

Welding Qualification/Certification



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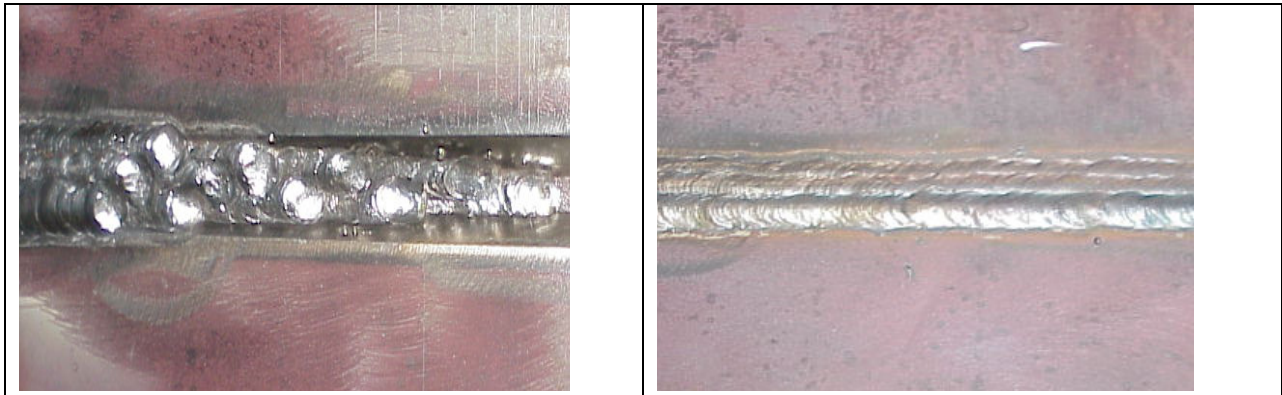
Pre-Test Requirements

PCC offers plate welding and Pipe welding qualification/certification tests. The welding portion of the test is given in the Welding Shop at PCC and then is sent to an independent test lab for evaluation. Once the test plate passes inspection the test lab will issue the appropriate paper work indicating the results. The student will have the option of purchasing a *City Card* with the test results. This card will allow the student to weld on a City Project without having to be re-tested. This is an excellent *tool* in securing a job!

Before a welding test will be issued at PCC the student must pass two “mock-up tests” to prove their ability to make sound welds that are visually acceptable. This means that two plates per position will need to be completed and pass both visual and bend test criteria set forth by the **American Welding Society, D1.1 Structural Steel Welding Code**.

Visual Criteria Example of a High Quality Weld per AWS D1.1

VT Criteria	Cover Pass
Reinforcement (groove welds)	Flush to 1/8”
Fillet Weld Size	See specification on drawing
Undercut	1/32” deep
Weld Contour	Smooth Transition
Root Pass	100% fusion, free of slag and porosity
Cracks	None Allowed
Arc Strikes	None Allowed
Fusion	Complete Fusion Required
Porosity	None Allowed

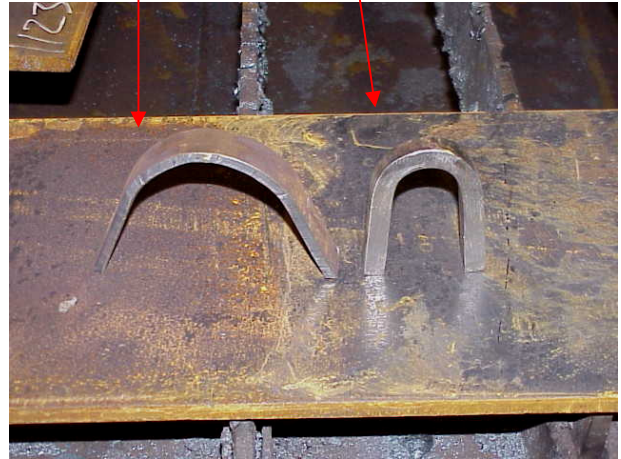


Bend Test Criteria

4.8.3.3 Acceptance Criteria for Bend Tests

The convex surface of the bend test specimen shall be visually examined for surface discontinuities. For acceptance, the surface shall contain no discontinuities exceeding the following dimensions:

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



Shop Pre-Test Bend Test Procedure

The plate(s) in question must pass visual inspection first.

Bend tests are used to determine the soundness of a weld joint. The test will determine if fusion was obtained in the weld joint. Reference the AWS D1.1 Structural Welding Code to determine the dimensional layout of the bend coupons (use this diagram for all positions). Use the following procedure in preparing and bending your coupons.

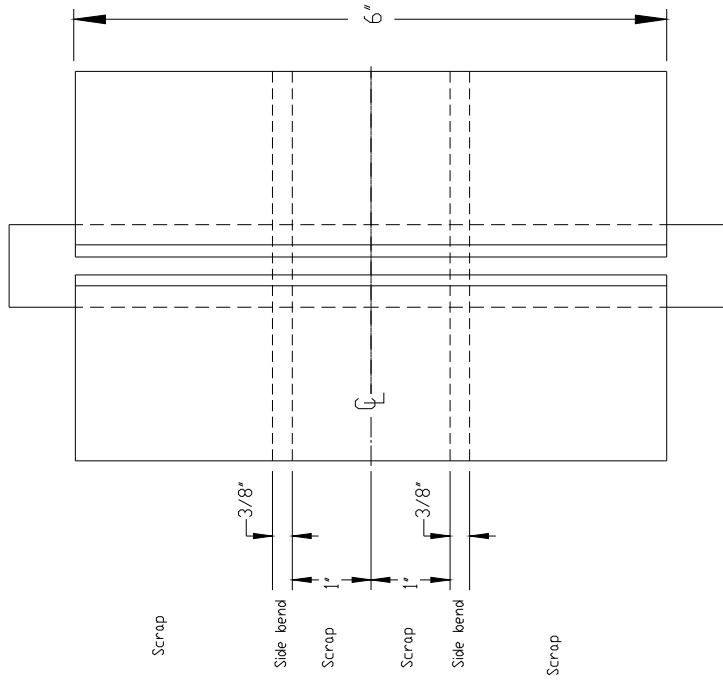
1. Flush back up strip off of the plate at the flushing station.



2. Layout two 3/8" wide coupons and cut using the track burner. **Do Not Bend** coupons greater than 3/8" wide they will not fit in the bend jig.

Shop Test

Bend coupon for practice shop test on 1 inch thick plate




Test coupons shall be free of all defects such as undercut, porosity, slag inclusion, incomplete fusion, and such other defects as per AWS D1.1 code.

Approved: _____ Date: _____

Inch	MM
1/16"	1.6
1/8"	3.2
1/4"	6.4
1/2"	12.8
1"	25.6

Part No.	Required	Size (T×W×L)	S.I. Conversion


 Portland Community College
 Welding Technology

Tolerance (Unless otherwise Specified)		WLD Bend test layout	
Dimensional ± 1/16" Angle ± 5°		Size:	OC No.
Drawn By: John Deering		Approve	Date
Ck'd By:		Date: 01/12/02	Sheet

- Allow coupon to air cool. **Do Not Quench!**
- Grind coupon's smooth, ensuring grinding marks are going with the length of the Coupon's and all edges are rounded.

9/14/2011

Practical – Retainable – Teachable – Accountable

5. Request permission from your instructor to use the bend test machine.
6. **CAUTION:** *Keep hands and fingers clear when operating equipment.*

Watts Bend Test Machine



7. Ensure guard is in the correct position. The coupons sometimes eject out of the end of the machine rapidly.

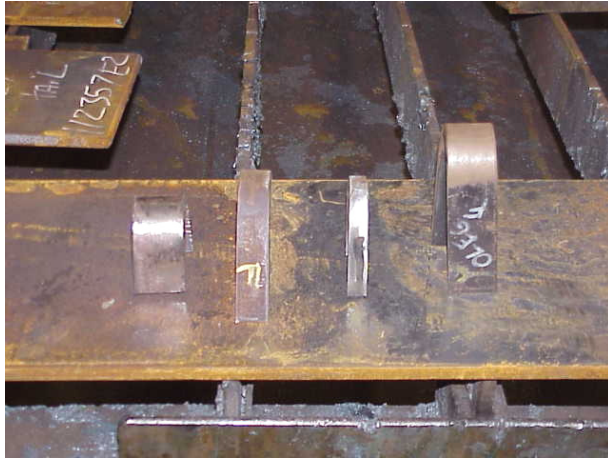
Guard



8. Place coupon in the machine taking care not to position your hands/fingers in the way. Locate weld in the center of the die. Bend one coupon (from each plate) to test the face and one to test the root.

9. Actuate the ram by the lever on top of machine and stand clear of the guard area where coupon will exit.
10. Inspect the convex surface of the bend specimen for fusion type defects.

Reference the AWS D1.1 Structural Welding Code for Acceptance Criteria for Bend Tests.



Four types of bend samples are shown above. Left to right are: face bend, face bend, root bend and a side bend



The bend samples shown above differ in the radius that they were bent. This is a requirement set forth by the code or standard that is being used.

Preparation and Testing Procedure For 1" Plate

This section is for those students who plan on taking the AWS Welder Qualification Test.

Permission to test is only issued upon successful completion of **two consecutive sets of shop bend tests**. This means two successful bends in the vertical position and two successful bends in the overhead position. Shop tests must meet visual inspection and bend test criteria set forth in AWS D1.1 prior to testing.

Step #1: You must request permission from your instructor to test.

Step #2: Complete Welding Performance Qualification Test Form. Check it for accuracy.

All tests are submitted for x-ray or bend examination to **AWS D1.1 Structural Steel Code** unless otherwise specified.

Take the test form to the PCC Business Office and pay the test fee. **Fill out Form Below.**

Return Welding Performance Qualification Test form and receipt to your instructor. Your test plates will be issued **only after payment of test fees.**

READ ALL INSTRUCTIONS CAREFULLY BEFORE YOU BEGIN. REVIEW THE TEST DISPLAY BOARD. SEE YOUR INSTRUCTOR IF YOU HAVE ANY QUESTIONS.

Welding Performance Qualification Form				
_____		_____		
Last Name	First Name	MI	Social Security #	
_____		_____		
Street	City	State	Zip	Phone Number
Original _____	Re-take _____			Test Plate Cost \$_____
Type of Test _____				City Card Cost \$_____
Material _____				Total Cost \$_____
Thickness _____			Date _____	
Process _____				_____
Electrode	Size _____	Type _____		PCC Instructor Signature
Position _____				_____
				Student Signature
Account Number M910				

Test Plate Fit-up Procedure

READ ALL INSTRUCTIONS CAREFULLY BEFORE YOU BEGIN. REMEMBER, THE 3/8" PLATE TEST ASSEMBLY IS DIFFERENT FROM THE 1" TEST. SEE YOUR INSTRUCTOR IF YOU HAVE ANY QUESTIONS.

Your test has 6 inspection points. Each inspection must be completed and signed by your instructor before progressing to the next step.

STEP 1: Material Preparation using track burner

- Cutting List: See code for specific dimensions
- Bevel Angle will be 22 ½° for SMAW, GMAW and FCAW (Dual Shield) with a ¼" root opening and 10° for Coreshield-8 *innershield with a 5/8" opening.*)
- Grind all surfaces in the area to be welded until free of mill scale. Surfaces to be cleaned include: all beveled surfaces, **3/16"** to **1/2"** front and back of plate adjacent to each bevel and one side of each back up strip.
- **CAUTION:** Clean material only. **Excessive grinding** will affect the quality of your fit up.

STEP 2: Assemble Groove Joint and Strong Backs

- Root Opening = ¼" (5/8" with a 10 degree bevel for Coreshield-8 *innershield* wire).
- Use Clamps or fixturing device to ensure a "***tight***" fit-up.
- Adjust plate position as needed to ensure proper root opening.
- Ensure that there is **NO** gap between the beveled plates and the back strap surface.
- Tack the assembly together with 1" tack welds at the ends where the plates meet the back up strip.
- Do not tack weld on the backside of the test plate.
- **Strong backs are used to control distortion of the plates during welding.**
- Position strong backs on the backside of the groove assembly 3/16" in from the ends of the plates.
- Tack the strong backs across the ends of the plates. **Weld only on the outside edge of the strong back.**
- **DO NOT** weld on the plate side (inside) of the strong backs.

STEP 3: TEST PLATE ASSEMBLY INSPECTION (See your instructor):

- Have your plates inspected for proper assembly and **Stamped For Testing**.
- Store test plates in designated locker.
- Review the testing procedures. The test examines your ability to weld in compliance with the specific acceptance criteria **and** your ability to comprehend and follow testing procedures.
- ***Violation of testing procedures will constitute automatic failure of your test. Which means you will be ineligible to take a welding test at PCC.***

Helpful Hints

1. Be prepared to feel confident during your test. You need to have demonstrated consistency during your practice tests. Repeat the practice tests as many times as necessary to ensure confidence and consistent performance.
2. **Be comfortable !!!** Plan your test on a day that you know you will be at your best, well rested and able to concentrate. Check your clothing, to be certain you are protected from any stray sparks. Nothing breaks your concentration faster than getting burned or catching on fire!
3. Check the condition of your cover lenses; **make sure that you can see clearly.**
4. Bring a flashlight so you may thoroughly inspect your inter-pass cleaning. Clean the weld thoroughly. Make sure your slag hammer and wire brush are in good condition.
5. Plan the weld carefully to avoid having to patch up low spots. Decide before you strike the arc the size and location of the bead you are about to run. **If the weld fill becomes uneven, fix it immediately by filling in the low areas, don't wait until the flush layer or cover layer.**
6. Notify your fellow students in your area that you are testing; ask their cooperation in avoiding any banging or movement of the booth area while you are welding.
7. **Above all don't panic!** Relax and take your time. Don't hold your breath! If at any time you become uncomfortable stop and reposition.
8. If you cannot see STOP. If you feel you have lost or are losing control of the puddle **STOP.**
9. Do not over heat the plates. Allow the plates **to air cool to 200 degrees** before you attempt to weld the cover passes.
10. See **your instructor** at anytime if you have a concern. Take a break as needed.

TESTING PROCEDURE

- STEP 1:** *Read entire procedure before you start your testing.*
- STEP 2:** Notify your instructor that you are going to begin your test.
- STEP 3:** Obtain a 300 degrees temp stick from the tool room.
- STEP 4:** Using a torch preheat the test plates to 70 degrees shall be sufficient to prevent cracking.
- STEP 5:** **INSPECTION: (See your instructor): Test Plate Position**
Position the test plates at your welding station. The plate stamped **3G** is
Positioned vertical. The plate stamped **4G** is positioned overhead.

Have your instructor inspect the proper positioning of the test plates. **Test plates must remain in position throughout the test. DO NOT MOVE THE TESTS Plates. Tests Plates must be cleaned and inspected in position. No grinding is allowed on the test.**

<u>Inspection by instructor:</u>	Instructors signature: _____
Date: _____	Student signature: _____

- STEP 6:** Complete the root passes in both positions.
- STEP 7:** **INSPECTION: Root Pass Inspection (See your instructor): Have your instructor inspect the root pass.**

<u>Inspection by instructor:</u>	Instructors signature: _____
Date: _____	Student signature: _____

- STEP 8:** Complete welding the V groove until the weld is within **1/16 to 1/8"** below the base material.

CAUTION: Control your inter-pass temperature. Use the 300-degree temp stick to monitor maximum heat input in the test material. DO NOT weld on the test plate if it is over 300 degrees to help avoid cracking.

STEP 9: INSPECTION: Flush Layer Inspection. Have your instructor inspect the test.

Inspection by instructor:	Instructors signature: _____
Date: _____	Student signature: _____

STEP 10: Complete the (cover pass) on both plates.

STEP 11: INSPECTION: Final Visual Inspection (See your instructor):

See your instructor for visual inspection. Both tests plates must pass visual inspection criteria to be submitted for x-ray examination. See visual inspection criteria below.

STEP 12: Remove plates from position and allow to air cool. **DO NOT** quench test plates in water at **Anytime**.

STEP 13: Remove strong backs and use the band saw to cut 1/4" off each end. Remember that a minimum of 5 1/2 in length must be sent to the test lab for 1" test plates and a minimum of 7" in length for the 3/8" test plates. **DO NOT REMOVE THE BACK UP STRIP !!!**

STEP 14: File all saw cut edges smooth for safe handling of test plates.

STEP 15: Turn in finished test plates to your instructor for final visual inspection of plates. Instructor will turn test plates in for shipping to testing lab. **Test Plates are submitted to the testing lab for RT or Bend examination. Results are usually received approximately two weeks after the tests are submitted.**

A. Arc strikes outside of the weld area are **NOT** acceptable.

- **Review "Welder Qualification" AWS D1.1 Structural Steel Code.**

I have read all of the above information in reference to the proper procedures to follow: direction to cut, thickness and width of material, cleaning and assembly of my Welding Certification test plates.

Sign off for Summary of visual Inspection Criteria

Inspection by instructor:	Instructors signature: _____
Date: _____	Student signature: _____

Testing Procedure Final Sign Off

Inspection by instructor: Instructors signature: _____

Date: _____ **Student signature:** _____

Passed Root inspection

Failed Visual

Passed Visual Fillets

Failed Visual

Passed Visual Cover

Failed Visual

All forms and packet must be returned to the instructor before plates will be sent to the inspection lab.

Support Technicians signature: _____