

AREA	Wind farm
POST	Operation and maintenance
TASK	G8X-G9X wind turbines

Operation/equipment	Before entry
Risks	Measures to be adopted
	ENTRY FORBIDDEN TO UNAUTHORISED PERSONNEL! Risk of falling objects, falling from heights, electrical risk, risk of trapping, etc. The installation may be entered only by personnel suitably informed of its risks, duly trained in access and working techniques and properly equipped with the obligatory PPEs. Before starting any operation in the farm, attend the SET or control building or, in its absence, report your presence to the Farm Manager/person responsible for the installation. Before entering any wind turbine, CECOER must be warned by tablet or telephone. Comply with instruction I01_GAE0704 on H&S Supervisors.
	Obligatory use of the personal protection equipment required for each task: a) Throughout the installation: ▪ Safety footwear with non-slip soles. ▪ Helmet with chinstrap fastened at all times. ▪ Long-sleeved clothing (when working inside the wind turbine, outdoor yard and electrical rooms in the sub-station). ▪ Safety goggles. ▪ Cell phone or equivalent system for communication with the outside (at least per pair). b) For work at heights: ▪ Headlamp device built into the helmet. ▪ Harness, double anchoring cable with energy absorber, anti-trauma and anti-fall device: Somain H04 or Somain H04 EVO ▪ To exit to the exterior of the nacelle, a safety cable and retractable anti-fall device must also be used. c) Safety gloves for work involving the manipulation of mechanical components, loads, tools, etc. Additional PPEs must be used in operations where so specified in the working procedures, safety sheets for chemicals and tool manuals.

Operation/Equipment	Access to the wind turbine
Risks	Measures to be adopted
Persons falling at the same level, persons falling to a different level 	Take care when entering the wind turbine, especially on days with strong wind, rain, ice or snow. Use the handrails. Take care when entering or leaving the tower, possible changes in levels or irregularities that may cause one to trip or fall. Maintain cleanliness and tidiness.
Trapping by the door 	Take care when entering the wind turbine, especially on days with strong wind. Fix the door with the catch provided to prevent untimely closures or if there is no catch, keep the door closed. Wear mechanical protection gloves. Maximum wind speed for entering and staying on ground: 25 m/s.
Trapping by or between objects	Do not start the work without first blocking the wind turbine's remote operation. All work inside and outside the turbine must be carried out with the machine stopped and its remote control disabled and blocked as per the LOTO technology communications sheet issued by Acciona.
Access by unauthorised persons	Place signage to forbid access by unauthorised persons and warn of possible risks. Do not keep the turbine door locked while persons are working inside it. Important: When leaving the turbine, the door must be locked!
Falling objects 	Before carrying out work involving hanging loads or a risk of falling objects, the area must be cordoned off and marked with a safety perimeter: ▪ Hoisting of loads, use of hoist or pulleys. ▪ Major corrective work. ▪ Exit to the outside of the nacelle, hub or blades. ▪ Work inside the hub, blades, etc.

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Blocks of ice/snow falling from the rotor and blades 	Under no circumstances must anybody ever approach a wind turbine from which pieces of ice/snow are falling, neither in a vehicle nor on foot.
Exposure to extreme environmental temperatures	In the event of exposure to high temperatures: ▪ Drink plenty of water to prevent dehydration, even if not thirsty. ▪ Use of safety sunglasses outside the wind turbine. ▪ Use light work clothing (within what the corporate uniform allows). ▪ Ventilate the work area as much as possible. ▪ Increase rotations with colleagues to carry out work with a greater physical or postural demand and with worse temperature and humidity conditions. ▪ Apply sun cream to prevent sunburn. ▪ Increase the frequency of rests. ▪ At the slightest sign of discomfort from excessive heat, stop the activity, rest and hydrate. Do not resume activity until recovered. Take great care if suffering from chronic disease such as respiratory failure, cardiovascular problems, diabetes, etc. If taking medication, ensure they do not cause side effects that enhance the harmful effects of the heat. For low temperatures: ▪ Use warm clothes for working in low temperature conditions. ▪ Avoid excessive sweating. ▪ The intake of high-energy food is recommended: Hot food and drinks help maintain body temperature. In the event of extreme temperatures plan the work to avoid the hours with the greatest exposure to high and low temperatures.
Others	In the event of an electric storm, do not enter the turbine or leave it immediately. Leave the vicinity of the wind turbine and take shelter in the vehicle or sub-station building. The tower door must not be locked closed while work is being done in the wind turbine, whether the personnel is inside or outside. When leaving the turbine, the door must be locked. Smoking is forbidden throughout the installation.

Operation/Equipment	Access to the ring
Risks	Measures to be adopted
Collisions and impacts against objects	The small size of the area prevents easy movement. Take great care to prevent impacts.
Electrical contacts	Entry to the area is forbidden while it is energised. To enter, the installation must be in outage, both the transformer and the feeder cables installed in the pit. Follow the “step by step” instruction for the technology.
Forced postures, strain	All tasks that require non-ergonomic postures for long periods or require exertion must be accompanied by rest stops to relieve the physical strain caused by the task and the use of knee pads. To reduce the duration of the task, the use of automatic/hydraulic tools is recommended whenever possible.

Operation/Equipment	Stay on ground
Risks	Measures to be adopted
Falling objects	It is forbidden to remain on the ground while work is being undertaken at higher levels or loads or tools are being handled inside the tower.
Hexafluoride poisoning	If hexafluoride leaks, open the door to ventilate the area. Since this gas is denser than air, a leak will accumulate at floor level, displacing the oxygen. Therefore do not crouch down with a hexafluoride leak but leave the area and leave the door open for ventilation.
Electrical contacts	Work with electrical risk must be carried out by authorised or qualified workers only, as per Royal Decree 614/2001 on electrical risk. Strict application of the Five Golden Rules: 1. Disconnect power sources. 2. Prevent any possible reconnection. 3. Check for the absence of power. 4. Earth and short circuit. 5. Delimit the working area. Use of personal protection equipment suitable for the voltage in tasks where required by regulations and where there is a risk of electrical contact or arcing (insulating gloves suitable for the voltage, heat protection gloves, inactinic screen, electric arc protective clothing). The equipment for electrical work must be revised as per the manufacturer’s maintenance instructions and current legislation.
Explosion (switchgear operation)	At all times respect the operating sequence as set by the manufacturer. If there is a problem, do not force the control and report the incident. Do not operate switchgear with a low hexafluoride level. Follow the set procedure for resetting switchgear.

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Fire 	Try to put out the fire with hand-held extinguishers as long as this does not cause a serious risk to persons. If the fire spreads, activate the wind farm’s Self-protection Plan. There may not be an extinguisher in these turbines. Whenever undertaking work with a risk of fire, first ensure that an extinguisher is at hand.
Trapping by the lift 	Take great care to avoid trapping by the lift. Do not enter the lift’s vertical plane at ground level and keep the area closed while the lift is moving. If it is absolutely inevitable, the lift must be blocked so that nobody can use it.
Helper: trappings and falls to a different level	The use of the helper is restricted to personnel trained in its use. Before using the helper, check the equipment has been inspected and is not damaged. If the equipment is not in good condition, block its use with a LOTO padlock and inform the Wind Farm Manager. The ascent helper system does not protect against the danger of falling, so when ascending or descending the ladder using this system, workers must also remain attached to the lifeline by the sliding fall arrester. If there are hatches in the tower platforms during ascent on the ladder, the helper must be stopped when the worker is above or below the hatch. Open the hatch, pass through it and close it again. When using the helper, keep fingers and other body parts, clothing, etc., away from the traction cables and pulleys.
Exposure to electromagnetic fields	Values are estimated between >100 µT and >5000 Vm in the following areas: switchgear, ground cabinet and transformer input area. Especially sensitive workers: pregnant workers or those with active or passive implants (pacemakers, defibrillators, insulin pumps, etc.) may experience interferences. Therefore, all sensitive or restricted personnel must be informed of these risks before entering.

Operation/Equipment	Ascending to/descending from the nacelle
Risks	Measures to be adopted
Trapping by the lift	Maximum wind speed for ascending the turbine: 20 m/s. In the event the lift is fit for service (no faults and up-to-date with the periodic maintenance), it is the preferred means of movement. The lifts must be used only by personal duly trained in the instructions for use and the standards for action in an emergency. Before using any lift, check that its revisions are up to date (see the information on the relevant label). Also check that the life line has been revised in case it has to be used. The manufacturer's prior checks must be carried out before each use. Personal protection equipment against falls from a height must be worn at all times (harness, double anchoring cable and anti-fall device). During use, also remain anchored to the anchorage point at the top of the lift. The lift's maximum load must be respected and safety devices must never be tampered with. Although the lift and ladder do not share a path, the simultaneous use of the ladder and lift is not recommended.
Persons falling to a different level	Always ascend or descend on the ladder anchored to the life line with the anti-fall device. Before ascending, check that the life line has been revised, place the anti-fall device correctly and check that the retention system functions as intended. A lifeline NOT SUITABLE FOR USE may be used only when there is a critical risk to the turbine and with the specific authorisation of the Production and QSE Department. If an unsuitable lifeline must be used, the way to ascend and descend is to use the fall arrester secured to the lifeline and always with one of the lines with a wide-opening hook tied to a safe anchor point so that you are always tied to two points. It is forbidden to release the line with the wide-opening hook until the second line is attached. Hands must be kept free for movements on ladders. Caution when ascending or descending if shoe soles are soaked in grease or oil. Platform hatches must be closed after passing through them. When disembarking on the platforms, do not release the anti-fall device until it has been secured with one of the anchoring lines. The ladder is equipped with folding landings every 9 m. Use them if you feel tired and have not reached any platform. Do not rest hanging from the anti-fall device. Ensure the landings are folded away after use.
Falling objects	Take great care to prevent objects from falling inside the tower. No work may be carried out on overlapping levels in the tower. Before starting work inside the tower, place signs at the entry door forbidding access to the ground. If it is necessary to raise or lower tools inside the tower, use closed tool bags. Do not carry loads/tools in your pockets. Use tool holding/fixing accessories.

Fire	In the event of serious fire, activate the wind farm’s Self-protection Plan and try to leave the installation as soon as possible to prevent injury from flames and asphyxiation. The lift must not be used in a fire.
Forced postures, strain	Do warm-up and stretching exercises before starting the ascent. All tasks that require non-ergonomic postures for long periods or exertion must be accompanied by rest stops to relieve the physical strain caused by the task. Wear knee pads if necessary.

Operation/Equipment	Staying/moving on intermediate platforms
Risks	Measures to be adopted
Persons falling to a different level 	It is forbidden to climb on the handrails. Personal protection equipment against falls from a height must be used wherever there is no group protection or where the protection is not in good condition.

Operation/Equipment	Stay on yaw platform
Risks	Measures to be adopted
Falling when moving from ladder to platform 	Do not release the anti-fall device from the life line until secured by the anchoring cable. In the opposite direction, do not release the anchoring line until secured to the life line with the anti-fall device. Always remain anchored to a fixed point until the hatch is closed. Do not carry tools or objects in your hands that make it difficult to hold on. Support/grip only on firm and reliable structural parts.
Impacts against objects	Take care not to impact against the nacelle access ladder when, due to the orientation of the nacelle, it is located just above us and with the yaw brake clamps.
Falling objects 	Keep objects and tools away from the ladder opening. Do not work near the opening while there are persons nearby (working or just ascending or descending in the machine). If for maintenance reasons it is necessary to work on the yaw platform or in its vicinity, install a portable tarpaulin in the central gap of the power cables. ▪ Work on the nacelle braking and turning system, and other work on the yaw platform. ▪ Major corrective work: gearbox change, generator change, axle change. ▪ Corrective work on the power train, in the area of influence of the yaw platform.

Operation/Equipment	Stay in nacelle
Risks	Measures to be adopted
Falling when passing from the yaw platform to the nacelle and vice versa. 	Take great care when moving from the platform to the nacelle and vice versa. Do not carry tools or objects in your hands that make it difficult to hold on. Support yourself only on firm and reliable structural parts. Footwear soles must not be soaked in grease or oil. Maintain cleanliness and tidiness.
Persons falling at the same level	Maintain cleanliness and tidiness. Any oil or grease stain must be removed because of the danger of slipping on it.
Collisions and impacts against objects	Take great care when moving in the nacelle since the confined space greatly increases the risk of collisions and impacts. Maintain cleanliness and tidiness and move in the nacelle with care and without haste.
Impacts and burns from explosion of gas discharges in the rear of the Top cabinet 	It is forbidden to pass behind the Top cabinet (V1-V2 and ABB models) or beneath it (V3 model) when the wind turbine is energised.

Operation/Equipment	Stay in nacelle
Risks	Measures to be adopted
Falls to a different level and falling objects: use of hoist	Before using the two hatches to use the hoist: ▪ Anchor yourself to a fixed point with the safety line. ▪ Keep tools away to prevent falling objects. ▪ Fix both hatches to prevent their unexpected closing. The hatch must remain closed at all times when the hoist is not in use.
Falls to a different level	When working on the fibre, anchor yourself to a fixed point with an anchoring line or retractable anchoring device.
Trapping in the power train	It is forbidden to remove any protective guard without first blocking the power train mechanically. Only trained personnel may block the rotor, following the instructions for the purpose. Maximum wind speed for blocking the rotor: 12 m/s. Wear mechanical safety gloves.
Inhaling or ingesting harmful substances	Cleaning the rings body and rotary joint and inspecting the gearbox involves exposure to chemical pollutants (dust particles and vapours). Open the nacelle hatches to ventilate the area, use suitable breathing protection (at least A2P2) and use suction cleaning methods.
Spraying fluids	Everyone working on the hydraulic unit must be familiar with the hydraulic distribution schematic. In order to dismantle any part of the hydraulic circuitry, the circuit must be discharged, power sources closed and blocked and check absence of pressure. Wear suitable protective gloves to prevent injuries from contact with oil on the skin and wear goggles.
Falls from outside the nacelle	Maximum wind speed for exiting of the nacelle: 12 m/s. Accessing the nacelle roof is done with a double anchoring cable with energy absorber and wide-opening hook, and a retractable anchoring device. 1. Hook the retractable anchoring device to a secure, fixed point inside the nacelle (generator lug or slow shaft). 2. The retractable cord will be connected to the harness before leaving the nacelle and will not be released until you return to it. 3. Attach yourself to the anchoring points marked in yellow on the nacelle cover using the wide-opening hooks, before completely leaving it. It is prohibited to have the two wide-opening hooks not attached to an anchoring point at the same time. Do not exit the nacelle if the surface is found to be slippery due to the presence of ice, snow or water.
Forced postures	All tasks that require adopting non-ergonomic postures for long periods must be accompanied by rest breaks to alleviate the physical effort caused by the task.
Fire	Regardless of whether the machine has an extinguisher or fire fighting system in the nacelle, it is obligatory to take an extinguisher when undertaking tasks with a risk of fire. All hot work requires a work permit. In the event of fire, try to put it out with manual extinguishing means without risking yourself at any time. If it cannot be extinguished, leave the nacelle immediately, either by the ladder (preferably) or with the emergency descender. Remember that there is a real risk of suffocation, so breathing must be as gentle as possible. Protect the mouth and nose with a cloth, T-shirt or similar.
Collisions and impacts against objects	Take great care when moving in the nacelle, move with care and without haste. Maintain cleanliness and tidiness. Maximum number of persons in the nacelle: 6
Electrical contacts	All electrical work must be carried out as per Royal Decree 614/2001 on electrical risk. See the electrical contacts preventive measures for stay on ground. These tasks include those that could enter the safety distances of live parts from outside the transformer compartment. The flexible tubes of the electrical wiring that passes through the transformer area are not considered a suitable physical barrier so the installation should be in outage if it is necessary to wire or introduce metal elements in these conduits.

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Operation/Equipment	Stay in nacelle
Risks	Measures to be adopted
Falls to a different level: emergency evacuation 	There is a solid anchoring point in the nacelle for fitting the descender if evacuation is necessary. This point is next to the hoist and the evacuation must be carried out through the lower hoist hatch. If this point does not exist, attach it to the hoist beam. The descender must be installed with the hoist hatch closed; open it only when the descender has been fully assembled. Resecure the descender with an EN 795 anchoring element to the generator lug or to the hoist beam.

Operation/Equipment	Lifting loads with the hoist
Risks	Measures to be adopted
Falling objects  	The maximum wind speed for using the hoist is set in the Acciona wind farm regulations. Before using the hoist, cordon off the platform area with a safety perimeter taking the movement of the loads into account. This area must have risks signage. Before using the hoist: ▪ Check that the equipment’s revision is up to date. ▪ Check that all parts of the lifting system are in good condition (chain, motor, etc.). ▪ Carry out the manufacturer’s prior checks. ▪ It is forbidden to use it if any defect is found. The nacelle technician must not start using the hoist until the wind turbine area personnel are outside the cordoned-off area. This area may be entered only to connect or disconnect the load from the hoist hook when the load is on the ground. Use approved tool bags with closing system for lifting loads, as per local regulations, that are suitable for the size and shape of the loads. They must be in a good state of conservation with the EC mark and current revisions as set by the manufacturer. Before starting the operation, check that the loads are properly secured, correctly inserted in the tool bags with nothing protruding and without exceeding the working load limit. It is forbidden FOR ANYTHING TO PROTRUDE FROM THE BAG EVEN IF IT IS TIED DOWN. If more than one bag is used, grabs must be used. There must be only one bag per hook. The hoist operator must watch the load at all times and must not leave the controls at any time. Take great care when passing loads into the nacelle to prevent the bags from catching or tipping over. If the load does not enter correctly, stop the hoist immediately. Make as many trips as are necessary to lift loads safely. In strong wind, loads must be held with a guide rope to prevent their hitting the tower. It is forbidden to raise small loads in strong wind without an effective system for controlling them from the ground. The worker guiding the load and operating the button panel must remain outside the cordoned-off area away from any falling objects. It is forbidden to leave the area with a load hanging. It is absolutely forbidden to leave loads hanging from the hoist hook. Keep tools away from the area of the hatch to prevent falling objects.
Strains, entrapments	Make all the necessary trips to lift the load safely to avoid pulling it. Tool bags must be suitable in size and shape for the loads and for the hatch in the turbine. Grip loads firmly and with great care. Use approved elements for lifting loads. Do not place the hands on moving parts. Wear mechanical safety gloves.

Operation/Equipment	Access to hub
Risks	Measures to be adopted
Falls from heights, trapping, slipping 	Maximum wind speed for entering the hub/blades: 12 m/s. It is obligatory to block the rotor mechanically before entering the hub. Move securing yourself against falls from heights according to the safety procedure for the technology. Check that the soles of the shoes are not soaked in grease or oil. If it is necessary to carry tools, use suitable tool bags to prevent them from falling and to keep your hands free. Do not carry loads in your pockets. Use tool holding or clamping accessories. Adequate artificial lighting devices must be provided to ensure proper visibility inside the hub.
Forced postures, strain	All tasks that require non-ergonomic postures for long periods or require exertion must be accompanied by rest stops to relieve the physical strain caused by the task. To reduce the duration of the task, the use of automatic/hydraulic tools is recommended whenever possible. Make all necessary trips to introduce tools/spare parts effortlessly.
Electrical contacts	Before entering the rotor, the blades must be earthed, using Class 0 dielectric gloves and an inactinic screen.



Emergencies	In the event of an emergency evacuation, this will be done as indicated in the technology manual.
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Operation/Equipment	Stay in the transformer area
Risks	Measures to be adopted
Fire (cabling short circuit)	Try to put out the fire with hand-held extinguishers as long as this does not cause a serious risk to persons. If the fire spreads, activate the wind farm’s Self-protection Plan.
Falls to the same level	Always remain anchored to a fixed point when undertaking work on the fibre.
Electrical contacts	All electrical work must be carried out as per Royal Decree 614/2001 on electrical risk. See the electrical contacts preventive measures for stay on ground. These tasks include those that could enter the safety distances of live parts from outside the transformer compartment. The flexible tubes of the electrical wiring that passes through the transformer area are not considered a suitable physical barrier so the installation should be in outage if it is necessary to wire or introduce metal elements in these conduits.

Operation/Equipment	Access to blade interior
Risks	Measures to be adopted
Confined spaces	Access to the inside of the blade is confined space work. It is necessary to have a work permit with monitoring of the internal air quality by a continuous oxygen presence meter located inside while the work is being carried out. During access to the interior of the blade, one technician will be required in the hub and another in the nacelle. The technicians involved in the work must have training and be in possession of: ▪ A specific rescue procedure for the turbine (own, technologist's or owner's). ▪ Training to act in an emergency inside a blade and to be able to demonstrate that they have carried out a practical rescue drill in a real installation. No one who cannot justify this fact may act either as a technician accessing the inside of the blade to carry out inspections or repairs, or as a watchman in the hub, or as a support technician in the nacelle. ▪ The team members must have all the necessary equipment to be able to act in a rescue. The rescue kit will include escape equipment (EN 1146:2006 Respiratory Protective Devices. Self-contained open-circuit compressed air breathing apparatus incorporating a hood for escape) in case it is necessary to enter the interior of the blade and the quality of the air inside is not guaranteed.
Falls to the same level	Possible presence of oil or moisture. Dry the passageway before starting work.
Chemicals	The handling or application of chemicals may generate an explosive, toxic or noxious atmosphere. Check the safety data sheet of the chemical before handling it. Install a ventilation system when making chemicals that have a limit value in the safety data sheet that must be monitored. Wear gloves and respiratory protection according to the instructions in the safety data sheet.

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