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Operations & Maintenance Associate Technician (OMAT) 2026

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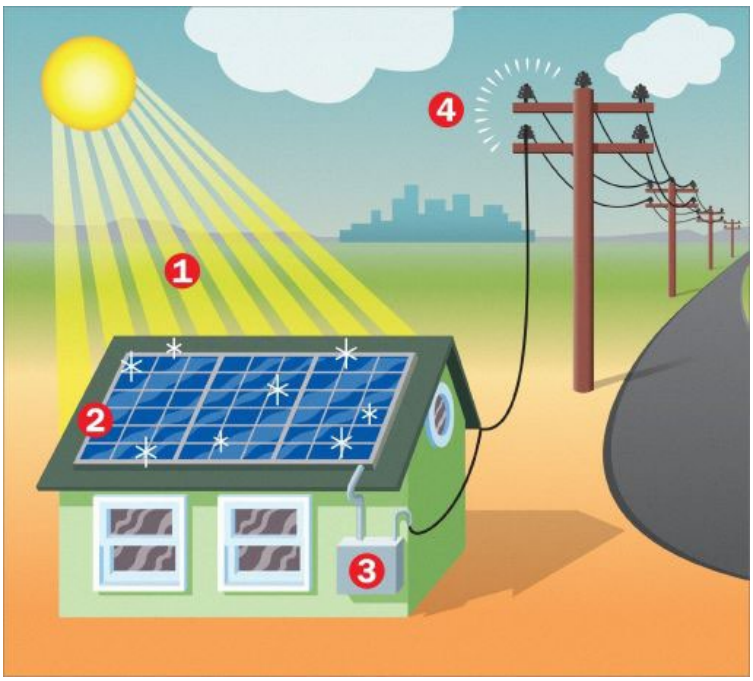
Introduction

The NABCEP Operations & Maintenance Associate Technician™ (OMAT™) Program ensures that individuals earning the OMAT credential have the knowledge of the fundamental principles of the application, installation, operation and maintenance of Photovoltaic (PV) systems. This document presents a comprehensive Job Task Analysis (JTA) for individuals who are eligible for the OMAT exam. The tasks described in this JTA are based on standardized skills for entry-level technician roles in safety, operational protocols and system maintenance for residential and utility-scale solar PV installations.



Anyone who passes the NABCEP OMAT Exam has demonstrated a basic knowledge of photovoltaic systems. O&M Associate Technicians (OMATs) will inspect, evaluate, test, repair, and maintain solar equipment and systems. They will be familiar with a variety of tools, electrical concepts, measuring and testing devices; they will be able to read PV System Plan Sets, understand mounting structures and equipment specifications, performance parameters, grounding and bonding methods. As with all NABCEP credentials, there is a heavy emphasis on hazard identification and safety controls. The knowledge demonstrated by passing this test does not replace the knowledge, skills or abilities of the electrical or other construction trades, or those of other professions or degree programs that require considerably more academic and practical experience. NABCEP also offers a specialized Board Certification *PV Commissioning & Maintenance Specialist Certification* (PVCMS) for professional advancement. O&M Associate Technicians who want to qualify for the Professional-level PV Commissioning & Maintenance Specialist Certification will be required to demonstrate the capability to supervise the commissioning of PV system facilities and pass a much more rigorous examination.

Task Steps and Knowledge in Each Category Level

Scope of Job Task Analysis

The scope of the NABCEP Operations and Maintenance Associate Technician Job Task Analysis encompasses the knowledge of the fundamental principles of the application, installation, safety protections, and operation & maintenance of Photovoltaic (PV) systems. NABCEP OMATs fill a wide range of entry-level positions within the industry like "Tech 1" and Tech 2" duties. Instituting expanded standardization helps both employers and workers know what skills are most important to the other. The NABCEP OMAT credential acts as a shorthand to identifying the range of responsibilities and skills that may fall within the scope of job duties. This Job Task Analysis is broad in scope: not all OMATs will perform all the tasks described. The JTA is used to create the NABCEP OMAT test specifications (i.e., test blueprint) to ensure that the knowledge and skills measured by the examination reflect current practice in the field.

The passing score of NABCEP examinations are set by a criterion-referenced standard-setting exercise by experts in the field under the guidance of a psychometrician. NABCEP Associate examinations are not graded "on a curve" – any Candidate who meets the eligibility requirements and achieves a passing score on the examination will earn the credential. Testing industry best practice is to report exam results as scaled scores. Scaled scores are statistically derived by adjusting the raw score (the number of questions a Candidate answers correctly) by a factor that accounts for the difficulty of a particular exam format relative to other formats. A scaled score of 65 is required to achieve a passing score on a NABCEP Associate Examination.

A panel of NABCEP Subject Matter Experts (SMEs) identified the most important information for anyone working in photovoltaics to understand. These four performance domains contain the essential tasks necessary to demonstrate that understanding.

Content Domains

Content Domain	Percentage of Examination
Safety	20%
Core Knowledge	30%
Existing System Infrastructure Considerations	28.3%
Operations & Maintenance	21.7%

*LISTED PERCENTILES DO NOT EQUAL 100% DUE TO ROUNDING.

Domain 1: Safety 20%

Task 1 Hazard Identification and Controls

Knowledge of:

A. Hierarchy of Controls (i.e., elimination, substitution, engineering controls, administration controls, and PPE)
B. Fall hazards (e.g., leading edge, roof openings)
C. Environmental hazards (e.g., extreme temperature, inclement weather, animal encounters)
D. Hazardous materials (e.g., chemical, physical)
E. Digging hazards (e.g., trenching, ground mount systems, underground utilities, soil contamination)
F. Personal protective equipment (PPE) (e.g., hard hats, safety glasses, gloves, ear protection, arc and fire rated clothing, footwear)

Task 2 Safe Work Practices

Knowledge of:

A. Ergonomics (e.g., manual handling, body positioning, lifting)
B. Safe use of hand and power tools
C. Equipment inspections
D. Vehicle safety and equipment transport (e.g., heavy equipment)

Task 3 Safety Plan

Knowledge of:

A. Safety regulations (e.g., OSHA, NFPA)
B. Equipment staging (e.g., roof load distribution)
C. Access control (e.g., fence, screening)
D. Emergency response plan (e.g., first aid, hazardous materials, fire, fall rescue)
E. Safety meetings
F. Required on-site documentation (e.g., injury and illness prevention program, safety data sheets)

Task 4 Electrical Safety

Knowledge of:

A. Electrical hazards and control methods (e.g., DC/AC, electrical shock, arc flash, de-energization plan, lockout/tagout, working clearance, ground fault)
B. Safe use of electrical testing equipment
C. Risk in working with energized and/or faulty equipment (e.g., rapid shutdown)
D. Battery safety (e.g., insulated tools, face guard, chemical goggles, eye wash, gloves, aprons)

Task 5 Working at Height

Knowledge of:

A. Protection systems (e.g., harness, personal fall arrest systems, guardrails, scaffolding, skylight guards)
B. Equipment handling techniques (e.g., hoisting and rigging methods, tool tethering)
C. Ladder safety (e.g., selection, use)

Domain 2: Core Knowledge 30%

Task 1 Types of PV Systems

Knowledge of:

A. PV Direct
B. Stand-alone
C. Grid-tied
D. Multimode (i.e., grid-tied with energy storage)

Task 2 Components of PV Systems and Functionality

Knowledge of:

A. PV modules
B. Mounting structures
C. Inverters (e.g., string, micro, multimode, central)
D. Power electronics (e.g., rapid shutdown devices, DC-to-DC converter)
E. Energy storage
F. Load control
G. Balance of system (BOS) components (e.g., panelboard and disconnects, raceways and conduit, wire and conductors, overcurrent protection devices)
H. Monitoring equipment
I. Grounding and bonding elements (e.g., equipment grounding conductor, grounding electrode conductor, grounding electrode, bonding jumper)

Task 3 Electrical Concepts

Knowledge of:

A. Photovoltaic effect
B. Ohm's law
C. Power and energy (i.e., watts verses watt-hours)
D. Electrical measurements (e.g., voltage, current, impedance, resistance)
E. Alternating current (AC) and direct current (DC)
F. Single-phase, split-phase, and three-phase circuits
G. Series and parallel circuits
H. Grounding and bonding (e.g., system and equipment)

Task 4 Codes and Standards

Knowledge of:

A. Electrical codes (e.g., national, state, and local codes)

B. Building codes (e.g., national, state, and local codes)
C. Fire codes (e.g., national, state, and local codes)
D. Workplace safety standards (e.g., OSHA, ANSI, NFPA)

Task 5 Equipment Specifications

Knowledge of:

A. PV module specifications (e.g., Standard Test Conditions [STC], open circuit voltage, short circuit current)
B. Manufacturer documentation (e.g., datasheets, installation manuals)
C. Inverter specifications (e.g., voltage, current, frequency, surge)
D. Existing service and/or equipment (e.g., voltage, current, phase)
E. Energy Storage Systems (e.g., type, capacity, voltage)
F. National recognized testing labs [NRTL]
G. Product safety standards (e.g., IEEE standards, UL, national standards)
H. Location conditions (e.g., wind, snow, seismic activity)

Domain 3: Existing System Infrastructure Considerations 28.3%

Task 1 PV System Plan Sets

Knowledge of:

A. Site plan and array layout
B. Electrical diagrams (e.g., one-line or three-line diagrams, wiring diagram, string diagram)
C. String configuration
D. Conductor properties (e.g., temperature ratings, ampacity ratings, UV resistance, moisture rating)
E. Electrical and plan set symbols
F. Electrical equipment (e.g., wire, conduits, raceways, disconnects)
G. Equipment data sheets and installation instructions
H. Details (e.g., structural, electrical, grounding, labeling)

Task 2 Mounting Structure Types and Installation

Knowledge of:

A. Types of mounting structure and components (e.g., flat roof, pitched roof, ground mount)
B. Manufacturer manuals and specifications (e.g., installation manuals, site engineered plans)
C. Roof considerations (e.g., type, pitch, warranty)
D. Structural considerations (e.g., rafter, truss, stud, decking, beams, purlins, span, cantilever)
E. Fastener types and sizes (e.g., metal, wood, concreter fasteners; material - stainless steel/galvanized; grade, strength markings, compatibility of metals/materials)
F. Grounding and bonding methods (e.g., integrated grounding, listed grounding components, star washers)

G. Common power and hand tools

Task 3 Electrical Equipment Installation

Knowledge of:

A. Manufacturer manuals and specifications (e.g., termination torque specifications, NEMA ratings, sunlight exposure)
B. Working clearances
C. Common electrical fittings and uses (e.g., connectors, couplings, grounding bushings, strain reliefs, raceway)
D. Labeling and marking requirements (e.g., code requirements, durability)
E. Wiring best practices (e.g., PV connector compatibility, drip loops, service loops, minimum bend radius, support, exposure to damage)
F. Material compatibility (e.g., conductor type, terminations, splices)

Task 4 Energy Storage Installation

Knowledge of:

A. Common types of energy storage (e.g., lithium batteries, lead acid batteries)
B. Manufacturer manuals and specifications (e.g., installation manuals, system programming and controls, product safety guidelines)
C. Labeling and marking requirements (e.g., code requirements)

Domain 4: Operations and Maintenance 21.7%

Task 1 Performance Parameters

Knowledge of:

A. Local conditions (e.g., weather, soiling, temperature, windspeed, irradiance)
B. Site conditions (e.g., shading, orientation, utility voltage and frequency)
C. Equipment and performance (e.g., system losses, inverter compatibility, inverter voltage [AC and DC])
D. IV curve characteristics (e.g., short circuit, open circuit, maximum power point [MPP])
E. Battery voltage
F. Battery state of charge (SOC)

Task 2 System Monitoring Equipment and Applications

Knowledge of:

A. Monitoring methods (e.g., app- and web-based, on-site)

B. Data acquisition and control (e.g., DAS, SCADA)
C. Instrumentation transformers (e.g., current transformers [CT], potential transformer [PT])
D. Revenue grade meter
E. Weather monitoring systems (e.g., albedometer, pyranometer, anemometer, thermometer)
F. Battery temperature sensors
G. Amp hour meter

Task 3 Electrical Test Equipment and Application

Knowledge of:

A. Multimeters (e.g., current, voltage, resistance, continuity)
B. Insulation testing devices (e.g., megohmmeter)
C. IV curve tracer
D. Infrared thermometer
E. Irradiance meter
F. Battery capacity testing devices (e.g., load tester)
G. Hydrometer
H. Refractometer
I. Thermal camera

Task 4 Deviations from Expected Performance

Knowledge of:

A. Test conditions (e.g., Standard Test Conditions [STC], nominal operating cell temperature [NOCT])
B. Installation deficiencies
C. Electrical faults (e.g., arc fault, ground fault)
D. Production losses and their causes (e.g., weather, pollution, shading, animals, soiling, system degradation)
E. System curtailment (e.g., export limitation, load control)

Task 5 Maintenance of PV Systems

Knowledge of:

A. Scopes of work (e.g., preventative and reactive maintenance, inspections, cleaning, vegetation management, remote monitoring)
B. Record keeping (e.g., system logging, data sheets, user manuals, as-built plan set, maintenance plan, photography)
C. Visual inspection
D. Equipment replacement (e.g., installation practices, lockout/tagout, service life)
E. Equipment-specific maintenance requirements (e.g., lockout/tagout, torque requirements, cleaning)

Task 6 System Commissioning

Knowledge of:

A. Visual inspection (e.g., Quality Assurance Quality Control [QAQC], installation checklists)
B. Testing (e.g., thermography, string voltage, polarity)
C. Proper operation of equipment (e.g., inverter operation, monitoring/ communication, disconnects)
D. Documentation (e.g., commissioning forms, manufacturer checklists, photo checklists, permission to operate [PTO])

NABCEP's mission is to support, and work with, the renewable energy and energy efficiency industries, professionals, and stakeholders to develop and implement quality credentialing and certification programs for practitioners.

NABCEP's PVIP and ESIP Certifications are North America's only renewable energy personnel certifications that have been ANSI accredited to the internationally recognized ISO/IEC 17024 standard.

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