



4.4 Basic Electricity for Propane Appliance Service Performance-Based Skills Assessment 2019



Section One	<u>Identify Safety Responsibilities and Review Basic Propane Appliances</u>
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Task 2	Review of Basic Propane Appliances
Section Two	<u>Identify Properties of Electrical Circuits</u>
Task 1	Explain Current, Voltage, Resistance, and Power
Task 2	Identify Components of Simple Ladder Diagrams
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Section Three	<u>Demonstrate Measurement of Electrical Quantities</u>
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Task 2	Interpret Sequence of Operations

NOTICE: The Skills Evaluator must be the candidate's supervisor or another qualified person who has completed CETP 2019 4.4 *Basic Electricity for Propane Appliance Service* or is familiar with the subject matter.

CETP Certification requires that the employee seeking certification cannot act as his/her own evaluator.

Instructions for Use:

The Performance Based Skill Assessment Evaluation is designed to standardize conditions under which the candidate demonstrates performance of tasks to meet the requirements for NPGA CETP Certification.

The Skills Assessment should be supplemented with company policies and procedures related to each task being evaluated as needed.

1. The candidate has 12 months from the date of successfully passing the CETP Certification exam to train and successfully complete the tasks within the evaluation.
2. The affidavits and a final checklist are provided on the last two pages of the skills packet.
 - Affidavits must be signed by both the candidate and the skill evaluator
 - The final checklist must be fully completed within 12 months of passing the exam (Candidates may use this time to practice skills as often as necessary)
 - Make a copy for the training records when the skills assessment is completed for future audits
 - Send the affidavit page and final checklist (last two pages) to the testing center within 12 months of passing the exam
3. All requirements and prerequisites must be met before certification will be granted.

4.4 “Basic Electricity for Propane Appliance Service” Certification Requirements

- Passing exam score on 4.4 “*Basic Electricity for Propane Appliance Service*” exam
- Completed and signed 4.4 “*Basic Electricity for Propane Appliance Service*” Skills Assessment Affidavit and Final Checklist returned to the testing center within 12 months of passing the exam.
- 1.0 *Basic Principles and Practices* certification completed within 12 months of passing the exam

Users of this material should consult the law of their individual jurisdictions for codes, standards and legal requirements applicable to them. This material is not intended to be an exhaustive treatment of the subject, and should not be interpreted as precluding other procedures that would enhance safe LP-gas operations. This training material merely suggests methods the user may find useful in implementing applicable codes, standards, and legal requirements. This publication is not intended nor should it be construed to (1) set forth procedures which are the general custom or practice in the propane industry; (2) to establish the legal standards of care owed by propane distributors to their customers; or (3) to prevent the reader from using different methods to implement applicable codes, standards or legal requirements. This material was designed to be used as a resource only to assist expert and experienced supervisors and managers in training personnel in their organizations and does not replace federal, state, local, or company safety rules. The user of this material is solely responsible for the method of implementation. The Propane Education and Research Council, the National Propane Gas Association and Industrial Training Services, Inc. assume no liability for reliance on the contents of this training material.

Issuance of this material is not intended to nor should it be construed as an undertaking to perform services on behalf of any party either for their protection or for the protection of third parties.

Instructions for Candidate:

Practice the operations as many times as needed to become confident and proficient with the documents or equipment necessary to complete each task. Your evaluator will check and observe your performance, using the steps to complete each hands-on operation and/or company procedures.

The candidate must adhere to all safety precautions. If a safety precaution is violated, then the demonstration shall be stopped and the skills evaluator must instruct the candidate on the proper safety procedures that apply before allowing the candidate to continue.

After completing the skills evaluation, the candidate must fill out the Employee Information section and sign the Affidavit.

Required information includes the candidate's last four digits of the SSN to assist the testing center in locating the correct records.

Instructions to the Skills Evaluator:

The candidate must adhere to all safety precautions. If a safety precaution is violated, then the demonstration shall be stopped and the skills evaluator must instruct the candidate on the proper safety procedures that apply before allowing the candidate to continue.

- Review the tasks within the Skills Evaluation with the candidate.
- Review all of the instructions, answering any questions and explaining how the skills assessment will be used.
- Demonstrate and/or talk the candidate through each of the steps required to perform each task.
- Allow the candidate time to ask questions and/or study the steps.
- Observe the candidate performing the required steps, providing corrections as needed
- Allow the candidate to practice until he/she is confident. *Remember:* the candidate has 12 months from the date of passing the exam to complete and return the skills assessment
- Evaluate the candidate when ready
- After completing the final checklist, complete the Skills Evaluator information and sign the affidavit.
- Ensure that the Affidavit and final Checklist are copied for the Employee Training Records and then sent to the testing center.

Each task is divided into one or more operations upon which the candidate's performance is evaluated. All tasks must be completed unless the "Not Applicable" option is both available for the task and applicable to the candidate or the marketer's present situation.

Satisfactory - When all the operations within a task are successfully performed by the candidate according to the criteria provided, the evaluator will check off the box marked "Satisfactory."

* **Not Applicable** - Certain tasks have the "Not Applicable" option available. The Skills Evaluator must ensure the circumstances described under the option are applicable to either the candidate or marketer's present situation.

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Section One: Overview of Safety Responsibilities and Basic Propane Appliances

NPGA 4.4 Basic Electricity for Propane Appliance Service Skills Assessment (2019)

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Task 1: Identify Safety Responsibilities

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain the meaning of the following safety precautions in the event of a propane leak or release:
 - Always place personal safety first
 - No flames or sparks
 - Leave the area immediately
 - Shut off the gas, if able to do so
 - Report the Leak
 - Do not return to the building or area until safe to do so
 - Do not re-enter a hazardous environment
2. Explain the following electrical safety procedures used while servicing an appliance:
 - Work on de-energized circuits whenever possible, unless troubleshooting
 - Unplug small appliances from the power outlet
 - For large appliances, use service shutoff switch located at the appliance. If no shutoff switch is available, determine which electrical circuit is involved and turn off the power to the circuit at the electrical panel.
3. Explain company policies and procedures regarding lockout / tagout procedures.
4. Identify the following safety responsibilities according to company policies and procedures:
 - Personal Protective Equipment (PPE) and tools
 - Safe Work Habits
 - Working in wet areas
5. Explain company policies and procedures for identifying and resolving unsafe working conditions at a customer site, to include:
 - Flammable materials too close to an ignition source
 - Incorrect venting of water heater
 - Documenting conversations with customers
 - Company policies and procedures related to Warning Tags and/or conditions that lead to removing a customer appliance from service.

Satisfactory

Task 2: Review of Basic Propane Appliances

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Identify the following primary heating and distribution components and explain their primary function for the appliance:
 - Gas Control Valve
 - Pilot Burner
 - Main Burner
 - Orifice
 - Combustion Chamber
 - Heat Exchanger
 - Blower or Circulator Motor
2. Identify the following operating control components and explain their primary function for the appliance:
 - Thermostat
 - Fan Controls
 - Aquastats
3. Identify and explain the purpose of the Pilot Safety System and why it is required on all pilot ignition systems.
4. Identify the following safety devices and explain their primary purpose and how they function in the appliance:
 - High Temperature Sensors
 - Flame Rollout Sensors
 - Combustion Product Switches
 - Low Water Sensors
 - High Water Pressure Relief Valves
 - Oxygen Depletion Sensors

Continued

Task 2 continued

5. Explain the status for the following steps when an appliance receives call for heat:
- Standby Mode:** What is the status of the pilot flame and gas flow to the main burner during standby mode?
 - Heating Cycle:** What happens within the appliance when a call for heat occurs?
 - Return to Standby Mode:** How does an appliance return to standby mode?
 - Appliance Malfunction:** What happens if a safety control detects a problem within the appliance during a heating cycle?

Satisfactory

Section Two: Identify Electrical Circuits

Task 1: Explain Current, Voltage, Resistance and Power

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain how current measurements are used by a technician troubleshooting an appliance motor.
2. Explain what voltage measures in an electrical circuit.
3. Explain what determines resistance in an electrical circuit.
4. Explain the relationship between the following:
 - Power
 - Watt
 - Kilowatt

Satisfactory

Task 2: Identify Components of Simple Ladder Diagrams

Evaluator: Please use a propane appliance ladder diagram designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Identify the following points on the ladder diagram:
 - Electrical outlet or source of electricity
 - Neutral
 - Ground
 - Load
 - Any open switches, as applicable
 - Any closed switches, as applicable
 - Any connectors
2. Explain the following:
 - Direction electricity flows through the diagram
 - Effect open switches would have on the load
 - Effect closed switches would have on the load

Satisfactory

Task 3: Identify Open and Short Circuits

Evaluator: Please use a propane appliance ladder diagram designed to heat air or water, and with a standing pilot or simple spark ignition for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Identify the following four elements on an appliance ladder diagram:
 - Source
 - Load
 - Wire
 - Switch

Continued

Task 3 continued

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2. Explain what an open circuit is and how the circuit might be opened.
3. Identify possible causes of a short circuit and explain the following:
 - How does electricity flow if a short exists in a circuit?
 - How can a short circuit be **unintentionally** made with testing equipment?
 - Describe damage that can result from the high current caused by a short circuit.
 - What are the major means of protecting against short circuits?
4. Identify potential faults typical for each of the four elements of an electrical circuit:
 - Source:** three possible faults
 - Wire and Connections:** three possible faults
 - Load:** three possible faults
 - Switches:** two faults

Satisfactory

Section Three: Demonstrate Measurement of Electrical Quantities

Task 1: Demonstrate Understanding of Test Meter Safety

Evaluator: Please use a propane appliance designed to heat air or water with a standing pilot or simple spark ignition system. Ensure the Candidate uses test meters currently utilized by the company for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain how a person can experience fatal electrical shock from current flow.
2. Explain how to ensure the following precautions are observed in order to avoid electrical shock hazards when using test meters or working on an electrical circuit:
 - Avoid contact with both the conductor that is being supplied with power and the neutral conductor at the same time
 - Avoid contact with both a conductor that is being supplied with power and with the ground
 - Avoid touching two conductors that are being supplied with electrical energy
3. Explain the importance of selecting test meters that provide the highest overvoltage protection for the location and type of equipment being tested.
4. Demonstrate an understanding of working with test meters safely while working **with the power on:**
 - Ensure equipment you are working with is grounded
 - Ensure polarity is correct
 - Use PPE according to company policies and procedures
 - Use insulated tools, such as meters with insulated leads, to prevent shock
 - Do not wear watches or other jewelry that may be a conductor
 - Stand on an insulated mat, if possible
 - Avoid working in wet areas when possible. If working in wet areas, wear use PPE, including footwear with shock-resistant outsoles and nonconductive, shock-resistant soles and heels
 - Inspect the appliance before you start working to ensure it has been properly de-energized
 - Implement lockout/tagout procedures when appropriate to ensure that circuits are not re-energized before work is complete or without technician's knowledge and consent. If these procedures are not in place, assume the circuit is energized.

Satisfactory

Task 2: Demonstrate Understanding of Test Meters

Evaluator: Please use a propane appliance designed to heat air or water with a standing pilot or simple spark ignition system. Ensure the Candidate uses test meters currently utilized by the company for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Identify the types of test meters currently utilized by the company and explain the features, functions, and accessory connections.
2. Correctly demonstrate understanding of multimeter operation:
 - Turn multimeter on by either pushing the power button or selecting a function
 - Select the function for the appropriate measurement. If the multimeter does not have an autorange feature, select the expected range for the measurement.
 - Connect the black probe to the COM input jack on the multimeter and connect the red probe to the input jack that corresponds to the function you selected in the previous step.

Continued

Task 2 Continued

- Touch or attach the black probe to one connector and touch or attach the red probe to another connector
 - Interpret the results in the display window of the multimeter
 - Take additional readings as necessary. (**NOTE:** Remember to remove the red probe to the correct input jack as needed if you change function selector switch position.)
 - If the multimeter has a power on/off button that is separate from the function selector switch, always reset the function selector switch to the highest AC voltage scale before turning off the meter to prevent possible injury or damage to the meter the next time it is turned on.
3. Verify the meter is working properly before attempting to take any measurements by using the three point test method:
- Test a known energized circuit
 - Test the target circuit
 - Test the known energized circuit again
4. Explain how and when a clamp meter or clamp attachment is used.
5. Correctly demonstrate the following test meter connections to a circuit:
- Wire nuts
 - Terminal screws
 - Blade terminals
 - Terminal strips
 - Wiring harness connectors

Satisfactory

Task 3: Measure Electrical Quantities

Evaluator: Please use a propane appliance designed to heat air or water with a standing pilot or simple spark ignition system. Ensure the Candidate uses test meters currently utilized by the company for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Demonstrate how to correctly prepare the test meter and measure voltage to the load:
 - Attach the black lead to N (neutral) for a line voltage circuit, or C (Common) for a low voltage circuit
 - Touch the red lead to the connector on the input side of the load
 - Read the value on the display screen
 - Check the nameplate for the load to determine the amount of voltage required to operate properly and determine results
2. Measure resistance to the load:
 - Turn off the power to the appliance and disconnect the wires to the load
 - Touch the probes to the contacts on either side of the load and read the results on the display screen
 - Subtract the zero-ohm value from the measurement on the display screen to obtain the actual resistance value
 - Compare the actual resistance value with the expected value in the manufacturer documentation:
 - If the actual resistance is higher or lower, the component is defective and should be replaced
 - If the reading is OL (open loop), there is an open circuit inside the load, and the load should be replaced
3. Demonstrate how to correctly prepare the test meter and measure the resistance of a switch or wire, and then explain the following:
 - A reading of OL or a series of dashes (----): what should you look for?
 - A small amount of resistance in a portion of a circuit with no load: What should you look for?
4. Demonstrate how to correctly test for continuity and complete the following:
 - Use voltage measurements to test for continuity
 - Use resistance measurements to test for continuity
 - Test for continuity between connectors in the circuit
5. Demonstrate how to correctly prepare the test meter to directly measure the current of a load:
 - Check the manufacturer specifications for the load for the expected amperage range
 - Prepare the multimeter to measure the expected amperage
 - Turn off the power to the appliance
 - Disconnect the wiring at the point where the current is to be measured
 - Connect the meter leads to the disconnected wires to complete the circuit again with the meter now a part of the circuit
 - Turn on the power to the appliance and initiate appliance startup
 - Read the value on the meter display screen. Compare the measured amperage to the load specifications provided by the manufacturer. The amperage specifications are also usually listed on the load itself, such as a motor nameplate
 - Shut off the power to the appliance again when disconnecting the test meter from the circuit
6. Demonstrate how to correctly measure current indirectly with a clamp meter or clamp accessory.

Satisfactory

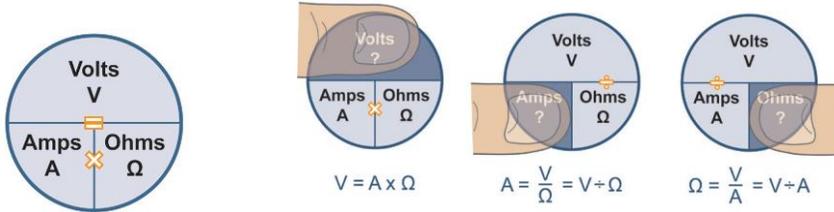
Section Four: Properties of Electrical Circuits

Task 1: Explain Electrical Relationships

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

- Ohm's Law** states that voltage equals current times resistance. If you know two of these values, you can calculate the third by dividing voltage by the known value to get the missing value.

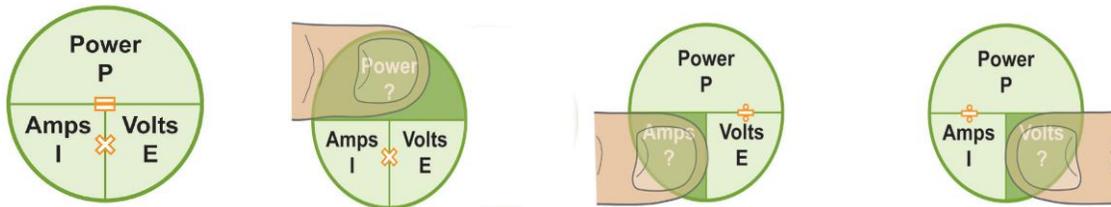
Volts = amps x ohms $V = A \times \Omega$ or $E = I \times R$



Using the formulas/visual aids above answer the following:

- How many amps would you have in 24-volt circuit with a gas valve as a load that has 30 ohms of resistance?
 - If a fan motor in a space heater is supplied with 120 volts and draws 0.6amps, what should be the resistance of the fan motor?
 - How many volts would be required to operate a draft fan motor on a gas appliance if the motor has an amperage rating of 0.5 amps and 240 ohms of resistance?
 - How much voltage would be required in a circuit that has a relay coil that has 60 ohms of resistance and draws 0.4 amps?
- Watt's Law** explains the relationship between power, voltage, and current.

Power (watts) = Current x Voltage (volts) $W = A \times V$ or $P = I \times E$



Using the formulas/visual aids above answer the following:

- How much electrical power is motor expending when it is operating on 120 volts and requiring 8 amperes of electrical current?
- What is the required voltage to run a 720-watt motor if the motor normally operates at 8 amperes?
- How much current will a 360-watt igniter require when operating on 120 volts?
- How much current will a 160-watt lamp require when operating on 120 volts?
- How much electrical power is a gas control valve expending when it operating on 24 volts and require 0.8 amperes?
- What is the required voltage to light a 220-watt lamp if the lamp normal operates on 1.2 amperes?

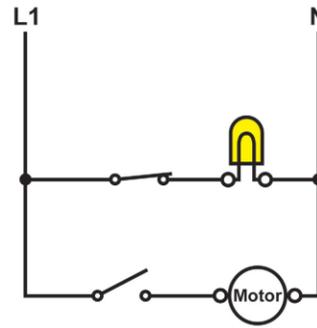
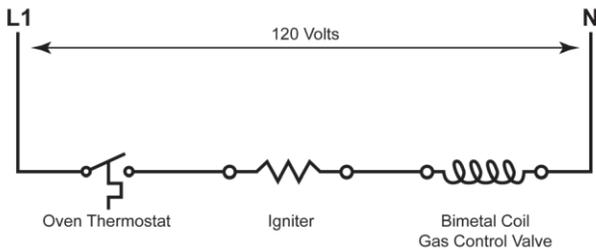
Satisfactory

Task 2: Identify Series and Parallel Circuits

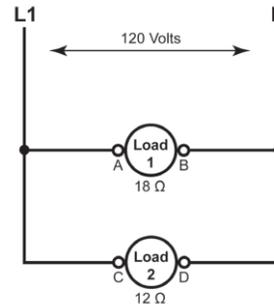
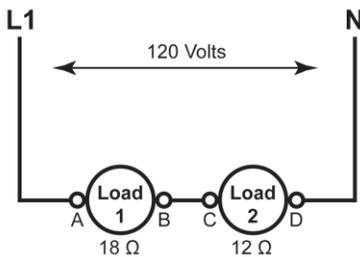
Evaluator: Please use propane appliance electrical circuits designed to heat air or water and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

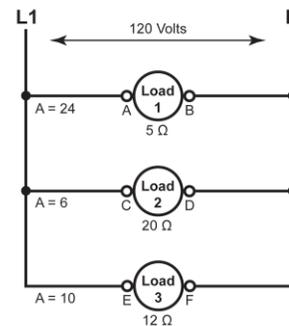
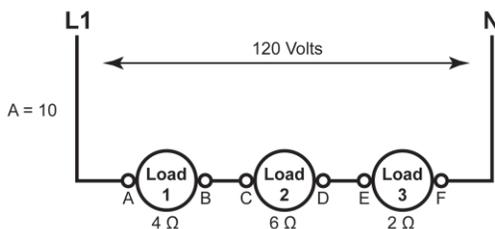
- Using the two circuits below, identify the following:
 - How current flows through the components in a series circuit:
 - How current flows through the components within the branches of a parallel circuit



- Explain how a combination of series and parallel circuits would be used in an appliance.
- Using the circuits below, determine the correct "load" for the following:
 - Series circuit
 - Parallel circuit



- Explain how voltage "drops" from one load to the next load.
- Identify the voltage drops on the following circuits:
 - Series circuit
 - Parallel circuit



Satisfactory

Task 3: Identify Types of Switches

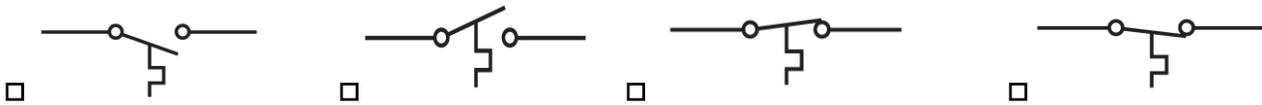
Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain the basic purpose of switches in a circuit.
2. Identify the following types of switches, explain how they operate, and provide examples when each might be used:



-

3. Explain the meaning of a normally open or normally closed switch.
4. Correctly identify the following sensor-activated switches as NO or NC and whether the arm will open or close the switch upon an increase or decrease of whatever the sensor is detecting.



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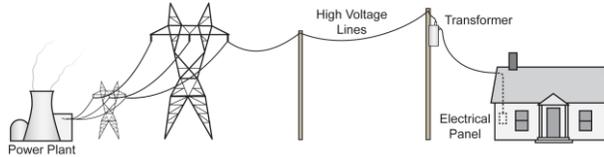
Satisfactory

Task 4: Explain Electrical Power – From Source to Appliance

Evaluator: Please use a propane appliance designed to heat air or water and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain how 240V high power lines are reduced to 120V power lines for residential electrical panels.



2. Identify the following components of an electrical panel:

- | | |
|---|---|
| <input type="checkbox"/> Hot Bus Bar | <input type="checkbox"/> Double Circuit Breakers |
| <input type="checkbox"/> Neutral | <input type="checkbox"/> Line-voltage Fuses (if applicable) |
| <input type="checkbox"/> Ground | <input type="checkbox"/> Single Circuit Breakers |
| <input type="checkbox"/> Main Circuit Breaker | |

3. Explain the purpose of the following:

- Electrical grounding system
- Appliance grounding
- Bonding all pipes and metal surfaces to the electrical grounding system

4. Explain the following:

- What is polarity?
- The potential hazards of reversed polarity
- Household outlets, small appliance plugs, and polarity
- How to check polarity in a circuit

Satisfactory

Section Five: Identify Common Sensing Devices in Propane Appliances

Task 1: Identify Temperature, Pressure, Air Flow, and Current Responsive Devices

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain the purpose of the following *temperature responsive devices* and how they operate in propane appliances:
 - Bimetals used as temperature sensors
 - Rod and tube sensors
 - Hydraulic and pneumatic bulbs
 - Fusible links
 - Flame rollout sensors
 - Energy Cutoff sensors (ECOs)
 - Temperature and pressure relief valves
2. Explain the purpose of the following *pressure-responsive devices* and how they operate in propane appliances:
 - Diaphragm
 - Water pressure switch
 - Gas pressure switch
 - Vacuum switch
3. Explain the purpose of *air flow responsive devices* and how they operate in propane appliances.
4. Explain the purpose of *current responsive devices* and how they operate in propane appliances.
5. Identify the following symbols, explaining whether the switch is open or closed and what will activate the sensor:



Satisfactory

Task 2: Identify Liquid Level, RPM, and Flame Sensors

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain the purpose of the following *liquid level sensors* and how they operate in propane appliances:
 - Low-water cutoff devices
 - Float-type devices
2. Explain the purpose of an RPM sensor and how it operates in propane appliances.
3. Explain the purpose of the following *flame sensors* and how they operate in propane appliances:
 - Thermocouples
 - Thermopiles
 - Oxygen depletion sensors (ODS)
 - Bimetal used as flame sensors
 - Hydraulic vaporization flame sensors
4. Explain the importance of the *oxygen depletion sensor* (ODS) in propane appliances.
5. Identify the following symbols, explaining whether the switch is open or closed and what will activate the sensor:



Satisfactory

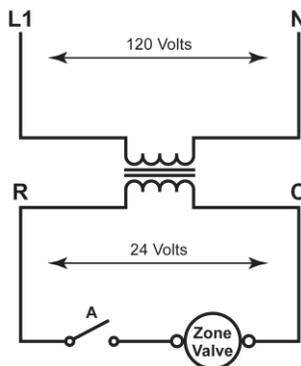
Section Six: Identify Electrical Components in Propane Appliances

Task 1: Demonstrate an Understanding of Transformers

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain the purpose of a transformer.
2. Identify the following in the ladder diagram below:
 - Transformer and windings
 - Primary or input side of the transformer
 - Secondary or output side of the transformer



3. Provide the following from an appliance transformer label:
 - Input voltage
 - Output voltage
 - VA (volt amp) rating for the secondary circuit
4. Using the information provided in #3, calculate the current supplied by the transformer using Watt's Law ($W = V \times A$).

Satisfactory

Task 2: Explain the Purpose and Operation of Relays

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain the purpose of relays and how they work in propane appliances.
2. Explain the function of the two basic parts of a relay:
 - Coil – what happens when electricity is applied to the coil?
 - Contact – what does the contact serve as?
3. Identify four combinations of poles and throws used for relay contacts.
4. Follow the sequence of operation of the relays and contacts throughout the propane appliance ladder diagram and explain the following:
 - Number of relays in the ladder diagram and the motor each relay operates
 - Interpret the operation of each relay contact, to include the action of poles and throws, and how each function to start the motor

Satisfactory

Task 3: Identify Motors and Capacitors

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Identify symbols used for motors in ladder diagrams.
2. Provide examples of motors used in propane appliances that move the following:
 - Air
 - Flue gases
 - Water
3. Explain the purpose of a capacitor and the differences between a start and run capacitor
4. Explain the hazards of the following:
 - Handling a capacitor
 - Discharging a capacitor
5. Identify the motors and capacitors on a propane appliance circuit diagram.

Satisfactory

Task 4: Demonstrate an Understanding of Wall Thermostats

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain the primary purpose of wall thermostats.
2. Identify where the following thermostat terminals are connected:
 - R
 - W
 - Y
 - G
 - C
3. Explain the wiring and operation for the following types of wall thermostats:
 - Heat Only Thermostats (R and W)
 - Cooling Thermostats (Y)
 - Fan Control Thermostat (G)
 - Thermostats with Rh and Rc Terminals
4. Explain how electric thermostats requiring power to operate the electronics *inside* of the thermostat are wired using the C terminal to make a complete circuit that provides 24 volt power with the transformer as the load.

Satisfactory

Task 5: Identify Limit and Fan Controls

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain the purpose of high limit and fan controls.
2. Explain how the following high limit controls function:
 - Bimetal snap disc high limit and fan controls
 - o How to interpret information on the label
 - o How to manually reset the control
 - Adjustable snap disc fan controls
 - Extension mounts for bimetal snap discs
 - Helix bimetal sensor fan and high limit controls
 - Time delay relays as fan controls
 - Aquastats
3. Describe the characteristics that define High Limit Controls in a circuit diagram
4. Describe the characteristics that define Fan Controls in a circuit diagram

Satisfactory

Task 6: Demonstrate an Understanding of the Gas Control Valve and Components

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain the purpose of the gas control valve.
2. Identify the following components of a gas control valve and explain their function:
 - Gas inlet
 - Gas outlet
 - Inlet pressure tap
 - Outlet pressure tap
 - Pilot outlet
 - Pilot adjustment screw
 - Manual gas knob
 - Reset button
 - Pressure regulator adjuster
 - Thermocouple connection
 - Thermopile connection
 - Wiring terminals
2. Demonstrate how to adjust the pilot burner flame:
 - Remove the pilot adjustment screw cover
 - Turn the inner adjustment screw:
 - Clockwise to *decrease* the pilot flame
 - Counterclockwise to *increase* the pilot flame
 - Replace the screw cover and tighten firmly
3. Explain the precautionary use notices for the following:
 - Outlet pressure tap
 - Cross-threading connections
 - No use of jumpers across valve coil terminals

Satisfactory

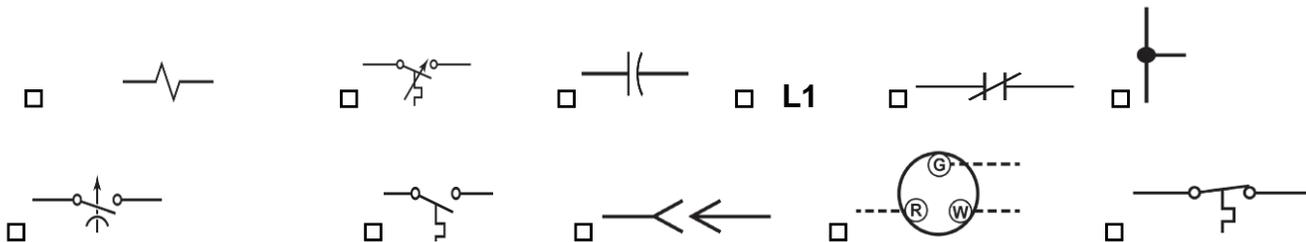
Section Seven: Demonstrate Understanding of Electrical Control Circuit Diagrams

Task 1: Identify Electrical Symbols and Diagrams

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Identify the following symbols:



2. Explain the differences between the following:
 - Connection diagram and circuit diagram
 - Ladder diagram and circuit diagram

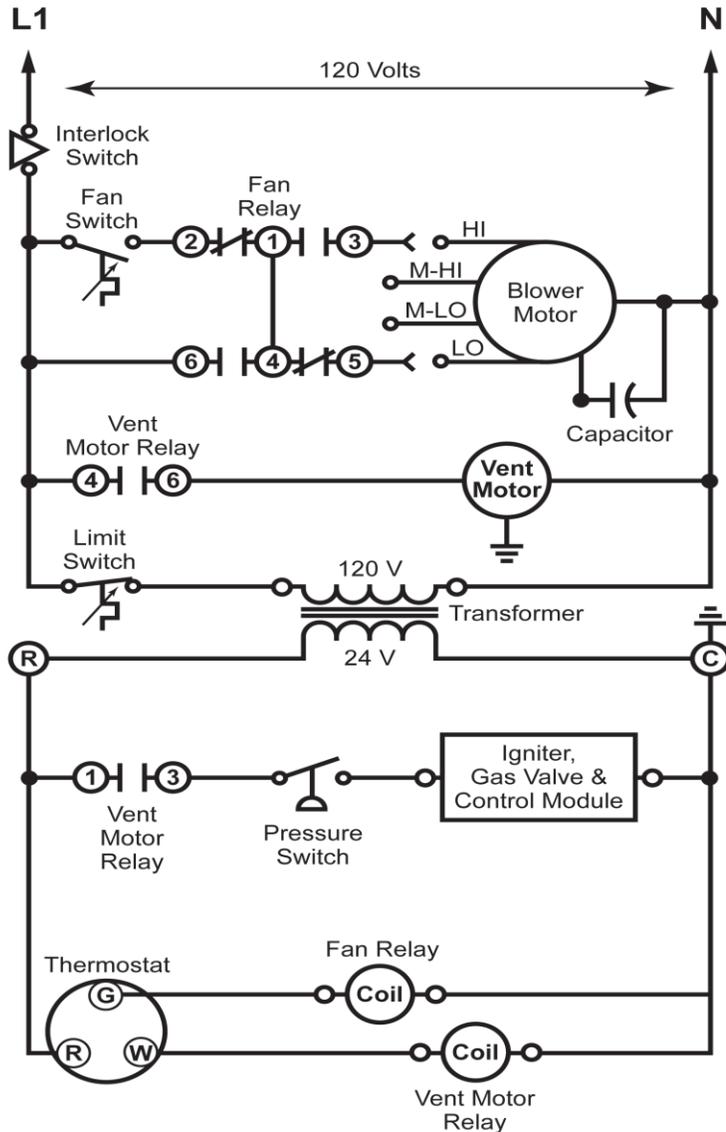
Satisfactory

Task 2: Interpret Sequence of Operation

Evaluator: Please use a propane appliance designed to heat air or water, and with a standing pilot or simple spark ignition system for the following task.

Preparation Guide: Wear appropriate Personal Protective Equipment (PPE) for the skills assessment task evaluation:

1. Explain each step in the sequence of operations when a call for heat occurs.
2. Explain each step in the sequence of operations as the appliance returns to standby mode.



Satisfactory

CETP Certification Performance Evaluation / Candidate Record (4.4) 2019

Completing your NPGA CETP Certification:

- 1: Successfully pass the exam.
- 2: Complete and return the *CETP Performance Evaluation / Employee Record* to the testing center below within 12 months of passing the exam.
- 3: Complete any necessary prerequisites within 12 months of passing the exam.

Make a copy for your training records and then send to:

Industrial Training Services, Inc.

120 Max Hurt Drive ● Murray, KY 42071 ● PH: 270-753-2150 ext. 2 ● EMAIL: skills@its-training.com

The information requested below will be used to assist in locating your records in the CETP database. Please make sure to complete all requested information; we thank you in advance for your assistance.

Candidate Information: (print or type) Test Group Number (if known): _____

Name: _____ Last four digits of SSN (only): _____

Employer: _____ Email: _____

Address: _____ Daytime Phone#: _____

City, State: _____ Zip Code: _____

Affidavit

I affirm that I am the person who has performed those items checked on this checklist. I acknowledge that the performance checklists used are solely for the purpose of skills assessment for the CETP Certification requirements, and are not intended to replace or modify company operating or safety procedures, and may not be appropriate for use in all circumstances. I acknowledge that I am responsible for recognizing hazards and abnormal conditions in my workplace and must exercise care and good judgment, always using appropriate equipment, procedures and tools for the tasks I perform. The Propane Education and Research Council, the National Propane Gas Association and Industrial Training Services, Inc. assume no liability for my actions, or for my application of the skills assessment performance guides used in this evaluation checklist.

Candidate Signature _____ **Date** _____

Skills Evaluator Information: (print or type)

Name: _____

Organization/Employer: _____

Affidavit

I affirm that I am the person who has administered this checklist, and that I have conducted this Performance-Based Skills Assessment Evaluation with integrity. I also affirm that the above named Candidate is the person whose performance I evaluated, and that the above named person performed the checked tasks at the indicated level without assistance from me or any other person.

Skill Evaluator's Signature _____ **Date** _____

Registered Skills Evaluator Number * _____

NPGA 4.4 Basic Electricity for Propane Appliance Service Skills Assessment (2019)

Return to: **INDUSTRIAL TRAINING SERVICES, INC.**

120 Max Hurt Dr. ● Murray, KY 42071 ● TELEPHONE: 270/753-2150 ● Page 17

V010516

Final Checklist for: 4.4 Basic Electricity for Propane Appliance Service - 2019

Name: _____ Last four digits of SSN (only): _____

The candidate has been evaluated on the following tasks at the following level:
 (The N/A option is available only as listed in the Not Applicable column/available box(s) below. All other tasks must be completed.)

Satisfactory	Not Applicable	Section One: Identify Safety Responsibilities and Review Basic Propane Appliances
<input type="checkbox"/>		Identify Safety Responsibilities
<input type="checkbox"/>		Review of Basic Propane Appliances
Section Two: Identify Properties of Electrical Circuits		
<input type="checkbox"/>		Explain Current, Voltage, Resistance, and Power
<input type="checkbox"/>		Identify Components of Simple Ladder Diagrams
<input type="checkbox"/>		Identify Open and Short Circuits
Section Three: Demonstrate Measurement of Electrical Quantities		
<input type="checkbox"/>		Demonstrate Understanding of Test Meter Safety
<input type="checkbox"/>		Demonstrate Understanding of Test Meters
<input type="checkbox"/>		Measure Electrical Quantities
Section Four: Properties of Electrical Circuits		
<input type="checkbox"/>		Explain Electrical Relationships
<input type="checkbox"/>		Identify Series and Parallel Circuits
<input type="checkbox"/>		Identify Types of Switches
<input type="checkbox"/>		Explain Electrical Power – From Source to Appliance
Section Five: Identify Common Sensing Devices in Propane Appliances		
<input type="checkbox"/>		Identify Temperature, Pressure, Air Flow, and Current Responsive Devices
<input type="checkbox"/>		Identify Liquid Level, RPM, and Flame Sensors
Section Six: Identify Electrical Components in Propane Appliances		
<input type="checkbox"/>		Demonstrate an Understanding of Transformers
<input type="checkbox"/>		Explain the Purpose and Operation of Relays
<input type="checkbox"/>		Identify Motors and Capacitors
<input type="checkbox"/>		Demonstrate an Understanding of Wall Thermostats
<input type="checkbox"/>		Identify Limit and Fan Controls
<input type="checkbox"/>		Demonstrate an Understanding of the Gas Control Valve and Components
Section Seven: Demonstrate Understanding of Electrical Control Circuit Diagrams		
<input type="checkbox"/>		Identify Electrical Symbols and Circuits
<input type="checkbox"/>		Interpret Sequence of Operations