2024-26 EDITION

SkillsUSA CHAMPIONSHIPS

WELDING SCULPTURE

SkillsUSA Championships Technical Standards

PURPOSE

To evaluate each competitor's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of welding or metal trades.

First, download and review the General Regulations at updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in career and technical programs with welding or metal trades as an occupational objective. Each state may send one high school and one college/postsecondary entry.

CLOTHING REQUIREMENTS

Class I: Competition Specific — Welding | Welding Fabrication

- Official SkillsUSA khaki long-sleeve work shirt (100% cotton as per OSHA regulations)
- Khaki pants (100% cotton as per OSHA regulations)
- Black, brown, or tan work shoes

Note: Safety glasses must have side shields or goggles. (Prescription safety glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles.)

These regulations refer to SkillsUSA Championships Clothing Classifications that are pictured and described at skillsusastore.org. If you have questions about competition uniforms, call the SkillsUSA Store at 888-501-2183.

Note: Competitors must wear their official competition clothing to the competition orientation.

SAFETY INSTRUCTION AND VERIFICATION OF TRAINING

All competitors must submit online a letter from the appropriate school official (i.e., CTE administrator, principal, instructor, etc.) on school letterhead which simply states:

"I certify that [competitor's name] meets the safety training requirements as outlined in the national technical standards for the SkillsUSA Championships Welding Sculpture competition. Both the instructor(s) and the competitor certify that [competitor's name] has received instruction and has satisfactorily passed examination on the safe use of equipment that may be used in the competition. We understand that competitors will be removed from competition if proper training has not been provided, and/or they are using the equipment in an unsafe manner. Signed, [school official]."

Both the instructor and the competitor certify by agreeing to enter this competition that SkillsUSA Inc., the national technical committee and national judges are released from all responsibilities relating to personal injury resulting from their use. Competitors will be removed from competition if proper training is not provided and/or the equipment is used unsafely.

See "Online Submission Requirements" below for guidelines.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. A minimum 28" by 28" table space per competitor
   b. Industry standard welding and cutting equipment with appropriate filler metals as well as metal to be welded and cut during skills demonstration.
2. Supplied by the competitor:
   a. Competitor-designed and -produced sculpture.
   b. Official SkillsUSA three-ring binder documenting the sculpture project and processes.
      1.) All competitors must also submit a digital copy of their binder's contents saved as a PDF file. The purpose of the "Online Submission Requirements" is for pre-conference evaluation. Failure to submit a digital copy of the binder that can be opened and meets the required format may result in a loss of points. See "Online Submission Requirements" below for guidelines
      2.) Digital copy (PDF) of binder contents saved on a USB flash drive turned in at orientation along with the physical binder.
   c. Hearing and/or ear protection
   d. Welding gloves — full length (gauntlet) for SMAW, GMAW and FCAW
   e. Welding gloves — appropriate for GTAW
   f. Welding cap/beanie
   g. 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.

h. 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.
i. All competitors must create and submit online a one-page single sided resume. See "Online Submission Requirements" below for guidelines.
j. All competitors must submit a letter online verifying completion of the required safety training. See "Online Submission Requirements" below for guidelines.

Note: All national competitors must also check for competition-specific updates and/or competitor preparation instructions on the SkillsUSA website at updates.skillsusa.org.

PROHIBITED DEVICES

Cellphones, electronic watches and/or other electronic devices not approved by a competition's national technical committee are NOT allowed in the competition area. Please follow the guidelines in each technical standard for approved exceptions. Technical committee members may also approve exceptions onsite during the SkillsUSA Championships if deemed appropriate.

Penalties for Prohibited Devices

If a competitor's electronic device makes noise or if the competitor is seen using it at any time during the competition, an official report will be documented for review by the Director of the SkillsUSA Championships. If confirmed that the competitor used the device in a manner which compromised the integrity of the competition, the competitor's scores may be removed.

ONLINE SUBMISSION REQUIREMENTS

All SkillsUSA national competitors must submit their one-page single sided resume online. The deadline and link for online submissions will be published on updates.skillsusa.org.
Failure to submit any of the required document(s) listed below by the established deadline will result in a 10-point penalty.

1. One-page single sided resume
2. Safety verification letter
3. A digital copy of their binder's contents saved as a single PDF file. The online submission of scanned pages must be in the same order as the physical binder presented at the competition orientation.

Your submission must be saved as PDF file type using the file name format of "Your Last Name_Your First Name_Resume." For example, "Amanda Smith" would save the individual PDF submissions file as:

- Smith_Amanda_Resume
- Smith_Amanda_Safety
- Smith_Amanda_Binder

SCOPE OF THE COMPETITION

The competition evaluates the ability of the competitor to design and produce a welding sculpture. The skill performance includes an interview for competitors to answer questions related to all aspects of their creation of the design. Competitors will also be required to set up and operate machines to appropriately weld/cut in any of the following processes: GMAW, SMAW, GTAW, FCAW, PAC, OFC.

KNOWLEDGE PERFORMANCE

The competition will include a test assessing knowledge of basic welding and cutting processes. General questions about GMAW, GTAW, SMAW, FCAW, PAC and OFC will be included on this test. Competitors are also required to take the SkillsUSA Professional Development Test.

SKILL PERFORMANCE

The competition consists of four parts:

1. Evaluation of the sculpture
2. Binder documentation
3. Interview
4. On-site welding component

COMPETITION GUIDELINES

1. Competition orientation
    a. Competitors will be assigned appointment times. Appointments may be randomly pre-assigned by the technical committee or drawn during the competition orientation.
    b. A digital copy (PDF) of the binder contents must be submitted on a USB drive; USB drives will be returned to students after the competition.
    c. A penalty of 50 points will be deducted for a late submission.
    d. Sculptures will be measured (competitors will place a box with said dimensions over their sculpture so that judges may verify the sculpture meets the size requirement) and weighed. See “Sculpture” section below.
    e. Competitors must bring the sculpture and physical binder for setup as directed.
2. Binder specifications
    a. The documentation must be submitted onsite in an official SkillsUSA three-ring binder. The binder must contain no more than 60 pages.
    Note: A sheet of paper has two sides. Each side is considered one page. Therefore, a single sheet of unfolded paper is two pages.
        1.) A penalty of five (5) points will be assessed for each page beyond the limit.
        2.) If sheet protectors are used, two sheets of paper can be placed back-to back, creating a front and back page. This would be considered two pages.
        3.) Unused sheet protectors will count as pages, as will any additional documents (such as extra resumes) placed in the binder.
        4.) Any pages contained in a pocket, folded page, or similar features will be counted as additional pages and will be subject to penalty

b. Binders are not considered presentation pieces and are required to be placed with the sculpture prior to judging.
c. The following binder components must be clearly labeled, tabbed, and in the stated order.
    1.) Table of contents
        a.) Must be first page.
    2.) A verification letter, on school letterhead, signed by an administrator, that
        a.) Identifies the school, city, state and local advisor.
        b.) Indicates the competitor and the division (high school or college/postsecondary).
        c.) Verifies the sculpture was designed and constructed by the competitor, and the same sculpture was used throughout the local and state SkillsUSA competitions that lead to the National Leadership & Skills Conference.
        d.) Lists approximate time in each process.
        e.) Includes an itemized list of expenses with receipts, photocopies of receipts, invoice or proof of donated materials required for expenses.
        f.) Signed by a school administrator.
    3.) Photographs with captions (minimum 10)
        a.) Photos must include the competitor, who must be identifiable working on their sculpture throughout various stages of construction; captions must depict the process demonstrated.
        b.) If welds are ground or removed, photo documentation of original welds must be provided.
    4.) Photographs: local and state competitions
        a.) Competitor with sculpture, medal/certificate to verify the same sculpture has been used for all applicable qualifying SkillsUSA competitions (local, regional/district, and/or state).
    5.) Drawings
        a.) Concept drawing(s)
        b.) Drawings with approximate dimensions
    6.) Supporting documents
        a.) Examples: additional photos of process, design, cutting, welding, forming; explanation of creative use of process, etc.

3. Interview
    a. All competitors will be asked the same questions.
4. Sculpture specifications
    a. The sculpture cannot exceed the maximum size of 18" tall by 12" wide by 18" long and cannot exceed a weight of 100 lbs.
        1.) A penalty of 100 points will be deducted if the sculpture exceeds the size limits.
        2.) A penalty of 100 points will be deducted if the sculpture exceeds the weight limit.
    b. Sculptures shall be welded, brazed or soldered, depending on the material used. The sculpture should be representative of the welder’s skills and ability.

1.) Materials used must be ferrous or nonferrous metals.

c. The sculpture must be the original and creative work of the competitor.
   1.) All copyright laws must be followed in the creation of the design.
      a.) A penalty of 50 points will be deducted for copyright violation.
d. The sculpture must be one continuous piece, not multiple pieces unconnected.
   1.) Movement is allowed but not required.
   2.) Moving parts are permitted provided they do not affect the size parameters or integrity of the piece or create a safety hazard.
e. Projects are to be left unpainted, including primers and other coatings (except for clear coating).
   1.) Naturally achieved patinas shall be limited to air, water or heat, or any combination thereof. (No chemically enhanced finishes are permitted).
      a.) A penalty of 50 points will be deducted for paint/finish violation.
f. No additional appurtenances can be used (mirrors, stands, etc.).
g. The sculpture shall stand alone. No presentation pieces are permitted.
h. No modifications may be made to sculptures after regional/state competitions, except polishing and clear coating.
i. The following sculpture components will be evaluated:
   1.) Metal working (fitting and techniques)
   2.) Welding
      a.) Fit-up
      b.) Function of welds
      c.) Amount of welds
      d.) Quality of welds
         i.) No extra credit or deductions for mechanical fasteners
   3.) Cutting
      a.) Function of cuts
      b.) Quality of cuts
         i.) No extra credit or deductions for CNC cutting
   4.) Design creativity
      a.) Level of difficulty
      b.) Creative use material/process
      c.) Creativity
      d.) Original Design

5. Onsite Welding
   a. Competitors will set up welding and cutting equipment and perform a weld/cut using any of the following processes: GMAW, GMAW, SMAW, GTAW, FCAW, PAC, OFC.
   b. Proper PPE must always be worn during this portion of the competition.
      1.) A penalty of 50 points will be deducted for safety violation
   c. The following welding components will be evaluated:
      1.) Welding
         a.) Machine set-up

b.) Quality of weld
c.) Fit-up
d.) Adherence to WPS/blueprint or directions

2.) Cutting
a.) Equipment set-up
b.) Quality of cut
c.) Fit-up
d.) Adherence to WPS/blueprint or directions

STANDARDS AND COMPETENCIES

WS 1.0 — Identify safety standards and demonstrate safety and health practices of welders in accordance with ANSI Z49.1.

1.1 Demonstrate proper use of equipment used for protection of personnel.
1.2 Demonstrate proper use and inspection of equipment used for ventilation.
1.3 Demonstrate Hot Work operation.
1.4 Demonstrate working in confined spaces properly.
1.5 Understand precautionary labeling.

WS 2.0 — Demonstrate an understanding of practical measurement.

2.1 Identify basic metal-working tools used in measuring.
2.2 Use visual measuring tools to accuracy of 1⁄32".
2.3 Use layout and marking tools as required.

WS 3.0 — Read and interpret prints.

3.1 Apply information found in the information block of the drawing.
3.2 Identify the basic views used on prints including assembly, detail and fit-up drawings.
3.3 Identify common types of lines, abbreviations and symbols in accordance with national drawing standards (ANSI).
3.4 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 A 2.4, current edition.

WS 4.0 — Produce welds using a Shielded Metal Arc Welding (SMAW) process to AWS QC10 standards.

4.1 Demonstrate safety procedures for SMAW.
4.2 Demonstrate ability to correctly set up SMAW power sources, related welding equipment and do basic process and equipment troubleshooting for welding of carbon steel and/or stainless steel.
4.3 Select the correct type of electrode based on carbon steel and/or stainless steel plate (¼" to ½" thickness).
4.4 Prepare carbon steel and/or stainless steel for welding.

WS 5.0 — Produce welds using a Gas Metal Arc Welding (GMAW) process to AWS QC10 standards.

5.1 Demonstrate correct safety procedures for GMAW.
5.2 Demonstrate ability to correctly set up GMAW power sources, related welding equipment and do basic process and equipment troubleshooting.
5.3 Identify short circuiting, globular, spray and pulsed transfer welding of carbon steel, stainless steel and/or aluminum.
5.4 Select the correct type of filler metal, type of shielding gas, amperage and voltage based on carbon steel, stainless steel and/or aluminum sheet and/or plate (1⁄16" to 3⁄8" thickness).
5.5 Prepare carbon steel, stainless steel and/or aluminum for welding.

WS 6.0 — Produce welds using a Fluxed Cored Arc Welding (FCAW) process to AWS QC10 standards.

6.1 Demonstrate correct safety procedures for FCAW.
6.2 Demonstrate ability to correctly set up FCAW power sources, related welding equipment and do basic process and equipment troubleshooting.
6.3 Select the correct type of filler metal, type of shielding gas, amperage and voltage based upon carbon steel and/or stainless steel sheet and/or plate (1⁄4" to 3⁄8" thickness).
6.4 Prepare stainless steel and/or carbon steel for welding.

WS 7.0 — Produce welds using a Gas Tungsten Arc Welding (GTAW) process to AWS QC10 standards.

7.1 Demonstrate safety procedures for GTAW.
7.2 Demonstrate ability to correctly set up GTAW power sources, related welding equipment and do basic process and equipment troubleshooting for regular and pulsed welding of aluminum, stainless steel and/or carbon steel.
7.3 Select the correct type of tungsten and filler metal based on aluminum, stainless steel or carbon steel sheet and/or plate (1⁄16" to 1⁄4" thickness).
7.4 Prepare aluminum, stainless steel and/or carbon steel for welding.

WS 8.0 — Produce cut materials using an Oxygen Fuel Cutting (OFC) process to AWS QC10 standards.

8.1 Demonstrate safety procedures for OFC.
8.2 Demonstrate ability to correctly set up the OFC equipment for cutting and do basic process troubleshooting.

WS 9.0 — Produce cut materials using a Plasma Arc Cutting (PAC) process to AWS QC10 standards.

9.1 Demonstrate safety procedures for PAC.
9.2 Demonstrate ability to correctly set up the PAC power sources, related cutting equipment and do basic process and equipment troubleshooting.
9.3 Set up and shut down equipment for cutting carbon steel, stainless steel and/or aluminum.

WS 10.0 — Demonstrate knowledge of welding positions and terminology.

10.1 Start, stop and restart stringer beads in the flat, horizontal, vertical up and down, and overhead positions.

10.2 Weld a pad with a multiple pass weld in the flat, horizontal, vertical up and down, and overhead positions.
10.3 Weld a lap joint with a single pass, fillet weld in flat, horizontal, vertical up and down, and overhead positions.
10.4 Weld a lap joint with a multiple pass, fillet weld in the flat, horizontal, vertical up and down, and overhead positions.
10.5 Weld a T-joint with a single pass, fillet weld in the flat, horizontal, vertical up and down, and overhead positions.
10.6 Weld a T-joint with a multiple pass, fillet weld in the flat, horizontal, vertical up and down, and overhead positions.
10.7 Weld a butt joint with a single pass square groove weld in the flat, horizontal, vertical up and down, and overhead positions.
10.8 Weld a butt joint with a partial joint penetration, single pass, double V-groove weld in the flat, horizontal, vertical up and down, and overhead positions.
10.9 Weld a butt joint with a multiple pass V-groove weld in the flat, horizontal, vertical up and down, and overhead positions.
10.10 Weld a butt joint with complete joint penetration, multiple pass, double groove weld in the flat, horizontal, vertical up and down, and overhead positions.
10.11 Weld a 2" to 8" diameter, schedules 40 to 80 pipe, single/multiple pass V-groove weld in the 2G, 5G and 6G positions.
10.12 Lay out, weld, cut and prepare coupons for evaluation.

WS 11.0 — Project a professional self-image through attire and grooming.

11.1. Demonstrate a professional appearance in dress, good grooming, and personal presentation.
11.2. Display clothing that meets national standards requirement for competition.
11.3. Demonstrate good grooming in personal hygiene.
11.4. Wear clothing that fits well.
11.5. Present a wrinkle-free appearance.

WS 12.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. For more, visit: www.skillsusa.org/who-we-are/skillsusa-framework/.

COMMITTEE IDENTIFIED ACADEMIC SKILLS

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

Math Skills

- Use fractions to solve practical problems.
- Convert fractions to decimals and vice versa.
- Measure angles.
- Construct three-dimensional models.

Science Skills

- Describe and recognize solids, liquids and gasses.
- Use knowledge of principles of electricity and magnetism.

Language Arts Skills

- Provide information during oral presentations.

CONNECTIONS TO NATIONAL STANDARDS

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Communication
- Connections
- Geometry
- Measurement
- Problem solving
- Representation

Source: *NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.*

Science Standards

- Understands the structure and properties of matter.
- Understands the sources and properties of energy.
- Understands forces and motion.
- Understands the nature of scientific inquiry.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics).

Source: *IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.*