Performance Verification Packet

Industrial Maintenance Electrical and Instrumentation Technician

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. For a Certified Plus credential, the version of the assessment and performance verification must be the same.

Last Updated: January 2010
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Objectives

The candidate will demonstrate the ability to use construction drawings, calibrate a pressure transmitter, build a control loop, use the calibration standard, troubleshoot a PLC system, draw DC power supply, demonstrate tub bending, install compression fittings, use measuring instruments, identify tuning parameters of a controller, document calibration results, wire a three-phase motor starter and connect to the motor, wire a lighting circuit, and demonstrate safety.

Scope

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

- Pressure transmitter loop calibration and configuration
- Troubleshoot a PLC system
- Draw DC power supply
- Tube bending and use of compression fittings
- Thermocouple or RTD
- Process control loops and tuning
- Wire a three-phase motor
- Wire a lighting circuit
- Safety

Materials Required

- Electronic or HART-capable transmitter
- Adjustable/regulated 24Volt DC power supply or loop calibrator
- Test leads
- Digital voltmeter
- Precision pressure source
- Fittings
- Hoses
- 5-point calibration sheet
- Instruction manuals
- PLC
- Processor key that can be used with PLC
- Laptop or HMI (optional)
- Paper
- Pencil
- Calculator
- Diagram of project for tubing and fittings
- Tubing
- Compression fittings
- Cutting/deburring tools
- Vise with rubber jaws (optional)
- Tubing benders
- Wrenches
- Measuring tape
- Wire marker
- Appropriate PPE
- Thermo couple or RTD
- Temperature calibrator
- Test leads to use with calibrator
- Regulated heat source

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- Tolerance value for thermo couple or RTD
- Pneumatic or electronic controller with adjustable set point and tuning parameters
- Process control loop containing process media such as liquid or gas
- Transmitter
- Control element
- Wiring schematic for a three-phase motor
- Control wiring diagrams
- 120/240/480V power supply-panelboard (depending on available lab voltage)
- Proper color coded wire (depending on voltage/power source)
- Grounding lugs
- Flexible cord or flexible metal conduit w/connectors
- Conduit support straps
- Stripped combination starter
- Disconnect
- Hand/off/auto switch
- Green indicator lamp
- Red indicator lamp
- Contactor
- Overload relay
- Proper sized heaters
- Control transformer
- Limit switch/pressure switch
- 4 FS/FD box
- Fasteners
- Three-phase motor
- Electric tape
- Wire nuts
- Split bolt connectors
- 2 three-way switches
- Four-way switch
- 14AWG wire in black, white, and green
- Lamp base
- Octagon box
- 60W lamp

Time Required

Up to 16 hours

Tasks

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

- **Pressure transmitter**
  - Use a given set of drawings
  - Bench calibrate a pressure transmitter
  - Build a control loop
  - Make all electrical connections and necessary pressure connections
  - Demonstrate the use of the calibration standard
- **Troubleshoot a PLC system**

- Troubleshoot an input/output

- **Draw DC power supply**
  - Include a full wave bridge rectifier
  - Indicate the wave forms

- **Tube bending and compression fittings**
  - Demonstrate tube bending
  - Install compression fittings

- **Thermocouple or RTD**
  - Use a measuring instrument to determine if a thermocouple or RTD is reading accurately

- **Controller parameters**
  - Identify tuning parameters of a controller while in operation

- **Calibration**
  - Document calibration results (as found & as left)
  - Document percentage of error

- **Wire a three-phase motor**
  - Use a given set of drawings
  - Include a start/stop station, control transformer, and indicator lights

- **Wire a lighting circuit**
  - Include three-way switches
  - Use NEC requirements
  - Connect to a breaker panel

- **Safety**
  - Demonstrate a safety inspection of high voltage rubber gloves and sleeves
  - Demonstrate safe work practices
  - Use PPE correctly

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Date Completed	Task To Perform
__-__-__	1. Pressure transmitter • Used given set of drawings • Bench calibrated a pressure transmitter • Built a control loop • Made all electrical connections and necessary pressure connections • Demonstrated the use of the calibration standard
__-__-__	2. Troubleshoot a PLC system • Troubleshoot an input/output
__-__-__	3. Draw DC power supply • Included a full wave bridge rectifier • Indicated the wave forms
__-__-__	4. Tube bending and compression fittings • Demonstrated tube bending • Installed compression fittings
__-__-__	5. Thermocouple or RTD • Used a measuring instrument to determine if a thermocouple or RTD is reading accurately
__-__-__	6. Controller parameters • Identified tuning parameters of a controller while in operation
__-__-__	7. Calibration • Documented calibration results (as found & as left) • Documented percentage of error
__-__-__	8. Wire a three-phase motor • Used given set of drawings • Included a start/stop station, control transformer, and indicator lights
__-__-__	9. Wire a lighting circuit • Included three-way switches • Used NEC requirements • Connected to a breaker panel
__-__-__	10. Safety • Demonstrated safety inspection of high voltage rubber gloves and sleeves • Demonstrated safe work practices • Used PPE correctly

NCCER PERFORMANCE VERIFICATION HOW TO SHEET
INDUSTRIAL MAINTENANCE ELECTRICAL AND INSTRUMENTATION TECHNICIAN

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 the 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. Do not use a signature stamp.
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.

PERFORMANCE VERIFICATION FORM

INDUSTRIAL MAINTENANCE ELECTRICAL & INSTRUMENTATION TECHNICIAN PVIMEIT40

Candidate information		
Last Name	First Name	SSN or SGN
Employer/Company Name	State	Site Code
Evaluator		
Last Name	First Name	SSN or SGN

Task Number	TASK	DATE (MM/DD/YY)	START TIME	END TIME
01	Pressure transmitter (40403-09)			
02	Troubleshoot a PLC system (40409-09)			
03	Draw DC power supply (40203-08)			
04	Tube bending & compression fittings (40208-08)			
05	Thermocouple or RTD (40205-08)			
06	Controller parameters (40409-09)			
07	Calibration (40402-09)			
08	Wire a three-phase motor (40304-09)			
09	Wire a lighting circuit (40302-09, 40308-09, 40401-09)			
10	Safety (40201-08)			

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:** _____

Last Updated: January 2010
Return Completed Form To:
NCCER Registry
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