



Wind Turbine Technician Occupational Standards



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About the Electricity Sector Council

Approximately 100,000 Canadians are involved in the generation, transmission and distribution of one of our country's essential utilities: electricity. Their work powers homes and businesses across the country, fuelling everything from light bulbs, cell phones and refrigerators to water treatment plants and road vehicle assembly lines.

The Electricity Sector Council provides support to this dedicated team by working with industry employers and other stakeholders to research and resolve human resource and workplace development issues.

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Wind Turbine Technician Occupational Analysis Profile

Disclaimer: Please note that some of the tasks detailed in this document will require the services of a registered tradesperson depending upon the province of work. Provincial regulations change from time to time, employers and employees should consult your provincial appropriate licensing authority for clarification regarding which tasks may be affected. It is the responsibility of the individual employer/employee to ensure they act within the regulation for their jurisdiction.

A Ensure Workplace Safety	A.1	A.2	A.3	A.4	A.5	A.6
	Maintain certification and training	Follow lock-out and tag-out procedures for all systems	Follow all relevant manufacturer's policies and procedures	Follow all legislated safety standards	Use personal protective equipment	Maintain safety systems
	A.7	A.8	A.9	A.10	A.11	A.12
	Perform a high angle rescue	Hold regular safety meetings	Initiate emergency response plan	Develop a job safety analysis (JSA)	Follow MSDS and WHMIS guidelines	Verify test equipment
B Maintain Wind Turbine Systems and Equipment	B.1	B.2	B.3	B.4	B.5	B.6
	Perform scheduled and preventative maintenance	Disassemble/assemble wind turbine/ components for maintenance	Commission and start-up wind turbines	Work in confined spaces or heights	Rig to move equipment	Maintain meteorological towers and equipment
	B.7	B.8	B.9	B.10		
	Utilize SCADA system	Monitor condition-based monitoring system	Monitor lubrication	Monitor wind turbine controller		

C	Apply Troubleshooting Techniques	C.1	C.2	C.3				
		Analyze failure symptoms	Diagnose fault	Select troubleshooting techniques				
D	Repair Mechanical and Hydraulic Equipment	D.1	D.2	D.3	D.4	D.5	D.6	
		Apply mechanical skills/techniques in servicing equipment	Inspect and replace/repair seals and gaskets	Repair and maintain pitch systems	Repair mechanical power transmission systems	Inspect and replace bearings	Inspect and replace/repair brake systems	
		D.7	D.8	D.9	D.10	D.11		
		Use precision measurement tools	Maintain man-lifts or climb assist	Use power tools	Use hand tools	Install retrofits as per manufacturer's specifications		
E	Repair Electrical Equipment	E.1	E.2	E.3	E.4			
		Repair/replace electrical devices	Repair/replace electrical conductors and cables	Inspect and replace motors	Inspect and service generators			

F Develop Personal Competencies

F.1	F.2	F.3	F.4	F.5	F.6
Use communication technology	Speak effectively	Listen to understand	Complete reports	Keep logs up to date	Read industry related material
F.7	F.8	F.9	F.10	F.11	F.12
Communicate with customers/stakeholders	Communicate with supervisor and other workers	Display interpersonal skills	Develop and maintain skills	Adhere to principles of confidentiality	Ship and receive parts and inventory
F.13	F.14	F.15	F.16	F.17	F.18
Take responsibility for own actions and decisions	Manage time and resources	Work as a member of a team	Maintain physical and mental health	Use workplace hardware and software	Make decisions

Wind Turbine Technician Occupational Standards

Area of Competence A: Ensure Workplace Safety

Task A.1: Maintain certification and training

Sub-tasks:	Supporting Knowledge and Abilities:
a) Establish mandatory training and proper certification requirements	<ul style="list-style-type: none"> E.g., CPR, first aid, high-angle rescue, repelling, descent training, WHMIS
b) Schedule retraining and certification	<ul style="list-style-type: none"> E.g., yearly, bi-yearly
c) Obtain training and certification	

Task A.2: Follow lock-out and tag-out procedures for all systems

Sub-tasks:	Supporting Knowledge and Abilities:
a) Refer to company and manufacturer policies and procedures for lock-out and tag-out	
b) Ensure all on-site personnel are properly trained and using the procedures	

Task A.3: Follow all relevant manufacturer’s policies and procedures

Sub-tasks:	Supporting Knowledge and Abilities:
a) Be aware of manufacturer’s and site policies and procedures	
b) Update health and safety manuals	<ul style="list-style-type: none"> • E.g., MSDS, WHMIS

Task A.4: Follow all legislated safety standards

Sub-tasks:	Supporting Knowledge and Abilities:
a) Establish Health and Safety committee	
b) Conduct periodic inspections	<ul style="list-style-type: none"> • Publish and circulate inspection minutes to union and management for review
c) Comply with all company, provincial and federal safety requirements	<ul style="list-style-type: none"> • E.g., OHS, Workers’ Compensation Board/ WSIB

Task A.5: Use personal protective equipment

Sub-tasks:	Supporting Knowledge and Abilities:
a) Select proper PPE for job	<ul style="list-style-type: none"> • Types of PPE include: safety glasses, gloves, fall protection equipment, steel-toed boots,
b) Ensure PPE is properly fitted and adjusted	
c) Replace any defective PPE	

Task A.6: Maintain safety systems

Sub-tasks:	Supporting Knowledge and Abilities:
a) Maintain emergency stops, turbine equipment safety systems, moving part guards	<ul style="list-style-type: none"> • Periodically inspect circuitry for e-stops • Test turbine equipment safety systems • Visually inspect moving part guards
b) Maintain proper lines of communication between crews	<ul style="list-style-type: none"> • E.g., communication between crews on the ground and in the turbines

Task A.7: Perform a high angle rescue

Sub-tasks:	Supporting Knowledge and Abilities:
a) Maintain certification	<ul style="list-style-type: none"> • Regularly perform on-site training exercises
b) Inspect and replace equipment required for high angle rescue	<ul style="list-style-type: none"> • Periodically inspect and verify that all needed safety equipment is contained in high angle rescue kit
c) Store high angle rescue kit in designated location	<ul style="list-style-type: none"> • Clearly mark location of equipment
d) Ensure other first-responders are certified in high angle rescue	<ul style="list-style-type: none"> • E.g., EMS, fire department

Task A.8: Hold regular safety meetings

Sub-tasks:	Supporting Knowledge and Abilities:
a) Follow company policy and procedures	
b) Record minutes for each safety meetings	<ul style="list-style-type: none"> • Make minutes publicly available within the company
c) Report any incidents or near-misses	
d) Report any suggestions that promote safety	
e) Appoint a safety representative for site	

Task A.9: Initiate emergency response plan

Sub-tasks:	Supporting Knowledge and Abilities:
a) Develop a plan in conjunction with local emergency response services	<ul style="list-style-type: none"> • E.g., fire departments, EMS
b) Complete regular mock training drills to test efficiency of plan	
c) Continually review and improve emergency response plan	

Task A.10: Develop a job safety analysis (JSA)

Sub-tasks:	Supporting Knowledge and Abilities:
a) Determine risks associated with a particular task	<ul style="list-style-type: none"> • Base JSA on company policies and procedures
b) Warrant a risk factor to the task	
c) Use risk factor to determine actions	
d) Make decision regarding work based on JSA	

Task A.11: Follow MSDS and WHMIS guidelines

Sub-tasks:	Supporting Knowledge and Abilities:
a) Before using any hazardous substance, refer to MSDS/WHMIS sheets	<ul style="list-style-type: none"> • E.g., for PPE requirements, emergency procedures, incompatible materials
b) Maintain proper certification	<ul style="list-style-type: none"> • E.g., yearly certification
c) Update MSDS book/WHMIS guidelines regularly	<ul style="list-style-type: none"> • When updates and revisions are made

Task A.12: Verify test equipment

Sub-tasks:	Supporting Knowledge and Abilities:
a) Check hot circuit	<ul style="list-style-type: none"> • To ensure meter is working correctly
b) Check cold circuit	<ul style="list-style-type: none"> • To ensure that circuit is connected
c) Check hot circuit	<ul style="list-style-type: none"> • To re-verify correct operation of meter

Area of Competence B: Maintain Wind Turbine Systems and Equipment

Task B.1: Perform scheduled and preventative maintenance

Subtasks:	Supporting knowledge and abilities:
a) Consult with management and service personnel to schedule maintenance, as required	<ul style="list-style-type: none"> • Resolve any scheduling conflicts • Determine schedule priorities according to company procedures considering production needs, output and critical equipment • Develop maintenance schedule that: <ul style="list-style-type: none"> ○ Has minimal disruption to the production process ○ Is sufficiently flexible to include fall back plans
b) Organize and gather service toolkit	<ul style="list-style-type: none"> • Gather all required tools • Refer to service manual for all necessary service parts needed for each service (e.g., filters, greases)
c) Complete required service	<ul style="list-style-type: none"> • Follow service steps as outlined in manufacturer's manual (e.g., inspect and service cooling and heating systems, electrical sensors, hydraulics)
d) Manage spare parts	<ul style="list-style-type: none"> • Use a systematic approach or computer software in managing spare parts • Organize storage of spare parts for easy accessibility, safety, and protection from damages • Recognize spare parts from manufacturer's manuals
e) Complete final service documentation	<ul style="list-style-type: none"> • Fill out any and all necessary forms for service being completed

Task B.2: Disassemble/assemble wind turbine/components for maintenance

Subtasks:	Supporting knowledge and abilities:
a) Review related policies and procedures	<ul style="list-style-type: none"> • Perform preparatory work in a manner that ensures safety • Identify and develop any unique procedures required • Communicate related tasks to all workers involved • Wear appropriate personal protective equipment as per company procedures • Lock out/tag out required components by: <ul style="list-style-type: none"> ○ Isolating circuits ○ Disconnecting linkages ○ De-energizing all stored energy devices ○ Installing locking pins, fixtures, rotor locks • Rope off site
b) Conduct crane operations for assembling/removing equipment, components	<ul style="list-style-type: none"> • Refer to delegated team leader during operations • Comply with rigging techniques • Use hand signals and/or radios to communicate with crane or forklift operators, and other team members • Follow procedures in handling fragile and/or unbalanced loads • Adhere to safety precautions at all times
c) Reassemble and secure components that have been replaced	<ul style="list-style-type: none"> • Wear personal protective equipment • Use correct tools as per manufacturer's instructions • Reassemble all sub-systems of main component (e.g., wiring, oil hoses, grease cartridges) • Alignment of component • Clear all faults in controller • Test turbine for any problems • Crane down all component replacement tools/equipment • Clean components using approved cleaning materials, techniques and solvent as per company and manufacturer's standards

	<ul style="list-style-type: none">• Record and report all replaced components in accordance with company procedures
d) Commission and start-up turbine	<ul style="list-style-type: none">• Follow commissioning process as per manufacturer's procedures• Test all component parts and systems to ensure correct operation• Check oil and fluid levels• Lubricate systems• Start turbine to initiate processes• Check for faults• Fill out all necessary paperwork and punch lists

Task B.3: Commission and start-up wind turbines

Sub-tasks:	Supporting Knowledge and Abilities:
a) Assist manufacturer in the commissioning process for new turbine	<ul style="list-style-type: none"> • Complete diagnostic checks on all turbine systems • Conduct tail-gate meeting prior to commencement of work • Gather applicable manuals, tools, and material • Ensure all lubrication/cooling systems working and at appropriate levels • Test run turbine • Wear appropriate personal protective equipment as per legislation and company procedures • Assist in closing-off work area • Fill out all required documentation
b) Commission non-warranty, refurbished wind turbine	<ul style="list-style-type: none"> • Conduct tail-gate meeting prior to commencement of work • Complete diagnostic checks on all turbine systems • Ensure all lubrication/cooling systems working and at appropriate levels • Test run turbine • Follow all work instructions for installing refurbished components • Lead sub-trades and sub-contractors (e.g., cranes, personnel) • Perform preparatory work in a manner that fosters team work • Gather applicable manuals, tools, and material • Wear appropriate personal protective equipment as per legislation and company procedures • Assist in closing-off work area

<p>c) Assist in the assembly of wind turbines</p>	<ul style="list-style-type: none"> • Conduct tail-gate meeting to ensure all workers are aware of activity • Use correct tools as per manufacturer's instructions • Identify various major components of the wind turbine and their inter-connections: <ul style="list-style-type: none"> ○ Rotor, hub, and blades ○ Pitch drives ○ Tower sections ○ Nacelle • Assemble/Assist in assembling wind turbines following manufacturer's procedures, ensuring no damage to system and components • Use hand signals to communicate with crane or forklift operators, and other team members • Follow procedures in handling fragile and/or unbalanced loads • Follow procedures in working in heights and confined spaces • Comply with rigging techniques • Adhere to safety precautions at all times
<p>d) Complete installation project</p>	<ul style="list-style-type: none"> • Complete assigned tasks efficiently • Contribute to the testing of the system • Clean all work areas • Return all tools, equipment, and spare components following company procedures • Document all defective components • Document all aspects of the process

Task B.4: Work in confined spaces or heights

Subtasks:	Supporting knowledge and abilities:
a) Prepare for work in confined spaces or heights	<ul style="list-style-type: none"> • Identify the hazards of working in confined spaces and heights, including: <ul style="list-style-type: none"> ○ Gases ○ Fire ○ Stored energy (e.g., accumulators, capacitors) ○ Multiple power sources • Use proper personal protective clothing and equipment for various hazardous situations • Gather all necessary tools and parts for the particular task before entering a confined space or height for efficient operation
b) Review emergency procedures	<ul style="list-style-type: none"> • Adhere to the following procedures in case of emergency: <ul style="list-style-type: none"> ○ Occupational Health and Safety Act ○ Legislation/regulation ○ Company policy • Document all incidents according to legislation, manufacturer and company procedures

Task B.5: Rig to move equipment

Sub-tasks:	Supporting Knowledge and Abilities:
a) Determine the weight of equipment to be moved	<ul style="list-style-type: none"> • Determine correct rigging needed • Inspect all rigging to be used for defects (e.g., tears, stretching, safety pins, cracking, deformation, broken welds)
b) Install rigging on equipment	<ul style="list-style-type: none"> • Be aware of proper lift points, center of gravity, pre-alignments • Ensure rigging is installed correctly
c) Lift equipment	<ul style="list-style-type: none"> • Follow all safety procedures for lifting • Designate lift coordinator(s)

Task B.6: Maintain meteorological towers and equipment

Sub-tasks:	Supporting Knowledge and Abilities:
a) Check guy wires, if equipped	<ul style="list-style-type: none"> • Refer to safety procedures
b) Replace wind instruments	<ul style="list-style-type: none"> • Refer to safety procedures
c) Raise and lower tower	<ul style="list-style-type: none"> • As per manufacturer's procedures
d) Collect data	
e) Inspect power supply system	

Task B.7: Utilize SCADA system

Sub-tasks:	Supporting Knowledge and Abilities:
a) Collect data to troubleshoot faults	<ul style="list-style-type: none"> • E.g., temperature, wind speed, power, voltage, barometric pressure
b) Use data to develop turbine performance reports	<ul style="list-style-type: none"> • E.g., plot or graph power curves versus wind speed
c) Upload software	<ul style="list-style-type: none"> • E.g., change parameters
d) Use system to start and stop turbines	<ul style="list-style-type: none"> • E.g., planned power outage and icy conditions

Task B.8: Monitor condition-based monitoring system

Subtasks:	Supporting knowledge and abilities:
a) Monitor alarms	<ul style="list-style-type: none"> • E.g., vibration, over-speed, temperature, pressure alarms
b) Collect data	
c) Send data to specialist	<ul style="list-style-type: none"> • E.g., vibration analyzer
d) Act on recommendations from specialist report	

Task B.9: Monitor lubrication

Subtasks:	Supporting knowledge and abilities:
a) Extract oil sample	<ul style="list-style-type: none"> • Inspect system components • Follow manufacturer's specified sampling method
b) Evaluate oil sample analysis	<ul style="list-style-type: none"> • Interpret analysis results following manufacturer's specifications
c) Take corrective action or make recommendations for remedial actions	<ul style="list-style-type: none"> • Make necessary corrections when the action is: <ul style="list-style-type: none"> ○ Within company procedures, and ○ In compliance with manufacturer's specifications • Communicate and report test results and/or actions taken in accordance with company procedures • Make recommendations for remedial actions if necessary

Task B.10: Monitor wind turbine controller

Sub-tasks:	Supporting Knowledge and Abilities:
a) Monitor sensors and sensor data	<ul style="list-style-type: none"> • Monitor wind velocity data from anemometer(s) • Monitor wind direction from a wind vane • Monitor temperatures of various system components from thermocouple sensors
b) Check electrical and communication systems	<ul style="list-style-type: none"> • Check voltage, current, and energy produced • Assess power quality characteristics • Check wind turbine power performance relating to the wind speed recording • Check the operation of the communications system that allows the SCADA to record data for performance reporting • Check alarm systems for wind turbine operation such as fire, temperature
c) Report and distribute controller information	<ul style="list-style-type: none"> • Record controller console information: <ul style="list-style-type: none"> ○ In accordance with company and legislation requirements ○ In the required format ○ Filing the information within scheduled timeframe • Distribute information following company procedures • Store and manage controller console data in accordance with company requirements

Area of Competence C: Apply Troubleshooting Techniques

Task C.1: Analyze failure symptoms

Subtasks:	Supporting knowledge and abilities:
a) Obtain fault description	<ul style="list-style-type: none"> • Collect all data from SCADA error response logs, log books
b) Assess root cause	<ul style="list-style-type: none"> • Reproduce the symptoms: <ul style="list-style-type: none"> ○ Follow safety precautions ○ Follow equipment operation procedures ○ Ensure there is no damage to components of equipment • Analyze symptoms and contributing factors • Isolate the source of the problem • Narrow down symptoms to the root cause

Task C.2: Diagnose fault

Subtasks:	Supporting knowledge and abilities:
a) Retrieve fault data from SCADA system	
b) Refer to manufacturer's alarm/log book	<ul style="list-style-type: none"> • Locate appropriate troubleshooting tables from manuals, schematics, ladder logic • Ensure document is current edition
c) Follow procedure	<ul style="list-style-type: none"> • List all possible causes of trouble during diagnosis and testing • Follow troubleshooting flowcharts • Check list against troubleshooting charts for the causes

Task C.3: Select troubleshooting techniques

Subtasks:	Supporting knowledge and abilities:
a) Make decision on approaches to troubleshooting	<ul style="list-style-type: none"> • Distinguish the procedures for systemic versus intuitive troubleshooting techniques • Identify the time, urgency, technician’s skills and consequences for solving the problem • Refer to manufacturer’s suggestions
b) Apply intuitive troubleshooting techniques	<ul style="list-style-type: none"> • Recall or reference experience based on a wide selection of previous malfunctions • Compare current point of reference with previous experiences • Carry out corrective actions following all company standards and safety regulations (e.g., lock-out and tag-out electrical and mechanical components) • Restart turbine/system following company procedures and all safety precautions • Record problems in log book to assist in future diagnosis and remedy
c) Apply systemic approach in troubleshooting	<ul style="list-style-type: none"> • Consider all symptoms • Ensure safety while troubleshooting, including: <ul style="list-style-type: none"> ○ Safety of the trouble-shooter ○ Safety of equipment and components • Localize the problem by logically following each stage of the equipment • Isolate the faults • Carry out corrective actions following all company standards and safety regulations • Restart turbine/system following company procedures and all safety precautions • Record problems in log book to assist in future diagnosis and remedy • Fill out appropriate paperwork
d) Send troubleshooting data to specialist	<ul style="list-style-type: none"> • Obtain direction from specialist in regard to troubleshooting

Area of Competence D: Repair Mechanical and Hydraulic Equipment

Task D.1: Apply mechanical skills/techniques in servicing equipment

Sub-tasks:	Supporting Knowledge and Abilities:
a) Extract bolts	<ul style="list-style-type: none"> • Select appropriate tools for the conditions and types of bolt: <ul style="list-style-type: none"> ○ Wrench ○ Impact wrench ○ Torque wrench ○ Hydraulic torque station ○ Nut-splitter ○ Electrical-discharge machining • Use personal protective equipment • Use lubrications, heat treatment when appropriate • Apply appropriate leverage, minimize damage to bolts and other components • Clean work space and re-store tools
b) Repair threads	<ul style="list-style-type: none"> • Select appropriate tools • Use personal protective equipment • Select methods appropriate to the task: <ul style="list-style-type: none"> ○ Drill and tap to a bigger size ○ Dyes for bolt threads ○ Use drilling and plugging techniques ○ Use Heli-coil, Slimsert, or other commercial products • Protect work area, minimizing damage to other components • Use anti-seize compounds (e.g., Lock Tight and Never Seize), when applicable • Clean work space and re-store tools
c) Use heat application for assembling and disassembling equipment	<ul style="list-style-type: none"> • Select heat application equipment relevant to the process • Use appropriate shrink-fit procedure where required

	<ul style="list-style-type: none"> • Use personal protective equipment • Stack, load, or suspend components for heat treatment • Follow industry-standard techniques, sequence, and procedures • Inspect treated components for surface fractures, stripped/worn threads, and distortion • Recognize and report problems, changes, and/or malfunctions • Clean work space and re-store tools and materials
d) Cut and weld	<ul style="list-style-type: none"> • Select appropriate equipment and materials relevant to the process • Obtain permission and submit appropriate documentation prior to taking torches to the turbine • Use personal protective equipment • Take safety precautions in the work area (e.g., clear flammable materials from area) • When using acetylene welding/cutting, select welding tip and gas pressures that are suitable to the task in accordance with industry standards • Perform welding or cutting in accordance with industry procedures and sequence • Perform quality assurance checks and repair any imperfections • Clean work space and re-store tools and materials • Document all repairs according to company procedures

Task D.2: Inspect and replace/repair seals and gaskets

Sub-tasks:	Supporting Knowledge and Abilities:
a) Inspect seal/gasket surfaces and seal/gasket assemblies	<ul style="list-style-type: none"> • Distinguish between static and dynamic seal components • Inspect and troubleshoot the various components for evidence of corrosion, rubbing, wear or damage
b) Install seals and gaskets	<ul style="list-style-type: none"> • Ensure all sealing surfaces and gaskets are clean • Test seal/gasket performance with specifications in accordance with company procedures • Install seal/gasket, using special tool, following manufacturer's recommended procedures • Apply appropriate lubrication to manufacturer's specifications where necessary • Check for leaking or overheating • Document seal/gasket replacement in accordance with company procedures

Task D.3: Repair and maintain pitch systems

Sub-tasks:	Supporting Knowledge and Abilities:
a) Ensure safe work area	<ul style="list-style-type: none"> • Ensure area is free of people/obstruction prior to commencing work
b) Ensure fluid levels are accurate	
c) Complete tests throughout system	<ul style="list-style-type: none"> • As per manufacturer's specifications
d) Fix and replace any leaking components	<ul style="list-style-type: none"> • E.g., hoses and seals
e) Lubricate blade bearings	<ul style="list-style-type: none"> • As per manufacturer's specifications
f) Ensure all safety devices/valves are in proper working order	
g) Ensure system is clean following repairs	

Task D.4: Repair mechanical power transmission systems

Sub-tasks:	Supporting Knowledge and Abilities:
a) Service shafts and couplings	<ul style="list-style-type: none"> • Check system for excessive noise, vibration, low fluid levels, lubrication, excess wear, and damage • Shut down and isolate system (electrical and mechanical) following safety and company procedures • Remove shafts or couplings being serviced following manufacturer's procedures and without damage to the rest of the system • Replace damaged components, keys, and locking devices • Perform shaft alignment using conventional alignment tools or laser, making sure the axial and radial alignment tolerance is in compliance with manufacturer's specifications • Ensure shaft or coupling hub run-out, shim thickness and size meet specifications • Reinstall shafts or couplings following manufacturer's procedures • Check shafts or couplings for normal operation • Inspect all dampeners for cracking/damage • Be aware of balance issues for couplings
b) Service gearboxes	<ul style="list-style-type: none"> • Interpret the information on gearbox nameplate • Check for problems such as: non-conforming components, leaks, wear and damage, vibration, temperature, excessive noise, excessive backlash, meshing and undue movement of components • Shut down and isolate system (electrical and mechanical) following safety and company procedures • Repair gearbox, if possible • Replace damaged or substandard components • Reinstall gearbox following manufacturer's procedures • Check gearbox for compliance with operational requirement and manufacturer's specifications

	<ul style="list-style-type: none"> • Check oil filter magnets for metal debris • Refer to oil analysis • Check for oil flow throughout lubrication system • Check pressures, off-line filters • Complete and process gearbox records (e.g., pictures, vibration analysis, gear lashing measurements)
c) Re-commission the system	<ul style="list-style-type: none"> • Ensure all protective guards and systems are in place and functional • Ensure all bolts are torqued according to specifications • Confirm that all sub-systems related to mechanical power transmission system are operational • Inspect for leaks in gaskets and seals • Clean work spaces, store all tools, parts and material, and dispose of all waste following Health and Occupational Safety Act and company procedures • Document and report repairs

Task D.5: Inspect and replace bearings

Sub-tasks:	Supporting Knowledge and Abilities:
a) Inspect bearings	<ul style="list-style-type: none"> • Consider: <ul style="list-style-type: none"> ○ Age ○ Operating temperature ○ Excessive vibration ○ Unusual noise • Visually inspect for wear pattern and damage • Select appropriate tools • Remove cover following company procedures and taking all necessary safety precautions • Ensure bearings are clean • Perform detailed inspections, looking for: <ul style="list-style-type: none"> ○ Fractures ○ Significant spalls ○ Pitting ○ Discolouring • Determine action required: <ul style="list-style-type: none"> ○ Adjustments ○ Repair ○ Replacement
b) Install new bearings	<ul style="list-style-type: none"> • Install bearings, using special tool, following manufacturer's recommended procedures • Apply appropriate lubrication to manufacturer's specifications where necessary • Document bearings replacement in accordance with company procedures

Task D.6: Inspect and replace/repair brake systems

Sub-tasks:	Supporting Knowledge and Abilities:
a) Inspect brake system	<ul style="list-style-type: none"> • Isolate system and ensure safety of people and equipment • Check system for fluid leaks, incorrect fluid levels, leaking seals, worn or damaged components, brake pads, check high-speed rotor for discoloration, improper alignment of pads, following manufacturer's manual and safety procedures
b) Dismantle and repair brake system	<ul style="list-style-type: none"> • Select appropriate tools • Ensure main rotor is locked (e.g., rotor pins in place) • Dismantle brake system following manufacturer's manual and safety procedures • Replace worn brake lining in accordance with service information • Replace other defective and worn components: valves, cylinders, callipers, etc., in accordance with service information • Adjust air gap following manufacturer's procedures • Perform all necessary adjustments following manufacturer's procedures • Test brake system to ensure it meets operational requirements • Return all tools and dispose of all waste according to legislation and company procedures • Document and process all necessary reports

Task D.7: Use precision measurement tools

Sub-tasks:	Supporting Knowledge and Abilities:
a) Prior to use, ensure tools are calibrated in spec.	<ul style="list-style-type: none"> • If out of tolerance, do not use tools
b) Refer to manufacturer's specifications for use	
c) Handle with care	

Task D.8: Maintain man-lifts or climb assist

Sub-tasks:	Supporting Knowledge and Abilities:
a) Follow manufacturer's recommendations for preventative maintenance	
b) Inspect regularly	<ul style="list-style-type: none"> • Check: cables for fray, brake assembly, guides, cable tensioning, abnormal motor noises

Task D.9: Use power tools

Sub-tasks:	Supporting Knowledge and Abilities:
a) Wear appropriate personal protective equipment	<ul style="list-style-type: none"> • E.g., gloves, goggles
b) Select appropriate tool for the job	
c) Inspect tool prior to use	<ul style="list-style-type: none"> • E.g., check electrical cords for frays and damage • Dispose or tag-out of service defective tools • Ensure guards are present • Ensure tools are correctly calibrated (e.g., High Torque, torque machines)
d) Ensure proper torquing	<ul style="list-style-type: none"> • Ensure tools are correctly calibrated and torqued (e.g., high torque, torque machines)
e) Use tool as intended	<ul style="list-style-type: none"> • Refer to manufacturer's specifications

Task D.10: Use hand tools

Sub-tasks:	Supporting Knowledge and Abilities:
a) Wear appropriate personal protective equipment	<ul style="list-style-type: none"> • E.g., gloves, goggles
b) Select appropriate tool for the job	
c) Inspect tool prior to use	<ul style="list-style-type: none"> • Dispose or tag-out of service defective tools • E.g., check calibration to torque wrenches
d) Use tool as intended	<ul style="list-style-type: none"> • Refer to manufacturer's specifications

Task D.11: Install retrofits as per manufacturer's specifications

Sub-tasks:	Supporting Knowledge and Abilities:
a) Follow work instructions for retrofit	• As provided by manufacturer
b) Install retrofits required	

Area of Competence E: Repair Electrical Equipment

Task E.1: Repair/replace electrical devices

Sub-tasks:	Supporting Knowledge and Abilities:
a) Isolate/de-energize power source from device	<ul style="list-style-type: none"> • Use proper tools and equipment • Conduct circuit testing (e.g., hot/cold/hot test)
b) Conduct voltage test to confirm isolation of device	<ul style="list-style-type: none"> • Use proper tools and equipment (e.g., amp-meter, voltage meter)
c) Remove defective component	<ul style="list-style-type: none"> • Use proper tools • Verify that component is defective
d) Install new component	<ul style="list-style-type: none"> • Ensure replacement part is the correct model and specification • Use proper tools
e) Reconnect all electrical connections	
f) Remove isolation and re-energize system	
g) Conduct voltage test to confirm proper working order	
h) Test new device	<ul style="list-style-type: none"> • Test device to ensure proper operation according to manufacturer's specifications • Return all tools and testing instruments • Complete and process all required documentation following company procedures, including tag-out of defective components

Task E.2: Repair/replace electrical conductors and cables

Sub-tasks:	Supporting Knowledge and Abilities:
a) Inspect conductors and cables	<ul style="list-style-type: none"> • Follow all safety and company procedures • Isolate the conductors and cables electrically • Perform lock-out and tag-out on system • Request the help of specialist staff in the case of inspection of live line • Use appropriate tools and testing instruments • Identify conductor types from manual diagrams and physical components
b) Check for defects in conductors and cables	<ul style="list-style-type: none"> • Check conductors for: <ul style="list-style-type: none"> ○ Poor splices ○ Broken strands ○ Corrosion ○ Discoloration ○ Vibration ○ Breaks in outer insulation of cables ○ Blistering ○ Poor connection in terminal • Check insulators for: <ul style="list-style-type: none"> ○ Corrosion of metal parts ○ Deterioration of rubberized material ○ Wear of attachment points

c) Repair conductors and cables

- Repair all defects following all safety and manufacturer's specifications
- Report defects that require professional service in accordance with company procedures
- Tighten and secure all terminations in accordance to manufacturer's specifications
- Clean system and worksite, dispose of waste in accordance with legislation
- Return all tools and testing instruments
- Complete and process all required documentation following company procedures

Task E.3: Inspect and replace motors

Sub-tasks:	Supporting Knowledge and Abilities:
a) Identify defective motors	<ul style="list-style-type: none"> • Recognize type of motors such as: Split-phase, Synchronous, Three-phase induction, DC, and variable speed • Isolate motor from other circuits and systems • Follow safety and company procedures, • Use appropriate tools and testing instruments • Inspect motor for excessive noise, broken frame, tight or frozen shaft, and burned lead wires • Check mechanical coupling • Use megger and induction meter to check for proper insulation between windings and frame • Compare motor functions with specifications from manuals
b) Replace motors	<ul style="list-style-type: none"> • Following manufacturer's procedures • Disconnect electrical connections • Decouple and dismount motor • Fit new motor • Reconnect electrical connections • Complete alignments, if necessary
c) Test motor and report replacement	<ul style="list-style-type: none"> • Remove all lock-out and tag-outs before testing motor • Utilize testing equipment safely (e.g, volt meter) • Energize motor following all safety and company procedures • Check rotation of the motor • Reconnect any guards and associated sensors • Clean system and worksite, dispose of waste in accordance with legislation • Return all tools and testing instruments • Complete and process all required documentation following company procedures

Task E.4: Inspect and service generators

Sub-tasks:	Supporting Knowledge and Abilities:
a) Take turbine out of use	<ul style="list-style-type: none"> • Lock rotor • Lock and tag-out disconnects
b) Inspect generator	<ul style="list-style-type: none"> • Follow manufacturer's specifications • Thoroughly inspect for: short-to-ground and open-windings on the stator and rotor using a megger and induction meter • Check stator for loose, frayed or burned windings • Compare windings resistance with values from manufacturer's manuals
c) Prepare to replace generator	<ul style="list-style-type: none"> • Refer to work instructions for preparation for replacement • Follow all safety and company procedures • Use appropriate tools • Dismantle generator using appropriate hoist and rigging, and other equipment to prevent injury to people and damage to the system • Mark and identify all wire and components for reinstallation
d) Test generators	<ul style="list-style-type: none"> • Test generator with on load and off load following all safety, company, and manufacturer's procedures • Ensure proper generator alignment • Reinstall generator and sub-systems as per manufacturer's work instructions • Ensure the generator performance meets specifications and operational requirements • Clean system and worksite, dispose of waste in accordance with legislation • Return all tools and testing instruments • Complete and process all required documentation following company procedures

Area of Competence F: Develop Personal Competencies

Task F.1: Use communication technology

Sub-tasks:	Supporting Knowledge and Abilities:
a) Familiarize self with equipment and technology	<ul style="list-style-type: none"> • For example: <ul style="list-style-type: none"> ○ Cellular phones ○ Two-way radio ○ Fax machine ○ E-mail ○ Voiceover IP
b) Select appropriate equipment	
c) Comply with applicable standards, policies and procedures	
d) Convey message clearly and concisely	<ul style="list-style-type: none"> • E.g., use proper hand signals when communicating with crane and lift operators

Task F.2: Speak effectively

Sub-tasks:	Supporting Knowledge and Abilities:
a) Organize thoughts before speaking	
b) Keep message clear and focused	
c) Use appropriate body language	
d) Use appropriate volume and tone of voice	
e) Use appropriate language	
f) Confirm understanding	<ul style="list-style-type: none"> • Ask questions

Task F.3: Listen to understand

Sub-tasks:	Supporting Knowledge and Abilities:
a) Give speaker undivided attention	
b) Allow speaker to finish message before responding	<ul style="list-style-type: none"> • Do not interrupt speaker
c) Clarify or confirm information	<ul style="list-style-type: none"> • Validate by rephrasing
d) Ask questions in a respectful manner	<ul style="list-style-type: none"> • If message not clear or understood

Task F.4: Complete reports

Sub-tasks:	Supporting Knowledge and Abilities:
a) Write legibly and for appropriate style	<ul style="list-style-type: none"> • Use word-processing software if possible
b) Use appropriate forms and documents if applicable	
c) Use simple language	
d) Send reports to appropriate people	<ul style="list-style-type: none"> • File a copy of all reports on site.

Task F.5: Keep logs up to date

Sub-tasks:	Supporting Knowledge and Abilities:
a) Read maintenance logs prior to travelling to site	<ul style="list-style-type: none"> • E.g., to become informed of required maintenance and recorded faults
b) Complete logs in turbines	<ul style="list-style-type: none"> • E.g., to document who worked on the turbine, work completed, etc.

Task F.6: Read industry related material

Sub-tasks:	Supporting Knowledge and Abilities:
a) Read documents and materials prepared and distributed by the company	<ul style="list-style-type: none"> • E.g., paper and electronic documentation, policies and procedures
b) Read industry-specific publications	<ul style="list-style-type: none"> • E.g., magazines and periodicals specific to the wind industry

Task F.7: Communicate with customers/stakeholders

Sub-tasks:	Supporting Knowledge and Abilities:
a) Establish who you should speak with on a regular basis	<ul style="list-style-type: none"> • Consult supervisors as to responsibilities for communicating information • Establish who is/are the appropriate person(s) with whom to communicate.
b) Agree upon information to be presented	<ul style="list-style-type: none"> • Ensure clear understanding regarding quality and composition of communication and who other questions should be referred to.
c) Relay information on a regular basis.	<ul style="list-style-type: none"> • Ensure project team and stakeholders have all necessary information.

Task F.8: Communicate with supervisor and other workers

Sub-tasks:	Supporting Knowledge and Abilities:
a) Communicate with lead technician	<ul style="list-style-type: none"> • E.g., to obtain work orders for the day
b) Communicate with site manager	<ul style="list-style-type: none"> • E.g., to obtain permissions and work orders
c) Communicate with fellow technicians	<ul style="list-style-type: none"> • E.g., to coordinate work and operations

Task F.9: Display interpersonal skills

Sub-tasks:	Supporting Knowledge and Abilities:
a) Demonstrate communication skills	<ul style="list-style-type: none"> • Including: <ul style="list-style-type: none"> ○ Literacy ○ Verbal skills ○ Active listening
b) Demonstrate social skills	<ul style="list-style-type: none"> • Including: <ul style="list-style-type: none"> ○ Maintaining good eye contact ○ Using body language ○ Building rapport ○ Respecting cultural differences
c) Demonstrate emotional intelligence	<ul style="list-style-type: none"> • Including: <ul style="list-style-type: none"> ○ Being self-aware ○ Displaying emotional maturity

Task F.10: Develop and maintain skills

Sub-tasks:	Supporting Knowledge and Abilities:
a) Recognize skill areas requiring development or improvement	
b) Take part in continuous learning and skill development programs	<ul style="list-style-type: none"> • E.g., identify courses to be completed
c) Keep up-to-date with industry trends and relevant technological advancements	<ul style="list-style-type: none"> • E.g., read appropriate industry publications and materials released by the corporation

Task F.11: Adhere to principles of confidentiality

Sub-tasks:	Supporting Knowledge and Abilities:
a) Recognize materials and information that should be kept confidential	
b) Follow company policies and procedures regarding the use and distribution of confidential materials and information	<ul style="list-style-type: none"> • Ensure all team members and stakeholders adhere to company policies and procedures
c) Ensure all relevant materials and information is clearly identified as being confidential	

Task F.12: Ship and receive parts and inventory

Sub-tasks:	Supporting Knowledge and Abilities:
a) Check deliveries	<ul style="list-style-type: none">• To ensure that correct number and type of parts have been received
b) Complete sign off for deliveries	<ul style="list-style-type: none">• E.g., when shipping and receiving clerk is not available
c) Sign out parts from inventory	<ul style="list-style-type: none">• List serial numbers and quantity of parts taken from storage

Task F.13: Take responsibility for own actions and decisions

Sub-tasks:	Supporting Knowledge and Abilities:
a) Maintain personal safety	<ul style="list-style-type: none"> • Attend and participate in safety training
b) Maintain safety of others	
c) Maintain quality of work	
d) Apply due diligence	<ul style="list-style-type: none"> • Follow corporate and jurisdictional policies
e) Make informed decisions	<ul style="list-style-type: none"> • Share experiences with co-workers
f) Follow corporate codes of conduct	

Task F.14: Manage time and resources

Sub-tasks:	Supporting Knowledge and Abilities:
a) Apply time management skills	<ul style="list-style-type: none"> • Keep immediate supervisor informed of work activities and progress
b) Set priorities	
c) Delegate work, as required	<ul style="list-style-type: none"> • Respect lines of authority when delegating work activities.

Task F.15: Work as a member of a team

Sub-tasks:	Supporting Knowledge and Abilities:
a) Demonstrate accountability	<ul style="list-style-type: none"> • Report damages • Report to work on time
b) Be adaptable	<ul style="list-style-type: none"> • Demonstrate willingness to be trained
c) Respect differences	<ul style="list-style-type: none"> • E.g., in culture and work practices
d) Assist others when necessary	<ul style="list-style-type: none"> • E.g., to complete work safely and on-time

Task F.16: Maintain physical and mental health

Sub-tasks:	Supporting Knowledge and Abilities:
a) Be physically fit to perform job	<ul style="list-style-type: none"> • E.g., to maintain ability to climb • Report limiting factors to immediate supervisor
b) Maintain mental well-being	<ul style="list-style-type: none"> • Seek professional help if required • Report limiting factors to immediate supervisor
c) Recognize personal limits	<ul style="list-style-type: none"> • Seek assistance when required

Task F.17: Use workplace hardware and software

Sub-tasks:	Supporting Knowledge and Abilities:
a) Use only company authorized software and hardware	<ul style="list-style-type: none"> • Follow company policies and procedures.
b) Use software for work purposes only	
c) Request training in software and hardware	

Task F.18: Make decisions

Sub-tasks:	Supporting Knowledge and Abilities:
a) Apply training to analyze situations and answer questions	<ul style="list-style-type: none"> • Draw upon previous work and project experience • Refer to historical data
b) Gain confidence from experience	
c) Research solutions	<ul style="list-style-type: none"> • Access regulatory bodies' websites (e.g., standards, requirements, forms) for reputable research • Contact internal and external expertise
d) Make decisions based on facts	<ul style="list-style-type: none"> • Follow industry practices and common sense

