

WELDER

Nova Scotia
Practical Assessment

2017.05.24

Please read all the information provided before you start the examination.

This examination tests four welding processes (FCAW, SMAW, GMAW, GTAW), five plate assemblies (measurement, visual and bend), a gouging test, and three oxy-acetylene cutting tests (measurement and visual). Unless advised otherwise by the examining officer, you may do the tests in any logical order. Review the enclosed marking sheet for specifications.

Materials Provided:

- 6 pieces – 76 mm x 152 mm x 10 mm (3" x 6" x 3/8") P-1 Plates cut at 30° both ends
- 2 pieces – 76 mm x 152 mm x 6 mm (3" x 6" x 1/4") P-1 Plates cut at 30° both ends
- 2 pieces – 76 mm x 152 mm x 10 mm (3" x 6" x 3/8") P-1 Plate cut at 90° both ends
- 2 pieces – 50 mm x 203 mm x 6 mm (2" x 8" x 1/4") P-1 Backing plate cut at 90° both ends
- 1 piece – 100 mm x 127 mm x 10 mm (4" x 5" x 3/8") for Oxy-Fuel Test
- +/- 25 mm x 50 mm (+/-1" x 2") P-1 tabs for bridge or run off tabs
- All required welding electrodes, welding wire and shielding gas as described in the following pages
- Smaller plate pieces for setting of welding machine

Candidate to Provide:

- Helmet, goggles, gloves, personal hand tools (chipping hammer, file) and appropriate safety equipment including CSA approved work boots. **Candidates not having this safety equipment will not be allowed to perform the practical examination.**
- Angle grinder, grinding discs and buffing wheel.

General Instructions:

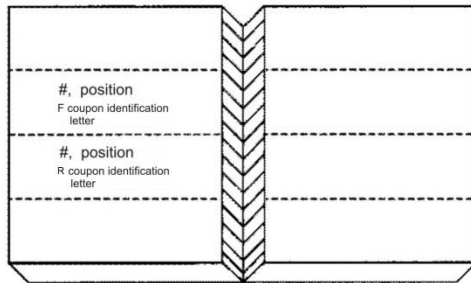
1. You will have five (5) hours in total to complete the six (6) processes assessed; 50 minutes for each welding test; and 30 minutes for oxy-fuel cutting. The pass mark is 70%. Do not engage in needless conversation with examiners or other candidates. Pay close attention to the availability of welding and cutting stations in order to complete the examination in the time allotted.
2. **You must follow these instructions precisely**, as well as any additional instructions by the examiners. You may ask the examiners for clarification of these instructions at any time.
3. You are required to wear and/or use all appropriate safety equipment.
4. **There is no extra set of coupons/straps issued during this examination.** The original coupons/straps issued at the beginning of the examination are the only coupons/straps you will have to work with. Extra coupons/straps will only be issued in the event of a retest, as described in #6 below.
5. **Plates must be stamped** with candidate number and position letter, test coupon/strap identification letter (F=Face and R=Root), as illustrated on the following pages, **before** beginning the exam.
6. Any **single** strap receiving a complete fracture rating (see last point of page 2) will result in a re-test of the failed position immediately following this examination. During the re-test, the coupon/strap will be bent on the face or root as applicable. One (1) hour will be allowed for this re-test.

Notes:

- **Failure to complete this re-test when instructed to do so by the examiners will result in failure of the entire test.**
 - **Re-test time cannot be used to begin a new test. Re-test time can only be used as a second attempt to pass one failed test.**
7. When you have completed the examination, clean up your workstation.
 8. Tests will be marked in the absence of the candidates. Stay away from the bending station until called by the examiners to review your examination results.
 9. Official examination results will be mailed to you.

NOTE: Candidates will not be eligible to write the Red Seal written examination until they have successfully passed the complete practical examination or provided proof of approved test equivalencies.

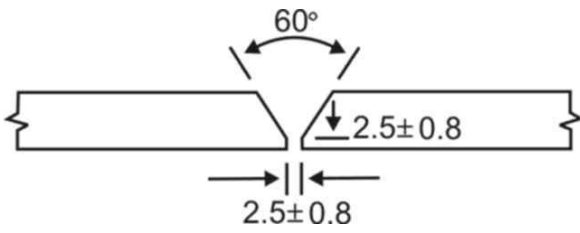

Welding Process Tests



- Before beginning to weld, stamp your straps as illustrated above with your candidate number, **leave a space**, and then the position letter. For example, if your candidate number is 3 and the strap is for the vertical position, mark the strap **3 V** on both halves. For test 4, use the letter **D** as the position number. **Re-test coupons/straps** (if required) are to be stamped in the same way, except **double stamp** the position letter before beginning any welding.
- Coupons/straps are to be tacked to each other on the bevel side unless otherwise described for each project. Maximum length of tacks is 13 mm (1/2") after feathering. All tacks and feathering of tacks may be done in the flat position. Any tool or grinder may be used for feathering of tacks. If the tack appears faulty, you may remove it. The original bevel must still be used following any tack repair. Run off tabs and/or bridge tacks are allowed only in Tests 1, 3 and 4.
- All welding is to be done from the bevel side **only**.
- All roots must be completed as described in test #s 1, 3 and 4. Root passes must be completed and ground **in position only**. **NOTE: For test #s 1, 3 and 4 it is required to request a marker to inspect your root pass IN POSITION once it has been completed** before proceeding to the fill and cap. Once completed, a root pass **cannot be removed**. In the event that the entire root pass is unable to be completed without a stoppage, a tie-in is allowed. The stop is allowed to be feathered **while in position only**. Removal of an entire root pass will result in **failure of the entire examination**. **Lack of penetration, excessive penetration, and non-fusion, continuous or cumulative for 50% or more of the joint will result in failure of the respective test.**
- Fill and cover passes **may not** be ground during the welding process.
- When completed, **wire wheel or wire brush only** and present your completed coupons/straps to the examiners for marking **before surface grinding begins**.
- Grind the welded surfaces to the thickness of the original parent metal. **Maximum** deviation is – 0.8 mm (1/32"). **Failure to maintain original coupon/strap thickness to within this tolerance throughout the weld area will result in a COMPLETE FRACTURE rating for the coupon/strap.** See last point at the bottom of this page.
- The excess weld metal deposited at the edges of the 152 mm (6") coupons/straps may be ground flush with the parent metal. **Do not grind parent metal.**
- Cut the coupons/straps lengthways once down the middle. **Only freehand cutting is allowed.** Cut one 37mm (1 1/2") strap each side of the centre line of the test specimen. Straps measuring less than 37 mm (1 1/2") will have points deducted. **Minimum width is 37 mm (1 1/2").** Straps outside an allowance of +/- 1/16" will receive a **COMPLETE FRACTURE RATING**. **Do not grind the cut edges of the straps.** Knock off the slag and **lightly** file the edges to remove any burrs.
- During bending, a **complete fracture** is a fracture exceeding 6.4 mm (1/4") starting from either edge or exceeding 3.2 mm (1/8") anywhere else. A **single** strap having a complete fracture will result in a **re-test** of the failed position at the end of this examination. **Two** straps having a complete fracture will require candidate to schedule another examination time to re-do the failed test. Partial fractures less than the above limitations will have one (1) point deducted per 1.6 mm (1/16").

Welding Procedure Specification (WPS): NWPE #1

Position: 3G Uphill Process: SMAW

<p>Joint Design and Tolerance:</p> 	<p>Suggested Sequence:</p> 
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Base Metal: Low Carbon Steel Plate CSA G40.21 GR 44W/A36
 2 plates at 76 mm x 152 mm x 10 mm (3 in. x 6 in. x 3/8 in.)

<p>Filler Metal:</p> <p>F3:E4310/E4311 (E6010/E6011/E7018) root</p> <p>F4:E4918 (E7018) hotpass, fill and cap</p>	<p>Diameter of Electrode:</p> <p>F3: 2.4mm (3/32")/3.2mm (1/8")</p> <p>F4: 2.4mm (3/32")/3.2mm (1/8")</p>	<p>Shielding:</p> <p>NA</p>
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Welding Notes:

Coupons/straps must be tacked within the bevel only using F3 or F4 electrodes.

Root passes must be completed and ground in position only.

Request a marker to inspect the root pass in position before proceeding further.

Hotpass, fill and cover passes may not be ground during the welding process.

Stringer passes only may be used to fill and cap.

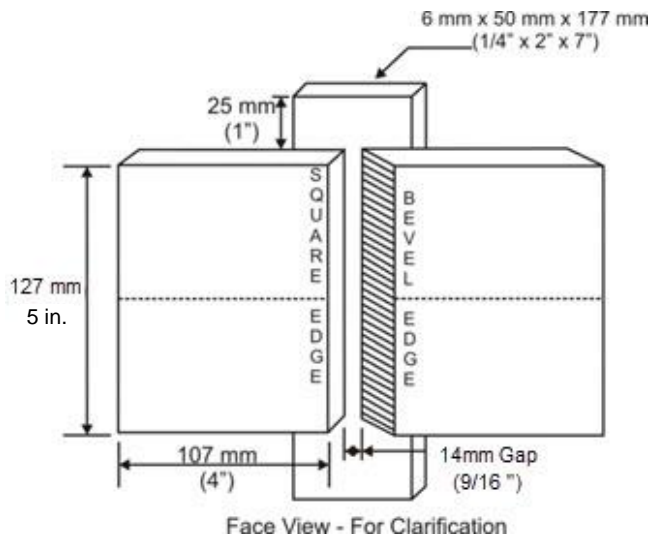
Excessive penetration maximum allowed is 3.2 mm or 1/8 in.

Welding Procedure Specification (WPS): NWPE #2

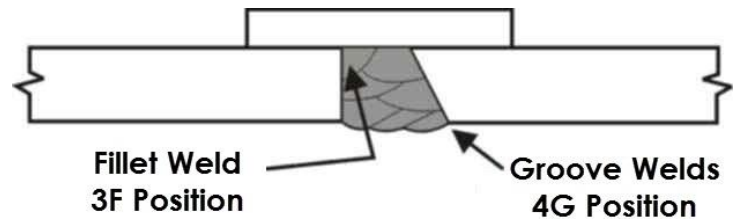
Position: 3F (First Pass) Uphill
4G (Fill and Cap)

Process: SMAW

Joint Design and Tolerance:



Suggested Sequence:



Base Metal: Low Carbon Steel Plate CSA G40.21 GR 44W/A36

2 plates at 76 mm x 152 mm x 10 mm (3 in. x 6 in. x $\frac{3}{8}$ in.)

1 plate at 50 mm x 203 mm x 6 mm (2 in. x 8 in. x $\frac{1}{4}$ in.) backing

Filler Metal:

F4:E4918 (E7018)

Diameter of Electrode:

F4:3.2mm (1/8")

Shielding:

NA

Welding Notes:

Backing plate is to be tacked on the topside of the coupons/straps.

Coupon/strap must be presented to the markers for verification of fit-up prior to beginning root weld.

Only stringer beads are allowed on this two-position test.

Fillet weld for the square shoulder must be performed in the vertical position.

All remaining welding to be performed in the overhead position.

Backing plate to be removed using any thermal or mechanical process to **within 1.6 mm (1/16")** of the parent metal.

No grinding is allowed at any time during the welding or gouging processes, wire wheel only.

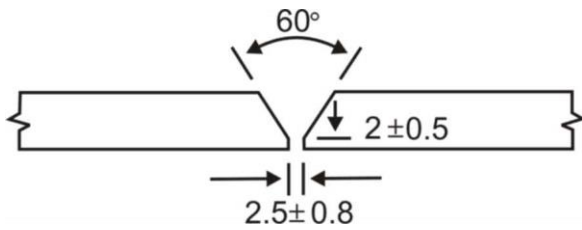
Coupon/strap must be presented to the markers after backing plate removal, **prior to face and root grinding.**

Welding Procedure Specification (WPS): NWPE #3

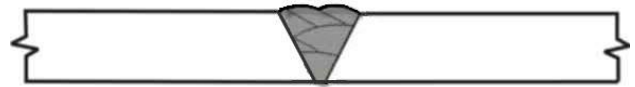
Position: 1G

Process: GMAW

Joint Design and Tolerance:



Suggested Sequence:



Base Metal: Low Carbon Steel Plate CSA G40.21 GR 44W/A36

2 plates at 76 mm x 152 mm x 10 mm (3 in. x 6 in. x 3/8 in.)

Filler Metal:

F6: ER49S-6 (ER70S-6)

Diameter of Electrode:

0.9 mm (0.35")

Shielding:

Gas: 75% Ar 25% CO₂
and/or

Gas: 92% Ar 8% CO₂

Flowrate: 12-17 L/min
(25-35 cfh)

Welding Notes:

Root face and gap to be determined by candidate.

Bridge tacks will be allowed **within the bevel only** using GMAW at the discretion of the candidate.

Run on/run off tabs or bridge tabs **tacked to the edges of the coupon/strap only** will be allowed at the discretion of the candidate.

Request a marker to inspect the root pass before proceeding further.

Stringer passes only may be used to fill and cap.

Candidate may select transfer mode.

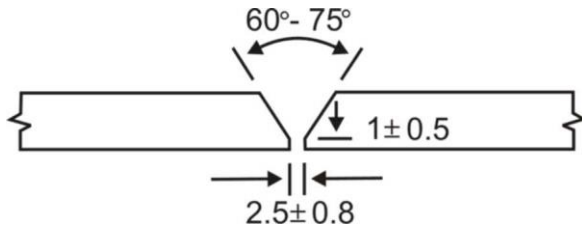
Excessive penetration maximum allowed is 3.2 mm or 1/8 in.

Welding Procedure Specification (WPS): NWPE #4

Position: 2G

Process: GTAW

Joint Design and Tolerance:



Suggested Sequence:



Base Metal: Low Carbon Steel Plate CSA G40.21 GR 44W/A36

2 plates at 76 mm x 152 mm x 6 mm (3 in. x 6 in. x 1/4 in.)

Filler Metal:

F6: ER49S-2/3 (ER70S-2/3)

Diameter of Filler Metal:

2.5 mm (3/32") – 3.2 mm (1/8")

Shielding:

Argon

Flowrate: 12-17 L/min
(25-35 cfh)

Welding Notes:

Filler metal rod diameter at the discretion of the candidate.

Root face and gap to be determined by the candidate.

NOTE: coupons/straps must be tacked **within the bevel only** using GTAW.

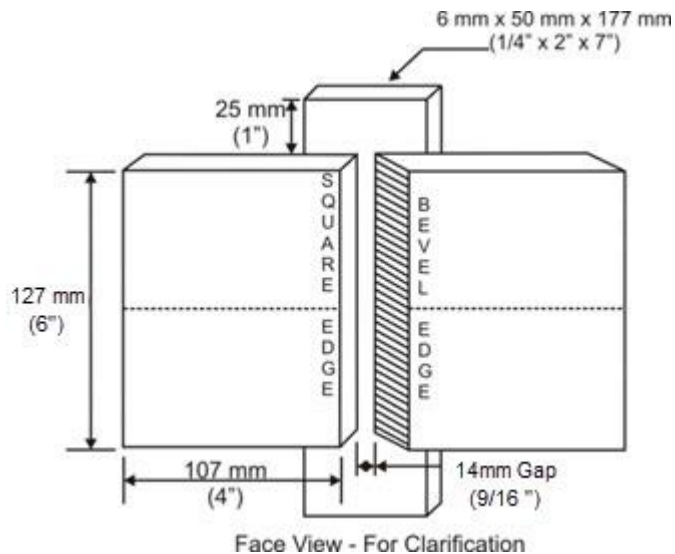
NOTE: Request a marker to inspect your GTAW root pass *IN POSITION* once it has been completed before proceeding to the GTAW fill and cap.

Welding Procedure Specification (WPS): NWPE #5

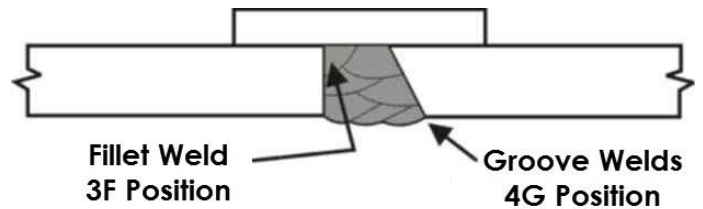
Position: 3F (First Pass) Uphill
4G (Fill and Cap)

Process: FCAW

Joint Design and Tolerance:



Suggested Sequence:



Base Metal: Low Carbon Steel Plate CSA G40.21 GR 44W/A36

2 plates at 76 mm x 152 mm x 10 mm (3 in. x 6 in. x $\frac{3}{8}$ in.)

1 backing strip at 50 mm x 203 mm x 6 mm (2 in. x 8 in. x $\frac{1}{4}$ in.)

Filler Metal:

F6:E491T-9 (E71T-1)

Diameter of Electrode:

1.1 mm (0.045")

1.4 mm (0.052")

1.6 mm (1/16")

Shielding:

75% Ar 25% CO₂

Flow Rate: 19 L/PM (40 cfh)

Welding Notes:

Backing plate is to be tacked on the topside of the coupons/straps.

Coupon/strap must be presented to the markers for verification of fit-up prior to beginning root weld.

Only stringer beads are allowed on this two-position test.

Fillet weld for the square shoulder must be performed in the vertical position.

All remaining welding to be performed in the overhead position.

Backing plate to be removed using any thermal or mechanical process to **within 1.6 mm (1/16")** of the parent metal.

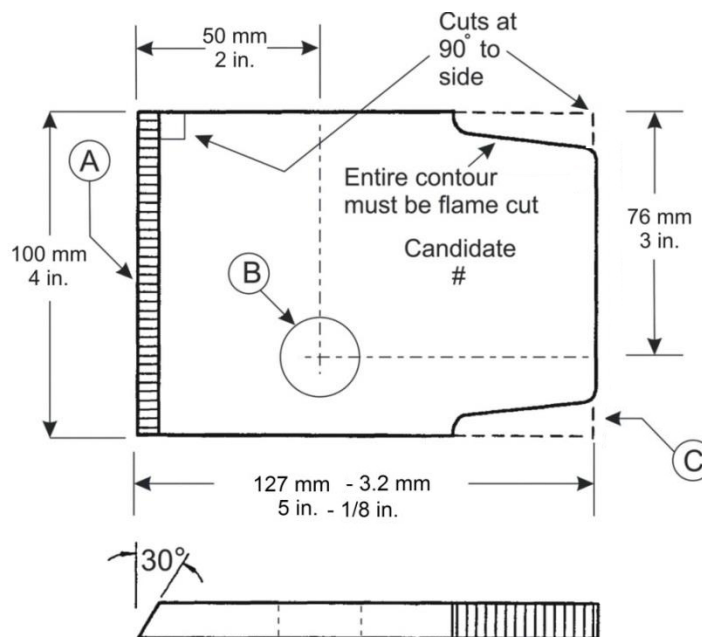
No grinding is allowed at any time during the welding or gouging processes, wire wheel only.

Coupon/strap must be presented to the markers after backing plate removal, **prior to face and root grinding.**

Welding Procedure Specification (WPS): NWPE #6

Position: N/A

Process: Oxy-Fuel Cutting



Directions:

- Only one 100 mm x 127 mm x 10 mm (4" x 5" x 3/8") Low carbon/mild Steel flatbar cut at 90° both ends will be provided for this portion of the test. **No retest coupon/strap will be allowed for this portion of the examination.**
- Any measuring device may be used for marking layout lines. A 1" NPS pipe and a section of 100 mm (4") channel or template of same will be provided for marking the layout lines for the applicable projects of this test.

<ul style="list-style-type: none"> • All cuts are to be made freehand. Failure to do so will result in a deduction of 10 points for that portion of this test. • No grinding is permitted on any cut edges. Knock off the slag and lightly file the edges to remove any burrs. Grinding of either cut edge will result in a deduction of 10 points for that portion of this test. • Overall length of the finished test plate must be within the tolerance stated in the above diagram. Failure to do so will result in a deduction of 10 points from either Project A or Project C at the discretion of the markers. 	
Project A:	<p>Perform a 30° cut along the 100 mm (4") end as shown in the diagram. Cut must be at 90° to the sides. The cut angle is allowed a maximum tolerance of +/- 3°.</p> <p>Cut angle between +/- 4° to +/- 10° of 30° will result in a deduction of 2 points.</p> <p>Cut angle in excess of +/- 10° of 30° will result in a deduction of 10 points.</p>
Project B:	<p>Locate and perform a circular 90° cut to accept a 1" NPS pipe as shown in the diagram. The fit of the pipe is allowed a maximum 3/32" clearance at any point.</p> <p>Clearance between 2.5 mm (3/32") and 6.5 mm (1/4") will result in a deduction of 2 points.</p> <p>Clearance of 6.5 mm (1/4") or more will result in a deduction of 10 points.</p>
Project C:	<p>Perform a coping cut to accept a 100 mm (4") channel or template as shown in the diagram. Cut must be at 90° to the sides. The fit of the channel is allowed a maximum 2.5 mm (3/32") clearance at any point.</p> <p>Clearance between 2.5 mm (3/32") and 6.5 mm (1/4") will result in a deduction of 2 points.</p> <p>Clearance of 6.5 mm (1/4") or more will result in a deduction of 10 points.</p>