AMERICAN MANUFACTURING COMPLIANCE AUTHORITY

METAL FINISHING AND PLATING SERVICES QUALITY STANDARD

AMERICAN MANUFACTURING CERTIFICATE OF REGISTRATION COMPLIANCE AUTHORITY
AMCA

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QUALITY STANDARDS FOR METAL FINISHING AND PLATING
Issued by the American Manufacturing Compliance Authority (AMCA)
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1. Purpose and Scope

These standards establish uniform requirements for metal finishing and plating operations to ensure product consistency, structural integrity, environmental responsibility, and worker safety. They apply to all AMCA-registered facilities performing electroplating, anodizing, conversion coating, mechanical finishing, and related surface-treatment processes.

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2. Definitions

- **Metal Finishing:** Any chemical, mechanical, or electrolytic process applied to a metal surface to improve appearance, corrosion resistance, hardness, or adherence of subsequent coatings.
- **Plating:** The deposition of a metallic coating onto a substrate via electrolytic or autocatalytic processes.
- **Substrate:** Base metal or alloy subject to finishing operations.
- **Bath Chemistry:** Chemical composition and operating characteristics of plating or treatment solutions.

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3. General Quality Requirements

3.1 **Process Control Documentation**

All facilities shall maintain documented procedures for each finishing and plating process, including equipment specifications, chemical parameters, temperature ranges, current densities, and expected performance characteristics.

3.2 **Operator Qualification**

Operators must be certified under an AMCA-approved training program, demonstrating proficiency in equipment handling, chemical safety, measurement

techniques, and troubleshooting.

3.3 **Traceability**
Each production batch must be traceable from raw material through final inspection via batch logs, material certificates, and process records. Records shall be retained for a minimum of five years.

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4. Substrate Preparation Standards

4.1 **Cleaning Requirements**
Surfaces shall be free of oils, oxides, particulates, and residues prior to plating. Acceptable cleaning methods include alkaline soak cleaning, electro-cleaning, solvent degreasing, and abrasive media finishing.

4.2 **Surface Roughness**
Required roughness values (Ra) must be documented according to the intended coating. Surface profiles shall be measured using calibrated instruments.

4.3 **Activation**
Where applicable, substrates must undergo acid activation or micro-etching to ensure proper coating adhesion. Activation procedures must be validated quarterly.

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5. Bath Chemistry and Equipment Standards

5.1 **Chemical Control**
Chemical composition shall be monitored at intervals appropriate to the process (daily minimum for production baths). Corrective additions must follow documented replenishment formulas.

5.2 **Contamination Limits**
Contaminant thresholds (e.g., tramp metals, organics) must not exceed AMCA-specified limits for each process class. Bath purification methods (carbon treatment, dummy plating, filtration) shall be employed as needed.

5.3 **Equipment Calibration**
Critical measurement devices—including pH meters, thermometers, conductivity meters, and rectifiers—must be calibrated at least monthly and after any repair.

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6. Plating Process Standards

6.1 **Current Density and Temperature Regulation**
Plating shall occur within the specified current density and temperature ranges. Deviations beyond ±5% require engineering approval and documented justification.

6.2 **Agitation and Distribution**
Mechanical or air agitation shall ensure uniform deposition. Parts must be fixtured to allow proper solution flow and minimize thickness variations.

6.3 **Thickness Requirements**
Minimum and maximum plating thicknesses must meet the applicable AMCA coating class. Thickness shall be verified by XRF, coulometric analysis, or micrometric measurement.

6.4 **Adhesion and Integrity**
Coatings shall show no peeling, blistering, or flaking when subjected to bend testing, thermal cycling, or tape pull testing as defined in AMCA-TM-508.

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7. Post-Treatment Standards

7.1 **Rinsing**
All parts shall be thoroughly rinsed between process steps. Final rinsing must meet conductivity and clarity requirements.

7.2 **Passivation and Sealing**
Where applicable, passivation or sealing compounds must be applied according to controlled dwell times and temperatures.

7.3 **Drying and Handling**
Parts shall be dried in clean, controlled environments with no exposure to contaminants. Handling equipment must be non-abrasive and corrosion-free.

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8. Inspection and Testing Requirements

8.1 **Visual Inspection**
All finished parts shall undergo 100% visual inspection for defects including pitting, discoloration, staining, and incomplete coverage.

8.2 **Dimensional Verification**
Critical dimensions affected by finishing processes shall be verified post-process and documented.

8.3 **Corrosion Testing**
Salt-spray, humidity, or cyclic corrosion tests shall be administered for coatings requiring corrosion-resistance verification, following AMCA test protocols.

8.4 **Hardness and Wear Testing**
Hard coatings (e.g., chrome, nickel, anodic films) shall be hardness-tested using standardized microhardness or nanoindentation methods.

8.5 **Sampling Plans**
Inspection sampling shall follow AMCA-SPC-102 or an approved equivalent statistical sampling method.

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9. Environmental and Safety Compliance

9.1 **Chemical Storage and Handling**
All chemicals must be stored in labeled, compatible containers. Secondary containment is required for all corrosive or toxic materials.

9.2 **Ventilation and Air Quality**
Plating lines must operate with adequate fume extraction systems. Air quality monitoring shall be performed quarterly.

9.3 **Waste Treatment**
Spent solutions, sludges, and rinse waters must be treated and disposed of according to AMCA environmental guidelines and federal regulations.

9.4 **Emergency Response**
Facilities must maintain spill response kits, eyewash stations, and documented emergency procedures accessible to all staff.

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10. Nonconformance and Corrective Action

10.1 **Nonconformance Identification**
Any deviation from process requirements or inspection criteria must be recorded in a nonconformance report (NCR).

10.2 **Corrective and Preventive Actions**
Root-cause analysis shall be performed for all critical NCRs. Documented corrective and preventive actions must be implemented within defined timelines.

10.3 **Rework and Reprocessing**
Rework methods must be approved by engineering and documented to ensure coating integrity is not compromised.

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11. Continuous Improvement

Facilities shall conduct periodic audits, review process capability metrics, and implement improvements in efficiency, waste reduction, and quality performance. Annual AMCA compliance audits are mandatory.

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12. Certification and Compliance Maintenance

To maintain AMCA certification, facilities must:

- Pass annual on-site audits
- Maintain operator training and equipment calibration records
- Demonstrate adherence to these standards without recurring major violations

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