

# **Heating, Ventilation, Air Conditioning and Refrigeration (HVACR)- 2025**

April 5, 2025 – 8 a.m.

Berglund Center

710 Williamson Road, Roanoke, VA 24016

**Please refer to the 2024 SkillsUSA Virginia Technical Standards for detailed description of guidelines and requirements. The scope of the contest will be drawn from these standards. NOTE: ALL contest are subject to increased difficulty levels from previous state competitions in order to align the scope and skill level to that of National Competitions.**

- **Resumes, one page** go to [www.vaskillsusa.org](http://www.vaskillsusa.org) State Leadership Conference Announcements for Resume Worksheet; resume is worth 10% of the total contest score.
- **OSHA card, certificate or letter** verifying OSHA training
- Contestants should report a few minutes early to the contest site with their nametag turned so that their contestant number is showing.
- The contest is not considered over until the area has been cleaned.

## **Clothing**

Official SkillsUSA khaki work shirt **or** SkillsUSA Virginia conference t-shirt and pants, black or brown leather work shoes, and safety glasses with side shields or goggles. *(Prescription glasses can be used only if they are equipped with side shields. If not, they must be covered with goggles.)*

## **Contestant's Tool List**

*Each Air Conditioning & Refrigeration competitor should bring the following tools and meters to the contest:*

- |                                   |   |
|-----------------------------------|---|
| 1. Flare Block and yoke           | 13. Two thermometers or an electronic thermometer with two probes |
| 2. Swaging tool                   |   |
| 3. Tube cutter (copper)           | 14. Volt-Ohm meter with Amp Clamp                                 |
| 4. Sand cloth/Scotch-Brite Pad    | 15. Nut driver set  |
| 5. Gauge manifold                 | 16. Pressure temperature chart                                    |
| 6. Wiping cloth                   | 17. 10" crescent wrench   |
| 7. Measuring tape                 | 18. Common pliers   |
| 8. Safety glasses                 | 19. Lineman pliers  |
| 9. Flare nut wrench or equivalent | 20. Service valve wrench  |
| 10. Ball peen hammer              | 22. Screwdrivers, straight and Phillips                           |
| 11. Deburring tool                | 22. Thermostat screwdriver  |
| 12. Gloves                        | 23. Resume  |

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## **Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) State Contest 2025**

### **Station 1: Brazing (30 minutes) 2 people**

Interpret piping diagram, assemble piping, braze per instruction, and pressurize for testing.

### **Station 2: Mechanical Troubleshooting (Refrigeration) (30 minutes) 2 people**

Read work order ticket and diagnose problem with Water Source Heat Pump system. Perform operational inspection on system.

### **Station 3: Electrical Wiring (30 minutes) 2 people**

Read given diagram and wire up provided components to simulate an electric furnace and air conditioning operation.

### **Station 4: Component Identification and Diagnosis (15 minutes) 1 person**

Using the proper instruments and procedures, determine and explain the nature of each component, and log your answer.

### **Station 5: Interview (15 minutes) 1 person**

Students will conduct a job interview answering a series of questions.

### **Station 6: Written exam (30 minutes) 2 People**

Answer general knowledge questions pertaining to the air conditioning and refrigeration field.

2.5 hours

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**Heating, Ventilation, Air Conditioning and Refrigeration  
(HVACR)  
State Contest 2025**

**Contestants Instructions  
Station: 1**

**Time Limit: 30 minutes**

The purpose of this station is to test the proficiency of the contestant in the use of the tools and materials used to fabricate piping as needed in the field. The project is simple but will require all the skills and speed the contestant can muster to do it accurately in the time allotted.

**Accuracy is very important.**

Use the below instructions to build your project. All joints will be hard soldered. Be as neat and craftsman like as you can.

**Project Instructions**

1. Cut 1 piece of 7/8" hard drawn copper 4 1/2" long and fit reducers on each end.
2. Cut 1 piece of 3/8" tubing 3 1/2" long and flare one end, insert the other into previously fitted 7/8" x 3/8" reducer.
3. Cut 1 piece of 3/8" tubing 2 1/2" long and swage 1 end, insert the other into previously fitted 7/8" x 3/8" reducer.
4. Insert 3/8" ODS access fitting into swaged end of 3/8" tubing.
5. Silver braze all connections using an acetylene torch.
6. Install flared reducing union.
7. Tighten all fittings and have the judge test for leaks.

**Purging with nitrogen while brazing is a requirement.**

**Please don't ask the judge any questions about your answers as he is only responsible for pressure testing.**

You will be judged on the following:

1. Proper use of tools and instruments.
2. The accuracy of your measurements.
3. Integrity and neatness of your finished product.
4. General safety practices.
5. Leaks

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# Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) State Contest 2025

## Contestants Instructions Station: 2

**Time Allowed: 30 minutes**

This exercise involves diagnosing and performing an operational inspection on a water source heat pump system:

**Perform operational inspection of water source heat pump and determine if there are indications of improper operation.**

**Record the following readings:**

1. Suction pressure
2. Discharge pressure
3. Superheat
4. Subcooling
5. Compressor amperage
6. Entering indoor temp
7. Leaving indoor temp

**Fill out the provided service ticket and hand to the judge when complete.**

### **NOTES:**

1. Follow all normal safety procedures.
2. Use proper tools and/or instruments.
3. Perform task in proper sequence.
4. Return all doors and equipment to proper state when finished.

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## Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) State Contest 2025

### Contestants Instructions Station: 3

**Time Allowed: 30 minutes**

This exercise involves wiring a conventional air conditioning system with a thermostat using the wiring diagram provided and check for proper operation.

After wiring is complete, run through the following sequence:

- 1. Cut fan only switch to on, light labeled high speed fan should come on, then cut fan switch back to auto**
- 2. Second put thermostat in cool mode and lower set point. Cool light and fan light should come on. Then raise set point so that lights cut off.**
- 3. Third cut thermostat to heat mode and raise set point. Heat light and fan should come on. Then lower set point so that lights cut off.**
- 4. Lastly, remove all of your low voltage wiring so board is ready for next contestant just like you found it.**

#### NOTES:

1. Follow all normal safety procedures.
2. Use proper tools and/or instruments.
3. Perform task in proper sequence.
4. Return all equipment to proper state when finished.

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**Contestants Instructions  
Station: 4**

**Time Allowed: 15 minutes**

This exercise involves the identification and diagnostic testing of components. Using the proper tools you are to:

- 1. Identify each component and record the corresponding number next to the proper name on the sheet provided.**
- 2. Answer any questions corresponding to the part on the sheet provided using necessary tools as needed.**
- 3. Provide your answers to the judge when you are complete.**

**NOTES:**

1. Follow all normal safety procedures.
2. Use proper tools and/or instruments.
3. Perform task in proper sequence.
4. Return all equipment to the proper place when finished.

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**Contestants Instructions  
Station: 5**

**Time Allowed: 15 minutes**

This exercise involves an interview with a human resource manager of a major HVAC company:

Using your communications skills, you are to:

**Answer each question the judge asks of you with the intent you are trying to land a job at a major HVAC company and begin your career path. Have fun with this, and remember you are trying to convince this person you are the right person for the job.**

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**Contestants Instructions  
Station: 6**

**Time Allowed: 30 minutes**

Read each question carefully on the provided written test. Follow the directions for each section. **Be sure to write your contestant number on your answer sheet.** When you have finished, turn paper over so we know you are complete.

***This Contest Update must be signed by student and advisor and is to be submitted to chairman upon arrival to the contest area the day of competition.***

Advisor: \_\_\_\_\_ Date: \_\_\_\_\_

Student: \_\_\_\_\_ Date: \_\_\_\_\_