AWS Welding/Fabrication Comprehensive Quality Plan

Selected pages (not a complete plan or manual)

Sample includes:

- ✓ Project-specific Quality Plan Pages
- ✓ Submittal Forms Examples
- ✓ AWS Forms Examples

Contact:
First Time Quality
410-451-8006

www.firsttimequalityplans.com

[CompanyName]

Fabrication and Erection

Quality Assurance/Quality Control Plan

[ProjectName]
[ProjectNumber]

Management acceptance

This Construction Quality Assurance/Quality Control Plan has been reviewed and accepted.

Endorsed By: (Name / Title)	[QualityManagerName], Quality Manager		
Signature:	*[QualityManagerName]*	Date:	[Date]
Version	1.0	Notes	Initial Issue

SIGNATURE SHEET

Plan Preparer

This [CompanyName] Project Quality Control Plan was prepared in accordance with the contract specifications and requirements of the [CompanyName] quality system and approved by:

[QualityManagerName] / [Date]

[QualityManagerName], Quality Manager /Date

Approval by Company Officer

This [CompanyName] Project Quality Control Plan is approved by:

[PresidentName] / [Date]

[PresidentName] President /Date

Plan Concurrence

[CompanyName] Project Quality Control Plan concurrence by:

[ProjectManagerName] / [Date]

[ProjectManagerName], Project Manager /Date

[SuperintendentName] / [Date]

[SuperintendentName], Superintendent /Date

PROJECT-SPECIFIC WELDING QUALITY PLAN

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PROJECT QC ORGANIZATION CHART

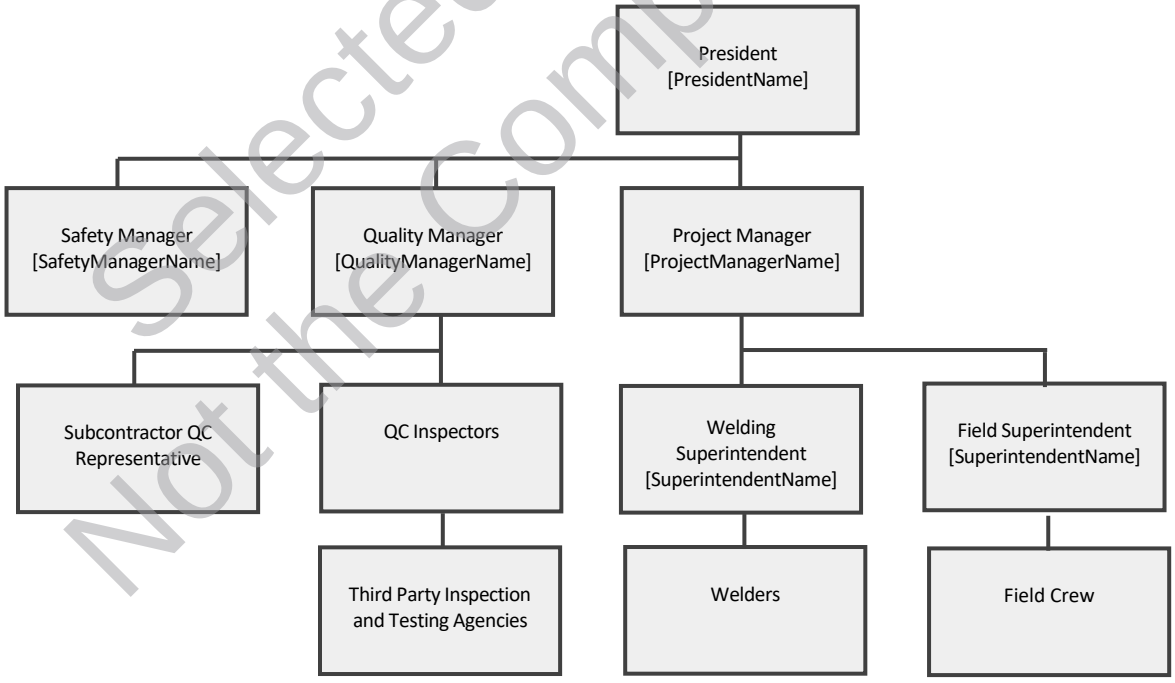
The Project QC Organization Chart shows the QC organizational structure. The chart includes job positions along with the name of each person appointed to that position. Figure A-1 shows the QC Organization Chart for this project.

The President defines the organization chart for the project. The organizational chart includes job titles, names of assigned personnel, and organizational and administrative interfaces with the customer. The organization chart defines lines of authority as indicated by solid connection; dotted lines indicate lines of communication. The lines of authority preserve independence of quality control personnel from the pressures of production.

When a person with authority is unavailable only a person with higher authority may assume the responsibility of the unavailable person.

The President assesses the qualification requirements for each position on the project organization chart, qualifications of each person, and then appoints only qualified persons to the project organization.

Figure A-1



D. Personnel Qualifications and Technical Certifications

[CompanyName] ensures that only knowledgeable, capable employees carry out the planning, execution, and control of the project.

We train our employees on quality standards and procedures based on project requirements as well as their job positions. Then we validate their capabilities before they are assigned to carry out their quality job responsibilities on the project. Ongoing monitoring of performance continually validates qualifications of each employee.

The Quality Manager qualifies employee capabilities to ensure that they are capable of completely carrying out their assigned quality responsibilities including the following capabilities:

- Knowledge of Company quality standards
- Knowledge of job responsibilities and authority
- Demonstrated skills and knowledge
- Demonstrated ability
- Demonstrated results
- Required training
- Required experience

The Quality Manager also evaluates independent contractor personnel on the same standards that apply to employees.

Personnel Certification and Qualification Requirements

Personnel certifications are required for the following:

Certification or License Title	Reference Standard No.	Reference Standard Title
Welders of structural steel	AWS D1.1/D1.1M	Structural Welding Code – Steel
Inspectors of structural steel welds	AWS D1.1/D1.1M	Structural Welding Code – Steel

Certified Welder Qualification Requirements

Only certified welders may perform welding activities. A welder must be certified to the AWS welding code, and any welding procedures.

For each project, the Quality Manager will determine welder certification requirements for codes and welding procedures

Certified welders must meet the requirements of AWS Q97-93 American Welding Society Standard for AWS Certified Welders. Only a Certified Welding Inspector can conduct welding tests for the purposes of welder certification.

The Quality Manager approves the qualification of all welders before they begin welding on a specific project.

Qualification of Welders for Specific Welding Codes

When indicated on the welding procedure, the Quality Manager approves qualification of welders to the specific welding procedure.

Qualification of Welders for Specific Welding Procedures

When indicated on the welding procedure, the Quality Manager approves qualification of welders to the specific welding procedure.

Certified Welding Inspector Requirements

Certified welding inspectors must be certified by the American Welding Society to AWS QC1-2007 American Welding Society Standard for AWS Certification of Welding Inspectors to the applicable code that applies to the inspections they perform.

The Quality Manager approves the qualification of all certified welding inspectors.

NDE Welding Inspector Requirements

Radiographic Interpreters shall be certified in accordance with AWS B5.15, Specification for the Qualification of Radiographic Interpreters.

Non-Radiographic NDE welding inspectors must be certified by the American Welding Society to AWS QC1-2007 American Welding Society Standard for AWS Certification of Welding Inspectors to the applicable code that applies to the inspections they perform.

The Quality Manager approves the qualification of all NDE welding inspectors.

[CompanyName]
Personnel Qualification Form

Name:	Job Position:

Project ID	Project Name	Approval	Approved By
[ProjectNumber]	[ProjectName]	☐Yes ☐No	

Review Topics	Project-Related Job Credentials	
	Certification required:	Certifications and expiration dates:
	Training required:	Training completed and expiration date:
	Licenses required:	License and expiration dates:
	Type and length of experience required:	Certifications and expiration dates:
	Qualifications	
	☐Knowledge of Company quality standards ☐Knowledge of Company job responsibilities and authority ☐Demonstrated skills and knowledge ☐Demonstrated ability ☐Demonstrated results	
	Qualification Notes:	

Provisional Approval: Action plan for improvement

Follow-up results and date

WELDER AND WELDING OPERATOR QUALIFICATION RECORD

Welder or welding operator's name _____ Identification no. _____
Welding process _____ Manual _____ Semiautomatic _____ Mechanized _____
Position _____
(Flat, horizontal, overhead or vertical—if vertical, state whether upward or downward)
In conformance with WPS no. _____
Material specification _____

FILLER METAL

Specification no. _____ Classification _____ F no. _____
Describe filler metal (if not covered by AWS specification) _____
Is backing used? _____
Filler metal diameter and trade name _____ Flux for SAW or gas for GMAW or FCAW-G _____

VISUAL INSPECTION (8.26.1)

Appearance _____ Undercut _____ Piping porosity _____

Guided Bend Test Results

Type	Result	Type	Result

Test conducted by _____ Laboratory test no. _____
per _____ Test date _____

Fillet Test Results

Appearance _____ Fillet size _____
Fracture test root penetration _____ Macroetch _____
(Describe the location, nature, and size or any crack or tearing of the specimen.)
Test conducted by _____ Laboratory test no. _____
per _____ Test date _____

RADIOGRAPHIC TEST RESULTS

Film Identification	Results	Remarks	Film Identification	Results	Remarks

Test witnessed by _____ Test no. _____
per _____

We, the undersigned, certify that the statements in this record are correct and that the welds were prepared and tested in conformance with the requirements of AASHTO/AWS D1.5M/D1.5, (_____) *Bridge Welding Code*.
(year)

Manufacturer or Contractor _____
Authorized By _____
Date _____

Form N-5

Form N-5—Welder and Welding Operator Qualification Record

[CompanyName]
Personnel Certifications and Licenses

Project ID	Project Name	Preparer	Date
[ProjectNumber]	[ProjectName]		

Person	Certification, License, or Credential	Expiration Date

G. Weld Project Quality Specifications

Fulfilling customer contract expectations is a primary objective of the [CompanyName] Quality System. To ensure that customer expectations will be fulfilled, [CompanyName] clearly defines the requirements for each contract before it is approved.

The Project Manager ensures that the information in customer contracts clearly defines customer expectations and that the necessary details are provided to set requirements for fabrication.

[CompanyName] personnel and subcontractors and suppliers are accountable for compliance to standards-based written specifications.

To achieve expectations reliably and consistently, specifications are clearly spelled out, not only for results but also for processes. Specifications apply to materials, work steps, qualified personnel and subcontractors and suppliers, safe work rules, and environmental work conditions.

Standards ensure that results are specified rather than left to discretionary practices.

All [CompanyName] fabrication activities comply with generally accepted good workmanship practices and industry standards.

Project - Specific Welding Procedure Standards

The Quality Manager approves welding procedures before they can be used to fabricate metal.

Welding procedures shall be qualified and approved, in accordance with the applicable AWS Welding Code(s) or Specification(s) (i.e., D1.1., D1.5) or AWS B2.1, Specification for Welding Procedure and Performance Qualification.

The welding procedure must identify the filler material.

When the governing AWS Welding Code(s) mandates that welding procedures be qualified by test, the Welding Fabricator shall have PQRs that support the applicable WPSs. When prequalified WPSs or Standard Welding Procedure Specifications (SWPSs) published by the AWS are permitted, PQRs are not required.

The Quality Manager or Certified Welding Inspector (CWI) reviews and approves the welding procedure before being used in production welding operations.

The WPSs and PQRs are controlled by the Quality Manager according by the document and record control procedures specified in the relevant section of this Quality Manual.

The applicable WPSs shall be available to welders or welding operators during testing and production welding.

WELDING PROCEDURE SPECIFICATION (WPS)
PREQUALIFIED ☐ QUALIFIED BY TESTING ☐
or PROCEDURE QUALIFICATION RECORDS (PQR) Yes ☐
AASHTO/AWS D1.5 Qualification Type 7.12.1 ☐ – 7.12.2 ☐ – 7.12.4 ☐

Contractor/
Organization _____
Welding Process(es) _____
Type: Manual ☐ Semiautomatic ☐
Mechanized ☐ Automatic ☐
Tandem ☐ Parallel ☐

JOINT DESIGN USED
Single ☐ Double Weld ☐
Backing: Yes ☐ No ☐ Material _____
Root Opening _____ Root Face Dimension _____
Groove Angle _____ Radius (J–U) _____
Backgouging: Yes ☐ No ☐ Method _____
Root Treatment _____

BASE METALS
Material Spec. _____
Type or Grade _____
Thickness: Groove _____ Fillet _____
Diameter (Pipe) _____

FILLER METALS
AWS Specification _____
AWS Classification _____
Manufacturer Trade Name _____

SHIELDING
Flux _____ Mfg. Trade Name _____
Electrode-Flux (Class) _____
Gas Composition _____
Flow Rate _____ Gas Cup Size _____

Identification _____
Revision _____ Date _____ By _____
Authorized by _____ Date _____
Supporting PQR No.(s) _____

POSITION
Position of Groove _____ Fillet _____
Vertical Progression: Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS
Transfer Mode (GMAW): Globular ☐ Spray ☐
Current: AC ☐ DCEP ☐ DCEN ☐ Pulsed ☐
Electrical Stick Out _____
Other _____

TECHNIQUE
Stringer or Weave Bead _____
Multi-pass or Single Pass (per side) _____
Number of Electrodes _____
Electrode Spacing: Longitudinal _____
Lateral _____ Angle _____
Interpass Cleaning _____

PREHEAT
Preheat Temp., Min. _____
Interpass Temp., Min. _____
Interpass Temp., Max. _____

POSTWELD HEAT TREATMENT
Temp. _____ Hold Time _____
Heating/Cooling Rate _____

HEAT INPUT
Calculated Heat Input Value: kJ/in ☐ kJ/mm ☐
Max. Heat Input _____ Min. Heat Input _____

WELDING PROCEDURE

Pass or Weld Layer(s)	Process	Filler Metals	Current		Volts	Travel Speed	Joint Details
		Diam.	Type & Polarity	Amps or Wire Feed Speed			

Form N-2

Form N-2—Sample Welding Procedure Specification

PROCEDURE QUALIFICATION RECORD

PQR NUMBER_____ *(Include PQR Number on All Supporting Documents)*

Welder's Name _____ ID_____ Welding Test Date _____
Process _____ Position_____ Joint Detail: ☐ Fig. 7.1 ☐ Fig. 7.2 ☐ Fig. 7.3 ☐ Fig. 7.8
Electrode(s) Mfg. Designation_____
AWS Electrode Classification _____ Electrical Stick Out_____
Flux Mfg. Designation _____ AWS Flux Classification _____
Postweld Heat Treatment: Temp._____ Hold Time_____ Heating/Cooling Rate _____

		Diam.	Current	WFS*	Voltage	Current and Polarity
Electrode	(1)					
	(2)					
	(3)					

Calculated Heat Input (see 7.12) _____
Shielding Gas _____ Dew Point _____ Flow Rate _____ Gas Cup Size _____
Travel Speed: Min. _____ Max._____
Base Metal Specification and Thickness_____ Heat Number _____
Backing Metal Specification and Thickness _____ Heat Number _____

(Attach Copy of Certified Mill Test Report for Base and Backing Materials)

Preheat Temp._____ Interpass Temp. Min._____ Max._____

SPECIMEN	TEST RESULTS
All Weld Metal Tension (AWMT) ☐ ksi ☐ MPa	Tensile Strength_____ Yield Strength _____ Elongation in 50 mm [2 in] (%) _____ Reduction in Area % _____
Visual Inspection: ☐ Acceptable ☐ Unacceptable	**Macro Test: ☐ Acceptable ☐ Unacceptable
Side Bends	1. _____ 2. _____ 3. _____ 4. _____
Reduced Section Tension ☐ ksi ☐ MPa	Tension Strength 1. _____ 2. _____ Location of Break 1. _____ 2. _____
Charpy V-Notch Impact Toughness of Weld Metal SMAW, SAW, FCAW, GMAW—5 Req'd. ESW and EGW—8 Req'd.	(_____, _____, _____, _____, _____) (_____, _____, _____) [a]Avg. ☐ ft·lbs, ☐ J _____ @ _____ ☐ °F ☐ [°C] [a]*Discard the highest and lowest values and average the 3 remaining.*
**Chemical Composition of Deposited Weld Metal When Required by Contract Documents*	C_____ Mn_____ Si_____ P_____ S_____ Ni_____ Cr_____ Mo_____ V_____ Cu_____
Radiographic Test: ☐ Acceptable ☐ Unacceptable	Remarks: _____
Fillet Weld Soundness Macroetch	Maximum Size Single Pass: _____ 1._____ 2._____ 3._____ Minimum Size Multiple Pass: _____ 1._____ 2._____ 3._____

We, the undersigned, certify that the above described WPQR/FWS has been qualified in accordance with Clause 5 of the AASHTO/AWS D1.5M/D1.5, (_____) *Bridge Welding Code.*
(year)

State/3rd Party Witness _____ Mfr./Contractor _____
Date _____ Authorized By_____
Agency Results Reviewed_____
Date _____ Date _____

*Optional **Optional for CJP
Form N-3

Form N-3—Procedure Qualification Record (PQR) for Qualification, Pretest, and Verification Results

PROCEDURE QUALIFICATION RECORD WORKSHEET
PQR NUMBER_____

Welder's Name_____ ID_____ Welding Test Date _____
Process_____ Position_____ Joint Detail: ☐ Fig. 7.1 ☐ Fig. 7.2
☐ Fig. 7.3 ☐ Fig. 7.8
Electrode(s) Mfg. Designation_____
AWS Electrode Classification _____ Electrical Stick Out _____
Flux Mfg. Designation _____ AWS Flux Classification _____
Postweld Heat Treatment: Temp._____Hold Time_____ Heating/Cooling Rate _____

		Diam.	Current	WFS*	Voltage	Current and Polarity
Electrode	(1)					
	(2)					
	(3)					

Shielding Gas _____ Dew Point _____ Flow Rate _____ Gas Cup Size _____
Travel Speed: Min._____Max._____
Base Metal Specification and Thickness_____ Heat Number _____
Backing Metal Specification and Thickness _____ Heat Number _____
Preheat Temp._____ Interpass Temp. Min. _____ Max._____

Pass Number	Layer	Process	FILLER METAL	CURRENT						TEMPERATURE	
			Diam.	Type & Polarity	Wire Feed Speed	Amp	Volts	Travel Speed	Stick Out	Preheat	Interpass

*Optional

Page_____of _____

For multiple electrodes, list each electrode on separate line. For parallel electrodes, show "2 @_____" under number and diameter. Measure preheat and interpass at mid length of plate approximately 25 mm [1 in] from the weld center line.

State/3rd Party Witness _____ Mfr./Contractor _____

Date _____

Form N-4

Form N-4—Procedure Qualification Record (PQR) Worksheet

I. Weld Equipment

The selection and use of equipment are controlled to assure the use of only correct and acceptable equipment on the project.

The Quality Manager determines specifications of required equipment that affect quality and the specifications of quality-controlled equipment.

When equipment is received, the Superintendent verifies that equipment is as specified.

Quality Controlled equipment is listed on the Quality Controlled Equipment form included as an exhibit in this subsection.

Calibration of Inspection, Measuring, and Test Equipment

The Quality Manager determines inspection, measuring, and test equipment that will be controlled, calibrated, and maintained.

Records of calibrations will be maintained including calibration certificates documenting of traceability to national standards.

A list of controlled and calibrated test equipment is listed on the Test Equipment Calibration Plan and Log included as an exhibit in this subsection.

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.
- Calibration requirements including the frequency of calibration. All calibrations must be traceable to national measurement standards.

When a measurement device is found not to conform to operating tolerances, the Quality Manager validates the accuracy of previous measurements.

[CompanyName] Quality Controlled Equipment Form				
Project ID	**Project Name**	**Preparer**	**Date**	
[ProjectNumber]	[ProjectName]			

Equipment	**Intended Use (If description is necessary)**			

[CompanyName]
Test Equipment Calibration Plan and Log

Project ID	Project Name	Preparer	Date	
[ProjectNumber]	[ProjectName]			

Type of measuring device	Calibration Type and Frequency	Measuring Device ID	Calibrated By/ Calibration Date	Calibration certificate #	Next Calibration Due Date
					Project Start

J. INSPECTIONS AND TESTS

INSPECTION OF WELDING WORK

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.

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 endure 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.

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.

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.

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

[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	Supervisor Sign and Date

For More Information:

Visit our Online Store at:

www.firsttimequalityplans.com

or

Contact: First Time Quality

410-451-8006

edc@firsttimequality.com