

2012 MICHIGAN SKILLS USA CHAMPIONSHIPS

WELDING TASKS & MATERIAL



Purpose

To evaluate each contestant's preparation for employment and recognize outstanding performance.

First, refer to General Regulations.

General:

Clothing Requirement

1. Suggest 100 percent cotton, fire retardant work pants, protective welder's clothing including welder's hat or skullcap, leather cape with sleeves and bib or fire resistant welding coat or sleeves, leather gauntlet welding gloves (for other than GTAW), leather welding gloves for GTAW, high-top (6" minimum height) leather shoes (steel-toed safety shoes are recommended) and welder's helmet. All outer clothing must be fire-resistant. Industrial quality safety glasses with side shields or safety goggles that meet the standards of the American National Standard Institute for Occupational Educational Eye and Face Protection. No cell phones or cameras allowed in the welding lab.

Eligibility

Open to active Skills USA-VICA members enrolled in programs with welding as the occupational objective.

Equipment and Materials:

1. Supplied by the technical committee:
 1. All necessary welding equipment and materials
 2. All instructions and procedure sheets with drawings
 3. All necessary information and furnishings for judges and technical committee
2. Supplied by the **contestant**:
 - a. Hearing and/or ear protection

- b. Welding helmet with appropriate #10/#12 filter plate/lens and protective cover plate/lens in a flip or slide front.
- c. Welding helmet/face shield/goggles with appropriate #5/#7 filter plate/lens and protective cover plate/lens for OFC/PAC
- d. Spare spatter and filter lenses/plates for arc welding helmet and oxyacetylene goggles
- e. Pocket calculator
- f. Lead pencil and/or ballpoint pen
- g. Soap stone with holder
- h. Scribe with magnet
- i. Combination square set
- j. 10-foot (3.1 meters) steel tape measure
- k. Fillet weld gauge
- l. 16-ounce (.45 kilogram) ball peen hammer
- m. Center punch
- n. 10-inch (254 millimeters) vice grips
- o. 6-inch (152 millimeters) side cutting pliers or diagonal cutting pliers
- p. 6-inch (152 millimeters) standard slip lock pliers
- q. Chipping hammer with or without wire brush
- r. Stainless steel wire brush
- s. Calculator
- t. Tungsten AWS EWTh-2 1/16, 3/32, 1/8 diameter, AWS EWP 3/32, 1/8 diameter.
- u. " V " - Metal Hand File - either a Round File or a Half Round 12" - 14" length.
- v. 2 - vise grip type pliers
- w. 1 page resume
- x. No gas lens allowed!

Specific Rules for Contest Participants

1. Contestants must correctly use the welding equipment during the contest. The contest chairman or contest coordinator may stop a contestant at any section of the contest if they deem a contestant's manner to be hazardous to either themselves or others. Such stoppage shall disqualify the participant for that section of the contest. If the contestant is warned a second time, he or she will be disqualified as a contest participant.
2. Contestants will be assigned a contest number for use during the welding contest. The contest judges will know the contestants by their assigned number only.
3. While the contest is in progress, there shall be no communication between the contestants or

I = Individual Competition

O = Overall Competition

between the contestants and anyone else except as directed by a judge, contest coordinator or contest chairperson.

4. The welding contest will be of a performance nature.
5. All terms and definitions and welding symbols will be in accordance with the current editions of ANSI/AWSA3.0 (Terms and Definitions) and ANSI/AWSA2.4 (Symbols).
6. Time limits will be established on the contest procedure sheets for all segments of the test.
7. Evaluation of the completed project will be judged visually. Nondestructive and/or destructive tests may be used to complete the project evaluation.
8. Welding and cutting operation instructions will be specified in drawings and procedure sheets provided to the contestants.

Scope of the Contest

1. Contestants will demonstrate their ability to perform jobs and skills selected from the following list of competencies as determined by the Skills USA Championships Technical Committee. Committee membership includes: Lansing Community College, American Welding Society, Chrysler LCC, Thermadyne, Lincoln Electric Co., Miller Electric Manufacturing Co., Victor Equipment, and Technical Welding Services.

a. Safety

1. Demonstrate personal safety.
2. Demonstrate general shop safety.
3. Demonstrate gas, electrical and chemical safety.
4. Demonstrate knowledge of proper actions to be taken in an emergency.

b. Measurements

1. Identify basic metal working tools used in measuring.
2. Use visual measuring tools to accurate of 1/32 of an inch.
3. Employ the components of a combination square set.
4. Use layout and marking tools as required.
5. Determine wire feed speed as indicated on drawing.

c. Blueprint Reading

1. Use information found in the information block of the drawing.
2. Read and understand three-dimensional drawings.

3. Identify the basic views used in blueprints including assembly, detail and fit-up drawings.
4. Identify common types of lines, abbreviations and symbols in accordance with national drawing standards –ANSI.
5. Identify basic welding symbols and components of a symbol (such as arrow, reference line, tail, size or length) in accordance with the national welding symbols standards – AWS.

d. Shielded Metal Arc Welding (SMAW)

1. **I/O** Demonstrate safety procedures for SMAW.
2. **I/O** Demonstrate ability to correctly set up SMAW power sources, related welding equipment and do basic process and equipment troubleshooting.
3. **I/O** Correctly identify base metal prior to welding.
4. **O** Set up and shut down equipment.
5. **I/O** Select correct type of filler metal size of electrode based on carbon steel plate (1/8-inch to 1/2" thickness).
6. **I/O** Prepare carbon steel for welding.
7. **I/O** Start, stop and restart stringer beads on carbon steel in the flat, horizontal, vertical up and down and overhead positions.
8. **I/O** Weld a lap joint with a single pass, fillet weld on carbon steel plate in flat, horizontal, vertical up and down and overhead positions.
9. **I/O** Weld a lap joint with a multiple pass, fillet weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
10. **I/O** Weld a T-joint with a single pass, fillet weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
11. **I/O** Weld a T-joint with a multiple pass, fillet weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
12. **I/O** Weld a butt joint with a single pass, square groove weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
13. **I/O** Weld a butt joint with a single pass, V-groove weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
14. **I/O** Weld a butt joint with a partial joint penetration, single pass, double V-groove weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.

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15. **I/O** Weld a butt joint with a multiple pass, double groove weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
16. **O** Weld 2 inch through 6 inch diameter, schedule 40, and smaller carbon steel pipe, single/multiple pass V-groove weld in the 2G position. Also, fillet weld in the 2F and 5F positions.
17. **O** Weld a plug weld in the flat position.
18. **I/O** Lay out, weld, cut and prepare coupons for evaluation.

e. Gas Metal Arc Welding (GMAW)

1. **I/O** Demonstrate correct safety procedures for GMAW.
2. **I/O** Demonstrate ability to correctly set up GMAW power sources, related welding equipment and do basic process and equipment troubleshooting.
3. **I/O** Correctly identify base metal prior to welding.
4. **I/O** Set up and shut down equipment.
5. **I/O** Select correct type of filler metal size of electrode, type of shielding gas, wire feed speed and voltage based on carbon steel plate (1/8-inch to 3/8-inch thickness).
6. **I/O** Prepare the carbon steel for welding.
7. **I/O** Start, stop and restart stringer beads on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
8. **I/O** Weld a lap joint with a single pass, fillet weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
9. **I/O** Weld a lap joint with a multiple pass, fillet weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions. Interrupt root pass at mid point and restart arc.
10. **I/O** Weld a T-joint with a single pass, fillet weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
11. **I/O** Weld a T-joint with a multiple pass, fillet weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
12. **I/O** Weld a butt joint with a single pass, square groove weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
13. **I/O** Weld a butt joint with a single pass V-groove weld on carbon steel plate in the flat,

horizontal, vertical up and down and overhead positions.

14. **I/O** Weld a butt joint with a multiple pass, V-groove weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
15. **I/O** Weld a butt joint with complete joint penetration, multiple pass, double V-groove weld on carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
16. **O** Weld 2-inch through 6-inch diameter schedule 40, and thinner carbon steel pipe, single/multiple pass V-groove weld in the 2G position. Also, fillet welds in the 2F and 5F positions.
17. **O** Weld a plug weld in the flat position.
18. **I/O** Lay out, weld, cut and prepare coupons for evaluation.

f. Gas Tungsten Arc Welding (GTAW)

1. **I/O** Demonstrate safety procedures for GTAW.
2. **I/O** Demonstrate ability to correctly set up GTAW power sources, related welding equipment and do basic process and equipment troubleshooting.
3. **I/O** Correctly identify base metal prior to welding.
4. **I/O** Set up and shut down equipment for regular and pulsed welding of aluminum, stainless steel and/or carbon steel.
5. **I/O** Select the correct size and type of tungsten and/or filler metal based on aluminum, stainless steel or carbon steel sheet/ plate (1/16-inch to 1/4-inch thickness).
6. **I/O** Prepare aluminum, stainless steel and/or carbon steel for welding.
7. **I/O** Start, stop and restart stringer beads on aluminum, stainless steel and carbon steel sheet/plate in the flat, horizontal, vertical up and down and overhead positions.
8. **I/O** Weld a lap joint with a single pass, fillet weld on aluminum, steel, stainless steel and carbon steel sheet/plate in flat, horizontal, vertical up and down and overhead positions.
9. **I/O** Weld a T-joint with a single pass fillet weld on aluminum, steel, stainless steel and carbon steel sheet/plate in the flat, horizontal, vertical up and down and overhead positions.
10. **I/O** Weld a butt joint with a single pass, square groove on aluminum, stainless steel and carbon steel sheet/plate in the flat, horizontal, vertical up and down and overhead positions.

11. **I/O** Weld a butt joint with a single pass, V-groove weld on aluminum, stainless steel, and carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
12. **I/O** Weld a butt joint with a multiple pass, V-groove weld on aluminum, stainless steel and carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
13. **I/O** Weld a butt joint with complete joint penetration, multiple pass, double V-groove weld on aluminum, stainless steel and carbon steel plate in the flat, horizontal, vertical up and down and overhead positions.
14. **O** Weld 2-inch through 4-inch diameter, schedule 40 and thinner, aluminum, stainless steel, carbon steel pipe, single/multiple pass V-groove weld in the 2G position. Also, fillet welds in the 2F and 5F positions.

g. Oxygen Fuel Cutting (OFC)

1. **I/O** Demonstrate safety procedures for OFC.
2. **I/O** demonstrates ability to correctly set up and OAC equipment for cutting and do basic process troubleshooting.
3. **I/O** correctly identifies base metal prior to cutting.
4. **I/O** Set up and shut down equipment for cutting carbon steel plate.
5. **I/O** Select correct tip size and gas pressure for serving carbon steel plate (1/4-inch to 1/2-inch thickness).
6. **I/O** Prepare carbon steel for cutting.
7. **I/O** Cutting operations will be specified in drawings and procedure sheets provided to the contestants.
8. **I/O** Properly light, adjust the flame, and shut down the oxygen fuel equipment.
9. **I/O** Use a straight edges and soaps stone laying out the prescribed pattern.
10. **I/O** Make a square cut on carbon steel in flat, horizontal and vertical positions.
11. **I/O** Make a bevel cut (45-degree angle) on carbon steel plate in the flat, horizontal and vertical positions.
12. **I/O** Pierce a hole in carbon steel in the flat, horizontal and vertical position.
13. **I/O** Make a cut on carbon steel pipe in flat, horizontal, and vertical positions.
14. **No cutting guides allowed**

h. Plasma Arc Cutting (PAC)

1. **O** Demonstrate safety procedures for PAC.

2. **O** Demonstrate ability to correctly set up the PAC power sources, related cutting equipment and do basic process and equipment troubleshooting.
3. **O** correctly identifies base metal prior to cutting.
4. **O** Set up and shut down equipment for cutting carbon steel, stainless steel and/or aluminum.
5. **O** Select correct cutting head and gas pressure for severing carbon steel, stainless steel or aluminum plate and/or sheet s (1/16-inch to 1/4-inch thickness).
6. **O** Prepare carbon steel, stainless steel and/or aluminum for cutting.
7. **O** Cutting operations will be specified in drawings and procedure sheets provided to the contestants.
8. **O** Properly adjust and use the plasma arc equipment.
9. **O** Use a straight edge and soapstone lay out the prescribed pattern.
10. **O** Make a square cut on carbon steel, stainless steel and aluminum sheet/plate in flat, horizontal and vertical positions.
11. **O** Make a bevel cut (45 degree angle) on carbon steel, stainless steel and aluminum sheet/plate in the flat, horizontal and vertical positions.
12. **O** Pierce a hole in carbon steel, stainless steel and aluminum sheet/plate in the flat, horizontal and vertical position.

i. Oxygen Acetylene Welding and Brazing

1. **I** Demonstrate the ability to correctly set up OAW equipment for gas welding and brazing and do basic process troubleshooting.
2. **I** Correctly identify base metal prior to welding or brazing.
3. **I** Select correct tip size and gas pressures for joining carbon steel plate (1/16 inch to 1/4 inch thickness).
4. **I** Demonstrate the ability to weld or braze a butt joint in flat, horizontal, vertical or overhead positions.
5. **I** Demonstrate the ability to weld or braze a fillet weld in flat, horizontal, vertical or overhead positions.

2. Judging Criteria

The contestant will be evaluated on the competencies based on the following rating system. The technical committee according to the difficulty of the assigned task will establish point values for each item. Final

judging of the welded projects will be evaluated using the following:

a. Visual Inspection Criteria:

1. Dimensional accuracy, including distortion.
2. Conformity to drawing requirements including determination of whether all welds have been completed and whether the finished welds conform to the required size and contour.
3. Visual examination of the welds for:
 - i. Cracks (Dye Penetrant)
 - ii. Undercut
 - iii. Overlap
 - iv. Crater fill
 - v. Spatter
 - vi. Arc strikes
 - vii. Porosity
 - viii. Convexity and reinforcement
 - ix. Tungsten inclusions
 - x. Inadequate joint penetration
 - xi. Surface irregularities
 - xii. Other irregularities
4. Destructive Testing
 - i. Fillet weld break and Macrotech
 - ii. Guided bend test
 - iii. Leak test (Dye penetrant)

b. Welding equipment may be obtained from a variety of manufacturers and may include transformers, rectifiers and/or inverters.

c. Filler metals will be compatible with the metals being welded and will be detailed on the contest

procedure sheet. Instructions to the contestants will define more specifically the filler metals that may be used. Below is a suggested list of electrodes and filler metal types and sizes:

1. Shielded Metal Arc
 - i. E 6010 – 1/8-inch diameter
 - ii. E7018 – 3/32-inch, 1/8 inch, 5/32-inch diameter
2. Gas Metal Arc
 - i. E70S-3 .035 - .045 diameter (75% Ar 25% CO2 Shielding Gas)
3. Gas Tungsten Arc
 - i. EWTH-2 - 1/16-inch, 3/32-inch, 1/8-inch diameter
 - ii. EWP – 3/32-inch, 1/8-inch diameter
 - iii. ER70-2 – 1/16-inch – 1/8-inch diameter
 - iv. ER4043 – 3/32-inch and 1/8-inch diameter
 - v. ER308L – 1/16-inch, 3/32-inch diameter
4. Oxyacetylene Welding
 - i. RG60 – 3/32-inch – 1/8-inch diameter
 - ii. RCUZN – 3/32-inch diameter

d. Cutting and Welding Tip Sizes:

1. Oxyacetylene Cutting
 - i. Cutting tip sizes: 0 – 1 (Victor or Harris equipment)
 - ii. Welding tip sizes: 0 – 3 (Victor or Harris equipment)

SkillsUSA Michigan Welding Competition
College/Postsecondary: March 30, 2012, Washtenaw Community College
High School: April 20 & 21, 2012, Lansing Community College

The following is the group meeting times and places for Secondary Welders at Lansing Community College – New West Campus Welding Lab on Friday and Saturday, April 20 & 21, 2012.

- **April 20 – Fri. – Overall Contestants Only. 4:00pm @ L.C.C. West Campus Welding Lab. Tack overall projects – All 18 overall contestants need to be at LCC welding lab by 4:00pm. Each will be given your prints and tack your projects together between 4:00 and 6:30pm on Friday evening. (you will finish welding your projects on Saturday). Contest for Overall starts at 4:00pm on Friday night. Anyone who is not on time forfeits that time allotment.**

Saturday April 21, 2012 - Performance Test Schedule

8:00 - 8:20 am.	Auditorium S147	Introduction
8:20 – 11:30 am.	WC 169 Welding Lab	Overall Welding Contestants
8:20 – 10:15 am.	WC 169 Welding Lab	Group A – Oxy Fuel Contestants
10:15 – 12:10 am.	WC 169 Welding Lab	Group B – Oxy Fuel Contestants
11:15am	WC 169 Welding Lab	SMAW, GMAW, GTAW, Contestants intro.
11:30 – 1:00 pm. Also	WC 169 Welding Lab	GMAW Contestants
11:30 – 1:30 pm.	WC 169 Welding Lab	GTAW Contestants
1:15 pm.	WC 169 Welding Lab	SMAW Contestants
1:30 – 3:30 pm.	WC 169 Welding Lab	SMAW Contestants

Note:

Your Contest numbers must be visible at all times and will be checked at your scheduled contestants times. If you miss the time of your contest you may not be allowed to compete in the event.

- **Special Notes to Overall Contestants:**

- This year the overall contestants will assemble and tack their projects on Friday evening. Please arrive no later than 4:00 pm to the Welding Lab (LCC new West Campus Technology Center).

Written Test Schedule (Both Skills Knowledge and Welding Knowledge Test)

Saturday April 21, 2012

GMAW – 9:00am – 10:00 am Written Test in Room WC 166

GTAW - 9:00am – 10:00 am Written Test in Room WC 165

SMAW – 10:00am – 11:00 am Written Test in Room WC 166

Overall – 11:45am – 1:00 pm - Written Test – (after weld test) - WC 166

Oxyacetyene 12:15pm – 1:00 pm Written Test – (after weld test) - WC 168

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Overall Contestant Job Interviews 1:30 pm in Room W 166

All competitors must have 1 page resume (submitted online at <https://www.skillsusa.net/newresume/> and also bring a hard copy with you to the contest)

Revised 3/5/12

SCORECARD Welding

Contestant Number

Items Evaluated	Possible Points						
GMAW (Gas Metal Arc Welding)	220						
GTAW (Gas Tungsten Arc Welding)	200						
OFC (Oxy Fuel Cutting)	100						
SMAW (Shielded Metal Arc Welding)	220						
Interview	60						
Visual Inspection Workstation	100						
Weld Written Test	100						
Résumé Penalty	0 or -50 only						
Clothing Penalty	0 to -50						
Safety Violation FCAW	-30						
Safety Violation GMAW-P	-30						
Safety Violation GTAW	-30						
Safety Violation OFC	-30						
Safety Violation SMAW	-30						
Total Possible Points	1000						

Date:

Judges' Signatures:

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