



AWS Structural Welding Fabrication & Erection Quality Manual Sample

Selected pages (not a complete manual)

Sample includes:

- ✓ **Quality Manual Pages**
- ✓ **Forms Examples**

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Fabrication and Erection

Quality Manual

Operating Policies of the [CompanyName] Quality System

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President/ Date

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QUALITY MANUAL

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1. QUALITY MANUAL CONFORMANCE

For this Quality Manual, the following codes determine the rules for controlling welding processes including weld acceptance at the [CompanyName] facility.

Reference Standard No.	Reference Standard Title
AWS D1.1/D1.1M	Structural Welding Code – Steel
AWS D1.2	Structural Welding – Aluminum
AWS D1.3	Structural Welding – Sheet Metal
AWS D1.4	Structural Welding – Reinforcing Steel
AWS D1.6	Structural Welding – Stainless Steel
AWS D1.7	Structural Welding – Strengthening and Repair

Selected Pages

7. MATERIAL CONTROLS

The Quality Manager ensures that all types of materials and equipment that affect quality are identified and controlled.

The Quality Manager evaluates the expected use of materials and equipment and identifies types of materials and equipment that may affect project quality. For each item, the Quality Manager sets specifications for their intended use, including:

- Compliance to contract requirements
- Compliance to code and industry standards and listing requirements
- Structural integrity
- Performance
- Durability
- Appearance
- Product identification for traceability.

The Quality Manager identifies controlled material and equipment that apply to the project.

The Quality Manager ensures that purchase orders for listed materials and equipment include the relevant specifications.

Only approved materials are used in the fabrication and erection process.

7.1. MATERIAL RECEIVING

The Superintendent or qualified receiving inspector inspects materials for conformance to the purchase order and project quality requirements. The receiving inspection includes a verification that the

- Correct material has been received
- The material is identified and meets the traceability requirements for the material
- Material certifications and/or test reports meet the specified requirements if required
- Materials are tested and approved for the specific application if required

Material receiving inspections are recorded on the Material Inspection and Receiving Report in the Forms section at the end of this Quality Manual.

Metals material receiving inspections are recorded on the Metals Material Receiving Inspection Report in the Forms section at the end of this Quality Manual.

7.2. MATERIAL INSPECTION AND TEST STATUS

The status of each material quality control inspection or test is clearly marked by tape, tag, or other easily observable signal to ensure that only items that pass quality inspections are used.

For each quality-controlled material, the Quality Manager determines the appropriate method for identifying quality inspection and test status.

7.3. MATERIAL STORAGE

The Superintendent ensures that all materials received and inspected will be stored and handled in a manner that protects them from damage, moisture, dirt and intrusion of foreign materials.

Filler materials of different filler metal types, sizes and heat numbers (if applicable) will be labeled and stored separately to prevent intermixing.

Filler materials will be stored in a controlled environment to prevent contamination and degradation. The storage environment will conform to any elevated temperature holding requirements of the filler metal manufacturer and the applicable AWS code or filler metal specification.

For additional details on weld filler material storage, see Filler Metal in the subsection below.

7.4. CONTROLLED USE OF MATERIALS

The Superintendent ensures that fabrication uses only materials specified in the contract technical specifications, contract drawings, and approved submittals. Substitutions are made only by agreement of the customer and documented by a Change Order. A Change Order form is included in the Forms section in this Quality Manual.

The Superintendent ensures that each work task that uses the inspected materials proceed only after the material has been accepted by the material quality inspection or test if required.

Materials that are defective, deteriorated, damaged, or not approved are not used. The Superintendent clearly marks such materials for non-use or otherwise holds them aside.

7.5. CONTROLLED MATERIAL IDENTIFICATION AND TRACEABILITY

The Quality Manager determines types of project materials that require quality controls.

For each type of quality-controlled material, the Quality Manager determines lot control traceability requirements, if any, and specifies the means of lot identification. Identification methods may include physical labels, tags, markings and/or attached certification documents.

When lot-controlled materials are received, the Superintendent verifies that materials have the specified lot identifications.

The Superintendent maintains lot identification at all production phases from receipt, through production, installation, or assembly, to final completion. Acceptable methods for preserving lot identification include physically preserving observable lot identifications, recording the lot identification on a work task quality inspection form or other work record, or collecting the physical lot identifier as a record supplemented with location.

If lot-controlled materials are without lot identification, the Superintendent deems the materials as nonconforming and segregates them and/or clearly marks them to prevent inadvertent use. The Superintendent treats the material according to the company policy for nonconformances. Only the Quality Manager can re-identify or re-certify the materials.

7.6. FILLER METAL

The Quality Manager ensures that filler material use will conform to the applicable AWS Welding Code(s) or Specification(s) (i.e., D1.1., D1.5) as specified in the Manual Conformance section of this Manual.

7.6.1. WELD FILLER MATERIAL (WFM) CONTROL PROGRAM

[CompanyName] has a Weld Filler Material Control Program in place that includes procurement, receipt, storage, issuance, and return of filler materials. The Quality Manager ensures that issuers, welders and procurement / receipt inspectors are trained on the WFM controls.

7.6.1.1. FILLER MATERIAL PROCUREMENT

The Operations Manager considers the end use of the weldment when procuring filler materials. Requirements will vary depending on the application. WFM procurement will be in accordance with ANSI/AWS A5.01, *Filler Metal Procurement Guidelines*.

7.6.2. FILLER MATERIAL RECEIPT

To confirm that the requirements of the Purchase Order are met, the Superintendent or a qualified receipt inspector will perform a material receipt inspection for all WFM in accordance with Material Control procedures specified in this Manual. Specifically, the inspector will observe the condition of the container(s) for dents, broken seals, and overall damage; ensure markings are legible and meet specified criteria; review documented test reports (CMTR / MTR's, etc.) against the PO, the SFA, and AWS classification requirements for required test results and chemistry ranges.

7.6.3. FILLER MATERIAL STORAGE

Electrodes, particularly low hydrogen, have specific storage conditions, temperatures, and rebaking requirements. The Quality Manager ensures that storage ovens are clearly labeled to trace the specific heat and lot information.

The Quality Manager ensures that WFM is stored in temperature and humidity-controlled area. Segregation within storage and issuance areas will be maintained. Alloyed materials will be clearly identified, and containers segregated from other materials and alloys.

When control of material is lost, it will be taken out of service and salvaged / scrapped.

7.6.4. FILLER MATERIAL ISSUE

The Quality Manager will maintain a filler material issue system that includes verification review of the welder range of qualification and expiration date before issuing material. Issuance of multiple filler materials (classifications) to the welder is not permitted except when the welder is performing multi-process welds, e.g., GTAW root, SMAW fill & cap. This is acceptable only when permitted by the WPS.

Weld filler material issue will be logged and tracked on the Weld Filler Material Issue Log form. A sample form is in Forms section at the end of this Quality Manual. The Weld Filler Material Issue Log includes the following information:

- Job number
- Heat
- AWS class
- Welder name
- Welder ID
- Issue date
- Quantity
- WPS

Low hydrogen electrodes will be issued in heated rod caddies. If this is not possible, then the amount of time they are out of a heated oven will be controlled. Welders are given an “issue ticket” with all applicable information regarding the filler material.

7.6.5. FILLER MATERIAL RETURN

The Quality Manager ensures that filler material that is damaged or where control has been lost will be discarded / scrapped. Stubs must be controlled to prevent unauthorized use. WFM may be placed back into storage if in good usable condition and traceability has been maintained. Low hydrogen electrodes may require segregation and re-baking before being placed in controlled issue locations.

Filler metals which have exceeded the maximum allowable exposure time to the atmosphere must not be used. They may be used only after redrying (baking) requirements of the filler manufacturer are met.

Unusable or damaged filler metals must be clearly marked to prevent inadvertent use and removed from the filler material storage area.

Selected Pages

8. MEASURING DEVICE CONTROL AND CALIBRATION

8.1. CALIBRATION

[CompanyName] uses measuring and testing equipment in its fabrication process to measure dimensions and perform flaw detection on sheet, tube, or pipe.

Prior to the start of every project, the Quality Manager evaluates the project requirements and determines if there are measuring devices that require controls to assure quality results.

For each type of device, the Quality Manager identifies:

- Restrictions for selection
- Limitations on use.
- National measurement standard
- Calibration procedure requirements including the calibration technique, frequency of calibration or conditions when recalibration is required.

The Quality Manager ensures that measuring and test equipment is controlled, calibrated, and maintained. Calibration will be performed by qualified welding personnel using a written calibration procedure.

The Quality Manager ensures that all calibration procedures are traceable to national measurement standards.

8.2. VERIFICATION AND VALIDATION OF WELDING MACHINES

At least annually, The Quality Manager ensures that welding machines are verified as specified by the manufacturer. At a minimum, the following will be checked:

- Condition of volt meters, amp meters and gas flow meters (if equipped)
- Condition of cables
- Condition of hoses (if equipped)
- Condition of wire feeders (if equipped)

8.3. CALIBRATION IDENTIFICATION

The Quality Manager ensures that a calibration identification label or tag is securely fixed to each piece of measuring and test equipment that will be controlled, calibrated and maintained. The label or tag will indicate the date of the last calibration and the due date of the next calibration.

The Quality Manager ensures that the information on the calibration identification label or tag matches the information on the Test Equipment Calibration Plan and Log form.

A sample Test Equipment Calibration Plan and Log form is included in the Forms section at the end of this Manual.

8.4. CALIBRATION RECORDS

A record of all measuring and test equipment that will be controlled, calibrated, and maintained is listed on the Test Equipment Calibration Plan and Log included as an exhibit in the Forms section of this Manual.

The Test Equipment Calibration Plan and Log includes the following information:

- Type of equipment
- Serial number
- Calibration frequency
- Calibration tolerance
- Date calibrated
- Next calibration due date
- Standard used

Calibration records will be controlled and maintained in accordance with the Document Control procedures in the Document Controls section in this Manual.

Selected Pages

12. INSPECTIONS AND TESTS

ASSURE COMPLIANCE

12.1. INSPECTION OF WELDING WORK

12.1.1. DIMENSIONAL INSPECTIONS – SIZE, LENGTH, AND LOCATION OF WELDS

A qualified welding inspector inspects all weld dimensions to ensure that the size, length, and location of all welds conform to the requirements of the applicable AWS Welding Code(s) or Specification(s) (i.e., D1.1., D1.5) as specified in the Manual Conformance section of this Manual, and to the detail drawings; and that no unspecified welds have been added without the approval of the contract Engineer.

12.1.2. WELD INSPECTIONS

During the welding process, at suitable intervals, weld inspections are performed by a qualified welding inspector. Such inspections will be conducted, on a sampling basis, prior to assembly, during assembly, and during welding. The welding inspector will observe joint preparation, assembly practice, and the welding techniques, and performance of each welder, welding operator, and tack welder to ensure that the applicable requirements of the AWS Welding Code(s) or Specification(s) (i.e., D1.1., D1.5) as specified in the Manual Conformance section of this Manual are met.

12.1.3. FINAL INSPECTIONS

After completion of the work, a certified welding inspector performs a final visual inspection of every weld to ensure that the requirements of the applicable sections of code are met. Other acceptance criteria, different from those described in the applicable AWS Welding Code(s) or Specification(s) (i.e., D1.1., D1.5) as specified in the Manual Conformance section of this Manual, may be used when approved by the Engineer on the contract.

Size and contour of welds will be measured with suitable gages. Visual inspection for cracks in welds and base metal and other discontinuities will be observed with the aid of a strong light, magnifiers, or such other devices as may be found helpful.

12.1.4. WELD INSPECTION AND TEST STATUS

The inspector identifies final acceptance or rejection of the work either by marking on the work or with other recording methods.

Final product acceptance inspection shall be indicated by permanent stamping or marking adjacent to the weld or must be unambiguously identified in the inspection report.

12.1.5. WELD INSPECTION RECORDS

The inspector shall make a record of the inspection which shall include the following information:

- Unique part identifier (serial number, shop order, or batch number)
- Drawing number and revision
- Procedure and applicable acceptance criteria
- Inspector identity and date of inspection
- Record of defect findings

- Nominal
- Actual
- Tolerance

The Inspector will record inspection results on the Visual Weld Inspection Report or other form if approved by the contract Engineer.

An example of the Visual Weld Inspection Report is included in the Forms section at the end of this Manual.

12.2. REQUIRED WORK TASK QUALITY INSPECTIONS AND TESTS

The Quality Manager identifies each Task that is a phase of fabrication and erection that requires separate quality controls to assure and control quality results. Each Task triggers a set of requirements for quality control inspections before, during and after work tasks.

Tasks are divided into two categories:

- Discrete Tasks are standard type of work where a completion inspection is performed one time at the completion of a phase of work.
- Process Tasks are tasks where completion inspections are performed continuously. Continuous inspections are required when there is a limited window of time to perform a completion inspection before the next task begins. Process tasks may also be characterized by independent monitoring of a work process, such as welding, where the observer verifies conformance to work procedures.

Process tasks undergo additional quality controls that continuously monitor compliance to specifications.

Independent quality audits are conducted to verify that the task quality controls are operating effectively.

Fabrication and erection projects may execute a work task multiple times in a project, in which case a series of quality inspections are required for each work task.

12.3. MATERIAL INSPECTIONS AND TESTS

Material quality inspections and tests ensure that purchased materials meet purchase contract quantity and quality requirements.

12.3.1.1. MATERIAL RECEIVING INSPECTION

The Supervisor inspects or ensures that a qualified inspector inspects materials prior to use for conformance to project quality requirements. The receiving inspection includes a verification that:

- The correct material has been received
- The material is identified and meets the traceability requirements for the material
- Material certifications and/or test reports meet the specified requirements
- Materials are tested and approved for the specific application

12.3.1.2. SOURCE INSPECTIONS

Source quality inspections are required when quality characteristics cannot or will not be verified during subsequent processing. The Quality Manager determines if a source inspection is necessary to validate supplier quality before materials are delivered to the project jobsite.

The Supervisor ensures that each work task that uses the source inspected materials proceed only the material has been accepted by the source inspection.

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ANNEX N

AWS D1.1/D1.1M:2010

Procedure Qualification Record (PQR) # _____
Test Results

TENSILE TEST

Specimen No.	Width	Thickness	Area	Ultimate Tensile Load, lb	Ultimate Unit Stress, psi	Character of Failure and Location

GUIDED BEND TEST

Specimen No.	Type of Bend	Result	Remarks

VISUAL INSPECTION

Appearance _____
Undercut _____
Piping porosity _____
Convexity _____
Test date _____
Witnessed by _____

Radiographic-ultrasonic examination
RT report no. _____ Result _____
UT report no. _____ Result _____

FILLET WELD TEST RESULTS

Minimum size multiple pass _____ Maximum size single pass _____
Macroetch _____ Macroetch _____
1. _____ 3. _____ 1. _____ 3. _____
2. _____ 2. _____

Other Tests

All-weld-metal tension test

Tensile strength, psi _____
Yield point/strength, psi _____
Elongation in 2 in, % _____
Laboratory test no. _____

Welder's name _____

Clock no. _____ Stamp no. _____

Tests conducted by _____

Laboratory _____

Test number _____

Per _____

We, the undersigned, certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in conformance with the requirements of Clause 4 of AWS D1.1/D1.1M, (_____) *Structural Welding Code—Steel*.
(year)

Signed _____

Manufacturer or Contractor

By _____

Title _____

Date _____

Form N-1 (Back)

[CompanyName] Test Equipment Calibration Plan and Log						
Type of measuring device	Device Serial Number	Calibration Type and Frequency	Calibration Tolerance	Calibrated By/ Calibration Date	Standard Used	Next Calibration Due Date

[CompanyName] Visual Weld Inspection Report

Report ID #	Unique Part ID (Serial #, Shop order, or batch number)	Project ID	Project Name	Drawing # & Rev.	Date of Inspection
Procedure and Acceptance Criteria / Ref#	Inspection Result Pass/Fail	Nominal	Actual	Tolerance	Comments
Final acceptance of completed work (sign and date)					
Inspector Sign and Date			Superintendent Sign and Date		

[CompanyName] Weld Filler Material Issue Log							
Job Number	Heat	AWS Class	Welder Name	Welder ID	Date	Quantity	WPS

[CompanyName] Nonconformance Report		
Nonconformance Report Control ID	Project ID	Project Name
	[ProjectNumber]	[ProjectName]
Preparer Signature/ Submit Date		Quality Manager Signature / Disposition Date
Description of the requirement or specification		
Description of the nonconformance, location, affected area, and marking		
Disposition	<input type="checkbox"/> Replace <input type="checkbox"/> Repair <input type="checkbox"/> Rework <input type="checkbox"/> Use As-is	
	Approval of disposition required by customer representative? Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Customer approval signature /date: _____	
Corrective Actions	<input type="checkbox"/> Corrective actions completed Name/Date: _____	
	Customer acceptance of corrective actions required? Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Name/Date: _____	
Preventive Actions		
	<input type="checkbox"/> Preventive actions completed Name/Date: _____	



For More Information:

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