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# Certification Standard for Shop Application of Complex Protective Coating Systems

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Draft dated May 15, 2024

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	by	53		by	
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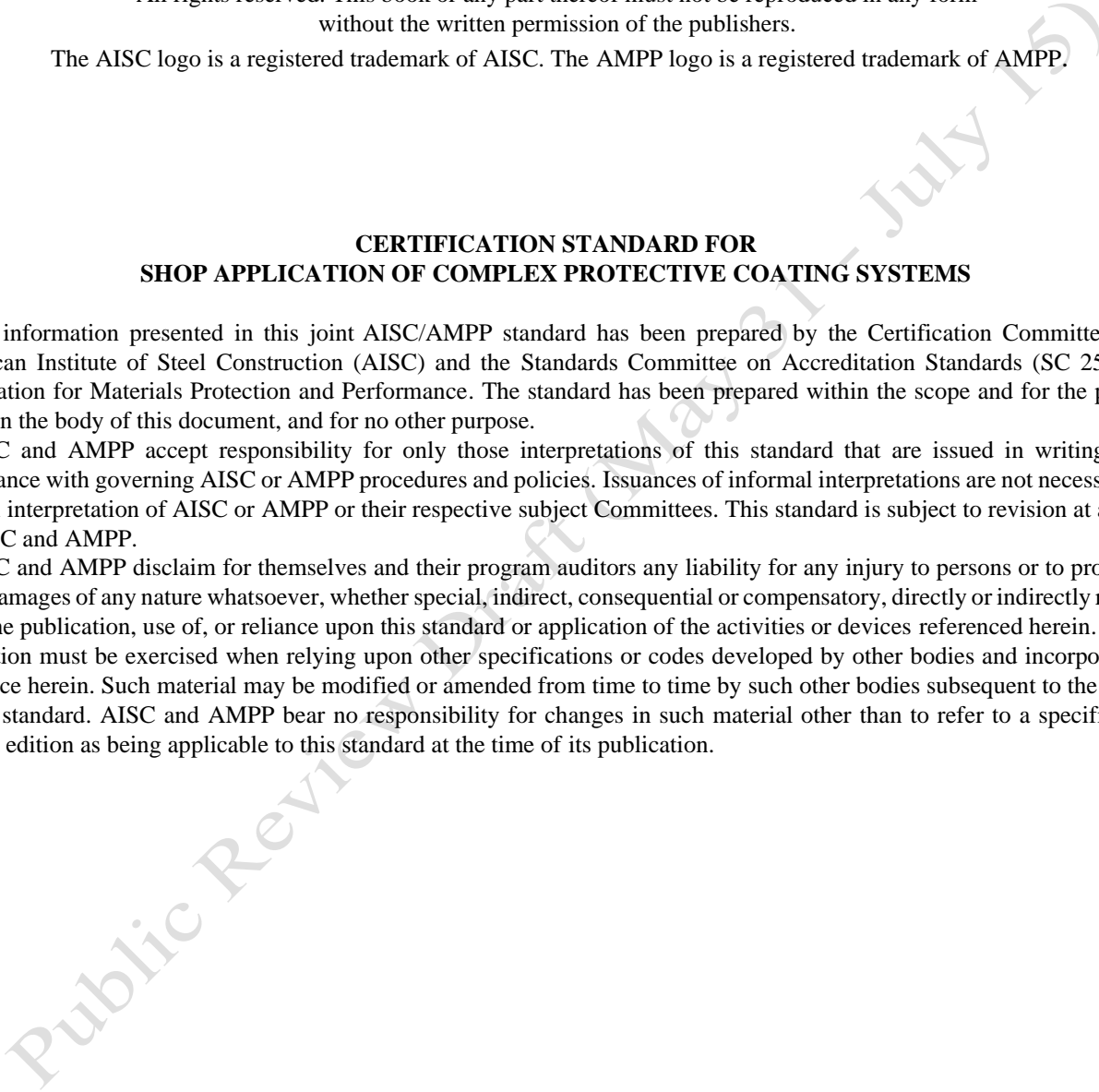
**CERTIFICATION STANDARD FOR  
SHOP APPLICATION OF COMPLEX PROTECTIVE COATING SYSTEMS**

The information presented in this joint AISC/AMPP standard has been prepared by the Certification Committee of the American Institute of Steel Construction (AISC) and the Standards Committee on Accreditation Standards (SC 25) of the Association for Materials Protection and Performance. The standard has been prepared within the scope and for the purposes stated in the body of this document, and for no other purpose.

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## 1. Purpose

The purpose of this Standard is to confirm to owners, the design community, and the construction industry that a Firm certified<sup>1</sup> to this Standard has knowledgeable personnel and the organization, experience, procedures, and equipment to provide surface preparation and application of complex painting systems in a shop facility in accordance with contract specifications.

Independent of the quality-focused purpose that is uniformly applicable to all Firms certified to this Standard, Firms will be labeled with one of three shop descriptors to communicate the basic description of their facilities. Owners, the design community, and the construction industry requiring certification to this Standard may choose to use the shop description label as part of qualification criteria for shop painting facilities. The shop descriptors are defined descending inclusive but not ascending inclusive. For example, a Firm described as Enclosed also meets the description for Covered and Open. A Firm described as Covered also meets the description for Open, but does not meet the description for Enclosed. Firms in any shop descriptor shall provide evidence of proper operating procedures and maintenance records of equipment, and evidence of proper coating storage and handling. All contract requirements shall be met, regardless of shop description. Specifiers who require certification to this Standard should evaluate the Firm's capacity to complete a specific project independently.

### Enclosed Shop

An enclosed shop is a facility, enclosure or building (four continuous walls or partitions to grade or floor with a roof) at the firm's location for certification where surface preparation, coating, curing, and coating storage are conducted in a controlled environment with fixed or portable ventilation systems. Ambient conditions such as temperature, humidity, dew point and airborne contaminants are controlled and maintained to meet contract requirements. The work environment is protected from adverse outdoor weather conditions and outdoor airborne contaminants, so that the surface preparation, coating, and curing activities are not jeopardized.

### Covered Shop

A covered shop is located at a site at the firm's location for certification with a roof but is not required to have walls, heating, or humidity control. Surface preparation, coating, and curing activities are performed under ambient conditions with fixed or portable ventilation systems. The structure provides limited protection from exposure to outdoor weather and airborne contaminants. Coating storage areas have either fixed or portable heating or cooling equipment. A method of control for this shop descriptor may be to suspend coating operations until ambient conditions are acceptable.

### Open (Exposed) Shop:

An open shop is a permanent or semi-permanent site at the firm's location for certification open to all ambient conditions. The area is exposed to outdoor weather conditions and airborne contaminants. The site provides no controls of temperature, humidity, or ventilation in the blast or coating areas. Drying and curing of coated items takes place under ambient conditions. Coating storage areas have either fixed or portable heating or cooling equipment. A method of control for this shop descriptor may be to suspend coating operations until conditions are acceptable.

## 2. Scope

This Standard describes requirements for certification of firms that apply complex painting systems as defined in this Standard.

The requirements of this Standard are applied to the quality management system of a certified Firm independent of individual project requirements for Certification to this Standard. The coating quality management system of a Firm, not its products, is certified. Certification to this Standard is neither an inspection nor an endorsement of product, surface preparation, or coating application. The Standard includes all functions and responsibilities that apply to surface preparation and coating in a shop environment for new ~~steelmetals~~, or for ~~steel-metals~~ which ~~has have~~ been previously coated and blast-cleaned and ~~is are~~ free of hazardous ~~paint-coatings~~ (lead, ~~chrome, cadmium, arsenic~~, etc.) when it arrives at the shop. The scope of this Standard does not include design, fabrication, manufacture, erection, surface preparation and application of coating in the field, metallizing or galvanizing, powder coating, anodizing, or compliance with ~~safety (OSHA) and environmental (EPA) environmental, health, and safety~~ regulations. The re-painting (including surface preparation) of previously coated items returned to the Firm's coating facility for rework is included in the scope of this Standard; however, removal of previously existing coatings is not included in the scope.<sup>2</sup> Certification to this Standard cannot be shared or transferred to another company or facility without the written approval of AISC or AMPP. The Firm shall have the capability to meet all the requirements of this Standard.

<sup>1</sup> This joint standard was initially published by AISC and SSPC: The Society for Protective Coatings, which merged with the National Association of Corrosion Engineers (NACE) to form AMPP. While AISC and SSPC both used the term "certification", AMPP uses the term "accreditation". All references to "certification" in this document shall be considered "accreditation" for AMPP purposes

<sup>2</sup> Removal of previously existing coatings containing hazardous materials may fall under the scope of SSPC-QP 2.

### 3. References

The Firm shall have the reference documents and standards necessary to provide personnel with the requirements of the work. The following references, at a minimum, shall be readily available to those who have coating program responsibilities. Firms shall possess the current edition of these references and any other references consistent with the requirements of existing contracts.

- SSPC-PA 1, “Shop, Field and Maintenance Coating of Metal~~Painting of Steel~~”
- SSPC-PA 2, “Procedure for Determining Conformance to Dry Coating Thickness Requirements~~Measurement of Dry Coating Thickness with Magnetic Gages~~”
- SSPC-VIS 1, “Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning”
- Manufacturer’s product data sheets, technical bulletins, and other recommendations for materials in use.
- ASTM D-3276, “Standard Guide for Painting Inspectors (Metal Substrates)”

### 4. Definitions

As used in this Standard, the word *shall* or *will* denotes a mandatory requirement. The word *should* denotes a guideline or recommendation. The word *may* denotes an obligation to make a choice.

**AISC.** The American Institute of Steel Construction—one of the two certifying bodies

**AMPP. Association for Materials Protection and Performance—one of the two certifying bodies.**

**ASTM.** American Society for Testing and Materials

**Complex Coating System.** Complex coating systems are defined for the purpose of this standard, as those that require special care in surface preparation, coating component preparation, application control, curing, and in-process inspection. These systems include materials such as zinc-rich, epoxy, and urethane coatings. These are typically multiple-coat systems, although only one or two coats of a multi-coat system may be shop-applied.

**Contract Documents.** The documents that define the responsibilities of the parties that are involved in surface preparation and coating. These documents typically include the design drawings, the specifications, special provisions, and the contract.

**Corrective Action (CA).** The action or actions undertaken to identify and eliminate the root cause of a product or process nonconformance to prevent its recurrence. Corrective action is not the repair or rework of identified nonconforming product or process to meet specified requirements.

**Customer.** Entity (e.g., the general contractor, owner, or specifier) contracting with the Firm for surface preparation and coating application.

**Design Drawings.** The graphic and pictorial portions of the contract documents showing the design and dimensions of the work. These documents generally include general notes, pay item quantities, fabricated item and coating details, and notes associated with specific items or required methods.

**Documented Procedure.** A procedure that is documented in writing or other graphical format. It can include written procedures or instructions, drawings, diagrams, charts, specifications and excerpts of, or references to, appropriate technical standards or codes. Documentation shall:

- Provide the purpose of the procedure.
- Describe the sequence of steps taken to carry out a particular course of action.
- Assign responsibilities for completion.
- Identify management responsibility for review of the procedure.
- Identify quality records that are generated.

Where the term “documented procedure” appears within this Standard, it indicates that the procedure is established, documented, implemented and maintained.

**Element.** A primary section of this standard as shown in the Table of Contents.

**Executive Management.** Executive management is defined as the top company officers responsible for the management and operation of the Certified Firm. Executive management may be defined by the Firm to include this top officer and a management team with these responsibilities.

**Fabrication or Manufacture.** The process of preparation and assembly of individual parts into a shipping piece.

**Firm.** The entity that is responsible for surface preparation and coating application in the shop environment. The Firm referenced in this document is the entity being certified.

**Nonconformities.** Attributes of materials, consumables, surface preparation and coating application (in-process or final) that do not meet contract requirements or the requirements of the Firm’s procedure for control of nonconformities (see Section 15).

**Objective Evidence.** Objective evidence is the data supporting the existence or verification of something. In this context, it is evidence that the quality management system is functioning properly. Evidence can be an observation of the performance of a task or creation of physical products; a record, document or procedure; or the result of an interview with

one or more employees that demonstrates their understanding of their duties and proper performance of tasks.

**Owner.** The entity or its authorized representative who has authority to define or accept changes to contract requirements and who will be or represents the ultimate owner of the finished/completed product.

**Procedure.** The sequence of steps taken to carry out a particular course of action.

**Quality Assurance.** The planned system of procedures and organizational requirements developed and implemented for the purpose of measuring and assuring compliance with customer requirements and providing confidence that quality goals are achieved. Quality Assurance encompasses such areas as compliance with project specification technical requirements, compliance with referenced standards and achievement of customer service goals. Specific functions included in quality assurance are: determination of quality criteria, establishment of a plan to monitor quality including assignment of quality control (inspection), determination of acceptance criteria, determination of QC personnel qualifications, oversight (periodic monitoring) of QC activities, summarizing and reporting quality conformance measurements to management.

**Quality Control (QC).** Quality control is the inspection of work. Inspection includes but is not limited to confirming that procedures are met; personnel performing the work are properly qualified; equipment is appropriate and in acceptable working order; and the proper materials are used as well as in compliance with inspection criteria.

**Quality Management System.** A system to establish policy and objectives to direct and control an organization with regard to quality.

**Quality Record.** A specific type of quality document that provides objective evidence of activities performed or results achieved.

**Specifications.** The portion of the Contract Documents that consists of the written requirements for materials, standards and workmanship.

**Specifier.** The entity defining the requirements for surface preparation and coating application.

~~**SSPC.** The Society for Protective Coatings—one of the two certifying bodies.~~

**Subcontractor.** A coating, fabrication or manufacturing contractor that performs a portion of the Firm's contract work for surface preparation or coating application.

**Supplier.** A manufacturer, direct supplier or distributor that supplies materials (including but not limited to blast-cleaning abrasives, coatings, and additives) or that provides equipment (including but not limited to blast-cleaning equipment, coating equipment and proprietary buy-out items) needed to fulfill the Firm's contract requirements.

**Visible Coating Defects.** Imperfections that may be detected without any magnification. These include but are not limited to runs, sags, lifting, chipping, cracking, spalling, flaking, mud cracking, pin holing and checking.

## 5. Management Responsibility

The Firm's executive management is responsible for developing and maintaining a quality management system to meet the specific requirements of this Standard and to assure that contract requirements are met.

### 5.1. Policy

Executive management shall adopt and document a policy defining the Firm's quality goals related to coating operations. The policy shall include the commitment to meeting contract requirements. Executive management shall ensure that the policy is understood, implemented and maintained at appropriate levels of the Firm's organization. The Firm shall document a minimum of one specific measurable goal related to coating application process quality. Executive management shall record and know the current level of that goal. There shall be a plan to work to the achievement of the goal.

### 5.2. Direction and Leadership

The Firm's executive management shall review the Firm's quality management system at planned intervals, but not less than annually.

Records from management reviews shall be maintained. Management review requirements shall be defined by the Firm and include a specific method to obtain, appropriately assess and analyze, and then report the following:

- Results of internal and external audits
- Opportunities for improvement of product quality
- Need for changes to the quality management system
- Customer feedback, for example: surveys, letters of recognition, personal interviews, requests for corrective action and complaints
- The level of qualification and training of personnel
- Channels for communication to address and resolve all quality issues including customer complaints
- Effectiveness of means, methods, and practices. Performance measures may include surface preparation and coating process errors, shipping delays, improper treatment of nonconformances, external audit corrective action reports not closed in time, or failure to conduct management review or other meetings in accordance with



established procedures

- Product nonconformance
- Results from previous management reviews

The output from the management review shall include the record and implementation of any decisions and actions related to:

- Improvement of the effectiveness of the quality management system and its processes
- Improvement of product quality
- Power agitators
- Lifting equipment
- Provisions for loading and blocking
- Resource needs

### 5.3. Resources

The Firm shall have the resources needed to achieve conformity to contract specifications. Resources shall include, but not be limited to, those described in the sub-articles of this section. Resources can include coating consultants, technical societies, trade associations, and researchers.

#### 5.3.1. Personnel

Personnel responsible for determining inspection requirements, oversight of inspection activities, acceptance criteria and disposition of nonconformities shall be identified. Personnel responsible for coating preparation and application, surface preparation and coating inspection shall also be identified.

##### **5.3.1.1. Management Representative for Quality (Quality Supervisor)**

Executive management shall designate a management representative or representatives for quality who shall report directly to (or be a part of) executive management. The designated management representative(s) for quality may perform other functions within the company, provided that those functions do not conflict with the quality responsibilities. The designated management representative(s) shall have the ability, responsibility, and authority to:

(a) Ensure that documented procedures needed for the quality management systems are established, implemented, and maintained in accordance with this Standard.

(b) Report to executive management on the performance of the quality management system and any need for improvement.

(c) Communicate with external parties on matters relating to the quality management system.

##### **5.3.1.2. Technical Coatings Representative**

Executive management ~~shall designate~~ identifies and records the top ~~individual employee based~~ at the facility with technical knowledge of the coating process. This individual shall have a minimum of one year experience in surface preparation and application of complex coating systems or their components.

#### 5.3.2. Buildings, Workspace, and Associated Utilities

The Firm shall have a location at which surface preparation, coating, and curing is conducted. The Firm shall also provide protection of stored coating materials, blast-cleaning products, and curing products from deterioration or damage.

Regardless of whether the Firm has two distinct areas for cleaning and coating operations, or one single area for the entire coating process, the Firm shall be able to demonstrate methods used to control the ambient conditions in these areas, and prevent surface contamination during the cleaning, application, and curing processes.

#### 5.3.3. Process Equipment

The Firm shall own or control coating and blast-cleaning equipment suitable for applying complex coating systems. The required equipment shall be present at the facility and must be operable during the onsite audit at the facility that holds the certification.

Equipment shall include, but not be limited to:

- Blast cleaning equipment, which includes conventional abrasive blast equipment
- Power tools or hand tools for surface preparation
- Compressors, line driers and oil separators
- Conventional or airless spray equipment
- Lighting
- Power agitators
- Lifting equipment

~~Provision for loading and blocking~~

#### 5.3.4. Inspection, Measuring, and Test Equipment

The Firm shall control and have located at their facility operable equipment for inspecting, measuring and testing for surface preparation, coating application, and curing, and for verifying the calibration of measuring equipment in accordance with Section 14.

Surface preparation and application measuring, or evaluation equipment shall include equipment in good working order that provides a means to measure:

- Surface profile
- Surface cleanliness (conformance to specified surface preparation standards)
- Surface temperature
- Ambient conditions (air temperature, relative humidity, dew point)
- Wind direction/speed (if coating in an area exposed to the wind)
- Coating temperature
- Wet film thickness
- Dry film thickness

#### 5.4. Document Requirements

The following is a list of required documents for the Firm's quality management system. These documents shall be maintained within a quality manual or within other appropriate systems in the Firm.

##### 5.4.1. Organizational Chart

The organizational chart shall show lines of authority within the organization as well as define positions and reporting relationships. At a minimum, the positions that are responsible for coating preparation, application, curing, surface preparation, coating inspection, purchasing, inventory and the management of those functions shall be identified.

##### 5.4.2. Job Descriptions, Qualifications, and Biographical Information

The Firm shall document and maintain job descriptions and qualifications and a brief summary of relevant experience for key personnel. Key personnel shall include, at a minimum, the following functions: management, purchasing, quality control, surface preparation, application and inspection. Responsibilities and authorities for positions that manage these functions shall be defined.

Qualifications and biographical information for key positions shall include, at a minimum: name, titles, years of experience performing complex coating operations, internal or external training, and professional certifications and registrations.

##### 5.4.3. Facility Plan

A facility plan detailing the general layout of the surface preparation, application and curing areas as well as general location of equipment critical to production shall be documented and maintained.

##### 5.4.4. Equipment List

An equipment list showing the Firm's equipment used for cleaning, surface preparation, coating mixing and application, and material handling shall be documented and maintained.

##### 5.4.5. Project List

An up-to-date project listing that shows a representative sampling of the most current projects within the last three years shall be documented and maintained. This list shall demonstrate the knowledge level of the Firm by listing the:

- Project name
- Project size (e.g., tons, square feet, etc.)
- Dates work was performed
- Surface preparation (e.g., SSPC-SP 5, SP 6, SP 7, SP 10)
- Coating system information (e.g., three coat epoxy or two coat urethane).

Firms seeking initial certification (or re-certification after a lapse in certification) to this Standard shall demonstrate an acceptable level of compliance to the Standard during the audit on existing work in-house, on a test panel similar to that detailed in ASTM D-4228, or on a demonstration piece or pieces that appropriately reflect the nature of the proposed work as approved by the qualifying agency.

## 6. Contract and Project Specification Review and Communication

427 The Firm shall document and implement a procedure for contract and project specification review. The review shall identify  
 428 and record the specific project requirements, determine, and plan shop actions to accomplish them, and distribute information  
 429 to the responsible individuals throughout the organization. This review shall consider all issues that affect the Firm's capability  
 430 to perform the work.

431 The procedure shall define the method for review of the original contract documents, revised contract documents, and  
 432 changes received through clarification (e.g., requests for information or other sources) to assure that the Firm fully understands  
 433 and can satisfy the contract requirements.

434 The procedure shall also define how the Firm documents, communicates, and resolves identified need for additional contract  
 435 information and conflict between contract documents and manufacturers' recommendations. The procedure ~~should~~ shall direct  
 436 that in the event of a conflict between contract documents and manufacturer-s recommendations, the Owner shall be notified  
 437 in writing and, unless directed otherwise in writing, the requirements of the contract documents shall prevail.

438 The record of contract review can include technical summaries, signoffs, change orders, schedules, and allocation of  
 439 adequate resources. The record shall show the consideration by management, purchasing, coating process control, inspection,  
 440 quality assurance, and quality control functions. The record will also show other critical project requirements to consider that, if  
 441 missed, would have a major impact on project quality.

## 442 7. Coating System Communication

443 Written documents (e.g., drawings, travelers, or quality plans) shall be used to communicate throughout the organization:

- 444 • Surface preparation (including specification of surface finish),
- 445 • Coating type
- 446 • Dry film thickness requirements
- 447 • Step backs
- 448 • Masking
- 449 • No-coating or reduced-DFT zones

## 450 8. Document and Data Control

451 The Firm shall document a procedure to control the Quality Manual; contract documents, drawings and changes;  
 452 documented procedures required by this Standard; and other documents affecting coating quality. This procedure shall address  
 453 the following elements of control:

### 454 8.1. Review and Approval

455 Documents affecting coating quality shall be reviewed and approved by authorized management. Revisions to these  
 456 documents shall be reviewed for adequacy and approved by the same function and level that authorized the original  
 457 document. At a minimum, the result shall be agreement between the documents and the actual methods, procedures and  
 458 work practiced by the Firm. Management shall establish the frequency and requirements for review and the updating of  
 459 these documents.

### 460 8.2. Revision Control

461 The revision status of the document shall be clearly identifiable. There shall be a method for monitoring and identifying  
 462 the latest revision, location, and how changes are identified from the previous revision.

### 463 8.3. Access

464 Procedures and documents pertinent to an area of operation or management shall be available and readily accessible  
 465 to all personnel responsible for performing work affecting coating quality.

### 466 8.4. Obsolescence

467 Controlled documents that are obsolete shall be marked, segregated, destroyed or otherwise prevented from inadvertent  
 468 use.

### 469 8.5. Transmittal

470 A system shall be established to track the distribution of drawings, documents and specifications affecting the quality  
 471 of surface preparation and coating to owners, customers, subcontractors and suppliers.

### 472 8.6. Customer Requirements

473 The Firm shall document a procedure to receive and document customer requirements as well as changes originated  
 474 by the Firm as they occur throughout the surface preparation and coatings application process. The system shall include  
 475 records (e.g., logs, files or master lists) that show receipt, incorporation, issue and distribution of contract drawings,  
 476 specifications, technical requirements and other pertinent data by the firm as well as the distribution to all necessary  
 477 departments and personnel at the Firm's facility and necessary external organizations, subcontractors or suppliers.

## 9. Control of Quality Records

The Firm shall establish and maintain a documented procedure for identification, collection, storage, maintenance and disposition of quality records that indicate the quality of coating (as described in the sub-elements of this element.) Contract documents and records of clarifications or variations in contract technical documents shall be maintained. Procedures for protecting the integrity of contract documents and quality records shall be in place.

### 9.1. Storage

Quality records shall be stored and retained in a way that enables retrieval and provides a suitable environment to prevent damage, deterioration or loss.

### 9.2. Retention

Retention times shall be established and recorded for records retained for any purpose related to the quality of surface preparation and coating application. The retention periods shall be at least long enough to permit evaluation of the records and until final acceptance by the ~~e~~Owner, or longer if stipulated by the contract documents. The Firm shall make quality records available for the customer's and/or owner's review and evaluation during the retention period.

### 9.3. Minimum Required Quality Records

- Contract document review
- Contract clarifications (RFIs)
- Documented training
- Internal audit record
- Certificate of Conformance for system components
- Qualification and ongoing evaluation of subcontractors
- Qualification and ongoing evaluation of suppliers
- Requests (and responses to requests) for deviation from contract requirements (DFSs)
- Surface preparation records
- Application records
- Documentation of nonconformities
- Waivers from the owner for nonconforming product
- Corrective action as defined in Section 16
- Final inspection
- Management Review records

## 10. Purchasing Documents

### 10.1. Purchasing

The Firm shall document a procedure to ensure that coating subcontractors, purchased products, materials and services conform to contract requirements (as described in the sub elements of this element). The responsibility for the quality of the subcontracted product remains with the certified Firm. Purchase orders, manufacturers' product data sheets, and records of the initial qualification and subsequent periodic evaluation of subcontractors and suppliers shall be maintained.

### 10.2. Purchasing Data

The Firm shall clearly describe subcontracted work and the purchased products, materials and services ordered in purchasing documents. This shall include, but not limited to:

- The type of service, material and other unique identification
- The applicable specifications, drawings, process requirements, inspection instructions and any witness points
- Delivery instructions
- Certificates of Compliance, Conformance, or Analysis
- Coating manufacturers' product data sheets (for coating products)
- Testing requirements as applicable

### 10.3. Evaluation of Subcontractors

The Firm shall evaluate and select subcontractors on the basis of their ability to meet:

- Subcontract requirements
- Project requirements
- Specific inspection requirements.

When this Standard is required by the contract documents, the selected subcontractor shall have this certification as well.

### 10.4. Qualification and Evaluation of Suppliers

Firms shall qualify and evaluate suppliers using a suitable method defined by the Firm. The method employed should include consideration of these ~~se qualification and~~ evaluations ~~means of~~:

- Contract documents
- Consistent ease of application (applies to suppliers of coating)
- Curing time (applies to suppliers of coating)
- Delivery
- Product quality
- Customer or owner preference
- Availability and suitability of the supplier's technical support staff

The frequency of periodic evaluation shall be established in the purchasing procedure. Records of the evaluation of suppliers and subcontractors shall be maintained.

## 11. Material

### 11.1. Container

Material identification on the coating container shall be identified as a minimum by color (pigment description and federal standard number, or manufacturer's number), lot/batch number, ID/stock number, and quantity of coating in container, date of manufacture and manufacturer's name and address.

### 11.2. Storage

Materials shall be stored in protected areas under conditions (including temperature) per manufacturers' recommendations. Coating with expired shelf life shall be segregated from current material or specifically marked as "expired" by the Firm. Materials with expired shelf life are nonconforming and treatment is defined in the Procedure for Control of Nonconformities required by this Standard.

### 11.3. Certificate of Conformance for Coating - Requirements

This quality record shall validate that the specific batches of coating and thinner or reducers satisfy the contract documents and recommendations on the manufacturer's product data sheets. This includes the components provided by the coating manufacturer such as the vehicle, catalyst/activator, and zinc dust, and those supplied by the shop such as thinner. Certificates of Conformance shall address requirements established by the coating manufacturer and applicable contract documents including composition and testing for the specific coating.

At a minimum, the Certificate of Conformance issued by the manufacturer on the manufacturer's stationery shall contain:

- The name of the manufacturer
- The product name
- The batch number
- The date of the manufacture
- A statement that the product complies with the specifications contained in the manufacturer's product data sheet based on applicable test methods

The Certificate of Conformance shall be retained by the Firm as part of its quality records.

## 12. Process Control

The Firm shall document and follow procedures necessary to produce a consistent acceptable level of quality of the required coating process, including surface preparation, coating application, curing, and equipment maintenance.

### 12.1. Surface Preparation

Surfaces to be coated shall be prepared and cleaned in accordance with contract documents, coating manufacturer recommendations, and other nationally or internationally recognized standards or guidelines.

Procedures shall be effective in controlling open-nozzle abrasive blast-cleaning and other airborne materials to the degree that the quality of other coating application or curing operations is not affected. (Also see Section 5.3.2.)

### 12.2. Coating Mixing and Application

The mixing and application of coating shall be in accordance with contract documents and the coating manufacturer's recommendations. The procedure shall be effective in demonstrating that:

- Required conditions are maintained during mixing and application;
- Coating areas are free of air-blown dust, blast media, or other debris and contaminants that can be detrimental to the quality of the coating during application;
- Required areas are masked to protect no-coating areas.

#### 12.2.1. Application Records

As part of the application process for complex coating systems, the following shall be recorded for each coat at a minimum:

- Verification of conforming surface condition

- Verification of required surface and coating temperature
- Coating product applied (e.g., name, number, color)
- Shelf life expiration date
- Coating batch numbers from base and any mixed components
- Ambient temperature, relative humidity and dew point at time of application
- Verification that the coating (prior to application) is free from visually evident defects
- Verification that the paint was properly proportioned, thoroughly mixed and properly agitated (if required) prior to application
- Thinner/reducer added (quantity, ~~and~~ type, and batch number)
- Induction (sweat-in) time period (beginning and ending) where applicable
- Verification that the coating was mixed and applied within the manufacturer's specified pot life
- Coating application equipment used, including pressure, coating spray gun type and tip size as applicable
- Period of time elapsed since application of previous coat in multi coat systems.
- Start time and finish time
- Dry film thickness (DFT)

#### **12.2.2. Transfer of Markings**

Pertinent piece marks shall be properly transferred and heat numbers shall be transferred when required by contract documents.

### **12.3. ~~12.2.2~~ Equipment**

#### **12.3.1. Function**

All facilities and equipment (e.g., lighting, blasting and spraying equipment, air and particulate handling, etc.) shall be functional and adequate for performance of the work.

#### **12.3.2. Preventive Maintenance**

A documented preventative maintenance procedure shall be implemented for major equipment, including but not limited to:

- Blast cleaning equipment, which includes nozzle blast equipment, centrifugal blast equipment, and dust collectors
- Compressors, line driers, and oil separators,
- Conventional or airless spray equipment
- Lifting equipment

## **13. Inspection and Testing**

The Firm shall document a procedure for inspection and testing activities in order to verify that the product quality meets the requirements of the contract documents. The Firm shall establish in the procedure an inspection plan to assure contract requirements are met. This plan shall be adjusted at any time when the required quality level is not met. The inspection procedure shall include assignments of inspection duties, showing the required inspection and testing, and the required records to meet the contract requirements.

The Firm shall conduct 100% inspection for visible coating defects. At a minimum, the Firm shall conduct dry film thickness measurement in accordance with SSPC-PA 2, unless otherwise specified in the contract documents. The sampling plan should identify the unique problem areas created by the part or piece geometry. The Firm shall enforce its procedures for control of nonconformities (see Section 15) when product is found nonconforming.

### **13.1. Assignment of Inspection of Surface Preparation and Application of Coating**

Inspectors shall be assigned on the basis of their qualifications to perform inspections of coating systems.

Production personnel can be assigned to inspection duties under the following conditions:

- They are trained both in knowledge and practice of proper inspection methods and acceptance criteria specified for the material they are inspecting. This capability can be demonstrated by their knowledge of the acceptance criteria for the part of the process for which they have inspection responsibility.
- They are aware of and have adequate time to perform their inspection responsibilities.
- Production personnel shall be capable of inspecting their own work as an in-process inspection, however, that inspection cannot be accepted as the final inspection for product conformity.
- Their inspections are monitored by qualified personnel. Production personnel can perform final inspection of the work of others, provided they are properly trained, and their work is monitored by QC (another QC qualified inspector or QC management.)

### **13.2. Inspection Records**

Records shall be maintained for complex coating systems showing what parameters were inspected, who performed

the inspections, the date of inspections, what pieces were inspected, and disposition of any nonconformances. The Firm shall document every final complex coating inspection that is conducted. Documentation requires retrievable records that are retained for an appropriate period related to contract requirements (see Section 9). The scope of the final coating inspection is per the Firm's plan for meeting the minimum requirements (see Section 13), and which may be dictated by contract requirements. Inspection reports and test results shall be consistent with customer and owner requirements. At a minimum, the following inspections shall be recorded:

- Surface Preparation (degree of cleanliness achieved; surface profile achieved; condition of surface immediately prior to beginning coating application)
- Dry film thickness (DFT) including any specific data required by SSPC-PA 2 or contract documents.
- Visual inspection for visible coating defects (recording by exception only does not meet this requirement)
- DFT gage accuracy verification record (in accordance with SSPC-PA 2)

#### 14. Verification of Accuracy of Inspection, Measuring, and Test Equipment

Verification of accuracy shall be per manufacturer's recommendation or contract documents. The verification method shall be documented and shall address the acceptance criteria used to verify that gages are reading accurately, and what happens when a gage is found not to be reading accurately. The Firm shall describe what measures and evaluations are in question for items that were inspected with the gage determined not to be reading accurately.

The only equipment for which verification of accuracy is required for this standard is the gage used to measure dry film thickness (DFT). The gage to measure wet film thickness shall be included if any of the Firm's contracts or product manufacturers recommendations use this measurement option as the final acceptance of the coated surfaces. The verification of accuracy of the DFT gage shall be determined according to ~~Section 3 of~~ SSPC-PA 2 using a standard (shims or test blocks) that are traceable to a national standard.

#### 15. Control of Nonconformities

The Firm shall document a procedure to provide for disposition of nonconforming surface preparation and coated product, including identification, segregation, evaluation, repair or disposal, and notification to the functions concerned. This procedure shall ensure that coated product that does not conform to contract requirements is prevented from reaching the customer.

The procedure shall define responsibility for review and disposition of nonconforming product and shall identify qualifications required for that responsibility. The disposition of nonconforming product may be:

- Reworked
- Repaired
- Used as is (after more detailed analysis or acceptance by the Firm's engineering or management, provided contract requirements are met)
- Owner-approved nonconforming product
- Scrapped.
- Repaired or reworked product shall be re-inspected in accordance with the drawings, specifications, and project requirements. Where ~~e~~Owner approval is required, it shall be documented.

Materials with expired shelf life are nonconforming. Such materials may be "used as is" with authorization from the manufacturer as described in ~~Section 5.1.5 of~~ SSPC-PA 1, "Shop, Field, and Maintenance ~~Painting of Steel~~ Coating of Metal." The manufacturer's extension of the shelf life is evidenced by a replacement Certificate of Conformance. Alternatively, materials with expired shelf life may be used as "owner-approved nonconforming product" with documentation of approval from the Owner. Records shall be kept of the nonconforming materials and pieces affected, the nature of the nonconformance, the disposition selection, authorization, and inspection results.

#### 16. Corrective Action

The Firm shall develop a documented procedure for corrective action. Any corrective action taken shall be to the degree appropriate to the magnitude of problems and commensurate with the risks to product quality.

The corrective action procedure shall include periodic review of records or summaries of nonconformities and of internal and external quality audit reports for determination and initiation of corrective actions. Corrective action shall be applied when:

- There is a nonconformity that is repetitive in nature. This can be identified by periodically reviewing nonconformance reports or summaries for negative trends.
- Process nonconformities are found during the internal and external quality audits indicating that the quality management system may not be implemented and functioning as stated in the quality manual.
- Nonconformance with the quality management system is found during the day-to-day execution of the system.
- Nonconformance is unacceptable due to cost or severity.
- A customer complaint has been received.

The corrective action procedure shall address these steps:

1. Document a corrective action request (CAR) that includes the nonconformity to be addressed by the Corrective Action

and the requirement that has not been met. The corrective action procedure shall define the functional positions authorized to issue a CAR and initiate the corrective action process.

2. Assign responsibility and establish a timeframe for the response to a CAR.
3. Investigate and document the scope of the non-conformity, root causes, and measures taken to bring a nonconforming product or process into conformance with specified requirements and list the actions to be taken to prevent recurrence.
4. Communicate the CAR and resolution to the management team and appropriate members of the organization.
5. Follow up the corrective action taken with periodic monitoring to assure the corrective action is implemented and is effective.

## 17. Handling, Storage, and Delivery of Product and Materials

Coated product shall be handled, stored, loaded, and prepared for shipment to prevent damage and deterioration.

## 18. Training

Personnel involved in application and surface preparation shall receive initial and continuing (as defined by the Firm) documented training appropriate for their job functions as well as in inspection methods and quality acceptance criteria. Training shall be conducted by a qualified external source or delivered in-house by a qualified internal person. Qualification of trainers shall be documented.

Training shall cover the key issues of the subject and be documented with a record of the topics discussed, the course administrator, trainees in attendance, measurement of trainee comprehension and the training dates. The course curricula shall relate to the subject and cover the key issues of the subject.

### 18.1. Qualification and Training of Production Personnel

Production personnel shall demonstrate and be capable of inspecting their own work as an in-process inspection. The Firm shall implement a written program to:

- Assess the skills and general training needs of newly hired craft workers and qualify them for their assigned tasks
- Verify the qualifications of existing craft workers
- Train inexperienced craft workers (trainees) as necessary
- Evaluate the performance of craft workers at least once per calendar year and provide additional training as necessary
- Ensure compliance with contract specific worker training/qualification requirements, including
- Train in the use of new equipment and use of materials not previously applied

### 18.2. Qualification and Training of Inspection Personnel

Personnel involved in inspection of surface preparation and coating application and curing shall be qualified by training and experience as defined by the Firm. Experience shall include the inspection of complex coating systems applied on a variety of projects. They shall be familiar and proficient with their responsibilities, the use of inspection equipment and the inspection procedures. The basis for qualification of inspectors for coating processes shall be documented and shall include experience and training in surface preparation and coating application and in inspection and testing of these processes. The competency of inspectors shall be assessed and then documented.<sup>32</sup> The competency of inspectors without experience or inspectors at new Firms shall be documented. Qualification standards and certifications granted by recognized industry organizations can be used to establish the basis for qualification.

~~Inspectors shall be trained in the inspection tasks they will perform.~~ Training for inspectors ~~may~~ shall be provided and documented by ~~either~~ qualified in-house instructors or ~~by~~ qualified external sources. ~~At a minimum,~~ The training shall include ~~these "body of knowledge" items as described in ASTM D-3276.~~

- ~~• Surface Preparation (mill scale; surface profile; chemical cleaning; solvent vapor cleaning; hand and power tool cleaning; abrasive blast cleaning; pressurized water cleaning; steel surfaces, galvanized surfaces)~~
- ~~• Coating Storage and Handling (storage of coating and thinner; mixing; thinning; initial samples of coating and thinner; heating of coating)~~
- ~~• Weather Considerations (drying; low temperature; high temperature, moisture; wind)~~
- ~~• Coating Application (residual contaminants; quality assurance; film defects; brush application; roller application; spray application; miscellaneous methods; rate of application)~~
- ~~• Additional Considerations (ventilation; shop coat repair; coating schedule; recoat time; coating system failure)~~
- ~~• Inspection Equipment (general; surface profile gage; adhesion of existing coating; portable pull off adhesion; drying and curing times; thermometers; relative humidity and dew point; coating consistency cups; weight per gallon cup; wet film thickness; interchemical gage; notched gage; dry film thickness gages; non-destructive film thickness gages; magnetic type gages; current type gages; holiday detectors; Tooke gage;~~

<sup>3</sup> It is recognized that those performing final inspection may have received training prior to the requirement for documentation of training that is now part of this standard. To comply, the Firm's management shall document a review of the qualifications of current inspection personnel for implementation of the quality management system. Subsequent required periodic training shall be documented.



- ~~Comparison of Surface Preparation (specifications)~~
- ~~Inspection Checklist~~

## 19. Internal Audit

The Firm shall perform an internal audit of the coating process, procedures and all the elements of this Standard at least once a year. A qualified individual, independent of the function being audited, shall perform the audit. Internal audits and their results shall be recorded and include any corrective actions that are realized as a result of the audits. Internal audits shall be effective at identifying issues requiring corrective action.

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