



WEST VIRGINIA

WELDER'S Certification Standards





West Virginia Board of Education
2022-2023

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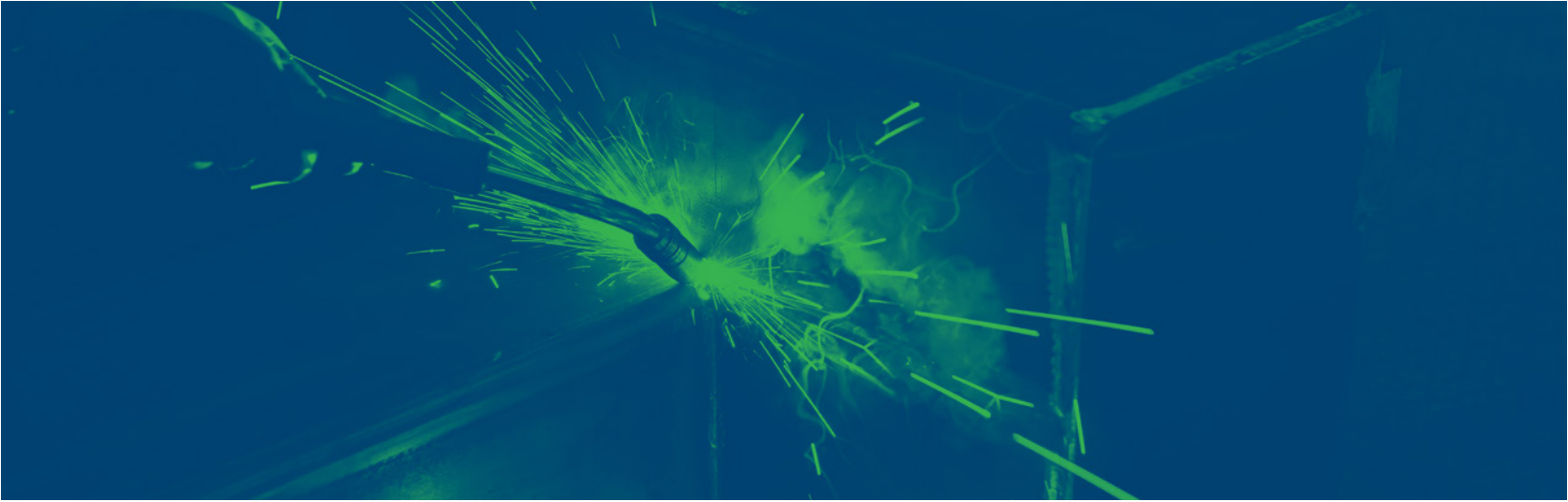


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STATE OF WEST VIRGINIA

WELDER CERTIFICATION STANDARDS AND TEST PROCEDURE

The State of West Virginia Welder, a Performance Certification test, as described herein, is intended to demonstrate the ability of a welder to make sound welds. It is the desire of the West Virginia Department of Education to provide resident citizens a location, equipment and supervision whereby their ability may be tested in uniform fairness, regardless of the testing location. A certificate will be issued by the Department of Education for each test completed with the scope of this procedure.

STANDARDS

TEST ADMINISTRATOR

The test administrator(s) shall be the welding instructor(s) who must be certified in the welding processes in which welding certification tests are given. The minimum certification of the welding instructor(s) shall be plate SMAW and plate GMAW. Any licensed CWI (Certified Welding Inspector) who teaches can administer these tests.

RESPONSIBILITY

It shall be the responsibility of the welding instructor to supervise all aspects of the welding test as described in this procedure. The failure to properly conduct a test may cause its rejection and the loss of certification of the school as a testing site and/or the welding instructor as a test administrator.

TEST SITE

The State of West Virginia Welding Certification Test may be conducted at any school that is operated and duly certified by the West Virginia Department of Education. The test site will be inspected and certified periodically by the governing agency. As a minimum requirement the test site must be equipped to provide certification in both SMAW and GMAW. Upon site inspection by the West Virginia Department of Education, they may be placed on probation or have site approval revoked if deficiencies are found in equipment, safety, testing procedures or record keeping.

TEST SITE REVIEW

Testing sites are subject to review by the West Virginia Department of Education for the purpose of reviewing welder test coupons, monitoring test procedures and reviewing safety practices, safety conditions and record keeping.

TEST

A welding test coupon shall include stamping the plates with identification, welding of test plates in all required positions, properly removing coupons from the test plates, preparing them for bending and the actual bending of the test plates.

TEST RECORDS

The welding instructor shall supervise each test and maintain test records showing that the tests were performed according to this procedure. The instructor shall have the responsibility and authority to grade any test, reject any coupon or disqualify any welder. Any welding coupon which is deemed as unacceptable to the welding instructor shall not be accepted by the West Virginia Department of education. However, the West Virginia Department of Education Inspector or his/her designated representative shall make the final decision on any test coupon. The test report shall be sent to the West Virginia Department of Education within thirty (30) days of the test completion date. The weld test coupons shall be kept in locked storage for a period of ninety (90) days. After this time frame, the coupons must be destroyed and/or disposed of by suitable means.

CERTIFICATE

A West Virginia Welding Certificate will be issued by the West Virginia Department of Education for each weld test conducted and accepted with the scope of this procedure.

WV DEPARTMENT OF EDUCATION RECORDS

The West Virginia Department of Education will keep the welding certification test reports on file for a period of one (1) year from which a duplicate certificate may be issued upon written request by the welder. Any welder desiring a West Virginia Welding Certificate after this time must re-test. If the instructor has a copy of the certification test report, the WV Department of Education will re-issue a certificate for one additional year. The maximum time limit for reissuance of a lost certificate is two (2) years after the first date of issuance.

TEST TYPE

The type of test may be plate or pipe. The welder may complete a test of each type; however, the pipe test in 6G position also qualifies welding of plate in all positions. This eliminates the need of the plate test when the pipe test is completed first.

WELDING PROCESSES

Shielded Metal Arc Welding (SMAW or Stick), Gas metal Arc Welding (GMAW or MIG), Gas Tungsten Arc Welding (GTAW or TIG), and Flux Core Arc Welding (FCAW). Welders may also complete both types of tests with each change of process.

BASE METAL

The base metal for SMAW and FCAW shall be mild steel. The base metal for GMAW and GTAW may be mild steel, stainless steel or aluminum. Base metals used in all process must be specified by SAE number, ASTM number or ASME number.

FILLER METAL

The filler metal sizes for GTAW should be .062" to .125" and for the electrodes (Wire) GMAW .030" to .045". For the FCAW .035" to .045". For SMAW the electrode size may be from 3/32" to 3/16". (Note: Filler metal designation is accurately referenced for GTAW only. Electrodes are GMAW, FCAW and SMAW.) Any wire that produces the arc is referred to as an "electrode". Any wire that does not produce the arc is referred to as "filler metal". Filler metals must be specified by AWS classification number. A range of electrode size from 3/32" to 3/16" may be used.

BACKING

An alternative for a backing plate would be to place a weld on the backside of the test plate prior to making the weld. It would have the same result and will save on material and time. Backing may or may not be used. However, if a backing strip is used, it MUST be specified on the application and it will appear on the certification that a backing strip was utilized during testing.

WELD GROOVE DESIGN

The weld groove design shall be the single V-type. When flame cutting is used to bevel test pieces, the ripples produced by this process shall be ground or milled to remove all carburized metal. Dimensions of the test groove will be as shown in figures 1A and 1B.

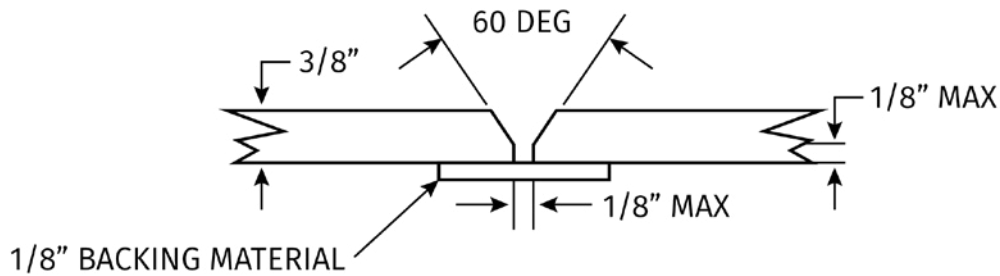


Figure | 1A

Plate and pipe butt joint. Limited thickness – with backing.

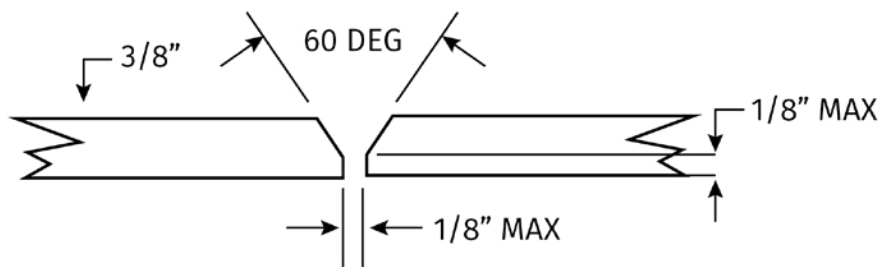


Figure | 1B

Figure 1B – Plate and pipe butt joint. Limited thickness – without backing.

DISQUALIFICATION

Any welder who does not follow the rules of this procedure may be disqualified by the welding instructor or the West Virginia department of education inspector. When a disqualification occurs, there may or may not be a retest condition allowed by either the welding instructor or the West Virginia Department of Education.

RETEST

An immediate retest may be authorized for any one position failed if the welder completes two consecutive test plates in that position. The two test plates shall be prepared and completed as to produce four coupons. Two are to be face bends and the other two are to be root bends. The welding procedure followed for the retest shall be the same as the original test except the additional stamp "R" to indicate the coupon was a retest. The practice or training period required for retests is the sole decision of the welding instructor administering the test. If a prospect fails one position, they can only retest in that position. Failure in two positions will require a complete retest.

PROCEDURES

PLATE TEST PIECES

The welder may prepare or be provided with test pieces. Test pieces of plate material shall be 3/8" thick and a minimum of 4" x 6". There will be a total of six test pieces required for one test.

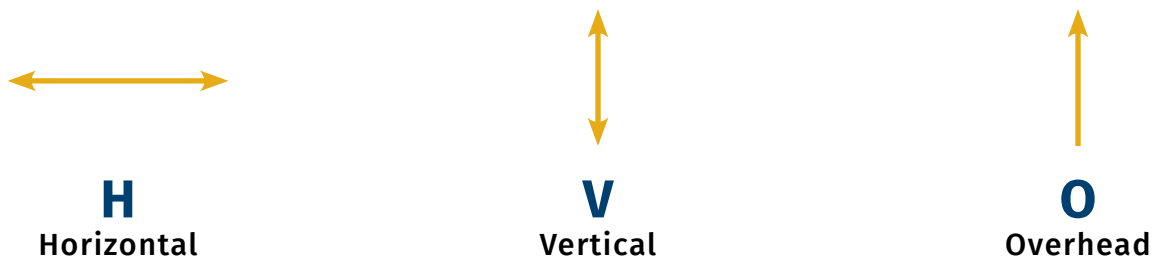
Two test pieces that are tack welded together will constitute a test plate. The welder must make the fit on test pieces as depicted in Figures 1A and 1B. The welder can then join them with tack welds. All welds must be done in the position being tested.

PIPE TEST PIECES

The welder may prepare or be provided with pipe test pieces (at the discretion of the welding instructor). Test pieces of pipe shall have an outside diameter of 4" to 7" and a wall thickness from 5/16" to 7/16". The length of pipe shall be a minimum of 4". A total of four (4) pieces are needed for the test with the exception of 6G testing which requires two (2).

IDENTIFICATION OF COUPONS

Prior to beginning any test, each test plate shall be metal stamped to identify each coupon. The stamping will include the welder's initials, welding process and welding position. The process will be identified by stamping each coupon with one of the following methods: SMAW, GMAW, GTAW or FCAW. The weld position will be identified by stamping each coupon with a letter corresponding to the position as follow:



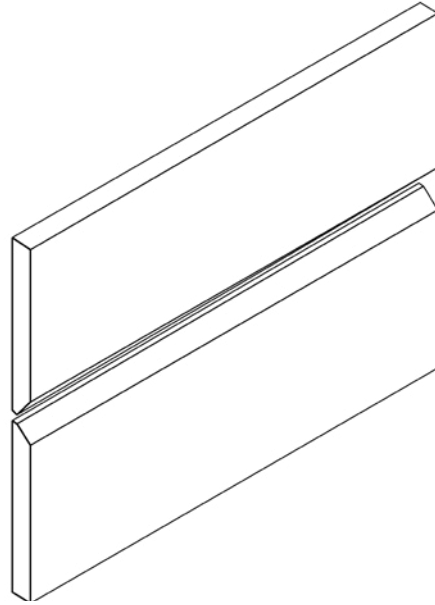
For vertical pipe, the test plate will be stamped TOP and include V and 6G. This stamping shall remain on top during welding. Refer to Figures 2, 3a and 3B.

TESTING POSITIONS FOR PLATE

The plate test shall include welding of test plates in the three following positions:

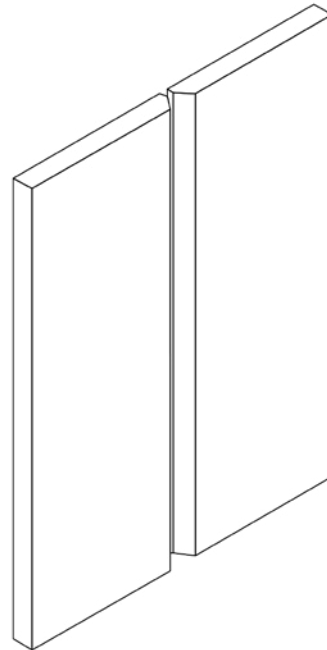
HORIZONTAL POSITION (2G)

The test plate shall be placed in a vertical plane ± 5 degrees with the axis of the weld groove horizontal within 5 degrees.



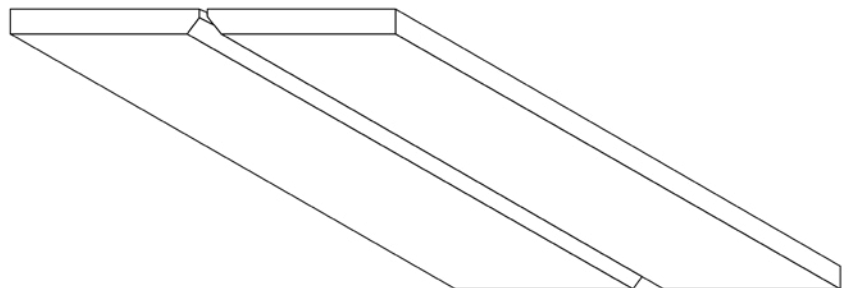
VERTICAL POSITION (3G)

The test plates shall be placed in a vertical plan with the axis of the weld groove vertical (within 5 degrees)



OVERHEAD POSITION (4G)

The test plates shall be placed in a horizontal plane with the axis of the weld groove horizontal (all specifications with 5 degrees). The filler metal shall be deposited from the underside.



TEST POSITIONS FOR PIPE

The pipe test shall include welding of test pieces in two of the following positions:



2g
Horizontal



5g
Vertical



6g
Inclined

Descriptions of positions:

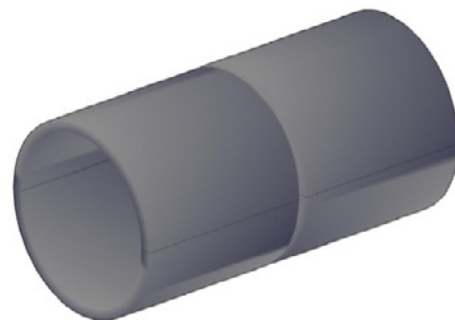
HORIZONTAL POSITION (2G)

The test plates shall be in a vertical plane with the axis of the weld groove horizontal. The pipe should be within 5 degrees.



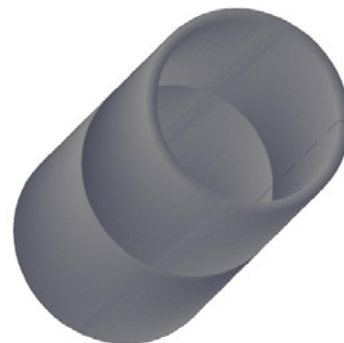
VERTICAL POSITION (5G)

The test pipe shall be placed with its axis horizontal and the weld groove in a vertical plane. The top shall be marked and the pipe cannot be rotated during welding.



INCLINED POSITION (6G)

The test pipe shall be placed with its axis 45 degrees from the horizontal and the weld groove in the inclined plane. The top shall be marked and the pipe shall not be rotated during welding.



TEST COUPON

A test coupon is a rectangular segment removed from the test plate transverse to the weld groove. Each test coupon shall be a minimum of 1-1/2" in width after removal from the pipe.

TEST COUPONS REQUIRED

Plate test requires two test coupons to be removed from each test plate for a total of six coupons for the complete plate test. Refer to Figure 2.

Pipe Test requires that two test coupons be removed from the horizontal pipe test plate and four coupons from the vertical pipe test plate (for a total of six coupons for the complete test). Positions 5G and 6G require four coupons *each*. The welder may remove the coupons by sawing or flame cutting. Care should be taken to incorporate the identification stamping on each coupon. Refer to Figures 3A and 3B.

FIGURE 2 | IDENTIFICATION STAMPING

- » Welder's Initials
- » Welding Process Symbol
- » Welding Position Symbol

Test coupons shall be removed as shown for the horizontal (2G), vertical (3G) and overhead (4G) test positions.

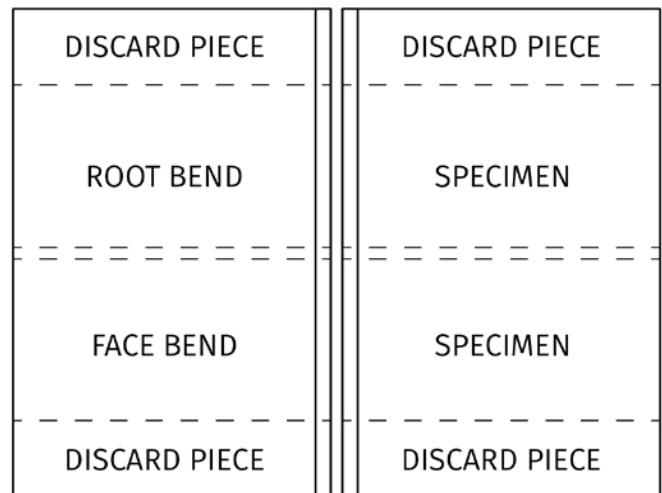


FIGURE 3-A | IDENTIFICATION STAMPING (ALL COUPONS)

- » Welder's Initials
- » Welding Process Symbol
- » Welding Position Symbol
- Two coupons shall be removed opposite each other on the horizontal (2G) test.

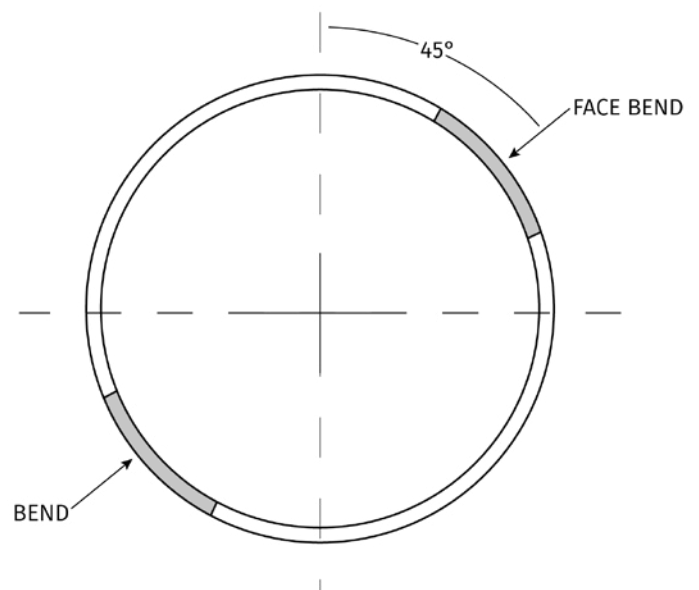
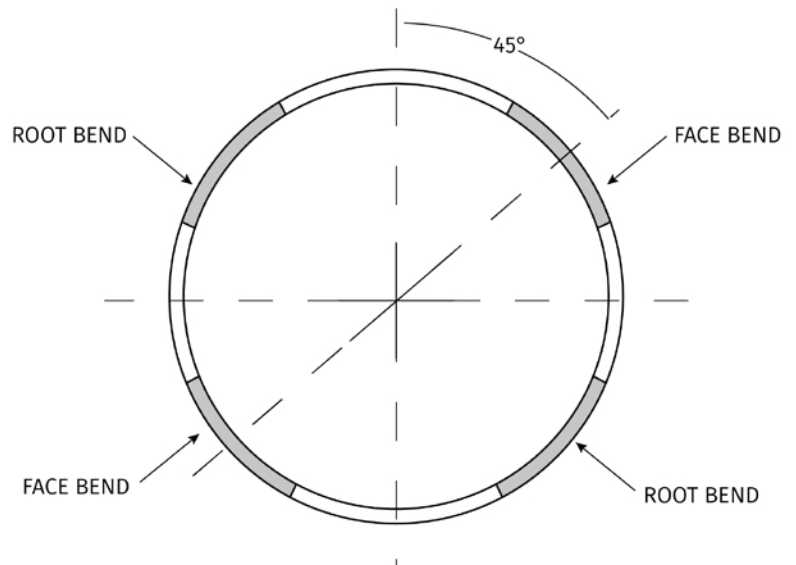


FIGURE 3-B | IDENTIFICATION STAMPING (ALL COUPONS)

- » Welder's Initials
- » Welding Process Symbol
- » Welding Position Symbol
- Four coupons shall be removed from locations as shown for the vertical (5G) and inclined (6G) test.



PREPARATION OF COUPONS

The coupons shall be removed and prepared for bending as described in the preceding paragraphs. Excess weld (reinforcement) shall be removed by grinding and filing. Grinding should be performed in a direction across the weld to eliminate lines that may open up when bending. The welded area shall be finished flush or nearly flush to the plane of the plate material. Rough grind marks will be removed, and the edge of the weld made visible. The corners of the coupon may be removed to a 1/8" radius to eliminate the high stresses on the edge area. Coupons shall not be annealed prior to bending.

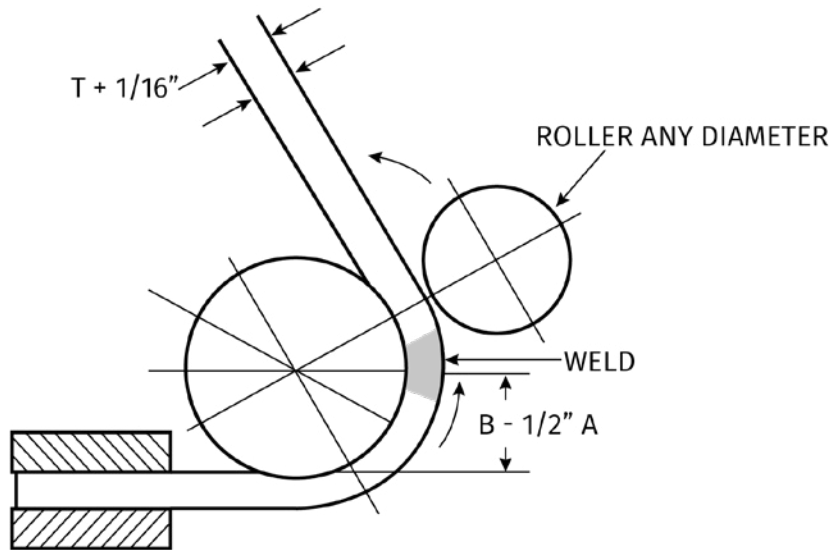
BENDING OF COUPONS

The welding instructor shall bend or witness bending of all test coupons. One face bend and one root bend are required for each weld position. Two face bends and two root bends from the vertical pipe test plate are required. The weld and heat affected zone shall be within the bend. The coupons shall be bent to a true "U" shape or as near such as to not allow a 1/8" space between the test jig plunger and the test coupon (See method of Testing Specimens).

ACCEPTANCE CRITERIA

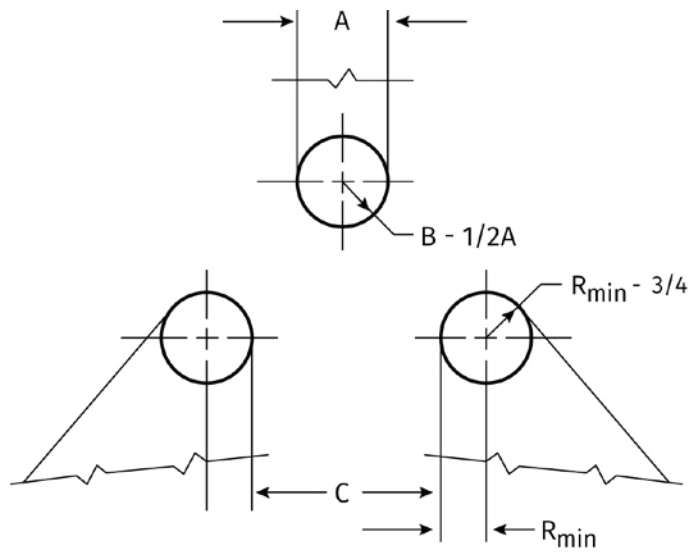
Prior to bending the base material thickness shall not have been reduced by the process of weld reinforcement removal more than 1/16" (0.062). There shall be no evidence of lack of fusion, lack of penetration or undercutting in or at the weld.

After bending the guided bend specimen (coupon) shall have no open defect or aggregate defects in excess of 3/32" measured in any direction on the convex surface of the specimen. However, the West Virginia Department of Education would like for welds to have no cracks, no open defects and no aggregate defects. Cracks occurring on the corners of the test specimen shall not be considered unless there is definite evidence they result from slag or other internal defects. Failure of one coupon of a test position constitutes failure of that position.



Minimum specified material yield strength, psi	A In.	B In.
50,000 & under	1-1/2	3/4

FIGURE 4B | ALTERNATIVE WRAPAROUND GUIDED-BEND TEST JIG.



Minimum specified material yield strength, psi	A In.	B In.	C In.
50,000 & under	1-1/2	3/4	2-3/8

FIGURE 4C | ALTERNATIVE ROLLER EQUIPPED GUIDED BEND TEST FIG FOR BOTTOM EJECTION OF TEST SPECIMEN

NOTES



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