



# EXTRUSIONS QUALITY STANDARD



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# AMERICAN MANUFACTURING COMPLIANCE AUTHORITY (AMCA) QUALITY STANDARDS FOR EXTRUSIONS Revision 1.0 — 2025

## 1. Scope

These Quality Standards for Extrusions, issued by the American Manufacturing Compliance Authority (AMCA), define the minimum requirements for the production, inspection, testing, handling, and documentation of metal and polymer extruded profiles used in industrial, structural, architectural, and consumer applications. These standards apply to aluminum, steel, copper, engineered polymers, and composite extrusion processes unless otherwise specified.

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## 2. Definitions

**Extrusion:** A continuous manufacturing process in which material is forced through a die to produce a profile with a defined cross-section.

**Profile:** The resulting extruded shape.

**Lot:** A defined quantity of extrusions produced under uniform conditions.

**Defect:** Any deviation from the specified dimensional, material, or visual requirements.

**Critical Dimension:** A dimension essential to fit, function, or safety of the extrusion.

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## 3. Material Requirements

### 3.1 Material Certification

Manufacturers must obtain and retain material certifications from suppliers verifying alloy, grade, melt/source identification, and mechanical properties.

### 3.2 Material Identification

All raw materials must be tagged or labeled with lot numbers traceable to certificates of conformance.

### 3.3 Contamination Control

Raw materials shall be free from contamination including oils, oxides, foreign

materials, moisture, and corrosion unless allowed by the specific process.

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## **4. Process Control Requirements**

### **4.1 Equipment Calibration**

All extrusion presses, measurement devices, temperature sensors, and control systems must be calibrated at intervals not exceeding 12 months. Records must be maintained for a minimum of five years.

### **4.2 Process Parameters**

Manufacturers shall maintain documented process parameters including:

- Billet or feedstock temperature
- Extrusion pressure and speed
- Die temperature and condition
- Cooling method and rate
- Puller tension and alignment

Process deviations exceeding  $\pm 10\%$  of specified parameters must trigger a hold-and-review protocol.

### **4.3 Die Management**

Dies must be inspected before each production run for wear, cracking, buildup, or deformation.

Die maintenance logs shall include cleaning, repairs, replacements, and life-cycle tracking.

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## **5. Dimensional Requirements**

### **5.1 Tolerance Standards**

Dimensional tolerances shall comply with applicable engineering drawings, CAD models, or customer specifications. If not otherwise stated, standard tolerances shall adhere to the following AMCA default ranges:

- **Linear dimensions:**  $\pm 0.25$  mm for profiles under 50 mm;  $\pm 0.50$  mm for profiles over 50 mm

- **Wall thickness:**  $\pm 10\%$  of nominal thickness
- **Twist:** Maximum 2 mm per meter
- **Straightness:** Maximum 1.5 mm per meter
- **Flatness (for hollow or wide profiles):** Maximum 1.0 mm variation

## 5.2 Critical Dimension Control

Critical dimensions must be verified at the start of production, after every die change, and at intervals not exceeding one hour during continuous runs.

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## 6. Surface Finish Requirements

### 6.1 General Appearance

All extrusions must be free from visible defects affecting performance or customer acceptance, including:

- Scratches exceeding 0.2 mm depth
- Gouges, dents, cracks, pits, folds
- Surface contamination
- Burn marks or discoloration

### 6.2 Special Finishes

Profiles intended for anodizing, coating, or polishing must meet pre-finish quality requirements with no surface anomalies that would impede finishing.

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## 7. Mechanical Property Requirements

### 7.1 Testing Frequency

Mechanical property testing shall occur at least once per production lot or every 8-hour shift, whichever comes first.

### 7.2 Minimum Requirements

Manufacturers shall meet or exceed the mechanical properties specified by the material standard or customer requirements, including:

- Yield strength
- Tensile strength

- Elongation
- Impact resistance (for plastics and composites)

### 7.3 Heat Treatment Verification

For materials requiring heat treatment (e.g., aluminum T6 temper):

- Verify furnace temperature uniformity
  - Record cycle times and load configurations
  - Conduct hardness testing on each lot
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## 8. Visual and Structural Inspection

### 8.1 Sampling Plan

Inspection shall follow ANSI/ASQ Z1.4 or equivalent sampling plans unless full inspection is required.

### 8.2 Non-Destructive Testing (NDT)

Where structural integrity is critical, ultrasonic, eddy current, or X-ray inspection shall be conducted to detect internal voids or delamination.

### 8.3 Defect Classification

- **Critical defects:** Conditions that compromise safety or load-bearing capacity.
  - **Major defects:** Conditions affecting fit, function, or durability.
  - **Minor defects:** Cosmetic imperfections within acceptable limits.
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## 9. Handling and Packaging Standards

### 9.1 Handling

Extrusions must be handled using padded supports, non-abrasive slings, and controlled lifting methods to avoid bending, scratching, or deformation.

### 9.2 Packaging

Packaging shall:

- Prevent mechanical damage, corrosion, and contamination
- Support the extrusion's full length

- Include moisture barriers for corrosion-sensitive materials
- Ensure stack stability during transport

### **9.3 Labeling**

Each bundle or container must display:

- Manufacturer name
  - Lot number
  - Profile ID and revision
  - Quantity and length
  - Date of manufacture
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## **10. Documentation and Traceability**

### **10.1 Production Records**

Manufacturers must keep:

- Material certificates
- Process parameter records
- Inspection and test results
- Packaging and shipping logs

### **10.2 Traceability**

Each extrusion must be traceable from raw material to shipment.

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## **11. Nonconformance and Corrective Action**

### **11.1 Identification and Segregation**

Nonconforming extrusions must be immediately tagged and physically segregated.

### **11.2 Corrective Action Process**

A root-cause analysis shall be conducted for repeated or severe deviations, followed by documented preventive measures.

### **11.3 Rework Limitations**

Rework (e.g., cutting, straightening, machining) must not compromise structural

integrity or dimensional requirements.

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## **12. Certification and Compliance**

### **12.1 Certificate of Conformance**

A signed certificate must accompany each shipment, confirming compliance with AMCA Extrusion Standards and customer specifications.

### **12.2 Audits**

Manufacturers are subject to AMCA compliance audits, including document review, plant inspection, and product sampling.

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## **13. Revision Control**

Revisions to this standard must be approved by AMCA's Standards Committee. Manufacturers shall maintain controlled copies and update internal procedures accordingly.

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