



National Craft Assessment and Certification Program  
S P E C I F I C A T I O N S

**POWER LINE WORKER SUBSTATION  
PLWSUB82**

January 2013

**Focus Statement**

A Power Line Substation Worker must be able to demonstrate an understanding of personnel and equipment safety, use of hand and power tools, electrical theory, testing practices, and drawing reading. The worker must also be able to work with conductors and system protection and control.

**Overview**

- Two-hour closed-book examination
- May use a basic function, non-printing calculator
- No extra papers, books, notes or study materials are allowed
- The minimum passing score is 75
- A corresponding hands-on Performance Verification is available

**NCCER Curriculum**

All NCCER knowledge assessments are referenced to NCCER's curriculum modules as listed on this specification sheet. You may order modules from Pearson (800.922.0579) or from NCCER's Online Catalog at [www.nccer.org](http://www.nccer.org).

**Assessment Development**

All questions are developed and approved by subject matter experts under the direction of NCCER.

**Credentials**

Upon successful completion of the knowledge assessment, NCCER will send applicable credentials to the assessment center.

**Score Report and Training Prescription**

Each candidate will have access to their assessment results including their overall score and recommended training.

**NCCER Registry**

Knowledge assessment results are recorded in NCCER's Registry and become a part of the portable record of an individual's NCCER credentials.

**Knowledge Assessment Contents:**

Content Domain	Number of Questions
Personnel Safety [00101-09, 26501-12, 49102-11, 49106-11]	19
Equipment Safety [82201-12, 82203-12, 40308-09, 49112-11]	14
Tools of the Trade [00103-09, 00104-09, 49107-11, 49109-11]	15
Rigging [00106-09, 49110-11, 38201-11]	9
Electrical Knowledge [49103-11, 49104-11, 80201-11, 82302-12]	13
Testing [49113-11, 82205-12, 82305-12]	13
Conductors [82202-12, 26207-11, 26206-11, 82304-12]	12
Drawing Reading [82301-12]	4
System Protection and Control [82303-12, 82306-12]	7
<b>Total Number of Questions</b>	<b>106</b>

NCCER

13614 Progress Blvd. • Alachua, FL 32615 • 1-888-622-3720 • [www.nccer.org](http://www.nccer.org)



National Craft Assessment and Certification Program  
S P E C I F I C A T I O N S

Learning Objectives related to Assessment:

	Personnel Safety
Registry ID Number:	Module Title and Objectives:
00101-09	<b>Basic Safety</b>
	Explain fall protection.
	Identify struck-by hazards and demonstrate safe working procedures and requirements.
	Identify caught-in-between hazards and demonstrate safe working procedures and requirements.
	Demonstrate the use and care of appropriate personal protective equipment (PPE).
	Identify other construction hazards on the job site, including hazardous material exposures, environmental elements, welding and cutting hazards, confined spaces, and fires.
26501-12	<b>Managing Electrical Hazards</b>
	Identify types of electrical hazards and locations, and explain related safety guidelines and terms.
	Recognize and explain hazard boundaries.
	Explain employer and employee responsibilities in recognizing and managing electrical hazards.
	List common factors that lead to electrical incidents and explain the importance of using appropriate procedures and safe work practices.
	Analyze the electrical hazards of a given task, plan the job, and complete an electrical work permit request.
	Select, inspect, and maintain personal protective equipment (PPE) and test equipment used for electrical work.
	Explain how to create an electrically safe work condition.
49102-11	<b>Power Line Worker Safety</b>
	Identify, inspect, maintain, and use craft-specific PPE and identify its limitations.
	Describe the safety practices associated with high-voltage work, including: step and touch potential; minimum approach distance; protection from arc flash and arc blast; and procedures for entering substations.
	Explain work zone safety requirements.
	Identify the signs and causes of unstable trenches and describe the safety practices associated with trench work.
	Identify hazards and safeguards associated with confined-space work.
	Explain the purposes of a job safety analyses and a task safety analyses.
	Describe how to mitigate environmental impacts.
	Visually inspect rubber insulating blankets, line hoses, covers, and guards, and install them on deactivated power lines.
49106-11	<b>Climbing Structures other than Wood</b>
	Demonstrate the ability to inspect required safety equipment before use.
	Identify the various environmental hazards requiring consistent attention.
	Demonstrate the physical and mental ability to endure the unique stresses of working at high elevations.
	Equipment Safety
Registry ID Number:	Module Title and Objectives:

<b>82201-12</b>	<b>Introduction to Substations</b>
	Describe the functions performed by various substations.
	Identify voltage classes that exist in substations.
	Identify the following medium- and high- voltage equipment: buses; disconnect switches; oil circuit breakers; gas circuit breakers; vacuum circuit breakers; power transformers; instrument transformers; capacitors; and reactors.
	Interpret a one line substation diagram.
	Describe the safe work practices used with substations, including clearance zones and lockout/tag out requirements.
<b>82203-12</b>	<b>Grounding Systems</b>
	Explain the purpose of the ground grid system.
	Explain the safety precautions used and personal protection equipment (PPE) required when repairing and/or expanding an existing ground grid.
<b>40308-09</b>	<b>Temporary Safety Grounding</b>
	Explain the purpose of temporary grounding.
	Explain requirements associated with temporary grounding devices.
	Identify and explain temporary grounding equipment.
	Explain how to install and remove temporary grounding devices.
<b>49112-11</b>	<b>Trenching, Excavating, &amp; Boring Equipment</b>
	Identify the trenching, excavating, and boring safety guidelines.
	Identify and explain the use and operation of compact and pedestrian trenchers.
	Identify and explain the use and operation of a backhoe.
	<b>Tools of the Trade</b>
<b>Registry ID Number:</b>	<b>Module Title and Objectives:</b>
<b>00103-09</b>	<b>Introduction to Hand Tools</b>
	Recognize and identify some of the basic hand tools and their proper uses in the construction trade.
<b>00104-09</b>	<b>Introduction to Power Tools</b>
	Identify power tools commonly used in the construction trades.
<b>49107-11</b>	<b>Tools of the Trade</b>
	Identify and explain the use of common insulated hand tools.
<b>49109-11</b>	<b>Utility Service Equipment</b>
	Identify the types of bucket trucks and digger derricks used by power line workers.
	Identify the operator safety requirements that must be followed when operating a bucket truck or digger derrick.
	Explain and demonstrate how to perform a pre-start inspection on a service vehicle.
	Describe the safety considerations associated with setting up a service vehicle at a job site.
	Describe and demonstrate the safety considerations and basic operations procedures associated with using a bucket truck at a job site.
	Describe and demonstrate the safety considerations and basic operations procedures associated with using a digger derrick at a job site.
	<b>Rigging</b>
<b>Registry ID Number:</b>	<b>Module Title and Objectives:</b>
<b>00106-09</b>	<b>Basic Rigging</b>
	Describe basic inspection techniques and rejection criteria used for slings and hardware.

	Describe basic load-handling safety practices.
<b>49110-11</b>	<b>Rigging</b>
	Describe hand signals and other communication methods used in rigging work.
	Describe safety hazards and safety practices associated with rigging work.
	Identify the safety procedures associated with the use of cranes in rigging work.
<b>38201-11</b>	<b>Intermediate Rigging</b>
	Explain the purpose of a load chart.
	Explain how the center of gravity is determined.
	<b>Electrical Knowledge</b>
<b>Registry ID Number:</b>	<b>Module Title and Objectives:</b>
<b>49103-11</b>	<b>Introduction to Electrical Circuits</b>
	Explain the difference between conductors and insulators.
	Define voltage and identify the ways in which it can be produced.
	Define the units of measurement that are used to measure the properties of electricity.
	Identify the meters used to measure voltage, current, and resistance.
	Explain the basic characteristics of series and parallel circuits.
<b>49104-11</b>	<b>Introduction to Electrical Theory</b>
	Explain the purpose of grounding and bonding.
<b>80201-11</b>	<b>Alternating Current &amp; Three-Phase Systems</b>
	Describe the operating principles and functions of capacitors.
	Explain the principles and functions of transformers.
<b>82302-12</b>	<b>Medium &amp; High Voltage Equipment Installation</b>
	Identify various types of buses and support insulators.
	Identify the installation of various types of disconnects and circuit switchers.
	Identify the installation of various types of circuit breakers.
	Identify various types of capacitor banks and reactors.
	<b>Testing</b>
<b>Registry ID Number:</b>	<b>Module Title and Objectives:</b>
<b>49113-11</b>	<b>Electrical Test Equipment</b>
	Describe the following pieces of test equipment and explain their purpose: voltmeter; ohmmeter; clamp-on ammeter; multimeter; megohmmeter; hi-pot tester; motor and phase rotation testers; recording instruments; high-voltage detector; and phasing sticks.
	Select the appropriate meter for a given work environment based on category ratings.
	Identify the safety hazards associated with various types of test equipment.
<b>82205-12</b>	<b>Mechanical Construction Methods and Materials</b>
	Identify the types and materials of steel structures.
	Identify types of fasteners.
	Identify types of bus and connectors.
	Identify the types of bus supports.
<b>82305-12</b>	<b>Equipment Testing, Troubleshooting, &amp; Splicing</b>
	Explain how to test and maintain batteries.
	Explain how to test and maintain disconnects, switches, and circuit switchers.
	Explain how to test and maintain circuit breakers.

<b>Conductors</b>	
<b>Registry ID Number:</b>	<b>Module Title and Objectives:</b>
<b>82202-12</b>	<b>Conductors and Cable</b>
	Identify types, sizes, and applications of conductors and cables.
	Interpret a cable drawing and schedule.
	Explain below-grade methods for installing cables.
<b>26207-11</b>	<b>Cable Tray</b>
	Explain the methods used to hang and secure cable tray.
	Describe how cable enters and exits cable tray.
	Select the required fittings to ensure equipment grounding continuity in cable tray systems.
<b>26206-11</b>	<b>Conductor Installations</b>
	Explain the importance of communication during a cable-pulling operation.
	Describe the installation of cables in cable trays.
	Explain the care and use of conductors
<b>82304-12</b>	<b>Connectors, Conductor Terminations, &amp; Splicing</b>
	Explain how to prepare a non-insulated cable for termination and splices.
	Explain the inspecting and testing process of medium and high voltage terminations and splices.
<b>Drawing Reading</b>	
<b>Registry ID Number:</b>	<b>Module Title and Objectives:</b>
<b>82301-12</b>	<b>Advanced Drawing Reading</b>
	Identify and interpret common construction drawings.
	Read and interpret schematic and connection diagrams.
	Read and interpret general arrangement drawings.
<b>System Protection &amp; Control</b>	
<b>82303-12</b>	<b>Control House</b>
	Identify and explain the uses of the components in battery and DC systems.
	Identify and explain the systems and system components in station services.
<b>82306-12</b>	<b>System Protection &amp; Control</b>
	Explain the function of system protection and control.
	Identify the components used in system protection and control.