

AWEA 5000-2-202X Wind Technician Entry Level

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AMERICAN WIND ENERGY ASSOCIATION
Wind Standards Committee



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1. Scope

- 1.1. A competency standard to serve as the recommended curriculum for prospective or new wind technicians. To assist employers, workforce development and training professionals, academia, and others with the minimum educational and training-related requirements for entry level Wind Energy Technicians. This standard will outline the minimum requirements for educational and training program's learning objectives, knowledge, and skills needed for an entry level wind energy technician position.

2. Purpose

- 2.1. The American Wind Energy Association (AWEA) Wind Workforce Standards Committee (WWSC) created the Wind Technician Entry Level Subcommittee (the Subcommittee) to develop minimum basic competencies for an entry level wind technician. The purpose of this standard is to establish minimum knowledge and competencies for an individual with no work experience as a wind technician across all platforms upon completion of an entry level wind technician educational program (program).
- 2.2. This framework is intended to provide standardized training and education for entry level wind technicians, a point of reference for the development of a minimum program curriculum base. This standard shall be a minimum baseline requirement, programs should meet or exceed the framework developed.
- 2.3. It is important to note, employers within the wind energy industry are diverse. This standard is only intended to be a starting point in one's journey as a wind technician in the United States. Each employer will require new hires and their employees to abide by their policies and procedures, this standard is not intended to conflict or contradict their policies, procedures, or expectations.

3. Terms and Definitions

- 3.1. Terms and definitions are defined in the ANSI/AWEA 5000.1: AWEA Wind Workforce Definitions (2020).

4. General

- 4.1. Core competencies are divided into five (5) knowledge base areas: General Work Skills, Operational Skills, Safety Skills, Mechanical Skills, and Electrical Skills
- 4.2. Each skill set outlines specific minimum competencies that individuals will be able to demonstrate upon completion of a program.

5. General Work Skills

- 5.1. Summary: graduates shall demonstrate broad competencies aimed to ensure confidence in general knowledge and skill sets, such as basic office, computer, communication, and soft skills. They shall have a basic understanding of expectations and requirements of the occupation; SCADA systems; monitor park conditions; and safety and health programs.
- 5.2. General understanding of occupational career requirements and pathways.
 - 5.2.1. Demonstrate knowledge of prerequisite requirements:
 - 5.2.1.1. High school diploma and/or GED,
 - 5.2.1.2. Valid driver's license,
 - 5.2.1.3. Understanding of physical requirements: climb 80m+, lift 50lbs+, working at extreme heights, confined spaces and extreme weather and weight requirements (based on equipment),
 - 5.2.1.4. Potential career pathways.

- 5.3. Soft Skills
 - 5.3.1. Interpersonal skill sets, which are hard to define and evaluate, however, typically essential to the day to day interaction for workplace success, sometimes called – cross-cutting, employability, and/or personal effectiveness competencies or skills.
 - 5.3.1.1. Demonstrate ability to work effectively with others, in teams, and alone.
 - 5.3.1.2. Demonstrate (not all inclusive and not limited to) teamwork, customer focused, planning, problem solving, decision making, integrity, professionalism, initiative, dependability, reliability, adaptability, flexibility, life-long learning, creative thinking, and working with tools and technology.
- 5.4. Basic Office/Computer/Administrative
 - 5.4.1. Demonstrate the ability to perform tasks responsible for wind operations office management.
 - 5.4.1.1. Answer phone calls and take proper messages.
 - 5.4.1.2. Recordkeeping and document management.
 - 5.4.3. Demonstrate use of multiple communication devices and other electronic devices.
- 5.5. Basic Math/Conversion
 - 5.5.1. Demonstrate the basic math skills associated with adding, subtracting, multiply, divide whole numbers, fractions and decimals.
 - 5.5.2. They shall demonstrate their knowledge to convert the following items from American standard to metric measurements. The following list is not an all-inclusive list. These are just examples of some of the items that will be involved with operating and maintaining a wind turbine. Understand how to convert units of speed, length, pressure, and volume.
 - 5.5.2.1. Imperial to Metric Conversion.
 - 5.5.2.2. Temperature Conversions.
 - 5.5.2.3. 12/24-hour clock.
- 5.6. Basic Communication – Oral/Written/Comprehension
 - 5.6.1. Implement professional oral and written communications. They should be able to organize and present effective presentations.
 - 5.6.2. Demonstrate proper nomenclature and descriptive technical terms.
 - 5.6.3. Demonstrate legible handwriting,
 - 5.6.4. Demonstrate accuracy.
 - 5.6.5. Proficiency in 3-part communication.
- 6. Operational Skills**
 - 6.1. Turbine Fundamentals
 - 6.1.1. Demonstrate basic understanding and knowledge of wind power facility infrastructure, basic life cycle of a wind turbine, wind turbine fundamentals, major and minor components to the wind turbine generator (WTG) (generators, gearboxes, bearings, transformers, and others), and general wind energy plant monitoring.
 - 6.1.2. Demonstrate ability to identify, describe, interpret, and distinguish types of drawings (electrical, hydraulic, and mechanical schematics).
 - 6.1.3. Demonstrate knowledge of fundamentals of basic WTG operations and conversion of wind energy to electrical energy.
 - 6.1.3.1. Understand the basic function of major power electronics components of the converter system.
 - 6.1.3.2. Understand the basic function of operation of each type of pitch system (Electric or Hydraulic).
 - 6.1.3.3. Understand the basic parts of a blade (root, tip, leading and trailing edge).
 - 6.1.3.4. Describe what you might see during a blade inspection including unusual noises, cracking or obvious clues, leading edge erosion and tip damage.
 - 6.1.3.5. Describe how a blade is protected from a lightning strike and what to do after a thunderstorm to include inspecting lightning receptor and anything associated with the tip of the blade.

- 6.1.3.6. Describe the difference between protection devices (fuse, motor protection, breakers, etc.) and surge devices (for protecting communication signals).
 - 6.1.3.7. Describe the basic function of a PLC system in a WTG. The function of Inputs, Program/CPU, and outputs of the PLC system.
 - 6.1.3.8. Describe what inspections are performed on the foundation including visual inspection of foundation, soil, and grout.
- 6.2. Turbine Maintenance
- 6.2.1. Demonstrate understanding, knowledge, and practical ability.
 - 6.2.2. Describe standard wind turbine maintenance tasks and proper inspection procedure.
 - 6.2.3. Demonstrate proper inspection, use, and operation of a variety of electric, hydraulic, and hand tools.
 - 6.2.4. Describe the general operational modes of a wind turbine.
 - 6.2.5. Describe tower communication and lighting basics.
 - 6.2.6. Demonstrate proper handling and use of precision measurement equipment.
 - 6.2.7. Proper hoisting operations, inspection, and usage.
 - 6.2.7.1. Hoisting of tools and equipment.
 - 6.2.7.2. Explain wind turbine equipment hoisting procedures.
 - 6.2.8. Basic crane awareness
 - 6.2.8.1. Basic rigging training.
 - 6.2.8.2. Explain rigging and lifting equipment inspection techniques.
 - 6.2.8.3. Basic signalperson training.
 - 6.2.9. General awareness of site access procedures and restrictions
 - 6.2.9.1. Have general awareness of wind power plant infrastructure.
 - 6.2.9.2. Have general awareness of wind power delivery to the electrical grid.
 - 6.2.9.3. Understand the relationship between customers and contractors and how they interact.
 - 6.2.9.4. General awareness of regulatory and state environmental, health, and safety laws and how they relate to the operations of a wind farm.
- 7. Safety Skills**
- 7.1. Demonstrate knowledge and understanding of applicable Occupational Safety and Health Administration (OSHA) standards.
 - 7.2. Have the knowledge, skills, and ability to understand and communicate safety precautions. They should have the proper training to recognize hazards and be able to apply controls necessary to minimize or eliminate exposures.
 - 7.3. Successfully complete OSHA 10-hour course (or equivalent) that includes but not limited to fall protection, Personal Protective Equipment (PPE) (standard and specialty), ladder safety, walking working surfaces, confined space, Lock Out/ Tag Out (LOTO), rigging and crane safety, and emergency response, among others.
 - 7.4. Successfully complete any additional or in-depth safety training covering topics or exposures that may be encountered during performance of duties including chemical exposure, water exposure, rotating equipment, etc.
 - 7.5. Shall be able to recognize and understand workplace electrical safety requirements under CFR 29 §1910.269, Subpart S, NFPA 70E. Demonstrate an understanding of lock out tag out (LOTO).
 - 7.6. Understand the safety hazards and wear proper PPE when using machinery, power tools, and other materials that may have health risks.
 - 7.7. Have first aid knowledge (including bloodborne pathogens training) and the skills to recognize and treat medical injuries including CPR and use of an Automatic External Defibrillator (AED).
 - 7.8. Shall have the necessary knowledge and skills to perform safe work at heights and comprehensive fall protection, rescue, and general awareness of EMS protocols.

- 7.9. Understand and demonstrate dropped object prevention methods.
- 7.10. Describe the safety risks and hazards of the mechanical components within the turbine.

8. Mechanical Skills

- 8.1. Identify, describe and understand the following:
 - 8.1.1. Describe basic mechanical theories.
 - 8.1.2. Understand basic bearing types designed for different applications.
 - 8.1.2.1. Understand maintenance/visual inspection of bearings.
 - 8.1.3. Understand the basic concepts of gears.
 - 8.1.4. Explain the use of couplings to connect rotating shafts.
 - 8.1.5. Understand the importance of condition monitoring of a coupled driver and driven machine.
 - 8.1.6. Fasteners, Torque, and Tension
 - 8.1.6.1. Demonstrate the basic understanding of the types of fasteners, torque and tension.
 - 8.1.6.2. Demonstrate the proper techniques of mechanical, electrical and hydraulic torque wrench assembly and use.
 - 8.1.6.3. Torque patterns.
 - 8.1.6.4. Define the difference between torque and tension.
 - 8.1.6.5. Understand the measurements of torque and tension.
 - 8.1.6.6. Explain the proper use of washers and bushings.
 - 8.1.6.7. Understand the difference between dry vs. lubricated threads.
 - 8.1.6.8. Explain the application and safety risks and hazards when using mechanical, hydraulic, and electric tools.
 - 8.1.6.9. Understand the proper techniques to torque marking.
 - 8.1.6.10. Demonstrate the use of various torque and tension equipment.
 - 8.1.6.11. Describe the importance of performing a ping test.
 - 8.1.7. Gearboxes and Oil Samples
 - 8.1.7.1. Understand the basic characteristics of gearboxes: types of gear systems in gear boxes, maintenance, filter, cleanliness, lubrication, pumps and impurities.
 - 8.1.7.2. Understand the basic functionality of open and enclosed gears commonly used in industrial applications.
 - 8.1.7.3. Understand inspection methods to determine normal wear or damage.
 - 8.1.7.4. Explain the proper safety procedures for oil sampling.
 - 8.1.7.5. Understand the process and significance of oil sampling including proper record keeping.
 - 8.1.7.6. Explain the safety procedures based on manufacturer information, Safety Data Sheets (SDS), established work practices/ requirements.
 - 8.1.7.7. Demonstrate proper lock out/ tag out (LOTO) to prevent unexpected release of energy while performing work.
 - 8.1.7.8. Explain oil spill prevention techniques and the ability to report and clean up any spills observed or caused by work being performed.
 - 8.1.9. Tools and Test Equipment
 - 8.1.9.1. Demonstrate proper personal protective equipment (PPE) for mechanical work and be able to identify the risks and hazards applicable to the tools and test equipment including hand and power tools.
 - 8.1.9.1.1. Describe the ergonomic hazards of vibration involved with tooling.
 - 8.1.9.1.2. Understand the difference between tool sizes and measurements to perform the job safely.
 - 8.1.9.1.3. Describe the difference between Caliper and Micrometer measurements.
 - 8.1.9.1.4. Demonstrate proper use of Feeler gauges.
 - 8.1.9.1.5. Demonstrate proper use of Dial Indicators.
 - 8.1.9.1.6. Describe the how to perform a test of a grinder wheel.

9. Electrical Skills

- 9.1. Demonstrate basic understanding of electrical systems, symbols and charts.

- 9.2. Basic Electrical Theory and General Knowledge
 - 9.2.1. Electrical Safety – describe understanding of basic general electrical safety awareness.
 - 9.2.2. Demonstrate proper identification of basic electrical meters and meggers and operation and safe measurement techniques.
 - 9.2.2.1.1 Meggers
 - 9.2.2.1.2. Amp Clamps
 - 9.2.2.1.3. Multimeters
 - 9.2.2.1.4. Hot cold hot checks
 - 9.2.3. Demonstrate knowledge of AC/DC Theory including being able to measure resistance, voltage, current, and power.
 - 9.2.4. Demonstrate knowledge of electrical laws – Ohm’s Law.
- 9.3. Generators
 - 9.3.1. Describe General knowledge of function, and operation of generators:
 - 9.3.1.1. Identify components of generator.
 - 9.3.1.2. Basic identification and awareness of Slipring purpose.
 - 9.3.1.3. Understand and identify Drive Ends & Non-Drive Ends.
 - 9.3.1.4. Demonstrate general generator alignment.
 - 9.3.1.5. Demonstrate Basic maintenance.
 - 9.3.1.6. Demonstrate Lubrication system.
- 9.4. Transformers
 - 9.4.1. Describe General knowledge of function, and operation of transformers.
- 9.5. Fiber Optics
 - 9.5.1. Describe General knowledge of fiber optics.
- 9.6. Storage Devices: expand to include knowledge function and dangers.
 - 9.6.1. Battery
 - 9.6.1.1. Describe types and purposes of batteries used in the turbine.
 - 9.6.1.2. Describe danger associated with batteries.
 - 9.6.1.3. Identify different types of batteries.
 - 9.6.1.4. Describe isolation of battery system (LOTO).
 - 9.6.2. UPS (Uninterrupted Power Supply)
 - 9.6.2.1. Describe types and purposes of UPS used in the turbine.
 - 9.6.2.2. Describe danger associated with UPS.
 - 9.6.2.3. Describe isolation of UPS.
 - 9.6.3. Capacitor Banks
 - 9.6.3.1. Describe types and purposes of Capacitor Banks used in the turbine.
 - 9.6.3.2. Describe danger associated with Capacitor Banks.