



## PURPOSE

To evaluate each competitor's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of residential plumbing.

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

## ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with residential plumbing as an occupational objective.

## CLOTHING REQUIREMENTS

### **Class D: Competition Specific — Blue Attire**

- Official SkillsUSA light blue work shirt
- Navy pants
- Work shoes.
- Black, brown, or tan 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](http://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. All necessary supplies and appliances required for the project
  - b. Tank and tips will be provided
2. Supplied by the competitor:
  - a. Steel tape measure and/or folding rule
  - b. Copper tubing cutter with reamer
  - c. Tubing bender for  $\frac{3}{8}$ " o.d. fixture supplies
  - d. Arc joint pliers (channel lock type)
  - e. An adjustable wrench
  - f. Set of assorted slotted and Phillips screwdrivers
  - g. Torpedo level
  - h. 14-16 oz. claw hammer
  - i. Plastic (PVC) pipe reamer or suitable knife
  - j. Any one of the following: Manual saw, plastic pipe shear, battery operated reciprocating saw, pipe cutter with plastic cutter-wheel capable of cutting up to 3" PVC pipe.
  - k. Copper cleaning tool (inside and outside)
  - l. Pencil and eraser
  - m. Soap stone or another marker suitable for marking cast-iron pipe
  - n. Black permanent marker (Sharpie fine point)
  - o. Cutters suitable for cast-iron soil pipe
  - p. T-handle,  $\frac{5}{16}$ " torque wrench for no-hub clamps (60 in. lbs.)
  - q.  $\frac{5}{16}$ " nut driver
  - r. Hacksaw, manual or battery operated.
  - s.  $\frac{3}{8}$ " drive socket set
  - t. Portable battery-operated screw gun
  - u. Assorted screwdriver tips and  $\frac{5}{16}$ " nut driver end for use with battery operated screw gun.
  - v. Plumb bob
  - w. Speed square
  - x. Wiping rag
  - y. Work gloves (optional)
  - z. 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 South Carolina competitors should submit their resume by the deadline published on the competition updates page of our website. 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 state website.

## **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.

## **SCOPE OF THE COMPETITION**

The competition is defined by industry standards as set by the current industry technical standards.

### **KNOWLEDGE PERFORMANCE**

The competition will include a written test to assess the general knowledge of residential plumbing standards and competencies.

### **SKILL PERFORMANCE**

The competition includes a testing station with a series of changes designed to test the ability to perform jobs or skills selected from the following list of competencies as determined by the SkillsUSA Championships technical committee.

### **COMPETITION GUIDELINES**

All piping will be visually inspected and may be tested for leaks.

### **STANDARDS AND COMPETENCIES**

#### **PLB 1.0 — Perform basic plumbing tasks using appropriate tools and equipment**

- 1.1. Identify and use basic hand tools, power tools and equipment
  - 1.1.1. Measure lines to the nearest 1/16" with a ruler/tape measure
  - 1.1.2. Cut out an opening for various pipes and fixtures
- 1.2. Demonstrate proper use of hangers and supports

## **PLB 2.0 — Read and interpret blueprints and perform measurements and calculations**

- 2.1. Read the architect's scale
- 2.2. Read and develop an isometric sketch of a plumbing system
- 2.3. Determine measurements from a manufacturer's specifications/rough-in drawing
- 2.4. Properly lay-out rough-in locations
- 2.5. Interpret riser diagrams

## **PLB 3.0 — Perform proper plumbing systems rough-in**

- 3.1. Properly install DWV systems
  - 3.1.1. Label a cross-section of a P-trap
  - 3.1.2. Identify the proper fittings required for a DWV system
  - 3.1.3. Calculate the slope required for drainage lines
  - 3.1.4. Install proper venting
  - 3.1.5. Install cleanouts
  - 3.1.6. Rough-in plumbing fixtures
  - 3.1.7. Perform DWV rough-in inspection test
- 3.2. Properly install water supply systems
  - 3.2.1. Determine proper pipe sizing for hot and cold water systems
  - 3.2.2. Rough-in water supply lines for plumbing fixtures and appliances
  - 3.2.3. Perform approved water pressure tests
- 3.3. Identify and perform the proper joining method for given piping material
  - 3.3.1. Join steel and CSS pipe and fittings
  - 3.3.2. Join cast iron pipe and fittings
  - 3.3.3. Join copper tube and fittings
  - 3.3.4. Join plastic pipe and fittings
- 3.4. Identify types of fittings
- 3.5. Identify size of fittings

## **PLB 4.0 — Install plumbing fixtures, appliances and appurtenances**

- 4.1. Install fixture supply stops
- 4.2. Install water supplies
- 4.3. Install appropriate traps
- 4.4. Install a faucet/valve
- 4.5. Install a drain assembly
- 4.6. Install the fixture level, plumb and secure
- 4.7. Install appropriate relief valves

## **PLB 5.0 — Perform plumbing systems service and repair**

- 5.1. Replace a section of damaged water supply pipe
- 5.2. Repair damaged DWV pipe
- 5.3. Repair a leaking faucet
- 5.4. Repair a leaking shower valve
- 5.5. Replace a water closet fill valve
- 5.6. Replace a trap
- 5.7. Clear obstructions from a drain
  - 5.7.1. Clear obstructions from a drain
  - 5.7.2. Clear obstructions from a water closet drain

- 5.7.3. Clear obstructions from a main drain line

### **PLB 6.0 — Perform plumbing tasks in a safe environment**

- 6.1. Keep your work area clean and safe
- 6.2. Understand and apply OSHA regulations that involve plumbing practices
- 6.3. Use appropriate safety apparel for the task being performed
  - 6.3.1. Wear appropriate safety glasses, hard hats, work boots, respirators, ear protection, back and knee protection, etc., for a given situation
- 6.4. Demonstrate safe piping installation practices
  - 6.4.1. Demonstrate correct procedure per piping material manufacturer instructions provided
- 6.5. Demonstrate proper use of GFI in potentially hazardous conditions
- 6.6. Demonstrate safe use of power and hand tools
- 6.7. Maintain proper ventilation when working with chemicals and other potentially hazardous materials

### **PLB 7.0 — Employability**

- 7.1. Exhibit personal skills such as attendance, time management, individual responsibility and teamwork
- 7.2. Practice good customer relations
- 7.3. Fill out a job application completely and legibly
- 7.4. Maintain professional conduct and appearance
  - 7.4.1. Demonstrate polite, attentive attitude
  - 7.4.2. Wear neat, clean clothing and be well groomed
- 7.5. Respect the property of both your customer and employer

### **PLB 8.0 — 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. Please reference the graphic, as you may be scored on specific elements applied to your project. For more, visit: [www.skillsusa.org/who-we-are/skillsusa-framework/](http://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**

- Solve single variable algebraic expressions.
- Solve multiple variable algebraic expressions.
- Measure angles.
- Find volume and surface area of three- dimensional objects.

- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures.
- Construct three-dimensional models.
- Find slope of a line.
- Solve practical problems involving complementary, supplementary and congruent angles.
- Use measures of interior and exterior angles of polygons to solve problems.

### **Science Skills**

- Plan and conduct a scientific investigation.
- Describe characteristics of types of matter based on physical and chemical properties.
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color).
- Use knowledge of classification of elements as metals, metalloids and nonmetals.
- Describe phases of matter.
- Describe and identify physical changes to matter.
- Use knowledge of potential and kinetic energy.
- Use knowledge of mechanical, chemical and electrical energy.
- Use knowledge of speed, velocity and acceleration.
- Use knowledge of Newton’s laws of motion.
- Use knowledge of work, force, mechanical advantage, efficiency and power.
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices.

### **Language Arts Skills**

- Demonstrate comprehension of a variety of informational texts.
- Use text structures to aid comprehension.
- Demonstrate knowledge of appropriate reference materials.
- Use print, electronic databases and online resources to access information in books and articles.

## **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
- Data analysis and probability
- Problem solving
- Communication

- Connections
- Representation

*Source: NCTM Principles and Standards for School Mathematics. For more information, visit: [www.nctm.org](http://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.
- Understands the scientific enterprise.

*Source: McREL compendium of national science standards. To view and search the compendium, visit: [www2.mcrel.org/compendium/](http://www2.mcrel.org/compendium/).*

### **Language Arts Standards**

- 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.

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