



MASONRY



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 masonry.

First, download and review the General Regulations at: <http://updates.skillsusa.org>.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with masonry or bricklaying as the occupational objective.

CLOTHING REQUIREMENTS

Class C: Competition Specific — Manufacturing/Construction Khaki Attire

- Official SkillsUSA khaki short-sleeve or long-sleeve work shirt
- Khaki pants
- Black, brown or tan leather work shoes

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.)

These regulations refer to clothing items that are pictured and described at www.skillsusastore.org. If you have questions about clothing or other logo items, call 1-888-501-2183.

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

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
 - a. Tenders
 - b. Hose
 - c. Three 55-gallon water drums
 - d. Mortar pans, boards, pails, and wheelbarrows
 - e. Hoes
 - f. Square-nosed, short-handled shovels
 - g. Sand
 - h. Masonry mix or ready-mixed mortar
 - i. Resin paper or suitable area covering
2. Supplied by the competitor:
 - a. One trowel
 - b. Two levels (24" and 48")
 - c. One "S" jointer
 - d. Long jointer
 - e. One brick hammer
 - f. Two 6-foot folding rules (one modular, one standard)
 - g. One carrying bag
 - h. One pencil
 - i. One square
 - j. One brush
 - k. One brick chisel
 - l. Line and line blocks
 - m. All competitors must create a one-page resume. See "Resume Requirement" below for guidelines.

RESUME REQUIREMENT

Competitors must create a one-page resume to submit online. SkillsUSA national competitors should submit their resume by June 1. The link for resume submission will be published on <http://updates.skillsusa.org> on May 1. Failure to submit a resume will result in a 10-point penalty.

Your resume must be saved as a PDF file type using file name format of "Last Name_First Name." For example, "Amanda Smith" would save her resume as **Smith_Amanda**. If you need assistance with saving your file as a PDF, visit [the Adobe website](#) for more information.

Note: Check the Competition Guidelines and/or the updates page on the SkillsUSA website at <http://updates.skillsusa.org>.

PROHIBITED DEVICES

Cell phones 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 SkillsUSA Championships director. If confirmed that the competitor used the device in a manner which compromised the integrity of the competition, the competitor's scores may be canceled.

SCOPE OF THE COMPETITION

The competition is defined by industry standards as determined by the SkillsUSA Championships technical committee, comprised of the North Carolina Masonry Contractors Association, Oldcastle, Bon Tool Co., Brick Industry Association, Brick Industry Association SE Region, E/Z Grout Corp., Marshalltown Co., Mason Contractors Association of America, National Concrete Masonry Association and SPEC MIX Inc.

KNOWLEDGE PERFORMANCE

The competition will include a written exam assessing mastery of brick masonry techniques including but not limited to: safety; identification and usage of hand tools, power tools, measuring tools and equipment; and blueprint reading.

SKILL PERFORMANCE

The competition will include a skills performance that will assess the ability of the competitor to safely construct a composite brick and block project.

COMPETITION GUIDELINES

1. Competitors will construct a project or wall system using brick or brick and block, according to project specifications and drawings, within an allotted period of time.
2. The project will include components of the most frequently used details in residential and commercial masonry construction. In addition, the assessment will also include the vital elements of quality workmanship.

STANDARDS AND COMPETENCIES

* Considered essential competencies.

** Should be mastered at the journeyman level.

All other items are considered supplemental.

M 1.0 — Practice safe brick and masonry techniques according to industry standards as set forth by the SkillsUSA technical committee

- 1.1. Choose proper tools and materials. *
- 1.2. Perform work in a reasonable amount of time as determined by the instructor and/or industry standards. *
- 1.3. Lay masonry products in an accurate and professional manner. **

- 1.4. Load and unload materials as directed. *
- 1.5. Clean up work areas properly and thoroughly. *

M 2.0 — Model safety standards according to and following OSHA regulations

- 2.1. Demonstrate appropriate safety precautions when performing all tasks. *
- 2.2. Demonstrate awareness of potential hazards when performing all tasks. *
- 2.3. Accept responsibility for the safety of other workers. *
- 2.4. Keep work areas neat and organized. *
- 2.5. Wear proper safety equipment and clothing. *
- 2.6. Follow prescribed OSHA standards.

M 3.0 — Use hand tools and equipment according to industry standards as set forth by the SkillsUSA technical committee

- 3.1. Cut masonry safely around others*
- 3.2. Place mortar cautiously in the mortar pan or on the mortar board. *
- 3.3. Keep tools out of the paths of other people working on the job. *
- 3.4. Handle tools properly. *

M 4.0 — Identify and use basic hand tools used in brick masonry according to industry standards as set forth by the SkillsUSA technical committee

- 4.1. Demonstrate an understanding of the specific uses of each hand tool. *
- 4.2. Practice the safety rules for each hand tool. *
- 4.3. Identify quality tools. *
- 4.4. Store and care for hand tools. *

M 5.0 — Use measuring tools according to industry standards as set forth by the SkillsUSA technical committee

- 5.1. Use and maintain a modular ruler and a spacing ruler.
- 5.2. Set and use a story pole.
- 5.3. Power tool identification and usage.

M 6.0 — Identify and use masonry power tools according to industry standards as set forth by the SkillsUSA technical committee

- 6.1. Demonstrate the specific uses of each power tool. *
- 6.2. Practice the safety rules for each power tool. *
- 6.3. Maintain power tools.
- 6.4. Set up power tools correctly. *

M 7.0 — Use equipment according to industry standards as set forth by the SkillsUSA technical committee

- 7.1. Identify equipment generally used in masonry. *
- 7.2. Correctly use each piece of equipment.
- 7.3. Store, maintain and repair all equipment.
- 7.4. Inspect, assemble and disassemble rigging and scaffolding properly.

M 8.0 — Use masonry levels according to industry standards as set forth by the SkillsUSA technical committee

- 8.1. Use a 24" and 48" level for plumbing and leveling. **

- 8.2. Care for and maintain a level. *

M 9.0 — Possess an appropriate knowledge of the fundamental theories in masonry

- 9.1. Demonstrate knowledge of trade terminology.
 - 9.1.1. Identify terms used in masonry. **
 - 9.1.2. Incorporate trade terminology into oral communication relating to masonry tasks.**
- 9.2. Demonstrate knowledge of basic math.
 - 9.2.1. Add, subtract, multiply and divide with whole numbers, decimals and fractions. *
 - 9.2.2. Figure proportions to mix masonry materials according to specifications. *
 - 9.2.3. Compute percentages to estimate and determine material requirements, work performed, schedules and costs. *
 - 9.2.4. Express answers relative to the trade. *
- 9.3. Read blueprints.
 - 9.3.1. Read basic drawings and sketches and understand the information contained in them. *
 - 9.3.2. Know the meanings of basic architectural symbols and abbreviations. *
 - 9.3.3. Use a builder's level relative to a benchmark. *

M 10.0 — Use materials and methods according to industry standards as set forth by the SkillsUSA technical committee

- 10.1. Use masonry materials with accuracy.
 - 10.1.1. Arrange masonry materials for efficient use. *
 - 10.1.2. Place mortar pans properly. *
 - 10.1.3. Temper or shake-up mortar with proper shovels. *
- 10.2. Use hod-carrying.
 - 10.2.1. Arrange masonry materials for efficient use. *
 - 10.2.2. Place mortar pans properly. *
 - 10.2.3. Temper or shake-up mortar with proper tools. *
- 10.3. Use trowels properly.
 - 10.3.1. Manipulate a trowel properly. **
 - 10.3.2. Cut and roll and cut and cup mortar to load trowel properly. **
 - 10.3.3. Spread and furrow mortar properly. **

M 11.0 — Prepare mortar according to industry standards as set forth by the SkillsUSA technical committee

- 11.1. Follow correct safety practices when mixing mortar.
- 11.2. Proportion mortar ingredients for specific mixes. *
- 11.3. Mix mortar manually with hoe and mortar box. *
- 11.4. Mix mortar with a mortar mixer. *

M 12.0 — Demonstrate bonding methods according to industry standards as set forth by the SkillsUSA technical committee

- 12.1. Possess knowledge of different types of bonding used in masonry construction.*
- 12.2. Lay out bond.* *
- 12.3. Determine coursing. **

M 13.0 — Use tool and point joints according to industry standards as set forth by the SkillsUSA technical committee

- 13.1. Use tool concave joints. **
- 13.2. Use a tool rake, weather, V-jointer, grapevine and struck joints.
- 13.3. Perform cut/rough joints.
- 13.4. Tuck-point a wall properly. *
- 13.5. Brush and touch up a wall. *

M 14.0 — Clean brick and structural tile according to industry standards as set forth by the SkillsUSA technical committee

- 14.1. Follow correct procedures for keeping masonry work clean. *
- 14.2. Follow correct procedures in cleaning brick and structural tile. *
- 14.3. Follow correct procedures for rubbing and tuck-pointing concrete block and slag block. *
- 14.4. Clean and tuck-point stonework.

M 15.0 — Lay brick and blocks according to industry standards as set forth by the SkillsUSA technical committee

- 15.1. Lay straight brick wall.
 - 15.1.1. Lay brick at the rate of 75–100 bricks per hour. *
 - 15.1.2. Attach a line block and line pins to a wall. **
 - 15.1.3. Set a trig. **
 - 15.1.4. Lay brick to a line while holding bond. **
 - 15.1.5. Throw a full head joint. **
- 15.2. Lay straight block wall.
 - 15.2.1. Spread bed joints and throw on full head joints for block units. *
 - 15.2.2. Lay block units to the line. *
- 15.3. Build the brick corner.
 - 15.3.1. Lay out a wall in preparation for building a brick corner. *
 - 15.3.2. Construct a rack-back lead. *
 - 15.3.3. Construct an outside and inside corner lead (+ or – 11/16"). *
- 15.4. Lay the block corner.
 - 15.4.1. Lay out a wall in preparation for building a block corner. *
 - 15.4.2. Install wire reinforcements in bed joints. *
 - 15.4.3. Build a block corner to a specified height. *
- 15.5. Lay brick veneer wall.
 - 15.5.1. Determine type of brick to be used.
 - 15.5.2. Bond the wall. *
 - 15.5.3. Scale each course. *
 - 15.5.4. Lay brick in mortar to scale. *
 - 15.5.5. Secure wall with ties at desired intervals. *
 - 15.5.6. Point and joint the wall. *
- 15.6. Lay brick masonry cavity wall.
 - 15.6.1. Determine width of cavity and type of brick to be used. *
 - 15.6.2. Construct components of the wall in the proper sequence. *
 - 15.6.3. Spread mortar to achieve the required bond without getting mortar into the cavity*.

- 15.6.4. Install wall ties that join the exterior and interior widths together into a single cavity wall. **
- 15.6.5. Install flashings and construct weep holes in a manner that permits effective drainage of moisture from cavity. **
- 15.6.6. Construct and maintain the cavity during construction so that the air space provides insulation. **
- 15.7. Lay single Wythe brick (load-bearing wall using units that are a minimum of 5" wide).
 - 15.7.1. Determine type of brick to be used.
 - 15.7.2. Bond the wall. *
 - 15.7.3. Scale each course.*
 - 15.7.4. Lay brick in mortar to scale. *
 - 15.7.5. Secure wall with ties at desired intervals. **
 - 15.7.6. Point and joint the wall. *
- 15.8. Lay a brick and block composite wall.
 - 15.8.1. Determine type of brick and block to be used.
 - 15.8.2. Bond the wall. *
 - 15.8.3. Scale each course. *
 - 15.8.4. Lay brick and block in mortar to scale. *
 - 15.8.5. Secure wall with ties at desired intervals. *
 - 15.8.6. Point and joint the wall. *

M 16.0 — Construct fireplaces and chimneys according to industry standards as set forth by the SkillsUSA technical committee

- 16.1. Identify various components of a fireplace. **
- 16.2. Build a fireplace according to plans. **
- 16.3. Identify various components of a chimney. **
- 16.4. Build a one-flue chimney from given plans. **

M 17.0 — Construct arches, columns and piers according to industry standards as set forth by the SkillsUSA technical committee

- 17.1. Demonstrate knowledge of architectural features including aesthetic trims, course designs, period and antique applications. *
- 17.2. Construct an arch using given plans. **
- 17.3. Construct a column using given plans. *
- 17.4. Construct a pier using given plans. *

M 18.0 — Lay floors, pavers and stairs according to industry standards as set forth by the SkillsUSA technical committee

- 18.1. Lay floors according to given plans. *
- 18.2. Lay pavers according to given plans. *
- 18.3. Lay stairs according to given plans. **
- 18.4. Concrete work. **

M 19.0 — Prepare footings according to industry standards as set forth by the SkillsUSA technical committee

- 19.1. Lay out footings properly. *
- 19.2. Place rebar properly. *

19.3. Place and rough finish concrete properly. *

M 20.0 — Lay out and establish foundations according to industry standards as set forth by the SkillsUSA technical committee

20.1. Lay out and establish grades for foundation. *

20.2. Establish corners and lay out concrete block according to a specific bonding plan. *

20.3. Lay foundation wall to joist and brick shelf height. *

20.4. Waterproof foundation wall. *

20.5. Install flashing, anchor bolts, termite shield and weep holes. *

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.
- Use proportions and ratios to solve practical problems.
- Simplify numerical expressions.
- Solve practical problems involving percentages.
- Measure angles.
- Find surface area and perimeter of two-dimensional objects.
- Find volume and surface area of three-dimensional objects.
- Make predictions using knowledge of probability.
- Make comparisons, predictions, and inferences using graphs and charts.
- Solve problems using proportions, formulas and functions.
- Find slope of a line.
- Find arc length and the area of a sector.

Science Skills

None Identified.

Language Arts Skills

- Provide information in conversations and in group discussions.
- Use listening and critical thinking skills to understand information given and ask pertinent questions following the outlined content

CONNECTIONS TO NATIONAL STANDARDS

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

Math Standards

- Numbers and operations
- Algebra
- Geometry

- Measurement
- Problem solving
- Communication
- Connections
- 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.

Source: McREL compendium of national science standards. To view and search the compendium, visit: <http://www2.mcrel.org/compendium/browse.asp>.

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).
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.
- Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

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