

# 2023 Skills USA – High School Welding Competition

When: Orientation 4/13/23 5:30 pm – 7:30 pm; Competition 4/14/23 8:00 am – 3:00 pm

Where: Central Community College; 3134 US-34, Grand Island, NE 68801

## Scope

Contestants will be evaluated through welding knowledge and skill performance assessments in accordance with industry standards. All drawings, welding symbols and welding terms conform to the latest edition of the American Welding Society (AWS) standards.

## Knowledge Performance

Contestants must complete a written exam on topics including safety, mathematics, print reading and general knowledge as it pertains to welding. The exam will be given after orientation the evening of 4/13/23. Those who are unable to complete the exam on 4/13 may be allowed to take the test during available times on 4/14 with penalty.

## Skill Performance

Contestants will be evaluated in their ability to complete a weldment using the OA, SMAW, GMAW and GTAW processes in accordance with drawing and visual inspection requirements. Contestants will be provided material and rotate in groups through each process to complete their weldment. The Skill Performance will be 4/14 from 8 am – 3 pm.

## Contest Guidelines

1. Contestants must correctly use the welding equipment during the contest. Any contest committee member 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 be documented as a warning. If the contestant is warned a second time. He or she will be disqualified for that section of the contest.
2. As soon as the contestants enter the contest area, no communication shall occur between the contestants or between the contestants and anyone else, except as directed by the contest chair, committee members or judges. Any such communication will result in the contestant being disqualified from that section of the contest. If any taped lines on the floor within the contest area are present, all contestants shall stay within the taped lines. Failure to stay within the taped lines except for being escorted to the restroom, will result penalties as follows: First violation, disqualification of the nearest segment of the contest. Second violation, disqualification as a contest participant.
3. Time limits will be established on the contest procedure sheets for all segments of the test.
4. Evaluation of the completed project will be judged visually. Nondestructive and/ or destructive tests may be used to complete the project evaluation.

5. Welding and cutting instructions will be provided to the contestants and specified on the Welding Procedure Specifications (WPS) and prints provided in the welding booths and near cutting stations.
6. Welding equipment used in the contest may be obtained from a variety of manufactures and may include transformers, rectifiers and/ or inverters.
7. Filler metals will be detailed on the WPS.
8. Welds will be evaluated visually using a rating system established by the Contest Coordinator.
9. Final judging of the welded projects will be evaluated according to the difficulty of the assigned task and by using the following visual inspection criteria: dimensional accuracy, including determination of whether all welds have been completed and whether the finished welds conform to the required size and contour; and visual examination of the welds for cracks, undercut, overlap, crater fill, spatter, arc strikes, porosity, convexity and reinforcement.
10. Print assembly tolerance will be +/- 1/16" unless otherwise noted.
11. If no print assembly dimensions are given to orient any project part, the part is to be approximately located based on the prints isometric view.

## **Standards and Competencies**

- 1. Identify safety standards and demonstrate safety and health practices of welders in accordance with ANSI Z49.**
  - a. Demonstrate proper use of equipment used for protection of personnel.
  - b. Demonstrate proper use and inspection of equipment used for ventilation.
  - c. Demonstrate Hot Work operation.
  - d. Demonstrate working in confined spaces properly.
  - e. Understand precautionary labeling.
- 2. Demonstrate an understanding of practical measurement**
  - a. Identify basic metal-working tools used in measuring.
  - b. Use visual measuring tools to accuracy of 1/32".
  - c. Employ the components of a combination square set.
  - d. Use layout and marking tools as required.
- 3. Read and interpret prints.**
  - a. Apply information found in the information block of the drawing.
  - b. Identify the basic views used on prints including assembly, detail and fit-up drawings.
  - c. Identify common types of lines, abbreviations and symbols in accordance with national drawing standards (ANSI).
  - d. Identify basic welding symbols and components of a symbol (such as arrow, reference line, tail, size, length and location) in accordance with the current national welding symbol standard AWS A2.4, current edition.
- 4. Produce welds using Shielded Metal Arc Welding (SMAW) process to AWS QC10 standards.**
  - a. Demonstrate safety procedures for SMAW.
  - b. Demonstrate ability to correctly set up SMAW power sources, related welding equipment and do basic process and equipment troubleshooting for welding of carbon steel.
  - c. Select correct type of electrode based on carbon steel.
  - d. Prepare carbon steel for welding.

- 5. Produce welds using Gas Metal Arc Welding (GMAW) process to AWS QC10 standards.**
  - a. Demonstrate correct safety procedures for GMAW.
  - b. Demonstrate ability to correctly set up GMAW power sources, related welding equipment and do basic process and equipment troubleshooting.
  - c. Identify short circuiting, globular, spray, and pulsed transfer welding of carbon steel.
  - d. Select correct type of filler metal, type of shielding gas, amperage and voltage based on carbon steel sheet and/ or plate (1/16" to 3/8" thickness).
  - e. Prepare the carbon steel for welding.
- 6. Produce welds using a Gas Tungsten Arc Welding (GTAW) process to AWS QC10 standards.**
  - a. Demonstrate safety procedures for GTAW power sources, related welding equipment and do basic process and equipment troubleshooting for regular or pulsed welding of carbon steel sheet.
  - b. Select the correct type of tungsten and/ or filler metal based on carbon steel sheet.
  - c. Prepare carbon steel for welding.
- 7. Produce cut materials using an Oxygen Fuel Cutting (OFC) process to AWS QC10 standards.**
  - a. Demonstrate safety procedures for OFC.
  - b. Demonstrate ability to correctly set up the OFC equipment for cutting and do basic process troubleshooting.
- 8. Demonstrate knowledge of visual inspection.**
  - a. Examine and measure undercut.
  - b. Examine and measure porosity.
  - c. Measure fillet weld size.
  - d. Examine and measure weld reinforcement.
  - e. Determine acceptability of welded samples in accordance with provided acceptance criteria.
- 9. Demonstrate knowledge of welding positions and terminology.**
  - a. Weld a single-V-groove weld with melt-through in a butt joint in the horizontal position with SMAW.
  - b. Weld a fillet weld in a T-joint in the horizontal position with GMAW.
  - c. Weld a fillet weld in a corner joint in the vertical down position/progression with GMAW.
  - d. Weld a fillet weld in a lap joint in the horizontal position with GTAW.
  - e. Lay out, weld, cut and prepare coupons for evaluation with OA.

## **Committee Identified Academic Skills**

The technical committee has identified that the following academic skills are embedded in this contest.

- Measurement.
- Problem solving.
- Communication.
- Connections.

- Representation.

## Clothing Requirement

1. 100% cotton T-shirt, jeans, appropriate work shoes/boots.
2. **Note:** Safety glasses must have side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

## Equipment and Materials

1. Supplied by the technical committee:
  - a. All necessary welding equipment, filler metals and base materials.
  - b. All instructions, Welding Procedure Specifications (WPS) and prints.
2. Supplied by the contestant:
  - a. Hearing and/ or ear protection.
  - b. Welding jacket – 100% cotton or full leather.
  - c. Welding gloves – full length (gauntlet) for SMAW and GMAW.
  - d. Welding gloves – appropriate for GTAW.
  - e. Welding cap/beanie.
  - f. Welding helmet with appropriate filter plate/lens and protective cover lens for tacking and welding; auto darkening filter plate/lens permissible. Spare filter plate and cover lens.
  - g. Cutting goggles – with shade 5 lens/cover lens for OFC/PAC; helmet with shade 5 capability permissible face shield head gear with shade 5 permissible. Spare filter and cover lens.
  - h. Pocket calculator.
  - i. Fillet weld gauge – standard set.
  - j. Lead pencil and/ or ballpoint pen.
  - k. Soap stone with or without holder.
  - l. Scribe without magnet.
  - m. Combination square set.
  - n. 10-foot (3.1 meters) minimum steel tape measure.
  - o. 11R or 10-inch (254 millimeters) vise grips.
  - p. 6-inch (152 millimeters) side cutting pliers or diagonal cutting pliers.
  - q. 6-inch (152 millimeters) needle nose pliers – welpers permissible.
  - r. Chipping hammer.
  - s. Carbon steel wire brush.
  - t. Friction lighter (striker) and tip cleaner.
  - u. All competitors must create a one-page resume and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

**Note:** Your contest may also require a hard copy of your resume as part of the actual contest. Check the Contest Guidelines and/ or the updates page on the SkillsUSA website at <http://updates.skillsusa.org/> .

## **Contest Coordinator(s) Info**

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