

## Manitoba Welder Practical Examination

# STRUCTURAL LEVEL 1

The Manitoba Welder Practical Examination is designed to test the scope of practical knowledge and skills of the trade. Please read all the information throughout this package.

All candidates must follow safety procedures, including the use of equipment, hand tools, safety glasses, CSA approved steel toe boots, leathers, gloves, helmets, safety goggles/visor and hearing protection.

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## STRUCTURAL PRACTICAL EXAM REQUIREMENTS

Oxy/Acetylene Cutting	
CWB – Flat SMAW	(Shielded Metal Arc Welding)
CWB – Flat GMAW	(Gas Metal Arc Welding)
CWB – Flat FCAW	(Flux Core Arc Welding) or MCAW (Metal Core Arc Welding)

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## Guidelines for Oxy/Fuel Cutting Test

- Only one 100mm x 125mm x 10mm Mild Steel plate cut at 90° both ends will be provided for this portion of the test. No retest coupon will be allowed for this portion of the examination. 1 hour to complete.
- Any measuring device may be used for marking layout lines. A 25mm round bar and a section of 100mm channel will be provided for marking the layout lines for the applicable projects of this test.
- All cuts are to be made freehand.
- No grinding is permitted on any cut edges. Remove slag and lightly file the edges to remove any burrs. Cut edges should be smooth, straight and even.

### Part A:

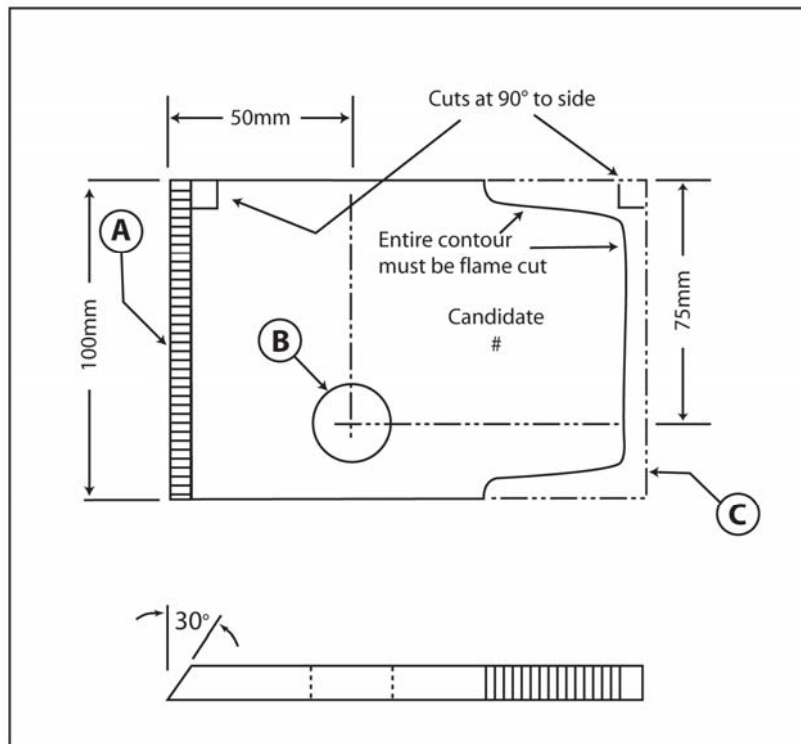
Perform a 30° cut along the 100mm end as shown in the diagram. Cut must be at 90° to the sides. The cut angle is allowed a maximum tolerance of +/- 3°.

### Part B:

Locate and perform a circular 90° cut to accept a 25mm round bar as shown in the diagram. The fit of the round bar is allowed a maximum 2mm clearance at any point. Results will be determined by examiner.

### Part C:

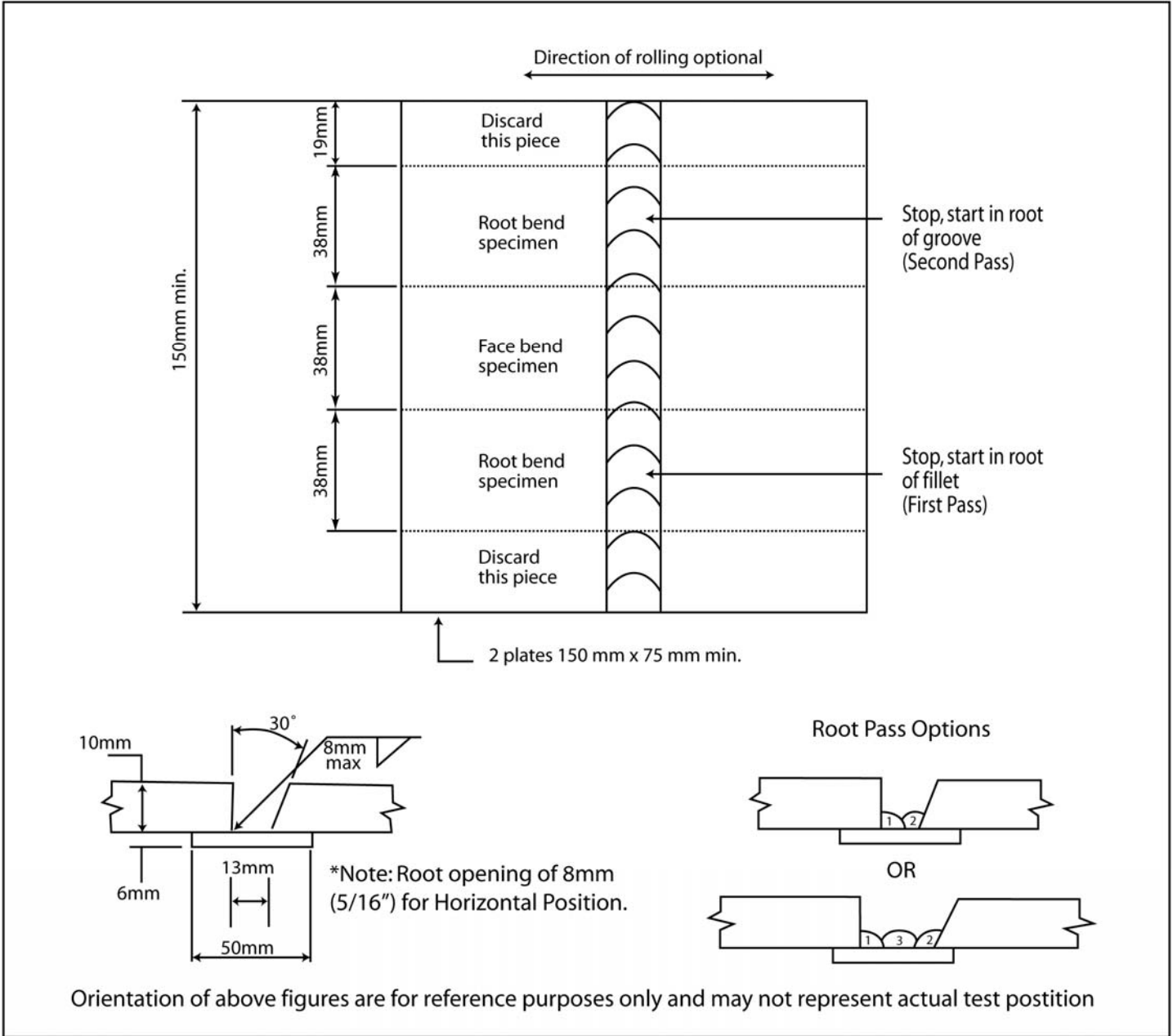
Perform a coping cut to accept a 100mm channel as shown in the diagram. Cut must be at 90° to the sides. The fit of the channel is allowed a maximum 2mm clearance at any point. Results will be determined by examiner.



## Guidelines for Testing SMAW, GMAW and FCAW/MCAW Processes

- a) Prior to welding, all test plates shall be verified for proper dimensions and shall be in accordance with CSA Welding Standard W47.1.
- b) All test plates will be number stamped by the examiner or CWB representative prior to welding.
- c) Only certified consumables (wire/electrodes) under CSA standard W48 shall be used. For SMAW: low hydrogen electrodes are to be used, and stored or held at a temperature of 120C/250F minimum.
- d) Each test plate must be completed within 45 minutes. No preheating of the test plates is allowed.
- e) Once the test has begun, unauthorized use of a grinder may result in the disqualification of the test. Use of wire wheel, wire brush and chipping hammer is permitted.
- f) All tests must incorporate two stop/restarts in the root passes (with the exception of the horizontal position which only has one on the 30° bevel side). All stop/restarts will be indicated on the test plate by an arrow mark and must be verified by the CWB representative.
- g) The first pass must be made on the 90° (fillet) side of the joint and weld size shall not be larger than 8mm (5/16"). With the exception of the horizontal position, the length of the first pass shall only be 115mm (4.5") and will stop at the mark noted on the test plate. The second weld pass shall be on the 30° (or bevel) side and shall stop on the arrow mark noted. NOTE: All restarts will initiate on the tapered crater (termination of weld) and continue outward.
- h) Completed tests shall be welded at least flush to plate thickness and cover passes (cap) height shall not exceed 3mm (1/8"). Maximum undercut depth allowed is 1mm (1/32").
- i) The completed weld test (before grinding operations) must be inspected by the CWB representative for final visual acceptance. (Refer to Test Plate – Visual Acceptance Criteria for details).
- j) Once visually accepted, the weld cap and backing bar are to be removed and ground flush. The test plate shall be verified by the CWB representative to ensure that over-grinding has not occurred (maximum 5% of plate thickness).
- k) Disqualification of the specimen will occur if imperfection or discontinuities are removed by grinding or welding following final visual inspection.
- l) Once preparation (grinding operations) of the test plate is verified acceptable, the test assemblies are to be cut into three specimens as per "*Test Plate Dimension and Root Pass Sequence*" diagram. Edges of the specimen can be ground to a radius of 3mm (1/8").
- m) Once the test specimens have reached ambient temperature; root bends will occur on specimens #1, #3 and a face bend on specimen #2 for a full 180° over a 38mm (1.5") mandrel.
- n) Bend specimens will be examined by the CWB representative and evaluated in accordance with CSA Welding Standard W47.1 (Refer to Test Plate – Visual Acceptance Criteria for details).

Test Plate Dimensions and Root Pass Sequence for SMAW, GMAW and FCAW/MCAW



## Test Plate – Visual Acceptance Criteria

### Welded Test Plate (prior to grinding)

- 1) The weld shall be free of surface cracks;
- 2) All craters shall be filled to the full cross-section of the weld;
- 3) There shall be no visible lack of fusion between welds and base metal (overlap);
- 4) Weld profile shall be smooth, free of excess weld splatter and cap height no more than 3mm (1/8");
- 5) The sum of diameters of visible porosity shall not exceed 10 mm (3/8") in any 25 mm (1") linear length of weld. Any individual pore shall have a dimension not exceeding 2.5mm (3/32");
- 6) Depth of undercut shall not exceed 1mm (1/32");
- 7) Welds shall be free of excessive splatter;
- 8) The weld profiles shall have a smooth transition from one bead to the next, (a deep valley between passes is not acceptable).

### Welded Test Plate (after grinding and prior to bending)

- 1) Nominal plate thickness shall be maintained (grind flush only);
- 2) Imperfections and discontinuities are not to be ground out or welded over;
- 3) Finish grinding shall be smooth and grain direction shall be transverse (perpendicular) to the weld.

### Evaluation of Bend Tests

Surface discontinuities for each bend specimen shall not exceed the following:

- 1) 3 mm (1/8") measured in any direction on the surface;
- 2) 10 mm (3/8") — the sum of the greatest dimensions of all discontinuities exceeding 1 mm (1/32") but less than or equal to 3 mm (1/8");
- 3) 6 mm (1/4") — the maximum corner crack, except when such a corner crack resulted from visible slag inclusion or other fusion-type discontinuities, in which case Item (1) shall apply;
- 4) Specimens with corner cracks exceeding 6 mm (1/4 in) with no evidence of slag inclusions or other fusion-type discontinuities shall be disregarded and considered acceptable.

## Frequently Asked Questions

- 1) Am I required to pass all the required practical tests in order to receive my Certificate of Qualification? Yes.
- 2) Will I still receive a CWB qualification cards (tickets) for tests that were passed in progression? Yes.
- 3) Are the test plate dimensions the same for SMAW, GMAW and FCAW or MCAW tests? Yes.
- 4) If I do obtain a CWB welder qualification can it be recognized by welding companies/future employers? Your welder qualification(s) can be an asset to verify basic welding skills to all welding companies. CWB welder qualifications achieved will be transferable which means a CSA W47.1 company can recognize them without further testing (some provisions to apply).
- 5) Is there an expiry date on the CWB student qualification card? Yes, two years from the date of evaluation.
- 6) If I already hold a valid CWB welder qualification can I be exempt from testing? Yes, no further testing is required on that specific process and should be confirmed with your examiner.
- 7) Can I use any welding parameters/settings to complete the weld tests? Yes, welder's discretion.
- 8) Can I adjust the settings at any time? Yes.
- 9) What causes the most failures to occur in a CWB test plate? Lack of fusion/penetration in the root passes.
- 10) Which SMAW electrode and diameter will I use for the test? E4918 (E7018) 1/8" diameter.
- 11) Will I get a chance to retest if a failure occurs? Yes.
- 12) How much time is allowed to weld each test? 45 min. (machine setup should be done prior).
- 13) What happens if I have problems with my welding machine during the test? Inform examiner and in most cases additional time will be allowed.
- 14) Will I be able to ask questions any time prior or during the tests? Yes.
- 15) Do I have to pass the tests in progression from Flat to Horizontal to Vertical to Overhead positions? Yes, in order to receive a CWB qualification, lower positions must be considered a pass first.
- 16) What kinds of tools are acceptable to use while testing? Any tools are acceptable but no weld metal shall be removed.
- 17) Can I move my test plate for cleaning or readjust for welding? Only for the Flat position tests.
- 18) How long will it take to receive the CWB welder qualification tickets? Yes, usually within 1-2 week period.
- 19) Should my cover (cap) passes be completed in one pass (weave technique) or multi-pass (stringer-bead technique)? Preferred is stringer bead technique with tight overlaps and no valleys.
- 20) Can I use run-off tabs? Yes, but not required.
- 21) Are there a certain number of passes or layers required to fill each test? No, welder's discretion.
- 22) Is there additional information that I can access in regards to CWB testing? Yes, "CWB" YouTube video.

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## CSA Welding Code W47.1

All structural welder practical test assemblies are derived from CSA Welding Standard W47.1. The CWB (*Canadian Welding Bureau*) will issue transferable qualification cards (tickets) upon successful completion of tests described in this package. All lower positions tests must be successfully completed prior to issuing qualifications for higher positions.

CSA Welding Code W47.1 – Certification of Companies for Fusion Welding of Steel

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CSA Welding Code W47.1 specifies the requirements for welder testing. The Canadian Welding Bureau is responsible for administering the requirements CSA Welding Standard W47.1.