

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

# **Qualification of Applicators of Plating and Coating Services for Equipment used in the Petroleum and Natural Gas Industry**

API STANDARD 20P  
FIRST EDITION, XXX 202X

BALLOT DRAFT

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

## **Table of Contents**

To be populated prior to publication.

BALLOT DRAFT

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

## **1. Scope**

### **1.1 Purpose**

This standard specifies requirements for the qualification of organizations providing plating and/or coating services for equipment used in the petroleum and natural gas industries.

### **1.2 Applicability**

This standard is applicable to the plating and coating of parts, components and equipment, where API product standards require conformance with this standard or otherwise specified as a requirement. The plating of electronic components and the application of weld overlay and cladding are outside the scope of this document.

NOTE This standard does not limit the responsibility of any manufacturer of commercial products using plating and coating services and manufactured to an API standard from its responsibility for conformance with all applicable requirements of that API standard.

## **2. Normative References**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any addenda) applies.

API Specification Q1, *Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

SAE AMS2750, *Pyrometry*

## **3. Terms and Definitions**

For the purposes of this document, the following definitions apply.

### **3.1 coating**

A layer of material applied onto a substrate to enhance the surface properties.

NOTE Normally for corrosion and wear protection.

### **3.2 plating**

The deposition of ductile metals onto substrates using mechanical, electrolytic, thermal and/or chemical energy.

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

### **3.3 standard rework**

Operation(s) performed to a documented and validated predefined procedure that brings the product back to meeting requirements.

### **3.4 subject matter expert**

Individual with characteristics or abilities gained through training or experience, or both, as measured against established requirements, such as standards or tests that enable the individual to perform a required function effectively.

### **3.5 surface treatment**

Activities to prepare the surface for subsequent plating or coating including solvent cleaning, thermal degreasing, blasting, de-oxidizing or passivating.

### **3.6 technical authority**

A subject matter expert who has been granted authority by the organization to approve the processes and process qualifications.

### **3.7 thermal treatment**

The application of heat to prepare the surface for the application of coating/plating. Post coating/plating to enhance the properties and / or release hydrogen generated by the process.

## **4. Quality Management System**

### **4.1 General**

The organization shall establish, document, implement and maintain a quality management system in conformance with API Q1.

### **4.2 Proprietary License Applications**

The organization shall maintain current licenses for proprietary applications as required.

### **4.3 Facility Requirements**

The organization shall have the following on-site capabilities at a minimum:

- a) building or enclosure;
- b) equipment to receive and ship material to customers;
- c) resources / equipment for surface preparation as applicable to the processes performed;
- d) equipment necessary for the coating or plating application;
- e) equipment necessary for handling and lifting;
- f) inspection and test equipment; and
- g) thermal treatment equipment for pre-and post-processing, as applicable.

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

#### **4.4 Process Qualification Requirements**

**4.4.1** The organization shall document, implement, and maintain a procedure, approved by the technical authority, addressing the qualification requirements for all application systems for which they are claiming API 20P conformance. The procedure may be prepared by a subject matter expert.

This procedure shall address as a minimum:

- a) Plating or coating process
- b) Qualification of personnel
- c) Surface preparation
- d) Equipment required
- e) Standard used as basis for qualification

NOTE This may be an internal standard.

- f) Process steps including critical operating parameters for those steps
- g) Controls / values on the critical parameters
- h) Special material handling requirements, if applicable
- i) Special preservation and storage requirements, if applicable
- j) Special raw material controls including shelf life
- k) Qualification testing required, including acceptance criteria
- l) Production inspection and / or testing to be performed, including acceptance criteria
- m) Standard rework that is permitted (see 4.4.2)
- n) Revalidation requirements

**4.4.2** Qualification testing is required for each plating or coating system, chemistry, standard rework, or product line for which conformance to this standard is claimed.

**4.4.3** As a minimum, re-qualification shall be performed if there is a change to the process, chemistry, and / or equipment exceeding the allowances in the qualification procedure.

**4.4.4** Records showing evidence of conformance to the qualification requirements shall be maintained.

#### **4.5 Personnel Training and Competency Requirements**

In addition to the requirements of API Q1, the organization shall maintain any special personnel qualifications required for the coating / plating application. A designated subject matter expert shall be readily available during processing to resolve technical questions.

### **5. Process Requirements**

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

The organization shall document, implement, and maintain a procedure that addresses the following process controls:

- a) storage of coating materials, including humidity and temperature control where applicable.
- b) inventory control;
- c) shelf-life control;
- d) contaminate control;
- e) application controls (mixing, surface prep, spray parameters, etc.);
- f) curing process controls;
- g) bath tank chemistry controls;
- h) thermal treatment controls;
- i) packaging and storage controls;
- j) traceability controls (see section 8); and
- k) inspection and testing controls.

## **6. Production Control**

### **6.1 General**

The organization shall have a production control document detailing the requirements of the process being performed. This document shall be in accordance with the requirements of the approved qualification procedure.

### **6.2 Outsourced Activities**

**6.2.1** Activities with process-based time constraints (e.g., time between plating and bake out) shall not be outsourced.

**6.2.2** The coating or plating application operations shall not be outsourced

**6.2.3** In addition to the requirements of API Q1 concerning suppliers, external testing facilities shall be in conformance with the requirements of ISO 17025 for qualification testing, plating material testing, bath chemistry testing, and any other testing applicable to the applied process controls.

### **6.3 Inspection Requirements**

**6.3.1** The organization shall maintain a documented procedure that defines the inspection process and acceptance criteria. The procedure shall include requirements for receiving, in-process, and final inspection and ensure that identification and traceability of product is maintained throughout the process, as specified in Section 8.

**6.3.2** Where sampling is used, the sampling plan shall be in accordance with the requirements of an internationally recognized sampling standard such as ANSI / ASQ Z1.4. The plan used shall be based on evaluation of the risk and shall be documented.

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

**6.3.3** The organization shall verify that the product meets the customer's requirements including marking, packaging, and documentation requirements.

## **7. Records**

**7.1** As a minimum the following information shall be recorded and maintained:

- a) Customer and purchase order number if different than the internal order number;
- b) Customer coating or plating specification and revision;
- c) Part number and serial numbers (if applicable);
- d) Quantity in the coating/plating batch;
- e) Internal order number;
- f) Internal coating/plating procedure and revision;
- g) Date of application;
- h) Coating/plating material(s) batch number(s);
- i) Process parameters including, but not limited to: thickness applied, temperature, time, hardness, environmental conditions appropriate to the coating or plating process at time of application, surface cleanliness, as appropriate to the application; and
- j) Inspection results.

**7.2** Records shall remain legible, identifiable, and retrievable. Records shall be retained for a minimum of ten (10) years after date of shipment or as required by customer, legal, and other applicable requirements, whichever is longer.

## **8. Identification and Traceability**

The organization shall have documented procedures for control of identification and traceability throughout the process including raw materials. The procedure shall address, as a minimum:

- a) method of marking the product;
- b) method of ensuring the physical marking is traceable to all records associated with the product;
- c) method for ensuring traceability of product back to received material after any processing where the original marking is removed;
- d) process for verification of product traceability during storage;
- e) requirements for maintenance or replacement of identification and/or traceability marks;
- f) method of ensuring traceability for any product during outsourced processes; and
- g) method for verifying traceability upon material receipt.

## **9. Nonconforming Product**

**9.1** In addition to the requirements of API Q1, the organization shall define and document the positions or personnel authorized to invoke standard rework.

**9.2** Records of disposition of nonconforming products, including standard rework, shall be maintained.

## **10. Preservation of Product**

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

**10.1** The organization shall maintain documented procedures describing the methods used to preserve the product throughout the process in order to maintain product integrity. Preservation controls shall include transportation, handling, storage, packaging, and protection.

**10.2** At a minimum, the following controls shall be addressed:

- a) mechanical damage from handling,
- b) method of preventing dissimilar metal contact and / or contamination,
- c) residual chemical contamination from cleaning solutions and markers,
- d) environmental exposure for alloys susceptible to corrosion after a plating or coating application.

**10.3** Corrosion protection of material shall be based on material type and customer requirements.

## **11. Calibration**

### **11.1 General**

Inspection, measuring, and testing equipment shall be used within its calibrated range and shall be identified, controlled, calibrated, and adjusted at specific intervals in accordance with written procedures that are based on manufacturer's standards, or internationally recognized standards such as ISO/IEC 17025.

Calibration intervals for measuring and test equipment shall be established based on repeatability, amount of usage, environment and past history for that type of instrument. For standard, adjustable, hand measurement tools the initial calibration interval shall be three months until a recorded calibration history for that instrument can be established. Intervals may then be lengthened or shortened. The calibration interval cannot be increased by more than twice the previous interval and shall not exceed more than one year.

Non-standard, or non-adjustable measurement devices such as surface plates, threaded plug/ring gauges, co-ordinate measuring machines, optical comparators, x-ray fluorescence (XRF), etc. shall be calibrated initially and the calibration interval set based on equipment type, usage, and operating environment. Calibration intervals shall not exceed three years for this type of equipment.

Calibration standards used to calibrate measuring equipment shall be checked and approved at least once every three years by qualified individuals using qualified equipment with traceability to the applicable national or international standards agency.

Instruments and calibration standards that have not been used during the calibration interval and that have been maintained in accordance with defined practice may have their calibration cycle extended for an amount equal to the designated cycle.

Equipment used to calibrate the production equipment shall possess an accuracy of  $\pm 0.25$  % of the useable full-scale range. Measuring devices used for dimensional



*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

inspection shall provide sufficient accuracy to minimize the measurement uncertainty. Where practical the measurement uncertainty shall not exceed 25% of the characteristic's tolerance limit. The measurement uncertainty may be determined through measurement studies, equipment manufacturer's accuracy statements, calibration certificates, or other recognized methodologies deemed appropriate by a qualified person.

## **11.2 Pressure Measurement**

Pressure measuring devices shall:

- Be readable to at least  $\pm 0.5$  % of full-scale range
- Be calibrated to maintain  $\pm 2$ % accuracy of full-scale range.

Pressure measuring devices shall only be used within the calibrated range and be calibrated with a master pressure measuring device or a dead weight tester. Spring style pressure gauges shall only be used within 20% to 80% of the gauge range. Calibration intervals for pressure measuring devices shall be a maximum of three months until documented calibration history can be established. Calibration intervals shall then be established based on repeatability, degree of usage, environment, and documented history.

## **11.3 Thermal Measurement**

Temperature measuring devices shall be calibrated in accordance with SAE AMS 2750, class 3, to an accuracy of 0.25% of the full range and be readable to at least 1°F / 0.6° C. Furnace uniformity surveys shall be in accordance with SAE AMS 2750, class 3.

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

## **Bibliography**

ANSI/ASQ <sup>1</sup> Z1.4, *Sampling Procedures and Tables for Inspection by Attributes*

BALLOT DRAFT

---

<sup>1</sup> American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203, <https://asq.org>.