

High School Welding Instructor Certification

Performance Qualification Procedures

To comply with Alabama State Department of Education welding teacher certification requirements, the following American Welding Society (AWS) welding performance qualification procedure is adopted for use as the recognized occupational proficiency exam for welding teachers. Passing scores on these assessments along with required work experience documentation and education transcripts are required in order to apply for Specialty Area 1 Certification.

Applicants and Certified Welding Inspectors (CWI) administering these performance tests are to familiarize themselves with the procedures, content, and standards detailed in this document. Certified Welding Inspectors are to objectively evaluate performance and report results based solely on the criteria specified in this document.

All testing must be done under the supervision of an American Welding Society Certified Welding Inspector. Applicants, with LEA approval, are free to select the inspection site of their choice. As an Alabama SkillsUSA Welding Education Team initiative, a number of AWS CWI's are providing this valuable professional service at no charge. A current list of these participating inspectors and their contact information is included in this document.

The following forms provided in this document are to be used for each of the tests.

Minimum Required AWS Performance Tests

Passing the following performance tests is required.

SMAW 3-G Uphill Progression – D1.1

GTAW 3-G Uphill Progression (Steel) – D1.1

FCAW 3-G Uphill Progression – D1.1

***The following Performance Test may be added at the discretion of the LEA**

GTAW 3-G Uphill Progression (Aluminum) – D1.2

*LEA has the option to add any additional performance standards that meet their needs.

Instructor Certification Welder Performance Qualification Procedure

1. *A.W.S. Certified Welding Inspector shall review welder certification application with applicant. (Exhibit 1)*
2. *A.W.S. Certified Welding Inspector shall assign applicant identification number. (Exhibit 1)*
3. *A.W.S. Certified Welding Inspector shall review safety and personal protective equipment requirements with application.(Exhibit 2)*
4. *A.W.S. Certified Welding Inspector shall review sketch and/or drawing of test assembly with applicant. (Sample Sketch Exhibit 3)*
5. *A.W.S. Certified Welding Inspector shall review welding position of test assembly. (Exhibit 4)*
6. *The applicant shall assemble test plates using fit-up procedure shown in Exhibit 5*
7. *Applicant shall stencil the assigned identification on test assembly and position test plate(s) in designated weld position(s) for inspection by the test supervisor.*
8. *After inspection by the A.W.S. Certified Welding Inspector, the applicant may weld test assembly.*
9. *A.W.S. Certified Welding Inspector documents the test plate(s) activities on Test Plate Checklist. Exhibit 6*
10. *Upon completion of test specimen, A.W.S. Certified Welding Inspector shall perform a visual inspection test (Exhibit 7) of test assembly in accordance with applicable acceptance criteria and digitally document test assembly. (Exhibit 8)*
11. *Applicant identification code shall be stenciled on specimens prior to their removal from test plate(s).*
12. *After visual inspection, the A.W.S. Certified Welding Inspector shall prepare test assembly in accordance with applicable code. (Exhibit 9)*

13. *Specimen shall be prepared in accordance with Exhibit 10 and shall be tested using the bend test procedure of ANSI/AWS B4.0. (Exhibit 11)*
14. *A.W.S. Certified Welding Inspector shall inspect bend specimens in accordance to acceptance criteria and digitally document test specimens. (Exhibit 12)*
15. *A.W.S. Certified Welding Inspector shall document test results of bend test specimens.(Exhibit 13)*
16. *A.W.S. Certified Welding Inspector shall prepare welder qualification report. (Exhibit 14)*
17. *A.W.S. Certified Welding Inspector shall forward reports to:*

**Chris Kennedy, Education Administrator
Career and Technical Education
PO Box 302101
Montgomery, AL 36130**

The report package is to include the following documents for each test taken:

- a. Welder Certification Application – Exhibit 1*
- b. Test Assembly Checklist Report -Exhibit 6*
- c. Visual Inspection of Test Assembly Report – Exhibit 7*
- d. Bend Test Results Report- Exhibit 13*
- e. Welder Certification Report – Exhibit 14*
- f. Digital image of test assembly – via e-mail or CD*
- g. Digital image of bend specimens – via e-mail or CD*

Exhibit 1

(Testing Site)

Welder Certification Application

Date:

Applicant's Name:

First Name

Middle

Last Name

Initial

Address:

Street Address

Apt #

City

State

Zip Code

Company Name:

Company Address:

Street Address

City

State

Zip Code

Applicant Telephone:

Area Code Number

Company Telephone:

Area Code Number

Social Security I.D.#
(Last 4 Digits Required)

Social Security No.

Applicant's Birth Date:

Month

Day

Year

Applicant's Drivers Lic #:
*****Must be Picture ID*****

Applicant Signature

Date

Exhibit 2

Safety Requirements

1. *Personal Protective Equipment (PPE)*
 - A. *Clear Safety Glasses*
 - B. *Approved Welder's Helmet*
 - C. *Approved Welder's Jacket or Sleeves*
 - D. *Leather Boots*
 - E. *Gauntlet-type Gloves*
2. *Safety Procedure*
 - A. *Must wear Personal Protective Equipment during Performance Testing*
 - B. *Must wear Safety Glasses during Performance Testing*

Exhibit 3

Sample Pre-Qualified Test Assembly

See Notes on Page 72

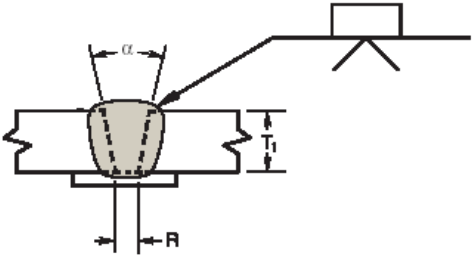
Single-V-groove weld (2) Butt joint (B)				Tolerances				
				As Detailed (see 3.13.1)	As Fit-Up (see 3.13.1)			
				$R = +1/16, -0$	$+1/4, -1/16$			
				$\alpha = +10^\circ, -0^\circ$	$+10^\circ, -5^\circ$			
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SMAW	B-U2a	U	—	R = 1/4	$\alpha = 45^\circ$	All	—	5, 10
				R = 3/8	$\alpha = 30^\circ$	F, V, OH	—	5, 10
				R = 1/2	$\alpha = 20^\circ$	F, V, OH	—	5, 10
GMAW FCAW	B-U2a-GF	U	—	R = 3/16	$\alpha = 30^\circ$	F, V, OH	Required	1, 10
				R = 3/8	$\alpha = 30^\circ$	F, V, OH	Not req.	1, 10
				R = 1/4	$\alpha = 45^\circ$	F, V, OH	Not req.	1, 10
SAW	B-L2a-S	2 max	—	R = 1/4	$\alpha = 30^\circ$	F	—	10
SAW	B-U2-S	U	—	R = 5/8	$\alpha = 20^\circ$	F	—	10

Figure 3.4 (Continued) (Inches)

Exhibit 3

Sample Pre-Qualified Test Assembly

See Notes on Page 72

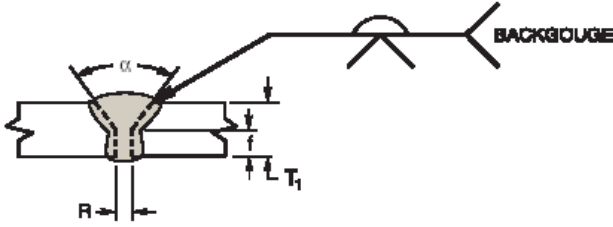
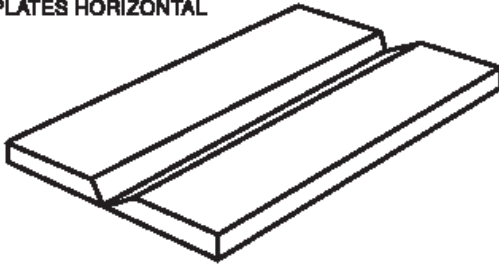
Single-V-groove weld (2) Butt joint (B)									
									
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances As Detailed (see 3.13.1)	As Fit-Up (see 3.13.1)			
SMAW	B-U2	U	—	R = 0 to 1/8 f = 0 to 1/8 $\alpha = 60^\circ$	+1/16, -0 +1/16, -0 +10°, -0°	+1/16, -1/8 Not limited +10°, -5°	All	—	4, 5, 10
GMAW FCAW	B-U2-GF	U	—	R = 0 to 1/8 f = 0 to 1/8 $\alpha = 60^\circ$	+1/16, -0 +1/16, -0 +10°, -0°	+1/16, -1/8 Not limited +10°, -5°	All	Not required	1, 4, 10
SAW	B-L2c-S	Over 1/2 to 1	—	R = 0 f = 1/4 max $\alpha = 60^\circ$	R = ± 0 f = +0, -f $\alpha = +10^\circ, -0^\circ$	+1/16, -0 $\pm 1/16$ +10°, -5°	F	—	4, 10
		Over 1 to 1-1/2	—	R = 0 f = 1/2 max $\alpha = 60^\circ$					
		Over 1-1/2 to 2	—	R = 0 f = 5/8 max $\alpha = 60^\circ$					

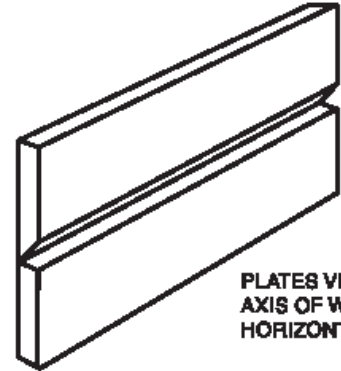
Figure 3.4 (Continued) (Inches)

Exhibit 4

PLATES HORIZONTAL



(A) FLAT WELDING TEST POSITION 1G



PLATES VERTICAL;
AXIS OF WELD
HORIZONTAL

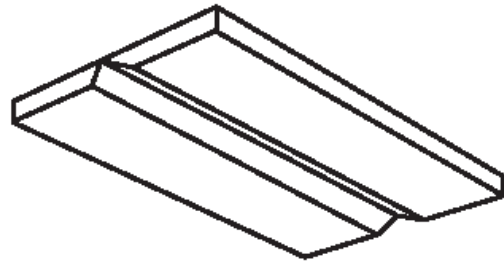
(B) HORIZONTAL WELDING TEST POSITION 2G



PLATES VERTICAL;
AXIS OF WELD
VERTICAL

(C) VERTICAL WELDING TEST POSITION 3G

PLATES HORIZONTAL



(D) OVERHEAD WELDING TEST POSITION 4G

Figure 4.3—Positions of Test Plates for Groove Welds (see 4.2.4)

Exhibit 5

Welder Qualification Test Fit-up Procedure

1. *Beveled Test Plates*
 - a. *Inspect Beveled edges.*
 - b. *If groove face exhibits a land, condition the face to a feathered edge with a grinder or file.*
 - c. *Remove any obstruction from the base metal or the backing bar that may prevent a tight fit at the root.*

2. *Test Plate Assembly*
 - a. *Assemble test plates to obtain a tight fit between the base metal and the backing bar extending ½” or more on each end.*
 - b. *Tack weld the backing bar to the test plates at the ends of the test plate outside of the groove joint.*
 - c. *Verify the fit-up is tight at the root after the restraints are removed.*
 - d. *Turn Test Plate over (groove down), restrain backing tight at the center and tack weld the backing bar to the base metal on both edges of the backing bar at the center of the test plate.*
 - e. *Stencil assigned identification code on edge of test assembly.*

Exhibit 6

Test Assembly Checklist

Applicant Name: _____ *Date:* _____

Welder I.D. _____

Material Base Specification _____

Base Metal Heat# _____ *Filler Metal Lot#* _____

Joint Designation: _____

Fit-up Procedure Reviewed with applicant. Yes ___ No ___

Safety requirements reviewed with applicant. Yes ___ No ___

Reviewed welding procedure specification with applicant. Yes ___ No ___

Fit-up of test assembly acceptable. Yes ___ No ___

Witness of root pass of test assembly. Yes ___ No ___

Identification code stencil on test assembly. Yes ___ No ___

Visual Inspection of Root Pass

Root Pass free of cracks Yes ___ No ___

Evidence of incomplete fusion Yes ___ No ___

Evidence of inadequate joint penetration Yes ___ No ___

Root Pass melt-through surface profile Yes ___ No ___

Concave melt-through surface profile exceeds 1/16 in. Yes ___ No ___

Melt-through surface profile exceeds 1/8 in. Yes ___ No ___

Total weld thickness is equal to or greater than that of base metal. Yes ___ No ___

Visual Inspection Results Pass ___ Fail ___

Test Supervisor Signature _____ *Stamp and Date* _____

Exhibit 7

Visual Inspection of Test Assembly

Applicant Name: _____ *Date:* _____

Welder I.D. _____

For acceptable qualification, welds shall meet the following requirements:

<u><i>Meets Requirements</i></u>	<u><i>Does Not meet Requirements</i></u>
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The weld root is free of cracks. _____

All crater filled to the full cross-section of the weld. _____

Face of weld flush with surface of base metal. _____

Weld(s) merge smoothly with base metal, weld toes and adjacent beads. _____

Weld reinforcement does not exceed 1/8 in. _____

Undercut does not exceed 1/32 in. _____

Visual Inspection Results *Pass* ___ *Fail* ___

Test Supervisor Signature _____ *Stamp and Date* _____

Exhibit 8

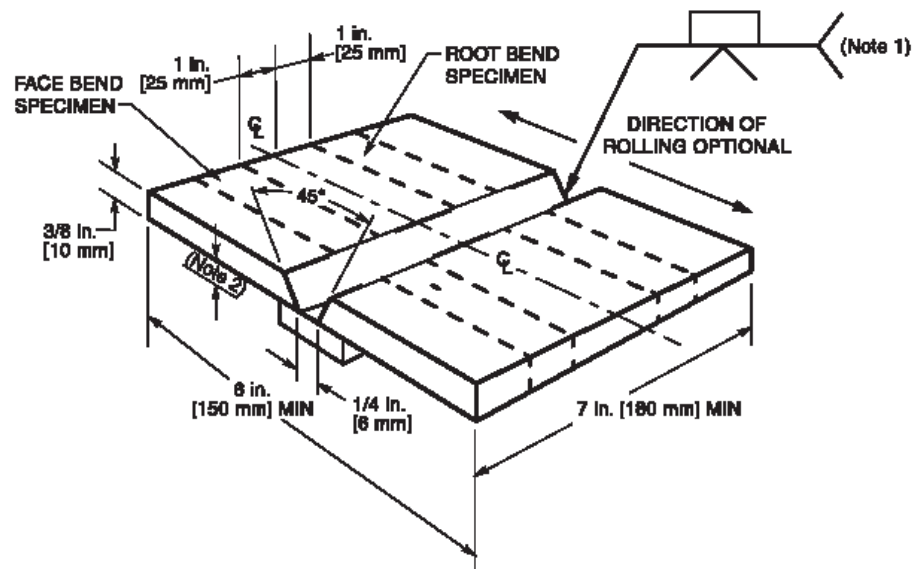
Visual Inspection Test Assembly Acceptance Criteria

For acceptable qualification welds shall meet the following requirements:

1. *The weld shall be free of all cracks.*
2. *All craters shall be filled to the full cross-section of the weld.*
3. *The face of the weld shall be flush with the surface of the base metal, and the weld shall merge smoothly with the base metal, in accordance with AWS D1.1 Structural Welding Code 5.24 acceptable weld profiles.*
4. *Weld reinforcement shall not exceed 1/8 in. (3 mm). The weld profile shall conform to AWS D1.1 Structural Welding Code Figure 5.4 and shall have complete fusion.*
5. *Undercut shall not exceed 1/32 in. (1 mm).*
6. *The weld root for CJP grooves shall be inspected, and shall not have any cracks, incomplete fusion, or inadequate joint penetration.*
7. *For CJP grooves welded from one side without backing, root concavity or melt-thru shall conform to the following:*
 - a. *The maximum root surface concavity shall be 1/16 in. (2 mm), provided the total weld thickness is equal to or greater than that of the base metal. The maximum melt-through shall not exceed 1/8 in. (3 mm).*
 - b. *The maximum melt-through shall be 1/8" (3mm) except for tubular T-, Y, and K- connections, where melt through is not limited*

Exhibit 9

Test Specimens Removal Procedure for
Limited Thickness Welder Qualification



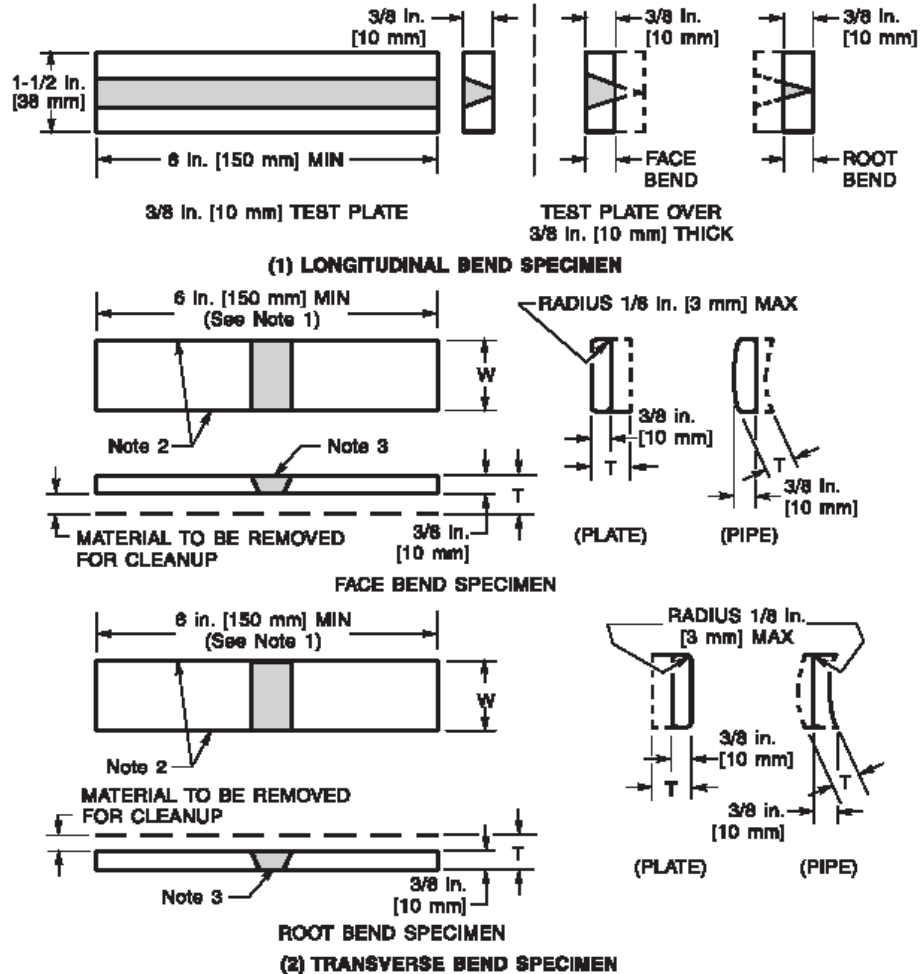
Notes:

1. When RT is used, no tack welds shall be in test area.
2. The backing thickness shall be 1/4 in. [6 mm] min to 3/8 in. [10 mm] max; backing width shall be 3 in. [75 mm] min when not removed for RT, otherwise 1 in. [25 mm] min.

**Figure 4.30—Test Plate for Limited Thickness—All Positions—
Welder Qualification (see 4.23.1)**

Exhibit 10

Face and Root Bend Specimens Preparation



Dimensions	
Test Weldment	Test Specimen Width, W in. [mm]
Plate	1-1/2 [40]
Test pipe or tube ≤ 4 in. [100 mm] in diameter	1 [25]
Test pipe or tube > 4 in. [100 mm] in diameter	1-1/2 [40]

General Notes:

- T = plate or pipe thickness.
- When the thickness of the test plate is less than 3/8 in. [10 mm], the nominal thickness shall be used for face and root bends.

Notes:

1. A longer specimen length may be necessary when using a wraparound type bending fixture or when testing steel with a yield strength of 90 ksi [620 MPa] or more.
2. These edges may be thermal-cut and may or may not be machined.
3. The weld reinforcement and backing, if any, shall be removed flush with the surface of the specimen (see 5.24.4.1 and 5.24.4.2). If a recessed backing is used, this surface may be machined to a depth not exceeding the depth of the recess to remove the backing; in such a case, the thickness of the finished specimen shall be that specified above. Cut surfaces shall be smooth and parallel.

Figure 4.12—Face and Root Bend Specimens (see 4.8.3.1)

Exhibit 11

Root, Face, and Side Bend Specimens Test Procedure

- 1. Transfer welder I.D. number to bend specimens.*
- 2. Stencil specimens "F" for face bend, and "R" for root bend.*
- 3. The specimen shall be placed on the die member of the jig with the weld at mid-span.*
- 4. Face bend specimens shall be placed with the face of the weld directed toward the gap.*
- 5. Root bend specimens shall be placed with the root of the weld directed toward the gap.*
- 6. Side bend specimens shall be placed with that side showing the greater discontinuity, if any, directed toward the gap.*
- 7. The plunger shall force the specimen into the die until the specimen becomes U-shaped. The weld and HAZs shall be centered and completely within the bent portion of the specimen after testing.*
- 8. When using the wrap-around jig, the specimen shall be firmly clamped on one end so that there is no sliding of the specimen during the bending operation. The weld and HAZs shall be completely in the bent portion of the specimen after testing. The test specimens shall be removed from the jig when the outer roll has been move 180 degrees from the starting point.*

Exhibit 12

Acceptance Criteria for Bend Tests

The convex surface of the bend test specimen shall be visually examined for surface discontinuities. For acceptance, the convex surface shall be limited to the following:

- 1. 1/8 in. (3 mm) measured in any direction on the surface.*
- 2. 3/8 in. (10 mm)-the sum of the greatest dimensions of all discontinuities exceeding 1/32 in. (1 mm), but less than or equal to 1/8 in. (3 mm).*
- 3. 1/4 in. (6 mm)-the maximum corner crack, except when that corner crack resulted from visible slag inclusion or other fusion type discontinuities, then the 1/8 in. (3 mm) maximum shall apply.*
- 4. Specimens with corner cracks exceeding 1/4 in. (6 mm) with no evidence of slag inclusions or other fusion type discontinuities shall be disregarded, and a replacement test specimen from the original test plate shall be tested.*

Exhibit 13

Bend Test Results

Welder I.D. _____

Date _____

Test Plate Assembly laid out in accordance with

Exhibit 2.3.1.10 A or Exhibit 2.3.1.10 B

Yes ___ No ___

Welder ID# transferred to test specimens

prior to cutting.

Yes ___ No ___

Test Plate specimens prepared in accordance

with Exhibit 2.3.1.10 C or Exhibit 2.3.1.10 D

Yes ___ No ___

Visual Inspection of Convex Surfaces of Bend Coupons

Specimen surface shall contain no discontinuities exceeding the following dimensions:

*Discontinuity exceeding 1/8 in. in any measured
direction on surface*

Yes ___ No ___

*Discontinuities exceeding 1/32 in. but less than
or equal to 1/8 in.*

Yes ___ No ___

Discontinuities exceed the sum of 3/8 in.

Yes ___ No ___

Corner Crack(s)

Yes ___ No ___

*Corner Crack(s) does not exceed 1/4 in without
visible slag inclusions or fusion type discontinuities*

Yes ___ No ___

Corner Crack(s) exceeds 1/4 in.

Yes ___ No ___

Bend Test Results

Pass___ Fail___

Test Supervisor Signature: _____

Date and Stamp _____

Exhibit 14

(Test Site)

Date: _____
Report No: _____
Purchase Order No: _____
Project: High School Welder Qualification

Welder Name:	Welder ID:	Welding Code	
Material Specification	Coupon Type	Plate	
Coupon Description	Welding Process		
Position	Welding Data By		

Filler Metal/Technique

Specification	Classification	F No.	Diameter	
Brand Name	Current	Polarity	Amps	
Shielding	Backing		Volts	

Guided Bend Test Specimens Prepared By:

Sample #1	
Sample #2	
Sample #3	
Sample #4	

Bend Type:

Sample #5	
Sample #6	
Sample #7	
Sample #8	

Visual Test

Visual Test Results	
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Liquid Penetrant Test

PT Test Results	
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Radiographic Test

Film I.D.

Test Results

RT	

Fillet Test

Fillet Leg Size:	
Weld Profile:	
Macro Test:	
Fracture Test:	

Qualification Results

Welder Qualification	Range Qualified:	
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Inspector: _____

Signature: _____ **Date:** _____ **Stamp:** _____

10/15/15 rev

Notes

Testing Sites

The following Certified Welding Inspectors (CWI), in partnership with the Birmingham Chapter of the American Welding Society, and the Alabama Association of SkillsUSA, have volunteered their professional services to provide this valuable industry-recognized performance certification testing to active and potential high school welding instructors.

Applicants are asked to contact the CWI at the location they wish to test in order to make arrangements for and schedule their assessments.

Jim Thompson, CWI - 256/352-8272 - Wallace State Community College-Hanceville (Blount County)

Todd Peterson, CWI – 256/741-4600 - Calhoun County Career Technical Center (Calhoun County)

Joe Abercrombie CWI – 256/896-0160 - Edward Bell Career Technical Center (Tallapoosa County)

Josh Richter CWI- 334/241-5307 Montgomery Career and Technical Center (Montgomery County)

James Smith CWI – 251/937-6751 North Baldwin Center for Technology (Baldwin County)

Mike Baswell CWI – 251/947-5041 South Baldwin Center for Technology (Baldwin County)

Marty Bishop CWI – 256/244-3196 Earnest Pruett Center of Technology (Jackson County)

Dale Stewart CWI- 334/347-2640 Enterprise High School (Coffee County)

Joe Johnson CWI – 334/983-3521 x250 Wallace Community College-Dothan (Houston County)

Ron Phillips CWI – 251/457-8681 WESCO Prichard – (Mobile County)