AMERICAN MANUFACTURING COMPLIANCE AUTHORITY

SHEET METAL FABRICATION AND ASSEMBLY SERVICES QUALITY STANDARD

867 BOYLSTON STREET
5TH FLOOR, SUITE 207
BOSTON, MA 02116
board@amcacert.com

AMCA Quality Standards for Metal Fabrication and Assembly

1. Introduction

The American Manufacturing Compliance Authority (AMCA) establishes comprehensive standards for the metal fabrication and assembly industry to ensure quality, safety, and compliance with applicable regulations. These standards encompass design, materials, processes, inspection, and assembly to ensure the creation of reliable, durable, and safe metal products. Compliance with AMCA standards is essential for ensuring that metal components and assemblies meet the rigorous demands of end users in sectors such as construction, automotive, aerospace, and industrial manufacturing.

2. General Requirements

- **Quality Management System (QMS):** All fabricators must maintain a documented QMS in compliance with ISO 9001:2015 or equivalent. The system must define procedures for design, procurement, fabrication, testing, and inspection.
- **Personnel Qualifications:** Fabrication and assembly personnel must have certifications consistent with industry standards, including but not limited to:
  - Certified Welder (AWS D1.1)
  - Certified Welding Inspector (CWI)
  - Certified Quality Technician (CQT)
  - Certified Metal Fabricator (CMF)

  These qualifications should be renewed periodically as required by the relevant certification bodies.

3. Material Standards

- **Material Specifications:** All raw materials used in fabrication must meet ASTM, ANSI, or equivalent international standards for their intended application. Materials must be traceable to their origin, and certificates of compliance or mill test reports must be available upon request.
- **Material Inspection:** Incoming materials shall undergo a thorough inspection process to verify that they conform to specifications. Inspections

may include visual examination, dimensional checks, and material testing (e.g., tensile, hardness, chemical composition).

- **Storage and Handling:** Materials should be stored in controlled environments to prevent contamination, corrosion, or physical damage. Steel materials must be stored off the ground and protected from the elements. Non-ferrous materials must be handled with care to prevent oxidation or surface damage.

4. Fabrication Process

- **Cutting and Shaping:** All cutting, shaping, and forming operations must be performed using equipment that is properly maintained and calibrated. The use of CNC machinery is preferred for precision cuts. Operators must follow all relevant safety procedures and wear the necessary personal protective equipment (PPE).
- **Welding:** Welding operations must comply with the following:
  - Use of proper welding procedures as outlined in the AWS standards.
  - Welders must adhere to pre-qualified or qualified welding procedures, with appropriate filler material for the specific base metal.
  - All welds must be inspected visually and undergo non-destructive testing (NDT) methods (e.g., ultrasonic testing, magnetic particle inspection, radiographic inspection) as applicable.
- **Bending and Forming:** Bending and forming must be carried out according to the material's properties and thickness. Equipment should be set up to avoid excessive deformation or cracking. Forming tolerances should be in compliance with the specifications provided in the design.
- **Machining:** If machining operations (e.g., milling, drilling, turning) are required, they must be executed with precision to the specified dimensions. Tooling and equipment must be maintained regularly for accuracy.

5. Assembly Process

- **Assembly Instructions:** Detailed assembly instructions must be provided for all components, including proper handling, alignment, and fastener specifications. Assemblers must be trained on these procedures to ensure accurate and consistent results.
- **Fastening and Joining:** All fastening methods (bolting, riveting, welding, etc.) must meet the design specifications. Bolted connections should be

torqued according to manufacturer recommendations, and welds should meet the required strength and appearance criteria.

- **Surface Preparation:** All components must undergo appropriate surface preparation before assembly. This includes cleaning to remove oils, dirt, rust, and mill scale. Surface coatings (e.g., paint, powder coating, galvanizing) must be applied according to industry best practices to prevent corrosion and enhance durability.

6. Inspection and Testing

- **In-Process Inspection:** Regular in-process inspections must be conducted at key stages of fabrication and assembly. This includes visual checks, dimensional verification, and process control tests to ensure conformity to drawings and specifications.
- **Final Inspection:** A comprehensive final inspection should be carried out before the product is released for shipment or delivery. This inspection should verify that all components are correctly assembled, welds are structurally sound, surface finishes meet requirements, and dimensional tolerances are within limits.
- **Non-Destructive Testing (NDT):** NDT methods such as ultrasonic testing (UT), radiographic testing (RT), and magnetic particle inspection (MPI) must be used where applicable to assess the integrity of welded joints, structural elements, and other critical components.
- **Destructive Testing:** Where applicable, destructive testing may be performed to confirm the mechanical properties of materials or assemblies. Examples include tensile testing, fatigue testing, and impact testing.

7. Tolerances and Dimensional Control

- **Tolerances:** All metal fabrication and assembly processes must adhere to the dimensional tolerances specified in the project documentation. Standard tolerances must align with ASME Y14.5 or equivalent standards. Any deviations outside the allowed tolerance range must be approved by the customer or end user.
- **Dimensional Control:** Fabricators must implement procedures for dimensional control throughout the process. Equipment used to measure dimensions, such as calipers, micrometers, and laser scanning devices, must be calibrated and traceable to national standards.

8. Safety Standards

- **Workplace Safety:** All fabrication and assembly operations must be conducted in compliance with OSHA regulations, including proper signage, ventilation, fire protection, and PPE usage. Operators should be trained in emergency response procedures, such as fire suppression and first aid.
- **Equipment Safety:** All machinery and equipment must be regularly inspected and maintained to ensure they meet safety standards. Lock-out/tag-out (LOTO) procedures must be followed when performing maintenance on equipment.
- **Ergonomics:** The design of workstations and handling procedures should minimize physical strain on workers, employing ergonomic principles to reduce the risk of repetitive stress injuries.

9. Packaging and Delivery

- **Packaging:** Finished products must be packaged to prevent damage during transit. This may include the use of foam, plastic sheeting, wood crates, or metal framing, depending on the size and nature of the components.
- **Shipping Documentation:** All shipments must include accurate shipping documentation, including certificates of compliance, material traceability records, and inspection reports, as applicable.

10. Continuous Improvement

- **Feedback Mechanism:** A system must be in place to capture feedback from customers and field personnel, enabling continual improvement of the fabrication and assembly processes.
- **Root Cause Analysis:** Nonconformities and defects should be investigated through root cause analysis. Corrective actions should be implemented to prevent recurrence, and these actions must be documented and monitored for effectiveness.
- **Training and Development:** Ongoing training programs should be provided for all personnel to ensure that they remain current with the latest industry standards, techniques, and safety practices.

11. Conclusion

By adhering to the above standards, metal fabrication and assembly companies can ensure the production of high-quality, safe, and compliant products. AMCA's

commitment to quality, precision, and continuous improvement is fundamental to the advancement of manufacturing excellence in the United States.

NOTE: This set of standards provides a comprehensive framework for maintaining quality in the metal fabrication and assembly industry. For further details or specific updates, manufacturers should regularly consult the latest AMCA publications.

Copyright © 2025 by AMCA Quality, Inc.
All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, email, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law.

AMCA, Inc.
867 Boylston Street
5th Floor, Suite 207
Boston, MA 02116

Printed in the United States of America