB)*	Polysiloxane XLE Hydrogloss WB (WB) Hi-Solids Poly-CA (SB)	Sherwin-Williams 101 Prospect Ave Cleveland, OH 44115 (800) 336-1110 www.sherwin-williams.co
InterZinc 22HS (SB) InterZinc 22HS (SB)	Interseal 670HS (SB)* Interseal 670HS (SB)*	Interfine 979 (SB) Interfine 878 (SB)	International Paint LLC 6001 Antoine Dr. Houston, TX 77091 (713) 682-1711 www.international-pc.co

Primer (Type)	Midcoat (Type)	Topcoat (Type)	Manufacturer
* Can be used as a direct-to-metal primer for stainless steel, aluminum, and other materials in Zone 5a and 5b environments. ** SB is solvent based, WB is water based			

Section III

Inorganic Topcoat Systems:

Primer (Type)	**Midcoat (Type)**	**Topcoat (Type)**	**Manufacturer**
D-9 HS (SB)	N/A	741 (SB) (IOT)	PPG Industries, Inc. One PPG Place Pittsburgh, PA 15272 (800) 722-4509 http://ppgamercoatus.p
CZ-11 VOC (SB) CZ-11(SB)	N/A N/A	Carbozinc Finish (SB) (IOT) Carbozinc Finish (SB) (IOT)	Carboline Co. 2150 Schuetz Road St. Louis, MO 63146 314-644-1000 www.carboline.com
Cathacoat 304V (SB)	N/A	Devram 701 (SB) (IOT)	International Paint LLC/ Devoe Coatings 6001 Antoine Drive Houston, TX 77091 (713) 682-1711 (800) 654-2616
InterZinc 22HS (SB)	N/A	Intertherm 181 (SB) (IOT)	International Paint LLC 6001 Antoine Dr Houston, TX 77091 (713) 682-1711 www.international-pc.c
Zinc Clad II (SB)	N/A	L03 (SB) (IOT)	Sherwin-Williams 101 Prospect Ave. Cleveland, OH 44115 (800) 336-1110 www.sherwin-williams.c

* SB is solvent based, WB is water based

APPENDIX C

APPROVED PRODUCTS LIST FOR METALLIZED (TSC) SYSTEMS

This list shall be used by or for the Government in the procurement of products covered. All products listed herein have been tested and meet the requirements for the product as specified. This list is subject to change without notice; revisions or amendments of this list will be issued as necessary. The listing of a product does not release the supplier from compliance with the specification requirements.

Procure thinners and cleaners for each of these coatings from the manufacturer of the coating.

The Materials Test and Corrosion Control Branch in the Engineering Directorate at KSC is responsible for conducting the testing and evaluation of candidate coatings for inclusion in the APL and for submitting updates to the KSC Engineering Directorate, which is responsible for this list.

Section I

Materials With Greater Than 400 Grams/Liter (3.3 Pounds/Gallon) VOC:

N/A

Section II

Materials With Less Than 400 Grams/Liter (3.3 Pounds/Gallon) VOC:

TSC Primer	Intermediate	Topcoat	Manufacturer
Pure Zinc Pure Zinc Pure Zinc	Interseal 1100 (WB) N/A N/A	Interthane 2100 (SB) Intercryl 520 (WB) Intertherm 181 (SB) (IOT)	International Paint LLC 6001 Antoine Dr Houston, TX 77091 (713) 682-1711 www.international-pc.c
Pure Zinc Pure Zinc Pure Zinc	Macropoxy 646-100 (SB)* Macropoxy 646-100 (SB)*	0 VOC Acrylic (WB) Hi-solids Poly 100 (SB) L03 (SB) (IOT)	Sherwin-Williams 101 Prospect Ave. Cleveland, OH 44115 (800) 336-1110 www.sherwin-williams.c
Pure Zinc Pure Zinc Pure Zinc	N/A N/A N/A	Carbothane 134MC (SB) Carbothane 133MC (SB) Carbozinc Finish (SB) (IOT)	Carboline Co. 2150 Schuetz Road St. Louis, MO 63146 314-644-1000 www.carboline.com
Pure Zinc	N/A	Noxyde (WB)	Rustoleum 11 Hawthorn Parkway Vernon Hills, IL 60061 (800) 323-3584 http://www.rustoleumib
Pure Zinc	N/A	Sky White Powder	Dupont Powder Coatings 9800 Genard Rd Houston, TX 77041 (800) 247-3886 http://www2.dupont.com
Pure Zinc Pure Zinc	BarRust 231V (SB)*	Devthane 379H(SB) Devram 701 (SB) (IOT)	International Paint LLC/Devoe Coatings 6001 Antoine Drive Houston, TX 77091 (713) 682-1711 (800) 654-2616

TSC Primer	Intermediate	Topcoat	Manufacturer
Pure Zinc Pure Zinc Pure Zinc Pure Zinc	Amerlock Sealer (SB) Amercoat 351 (WB) Amerlock 2 VOC (SB)* N/A	PSX700 (SB) PSX700 (SB) Amershield VOC (WB) 741 (SB) (IOT)	PPG Industries, Inc. One PPG Place Pittsburgh, PA 15272 (800) 722-4509 http://ppgamercoatus.p
*Can be used as a direct-to-metal primer for stainless steel, aluminum, and other materials in Zone 5a and 5b environments.			

** SB is solvent based, WB is water based

APPENDIX D

COATING SPECIFICATION KEY ELEMENTS

1. SCOPE.
2. APPLICABLE DOCUMENTS.
3. SUBMITTALS.
4. ENVIRONMENTAL PROTECTION.
5. WASTE MANAGEMENT.
6. SAFETY/PERSONNEL PROTECTION.
7. MATERIALS.
8. TOOLS AND EQUIPMENT.
9. ENVIRONMENTAL CONDITIONS.
10. WORK SCHEDULE.
11. SURFACE PREPARATION.
12. COATING SCHEDULE (see next page).
13. COATING MIXING AND APPLICATION.
14. QUALITY CONTROL INSPECTION.
15. REPORTING.
16. FINAL ACCEPTANCE.

APPENDIX E

COATING SCHEDULE

SURFACE DESCRIP (STEEL, CONCRETE, SURFACE A, B, ETC.) SSPC TU 2/NACE 6G197	APPROX. SURFACE AREA SQ FT	SURFACE PREP TYPE	PROFILE RANGE	FIRST COAT			SECOND COAT			THIRD COAT		
				TYPE	WFT/DFT	COLOR	TYPE	WFT/DFT	COLOR	TYPE	WFT/DFT	COLOR

APPENDIX F

COATING SYSTEM DAILY INSPECTION REPORT

See KSC Forms 28-589 and 28-589A.
http://corrosion.ksc.nasa.gov/pubs/kscstd01.txt

Forms can be obtained from the Contracting Officer.

-- End of Section --