

PLUMBING (VIRTUAL)



PURPOSE

To evaluate each contestant'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 the occupational objective.

CLOTHING REQUIREMENTS

Class D: Contest Specific — Blue Attire

- Official SkillsUSA light blue work shirt.
- Navy pants.
- Black, brown or tan leather work safety shoes (with protective toe cap).

Contest Clothing Notes (Apply ONLY to Virtual Competitions):

- Official SkillsUSA Competition Clothing recommended but NOT required.
- Contestant clothing options include the following:
 - Official Competition Clothing.
 - Trade Appropriate Clothing.
 - Professional Dress.
 - Business Casual.
- Clothing must meet industry safety standards.
- No identification of the contestant, school or state is allowed on clothing.
- No offensive, vulgar or inappropriate images or text are allowed on contestants clothing.
- No shorts or sleeveless shirts are allowed.
- Skirts must be at least knee-length.
- Proper Personal Protective Equipment (PPE) must be worn by contestant to meet all state, local and school requirements due to COVID-19.

- Scoring deductions may only be given and/or disqualification of contestant if clothing safety standards are not met.

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.

EQUIPMENT AND MATERIALS

Supplied by the contestant:

1. Computer with high-speed internet capability and camera to use applications such as Zoom, Teams, etc. The minimum recommended internet bandwidth speeds for joining Zoom meetings, accessing on-demand curriculum and other online operations is 2.0 Mbps up and down. You can test your current internet speeds by following this link: www.speedtest.net. Allow the page to load and click on GO.
2. A secondary camera(s) may be required to provide judges with the ability to view contestants from different angles. Additional camera requirements will be located on the SkillsUSA website at <http://updates.skillsusa.org>.
3. A contest Proctor will be required to be on site to assist judges. A local industry expert is preferred to serve as the Proctor and shall not be an individual who has been involved with the training of the contestant(s). The Proctor will serve as the onsite "hands and eyes" for the judges. Proctor will follow instructions from the judges for safety and operations related to the competition. Proctor may be asked by judges to perform several tasks such as operating a portable camera to show specific components or steps, measure parts, or any task that will provide judges with information needed to assist in accurate scoring of the contestant's work or presentation. However, the Proctor shall not serve as a judge nor have any influence on contestant scores.

4. The contestant's instructor or advisor shall be on-site to observe all competition activities to ensure a safe and healthy competition experience for all participants. That instructor or advisor will not be allowed to interact or interfere with the competitor unless a safety issue arises that requires interaction. Any other support or interaction between the contestant and the instructor/advisor will result in disqualification.
5. All competitors must create a one-page résumé and submit an electronic copy to the technical committee chair at least seven (7) days in advance of the competition. Failure to do so will result in a 10-point penalty. Instructions for submission of the electronic résumé copy will be provided on the SkillsUSA website at <http://updates.skillsusa.org>.
6. All necessary supplies and appliances required for the project
7. Tank and tips will be provided
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10. 8' steel tape measure
11. Copper tubing cutter with reamer
12. Striker
13. Arc joint pliers (channel lock type)
14. 8" or 10" adjustable wrench
15. Set of assorted slotted and Phillips screwdrivers
16. Torpedo level
17. 14-16 oz. claw hammer
18. Plastic (PVC) pipe reamer or suitable knife
19. Suitable saw or shear to cut PVC pipe
20. Copper cleaning tool (inside and outside)
21. 2H pencil and eraser
22. Cutters suitable for cast-iron soil pipe
23. Torque wrench for no-hub clamps
24. $\frac{5}{16}$ " nut driver
25. Hacksaw
26. $\frac{3}{8}$ " drive socket set
27. Portable battery screw gun
28. Plumb bob
29. Wiping rag

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

SCOPE OF THE CONTEST

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

Knowledge Performance

The contest will include a written knowledge exam assessing knowledge of the industry standards.

Skill Performance

The contest 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.

Contest Guidelines

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

Standards and Competencies

Note for Virtual Competitions: Contestants may not be required to perform all the standards and competencies listed in this section. However, contestants should be prepared to perform components in all areas. Prior to the competition, the technical committee may determine which standards and competencies contestants will be perform for the virtual contests. The technical committee will determine if additional information is needed for contestants prior to the competition. These changes will be posted on the SkillsUSA Championships contest update website at: <http://updates.skillsusa.org>.

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 $\frac{1}{16}$ " 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
- 2.4 Determine 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 soldering practices
 - 6.4.1 Demonstrate correct procedure for connecting torch equipment including regulators, tanks, hose, torch and tips
 - 6.4.2 Ignite and extinguish torch using safe practices
 - 6.4.3 Check for unsafe conditions such as cracked hoses, damaged gauges and leaks
- 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

Committee Identified Academic Skills

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

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: <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: <http://www2.mcrel.org/compendium/browse.asp>.

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.