



Performance Verification Packet

HVAC V2

PHVAC3_02

This performance verification is designed as one method to evaluate job skills and safe work habits of a participant. The performance of the participant must be evaluated by an NCCER certified evaluator, at an NCCER authorized assessment site and be approved by an NCCER accredited assessment center.

Last Updated: November 2009

NCCER

13614 Progress Blvd • Alachua, FL 32615

1-888-622-3720

Performance Verification Form

How to fill out and file your information

Participant

- 1) Print your last name, first name, and social security number.
- 2) Print your company name, current employer, and the state where your employer's main office is located.
- 3) In the space provided for "Participant Signature," sign your name and enter the date you signed the form.

Performance Evaluator

- 1) In the space provided for "Site Code," enter the postal zip code of the location where the performance verification is being conducted.
- 2) In the column provided for "Date," enter the date the participant completed each of the tasks. This date is important because there may be times a participant does not complete a performance verification in one day.
- 3) In the space provided for "Performance Evaluator," sign your name.
- 4) In the space provided for "Date," next to your signature, list the date the participant successfully completed all of the tasks.

Administrator

- 1) In the space provided for "Administrator," sign your name. Your signature indicates that the performance evaluator is certified to conduct this performance verification and that it was conducted within the guidelines of the NCCER.
- 2) In the space provided for "Date," next to your signature, list the date that this performance verification form is being sent to the NCCER for entry into the National Registry.
- 3) In the space provided for "Accredited Assessment Center," print the name of the accredited assessment center that is conducting this performance verification.

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NCCER PERFORMANCE VERIFICATION CANDIDATE SUMMARY
HVAC TECHNICIAN (PHVAC3_02)

Objectives

The candidate will demonstrate the ability to service, install, and maintain residential and light commercial HVAC systems.

Scope

This Performance Verification provides a means to observe and evaluate competencies in the following areas:

- Brazing
- Leak detection, evacuation, recovery, and charging
- Control circuit troubleshooting
- Troubleshooting cooling
- Planned maintenance
- Troubleshooting electronic controls
- Troubleshooting heat pumps
- Construction drawings
- Air system balancing

Materials Required

- Oxyacetylene torch set
- Personal safety equipment
- Split A/C system
- Electronic leak detector
- Soap bubbles
- Vacuum pump
- Micron gauge
- Manifold gauge set
- Reclaimer
- Multimeter
- Amprobe
- Small air compressor
- Dip tank
- Small three-phase rooftop A/C unit
- Digital thermometer to take superheat
- Refrigerant charts
- Hand tools
- Small three-phase package A/C unit with economizer
- Small window A/C unit for the cap tube metering device
- Water or digital manometer
- Speciality tools for oil furnace
 - Smoke test kit
 - Oil pump pressure gauge
 - Nozzle changing tool
 - Electrode setting tool
 - High voltage transformer tester
 - Soot vacuum and cleaning brushes
 - Draft gauge
 - Stack thermometer
- Electronic diagrams for equipment
- High efficient natural gas furnace

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NCCER PERFORMANCE VERIFICATION CANDIDATE SUMMARY HVAC TECHNICIAN (PHVAC3_02)

- Oil furnace
- Humidifier
- Electronic air cleaner
- Economizer
- Heat recovery ventilator
- Residential zone controls or system
- Tachmeter
- Air balance forms
- Measuring tape
- Velometer or a hot wire meter
- Air to air or water to air heat pump
- Set of construction drawings that have mechanical plans
- Functioning ductwork system w/prints, air handler, return duct with registers, supply duct with registers

Time Required

Up to 16 hours.

Tasks

Evaluator will provide necessary P& IDs, specification sheets, instrument index, and job-specific details for each task.

- **BRAZING**
 - Assemble an oxyacetylene torch, including selection of the proper size tip for the job.
 - Light and adjust an oxyacetylene torch flame.
 - Select correct filler metal rod for the intended brazing application.
 - Clean and cool the brazed joint.
- **LEAK DETECTION, EVACUATION, RECOVERY , AND CHARGING**
 - Under supervision, demonstrate and/or describe how to charge a system using the charging pressure charts method.
- **INTRODUCTION TO CONTROL CIRCUIT TROUBLESHOOTING**
 - Perform electrical test and troubleshooting as follows:
 - Single- and three-phase input voltage measurements.
 - Fuse and circuit breaker checks.
 - Resistive and inductive load checks.
 - Switch and contactor/relay checks.
 - Control transformer checks.
 - Perform electrical test and troubleshooting of compressor and fan motors as follows:
 - Start and run capacitor checks.
 - Start relay and start thermistor checks.

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NCCER PERFORMANCE VERIFICATION CANDIDATE SUMMARY

HVAC TECHNICIAN (PHVAC3_02)

- **TROUBLESHOOTING COOLING**
 - Isolate and correct malfunctions in a cooling appliance:
 - System-related compressor problems.
 - Refrigerant overcharge and undercharge.
 - Evaporator and condenser problems.
 - Metering device problems.
 - Refrigerant lines and accessories.
 - Noncondensibles and contamination.

- **PLANNED MAINTENANCE**
 - Perform preventive maintenance inspection, cleaning, adjustment, and other applicable servicing procedures on the following equipment as prescribed by the instructor:
 - Gas-fired heating equipment.
 - Oil-fired furnaces.
 - HVAC accessories.
 - Start relay and start thermistor checks.

- **TROUBLESHOOTING ELECTRONIC CONTROLS**
 - Analyze circuit diagrams and other manufacturers' literature to determine the operating sequence of microprocessor-controlled systems.

- **TROUBLESHOOTING HEAT PUMPS**
 - Isolate and correct malfunctions in a heat pump using the correct tools and instruments:
 - Cooling function.
 - Reverse cycle heating function.
 - Defrost cycle.
 - Auxiliary electric heat.

- **CONSTRUCTION DRAWINGS AND SPECIFICATIONS**
 - Identify and interpret the following on a mechanical plan drawing:
 - Hot- and chilled-water coil piping.
 - HVAC piping.
 - Chiller piping/installation.
 - Refrigeration piping schematics.
 - Air handling unit installation/connecting ductwork.
 - Hot- and chilled-water flow diagrams.
 - Schedules.
 - Specification references.
 - Legends.

- **AIR SYSTEM BALANCING**
 - Balance a selected air system:
 - Measure fan and fan motor rpm.
 - Measure supply and return duct static pressures.
 - Use fan curve charts.
 - Adjust supply fan speed to provide higher or lower air quantities.
 - Measure airflow at air supply outlets.
 - Adjust dampers in branch supply ducts and at air terminals and diffusers.
 - Prepare system balancing report forms.

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**NCCER PERFORMANCE EVALUATOR CHECKLIST
HVAC TECHNICIAN (PHVAC3_02)**

Date

completed Task

___ - ___ - ___ **1. Brazing**

- Assemble an oxyacetylene torch, including selection of the proper size tip for the job.
 - Light and adjust an oxyacetylene torch flame.
 - Select correct filler metal rod for the intended brazing application.
 - Clean and cool the brazed joint.
-

___ - ___ - ___ **2. Leak Detection, Evacuation, Recover, and Charging**

- Under supervision, demonstrate and/or describe how to charge a system using the charging pressure charts method.
-

___ - ___ - ___ **3. Introduction to Control Circuit Troubleshooting**

- Perform electrical test and troubleshooting as follows:
 - Single- and three-phase input voltage measurements.
 - Fuse and circuit breaker checks.
 - Resistive and inductive load checks.
 - Switch and contactor/relay checks.
 - Control transformer checks.
 - Perform electrical test and troubleshooting of compressor and fan motors as follows:
 - Start and run capacitor checks.
 - Start relay and start thermistor checks.
-

___ - ___ - ___ **4. Troubleshooting Cooling**

- Isolate and correct malfunctions in a cooling appliance:
 - System-related compressor problems.
 - Refrigerant overcharge and undercharge.
 - Evaporator and condenser problems.
 - Metering device problems.
 - Refrigerant lines and accessories.
 - Noncondensibles and contamination.
-

___ - ___ - ___ **5. Planned Maintenance**

- Perform preventive maintenance inspection, cleaning, adjustment, and other applicable servicing procedures on the following equipment as prescribed by the instructor:
 - Gas-fired heating equipment.
 - Oil-fired furnaces.
 - HVAC accessories.
 - Start relay and start thermistor checks.
-

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___ - ___ - ___ **6. Troubleshooting Electronic Controls**

- Analyze circuit diagrams and other manufacturers' literature to determine the operating sequence of microprocessor-controlled systems.

___ - ___ - ___ **7. Troubleshooting Heat Pumps**

- Isolate and correct malfunctions in a heat pump using the correct tools and instruments:
 - Cooling function.
 - Reverse cycle heating function.
 - Defrost cycle.
 - Auxiliary electric heat.

___ - ___ - ___ **8. Construction Drawings and Specifications**

- Identify and interpret the following on a mechanical plan drawing:
 - Hot- and chilled-water coil piping.
 - HVAC piping.
 - Chiller piping/installation.
 - Refrigeration piping schematics.
 - Air handling unit installation/connecting ductwork.
 - Hot- and chilled-water flow diagrams.
 - Schedules.
 - Specification references.
 - Legends.

___ - ___ - ___ **9. Air System Balancing**

- Balance a selected air system:
 - Measure fan and fan motor rpm.
 - Measure supply and return duct static pressures.
 - Use fan curve charts.
 - Adjust supply fan speed to provide higher or lower air quantities.
 - Measure airflow at air supply outlets.
 - Adjust dampers in branch supply ducts and at air terminals and diffusers.
 - Prepare system balancing report forms.



PERFORMANCE VERIFICATION FORM

PVHVAC3_02 - CRAFT

Candidate information		
_____	_____	_____
Last Name	First Name	SS#
_____	_____	_____
Employer/Company Name	State	Site Code
Evaluator		
_____	_____	_____
Last Name	First Name	SS#

Task Number	TASK	DATE (MM/DD/YY)	START TIME	END TIME
01	Brazing (03104-07)			
02	Leak Detection, Evacuation, Recovery, and Charging (03205-07)			
03	Introduction to Control Circuit Troubleshooting (03208-07)			
04	Troubleshooting Cooling (03210-07)			
05	Planned Maintenance (03307-08)			
06	Troubleshooting Electronic Controls (03309-07)			
07	Troubleshooting Heat Pumps (03311-08)			
08	Construction Drawings and Specifications (03401-09)			
09	Air System Balancing (03402-09)			

Consent/Release: I, the undersigned, do hereby authorize the National Center for Construction Education and Research (NCCER) to release the information and results attained through the administration of the National Craft Assessment and Certification Program (NCACP) to the organization referenced below, and acknowledge that the employer noted above is my present employer.

Accredited Assessment Center: _____

Participant: _____ **Date:** _____

Performance Evaluator: _____ **Date:** _____

Administrator: _____ **Date:** _____